



Power Systems

Site and hardware planning







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**Note**

Before using this information and the product it supports, read the information in “Notices,” on page 733, “Safety notices” on page xiii, the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

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## 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, a safety information booklet is included in the publications package shipped with the product. The booklet 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 in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the U.S. English publications.

### 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

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. (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)

**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.



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## Chapter 1. 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



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## Chapter 2. What's new in Planning for the system

Read about new or significantly changed information in Planning for the system since the previous update of this topic collection.

### October 2009

The following updates have been made to the content:

- There are new specifications for the 5877 expansion unit: 5877 expansion unit.
- There are new specifications for the 7042-CR5 desktop HMC: 7042-CR5 desktop Hardware Management Console specifications.
- There are new specifications for the 8261-E4S: Model 8203-E4A, 8261-E4S, 9407-M15, and 9408-M25 server specifications.
- New information has been added to Serial-attached SCSI cable planning.
- New information has been added to Configuring power cords.



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## Chapter 3. 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

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### 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 covers the following topics:

### 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





## Chapter 4. Server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Select the appropriate models to view the specifications for your server.

### Model 7037-A50 server and 7047-185 workstation specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

*Table 2. Rack-mounted 7037-A50 server*

Dimensions	Width	Depth	Height	EIA units <sup>1</sup>	Weight
Metric	429 mm	524 mm	218 mm	5	25 kg
English	16.9 in.	20.6 in.	8.6 in.		55 lb

*Table 3. Stand-alone 7037-A50 server*

Dimensions	Width	Depth	Height	Weight
Metric	216 mm	496 mm (without rear cover)	469 mm	25 kg
	257 mm (including stabilizer foot)	525 mm (with rear cover <sup>1</sup> )		
English	8.5 in.	19.5 in. (without rear cover)	18.5 in.	55 lb
	10.1 in. (including stabilizer foot)	20.7 in. (with rear cover <sup>1</sup> )		

<sup>1</sup>An optional acoustical cover is available for the 7037-A50 server tower that will reduce  $L_{WAd}$  and  $L_{pAm}$  approximately 0.3 B and 3 dB, respectively.

*Table 4. Stand-alone 7047-185 workstation*

Dimensions	Width	Depth	Height	Weight
Metric	216 mm	640 mm (with acoustical cover)	469 mm	25 kg
	257 mm (including stabilizer foot)			
English	8.5 in.	25.2 in. (with acoustical cover)	18.5 in.	55 lb
	10.1 in. (including stabilizer foot)			

*Table 5. Shipping dimensions*

Dimensions	Width	Depth	Height	Weight
Metric	625 mm	655 mm	485 mm	30 kg
English	24.6 in.	25.8 in.	19.1 in.	67 lb

Table 6. Shipping dimensions (China)

Dimensions	Width	Depth	Height	Weight
Metric	625 mm	655 mm	599 mm	30 kg
English	24.6 in.	25.8 in.	23.5 in.	67 lb

Table 7. Electrical

Electrical characteristics	Properties
kVA (maximum)	0.474
Rated voltage and frequency <sup>1</sup>	100 - 127/200 - 240 V ac at 50/60 plus or minus 0.5 Hz
Thermal output (maximum)	1536 BTU/hr
Maximum power consumption	530 W (1-core 7037-A50 , 1-core 7047-185, and 2-core 7047-185)
	750 W (2-core 7037-A50 )
Power factor	0.95
Inrush current (maximum)	90 A
Leakage current (maximum)	1.6 mA
Phase	1
Branch circuit breaker	20 A (maximum)

<sup>1</sup>The power supplies automatically accept any voltage with the published, rated-voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.

Table 8. Environment requirements

Environment	Temperature	
Recommended operating temperature <sup>1</sup>	5 - 35 °C (41 - 95 °F)	
Nonoperating temperature	5 - 45 °C (41 - 113 °F)	
Shipping temperature	-40 - 60 °C (-40 - 140 °F)	
	Operating	Nonoperating
Maximum dew point	28 °C (82.4 - °F)	29 °C (84.2 - °F)
Noncondensing humidity	8 - 80%	8 - 80%
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

<sup>1</sup>Class 3 product as defined in ASHRAE Thermal Guidelines for Data Processing Environments. The allowable operating range is 5 - 35 °C (41 - 95 °F). See the *Temperature and humidity design criteria* topic for more information.

Table 9. Noise emissions

Product description	Declared A-weighted sound power level, L <sub>WAd</sub> (B)		Declared A-weighted sound pressure level, L <sub>pAm</sub> (dB)	
	Operating	Idling	Operating	Idling
7047-185 1-core workstation with two 10 000 rpm hard disk drives, 2843 graphics card and 2 GB of memory (workstations have acoustical front and rear covers)	5.0	4.7	31 <sup>4</sup>	28 <sup>4</sup>
7047-185 2-core workstation with two 10 000 rpm hard disk drives, 2843 graphics card and 4GB of memory (workstations have acoustical front and rear covers)	5.1	4.9	33	31
7037-A50 1-core server tower with three 10 000 rpm hard disk drives <sup>8</sup>	5.3	5.0	38	35

Table 9. Noise emissions (continued)

Product description	Declared A-weighted sound power level, $L_{WA,d}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
7037-A50 2-core server tower with three 10 000 rpm hard disk drives <sup>8</sup>	5.8	5.6	40	39
7037-A50 1-core rack-mounted server with three 10 000 rpm hard disk drives	5.3	5.0	38 <sup>4</sup>	35 <sup>4</sup>
7037-A50 2-core server tower or rack-mounted server with three 10 000 rpm hard disk drives and 4 GB of memory	5.7	5.6	42	41
This is an estimated value.				
When a tape drive is installed, using the acoustic cover feature will reduce the noise emissions when the tape drive is in use.				
All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.				
For a description of noise emission values, see <i>Acoustics</i> .				

Table 10. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000–94, Notice 2000–72); People's Republic of China Commodity Inspection Law.



**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950–00; EN 60950; IEC 60950 including all National Differences

**Note:** See 0551, 0553, 7014, and 0555 rack configurations for typical configurations when the 0551, 0553, 7014, and 0555 rack is populated with various server models.

**Related reference:**

“0551, 0553, 0555, and 7014 rack configurations” on page 451  
 The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

-  Temperature and humidity design criteria
-  Acoustics

## ASHRAE declarations

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

These guidelines are available at *ASHRAE Technical Committee*.

Table 11. ASHRAE declarations

Description	Typical Heat Release	Airflow nominal		Airflow maximum at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Minimum configuration	300	42	71	83	141

Table 11. ASHRAE declarations (continued)

	Typical Heat Release	Airflow nominal		Airflow maximum at 35°C (95°F)	
Maximum configuration	450	42	71	83	141
Typical configuration	375	42	71	83	141
See Model 7037-A50 server and 7047-185 workstation specifications for weight and overall system dimension.					
ASHRAE Class	3				
Minimum configuration	1-core, 2.5 GHz processor, 2 GB memory, three hard disk drives, five PCI cards				
Maximum configuration	2-core, 2.5 GHz processor, 8 GB memory, three hard disk drives, six PCI cards				
Typical configuration	2-core, 2.5 GHz processor, 4 GB memory, three hard disk drives, four PCI cards				

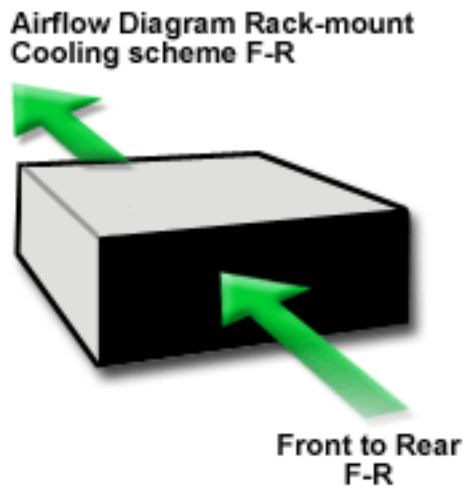


Figure 1. Airflow figure for server mounted in a rack

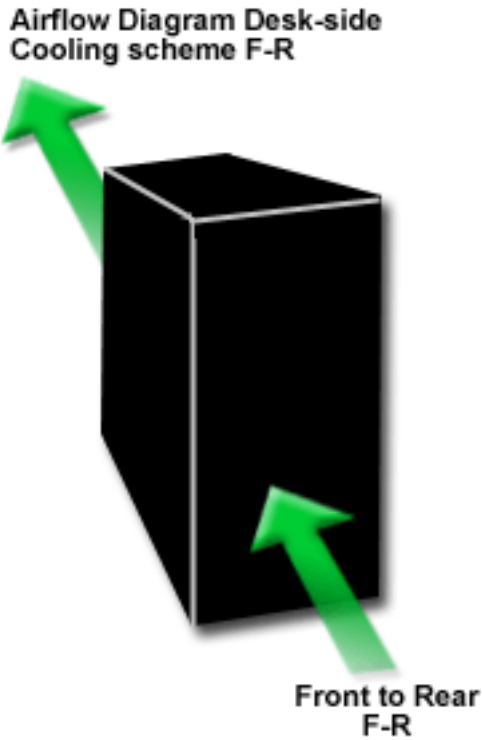


Figure 2. Airflow figure for stand-alone server

**Related information:**

[ASHRAE Technical Committee](#)  
ASHRAE guidelines are available in this website

## Model 8203-E4A, 8261-E4S, 9407-M15, and 9408-M25 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

Table 12. Dimensions - rack-mounted drawer

Width	Depth	Height	EIA units <sup>1</sup>	Weight
440 mm (17.3 in.)	538 mm (21.2 in.)	173 mm (6.81 in.)	4	34.0 kg (75 lb )

Table 13. Dimensions - stand-alone model

Width	Depth	Height	Weight
328.5 mm (12.9 in.) (with tip foot)	628 mm (24.7 in. )	540 mm (21.3 in.)	37.6 kg (83 lb)
182.3 mm (7.2 in.) (without tip foot)			

Table 14. Shipping dimensions - rack-mounted drawer

Width	Depth	Height	Weight <sup>1</sup>
610 mm (24 in.)	711 mm (28 in.)	1016 mm (40 in.)	68 - 113 kg (150 - 250 lb)
<sup>1</sup> This is an estimated value.			

Table 15. Shipping dimensions - rack-mounted drawer (China)

Width	Depth	Height	Weight <sup>1</sup>
610 mm (24 in.)	597 mm (23.5 in.)	1016 mm (40 in.)	68 - 113 kg (150 - 250 lb)
<sup>1</sup> This is an estimated value.			

Table 16. Shipping dimensions - Stand-alone model

Width	Depth	Height	Weight <sup>1</sup>
660 mm (26 in.)	737 mm (29 in.)	1016 mm (40 in.)	68 - 113 kg (150 - 250 lb)
<sup>1</sup> This is an estimated value.			

Table 17. Shipping dimensions - Stand-alone model (China)

Width	Depth	Height	Weight <sup>1</sup>
660 mm (26 in.)	622 mm (24.5 in.)	1016 mm (40 in.)	68 - 113 kg (150 - 250 lb)
<sup>1</sup> This is an estimated value.			

Table 18. Electrical

Electrical characteristics	Properties
Rated voltage and frequency <sup>1</sup>	100 - 127 V ac or 200 - 240 V ac at 50 - 60 plus or minus 3 Hz
Thermal output (maximum) <sup>2</sup>	2628 Btu/hr
Maximum power consumption <sup>2</sup>	770 W
Maximum kVA	0.794 <sup>3</sup>
Power factor	0.97
Inrush current (maximum)	80 A
Leakage current (maximum)	1.4 mA <sup>4</sup>
Phase	1
Dual power feature code	7703 (2x)
Branch circuit breaker (maximum)	20 A
Drawer mounted in 7014-T00 and 7014-T42 racks, and power distribution unit (PDU)	0278

Table 18. Electrical (continued)

Electrical characteristics	Properties
<b>Notes:</b>	
1. The power supplies automatically accept any voltage with the published, rated-voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.	
2. Power draw and heat load vary greatly by configuration. When planning for an electrical system, it is important to use maximum values. However, when planning for heat load, you can use the IBM Systems Energy Estimator to obtain a heat output estimate based on a specific configuration. See The IBM Systems Energy Estimator Web site for more information.	
3. To calculate the amperage, multiply the kVA by 1000 and divide that number by the operating voltage.	
4. Measured according to IEC 60950.	

Table 19. Environment requirements

Environment	Properties	
Operating temperature range	5 - 35°C (41 - 95°F)	
Nonoperating temperature	5 - 43°C (41 - 109°F)	
Shipping temperature	-40 - 60°C (-40 - 140°F)	
	Operating	Nonoperating
Maximum dew point	17°C (62.6°F)	27°C (80.6°F)
Noncondensing humidity	8 - 80%	8 - 80% (5 - 100% shipping)
Maximum altitude	3048 m (10 000 ft) <sup>1</sup>	3048 m (10 000 ft) <sup>2</sup>
<b>Notes:</b>		
1. The upper temperature limit should be derated 1°C for every 300 m above 900 m.		
2. The power supplies automatically accept any voltage with the published, rated-voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.		

Table 20. Noise emissions for the 8261-E4S, 8203-E4A (with 4.2 GHz processor), 9407-M15, and 9408-M25

Product description	Declared A-weighted sound power level, L <sub>Wad</sub> (B)		Declared A-weighted sound pressure level, L <sub>pAm</sub> (dB)	
	Operating	Idle	Operating	Idle
Stand-alone model 3 hard drives 1-way or 2-way processor 1 power supply With rear cover	6.1	6.1	45	44
Stand-alone model Fully configured With rear cover	6.6	6.6	49	49
Rack-mounted at 27U position 3 hard drives 2 processor books 1 power supply	6.5	6.5	51	51

Table 20. Noise emissions for the 8261-E4S, 8203-E4A (with 4.2 GHz processor), 9407-M15, and 9408-M25 (continued)

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
Rack-mounted at 27U position Fully configured	6.9	6.9	54	52
Rack-mounted at 27U position 3 hard drives 2 processor books 1 power supply With acoustic door: feature code 6248 or 6249	6.1	6.1	46	45
Rack-mounted at 27U position Fully configured With acoustic door: feature code 6248 or 6249	6.5	6.5	49	49
<b>Notes:</b>				
For a description of noise emission values, see <i>Acoustics</i> .				
All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.				

Table 21. Noise emissions for the 8203-E4A (with 4.7 GHz processor)

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle
Rack-mounted with slim line door	7	7	54	54
Rack-mounted with acoustic door	6.6	6.6	49	49
Stand-alone model	6.9	6.9	50	50
<b>Notes:</b>				
For a description of noise emission values, see <i>Acoustics</i> .				
All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.				

Table 22. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)



**Electromagnetic compatibility compliance:** FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000-94, Notice 2000-72); People's Republic of China Commodity Inspection Law.

**Safety compliance:** IEC 60950; UL 60950; CSA 60950; EN 60950

## Special Hardware Management Console considerations

When the server is managed by a Hardware Management Console (HMC), the console must be provided within the same room and within 8 m (26 ft) of the server. For additional considerations, see *Planning for consoles, interfaces, and terminals for your service environment*.

**Note:** As an alternative to the local HMC requirement, it is acceptable for you to provide a supported device, such as a PC, with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the system.

### Related reference:

“Planning for the 7014-T00 and 7014-T42 racks” on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 7014-T42, 7014-B42, and 0553 rack” on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Chapter 9, “Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack,” on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

### Related information:

 Acoustics

## 3D ASHRAE view for models 8203-E4A, 8261-E4S, 9407-M15, and 9408-M25

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

Table 23.

Description	Description Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Configuration	watts	cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Minimum	320	85	144	130	221
Typical	425	85	144	130	221
Full	683	85	144	130	221
Weight and system dimension	See “Model 8203-E4A, 8261-E4S, 9407-M15, and 9408-M25 server specifications” on page 13 for weight and system dimensions.				
ASHRAE Class	3				

Table 23. (continued)

Description	Description Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>	Airflow maximum <sup>1</sup> at 35°C (95°F)
Minimum Configuration	1-core, 4.2 GHz processor, two 1 GB memory DIMMs, two 15 k RPM hard disk drives, one PCI card, DVD, Dual 1 Gb host Ethernet adapter		
Typical Configuration	2-core, 4.7 GHz processor, four 2 GB memory DIMMs, four 15 k RPM hard disk drives, two PCI cards, DVD, Quad 1 Gb host Ethernet adapter		
Full Configuration	4-core, 4.7 GHz processor, eight 8 GB memory DIMMs, eight 15 k RPM SFF hard disk drives, four PCI cards, DVD, Dual 10 Gb host Ethernet adapter		
<b>Notes:</b> 1. Airflow includes the redundant power supplies (total of two power supplies per server). 2. The product safety rating label contains the following information: <ul style="list-style-type: none"> <li>• 100-127/200-240 V ac</li> <li>• 10/6 A   1.2 kVA</li> <li>• 50/60 Hz   1-phase</li> </ul>			

## Model 8204-E8A and 9409-M50 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

Table 24. Dimensions - rack-mounted drawer

Measurements	Width	Depth	Height	EIA units <sup>1</sup>	Weight
Metric	440 mm	730 mm	173 mm	4	48.7 kg
English	17.3 in.	28.7 in.	6.81 in.		107.4 lb
<sup>1</sup> See 0551, 0553, 7014, and 0555 rack configurations for typical configurations when the 0551, 0553, 7014, and 0555 rack is populated with various server models.					

Table 25. Dimensions - stand-alone model

Measurements	Width	Depth	Height	Weight
Metric	382.5 mm (with tip foot)	778 mm	540 mm	57.2 kg
	182.5 mm (without tip foot)			
English	12.9 in. (with tip foot)	30.6 in.	21.3 in.	117.3 lb
	7.2 in. (without tip foot)			

Table 26. Shipping dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	Weight <sup>1</sup>
Metric	610 mm	711 mm	1016 mm	68 - 113 kg
English	24 in.	28 in.	40 in.	150 - 250 lb
<sup>1</sup> This is an estimated value.				

Table 27. Shipping dimensions - Rack-mounted drawer (China)

Measurements	Width	Depth	Height	Weight <sup>1</sup>
Metric	610 mm	597 mm	1016 mm	68 - 113 kg
English	24 in.	23.5 in.	40 in.	150 - 250 lb
<sup>1</sup> This is an estimated value.				

Table 28. Shipping dimensions - Stand-alone model

Measurements	Width	Depth	Height	Weight <sup>3</sup>
Metric	660 mm	737 mm	1016 mm	68 -113 kg
English	26 in.	29 in.	40 in.	150 - 250 lb
This is an estimated value.				

Table 29. Shipping dimensions - Rack-mounted drawer (China)

Measurements	Width	Depth	Height	Weight <sup>1</sup>
Metric	660 mm	622 mm	1016 mm	68 - 113 kg
English	26 in.	24.5 in.	40 in.	150 - 250 lb
Drawer mounted in 7014-T00 and 7014-T42 racks, and Power distribution unit (PDU)			0288	
<sup>1</sup> This is an estimated value.				

Table 30. Electrical

Electrical characteristics	Properties
kVA (maximum)	1.546 kVA <sup>4</sup>
Rated voltage and frequency <sup>1</sup>	100 - 127 V ac or 200 - 240 V ac at 50/60 plus or minus 3 Hz
Thermal output (maximum) <sup>2</sup>	5120 Btu/hr
Maximum power consumption <sup>2</sup>	1500 W
Power factor	0.97
Inrush current (maximum)	90 A
Leakage current (maximum)	1.6 mA <sup>3</sup>
Phase	1
Dual power feature code	7707 (2x)
Branch circuit breaker	20 A maximum
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>The power supplies automatically accept any voltage with the published, rated-voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li> <li>Power draw and heat load vary greatly by configuration. When planning for an electrical system, it is important to use maximum values. However, when planning for heat load, you can use the IBM Systems Energy Estimator to obtain a heat output estimate based on a specific configuration. See The IBM Systems Energy Estimator Web site for more information.</li> <li>Measured according to IEC 60950.</li> <li>To calculate the amperage, multiply the kVA by 1000 and divide that number by the operating voltage.</li> </ol>	

Table 31. Environment requirements

Environment	Temperature	
Operating temperature range	5 - 35 °C (41 - 95 °F)	
Nonoperating temperature	5 - 40 °C (41 - 104 °F)	
Shipping temperature	-40 - 60 °C (-40 - 140 °F)	
	Operating	Nonoperating
Maximum dew point	17 °C (62.6 - °F)	27 °C (80.6 - °F)
Noncondensing humidity	8 - 80%	8 - 80% (5 - 100% shipping)
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

Table 32. Noise emissions

Product description	Declared A-weighted sound power level, L <sub>wad</sub> (B)		Declared A-weighted sound pressure level, L <sub>pAm</sub> (dB)	
	Operating	Idle	Operating	Idle
Rack mounted server	7.3	7.3	57	57
Rack mounted with acoustic door	6.7	6.7	51	51
Stand alone server	7.3	7.3	57	57

For a description of noise emission values, see *Acoustics*.

All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.

Table 33. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** FCC Part 15, ICES-003

**Safety compliance:** IEC 60950; UL 60950; CSA 60950; EN 60950

## Special Hardware Management Console considerations

When the server is managed by a Hardware Management Console (HMC), the console must be provided within the same room and within 8 m (26 ft) of the server. For additional considerations, see *Planning for consoles, interfaces, and terminals for your service environment*.

**Note:** As an alternative to the local HMC requirement, it is acceptable for you to provide a supported device, such as a PC, with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the system.

### Related reference:

“Planning for the 7014-T00 and 7014-T42 racks” on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 7014-T42, 7014-B42, and 0553 rack” on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Chapter 9, “Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack,” on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

“Model 0555 and 7014-S25 rack” on page 461

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

**Related information:**

 Acoustics

## Plan view for model 8204-E8A and 9409-M50

Dimensional planning information is shown in this top-down view of your server.

The following figure shows dimensional planning information for model 8204-E8A and 9409-M50 .

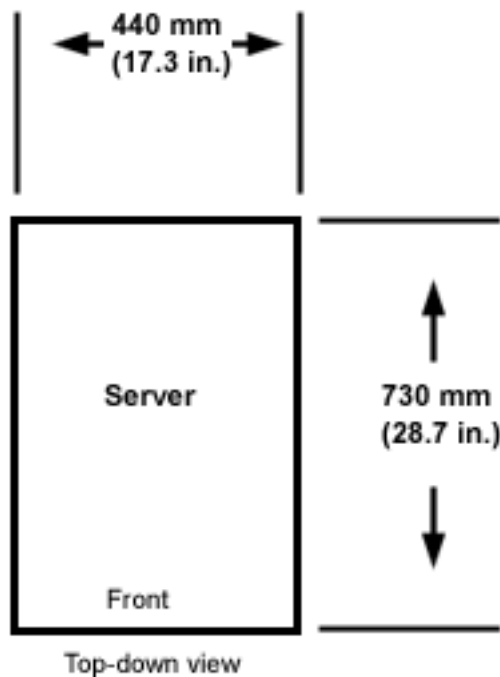


Figure 3. Model 8204-E8A and 9409-M50 plan view (rack-mount)

## 3D ASHRAE view for models 8204-E8A

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

Table 34.

Description	Description Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Configuration	watts	cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Minimum	320	85	144	130	221
Typical	425	85	144	130	221
Full	683	85	144	130	221
Weight and system dimension	See “Model 8204-E8A and 9409-M50 server specifications” on page 18 for weight and system dimensions.				
ASHRAE Class	3				
Minimum Configuration	1-core, 4.2 GHz processor, two 1 GB memory DIMMs, two 15 k RPM hard disk drives, one PCI card, DVD, Dual 1 Gb host Ethernet adapter				
Typical Configuration	2-core, 4.7 GHz processor, four 2 GB memory DIMMs, four 15 k RPM hard disk drives, two PCI cards, DVD, Quad 1 Gb host Ethernet adapter				
Full Configuration	4-core, 4.7 GHz processor, eight 8 GB memory DIMMs, eight 15 k RPM SFF hard disk drives, four PCI cards, DVD, Dual 10 Gb host ethernet adapter				
<b>Notes:</b>					
1. Airflow includes the redundant power supplies (total of two power supplies per server).					
2. The product safety rating label contains the following information:					
<ul style="list-style-type: none"> <li>• 100-127/200-240 V ac</li> <li>• 10/6 A   1.2 kVA</li> <li>• 50/60 Hz   1-phase</li> </ul>					

## Model 8234-EMA server specifications

Server specifications provide detailed information for your server, including dimensions, electrical data, power, temperature, environment requirements, and service clearances.

Use the following specifications to plan for your server.

### Rack-mounted drawer

Table 35. Rack-mounted drawer. This table provides the dimensions for the 8234-EMA server.

Width	Depth	Height	EIA units	Weight
483 mm (19 in.)	790 mm (31.1 in.)	174.1 mm (6.85 in.)	4	63.6 kg (140 lb)

### Shipping dimensions

Table 36. Shipping dimensions for a rack-mounted drawer. This table provides the shipping dimensions for the 8234-EMA rack-mounted drawer.

Width	Depth	Height	Weight
648 mm (25.5 in.)	991 mm (39 in.)	704 mm (27.7 in.)	80 kg (175 lb)

Table 37. PDU

PDU	Four-core processor system
Drawer mounted in 0551 rack, 7014-T00, 7014-T42 and 0553, 0555 racks, Power distribution unit (PDU)	0231 ( 8-core) 0232 ( 16-core)

## Electrical

Table 38. Electrical. This table provides the electrical information for the 8234-EMA server.

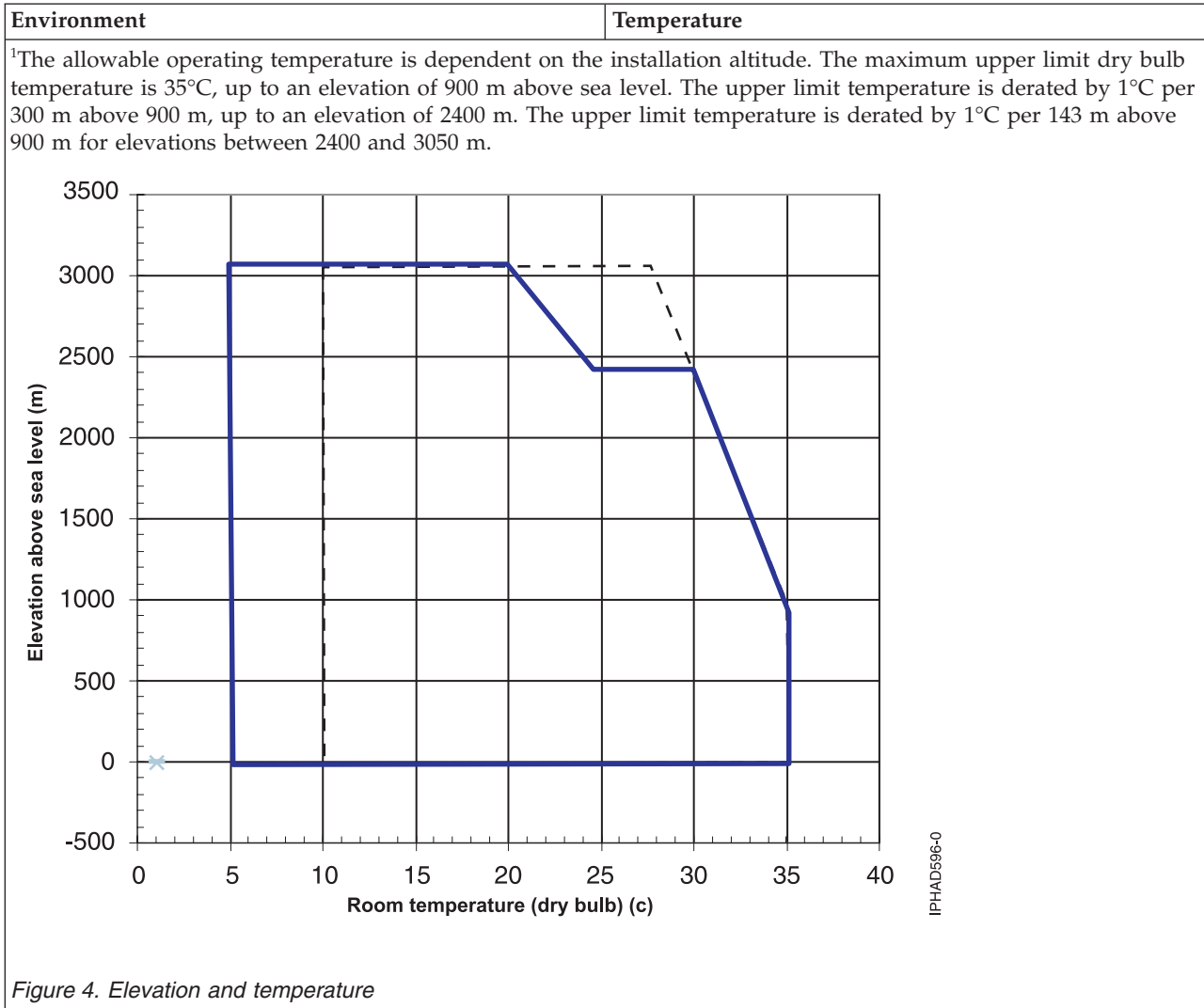
Electrical characteristics	Properties
Maximum kVA	1.224 kVA <sup>2</sup>
Rated voltage and frequency	200 - 240 V ac at 50/60 plus or minus 3 Hz
Maximum thermal output	4096 BTU/hr maximum
Maximum power consumption	1200 watts maximum
Power factor	0.98
Maximum inrush current	88 A
Maximum leakage current	3 mA <sup>1</sup>
Phase	1
Dual power feature code	Included
Maximum branch circuit breaker	20 A
<b>Note:</b>	
1. Measured according to IEC 60950.	
2. To calculate the amperage, multiply the kVA by 1000 and divide that number by the operating voltage.	

## Environment requirements

Table 39. Environment requirements. This table provides the recommended temperatures, humidity, and altitude for the 8234-EMA server.

Environment	Temperature
Recommended operating temperature	18 - 26°C (64.4 - 78.8°F) <sup>1</sup>
Operating temperature	5 - 35°C (41 - 95°F)
Recommended humidity	34 - 54%
Operating humidity	8 - 80%
Maximum operating altitude	3048 m (10 000 ft) <sup>1</sup>
Storage temperature	1 - 60°C
Storage relative humidity	5 - 80%
Shipping temperature	-40 - 60°C (-40 - 140°F)
Shipping relative humidity	5 - 100%
Operating dew point	28°C (82°F)
Nonoperating	21 °C (70 - °F)

Table 39. Environment requirements (continued). This table provides the recommended temperatures, humidity, and altitude for the 8234-EMA server.



## Noise emissions

Table 40. Noise emissions eight-core processor. This table provides the acoustical noise emissions for a typical configuration for the 8234-EMA server.

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle
FC 7537 (3.6 GHz) Single rack drawer 6 hard drives 2 power supplies	7.8	7.8	63	63



Table 40. Noise emissions eight-core processor (continued). This table provides the acoustical noise emissions for a typical configuration for the 8234-EMA server.

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
FC 7537 (3.6 GHz) Single rack drawer 6 hard drives 2 power supplies 19 in. rack acoustical doors 1.8 m FC 6248, 2 m FC 6249	7.3	7.3	56	56
<p><math>L_{WAD}</math> is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1).</p> <p><math>L_{PAM}</math> is the mean A-weighted emission sound pressure level measured at the 1-meter bystander positions (rounded to the nearest dB).</p> <p>10 dB (decibel) = 1 B (bel).</p> <p>All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</p> <p>19 in. acoustical doors are available: 1.8 m FC 6248, 2 m FC 6249. Acoustical doors provide approximately 0.5 bels sound power and 5 dB sound pressure level attenuation.</p>				

Table 41. Noise emissions sixteen-core processor. This table provides the acoustical noise emissions for a typical configuration for the 8234-EMA server.

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle
FC 7537 (3.6 GHz) 2 rack drawers 6 hard drives 2 power supplies	8.0	8.0	65	65
FC 7537 (3.6 GHz) 2 rack drawers 6 hard drives 2 power supplies 19 in. rack acoustical doors 1.8 m FC 6248, 2 m FC 6249	7.6	7.6	58	58

*Table 41. Noise emissions sixteen-core processor (continued).* This table provides the acoustical noise emissions for a typical configuration for the 8234-EMA server.

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)	Declared A-weighted sound pressure level, $L_{pAm}$ (dB)
<p><math>L_{WAD}</math> is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1).</p> <p><math>L_{PAM}</math> is the mean A-weighted emission sound pressure level measured at the 1-meter bystander positions (rounded to the nearest dB).</p> <p>10 dB (decibel) = 1 B (bel).</p> <p>All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</p> <p>19 in. acoustical doors are available: 1.8 m FC 6248, 2 m FC 6249. Acoustical doors provide approximately 0.5 bels sound power and 5 dB sound pressure level attenuation.</p>		

*Table 42. Noise emissions thirty two-core processor.* This table provides the acoustical noise emissions for a typical configuration for the 8234-EMA server.

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle
FC 7540 (4.2 GHz) 4 rack drawer 6 hard drives 2 power supplies 19 in. rack acoustical doors 1.8 m FC 6248, 2 m FC 6249	7.9	7.9	60	60
<p><math>L_{WAD}</math> is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1).</p> <p><math>L_{PAM}</math> is the mean A-weighted emission sound pressure level measured at the 1-meter bystander positions (rounded to the nearest dB).</p> <p>10 dB (decibel) = 1 B (bel).</p> <p>All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</p> <p>19 in. acoustical doors are available: 1.8 m FC 6248, 2 m FC 6249. Acoustical doors provide approximately 0.5 bels sound power and 5 dB sound pressure level attenuation.</p>				

## Service clearances

*Table 43. Service clearances.* This table provides the service clearance area measurements. These measurements are the area around the server that is needed for authorized service representatives to service the server.

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

## Electromagnetic compatibility compliance

The electromagnetic compatibility compliance is: FCC Part 15, ICES-003

## Safety compliance

The safety compliance is: IEC 60950; UL 60950; CSA 60950

## Special Hardware Management Console considerations

When the server is managed by a Hardware Management Console (HMC), the console must be provided within the same room and within 8 m (26 ft) of the server.

**Note:** As an alternative to the local HMC requirement, it is acceptable for you to provide a supported device, such as a PC, with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft.) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the system.

## 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.

## Plan view for model 8234-EMA

Dimensional planning information is shown in this top-down view of the server and cover.

The following figure shows dimensional planning information for model 8234-EMA.

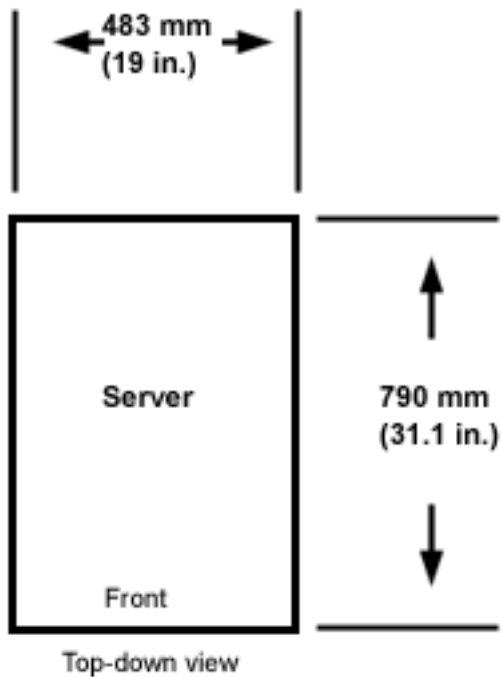


Figure 5. Model 8234-EMA plan view (rack-mount)

## Model 9110-510, OpenPower 710 (9123-710), and 9110-51A server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

Table 44. Dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	EIA units <sup>1</sup>	Weight
Metric	437 mm	691 mm	88.9 mm	2	23 kg
English	17.20 in.	27.2 in.	3.5 in.		51 lb

Table 45. Shipping dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	Weight
Metric	635 mm	864 mm	457 mm	53 kg
English	25 in.	34 in.	18 in.	117 lb

Table 46. Shipping dimensions - Rack-mounted drawer (China)

Measurements	Width	Depth	Height	Weight
Metric	635 mm	864 mm	457 mm	53 kg
English	25 in.	34 in.	18 in.	117 lb

Table 46. Shipping dimensions - Rack-mounted drawer (China) (continued)

Measurements	Width	Depth	Height	Weight
Feature code for drawer mounted in rack			7998	
Power distribution unit and power cord options for 7014, 0551, or 0553, 0551, and 7014-T00 racks			7999	

Table 47. Electrical

Electrical characteristics	Properties
kVA (maximum)	0.500 ( 9110-510 OpenPower™ 710) 0.658 (9110-51A with 4-core, 1.5 GHz processor configuration)
Rated voltage and frequency	100 - 127 or 200-240V ac at 50/60 plus or minus 0.5 Hz
Thermal output (maximum)	1622 Btu/hr ( 9110-510 OpenPower 710) 2133 Btu/hr (9110-51A with 4-core, 1.5 GHz processor configuration)
Maximum power consumption	475 W ( 9110-510 OpenPower 710) 625 W (9110-51A with 4-core, 1.5 GHz processor configuration)
Power factor	0.95
Inrush current (maximum)	75 A
Leakage current (maximum)	1.2 mA
Phase	1
Dual power feature code	7989 (quantity 2)
Branch circuit breaker	20 A (maximum)

Table 48. Environment requirements

Environment	Temperature	
Recommended operating temperature <sup>1</sup>	5 - 35 °C (41 - 95 °F)	
Nonoperating temperature	5 - 45 °C (41 - 113 °F)	
Shipping temperature	-40 - 60 °C (-40 - 140 °F)	
	Operating	Nonoperating
Maximum dew point	28 °C (82 - °F)	29 °C (84.2 - °F)
Noncondensing humidity	8 - 80%	8 - 80%
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

<sup>1</sup>Class 3 product as defined in ASHRAE Thermal Guidelines for Data Processing Environments. The allowable operating range is 5 - 35 °C (41 - 95 °F). See the *Temperature and humidity design criteria* topic for more information.

Table 49. Noise emissions

Product description	Declared A-weighted sound power level	Declared A-weighted sound power level
L <sub>WAd</sub> (Category 2D, General business) – rack drawer	6.2 bels <sup>1</sup>	6.2 bels <sup>1</sup>

Table 49. Noise emissions (continued)

Product description	Declared A-weighted sound power level	Declared A-weighted sound power level
L <sub>pAm</sub> (1-meter bystander)	44 dB <sup>1</sup>	44 dB <sup>1</sup>
<sup>1</sup> Preliminary data. For a description of noise emission values, see <i>Acoustics</i> .		

Table 50. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)	Not applicable	Not applicable
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000-94, Notice 2000-72); People's Republic of China Commodity Inspection Law

**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950-00; EN 60950; IEC 60950 including all National Differences

See 0551, 0553, 7014, and 0555 rack configurations for typical configurations when the 0551, 0553, 7014, or 0555 rack is populated with various server models.

**Related reference:**

Chapter 9, “Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack,” on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

“0551 rack” on page 445

The 0551 rack specifications provide detailed information for your rack.

“Planning for the 7014-T00 and 7014-T42 racks” on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 7014-T42, 7014-B42, and 0553 rack” on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

☞ Temperature and humidity design criteria

☞ Acoustics

## Model 9115-505 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

Table 51. Dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	EIA Units <sup>1</sup>	Weight
Metric	440 mm	710 mm	43 mm	1	17 kg
English	17.3 in.	28.0 in.	1.7 in.		37 lb

<sup>1</sup>See 0551, 0553, 7014, and 0555 rack configurations for typical configurations when the 0551, 0553, 7014, and 0555 rack is populated with various server models.

Table 52. Shipping dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	Weight
Metric	635 mm	851 mm	330 mm	20 kg
English	25.0 in.	33.5 in.	13.0 in.	43 lb

Table 53. Shipping dimensions - Rack-mounted drawer (China)

Measurements	Width	Depth	Height	Weight
Metric	610 mm	1016 mm	445 mm	27 kg
English	24.0 in.	40 in.	17.5 in.	60 lb
Feature code for drawer mounted in rack  <i>Power distribution Unit (PDU), 0551, 7014-T00, 7014-T42, 0553, and 0555 racks</i>			0259	

Table 54. Electrical

Electrical characteristics	Properties
kVA (maximum)	0.526
Rated voltage, rated amps, and frequency <sup>4</sup>	100 - 127 V ac (12 A) to 200 - 240 V ac (10 A) at 50 to 60 plus or minus 0.5 Hz
Thermal output (maximum)	1707 Btu/hr
Maximum power consumption	500 W
Power factor	0.95
Inrush current (maximum)	75 A
Leakage current (maximum)	1.2 mA
Phase	1
Dual power feature code	7958 (quantity 2)
Branch circuit breaker	20 A (maximum)

Table 55. Environment requirements

Environment	Temperature
Recommended operating temperature <sup>2</sup>	5 - 35°C (41 - 95°F)

Table 55. Environment requirements (continued)

Environment	Temperature	
Nonoperating temperature	5 - 45°C (41 - 113°F)	
Shipping temperature	-40 - 60°C (-40 - 140°F)	
	Operating	Nonoperating
Maximum dew point	28°C (82.4°F)	29°C (84.2°F)
Noncondensing humidity	8 - 80%	8 - 80%
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

Table 56. Noise emissions<sup>1, 5</sup>

Product description	Declared A-weighted sound power level, L <sub>Wad</sub> (B)		Declared A-weighted sound pressure level, L <sub>pAm</sub> (dB)	
	Operating	Idle	Operating	Idle
9115-505 with two hard drives and two power supplies	6.8	6.8	52	52
9115-505 with acoustic door (feature code 6248 or 6249) with two hard drives and two power supplies	6.2	6.2	44	44

Table 57. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000-94, Notice 2000-72); People's Republic of China Commodity Inspection Law

**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950-00; EN 60950; IEC 60950 including all National Differences

Table 58. Notes

Notes:
1. For a description of noise emission values, see <i>Acoustics</i> .
2. Class 3 product as defined in ASHRAE Thermal Guidelines for Data Processing Environments. The allowable operating range is 5 - 35°C (41 - 95°F). See the <i>Temperature and humidity design criteria</i> topic for more information.
3.
4. The power supplies automatically accept any voltage with the published rated voltage range for a defined processor configuration. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.
5. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.

**Related reference:**

Chapter 9, "Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack," on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.



“0551 rack” on page 445

The 0551 rack specifications provide detailed information for your rack.

“Planning for the 7014-T00 and 7014-T42 racks” on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 7014-T42, 7014-B42, and 0553 rack” on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

 Temperature and humidity design criteria

 Acoustics

## Model 9117-MMA and 9406-MMA server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

*Table 59. Dimensions*

Measurements	Width	Depth	Height	EIA units <sup>1</sup>	Weight
Metric	483 mm	790 mm	174.1 mm	4	63.6 kg
English	19 in.	31.1 in.	6.85 in.		140 lb

<sup>1</sup>See 0551, 0553, 7014, and 0555 rack configurations for typical configurations when the 0551, 0553, 7014, and 0555 rack is populated with various server models.

*Table 60. Shipping dimensions - Rack-mounted drawer*

Measurements	Width	Depth	Height	Weight
Metric	648 mm	991 mm	704 mm	80 kg
English	25.5 in.	39 in.	27.7 in.	175 lb

*Table 61. Shipping dimensions - Rack-mounted drawer (China)*

Measurements	Width	Depth	Height	Weight
Metric	640 mm	965 mm	692 mm	80 kg
English	25.2 in.	38 in.	27.25 in.	175 lb

*Table 62. PDU*

PDU	9117-MMA Two-core processor system	9117-MMA Four-core processor system
Drawer mounted in 0551 rack, 7014-T00, 7014-T42 and 0553, 0555 racks, Power distribution unit (PDU)	0231 ( 4-core)	0231 ( 8-core)
	0232 ( 8-core)	0232 ( 16-core)
	0241 (12-core)	0241 (24-core)
	0242 (16-core)	0242 (32-core)

Table 63. Electrical

Electrical characteristics	Properties
kVA (maximum)	1.428 <sup>6</sup>
Rated voltage and frequency <sup>1</sup>	200 - 240 V ac at 50/60 plus or minus 3 Hz
Thermal output (maximum) <sup>2, 4</sup>	4778 Btu/hr
Maximum power consumption <sup>3, 4</sup>	1400 W
Power factor	0.98
Inrush current (maximum)	88 A
Leakage current (maximum)	3 mA <sup>5</sup>
Phase	1
Dual power feature code	Included
Branch circuit breaker	20 A maximum
<b>Note:</b>	
<ol style="list-style-type: none"> <li>1. The power supplies automatically accept any voltage with the published, rated-voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li> <li>2. Thermal output value is for each 4-core drawer configuration.</li> <li>3. Maximum power consumption is specified for each 9117-MMA 8-core drawer. The 16-core, 24-core, and 32-core configurations are based on the use of multiple 8-core drawers (for example, an 16-core configuration consists of two 8-core drawers, a 24-core configuration consists of three 8-core drawers, and a 32-core configuration consists of four 8-core drawers).</li> <li>4. Power draw and heat load vary greatly by configuration. When planning for an electrical system, it is important to use maximum values. However, when planning for heat load, you can use the IBM Systems Energy Estimator to obtain a heat output estimate based on a specific configuration. See The IBM Systems Energy Estimator Web site for more information.</li> <li>5. Measured according to IEC 60950.</li> <li>6. To calculate the amperage, multiply the kVA by 1000 and divide that number by the operating voltage.</li> </ol>	

Table 64. Environment requirements

Environment	Temperature	
Recommended operating temperature	20 - 25 °C (68 - 77 °F) <sup>1</sup>	
Operating temperature range	5 - 35 °C (41 - 95 °F)	
Nonoperating temperature	5 - 40 °C (41 - 104 °F)	
Shipping temperature	-40 - 60 °C (-40 - 140 °F)	
	Operating	Nonoperating
Dew point	28 °C (82 °F)	21 °C (70 °F)
Noncondensing humidity	8 - 80%	8 - 80% (5 - 100% shipping)
Maximum altitude	9117-MMA Two-core processor system: 3048 m (10 000 ft)	3048 m (10 000 ft)
	9117-MMA Four-core processor system: 3048 m (10 000 ft) <sup>8</sup>	

Table 64. Environment requirements (continued)

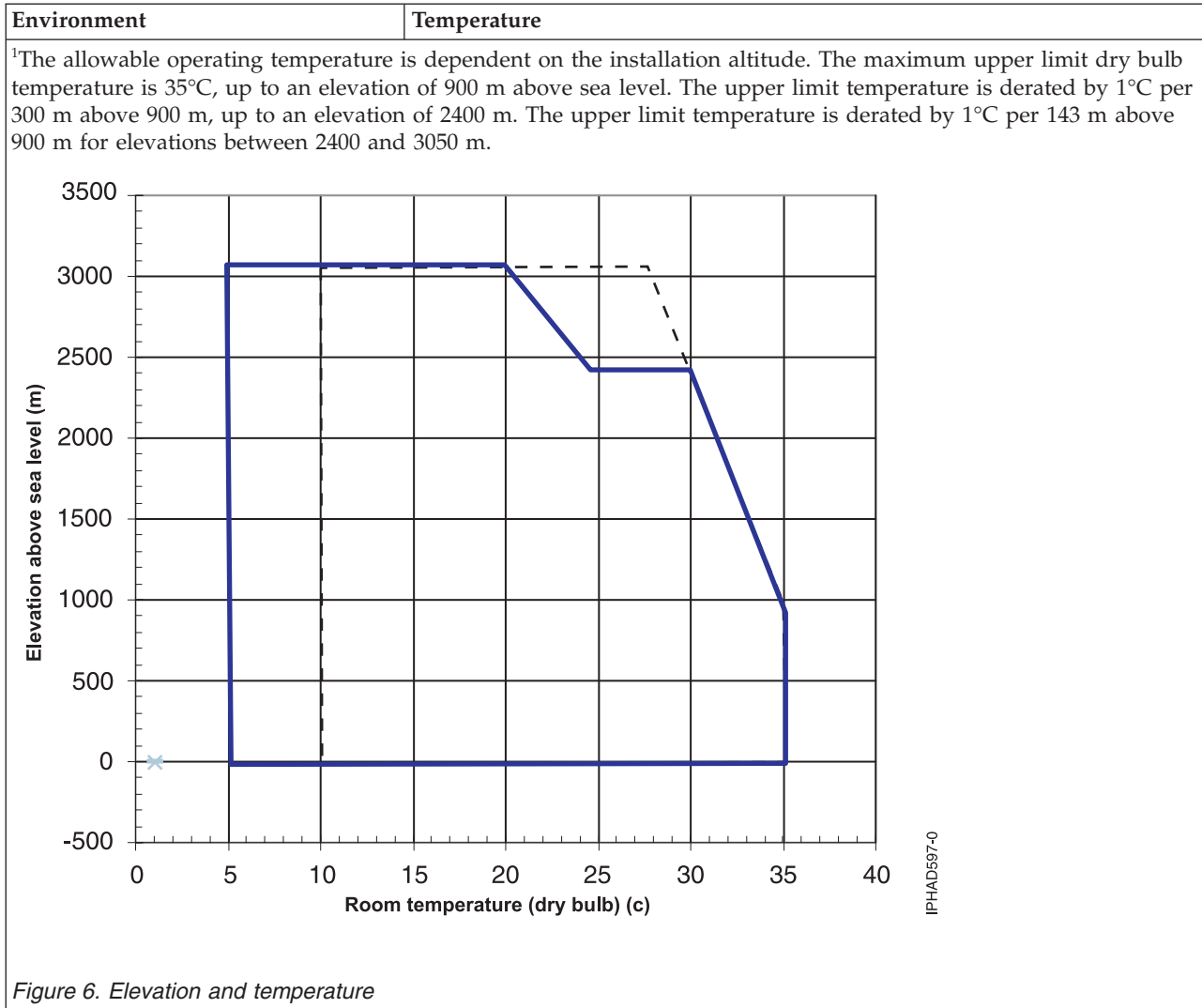


Table 65. Noise emissions two-core processor system

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle
2-core or 4-core system with 3.5 or 4.2 GHz processors, six hard drives and two power supplies	7.1	7.1	56	34
2-core or 4-core system with 4.7 GHz processors, six hard drives and two power supplies	7.4	7.4	59	59
16-core system with 3.5 or 4.2 GHz processors, six hard drives per chassis and two power supplies per chassis	7.8	7.8	61	61
16-core system with 4.7 GHz processors, six hard drives per chassis and two power supplies per chassis	8.1	8.1	62	62

**Table 65. Noise emissions two-core processor system (continued)**

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
2-core or 4-core system with 3.5 or 4.2 GHz processors, six hard drives and two power supplies with rack acoustical doors	6.7 <sup>3</sup>	6.7	50 <sup>1</sup>	50
2-core or 4-core system with 4.7 GHz processors, six hard drives and two power supplies with rack acoustical doors	6.9 <sup>1</sup>	6.9 <sup>1</sup>	54 <sup>1</sup>	54 <sup>1</sup>
16-core system with 3.5 or 4.2 GHz processors, six hard drives per chassis and two power supplies per chassis with rack acoustical doors	7.3 <sup>1</sup>	7.3 <sup>1</sup>	56 <sup>1</sup>	56 <sup>1</sup>
16-core system with 4.7 GHz processors, six hard drives per chassis and two power supplies per chassis with rack acoustical doors	7.6 <sup>1</sup>	7.6 <sup>1</sup>	57 <sup>1</sup>	57 <sup>1</sup>
For a description of noise emission values, see <i>Acoustics</i> .				
All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.				
<sup>1</sup> This is an estimated value.				

**Table 66. Noise emissions four-core processor system (9117-MMA)**

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle
FC 7387 (4.4 GHz) Single rack drawer 6 hard drives 2 power supplies	7.1	7.1	56	54
FC 7388 (4.4 GHz) Single rack drawer 6 hard drives 2 power supplies	7.4	7.4	59	59
FC 7540 (4.4 GHz) Single rack drawer 6 hard drives 2 power supplies	7.8	7.8	63	63
$L_{WAD}$ is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1). $L_{PAM}$ is the mean A-weighted emission sound pressure level measured at the 1-meter bystander positions (rounded to the nearest dB). 10 dB (decibel) = 1 B (bel). All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296. 19 in. acoustical doors are available: 1.8 m FC 6248, 2 m FC 6249. Acoustical doors provide approximately 0.5 bels sound power and 5 dB sound pressure level attenuation.				

**Table 67. Noise emissions sixteen-core processor system (9117-MMA)**

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle

**Table 67. Noise emissions sixteen-core processor system (9117-MMA) (continued)**

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
FC 7387 (4.4 GHz) 6 hard drives 2 power supplies	7.8	7.8	61	61
FC 7387 (4.4 GHz) 6 hard drives 2 power supplies 19 in. acoustical doors 1.8 m FC 6248, 2 m FC 6249	7.3	7.3	56	56
FC 7388 (5.0 GHz) 4 rack drawers 6 hard drives 2 power supplies	8.1	8.1	62	62
FC 7388 (5.0 GHz) 4 rack drawers 6 hard drives 2 power supplies 19 in. acoustical doors 1.8 m FC 6248, 2 m FC 6249	7.6	7.6	57	57
<p><math>L_{WAD}</math> is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1).</p> <p><math>L_{PAM}</math> is the mean A-weighted emission sound pressure level measured at the 1-meter bystander positions (rounded to the nearest dB).</p> <p>10 dB (decibel) = 1 B (bel).</p> <p>All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</p> <p>19 in. acoustical doors are available: 1.8 m FC 6248, 2 m FC 6249. Acoustical doors provide approximately 0.5 bels sound power and 5 dB sound pressure level attenuation.</p>				

**Table 68. Noise emissions thirty two-core processor system (9117-MMA)**

Product description	Declared A-weighted sound power level, $L_{Wad}$ (B)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)	
	Operating	Idle	Operating	Idle
FC 7540 (4.2 GHz) 4 rack drawers 6 hard drives 2 power supplies	8.3	8.3	65	65
<p><math>L_{WAD}</math> is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1).</p> <p><math>L_{PAM}</math> is the mean A-weighted emission sound pressure level measured at the 1-meter bystander positions (rounded to the nearest dB).</p> <p>10 dB (decibel) = 1 B (bel).</p> <p>All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</p> <p>19 in. acoustical doors are available: 1.8 m FC 6248, 2 m FC 6249. Acoustical doors provide approximately 0.5 bels sound power and 5 dB sound pressure level attenuation.</p>				

Table 69. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** FCC Part 15, ICES-003

**Safety compliance:** IEC 60950; UL 60950; CSA 60950

## Special Hardware Management Console considerations

When the server is managed by a Hardware Management Console (HMC), the console must be provided within the same room and within 8 m (26 ft) of the server.

**Note:** As an alternative to the local HMC requirement, it is acceptable for you to provide a supported device, such as a PC, with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the system.

## 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 to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM authorized service provider. 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 IBM 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.

### Related reference:

“0551 rack” on page 445

The 0551 rack specifications provide detailed information for your rack.

“Planning for the 7014-T00 and 7014-T42 racks” on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 7014-T42, 7014-B42, and 0553 rack” on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Chapter 9, “Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack,” on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

“ASHRAE declarations”

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

**Related information:**

➡ Acoustics

## Plan view for model 9117-MMA and 9406-MMA

Dimensional planning information is shown in this top-down view of your server.

The following figure shows dimensional planning information for model 9117-MMA and 9406-MMA.

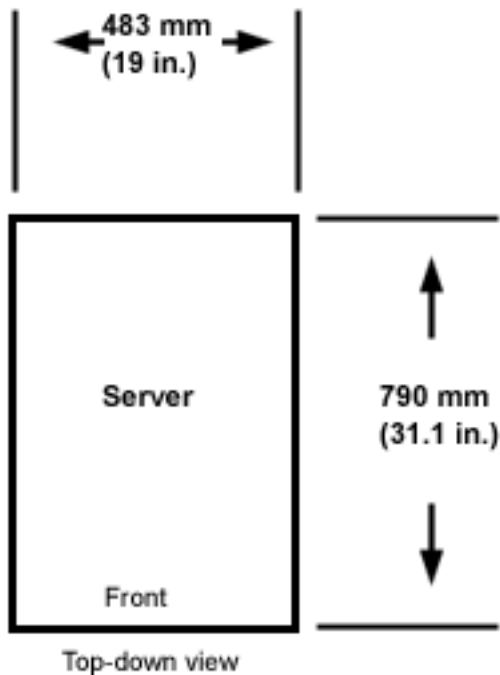


Figure 7. Model 9117-MMA and 9406-MMA plan view (rack-mount)

## ASHRAE declarations

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

Table 70. ASHRAE declarations

Description	Typical Heat Release <sup>2</sup> watts	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Configuration 1	1102	90	153	140	238
Configuration 2	890	90	153	140	238
See Model 9117-MMA and 9406-MMA server specifications for Weight and Overall system dimension.					
ASHRAE Class	3				

Table 70. ASHRAE declarations (continued)

	Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>	Airflow maximum <sup>1</sup> at 35°C (95°F)
Configuration 1	4-core, 4.7 GHz processor, 96 GB memory, six hard disk drives, four PCI cards, I/O riser, CD-RW		
Configuration 2	4-core, 3.5 GHz processor, 62 GB memory, six hard disk drives, five PCI cards, I/O riser, high speed link (HSL) card, DVD		
<b>Notes:</b> 1. Airflow for the typical and minimum configurations. 2. The product safety rating label contains the following information: <ul style="list-style-type: none"> <li>• 200 - 240 V ac</li> <li>• 10 A   2.0 kVa</li> <li>• 50/60 Hz   1-phase</li> </ul>			

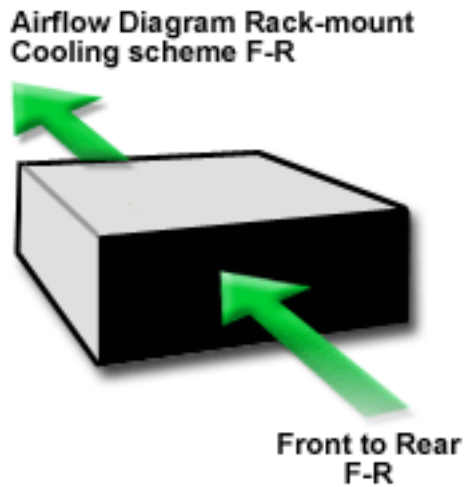


Figure 8. Airflow figure for server mounted in a rack

**Related reference:**

“Model 9117-MMA and 9406-MMA server specifications” on page 33  
 Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

**Related information:**

[➔](#) ASHRAE Technical Committee  
 ASHRAE guidelines are available in this website

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## Model 9118-575 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

The model 9118-575 refers to the complete system. The system consists of multiple components, as summarized in the following table.



Table 71. Model 9118-575 components

Model	Description	Minimum per system	Maximum per system
FC5793	42 EIA unit, 24-inch rack (54-inch deep)	1	1
FC7945	Slimline door set for FC5793 rack (front and rear)	1 <sup>1</sup>	1 <sup>1</sup>
FC7947	Acoustic door set for FC5793 rack (front and rear)	1 <sup>1</sup>	1 <sup>1</sup>
9118-575 (FC7836) <sup>3</sup>	8-core, 1.9 GHz processor	1	12
9118-575 (FC7657) <sup>3</sup>	16-core, 1.5 GHz processor	1	12
9118-575 (FC7675) <sup>3</sup>	8-core, 2.2 GHz processor	1	12
9118-575 (FC7676) <sup>3</sup>	16-core, 1.9 GHz processor	1	12
Various	Hardware Management Console (HMC) <sup>2</sup>	1	2
7045-SW4	HPS switch	0	2
FC5791 and FC5794	I/O drawer	0	5
FC6200 or FC6201	Optional integrated battery backup	0	6
<b>Note:</b>			
<ol style="list-style-type: none"> <li>1. Either slimline doors or acoustical doors are selected during the order process. Slimline doors do not meet the acoustic limits for Category 1A or 1B.</li> <li>2. For model 9118-575, a Hardware Management Console must be provided within the same room and within 8 m (26 ft) of the server. Or, as an alternative to the local HMC requirement, it is acceptable for you to provide a supported device (such as, a PC), with connectivity and authority to operate through a remotely-attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the server.</li> <li>3. The maximum number of processors per system is the total number of FC7836, FC7657, FC7675, and FC7676 that can be combined to a maximum of 12.</li> </ol>			

Table 72. Dimensions and weight<sup>1</sup>

Physical Characteristic	Slimline doors <sup>2</sup>	Acoustical doors <sup>2</sup>
Height	2025 mm (79.7 in.)	2025 mm (79.7 in.)
Width	785 mm (30.9 in.)	785 mm (30.9 in.)
Depth	1529 mm (60.2 in.)	1885 mm (74.2 in.)

Table 73. Weight - maximum configuration (with 1.9 GHz processor) Single frame

With integrated battery backup and slimline doors	Without integrated battery backup with slimline doors	With integrated battery backup and with acoustical doors	Without integrated battery backup and with acoustical doors
1569 kg (3460 lb)	1439 kg (3173 lb)	1578 kg (3479 lb)	1448 kg (3192 lb)

Table 74. Shipping dimensions and weight

Dimensions	Measurement
Height	2311 mm (91 in.)
Width	940 mm (37 in.)
Depth	1613 mm (63.5 in.)
Weight	Varies by configuration

Table 75. Electrical and thermal characteristics (3-phase)

Rated voltage and frequency (three-phase)	200 - 240 V ac at 50 - 60 Hz	380 - 415 V ac at 50 - 60 Hz	480 V ac at 50 - 60 Hz
Rated current, power cord with 48A plug, FC 8688 or 8689 (amperes per phase)	48	--	--
Rated current, all other power cords (amps, per phase)	60	32	24
Maximum power	41.6 kW		
Power factor, typical	0.99	0.97	0.93
Inrush current (maximum) <sup>3</sup>	163 A		
Thermal output	142 kBtu/hr	142 kBtu/hr	142 kBtu/hr
Dual power feature code	Standard <sup>7</sup>		
Branch circuit breaker and cord information	See <i>Breaker rating and cord information</i>		

Table 76. Environment specifications (based on an altitude of 1295 m (4250 ft))

Environment	Operating	Nonoperating	Storage <sup>4</sup>	Shipping <sup>4</sup>
Maximum wet bulb	23°C (73.4°F)	27°C (80.6°F)	29°C (84.2°F)	29°C (84.2°F)
Noncondensing relative humidity	8 - 80 %	8 - 80 %	5 - 80 %	5 - 100 %

Table 77. Environment temperatures (based on an altitude of 1295 m (4250 ft))

Environment	Temperature
Recommended operating temperature <sup>8</sup>	10 - 32°C (50 - 89.6°F)
Nonoperating temperature	10 - 43°C (50 - 109.4°F)
Storage temperature	1 - 60°C (33.8 - 140°F)
Shipping temperature	-40 - 60°C (-40 - 140°F)

Table 78. Declared acoustical noise emissions<sup>7</sup>

Product configuration	Declared A-Weighted Sound Power Level, L <sub>WAd</sub> (Bels) <sup>5, 6</sup>		Declared A-Weighted Sound Pressure Level, L <sub>pAM</sub> (dB) <sup>5, 6</sup> (bystander, 1 m)	
	Operating	Idle	Operating	Idle
Small configuration: Two processors, bulk power, and one I/O drawer; nominal conditions, slimline door set	8.2	8.2	65	65
Small configuration: Two processors, bulk power, and one I/O drawer; nominal conditions, acoustical door set	7.6	7.6	59	59

Table 78. Declared acoustical noise emissions<sup>7</sup> (continued)

Product configuration	Declared A-Weighted Sound Power Level, L <sub>WAd</sub> (Bels) <sup>5, 6</sup>		Declared A-Weighted Sound Pressure Level, L <sub>pAM</sub> (dB) <sup>5, 6</sup> (bystander, 1 m)	
Typical configuration: six processors, bulk power, and one I/O drawer; nominal conditions, slimline door set	8.6 <sup>7</sup>	8.6 <sup>7</sup>	69	69
Typical configuration: six processors, bulk power, and one I/O drawer; nominal conditions, acoustical door set	7.9	7.9	62	62
Maximum configuration: 12 processors, bulk power, and two I/O drawers; nominal conditions, slimline door set	8.9 <sup>7</sup>	8.9 <sup>7</sup>	72 <sup>7</sup>	72 <sup>7</sup>
Maximum configuration: 12 processors, bulk power, and two I/O drawers; nominal conditions, acoustical door set	8.2	8.2	65	65

**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000-94, Notice 2000-72); People's Republic of China Commodity Inspection Law

**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950-1; CAN/CSA C22.2 No. 60950-1; EN 60950-1; IEC 60950-1 including all national differences

Table 79. Notes

<b>Notes:</b>			
1. For configuration weights, see <i>Approximate system weights by configuration</i>			
2. Doors are not installed during product shipment to the customer.			
3. Inrush currents occur only at initial application of power (short duration for charging capacitors). No inrush currents occur during the normal power off-on cycle.			
4. When an IBM-approved vapor bag and desiccant packets are used to protect the system, the storage specifications are valid for 6 months and the shipping specifications are valid for 1 month. Otherwise, storage and shipping specifications are valid for two weeks each.			
5. $L_{wAd}$ is the upper-limit A-weighted sound level; $L_{pAM}$ is the mean A-weighted sound pressure measured at the 1-meter bystander positions; 1 B = 10 dB.			
6. All measurements made in conformance with ISO 7779 and declared in conformance with 9296.			
7. <b>Attention:</b> Your server installation might be subject to government regulations (such as those prescribed by OSHA or European Community Directives) that cover noise level exposure in the workplace. The model 9118-575 is available with an optional acoustical door feature that can reduce the likelihood of exceeding noise level exposure limits for densely populated racks. The actual sound pressure levels in your installation will depend on a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where the racks are installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. It is recommended that a qualified person, such as an industrial hygienist or acoustical consultant, be consulted to determine whether the sound pressure levels to which employees might be exposed exceed regulatory limits.			
8. The upper limit of the dry bulb temperature must be derated 1°C (1.8 °F) per 219 m (719 ft) above 1295 m (4250 ft). Maximum altitude is 3048 m (10000 ft).			

## Breaker rating and cord information

Use the Breaker rating and cord information table to determine the circuit breaker rating for the power cords used with your server.

**Note:** The 9119–FHA server design incorporates electromagnetic interference filter capacitors required to block electrical noise from penetrating the power grid. A characteristic of filter capacitors, during normal operation, is high leakage currents. Depending on the server configuration, this leakage current can reach 350mA. For most reliable operation, Ground Fault Circuit Interrupter (GFCI), Earth Leakage Circuit Breaker (ELCB) or Residual Current Circuit Breaker (RCCB) type circuit breakers are not recommended for use with 9119–FHA servers. By its internal design and grounding, the 9119–FHA server is fully certified for safe operation (compliance with IEC, CN, UL, CSA 60950-1). However, if a leakage detection circuit breaker is required by local electrical practice or standards, the breaker should be sized for a leakage current rating not less than 500ma in order to reduce the risk of a server outage caused by erroneous and spurious tripping.

Table 80. Breaker rating and cord information

Three-phase supply voltage (50/60 Hz)	200 - 240 V ac	380 - 415 V ac	480 V ac
Recommended customer-circuit-breaker rating <sup>1</sup>	60 A (60-A plug) or 80 A (100-A plug)	40 A	30 A
Cord information	1.8 m (6 ft) and 4.3 m (14 ft) 6 AWG power cord (60-A plug), or 1.8 m (6 ft) and 4.3 m (14 ft) 6 AWG power cord (100-A Plug)	14 foot, 8 AWG power cord, (electrician installed)	6 and 14 foot, 8AWG power cord

Table 80. Breaker rating and cord information (continued)

Three-phase supply voltage (50/60 Hz)	200 - 240 V ac	380 - 415 V ac	480 V ac
Recommended receptacle	IEC 60309, 60 A, type 460R9W (not provided) or IEC 60309, 100 A, type 4100R9W (not provided)	Not specified, electrician installed	IEC 60309, 30 A, type 430R7W (not provided)
<b>Notes:</b>			
1. The exact circuit breaker ratings might not be available in all countries. Where the specified circuit breaker ratings are not acceptable, use the nearest available rating. Always consult local electrical codes.			
2. When possible, use metal backbox with power cords using IEC 60309 plugs.			

## Power cord features

Use the Power cord features table to view the power cord specifications available for your server.

The following three-phase power cord features are available for the three-phase model 9118-575.

Table 81. Power cord features

Supply type	Nominal voltage range (V ac)	Voltage tolerance (V ac)	Frequency range (Hz)
Two 3-phase power cords	200 - 480	180 - 509	47 - 63

Table 82. Power cord features

Feature code	Description	Voltage (V ac)	Plug
8697	Power cord, 8 AWG, 4.3 m (14 ft)	480	IEC 60309 30 A plug
8698	Power cord, 8 AWG, 1.8 m (6 ft)	480	IEC 60309 30 A plug
8688	Power cord, 6 AWG/Type W, 4.3 m (14 ft)	200-240	IEC 60309 60 A plug
8689	Power cord, 6 AWG/Type W, 1.8 m (6 ft)	200-240	IEC 60309 60 A plug
8686	Power cord, 6 AWG, 4.3 m (14 ft)	200-240	IEC 60309 100 A plug
8687	Power cord, 6 AWG, 1.8 m (6 ft)	200-240	IEC 60309 100 A plug
8694 <sup>1</sup>	Power cord, 6 AWG/Type W, 4.3 m (14 ft)	380-415	No plug
8677 <sup>1</sup>	Power cord, 8 AWG, 4.3 m (14 ft)	380-415	No plug

<sup>1</sup>These power cords are shipped without a plug or receptacle. An electrician might be required to install the plug and receptacle to meet applicable country or region electrical codes.

## Doors and covers

Doors and covers are an integral part of the system and are required for product safety, proper airflow and cooling, and electromagnetic compatibility compliance.

The following rear door options are available for model 9118-575:

- Enhanced acoustical cover option

This feature provides a low-noise option for sites with stringent acoustical requirements and where a minimal system footprint is not critical. The acoustical cover option consists of special front and rear doors that are approximately 250 mm (10 in.) deep and contain acoustical treatment that lowers the noise level of the machine by approximately 7 dB (0.7 B) compared to the slimline doors. This reduction in noise emission levels means that the noise level of a single model system with slimline covers is about the same as the noise level of five model systems with acoustical covers.

- Slimline cover option

This feature provides an option to take up less floor space and cost less, when space is be more critical than acoustical noise levels. The slimline cover option consists of a front door, which is approximately 100 mm (4 in.) deep, and a rear door, which is approximately 50 mm (2 in.) deep. No acoustical treatment is available for this option.

- Rear door heat exchanger option

The rear door heat exchanger is a water-cooled device that mounts on the rear of the IBM 19-inch and 24-inch racks to cool the air that is heated and exhausted by devices inside the rack. A supply hose delivers chilled, conditioned water to the heat exchanger. A return hose delivers warmed water back to the water pump or chiller. Each rear door heat exchanger can remove up to 50 000 Btu (or approximately 15 000 watts) of heat from your data center. For detailed information on preparing your data center for using the rear door heat exchanger, see *Planning for the installation of rear door heat exchangers*.

**Related information:**

[🔗 Planning for the installation of rear door heat exchangers](#)

## Plan views

Dimensional planning information is shown in this top down view of your server.

The following figure shows dimensional planning information for single-frame systems.

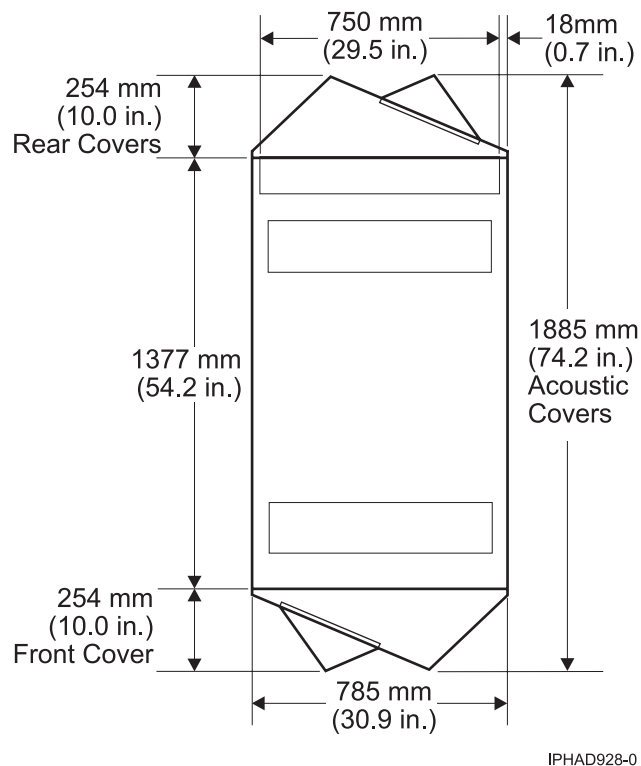


Figure 9. Plan view for single-frame systems with acoustical doors

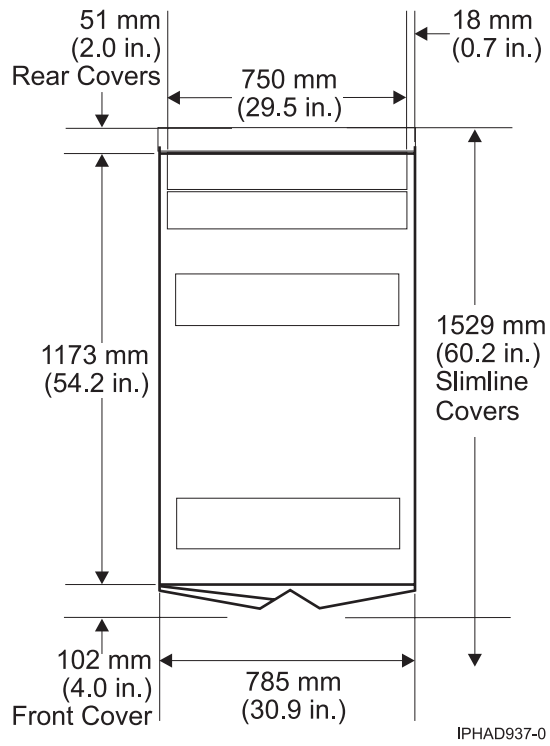


Figure 10. Plan view for single frame systems with slimline doors

**Attention:** When moving the rack, note the caster swivel diameters shown in the following figure. Each caster swivels in an approximate 130 mm (5.1 inch) diameter.

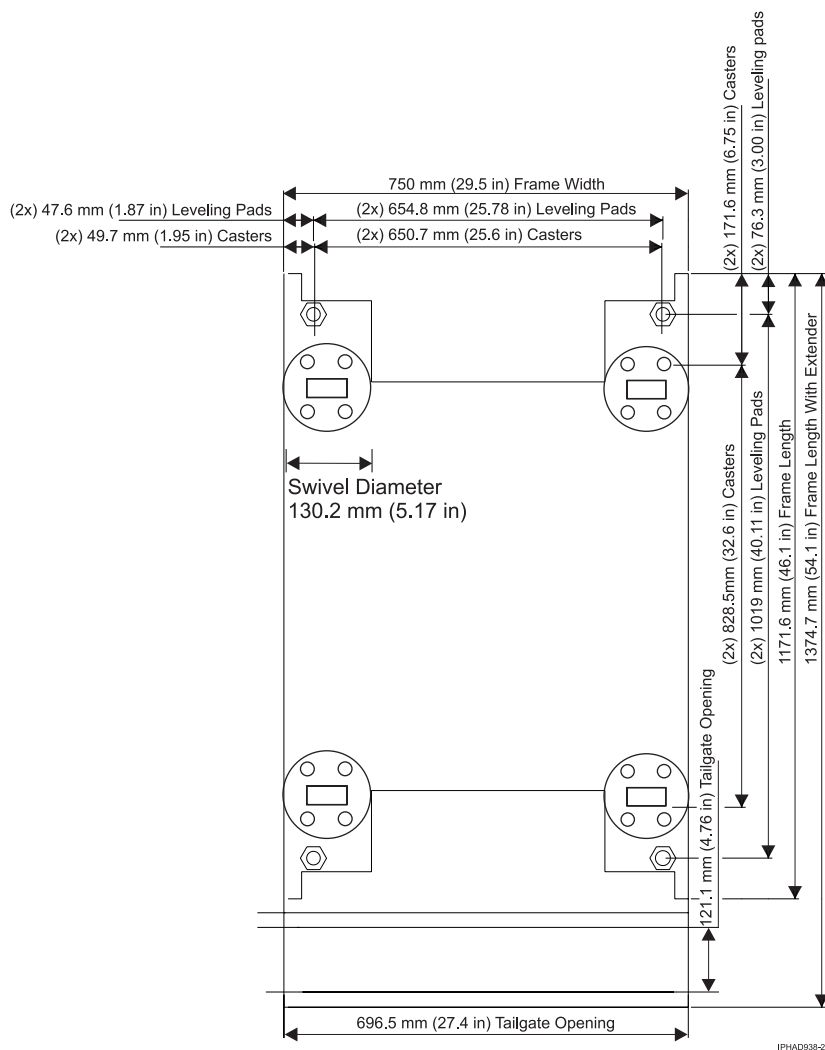


Figure 11. Leveling foot and frame dimensions

## Raised-floor requirements and preparation

A raised-floor is strongly recommended for model 9118-575 and its associated rack to ensure optimal performance for system cooling, cable management, and to comply with electromagnetic compatibility requirements.

Raised-floor cutouts should be protected by electrically nonconductive molding, appropriately sized, with edges treated to prevent cable damage and to prevent casters from rolling into the floor cutouts.

## Cutting and placing floor panels

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

Use the following procedure to cut and place floor panels in the raised floor. The x-y alphanumeric grid positions are used to identify relative positions of cutout floor panels that might be cut in advance.

1. Measure the panel size of the raised floor.
2. Verify the floor panel size. The floor panel size illustrated is 600 mm (23.6 in.) and 610 mm (24 in.) panels.



3. Ensure adequate floor space is available to place the frames over the floor panels exactly as shown in the figure. Use the plan view, if necessary. Consider all obstructions above and below the floor.
4. Identify the panels needed, and list the total quantity of each panel required for the installation.
5. Cut the required quantity of panels. When cutting the panels, you must adjust the size of the cut for the thickness of the edge molding you are using. The dimensions shown in the figures are finished dimensions. For ease of installation, number each panel as it is cut, as shown in the following figure.

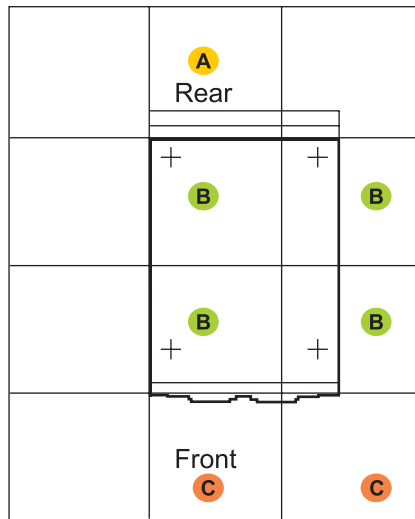
**Note:** Depending on the panel type, additional panel support (pedestals) might be required to restore structural integrity of the panel. Consult the panel manufacturer to ensure that the panel can sustain a concentrated load of 525 kg (1160 lb). For multiple frame installation, it is possible that two casters will produce loads as high as 1050 kg (2320 lb).

6. Use the following raised-floor figure to install the panels in the proper positions.

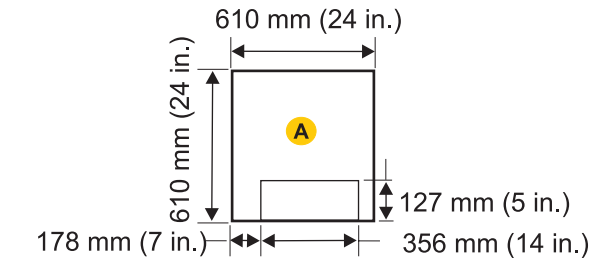
**Note:**

- a. This floor-tile arrangement is recommended so that the casters or leveling pads are placed on separate floor tiles to minimize the weight on a single floor tile. Furthermore, tiles bearing the weight (having casters or leveling pads on the tiles) should be uncut to retain the strength of the floor tile.
- b. The following figure is intended only to show relative positions and accurate dimensions of floor cutouts. The figure is not intended to be a machine template and is not drawn to scale.

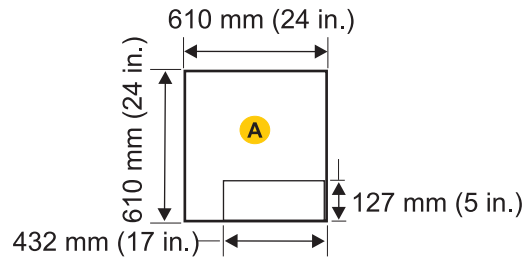
Recommended Raised Floor Cutouts  
24 inch (610 mm) and 23.6 inch (600 mm) tiles



Rack Entry/Exit	Dimension	
	(mm)	(in.)
Rear	635 mm x 127 mm	25 in. x 5 in.



Recommended for Non-Reinforced Pedestal Type



Recommended for Reinforced Pedestal or Stringer Types

- Uncut Panels
- Perforated Panels

Raised Floor with 610 mm (24-inch) Floor Panels

IPHAD942-1

Figure 12. Raised floor with 610 mm (24 in.) floor panels

## Securing the rack

Securing your rack to a concrete (nonraised) floor or to a raised floor prevents movement when vibrations occur.

Securing the rack is an optional procedure. See *Vibration and shock* for more information.

The following can be ordered by the customer as additional rack-securing options for model 9118-575.

- Request for Price Quotation (RPQ) 8A1183 for attaching the rack-mounting plates to the concrete floor (nonraised floor)
- RPQ 8A1185 to attach the rack to a concrete floor when server is on a raised floor 228.6 -330.2 mm (9 -13 in. depth)
- RPQ 8A1186 to attach the rack to a concrete floor when server is on a raised floor 304.8 -558.8 mm (12 -22 in. depth)

Before the service representative can perform the tie-down procedure, you must complete the floor preparation described in Cutting and placing floor panels and the procedures described in Attaching the rack to a concrete (nonraised) floor or Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor.

**Related reference:**

“Cutting and placing floor panels” on page 48

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

“Attaching the rack to a concrete (nonraised) floor”

Use this procedure to attach the rack to a concrete (nonraised) floor.

“Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor” on page 55

Use these steps to attach your rack to a 228.6 - 330.2 mm (9 - 13 in. depth). floor.

**Related information:**

 Vibration and shock

## Installing the frame tie-down kit

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

The following procedures describe how to install a frame tie-down kit and floor tie-down hardware to secure an IBM rack to a concrete floor beneath a 228.6 - 330.2 mm (9 - 13 in. depth) or a 304.8 - 558.8 mm (12 - 22 in. depth) raised-floor environment or to a nonraised floor.

### Positioning the rack

Use this procedure to unpack and position your rack.

To unpack and position the rack, do the following:

**Note:** See *Moving the system to the installation site* before attempting to position the rack.

1. Remove all packing and tape from the rack.
2. Place the last floor covering exactly adjacent and in the front of the final installation location.
3. Position the rack according to the customer floor plan.
4. Lock each caster wheel by tightening the thumbscrew on the caster.

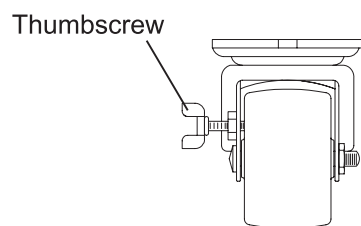


Figure 13. Caster thumbscrew

5. While moving the system to its final installed location and during relocation, it might be necessary to lay down floor covering, such as Lexan sheets, to prevent floor panel damage.

**Related reference:**

“Moving the system to the installation site” on page 74

Several factors must be considered before moving the system to the installation site.

### Attaching the rack to a concrete (nonraised) floor

Use this procedure to attach the rack to a concrete (nonraised) floor.

**Attention:** It is your responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

**Note:** You should obtain the service of a qualified structural engineer to determine appropriate anchoring of the mounting plates. A minimum of five anchor bolts for each mounting plate must be used to secure

the plates to the concrete floor. Because some of the drilled holes might be aligned with concrete reinforcement rods below the surface of the concrete floor, additional holes must be drilled. Each mounting plate must have at least five usable holes, two that are on the right-hand sides and the other two are on opposite ends, and one hole at the center. The mounting plates should be able to withstand 1134 kg (2500 lb) pulling force on each end.

1. Be sure the rack is in the correct location. To ensure that the holes are in the correct location, the diagonal distance of the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side-to-side distance) and 1019 mm (40.1 in.) (the front-to-back distance).

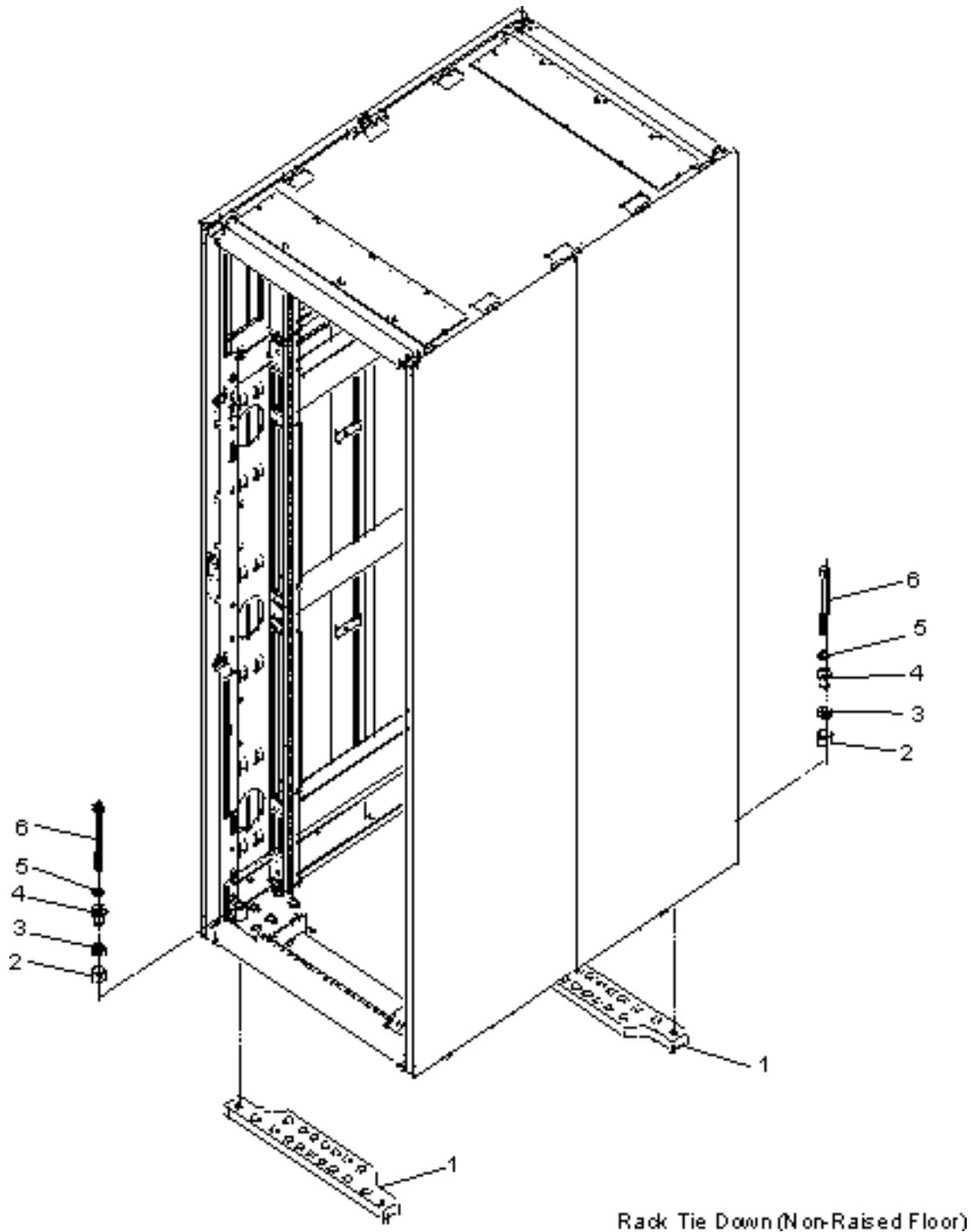


Figure 14. Rack tie down (nonraised floor)

2. Place the mounting plates (item 1 in the previous figure), front and rear, in the approximate mounting position under the system rack.
3. To align the mounting plates to the system rack, do the following:
  - a. Place the four rack-mounting bolts (item 6 in the previous figure) through the plate assembly holes at the bottom of the rack. Install the bushings and washers (item 4 and 5 in the previous figure) to ensure bolt positioning.

**Note:** The plastic bushing is intended to provide electrical insulation between the frame and the ground. When such insulation is not required, the plastic bushing does not need to be installed.

- b. Position the mounting plates (item 1 in the previous figure) under the four rack-mounting bolts (item 6 in the previous figure) so that the mounting bolts are centered directly over the tapped holes.
  - c. Turn the rack-mounting bolts (item 6 in the previous figure) three or four rotations into the tapped holes.
4. Mark the floor around the edge of the mounting plates, as shown in the following figure.

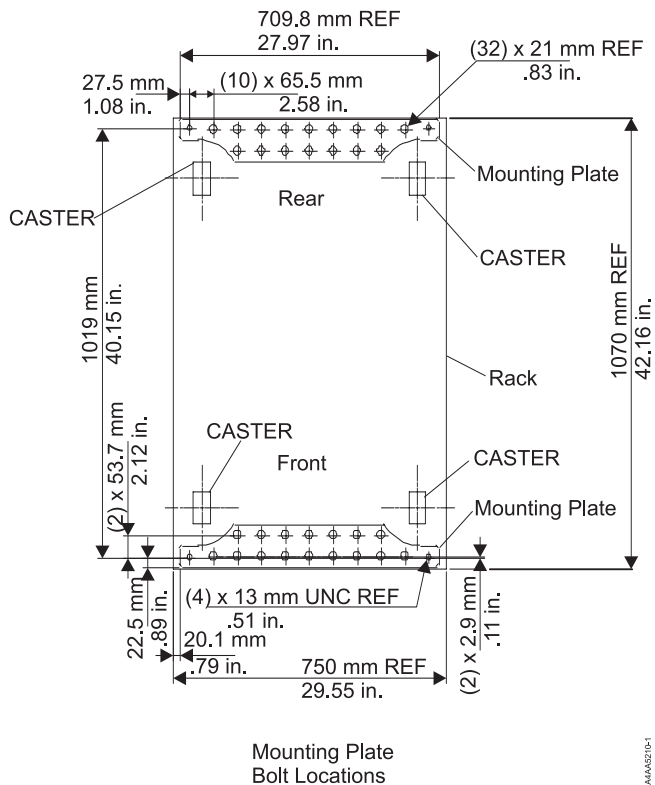


Figure 15. Mark floor around edge of mounting plates

5. Remove the mounting bolts from the threaded holes.
6. Move the rack away from the mounting plates.
7. Mark the floor at the center of each hole in the mounting plate (including tapped holes).
8. Remove the mounting plates from the marked locations.
9. At the marked location of the tapped mounting holes, drill two holes approximately 19 mm (.75 in.) to allow clearance for the ends of the two rack-mounting bolts. The ends of the rack-mounting bolts might protrude past the thickness of the mounting plate. Drill one hole in each group of anchor bolt location marks as indicated on the marked floor.
10. Using at least five heavy-duty-concrete anchoring bolts for each mounting plate, mount the mounting plates to the concrete floor.

## Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor

Use these steps to attach your rack to a 228.6 - 330.2 mm (9 - 13 in. depth). floor.

**Attention:** The frame tie downs are intended to secure a frame weighing less than 1429 kg (3150 lb). These tie downs are designed to secure the frame on a raised floor installation. It is the customer's responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

Use the following to determine your next step:

1. If the rack is being attached to a short depth raised floor environment 228.6 mm to 330.2 mm (9 in. to 13 in. depth) install the Raised Floor Tie Down Kit (Part number 16R1102) described in the following table.

*Table 83. Raised Floor Tie Down Kit (Part number 16R1102)*

Item	Part Number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P2999	4	Turnbuckle Assembly

2. If the rack is being attached to a deep raised floor environment 304.8 mm to 558.8 mm (12 in. to 22 in. depth) install the Raised Floor Tie Down Kit (Part number 16R1103) described in the following table.

*Table 84. Raised Floor Tie Down Kit (Part number 16R1103)*

Item	Part Number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P3000	4	Turnbuckle Assembly

It is the customer's responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

**Note:** To accommodate a floor with a depth of more than 558.8 mm (22 in.), a steel beam or a steel channel adapter for mounting the subfloor eyebolts is required. The customer must supply the floor eyebolts.

Consider the following when preparing the floor for tie-down:

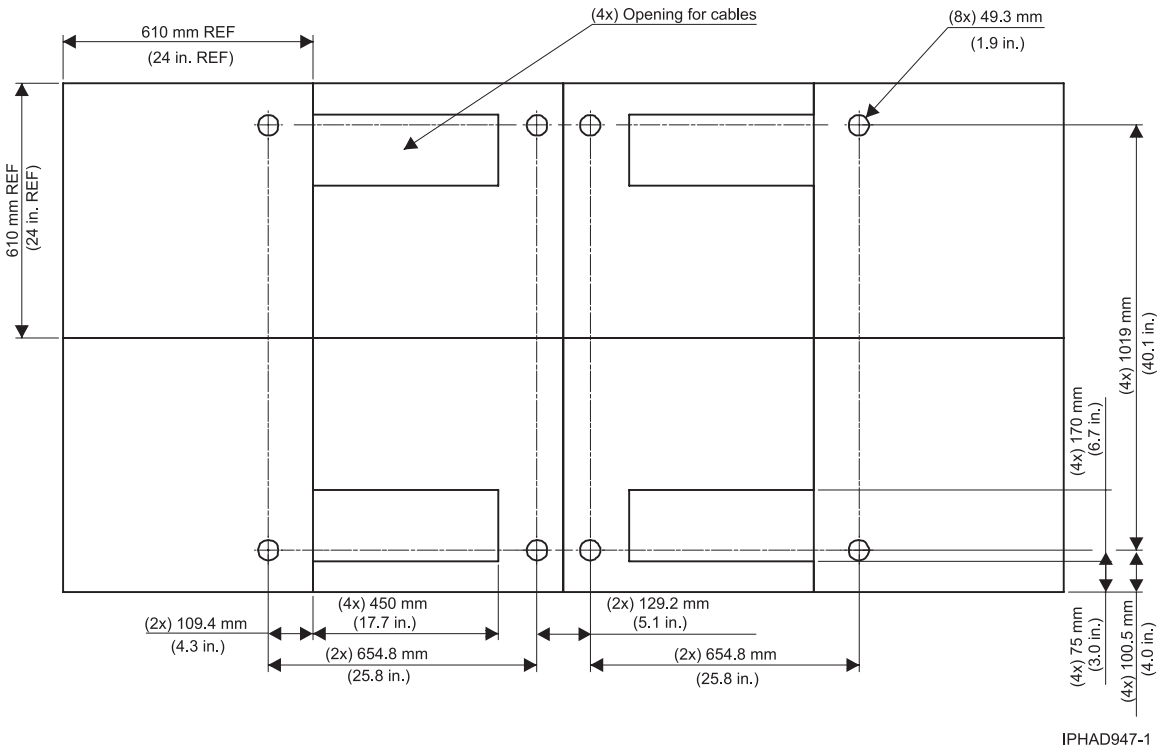
- The hardware is designed to support a frame weighing no more than 1578.5 kg (3480 lb).
- The estimated maximum concentrated load on one caster for a 1578.5 kg (3480 lb)-system is 526.2 kg (1160 lb). For a multiple system installation, it is possible that one floor tile will bear a total concentrated load of 1052.3 kg (2320 lb).

To install the eyebolts, do the following:

1. Obtain the service of a qualified structural engineer to determine appropriate installation of the eyebolts.
2. Consider the following before installing the eyebolts:
  - Floor eyebolts must be securely anchored to the concrete floor.
  - For a single frame installation, four 1/2-in. diameter by 13-inch subfloor eyebolts should be secured to the subfloor.
  - The minimum height of the center of the internal diameter is 2.54 mm (1 in.) above the concrete floor surface.

- The maximum height is 63.5 mm (2.5 in.) above the concrete floor surface. Higher than 63.5 mm (2.5 in.) can cause excessive lateral deflection to the tie-down hardware.
- The eyebolt's internal diameter should be 1-3/16 inch, and each eyebolt should be able to withstand 1224.7 kg (2700 lb). The customer should obtain the service of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to ensure that the raised floor and the building can support the floor-loading specifications.
- To ensure that the holes are in the correct location, the diagonal distance of the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side to side distance) and 1019 mm (40.1 in.) (the front to back distance).

3. Verify that the four eyebolts are positioned to match the dimensions is given in the following figures.



IPHAD947-1

Figure 16. Eyebolt positioning for 610 mm (24 in.) floor tile layout



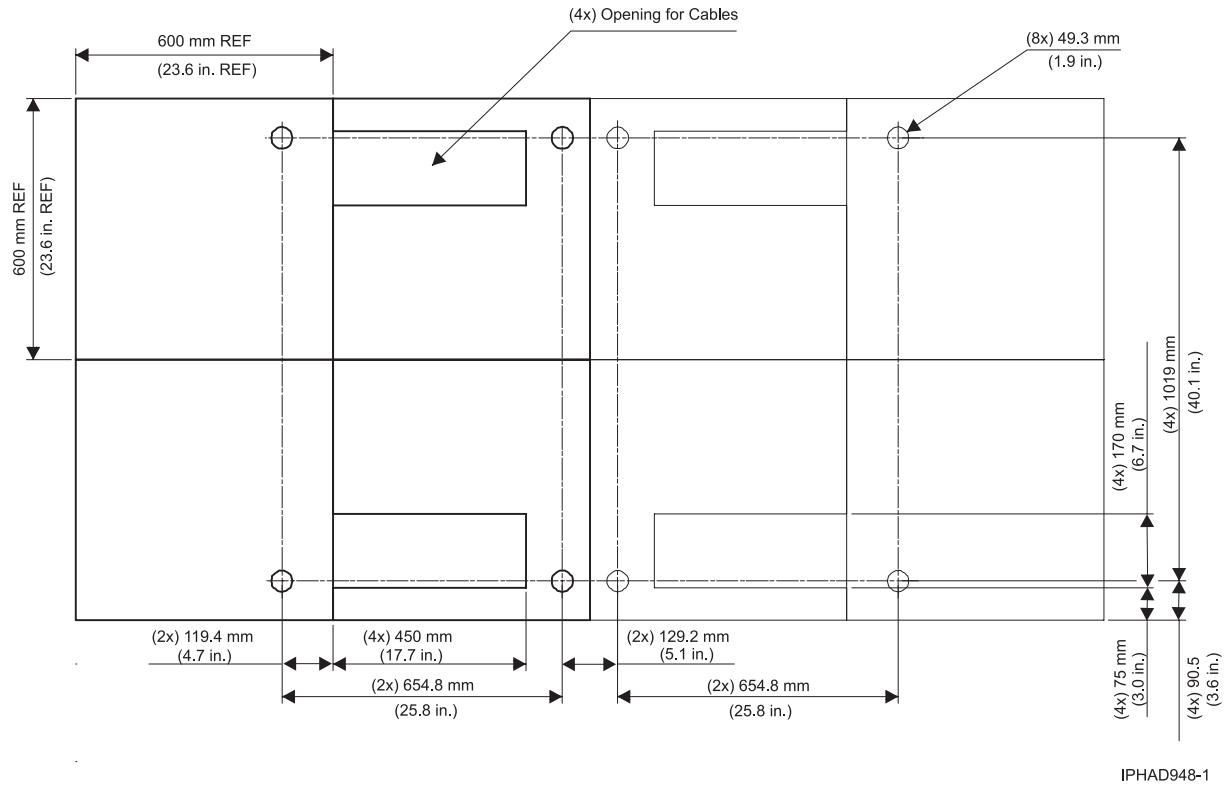


Figure 17. Eyebolt positioning for 600 mm (23.6 in.) floor tile layout

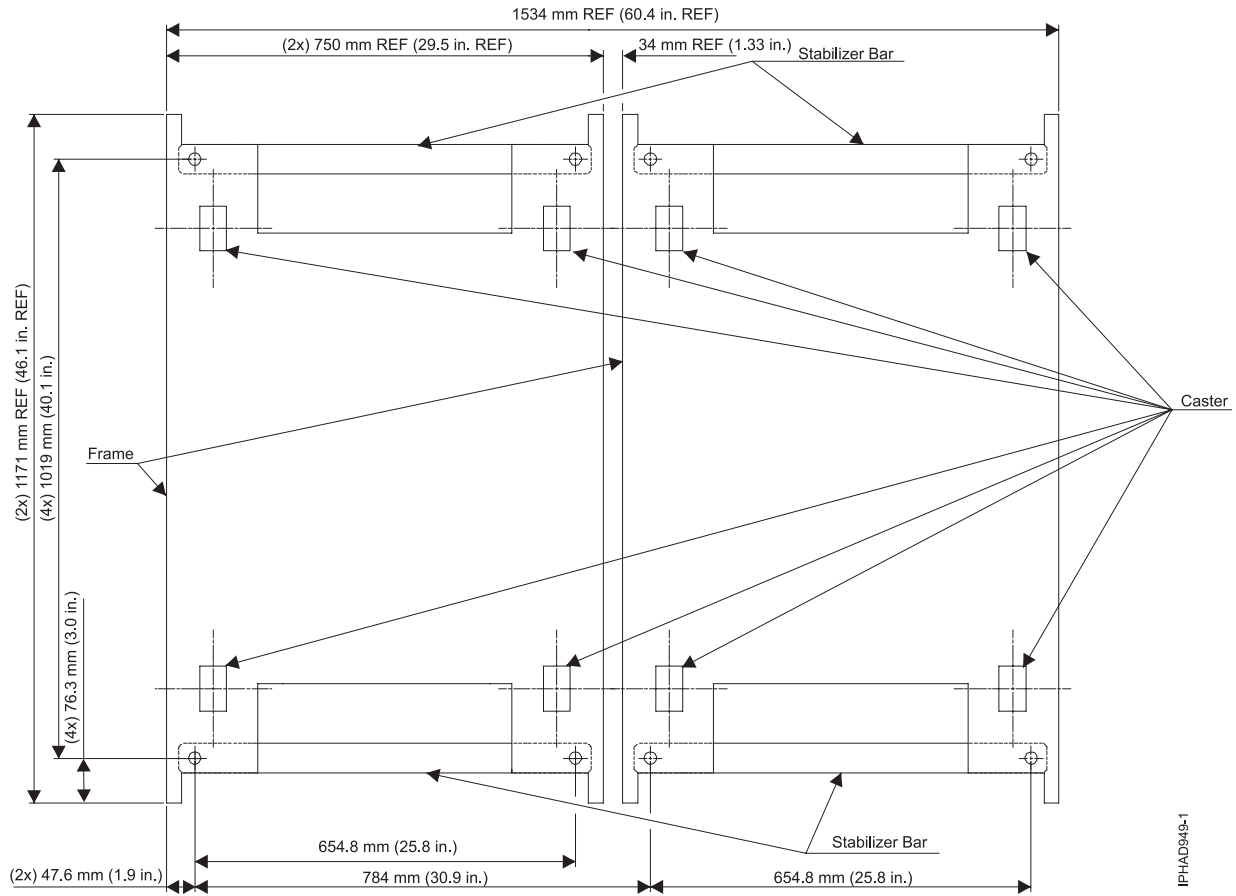


Figure 18. Stabilizer bar layout (top view)

4. Install the eyebolts to the floor.

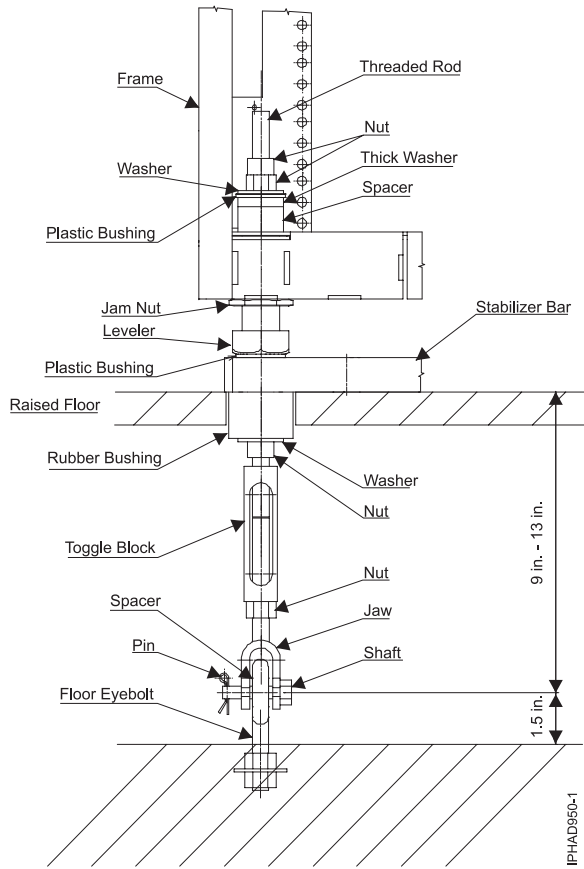


Figure 19. Turnbuckle assembly frame tie-down hardware for 228.6 mm to 330.2 mm (9 in. to 13 in.) raised floor (Part number 44P2999)

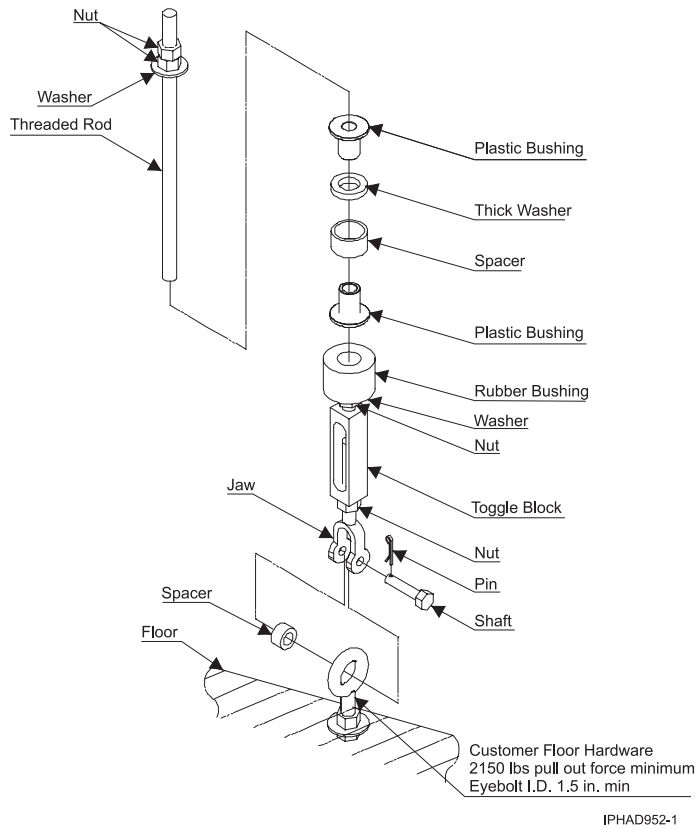


Figure 20. Turnbuckle assembly frame tie-down hardware for 228.6 mm to 330.2 mm (9 in. to 13 in.) raised floor (Part number 44P2999)

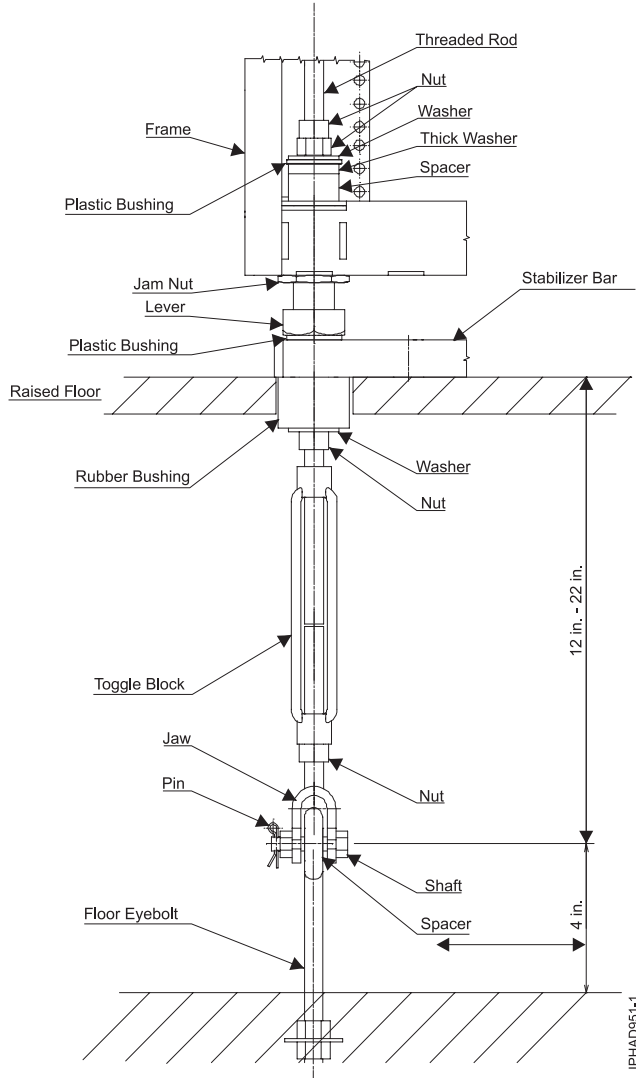


Figure 21. Turnbuckle assembly frame tie-down hardware for 304.8 mm to 558.8 mm (12 in. to 22 in.) raised floor (Part number 44P3000)

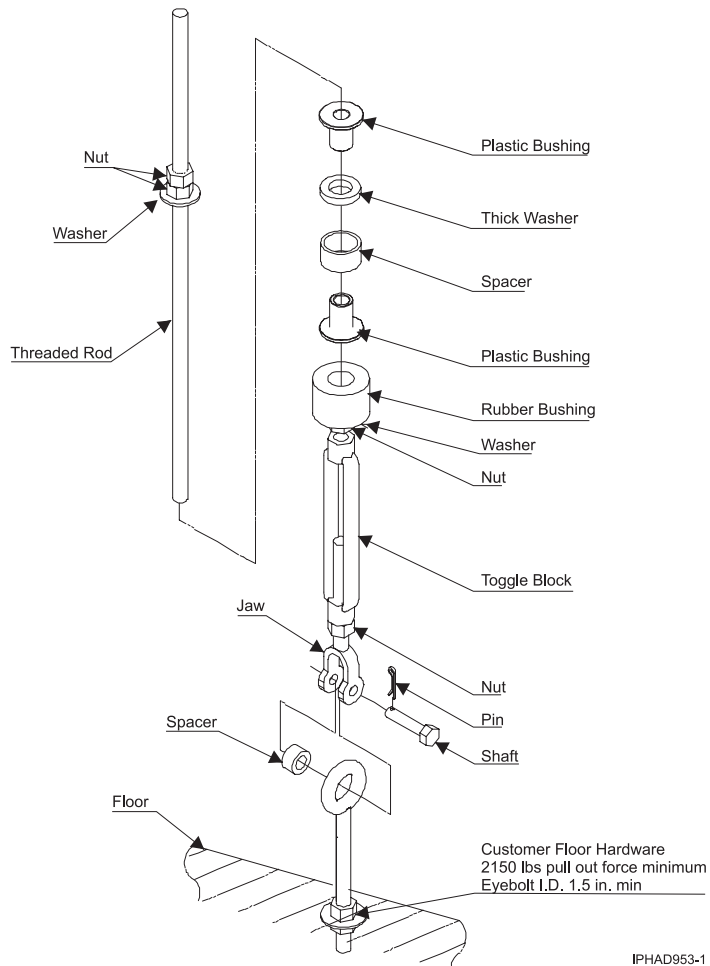


Figure 22. Turnbuckle assembly frame tie-down hardware for 304.8 mm to 558.8 mm (12 in. to 22 in.) raised floor (Part number 44P3000)

## Considerations for multiple-system installations

Learn about the installation requirements for a multiple-system installation.

In a multiple-system installation, it is possible that a floor tile with cable cutouts (refer to *Cutting and placing floor panels*) will bear two concentrated static loads up to 526 kg (1160 lb) per caster and leveler. Thus, the total concentrated load can be as high as 1052 kg (2320 lb). Contact the floor tile manufacturer or consult a structural engineer to ensure that the raised floor assembly can support this load.

When you are integrating a model 9118-575 into an existing multiple-system environment, or when adding additional systems to an installed 9118-575, consider the following factors:

- Minimum aisle width

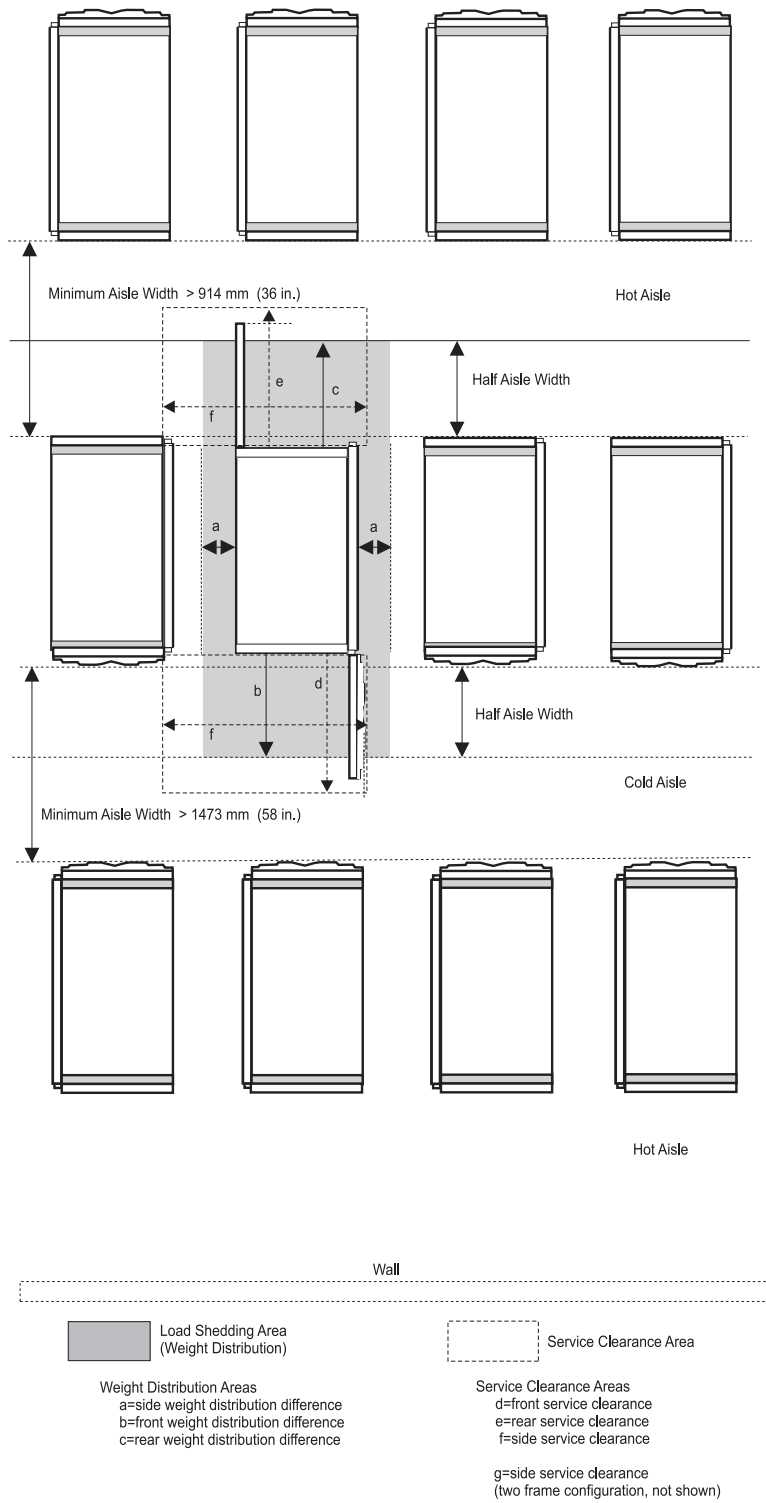
For multiple rows of systems containing one or more 9118-575 models, the minimum aisle width in the front of the system is 1473 mm (58 in.) and 914 mm (36 in.) in the rear of the system to allow room to perform service operations. The front and rear service clearances should be at least 1473 mm (58 in.) and 914 mm (36 in.), respectively. Service clearances are measured from the edges of the frame (with doors open) to the nearest obstacle.

- Thermal interactions

Systems should be faced front-to-front and rear-to-rear to create "cold" and "hot" aisles to maintain effective system thermal conditions, as shown in the following figure.

Cold aisles need to be of sufficient width to support the airflow requirements of the installed systems as indicated in *Cooling requirements*. The airflow per tile will be dependent on the underfloor pressure and perforations in the tile. A typical underfloor pressure of 0.025 in. of water will supply 300-400 cfm through a 25% open 2 ft by 2 ft floor tile.

### Proposed Floor Layout for Multiple Systems



IPHAD929-4

Figure 23. Proposed floor layout for multiple systems

**Related reference:**

“Cutting and placing floor panels” on page 48

These guidelines specify how to make the necessary openings in the raised floor for installing your



server.

“Cooling requirements” on page 71

Use the cooling system requirements in the proceeding table in conjunction with the cooling requirements graph and chilled airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

## Service clearances

The service clearance area is the area around the server that is needed for IBM service representatives to service the server.

The minimum service clearance for systems with slimline doors is shown in the following figures.

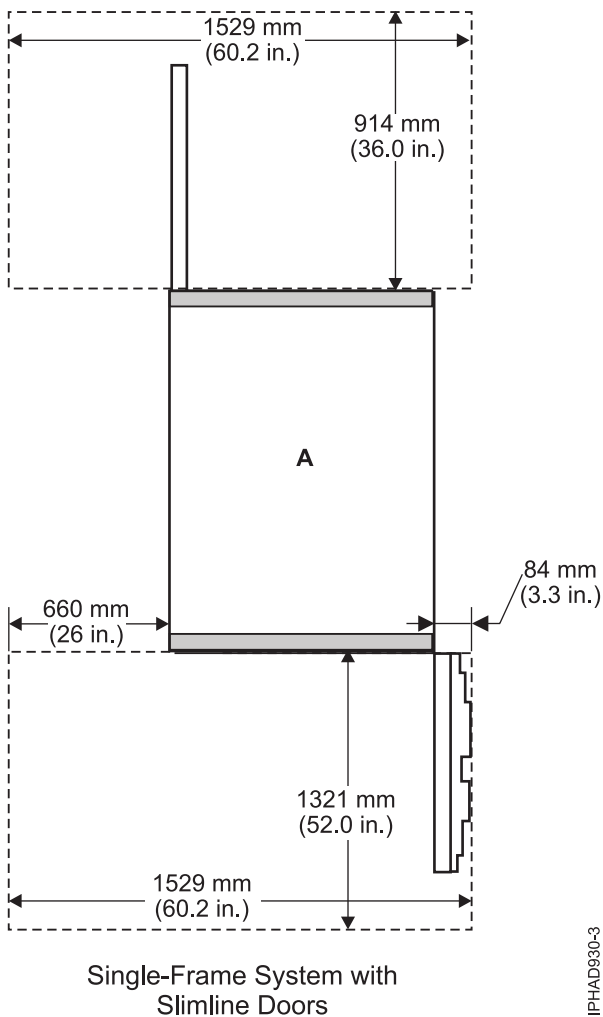
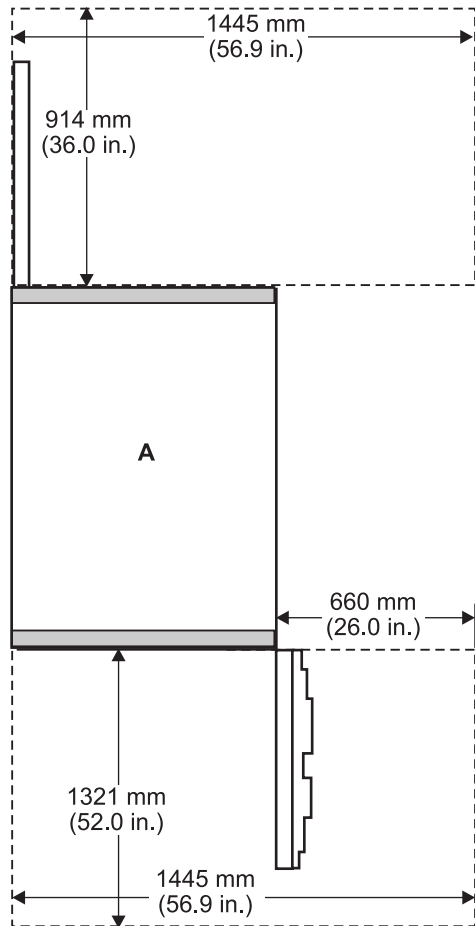


Figure 24. Service clearances for 9118-575 single frame systems with slimline doors



Single-Frame System with Slimline Doors (with alternative right-side service clearance)

IPHAD931-3

Figure 25. Service clearances for 9118-575 single frame systems with slimline doors (with alternative right-side service clearance)

The minimum service clearance for systems with acoustical doors is shown in the following figures.

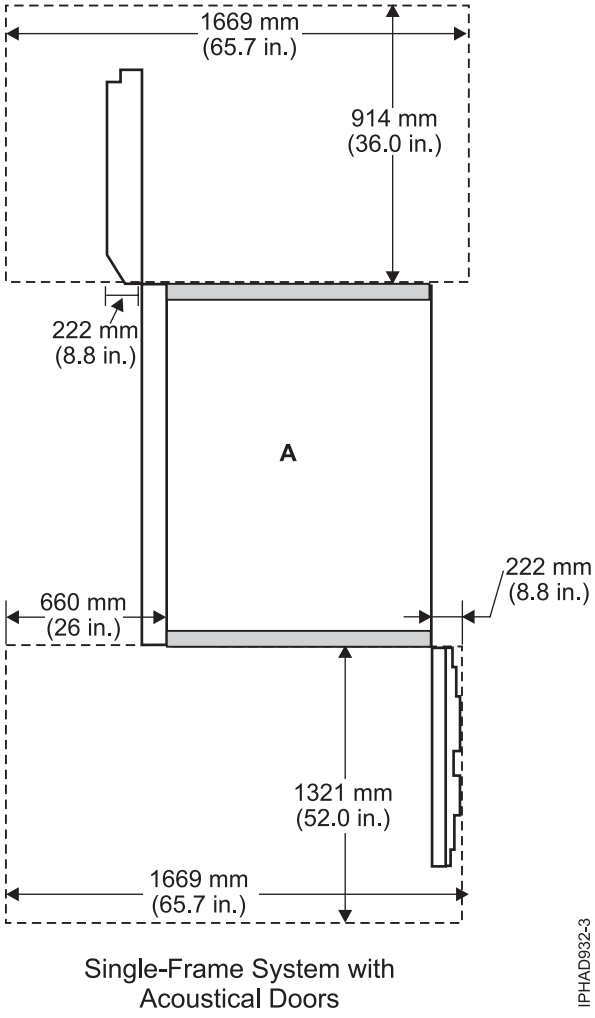
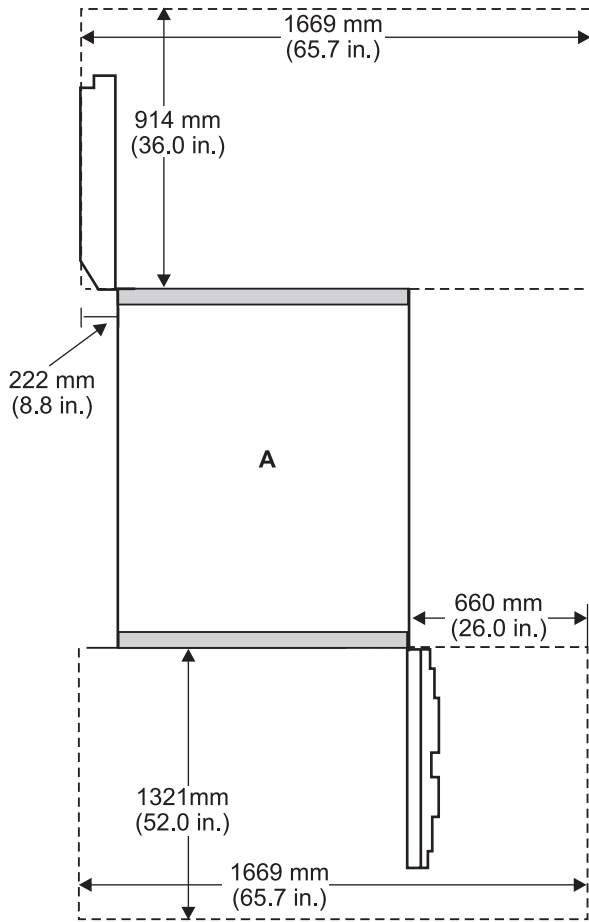


Figure 26. Service clearances for 9118-575 single-frame systems with acoustical doors

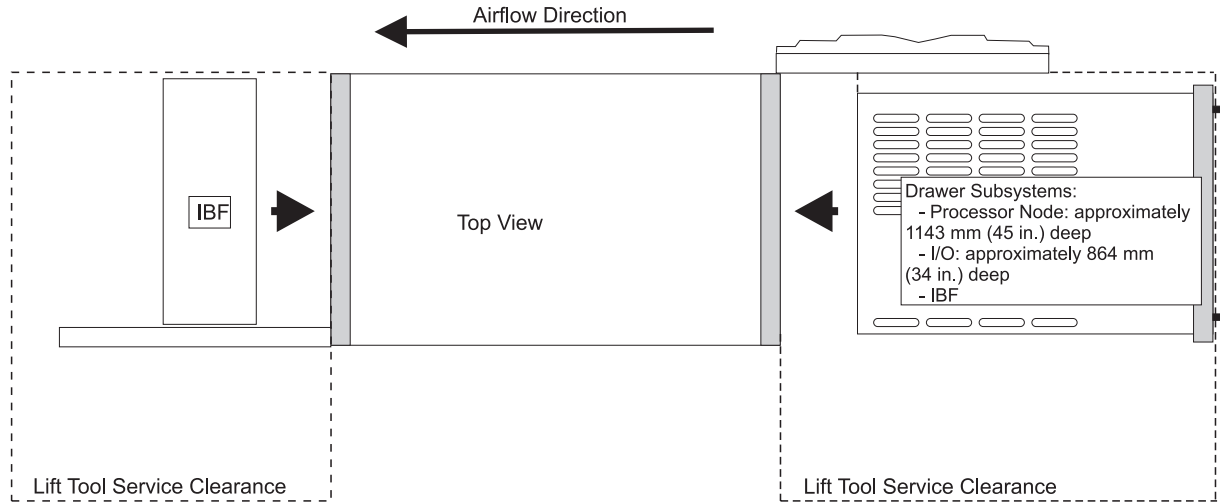


Single-Frame System with  
Acoustical Doors (with  
alternative right-side  
service clearance)

IPHAD933-4

Figure 27. Service clearances for 9118-575 single-frame systems with acoustical doors (with alternative right-side service clearance)

Front service access is necessary on model 9118-575 to accommodate a lift tool for the servicing of large drawers (the processor books and I/O drawers). Front and rear service access is necessary to accommodate the lift tool for servicing of the optional integrated battery backup.



Floor Plan Considerations for Single Units

A4AA5731-1

Figure 28. Floor plan considerations for single units

## ASHRAE declarations

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

These guidelines are available at *ASHRAE Technical Committee*.

Table 85. ASHRAE declarations

Description	Typical Heat Release	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	AEm <sup>3</sup> /hr
Minimum configuration	3.7	485	824	725	1232
Maximum configuration	41.6	2960	5029	4300	7306
Typical configuration	22.2	1610	2735	2350	3993
ASHRAE Class	3				
Minimum configuration	One processor drawer				
Maximum configuration	12 processor drawers and two I/O drawers				
Typical configuration	6 processor drawers and 2 I/O drawers				

See *Model 9118-575 server specifications* for Weight and Overall system dimension.

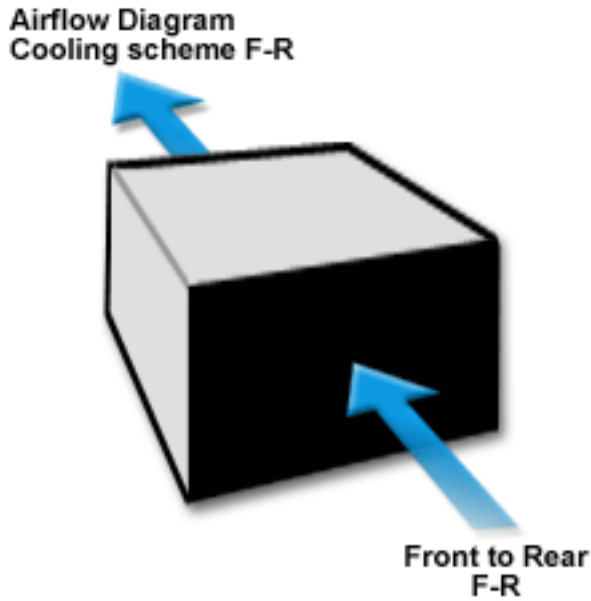


Figure 29. Airflow figure for server mounted in a rack

**Related information:**

➡ ASHRAE Technical Committee  
ASHRAE guidelines are available in this website

**Total system power consumption**

Use the System power requirements for 1.9 GHz processor systems table to determine the total system power consumption for your server's configuration.

The following table contains the maximum power requirements for model 9118-575.

Table 86. System power requirements for 1.9 GHz processor systems (9118-575 only) - (kW)

Processor drawers <sup>8,9</sup>	I/O drawers and switch drawers						
	0	1	2	3	4	5	6
1	3.7 <sup>4</sup>	4.9 <sup>4</sup>	5.9 <sup>1,4</sup>	7.0 <sup>2,4</sup>			
2	6.9 <sup>4</sup>	8.1 <sup>4</sup>	9.2 <sup>4</sup>	10.3 <sup>1,4</sup>	11.4 <sup>2,4</sup>		
3	10.2 <sup>4</sup>	11.3 <sup>4</sup>	12.4 <sup>4</sup>	13.6 <sup>4</sup>	14.7 <sup>1,4</sup>	15.8 <sup>2,4</sup>	
4	13.5 <sup>4</sup>	14.6 <sup>4</sup>	15.6 <sup>4</sup>	16.8 <sup>4</sup>	17.9 <sup>4</sup>	19.0 <sup>1,5</sup>	20.1 <sup>1,5</sup>
5	16.7 <sup>4</sup>	17.8 <sup>4</sup>	18.9 <sup>5</sup>	20.0 <sup>5</sup>	21.2 <sup>5</sup>	22.3 <sup>3,5</sup>	
6	19.9 <sup>5</sup>	21.1 <sup>5</sup>	22.2 <sup>5</sup>	23.3 <sup>6,10</sup>	24.4 <sup>6,10</sup>	25.5 <sup>3,6,10</sup>	
7	23.2 <sup>6,10</sup>	24.3 <sup>6,10</sup>	25.4 <sup>6,10</sup>	26.5 <sup>6,10</sup>	27.6 <sup>3,6,10</sup>	28.8 <sup>3,6,10</sup>	
8	26.4 <sup>6,10</sup>	27.6 <sup>6,10</sup>	28.7 <sup>6,10</sup>	29.8 <sup>6,10</sup>	30.9 <sup>3,6,10</sup>		
9	29.7 <sup>6,10</sup>	30.8 <sup>6,10</sup>	31.9 <sup>7,10</sup>	33.0 <sup>7,10</sup>	34.1 <sup>3,7,10</sup>		
10	32.9 <sup>7,10</sup>	34.0 <sup>7,10</sup>	35.2 <sup>7,10</sup>	36.3 <sup>7,10</sup>			
11	36.2 <sup>7,10</sup>	37.3 <sup>7,10</sup>	38.4 <sup>3,7,10</sup>	39.5 <sup>7,10</sup>			
12	39.4 <sup>7,10</sup>	40.5 <sup>7,10</sup>	41.6 <sup>3,7,10</sup>				

The following notes apply to the preceding table.

**Note:**

1. This configuration is valid only when populated with one 7045-SW4 switch drawer.
2. This configuration is valid only when populated with two 7045-SW4 switch drawers.
3. Not supported with integrated battery backup.
4. Power cord rules for this configuration:

		480 V ac (30-A cord)
60 A cord allowed	60 A cord redundant	380 - 415 V ac (no plug)
Yes	Yes	Yes

5. Power cord and bulk power jumper rules for this configuration:

		480 V ac (30-A cord)
60 A cord allowed	60 A cord redundant	380 - 415 V ac (no plug)
Yes	No	Yes

6. Power cord and bulk power jumper rules for this configuration:

		480 V ac (30-A cord)
60 A cord allowed	60 A cord redundant	380 - 415 V ac (no plug)
Yes	No	No

7. Power cord and bulk power jumper rules for this configuration:

		480 V ac (30-A cord)
60 A cord allowed	60 A cord redundant	380 - 415 V ac (no plug)
No	Not applicable	No

8. The maximum number of processors drawers per system is the total number of FC7836, FC7657, FC7675, and FC7676 that can be combined to a maximum of 12.
9. For each FC7657, FC7675, and FC7676 installed, subtract 0.2 kW from the total system power specified in this table.
10. A bulk power jumper (BPJ) is provided for this configuration. The presence of the BPJ prevents the concurrent maintenance of the bulk power controllers (BPC) and bulk power distributors (BPD) in the bulk power assemblies.

Maximum configurations are based on 64 memory cards per processor, two disk drives and four PCI adapter cards. To determine the typical power consumption for a specific configuration, subtract the following typical power values.

Component	Typical power value (W)
Disk drives	20
PCI adapter card	20
Memory cards	10

## Cooling requirements

Use the cooling system requirements in the preceding table in conjunction with the cooling requirements graph and chilled airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

The model 9118-575 requires air for cooling. As shown in *Considerations for multiple system installations*, rows of model 9118-575, and systems must face front-to-front. The use of a raised floor is recommended to provide air through perforated floor panels placed in rows between the fronts of systems (the cold aisles shown in *Considerations for multiple system installations*).

The following table provides system cooling requirements based on system configuration. The letter designations in the table correspond to the letter designations shown in Cooling requirements graph.

Table 87. System cooling requirements for processor systems

Number of processor drawers	Number of I/O drawers and switch drawers						
	0	1	2	3	4	5	6
1	A	B	B <sub>1</sub>	B <sub>2</sub>			
2	B	C	C	D <sub>1</sub>	D <sup>2</sup>		
3	D	D	E	E	F <sup>1</sup>	F <sup>2</sup>	
4	E	E	F	F	G	G <sup>1</sup>	H <sup>2</sup>
5	F	G	G	G	H	H <sup>3</sup>	
6	G	H	H	I	I	J <sup>3</sup>	
7	J	J	K	K	L <sup>3</sup>	L <sup>3</sup>	
8	K	K	L	L	M <sup>3</sup>		
9	K	K	L	L <sup>3</sup>	M <sup>3</sup>		
10	L	M	M	N <sup>3</sup>			
11	M	N	N <sup>3</sup>	O <sup>3</sup>			
12	O	O	P <sup>3</sup>				

**Note:**

1. This configuration is valid only when populated with one 7045-SW4 switch drawer.
2. This configuration is valid only when populated with two 7045-SW4 switch drawers.
3. Not supported with integrated battery backup.

**Related reference:**

“Considerations for multiple-system installations” on page 62  
 Learn about the installation requirements for a multiple-system installation.

**Cooling requirements graph**

Use the cooling requirements graph in conjunction with the cooling requirements tables and the chilled airflow area graphic to determine the area of the floor tiles to supply chilled air to the system.



## System Cooling Requirements

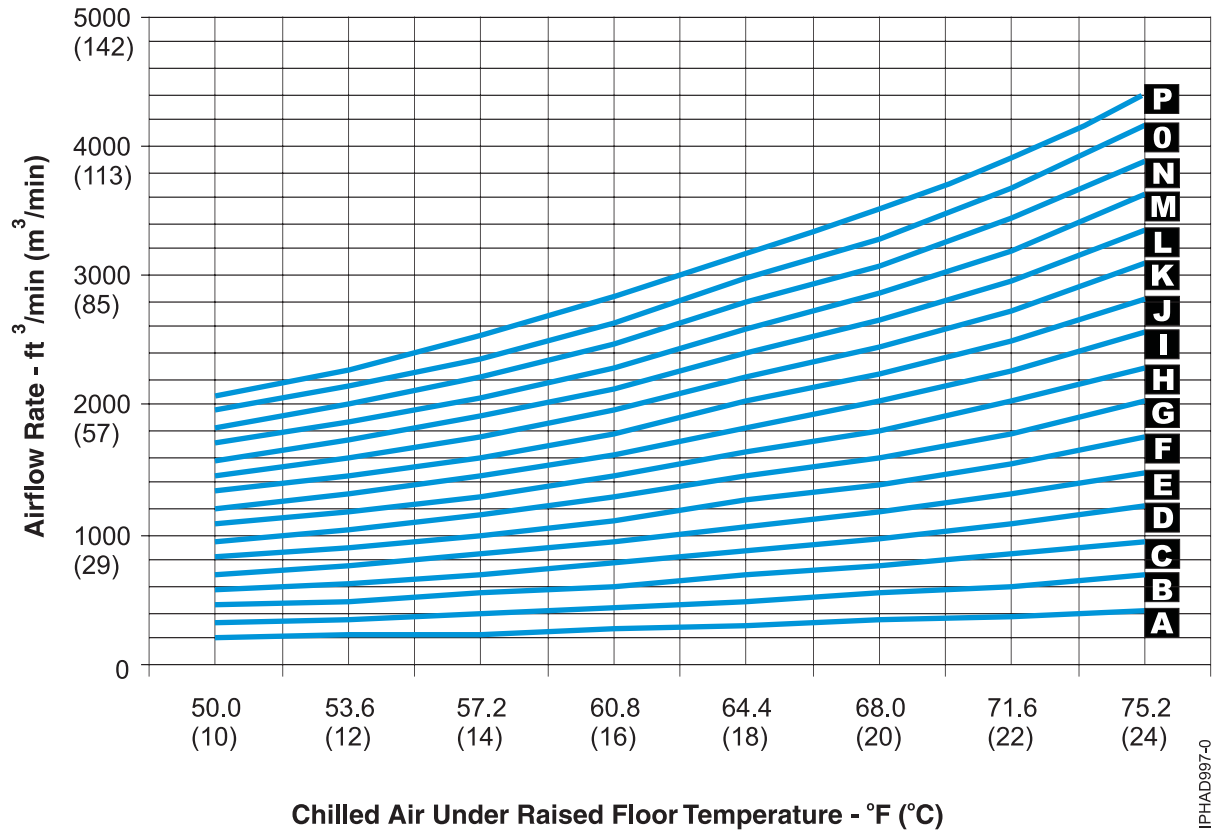
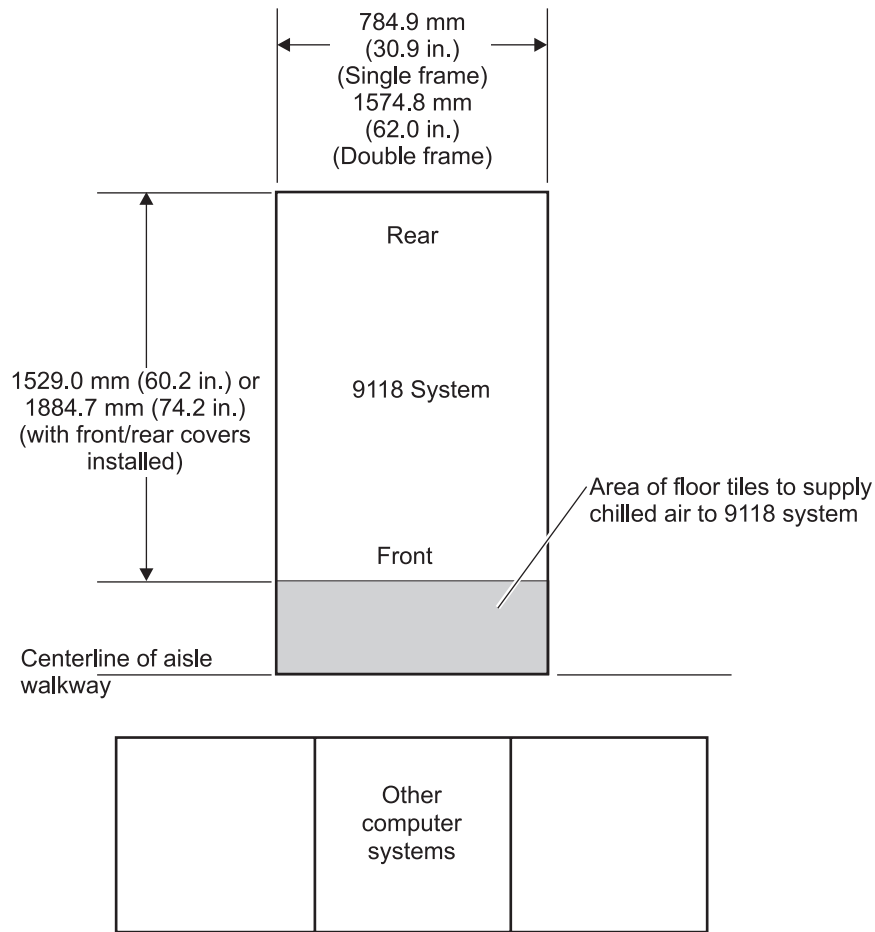


Figure 30. Cooling requirements graph

### Requirements for the chilled airflow area

The Chilled airflow area figure shows the chilled airflow area required for your system.

Use the system cooling requirements tables and the cooling requirements graph to determine the area of floor tiles to supply chilled air to the system.



IPHAD934-1

Figure 31. Chilled airflow area

## Moving the system to the installation site

Several factors must be considered before moving the system to the installation site.

Prior to moving the system to the installation site, you should:

- Determine the path that must be taken to move the system from the delivery location to the installation site.
- Verify that the height of all doorways, elevators, and so on are sufficient to allow moving the system to the installation site.
- Verify that the weight limitations of elevators, ramps, floors, floor tiles, and so on are sufficient to allow moving the system to the installation site. If the height or weight of the system can cause a problem when the system is moved to the installation site, you should contact your local site planning or sales representative.

For more detailed information, see .

If needed, a height reduction feature 7960 might be ordered. This feature allows for the system frame and the expansion frame to be shipped in two pieces and assembled at your location. With this feature, the top section of the system frame (including the power subsystem) is removed. The height of the system

frame with the upper section removed is reduced by .35 m (14 in.) to approximately 1.64 m (65 in.). For planning purposes, the weight of the rack top frame and components are shown in the following table.

Table 88. Weight of rack top frame and components

Item	Weight <sup>1</sup>
Rack top frame and crate	210.5 kg (463 lb)
Rack top frame with power (4 bulk power regulators, 4 bulk power distributors, and 2 bulk power assemblies) <sup>2</sup>	149.5 kg (329 lb)
Bulk power regulator	13.6 kg (30 lb)
Bulk power distributor	6.4 kg (14 lb)
Bulk power assembly	18 kg (40 lb)
Rack top frame without rails	30 kg (66 lb)
Rack top frame with rails	33 kg (73 lb)
Side cover <sup>3</sup>	22.7 kg (50 lb)
Front acoustic door	17.9 kg (39.4 lb)
Rear acoustic door	17.2 kg (37.9 lb)
Front slimline door	17.2 kg (38 lb)
Rear slimline door	9.1 kg (20 lb)
<b>Note:</b>	
1. Maximum total weight can be up to 255 kg (561 lb)	
2. Can be shipped with up to six bulk power regulators and six bulk power distributors.	
3. Each side cover consists of two panels.	

## 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 to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM authorized service provider. 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 IBM 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.

#### Related information:

 Acoustics

## Phase imbalance and BPR configuration

Use the Phase imbalance and BPR configuration table to determine the phase imbalance of your server's configuration.

Depending on the number of bulk power regulators (BPRs) in your system, phase imbalance can occur in line currents. All systems are provided with two bulk power assemblies (BPAs), with separate power

cords. Phase currents will be divided between two power cords in normal operation. The following table illustrates phase imbalance as a function of BPR configuration. For information about power consumption, see *Total system power consumption*.

Table 89. Phase imbalance and BPR configuration

Number of BPRs per BPA	Phase A line current	Phase B line current	Phase C line current
1	Power / Vline	Power / Vline	0
2	0.5 Power / Vline	0.866 Power / Vline	0.5 Power / Vline
3	0.577 Power / Vline	0.577 Power / Vline	0.577 Power / Vline

**Note:** Power is calculated from *Total system power consumption*. Vline is line-to-line nominal input voltage. Because total system power is divided between two power cords, divide the power number by 2.

**Related reference:**

“Total system power consumption” on page 70

Use the System power requirements for 1.9 GHz processor systems table to determine the total system power consumption for your server’s configuration.

### Balancing power panel loads

Use these methods to ensure that power panel loads are balanced.

When three-phase power is used, and depending on the system configuration, the phase currents can be fully balanced or unbalanced. System configurations with three BPRs per BPA have balanced power panel loads, while configurations with only one or two have unbalanced loads. With two BPRs per BPA, two of the three-phases draw an equal amount of current, and are, nominally, 57.8% of the current on the third phase. With one BPR per BPA, two of three-phases carry an equal amount of current, with no current drawn on the third phase. The following figure is an example of feeding several loads of this type from two power panels in a way that balances the load among the three-phases.

**Note:** Use of ground fault interrupt (GFI) circuit breakers is not recommended for this system because GFI circuit breakers are earth leakage current sensing circuit breakers and this system is a high earth leakage current product.

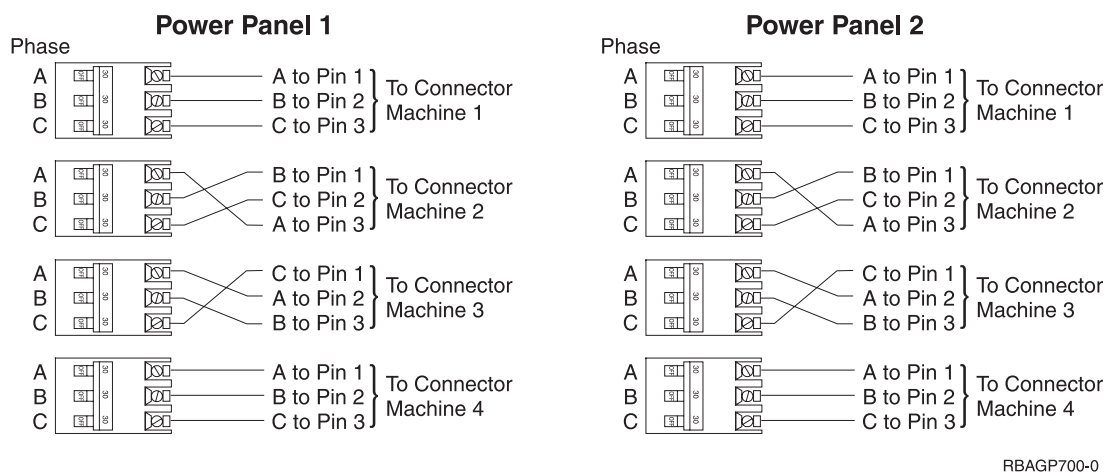


Figure 32. Power panel load balancing

The method illustrated in the preceding figure requires that the connection from the three poles of each breaker to the three-phase pins of a connector be varied. Some electricians might prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three-pole breakers are

alternated with single-pole breakers, so that the three-pole breakers do not all begin on Phase A.

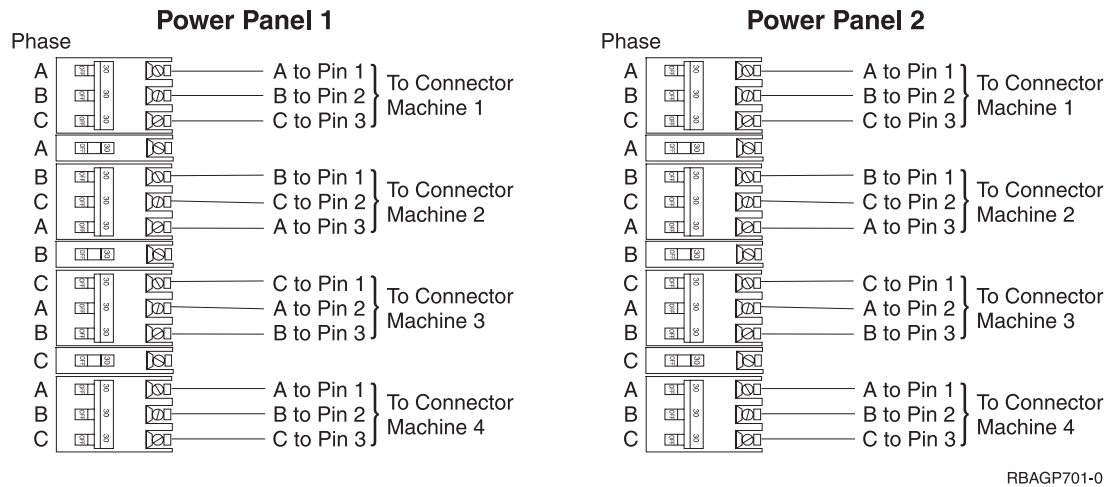


Figure 33. Power panel load balancing

The following figure shows another way of distributing the unbalanced load evenly. In this case, the three-pole breakers are alternated with two-pole breakers.

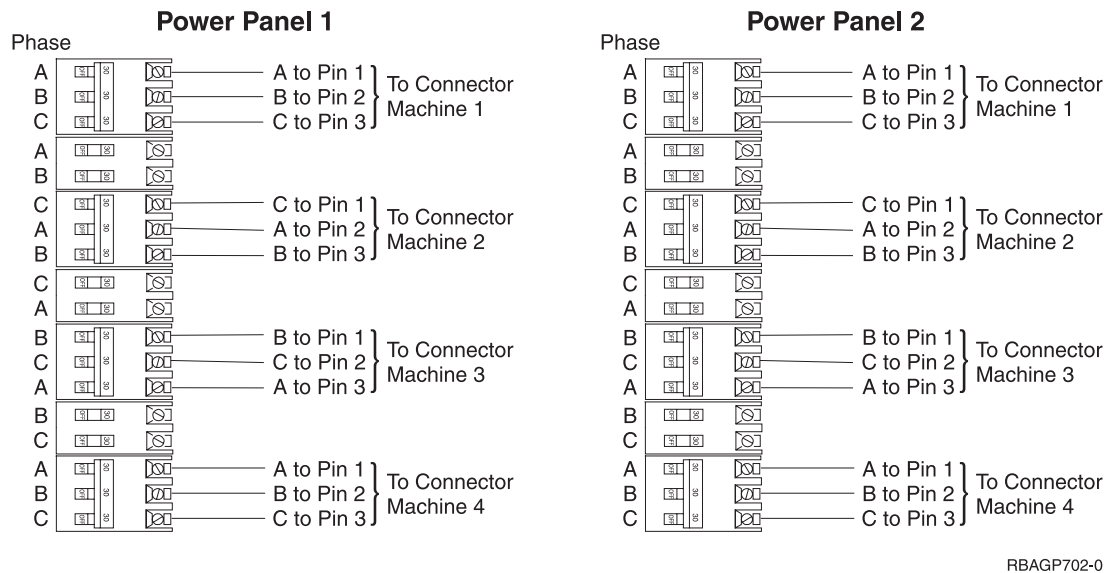


Figure 34. Power panel load balancing

## Configuring power cords

Use the Single-frame system power cord configuration figure to route power cords through floor tile cutouts.

The power cords exit the system from different points of the frame as indicated in the following figure. For raised-floor applications, it is recommended that both cords be routed to the rear of the frame and through the same floor-tile cutout. For more information about raised-floor applications, refer to *Cutting and placing floor panels*.

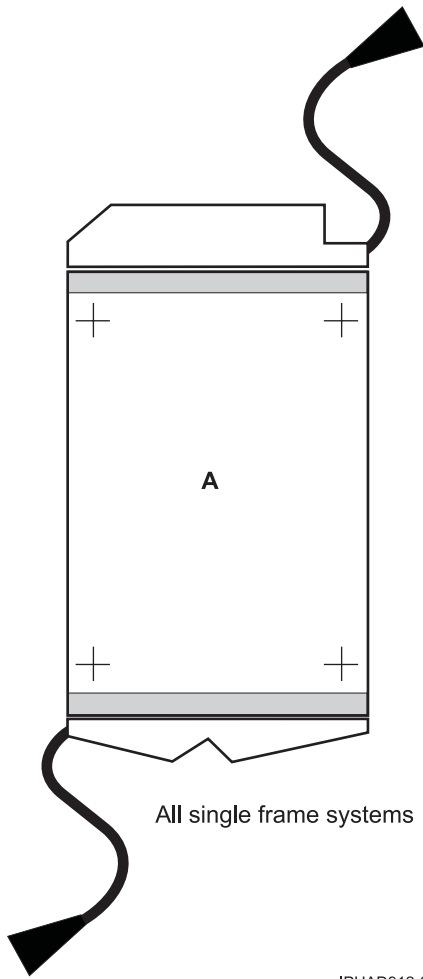


Figure 35. Single-frame system power cord configuration

**Related reference:**

“Cutting and placing floor panels” on page 48

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

## Dual power installation

To take full advantage of the redundancy and reliability that is built into the 9118-575 system must be powered from two different power distribution panels.

The model 9118-575 is designed with dual power cords with a fully redundant power system, except on some larger configurations. *Total system power consumption* and *Machine-holdup times* provide details for the configurations that have fully-redundant power and those that do not. The possible power installation configurations are described in *Dual power installations*.

**Related reference:**

“Total system power consumption” on page 70

Use the System power requirements for 1.9 GHz processor systems table to determine the total system power consumption for your server's configuration.

“Machine holdup times” on page 84

Use the Typical machine holdup time tables to determine the typical machine holdup times (time versus load) for fresh and aged batteries.

**Related information:**

 [Dual power installations](#)

## Approximate system weights by configuration

Use the Approximate system weights tables to calculate the approximate weight of your system based on its configuration.

If the system that you order weighs more than 1134 kg (2500 lb) when it is shipped from the factory, a weight-distribution plate is provided for the system. This plate is used to minimize the point loading from casters and leveling pads.

*Table 90. Approximate system weights with acoustical covers and without integrated battery backup – kg (lb)<sup>3</sup>*

Number of processor drawers	Drawers (I/O and switches)						
	0	1	2	3	4	5	6
1	531 (1168)	636 (1400)	735 (1618) <sup>1</sup>	835 (1836) <sup>2</sup>			
2	587 (1294)	714 (1574)	841 (1853)	939 (2071) <sup>1</sup>	1038 (2289) <sup>2</sup>		
3	687 (1515)	793 (1747)	898 (1979)	1003 (2211)	1102 (2429) <sup>1</sup>	1201 (2647) <sup>2</sup>	
4	744 (1641)	850 (1873)	955 (2105)	1060 (2337)	1166 (2570)	1265 (2788) <sup>1</sup>	1364 (3006) <sup>2</sup>
5	802 (1767)	907 (1999)	1012 (2231)	1117 (2464)	1223 (2696)	1328 (2928)	
6	859 (1893)	964 (2126)	1069 (2358)	1175 (2590)	1280 (2822)	1385 (3054)	
7	916 (2020)	1021 (2252)	1127 (2484)	1232 (2716)	1337 (2948)	1430 (3152)	
8	973 (2146)	1078 (2378)	1184 (2610)	1289 (2842)	1394 (3074)		
9	1030 (2272)	1136 (2504)	1241 (2736)	1346 (2968)	1439 (3172)		
10	1088 (2398)	1193 (2630)	1298 (2862)	1403 (3094)			
11	1145 (2524)	1250 (2756)	1355 (2988)	1448 (3192)			
12	1202 (2650)	1307(2882)	1412 (3114)				

**Note:**

1. This configuration is only valid when populated with one 7045-SW4 switch drawer.
2. This configuration is only valid when populated with two 7045-SW4 switch drawers.
3. For systems with slimline doors subtract 9 kg (19 lb).

*Table 91. Approximate system weights with acoustical covers and with integrated battery backup – kg (lb)<sup>3</sup>*

Number of processor drawers	Drawers (I/O and switches)						
	0	1	2	3	4	5	6
1	620 (1367)	725 (1599)	824 (1817) <sup>1</sup>	923 (2035) <sup>2</sup>			
2	677 (1493)	894 (1972)	1111 (2450)	1210 (2668) <sup>1</sup>	1309 (2886) <sup>2</sup>		
3	958 (2112)	1063 (2344)	1169 (2576)	1274 (2808)	1373 (3026) <sup>1</sup>	1472 (3244) <sup>2</sup>	
4	1015 (2238)	1121 (2470)	1226 (2702)	1331 (2934)	1436 (3167)	1535 (3385) <sup>1</sup>	Not supported
5	1072 (2364)	1178 (2596)	1283 (2828)	1388 (3061)	1493 (3293)		
6	1130 (2490)	1235 (2723)	1340 (2955)	1445 (3187)	1551 (3419)		
7	1187 (2617)	1292 (2849)	1397 (3081)	1503 (3313)			
8	1244 (2743)	1349 (2975)	1455 (3207)	1560 (3439)			
9	1301 (2869)	1406 (3101)	1512 (3333)				

Table 91. Approximate system weights with acoustical covers and with integrated battery backup – kg (lb)<sup>3</sup> (continued)

Number of processor drawers	Drawers (I/O and switches)						
	0	1	2	3	4	5	6
10	1358 (2995)	1464 (3227)	1569 (3459)				
11	1416 (3121)	1521 (3353)					
12	1473 (3247)	1578 (3479)					

**Note:**

1. This configuration is only valid when populated with one 7045-SW4 switch drawer.
2. This configuration is only valid when populated with two 7045-SW4 switch drawers.
3. For systems with slimline doors subtract 9 kg (19 lb).

## Weight distribution

Use the Floor loading dimensions figure and the Floor loading for system tables to determine the floor loading for various configurations.

The following figure shows the floor loading dimensions for the model 9118-575. Use this figure in conjunction with the floor loading tables to determine the floor loading for various configurations.



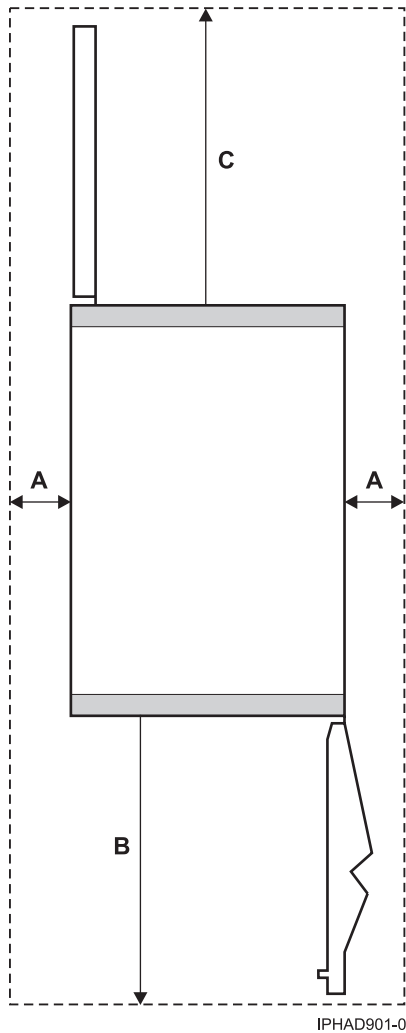


Figure 36. Floor loading dimensions

The following table shows the values used for calculating floor loading for model 9118-575. Weights include covers, width and depth are indicated without covers.

Table 92. Floor loading for system with 12 processors, 2 I/O drawers, and without integrated battery backup

Floor loading for system with 12 processors, 2 I/O drawers, and without integrated battery backup							
a (sides)		b (front)		c (back)		1 frame	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	206.6	1008.7
25	1.0	508	20.0	508	20.0	168.0	820.4
25	1.0	762	30.0	762	30.0	143.0	698.1
254	10.0	254	10.0	254	10.0	140.6	686.3
254	10.0	508	20.0	508	20.0	116.0	566.5
254	10.0	762	30.0	762	30.0	100.1	488.7
508	20.0	254	10.0	254	10.0	107.3	523.9
508	20.0	508	20.0	508	20.0	89.8	438.6
508	20.0	762	30.0	762	30.0	78.5	383.2

Table 92. Floor loading for system with 12 processors, 2 I/O drawers, and without integrated battery backup (continued)

Floor loading for system with 12 processors, 2 I/O drawers, and without integrated battery backup							
a (sides)		b (front)		c (back)		1 frame	
762	30.0	254	10.0	254	10.0	88.9	434.1
762	30.0	508	20.0	508	20.0	75.3	367.9
762	30.0	762	30.0	762	30.0	66.5	324.8

**Notes:**

1. Floor calculations should not be based on a weight shed area beyond 30 in. from each side of the system.
2. All floor calculations are intended for a raised-floor environment.
3. Contact your IBM installation planning representative or structural engineer for further assistance with calculating floor load.

Table 93. Floor loading for system with 12 processors, 1 I/O drawer, and with integrated battery backup

Floor loading for system with 12 processors, 1 I/O drawer, and with integrated battery backup							
a (sides)		b (front)		c (back)		1 frame	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	229.1	1118.5
25	1.0	508	20.0	508	20.0	185.7	906.9
25	1.0	762	30.0	762	30.0	157.6	769.5
254	10.0	254	10.0	254	10.0	154.9	756.2
254	10.0	508	20.0	508	20.0	127.3	621.5
254	10.0	762	30.0	762	30.0	109.4	534.1
508	20.0	254	10.0	254	10.0	117.5	573.7
508	20.0	508	20.0	508	20.0	97.9	477.8
508	20.0	762	30.0	762	30.0	85.1	415.5
762	30.0	254	10.0	254	10.0	96.8	472.8
762	30.0	508	20.0	508	20.0	81.6	398.3
762	30.0	762	30.0	762	30.0	71.7	349.9

**Notes:**

1. Floor calculations should not be based on a weight shed area beyond 30 in. from each side of the system.
2. All floor calculations are intended for a raised-floor environment.
3. Contact your IBM installation planning representative or structural engineer for further assistance with calculating floor load.

Floor loading for the system is illustrated in the Proposed Floor Layout for Multiple Systems in *Considerations for multiple system installations*.

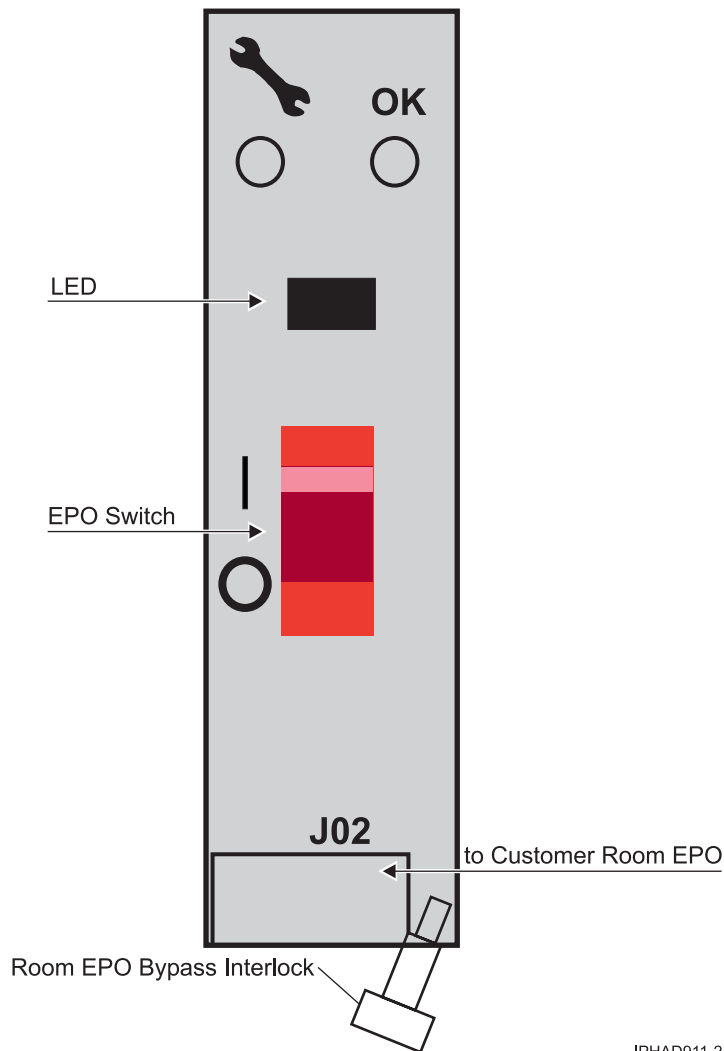
**Related reference:**

“Considerations for multiple-system installations” on page 62  
 Learn about the installation requirements for a multiple-system installation.

## Unit emergency power off

The server has a unit emergency power off (UEPO) switch on the front of the first frame (A Frame). When the switch is reset, the utility power is confined to the system power compartment, and all volatile data is lost.

Refer to the following figure, which shows a simplified UEPO panel.



IPHAD911-2

Figure 37. Unit emergency power off figure

It is possible to attach the computer room emergency power off (EPO) system to the system UEPO. When this is done, resetting the computer room EPO disconnects all power from the power cords and the internal battery backup unit, if it is provided. All volatile data will be lost in this case also.

If the room EPO is not connected to the UEPO, resetting the computer room EPO removes ac power from the system. If the interlock bypass feature is used, the system remains powered for a short time based on system configuration.

## Computer room emergency power off

You can incorporate the integrated battery backup into a computer room emergency power off (EPO) system. Otherwise, volatile data can be lost.

When the integrated battery backup is installed and the room EPO is reset, the batteries engage and the computer continues to run. It is possible to attach the computer room EPO system to the machine EPO. When this is done, resetting the room EPO disconnects all power from the power cords and the internal battery backup unit. In this event, all volatile data will be lost.

To incorporate the integrated battery backup into the room Emergency Power Off systems (EPO), a cable must connect to the back of the system EPO panel. The following figures illustrate how this connection is made.

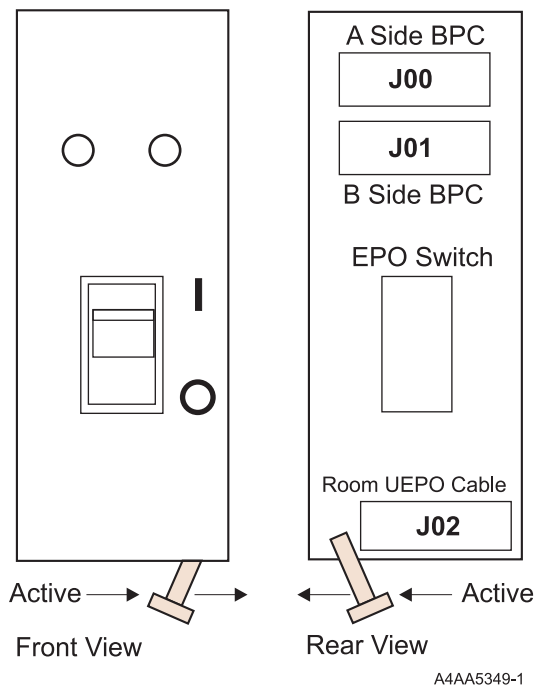
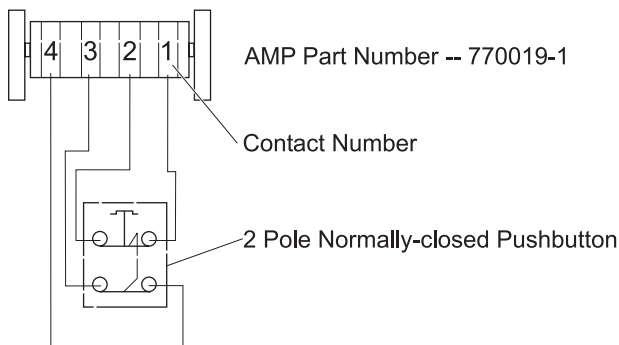


Figure 38. Computer room emergency power off figure

The preceding figure illustrates the back of the machine UEPO panel with the room EPO cable plugging into the machine. Notice the switch actuator. After it is moved to make the cable connection possible, the room EPO cable must be installed for the machine to power on.

In the following figure, AMP connector 770019-1 is needed to connect to the system EPO panel. For room EPO cables using wire sizes #20 AWG to #24 AWG, use AMP pins (part number 770010-4). This connection should not exceed 5 Ohms, which is approximately 61 m (200 ft) of #24 AWG.



Room UEPO Switch Schematic

Figure 39. AMP connector figure

## Machine holdup times

Use the Typical machine holdup time tables to determine the typical machine holdup times (time versus load) for fresh and aged batteries.

The following criteria apply to both machine holdup time tables.

- All times are listed in minutes.
- Machine load is listed in total ac input power (power for both power cords combined).
- A fresh battery is defined as 2.5 years old or less.
- An aged battery is defined as 6.5 years.

**Note:** Battery capacity decreases gradually as the battery ages (from fresh-battery value to aged-battery value). The system diagnoses a failed-battery condition if the capacity decreases below the aged-battery value.

Table 94. Typical machine-holdup time versus load for fresh battery

Typical machine-holdup time versus load for fresh battery														
Machine load	3.3 kW		6.67 kW		10 kW		13.33 kW		16.67 kW		20 kW		21.67 kW	
Integrated battery backup configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	7.0	21.0	2.1	7.0										
2 BPR	21.0	50.0	7.0	21.0	4.0	11.0	2.1	7.0						
3 BPR	32.0	68.0	12.0	32.0	7.0	21.0	4.9	12.0	3.2	9.5	2.1	7.0	1.7	6.5
N=Nonredundant, R=Redundant														

Table 95. Typical machine-holdup time versus load for aged battery

Typical machine-holdup time versus load for aged battery														
Machine load	3.3 kW		6.67 kW		10 kW		13.33 kW		16.67 kW		20 kW		21.67 kW	
Integrated battery backup configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	4.2	12.6	1.3	4.2										
2 BPR	12.6	30.0	4.2	12.6	2.4	6.6	1.3	4.2						
3 BPR	19.2	41.0	7.2	19.2	4.2	12.6	2.9	7.2	1.9	5.7	1.3	4.2	1.0	3.9
N=Nonredundant, R=Redundant														

Table 96. Bulk power regulator rules

Bulk power regulator (BPR) per bulk power assembly (BPA) rules <sup>5</sup>							
Number of processor drawers	Number of I/O drawers and switch drawers						
	0	1	2	3	4	5	6
1	1 <sup>2</sup>	1 <sup>2</sup>	1 <sup>2</sup>	1 <sup>2</sup>	Not applicable <sup>1</sup>	Not applicable <sup>1</sup>	Not applicable
2	1 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	Not applicable <sup>1</sup>	Not applicable
3	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	3 <sup>2</sup>	3 <sup>2</sup>	3 <sup>2</sup>	Not applicable
4	3 <sup>2</sup>	3 <sup>2</sup>	3 <sup>2</sup>	3 <sup>2</sup>	3 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>
5	3 <sup>2</sup>	3 <sup>2</sup>	3 <sup>3</sup>	3 <sup>3</sup>	3 <sup>3</sup>	3 <sup>3</sup>	Not applicable
6	3 <sup>3</sup>	3 <sup>3</sup>	3 <sup>3</sup>	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	Not applicable

Table 96. Bulk power regulator rules (continued)

Bulk power regulator (BPR) per bulk power assembly (BPA) rules <sup>5</sup>							
7	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	Not applicable
8	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>4</sup>	Not applicable	Not applicable
9	3 <sup>4</sup>	3 <sup>4</sup>	3 <sup>5</sup>	3 <sup>5</sup>	3 <sup>5</sup>	Not applicable	Not applicable
10	3 <sup>5</sup>	3 <sup>5</sup>	3 <sup>5</sup>	3 <sup>5</sup>	Not applicable	Not applicable	Not applicable
11	3 <sup>5</sup>	3 <sup>5</sup>	3 <sup>5</sup>	3 <sup>5</sup>	Not applicable	Not applicable	Not applicable
12	3 <sup>5</sup>	3 <sup>5</sup>	3 <sup>5</sup>	Not applicable	Not applicable	Not applicable	Not applicable
13	3 <sup>3</sup>	3 <sup>3</sup>	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
14	3 <sup>3</sup>	3 <sup>3</sup>	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

The following notes apply to the preceding table.

**Note:**

- Maximum of two 7045-SW4 switches in rack and one 5791 or 5794 per processor drawer.
- Power cord and bulk power jumper rules for this configuration:

60 A cord allowed	60 A cord redundant	Other cords redundant	Bulk power jumper provided
Yes	Yes	Yes	No

- Power cord and bulk power jumper rules for this configuration:

60 A cord allowed	60 A cord redundant	Other cords redundant	Bulk power jumper provided
Yes	No	Yes	Yes - for 60 A cords No - for other cords

- Power cord and bulk power jumper rules for this configuration:

60 A cord allowed	60 A cord redundant	Other cords redundant	Bulk power jumper provided
Yes	No	No	Yes

- Power cord and bulk power jumper rules for this configuration:

60 A cord allowed	60 A cord redundant	Other cords redundant	Bulk power jumper provided
No	Not applicable	No	Yes

## Model 9119-FHA server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 97. Rack dimensions

Dimensions	Rack only	Rack with side doors
Height	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)
Width	749.3 mm (29.5 in.)	784.86 mm (30.9 in.)
Depth	1272.54 mm (50.1 in.)	1272.54 mm (50.1 in.)

Table 98. Slimline door dimensions

Dimensions	One frame	Two frame	Front and rear door heat exchanger system unit frame
Height	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)
Width	784.86 mm (30.9 in.)	1567.18 mm (61.7 in.)	784.86 mm (30.9 in.)
Depth	1485.9 mm (58.5 in.)	1485.9 mm (58.5 in.)	1521.46 mm (59.9 in.)

Table 99. Acoustic door dimensions

Dimensions	One frame	Two frame	Front and rear door heat exchanger system unit frame
Height	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)
Width	784.86 mm (30.9 in.)	1567.18 mm (61.7 in.)	784.86 mm (30.9 in.)
Depth	1805.94 mm (71.1 in.)	1805.94 mm (71.1 in.)	1795.78 mm (70.7 in.)

Table 100. Full system weights (no covers)

Physical characteristics	Weight
Fully configured system unit frame	1451 kg (3200 lb)

Table 101. Cover weights

Physical characteristics	Weight
Side covers, pair	50 kg (110 lb)
Slimline door, single	15 kg (33 lb)
Acoustic door, single	25 kg (56 lb)

Table 102. Shipping dimensions

Physical characteristics	Dimensions
Height	231 cm (91 in.)
Width	94 cm (37 in.)
Depth	162 cm (63.5 in.)
Weight	Varies by configuration. The maximum weight is 1724 kg (3800 lb).

Table 103. Electrical and thermal characteristics for the US, Canada, Japan

Electrical and thermal characteristics	Properties	
Voltage and frequency	200 - 240 V ac at 50 - 60 Hz	
System rating, 5 GHz	48 A	80 A
System rating, 4.2 GHz	48 A	63 A
The system rating varies by configuration. See <i>Total system power consumption</i> to determine which system configurations have the higher rating.		

Table 104. Electrical and thermal characteristics for US high voltage

Electrical and thermal characteristics	Properties	
Voltage and frequency	480 V ac at 50 - 60 Hz	
System rating, 5 GHz	24 A	34 A
System rating, 4.2 GHz	24 A	24 A

Table 105. Electrical and thermal characteristics for the World Trade Corporation

Electrical and thermal characteristics	Properties			
Voltage and frequency	200 - 240 V ac at 50 - 60 Hz		380 - 415 V ac at 50 - 60 Hz	
System rating, 5 GHz	48 A	80 A	34 A	43 A
System rating, 4.2 GHz	48 A	63 A	34 A	34 A

Table 106. Electrical and thermal characteristics (Three-phase)

Electrical and thermal characteristics	Properties
Maximum power (fully configured 5 GHz system)	27.7 kW
Maximum power (fully configured 4.2 GHz system)	21.7 kW
Power factor	.99
Inrush current	250 <b>Note:</b> Refer to the Inrush current table.
Thermal output (5 GHz system) <sup>1</sup>	94.5 kBTU/hr
Thermal output (4.2 GHz system) <sup>1</sup>	74.1 kBTU/hr
<b>Note:</b> The system rating of the 9119-FHA is dependent on its configuration. See <i>Total system power consumption</i> for more information.	
<sup>1</sup> Power draw and heat load vary greatly by configuration. When planning for an electrical system, it is important to use maximum values. However, when planning for heat load, the IBM Systems Energy Estimator allows a user to obtain a heat output estimate based on a specific configuration. See The IBM Systems Energy Estimator web site for more information.	

Table 107. Inrush current. Inrush current per phase of each line cord to BPE

BPR number	208 V ac amperage	208 time (micro seconds)	480 V ac amperage	480 time (micro seconds)
Zero	100	20	120	20
One	110	150	140	150
Two	140	150	170	150



Table 107. Inrush current (continued). Inrush current per phase of each line cord to BPE

BPR number	208 V ac amperage	208 time (micro seconds)	480 V ac amperage	480 time (micro seconds)
Three	170	150	210	150
Four	200	150	250	150

Table 108. Environment specifications

Environment	Properties	Operating	Storage	Shipping
Temperature	8 - 32-core	50 - 89.6°F (10 - 32°C)	33.8 - 140°F (1 - 60°C)	-40 - 140°F (-40 - 60°C)
Temperature	40 - 64-core	50 - 82.4°F (10 - 28°C)	33.8 - 140°F (1 - 60°C)	-40 - 140°F (-40 - 60°C)
Relative humidity		20 - 80%	5 - 80%	5 - 100%
Maximum altitude	8 - 32 core	3048 m (10 000 ft)		
	40 - 64 core	2133 m (7000 ft)		

Table 109. Declared acoustical noise emissions for typical configuration of the 9119-FHA

Product configuration	Declared A-Weighted Sound Power Level, $L_{WAd}$ (B)		Declared A-Weighted Sound Pressure Level, $L_{pAm}$ (dB)	
	Operating	Idling	Operating	Idling
5.0-GHz, Typical configuration with acoustical door set: five processor nodes (40-core), three I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8.0 <sup>4</sup>	8.0 <sup>4</sup>	62	62
5.0-GHz, Typical configuration with nonacoustical (slimline) door set: five processor nodes (40-core), three I/O drawers, and bulk power assembly. Blowers at nominal speeds.	9.0 <sup>6</sup>	9.0 <sup>6</sup>	72	72
5.0-GHz, Typical configuration with rear door heat exchanger option and acoustical door set: five processor nodes (40-core), three I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8.5	8.5	70	70

Table 109. Declared acoustical noise emissions for typical configuration of the 9119-FHA (continued)

Product configuration	Declared A-Weighted Sound Power Level, $L_{WAd}$ (B)		Declared A-Weighted Sound Pressure Level, $L_{pAm}$ (dB)	
	Operating	Idling	Operating	Idling
4.2-GHz, Typical configuration with acoustical door set: five processor nodes (40-core), two I/O drawers, and bulk power assembly. Blowers at nominal speeds.	7.7 <sup>5</sup>	7.7 <sup>5</sup>	60	60
4.2-GHz, Typical configuration with nonacoustical (slimline) door set: five processor nodes (40-core), two I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8.5	8.5	68	68
4.2-GHz, Typical configuration with rear door heat exchanger option and acoustical door set: five processor nodes (40-core), two I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8.0 <sup>4</sup>	8.0 <sup>4</sup>	65	65

<sup>1</sup>Declared level  $L_{WAd}$  is the upper-limit A-weighted sound power level. Declared level  $L_{pAm}$  is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.

<sup>2</sup>All measurements are made in conformance with ISO 7779 and are declared in conformance with ISO 9296.

<sup>3</sup>1 Bel (B) equals 10 Decibels (dB).

<sup>4</sup>Meets IT Product Noise Limits for, *Generally Unattended Data Center*, per Statskontoret Technical Standard 26:6.

<sup>5</sup>Meets IT Product Noise Limits for, *Generally Attended Data Center*, per Statskontoret Technical Standard 26:6.

**Note:** <sup>6</sup> Government regulations (such as those prescribed by Occupational Safety and Health Administration (OSHA) or European Community Directives) might govern noise level exposure in the workplace and might apply to you and your server installation. This IBM system is available with an optional acoustical door feature that can help reduce the noise emitted from this system. The actual sound pressure levels in your installation depend on; a variety of factors, including the number of racks in the installation, the size, materials, the configuration of the room where you designate the racks to be installed, the noise levels from other equipment, the room ambient temperature, and employees' location in relation to the equipment. Compliance with such government regulations also depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. It is recommended that you consult qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Table 110. Declared acoustical noise emissions for maximum configuration of the 9119-FHA

Product Configuration	Declared A-Weighted Sound Power Level, $L_{WAd}$ (B)		Declared A-Weighted Sound Pressure Level, $L_{pAm}$ (dB)	
	Operating	Idling	Operating	Idling
5.0-GHz, Maximum configuration with acoustical door set: eight processor nodes (64-core), three I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8.3	8.3	65	65
5.0-GHz, Maximum configuration with nonacoustical (slimline) door set: eight processor nodes (64-core), three I/O drawers, and bulk power assembly. Blowers at nominal speeds.	9.3 <sup>6</sup>	9.3 <sup>6</sup>	76	76
5.0-GHz, Maximum configuration with rear door heat exchanger option and acoustical door set: eight processor nodes (64-core), three I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8.9 <sup>6</sup>	8.9 <sup>6</sup>	73	73
4.2-GHz, Maximum configuration with acoustical door set: eight processor nodes (64-core), two I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8	8	62	62
4.2-GHz, Maximum configuration with nonacoustical (slimline) door set: eight processor nodes (64-core), two I/O drawers, and bulk power assembly. Blowers at nominal speeds.	9.0 <sup>6</sup>	9.0 <sup>6</sup>	72	72

Table 110. Declared acoustical noise emissions for maximum configuration of the 9119-FHA (continued)

Product Configuration	Declared A-Weighted Sound Power Level, $L_{WAd}$ (B)		Declared A-Weighted Sound Pressure Level, $L_{pAm}$ (dB)	
	Operating	Idling	Operating	Idling
4.2-GHz, Maximum configuration with rear door heat exchanger option and acoustical door set: eight processor nodes (64-core), two I/O drawers, and bulk power assembly. Blowers at nominal speeds.	8.5	8.5	68	68

<sup>1</sup>Declared level  $L_{WAd}$  is the upper-limit A-weighted sound power level. Declared level  $L_{pAm}$  is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.

<sup>2</sup>All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.

<sup>3</sup>1 Bel (B) equals 10 Decibels (dB).

<sup>4</sup> Meets IT Product Noise Limits for, *Generally Unattended Data Center*, per Statskontoret Technical Standard 26:6.

<sup>5</sup> Meets IT Product Noise Limits for, *Generally Attended Data Center*, per Statskontoret Technical Standard 26:6.

**Note:** <sup>6</sup> Government regulations (such as those prescribed by OSHA or European Community Directives) might govern noise level exposure in the workplace and might apply to you and your server installation. This IBM system is available with an optional acoustical door feature that can help reduce the noise emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation, the size, materials, the configuration of the room where you designate the racks to be installed, the noise levels from other equipment, the room ambient temperature, and employees' location in relation to the equipment. Compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. It is recommended that you consult qualified experts in this field to determine whether you are in compliance with the applicable regulations.

## Electromagnetic compatibility compliance

This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 2004/108/EC; BSMI (CNS-13438, 2006 - Certification in Taiwan is for 220 V ac/60 Hz only); AS/NZS CISPR 22: 2006; ICES/NMB-003; Korean EMI/EMC (RLL Notice 2007-69, Notice 2007-71); People's Republic of China Commodity Inspection Law

The 6954 base rack is an optional second base frame with its own separate connection to AC power that is designed for use with model 9119-FHA For a complete set of planning information refer to *Planning for 6954 and 6953 racks*.

### Related reference:

"Planning for 6954 and 6953 racks" on page 375

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

## Power cord features

Use the Power cord features table to view the power cord specifications available for your server.

The following three-phase power cord features are available for the three-phase model 9119-FHA.

Table 111. Power cord features

Supply type	Nominal voltage range (V ac)	Voltage tolerance (V ac)	Frequency range (Hz)
Two redundant three-phase power cords	200 - 480	180 - 508	47 - 63

Table 112. Power cord features

Feature Code	Description	Plug
8677 <sup>1</sup>	Power cord, 8 AWG, 4.3 m (14 ft), 380 - 415 V ac	none
8686	Power cord, 6 AWG, 4.3 m (14 ft), 200 - 240 V ac	IEC 60309, 100 A, 3P+E
8687	Power cord, 6 AWG, 1.8 m (6 ft), 200 - 240 V ac	IEC 60309, 100 A, 3P+E
8688	Power cord, 6 AWG, 4.3 m (14 ft), 200 - 240 V ac	IEC 60309, 60 A, 3P+E
8689	Power cord, 6 AWG, 1.8 m (6 ft), 200 - 240 V ac	IEC 60309, 60 A, 3P+E
8694 <sup>1</sup>	Power cord, 6 AWG, 4.3 m (14 ft), 380 - 415 V ac	none
8695 <sup>1</sup>	Power cord, 4 AWG, 4.3 m (14 ft), 200 - 240 V ac	none
8696	Power cord, 4 AWG, 4.3 m (14 ft), 200 - 240 V ac	IEC 60309, 100 A, 3P+E
8696 and Request for Price Quotation (RPQ) 8A1668	Power cord, 4 AWG, 1.8 m (6 ft), 200 - 240 V ac	IEC 60309, 100 A, 3P+E
8697	Power cord, 8 AWG, 4.3 m (14 ft), 480 V ac	IEC 60309, 30 A, 3P+E
8698	Power cord, 8 AWG, 1.8 m (6 ft), 480 V ac	IEC 60309, 30 A, 3P+E
8699	Power cord, 6 AWG, 4.3 m (14 ft), 480 V ac	IEC 60309 60 A
8699 and RPQ 8A1668	Power cord, 6 AWG, 1.8 m (6 ft), 480 V ac	IEC 60309 60 A
RPQ 8A1871	Power cord, 6 AWG, 4.3 m (14 ft), 380 - 415 V ac	RussellStoll 7328DP

<sup>1</sup>These power cords are shipped without a plug or receptacle. An electrician might be required to install the plug and receptacle to meet applicable country or region electrical codes.

## Doors and covers for the 9119-FHA

Doors and covers are an integral part of the system and are required for product safety, proper airflow and cooling, electromagnetic compatibility compliance, and, for certain options, acoustical noise reduction.

The following rear door options are available for model 9119-FHA:

- Acoustical door option

This feature provides a specially designed, noise-reducing door set for those who want lower noise levels in their data center or who might want to meet certain acoustical or noise exposure requirements. The acoustical door option consists of a set of special front and rear doors, each

approximately 250 mm (10 in.) in depth. It contains acoustical treatment and unique air flow ducts. The acoustical door set provides about a 10 dB (1.0 B) reduction in the overall noise emission level of the rack when compared to the non-acoustical (Slimline) door set. This is the default door set that is offered, in order to provide the lowest noise option available for any configuration of electronics in the rack itself.

**Note:** A special acoustical attachment is available to provide noise reduction when ordering the rear door heat exchanger.

- Slimline door option

This feature provides an option to take up less floor space, when space is be more critical than acoustical noise levels. The slimline door option consists of a front and rear door set, approximately 100 mm (4 in.) in depth, to be used in conjunction with the required rear-door heat exchanger previously described. Acoustical treatment is not available for the slimline door option, and the 9119-FHA system generally does not meet industry acoustical noise limits with this option installed. The slimline door set is offered as a selectable option for those who are more concerned with floor space than noise levels because each slimline door is about 150 mm (6 in.) less deep than each acoustical door.

- Rear door heat exchanger

The rear-door heat exchanger feature is a water-cooled device that is mounted on the rear of the rack to cool the air that is heated and exhausted by devices inside the rack. A supply hose delivers chilled, conditioned water to the heat exchanger. A return hose delivers warmed water back to the water pump or chiller. Each rear-door heat exchanger can remove up to 50 000 British thermal unit (Btu) (or approximately 15 000 watts) of heat from your data center. See *Planning for the installation of rear door heat exchangers* for more information.

**Note:** For declared levels of acoustical noise emissions, refer to *Acoustical noise emissions*.

**Related information:**

 [Planning for the installation of rear door heat exchangers](#)

## Plan views

Dimensional planning information is shown in this top down view of your server.

The following figure shows dimensional planning information for single-frame systems.

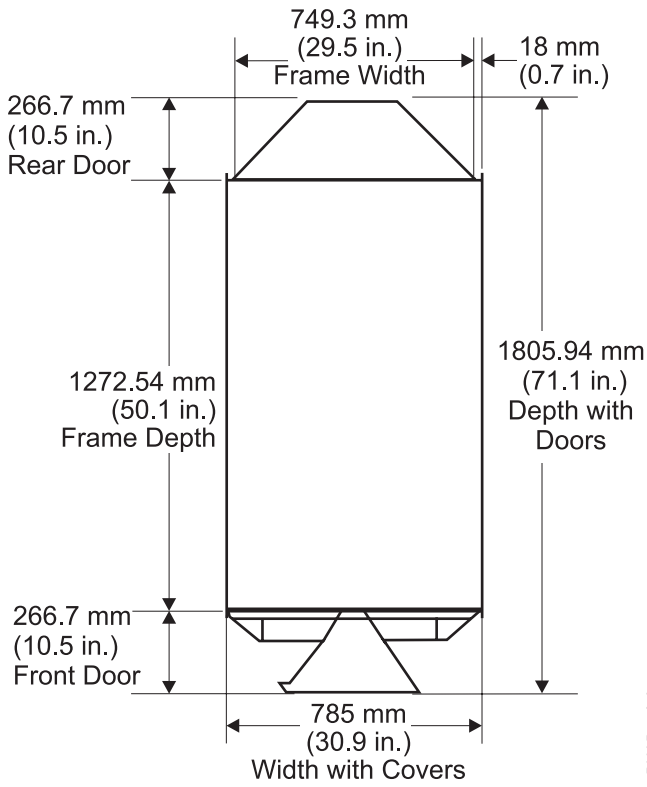


Figure 40. Plan view for single-frame systems with acoustical doors

The following figure shows dimensional planning information for single-frame systems.

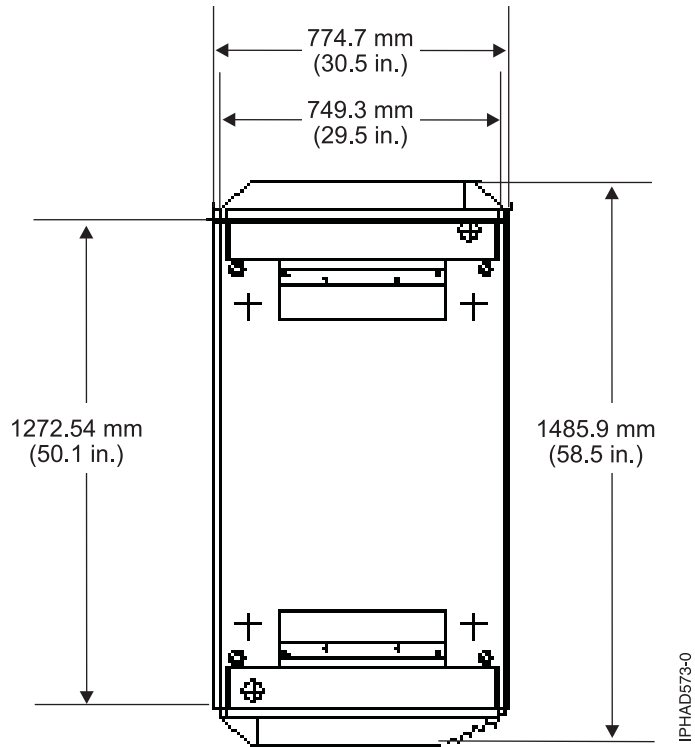


Figure 41. Plan view for single-frame systems with slimline doors

The following figure shows dimensional planning information for single-frame systems.



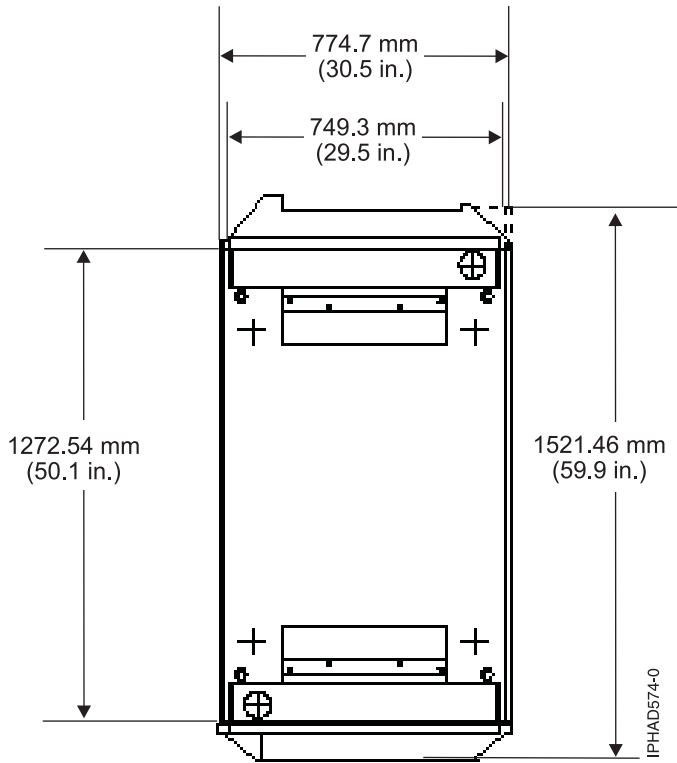


Figure 42. Plan view for single-frame systems with slimline doors and a Rear door heat exchanger

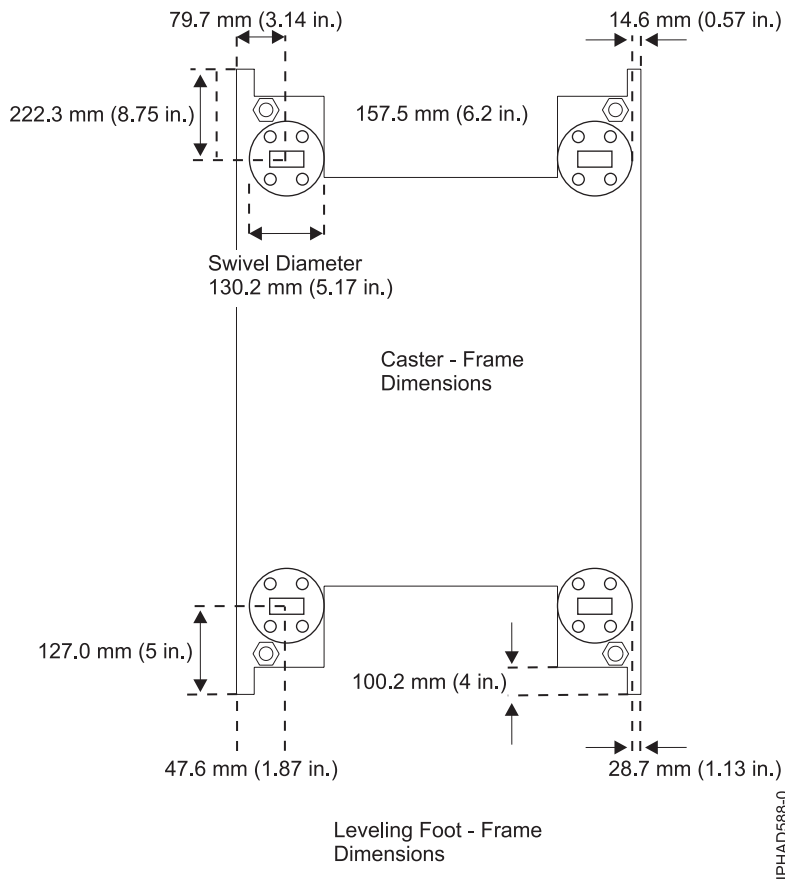


Figure 43. Leveling foot and frame dimensions

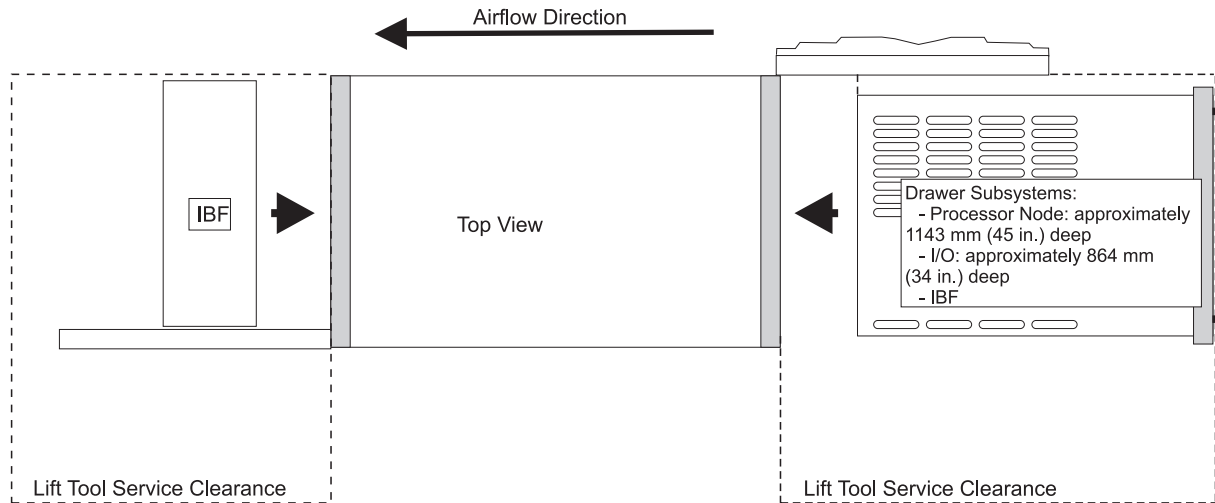
**Attention:** When planning for both the movement and positioning of the system, be aware that each caster swivels in an approximate 130 mm (5.1 in.) diameter.

## Raised-floor requirements and preparation

A raised floor is required for model 9119-FHA and its associated racks to ensure optimal performance and to comply with electromagnetic compatibility requirements.

A raised floor is required for all cabling on the system. Overhead cabling is not supported. Raised-floor cutouts should be protected by electrically non-conductive molding, appropriately sized, with edges treated to prevent cable damage and to prevent casters from rolling into the floor cutouts.

Front-service access is necessary on model 9119-FHA to accommodate a lift tool for the servicing of large drawers (the processor books and I/O drawers). Front and rear service access is necessary to accommodate the lift tool for servicing of the optional integrated battery backup.



Floor Plan Considerations for Single Units

A4AA5731-1

Figure 44. Floor plan considerations for single units

## Cutting and placing floor panels

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

Use the following procedure to cut and place floor panels in the raised floor. The x-y alphanumeric grid positions are used to identify relative positions of cutout floor panels that might be cut in advance.

1. Measure the panel size of the raised floor.
2. Verify the floor panel size. The floor panel size illustrated in the following figures is 600 mm (23.6 in.) and 610 mm (24 in.) panels.
3. Ensure adequate floor space is available to place the frames over the floor panels exactly as shown in the following figures. For front-to-back and side-to-side clearances, refer to *Considerations for multiple-system installations*. Use the plan view, if necessary. Consider all obstructions above and below the floor.
4. Identify the panels needed, and list the total quantity of each panel required for the installation.
- 5.

**Important:** Cut the required quantity of panels. When cutting the panels, you must adjust the size of the cut for the thickness of the edge molding you are using. The dimensions shown in the figures are finished dimensions. For ease of installation, number each panel as it is cut.

**Note:** For a multiple frame installation, two casters could produce loads as high as 2750 lb.

### Notes:

1. The weight distribution bar is a requirement for a model 9119-FHA on a raised floor. It is needed to maintain the integrity of the floor that holds the weight of the frame.
2. This floor-tile arrangement is recommended so that the casters or leveling pads are placed on separate floor tiles to minimize the weight on a single floor tile. Load bearing tiles that have cutouts might require additional pedestals to keep their structural integrity. Additionally, the cutouts span two tiles. Raised floors utilizing a stringer system should leave the stringer intact.

3. The *Raised floor with 610 mm (24 in.) floor panels figure* and *Raised floor with 600 mm (23.6 in.) floor panels figure* are intended only to show relative positions and accurate dimensions of floor cutouts. The figures are not intended to be a machine template and is not drawn to scale.

### Raised floor with 610 mm (24 in.) floor panels figure

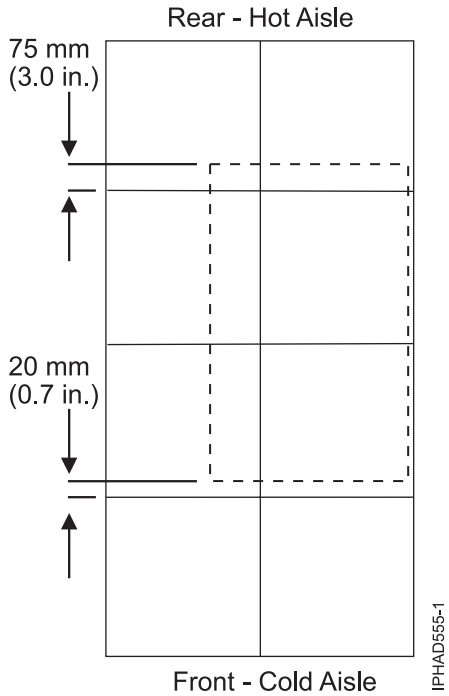


Figure 45. Rack placement for 610 mm (24 in.) tiles

This image shows an overview perspective of the rack placement on floor tiles. The dashed lines represent the rack. The solid lines are used for dimensions.

1. The rear of the server is placed 75 mm (3.0 in.) measuring up from the bottom edge of the first row tile.
2. The front of the server is placed 20 mm (0.7 in.) measuring up from the bottom edge of the third row tile.

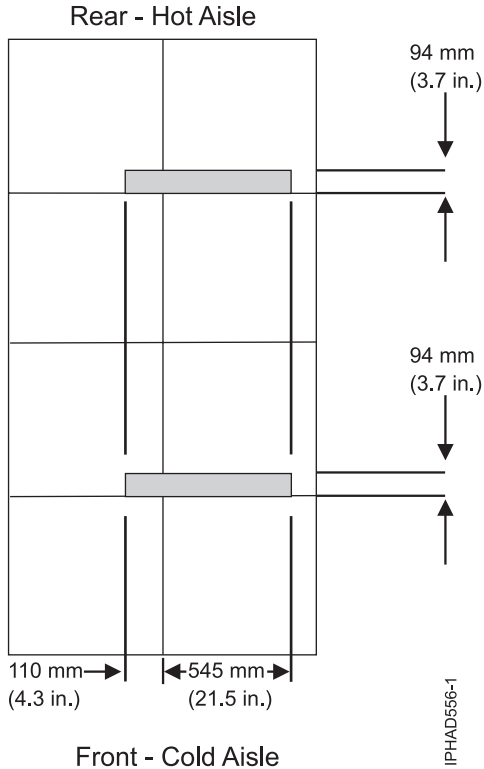


Figure 46. Cable cutout placement 610 mm (24 in.) tiles

This figure shows the floor cutouts for the cables. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width of the first cutout is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
2. The second cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width of the second cutout is 110 (4.3 in.) mm measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).

## Raised floor with 600 mm (23.6 in.) floor panels figure

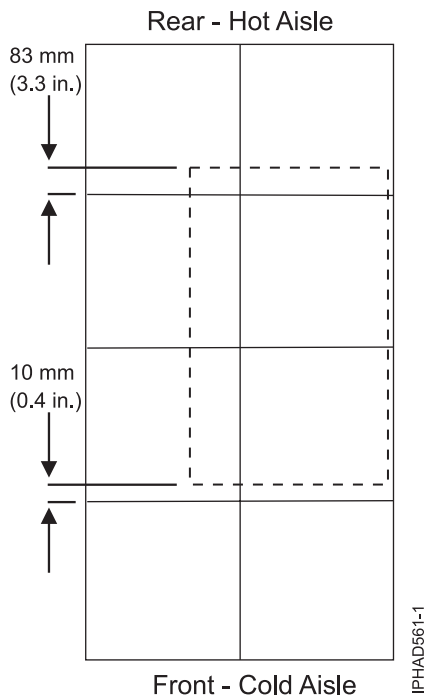


Figure 47. Rack placement for 600 mm (23.6 in.) tiles

This image shows an overview perspective of the rack placement on the floor tiles. The dashed lines represent the rack. The solid lines are used for dimensions.

1. The rear of the server is placed 83 mm (3.3 in.) measuring up from the bottom edge of the first row tile.
2. The front of the server is placed 10 mm (0.4 in.) measuring up from the bottom edge of the third row tile.

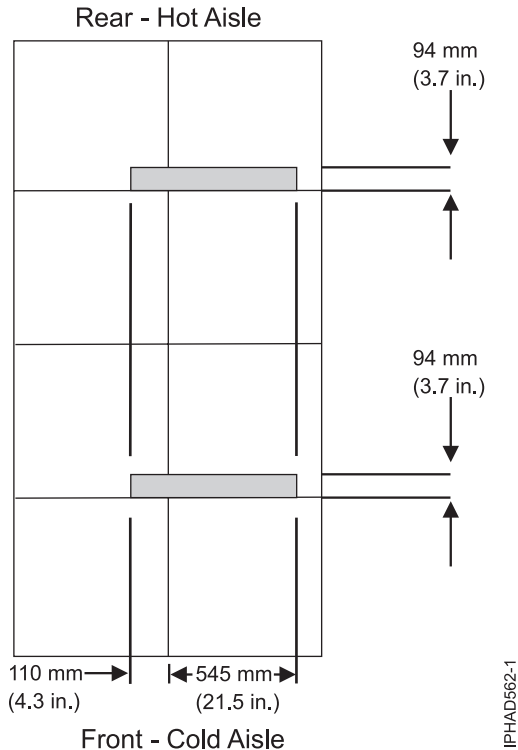


Figure 48. Cable cutout placement 600 mm (23.6 in.) tiles

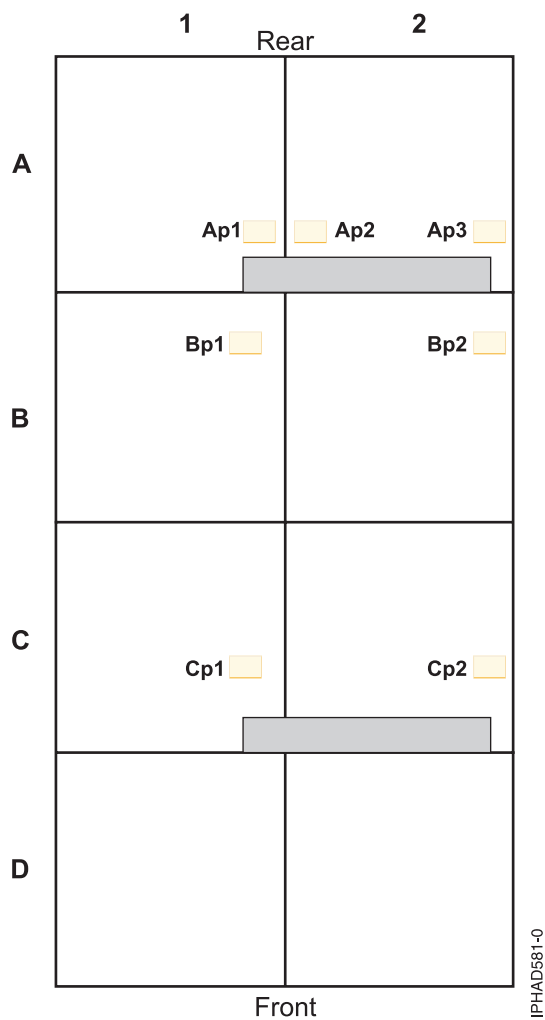
This figure shows the floor cutouts for the cables. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width of the first cutout is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
2. The second cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width of the second cutout is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).

### Additional pedestal placement

Placing large cutouts in the raised floor tiles, such as the cutouts needed for the 9119-FHA, can substantially change the structural integrity of each tiles. Additional support pedestals might be needed. Pedestals might be placed approximately under each caster position to prevent tiles from sagging. Pedestals might also be used to support the cut corners of floor tiles. Pedestals might be needed for tiles where the equipment is moving across, even though they are not permanent load bearing tiles. All pedestals should be installed and adjusted to barely contact the underside of each floor panel, before the frames are rolled into place. All pedestal locations are recommendations. Each facility is unique and additional pedestal supports might be needed for certain floors. You are responsible for verifying all floor loading capacities and requirements to determine where any additional pedestals might be needed.

**Note:** Use the following figure as an example of where the floor pedestals should be placed. It is only intended to show relative positions. This figure is not drawn to scale.



IPHAD581-0

Figure 49. Additional pedestal placement

**Important:** Extra pedestals might be placed as shown.

1. Pedestals Ap1, Ap2, and Ap3 might be used to support the cut corners of floor tiles. Although these floor tiles are not load-bearing after the machine is installed, the rolling loads put on these tiles during the installation of the machine can place high loads momentarily on these tiles.
2. Pedestals Bp1, Bp2, Cp1, and Cp2 might be placed under each caster position to prevent floor tiles from sagging.

**Related reference:**

“Installing the frame tie-down kit” on page 105

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

“Considerations for multiple-system installations” on page 114

Learn about the installation requirements for a multiple-system installation.

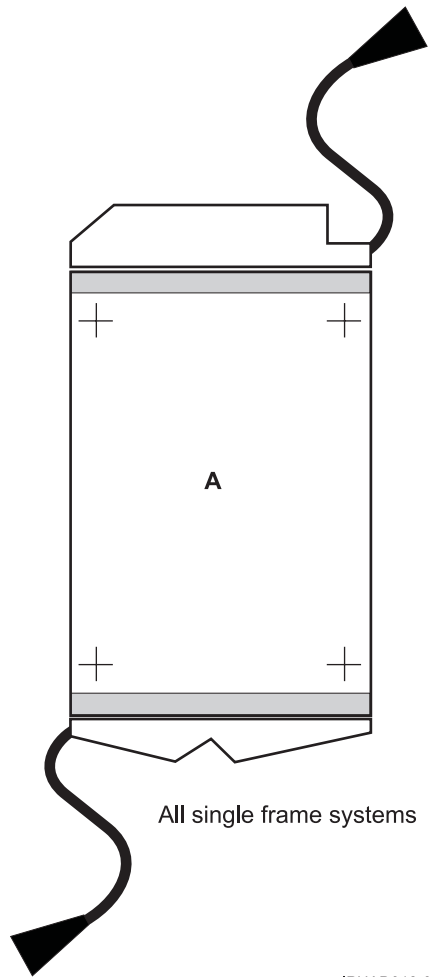
## Configuring power cords

Learn how to route power cords through floor tile cutouts.

The power cords exit the system from different points of the frame as indicated in the following figure. For raised-floor applications, if possible, route both cords to the rear of the frame and through the same



floor-tile cutout. For more information about raised-floor applications, refer to *Cutting and placing floor panels*.



IPHAD912-0

Figure 50. Single-frame system power cord configuration

### RPQ for overhead cabling

- RPQ 8A1715 enables a 9119-FHA frame to be installed on a non-raised floor environment without overhead cabling.
- RPQ 8A1732 enables a 9119-FHA frame to be installed with overhead I/O cabling in a raised floor environment.
- RPQ 8A1737 enables a 9119-FHA frame to be installed with overhead I/O cabling in a nonraised floor environment.
- RPQ 8A1735 enables feature code 6954, the Powered expansion rack, to be installed with overhead I/O cabling in a raised floor environment.

#### Related reference:

“Cutting and placing floor panels” on page 99

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

### Installing the frame tie-down kit

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

The following procedures describe how to install a frame tie-down kit and floor tie-down hardware to secure an IBM rack to a concrete floor beneath a 228.6 - 330.2 mm (9 -13 in. depth) or a 304.8 - 558.8 mm (12 - 22 in. depth) raised-floor environment or to a nonraised floor.

## Positioning the rack

Use this procedure to unpack and position your rack.

To unpack and position the rack, do the following steps:

**Note:** Before attempting to position the rack, see *Moving the system to the installation site*.

1. Remove all packing and tape from the rack.
2. Place the last floor covering exactly adjacent and in the front of the final installation location.
3. Position the rack according your floor plan.
4. Lock each caster wheel by tightening the thumbscrew on the caster.

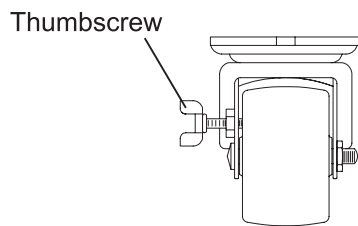


Figure 51. Caster thumbscrew

5. While moving the system to its final installed location and during relocation, it might be necessary to lay down floor covering, such as Lexan sheets, to prevent floor panel damage.

### Related reference:

“Moving the system to the installation site” on page 129

Several factors must be considered before moving the system to the installation site.

## Securing the rack

Securing your rack to a concrete (nonraised) floor or to a raised floor prevents movement when vibrations occur.

**Note:** Securing the rack is an optional procedure. See *Vibration and shock* for more information.

Before the service representative can perform the tie-down procedure, you must complete the floor preparation described in *Cutting and placing floor panels* and *Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor*.

### Related reference:

“Cutting and placing floor panels” on page 99

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

“Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor” on page 107

Use these steps to attach your rack to a 228.6 mm to 330.2 mm (9 in. to 13 in. depth). floor.

### Related information:

 [Vibration and shock](#)

## Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor

Use these steps to attach your rack to a 228.6 mm to 330.2 mm (9 in. to 13 in. depth). floor.

**Attention:** The frame tie downs are intended to secure a frame weighing less than 1429 kg (3150 lb). These tie downs are designed to secure the frame on a raised-floor installation.

Use the following to determine your next step:

1. If the rack is being attached to a short-depth raised-floor environment 228.6 - 330.2 mm (9 - 13 in. depth), install the Raised floor tie-down kit (part number 16R1102) described in the following table.

*Table 113. Raised floor tie-down kit 228.6 - 330.2 mm (9 - 13 in. depth)*

Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P2999	4	Turnbuckle Assembly

2. If the rack is being attached to a deep, raised-floor environment 304.8 - 558.8 mm (12 - 22 in. depth), install the Raised floor tie-down kit (part number 16R1103) described in the following table.

*Table 114. Raised floor tie-down kit 304.8 - 558.8 mm (12 - 22 in. depth)*

Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P3000	4	Turnbuckle Assembly

It is your responsibility to ensure that the following steps are completed before the service representative performs the tie-down procedure.

**Note:** To accommodate a floor with a depth of more than 558.8 mm (22 in.), a steel beam or a steel channel adapter for mounting the sub-floor eyebolts are required. The customer must supply the floor eyebolts.

Consider the following when preparing the floor for tie-down procedure:

- The hardware is designed to support a frame weighing no more than 1429 kg (3150 lb).
- The estimated maximum concentrated load on one caster for a 1429 kg (3150 lb) system is 476.3 kg (1050 lb). For a multiple-system installation, one floor tile might bear a total concentrated load of 952.5 kg (2100 lb).

To install the eyebolts, do the following steps:

1. Obtain the service of a qualified structural engineer to determine the appropriate installation of the eyebolts.
2. Consider the following before installing the eyebolts:
  - Floor eyebolts must be securely anchored to the concrete floor.
  - For a single-frame installation, four 1/2-in. diameter by 13-in. sub-floor eyebolts should be secured to the sub-floor.
  - The minimum height of the center of the internal diameter is 2.54 mm (1 in.) above the concrete floor surface.
  - The maximum height is 63.5 mm (2.5 in.) above the concrete floor surface. A height greater than 63.5 mm (2.5 in.) can cause excessive lateral deflection to the tie-down hardware.

- The eyebolt's internal diameter should be 1-3/16 inch, and each eyebolt should be able to withstand 1224.7 kg (2700 lb). The customer should obtain the services of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to ensure that the raised floor and the building can support the floor-loading specifications.
3. Verify that the four eyebolts are positioned to match the dimensions in the following figures:

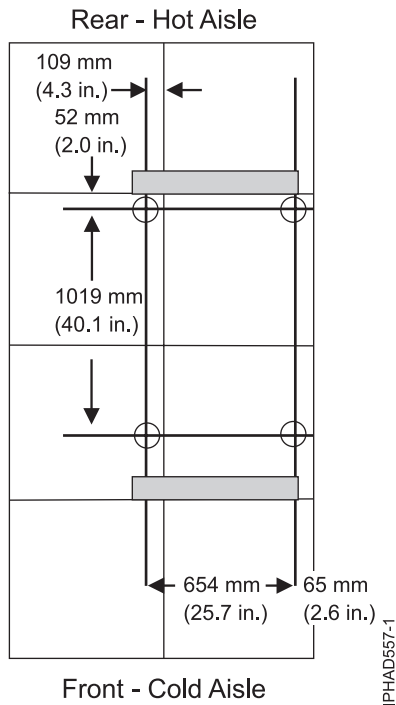


Figure 52. Single rack tiedown hole pattern. Raised floor with 610 mm (24 in.) floor panels figure

This figure shows the location of the rack tiedown for a single rack. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

- The first circle, located on the top left, is 109 mm (4.3 in.) measuring right from the right edge of the first column tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
- The second circle, located on the top right, is 65 mm (2.6 in.) measuring right from the right edge of the second column tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
- The third circle, located on the bottom left, is 109 mm (4.3 in.) measuring right from the right edge of the first column tile. It is 1019 mm (40.1 in.) measuring down from the first circle.
- The fourth circle, located on the bottom right, is 65 mm (2.6 in.) measuring right from the right edge of the second column tile. It is 1019 mm (40.1 in.) measuring down from the second circle.

Refer to *Install the frame tie-down kit* for instructions on how to install a frame tie-down kit and floor tie-down hardware.

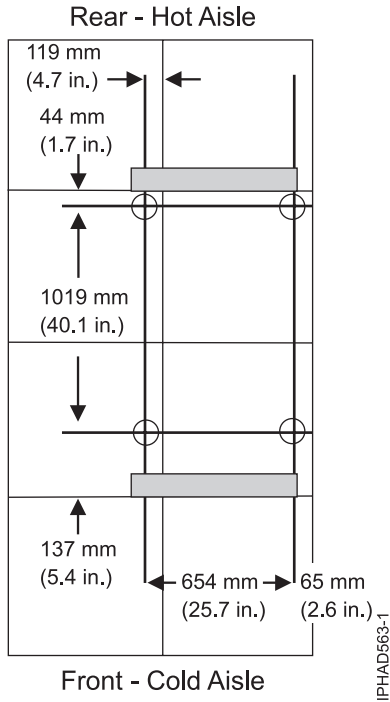
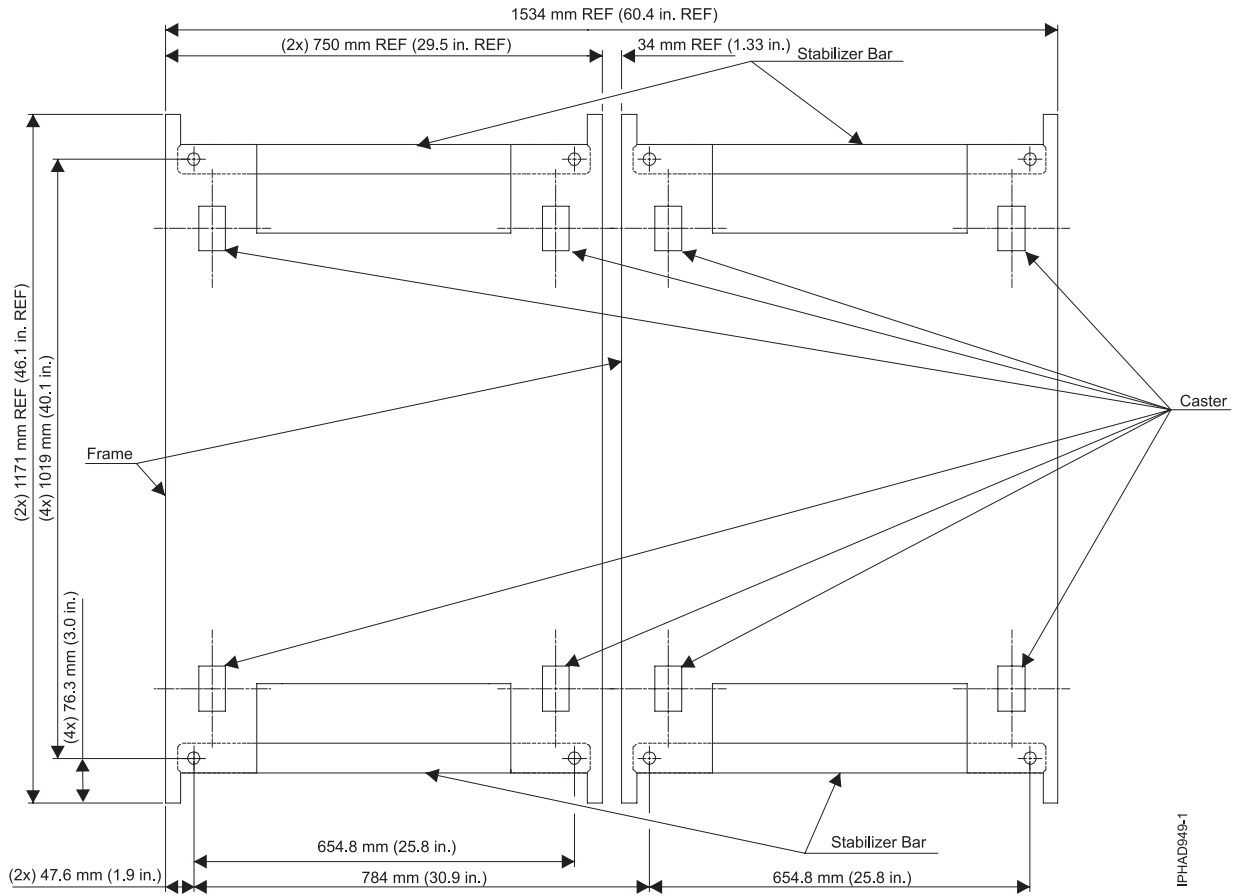


Figure 53. Rack tiedown hole pattern. Raised floor with 600 mm (23.6 in.) floor panels figure

This figure shows the location of the rack tiedown for a single rack. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

- a. The first circle, located on the top left, is 119 mm (4.7 in.) measuring from the right edge of the first column tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
- b. The second circle, located on the top right, is 65 mm (2.6 in.) measuring from the right edge of the second column tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
- c. The third circle, located on the bottom left, is 119 mm (4.7 in.) measuring from the right edge of the first column tile. It is 1019 mm (40.1 in.) measuring down from the first circle.
- d. The fourth circle, located on the bottom right, is 65 mm (2.6 in.) measuring from the right edge of the second column tile. It is 1019 mm (40.1 in.) measuring down from the second circle.

Refer to *Installing the frame tie-down kit* for instructions on how to install a frame tie-down kit and floor tie-down hardware.



IPHAD949-1

Figure 54. Stabilizer bar layout (top view)

4. Install the eyebolts to the floor. The service representative can now install the frame.

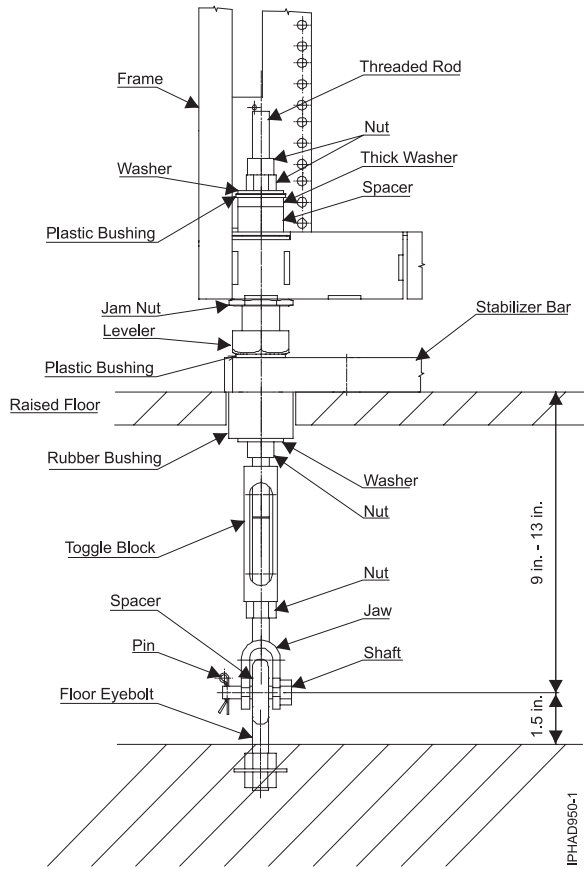


Figure 55. Turnbuckle assembly frame tie-down hardware for 228.6 - 330.2 mm (9 - 13 in.) raised floor (part number 44P2999)

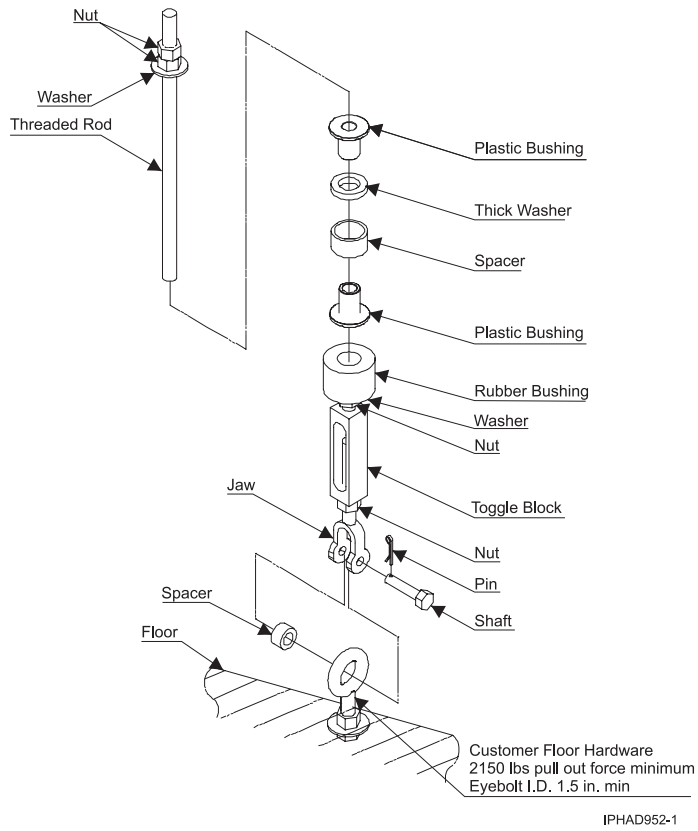


Figure 56. Turnbuckle assembly frame tie-down hardware for 228.6 - 330.2 mm (9 - 13 in.) raised floor (part number 44P2999)



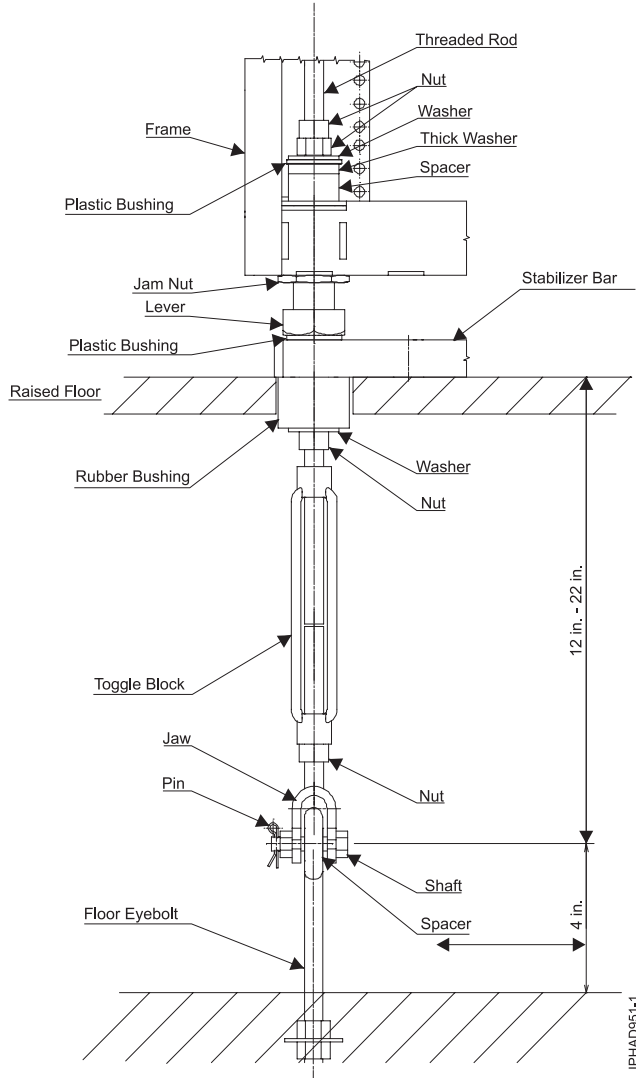


Figure 57. Turnbuckle assembly frame tie-down hardware for 304.8 - 558.8 mm (12 - 22 in.) raised floor (part number 44P3000)

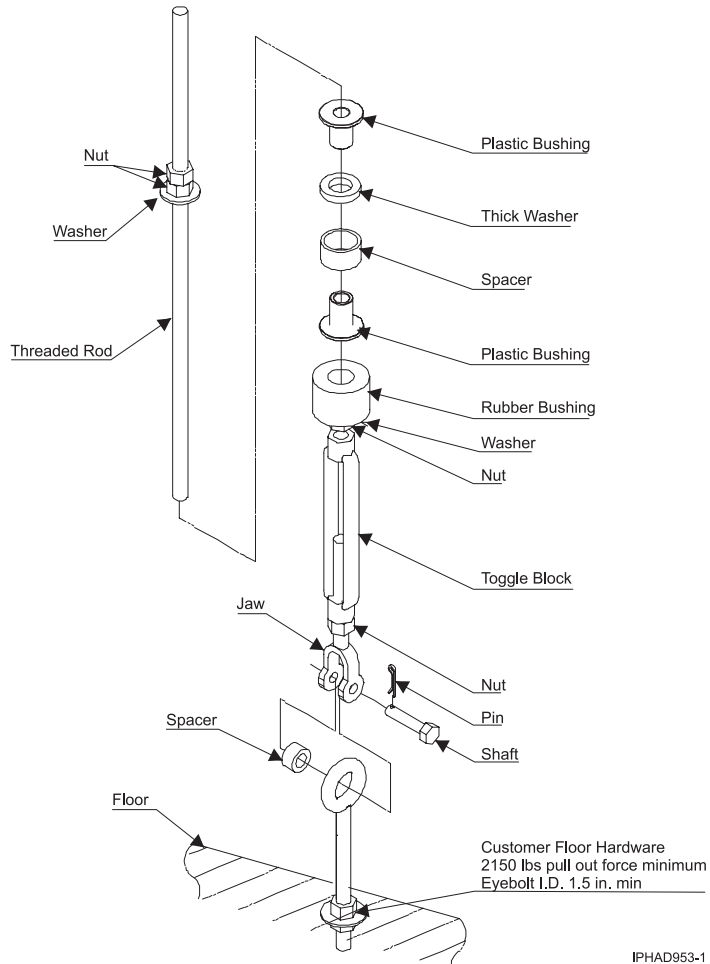


Figure 58. Turnbuckle assembly frame tie-down hardware for 304.8 - 558.8 mm (12 - 22 in.) raised floor (part number 44P3000)

## Considerations for multiple-system installations

Learn about the installation requirements for a multiple-system installation.

In a multiple-system installation, it is possible that a floor tile with cable cutouts (refer to *Cutting and placing floor panels*) will bear two concentrated static loads up to 476 kg (1050 lb) per caster and leveler. Thus, the total concentrated load can be as high as 1247.38 kg (2750 lb). Contact the floor tile manufacturer or consult a structural engineer to ensure that the raised-floor assembly can support this load.

When you are integrating model 9119-FHA into an existing multiple-system environment or when you are adding additional systems to an installed 9119-FHA, consider the following factors:

- Minimum aisle width

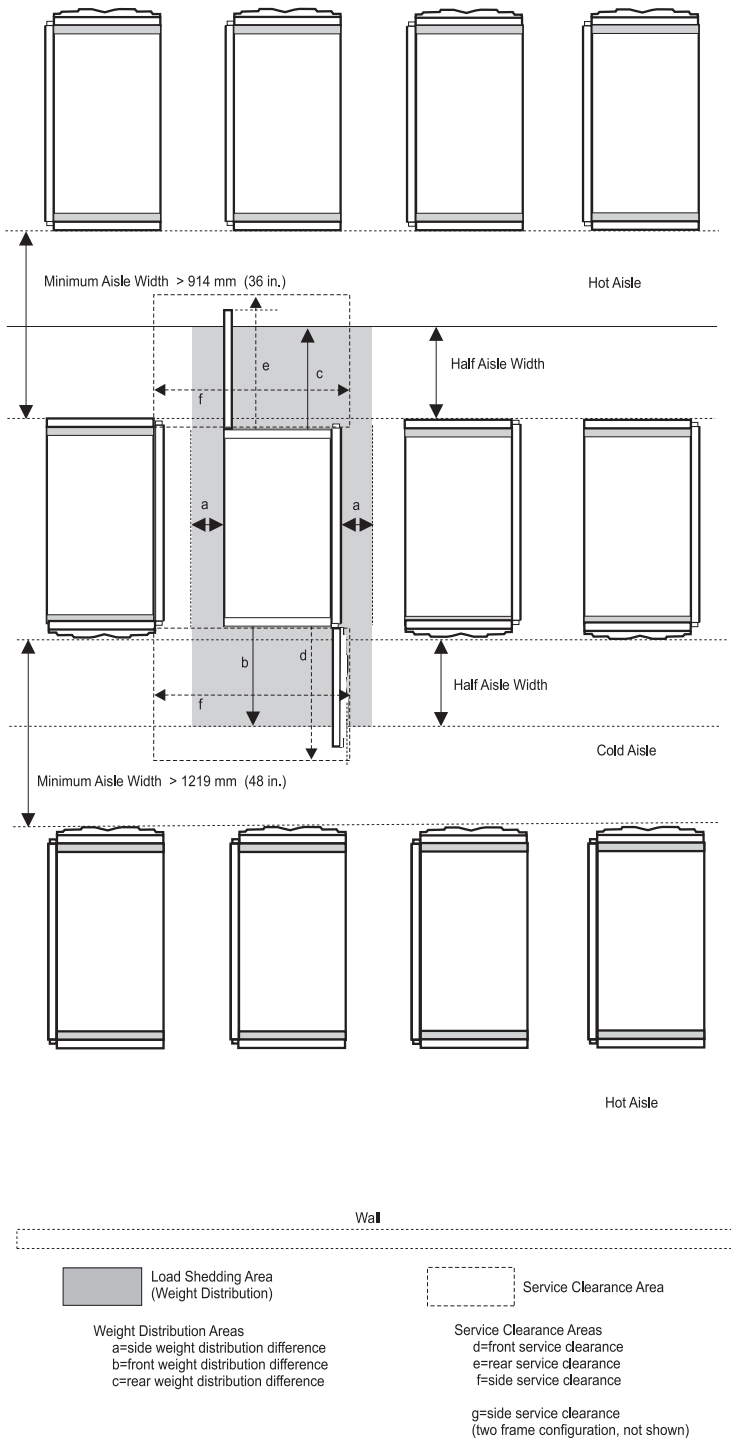
For multiple rows of systems containing one or more 9119-FHA models, the minimum aisle width in the front of the systems is 1219 mm (48 in.) and the minimum width in the rear of the systems is 914 mm (36 in.). The front and rear clearances are necessary for service operations. Service clearances are measured from the edges of the frame (with doors open) to the nearest obstacle.

- Thermal interactions

Systems should be faced front-to-front and rear-to-rear to create "cold" and "hot" aisles to maintain effective system thermal conditions, as shown in the following figure.

Cold aisles need to be of sufficient width to support the airflow requirements of the installed systems as indicated in *Cooling requirements*. The airflow per tile is dependent on the underfloor pressure and perforations in the tile. A typical underfloor pressure of 0.025 in. of water supplies 300 - 400 cubic feet per minute (CFM) through a 25% open 2 ft by 2 ft floor tile.

Proposed Floor Layout for Multiple Systems



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Figure 59. Proposed floor layout for multiple systems

Related reference:

“Cutting and placing floor panels” on page 99

These guidelines specify how to make the necessary openings in the raised floor for installing your

server.

“Cooling requirements” on page 126

Use the system cooling requirements and chilled airflow to determine the area of floor tiles that should supply chilled air to the system.

## Service clearances

The service clearance area is the area around the server that is needed for authorized service representatives to service the server.

The minimum service clearance for systems with slimline doors is shown in the following figures.

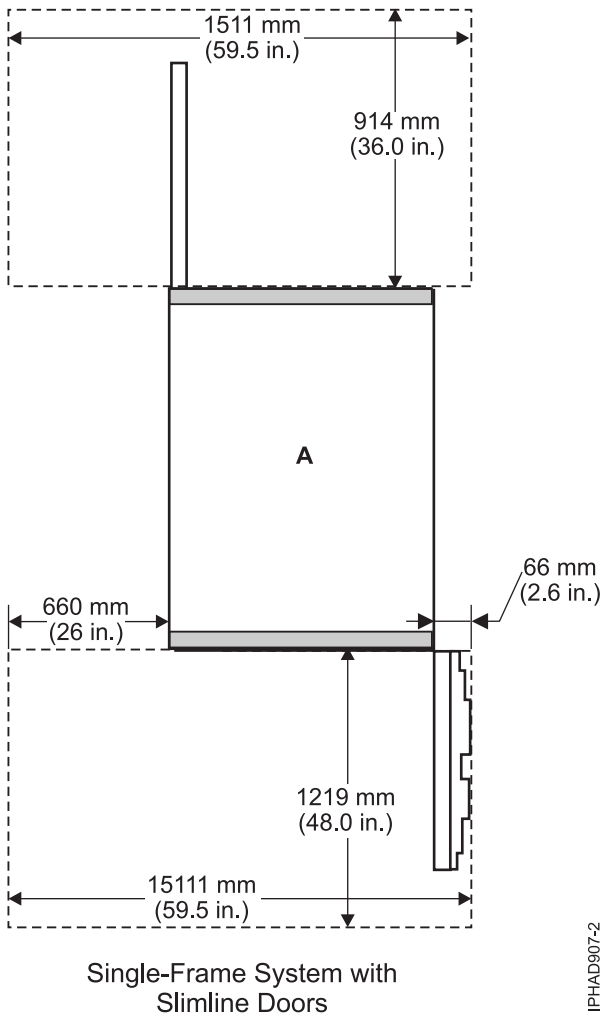
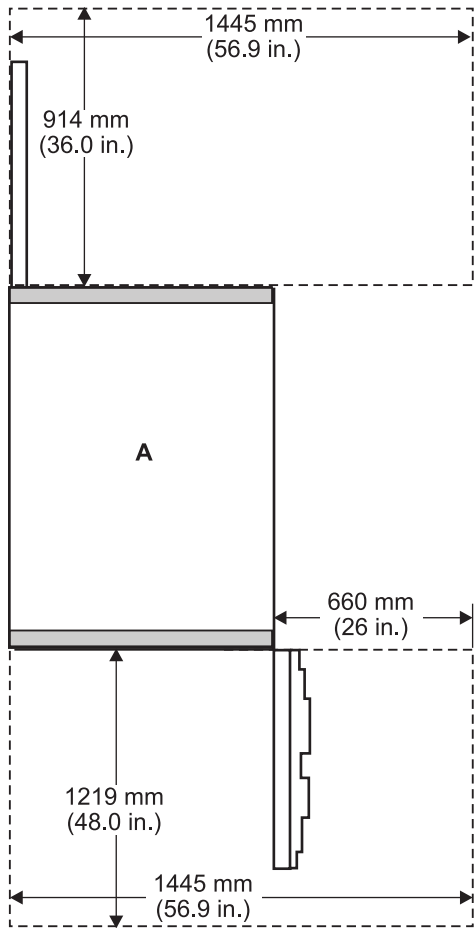


Figure 60. Service clearance for single system unit frame or single I/O rack with slimline doors



Single-Frame System with Slimline Doors (with alternative right-side service clearance)

IPHAD908-2

Figure 61. Service clearance for single system unit frame or single I/O rack with slimline doors (with alternative right side service clearance)

The minimum service clearance for systems with acoustical doors is shown in the following figures.

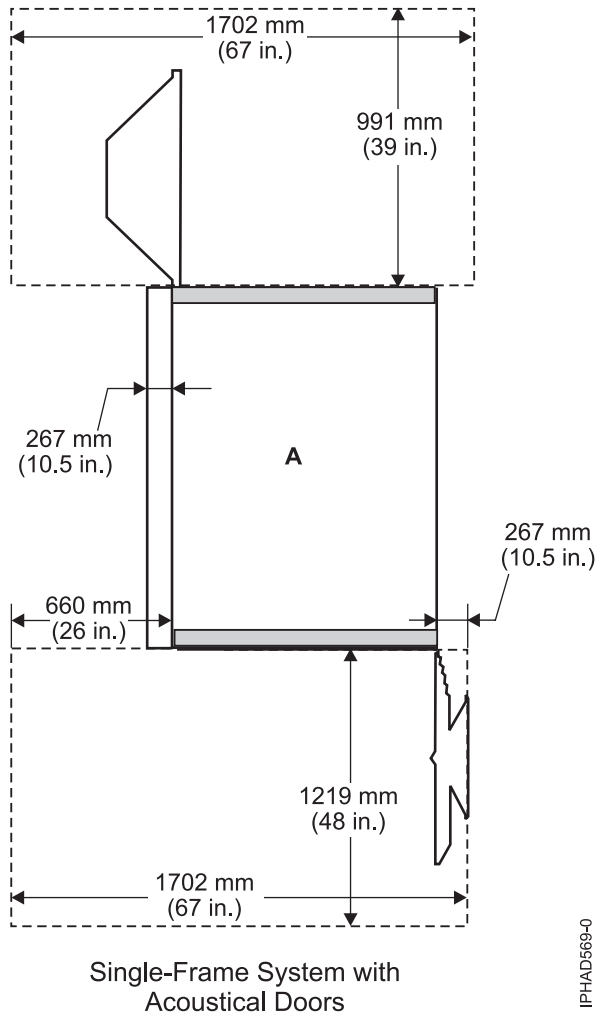
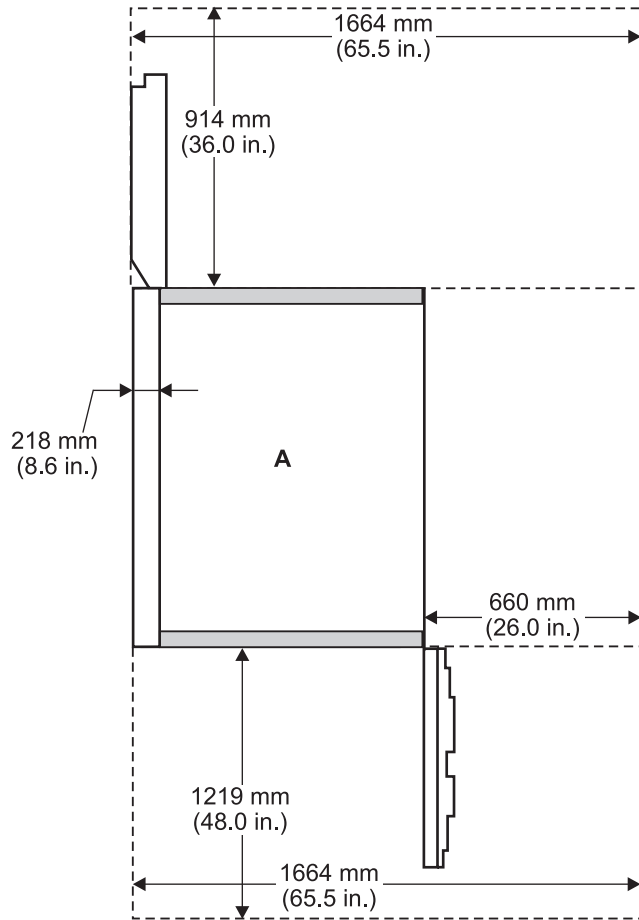


Figure 62. Service clearance for single system unit frame or single I/O rack with acoustic doors



Single-Frame System with  
Acoustical Doors (with  
alternative right-side  
service  
clearance)

IPHAD903-2

Figure 63. Service clearance for single system unit frame or single I/O rack with acoustic doors (with alternative right side service clearance)

Refer to the figure in *Raised-floor requirements and preparation* for service clearances that are shown in a raised-floor installation.

**Related reference:**

“Raised-floor requirements and preparation” on page 98

A raised floor is required for model 9119-FHA and its associated racks to ensure optimal performance and to comply with electromagnetic compatibility requirements.

**Total system power consumption**

Use the tables to determine the total system power consumption for your server's configuration.

The following tables show the maximum utility power in kilowatts. Actual system power is affected by memory configuration and system workload. The actual system power is typically less than the maximum listed amount. BPR current determines power cord size. Systems with 2 BPRs are unbalanced. A balanced power feature should be optionally available for customers whose configuration calls for 1 or 2 BPRs but want a simple way to achieve balanced three-phase power loading without having to custom wire their three-phase AC power distribution.



The configuration of the system determines the power cord that is needed. See *Power cord and breaker information* for more information. Amperage calculations based on the maximum measured power consumption could exceed the derated circuit breaker value. If this occurs based on the voltage used in the facility, the actual power consumption based on the configuration should be calculated.

Table 115. System power requirements for 5 GHz processor system in kW

Processor books (nodes)	I/O drawer			
	0	1	2	3
1	3.6 <sup>2</sup>	4.8 <sup>2</sup>	5.9 <sup>2</sup>	7.1 <sup>2</sup>
2	6.3 <sup>2</sup>	7.5 <sup>2</sup>	8.7 <sup>2</sup>	9.8 <sup>2</sup>
3	9.4 <sup>2</sup>	10.6 <sup>2</sup>	11.7 <sup>2</sup>	12.9 <sup>2</sup>
4	12.5 <sup>2</sup>	13.7 <sup>2</sup>	14.8 <sup>2</sup>	16.0 <sup>2</sup>
5	15.6 <sup>1</sup>	16.7 <sup>1</sup>	17.9 <sup>1</sup>	19.1 <sup>1</sup>
6	18.8 <sup>1</sup>	19.9 <sup>1</sup>	21.1 <sup>1</sup>	22.2 <sup>1</sup>
7	21.9 <sup>1</sup>	23.1 <sup>1</sup>	24.2 <sup>1</sup>	25.4 <sup>1</sup>
8	24.2 <sup>1</sup>	25.4 <sup>1</sup>	26.5 <sup>1</sup>	27.7 <sup>1</sup>

<sup>1</sup>A higher rated power cord is required.

<sup>2</sup>It is recommended that breakers and branch circuits be sized to accommodate the system rating. The ability to add additional processor books and I/O drawers can be restricted by the breaker rating. IBM cannot guarantee system availability with circuit breaker ratings that are below the system ratings. For each of these configurations operating at 380-415VAC, IBM supports the use of a 32 A breaker. Use of a 32 A breaker will not affect system warranty. Installations using smaller than recommended circuit breakers are subject to review by local electrical code enforcement or authorities having jurisdiction over the electrical installation.

Table 116. System power requirements for 4.2 GHz processor system in kW

Processor books (nodes)	I/O drawer			
	0	1	2	3
1	2.9 <sup>2</sup>	4.1 <sup>2</sup>	5.2 <sup>2</sup>	6.4 <sup>2</sup>
2	5 <sup>2</sup>	6.1 <sup>2</sup>	7.3 <sup>2</sup>	8.5 <sup>2</sup>
3	7.4 <sup>2</sup>	8.1 <sup>2</sup>	9.7 <sup>2</sup>	10.9 <sup>2</sup>
4	9.8 <sup>2</sup>	11.0 <sup>2</sup>	12.1 <sup>2</sup>	13.3 <sup>2</sup>
5	12 <sup>2</sup>	13.1 <sup>2</sup>	14.3 <sup>2</sup>	15.5 <sup>2</sup>
6	14.3 <sup>1</sup>	15.4 <sup>1</sup>	16.6 <sup>1</sup>	17.7 <sup>1</sup>
7	16.5 <sup>1</sup>	17.7 <sup>1</sup>	18.8 <sup>1</sup>	20.0 <sup>1</sup>
8	18.2 <sup>1</sup>	19.4 <sup>1</sup>	20.6 <sup>1</sup>	21.7 <sup>1</sup>

<sup>1</sup>A higher rated power cord is required.

<sup>2</sup>It is recommended that breakers and branch circuits be sized to accommodate the system rating. The ability to add additional processor books and I/O drawers can be restricted by the breaker rating. IBM cannot guarantee system availability with circuit breaker ratings that are below the system ratings. For each of these configurations operating at 380-415VAC, IBM supports the use of a 32 A breaker. Use of a 32 A breaker will not affect system warranty. Installations using smaller than recommended circuit breakers are subject to review by local electrical code enforcement or authorities having jurisdiction over the electrical installation.

Table 117. Powered I/O racks

Drawers	kW
1	1.2

Table 117. Powered I/O racks (continued)

Drawers	kW
2	2.5
3	3.7
4	4.9
5	6.2
6	7.4
7	8.6
8	9.8
9	11.1 <sup>1</sup>
10	12.3 <sup>1</sup>
11	13.5 <sup>1</sup>
12	14.8 <sup>1</sup>
13	16.0 <sup>1</sup>
14	17.2 <sup>1</sup>
15	18.5 <sup>1</sup>
16	19.7 <sup>1</sup>

<sup>1</sup>A higher rated power cord is required.

## Typical system power consumption

System power consumption can vary greatly depending by components, utilization, ambient temperature and workload. The following tables are provided as power estimates for a smaller configuration at a nominal ambient temperature when compared to the maximum configuration in the total system power consumption. Actual power consumption varies greatly with workload and can also vary with time. These are estimates only. To understand your server's actual power consumption, you should consistently measure and monitor the power draw of the system.

Table 118. 5.0 GHz special configuration typical power draw in kW

Processor books (nodes)	I/O drawers			
	0	1	2	3
2	4.4	4.8	5.3	5.7
3	6.5	6.9	7.3	7.8
4	8.6	8.9	9.4	9.9
5	10.6	11	11.5	12
6	12.8	13.2	13.7	14.2
7	15	15.4	15.9	16.4
8	17.1	17.5	18	18.5

Table 119. 4.2 GHz special configuration typical power draw in kW

Processor books (nodes)	I/O drawers			
	0	1	2	3
2	3.9	4.3	4.8	5.3
3	5.7	6.1	6.6	7.1

Table 119. 4.2 GHz special configuration typical power draw in kW (continued)

Processor books (nodes)	I/O drawers			
	0	1	2	3
4	7.5	7.9	8.4	8.9
5	9.4	9.8	10.2	10.7
6	11.3	11.7	12.2	12.7
7	13.2	13.6	14.1	14.6
8	15.1	15.5	16.0	16.4

The following tables are the estimated power consumption for the following configuration:

1. 4GB DIMMS, half sites populated (32 GB memory per processor book total)
2. 15% of peak bandwidth
3. 2 hub cards per I/O drawer plugged
4. 14 adapters per I/O drawer
5. 2 hard disk drives per I/O drawer
6. Nominal room temperature

To create a more specific cooling estimate for your specific configuration, use the proceeding tables by subtracting the power value times the number of components from the full configurations.

Table 120. DIMM feature power estimates (One DIMM feature equals 4 DIMMS.)

DIMM size (GB)	Typical power (W)	Max power (W)
1	36	44.4
2	41.6	50.4
4	38.4	53.6
8	37.2	48
16	63.6	72.4

Table 121. Device power

Device	Typical power (W)	Max power (W)
PCI adapter	8.0	25
Disk drive	10	20
I/O hub adapter	30	30

#### Related concepts:

“Power cord and breaker information”

Use the breaker rating and cord information tables to determine the circuit breaker rating for the power cords used with your server

## Power cord and breaker information

Use the breaker rating and cord information tables to determine the circuit breaker rating for the power cords used with your server

**Note:** The 9119–FHA server design incorporates electromagnetic interference filter capacitors required to block electrical noise from penetrating the power grid. A characteristic of filter capacitors, during normal operation, is high leakage currents. Depending on the server configuration, this leakage current can reach 350 mA. For most reliable operation, Ground Fault Circuit Interrupter (GFCI), Earth Leakage Circuit

Breaker (ELCB) or Residual Current Circuit Breaker (RCCB) type circuit breakers are not recommended for use with 9119-FHA servers. By its internal design and grounding, the 9119-FHA server is fully certified for safe operation (compliance with IEC, CN, UL, CSA 60950-1). However, if a leakage detection circuit breaker is required by local electrical practice or standards, the breaker should be sized for a leakage current rating not less than 500 mA in order to reduce the risk of a server outage caused by erroneous and spurious tripping.

Table 122. 5 GHz Power cord and breaker information US, Canada, Japan (200 - 240 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	60 A	100 A <sup>1</sup>
System rating	48 A	80 A <sup>1</sup>
Recommended circuit breaker rating	60 A	100 A <sup>1</sup>
Cord size	6 AWG	4 AWG <sup>1</sup>
Recommended receptacle (not provided)	IEC60309, 60 A, type 460R9W	IEC60309, 100A, type 4100R9W
Power Cord Feature Code 4.3 m (14 ft)	8688	8696

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 5 or more processor books.

Table 123. 5 GHz Power cord and breaker information North America (380 - 415 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	N/A	60 A
System rating	N/A	43 A
Recommended circuit breaker rating	N/A	63 A
Cord size	N/A	6 AWG
Recommended receptacle (not provided)	N/A	RussellStoll 7324-78
Power Cord Feature Code 4.3 m (14 ft)	N/A	RPQ 8A1871

Table 124. 5 GHz Power cord and breaker information US High Voltage (480 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	30 A	60 A <sup>1</sup>
System rating	24 A	34 A <sup>1</sup>
Recommended circuit breaker rating	30 A	60 A <sup>1</sup>
Cord size	8 AWG	6 AWG <sup>1</sup>
Recommended receptacle (not provided)	IEC60309, 30 A, type 430R7W	IEC60309, 60 A, type 460R7W <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8697	8699

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 5 or more processor books.

Table 125. 5 GHz Power cord and breaker information World Trade Corporation (200 - 240 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	No plug	No plug <sup>1</sup>
System rating	48 A	80 A <sup>1</sup>

Table 125. 5 GHz Power cord and breaker information World Trade Corporation (200 - 240 V ac) (continued)

Properties	Lower-rated power cord set	Higher-rated power cord set
Recommended circuit breaker rating	60 A	100 A <sup>1</sup>
Cord size	6 AWG	4 AWG <sup>1</sup>
Recommended receptacle (not provided)	Not specified, electrician installed	Not specified, electrician installed <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8694	8695

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 5 or more processor books.

Table 126. 5 GHz Power cord and breaker information World Trade Corporation (380 - 415 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	No plug	No plug <sup>1</sup>
System rating	34 A	43 A <sup>1</sup>
Recommended circuit breaker rating	40 A	63 A <sup>1</sup>
Cord size	8 AWG	6 AWG <sup>1</sup>
Recommended receptacle (not provided)	Not specified, electrician installed	Not specified, electrician installed <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8677	8694

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 5 or more processor books.

Table 127. 4.2 GHz Power cord and breaker information US, Canada, Japan (200 - 240 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	60 A	100 A <sup>1</sup>
System rating	48 A	63 A <sup>1</sup>
Recommended circuit breaker rating	60 A	80 A <sup>1</sup>
Cord size	6 AWG	6 AWG <sup>1</sup>
Recommended receptacle (not provided)	IEC60309, 60 A, type 460R9W	IEC60309, 100A, type 4100R9W <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8688	8686

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 6 or more processor books.

Table 128. 4.2 GHz Power cord and breaker information US High Voltage (480 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	30 A	30 A <sup>1</sup>
System rating	24 A	24 A <sup>1</sup>
Recommended circuit breaker rating	30 A	30 A <sup>1</sup>
Cord size	8 AWG	8 AWG <sup>1</sup>
Recommended receptacle (not provided)	IEC309, 30 A, type 430R7W	IEC309, 30 A, type 430R7W <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8697	8697

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 6 or more processor books.

Table 129. 4.2 GHz Power cord and breaker information World Trade Corporation (200 - 240 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	No plug	No plug <sup>1</sup>
System rating	48 A	63 A <sup>1</sup>
Recommended circuit breaker rating	60 A	80 A <sup>1</sup>
Cord size	6 AWG	6 AWG <sup>1</sup>
Recommended receptacle (not provided)	Not specified, electrician installed	Not specified, electrician installed <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8694	8694

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 6 or more processor books.

Table 130. 4.2 GHz Power cord and breaker information World Trade Corporation (380 - 415 V ac)

Properties	Lower-rated power cord set	Higher-rated power cord set
Plug rating	No plug	No plug <sup>1</sup>
System rating	34 A	34 A <sup>1</sup>
Recommended circuit breaker rating	40 A	40 A <sup>1</sup>
Cord size	8 AWG	8 AWG <sup>1</sup>
Recommended receptacle (not provided)	Not specified, electrician installed	Not specified, electrician installed <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8677	8677

<sup>1</sup> The configurations that require the higher-rated power cord set are those with 6 or more processor books.

**Related reference:**

“Total system power consumption” on page 120

Use the tables to determine the total system power consumption for your server's configuration.

**Cooling requirements**

Use the system cooling requirements and chilled airflow to determine the area of floor tiles that should supply chilled air to the system.

The model 9119-FHA requires air for cooling. As shown in *Considerations for multiple-system installations*, rows of model 9119-FHA systems must face front to front. The use of a raised floor is recommended to provide airflow through perforated floor panels placed in rows between the fronts of systems (the cold aisles shown in *Considerations for multiple-system installations*).

The following table provide system cooling requirements based on the system configuration. The letter designations in the table correspond to the letter designations in the graph shown in *Cooling requirements graph*.

Table 131. 5 GHz Processor system maximum utility power feed requirements

Nodes	I/O drawers			
	0	1	2	3
1	B	B	C	C
2	C	C	D	D

3	D	E	E	F
4	F	F	F	G
5	F	G	G	H
6	G	H	H	I
7	H	I	I	J
8	I	I	J	K

Table 132. 4.2 GHz Processor system maximum utility power feed requirements

Nodes	I/O drawers			
	0	1	2	3
1	A	B	B	C
2	B	C	C	D
3	C	D	D	E
4	D	E	E	F
5	E	E	F	G
6	F	F	G	H
7	G	G	H	H
8	G	H	I	I

**Related reference:**

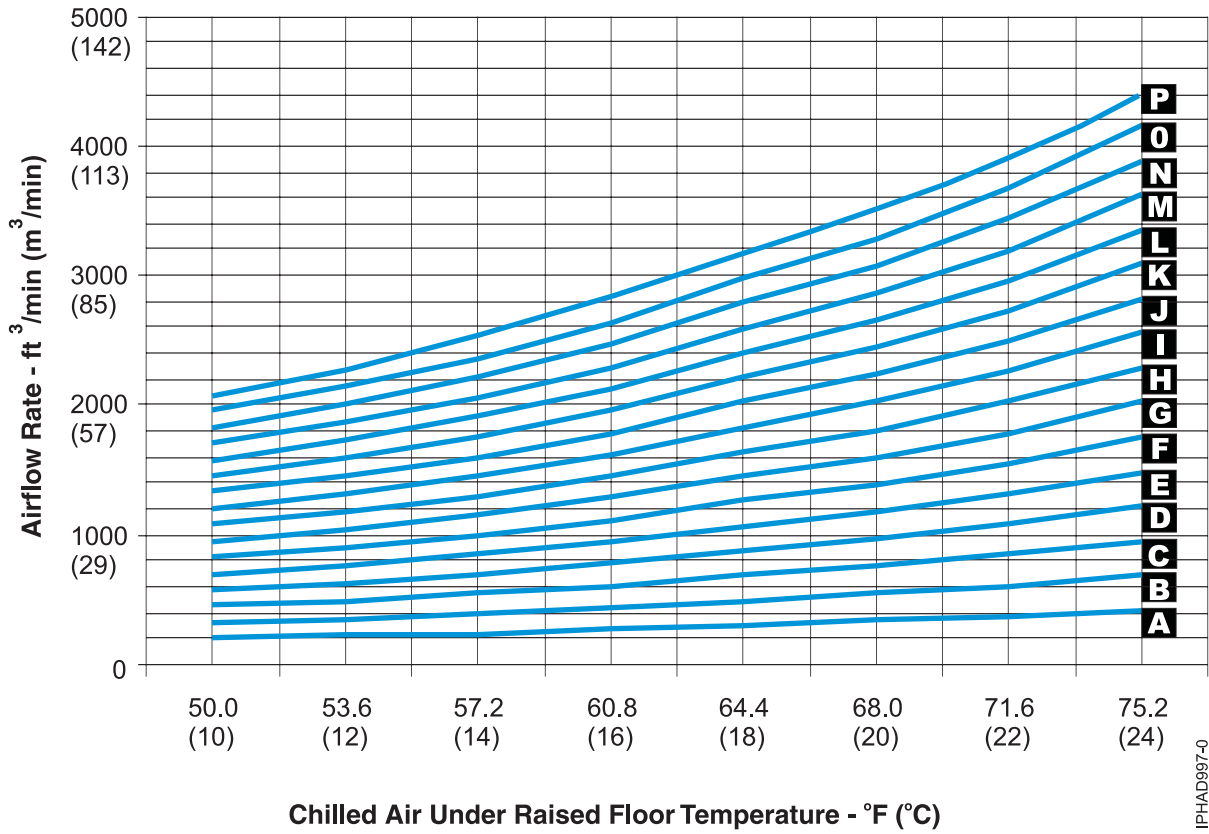
“Considerations for multiple-system installations” on page 114

Learn about the installation requirements for a multiple-system installation.

**Cooling requirements graph**

Use the cooling requirements graph in conjunction with the cooling requirements tables and the chilled airflow area graphic to determine the area of the floor tiles to supply chilled air to the system.

## System Cooling Requirements



IPHAD997-0

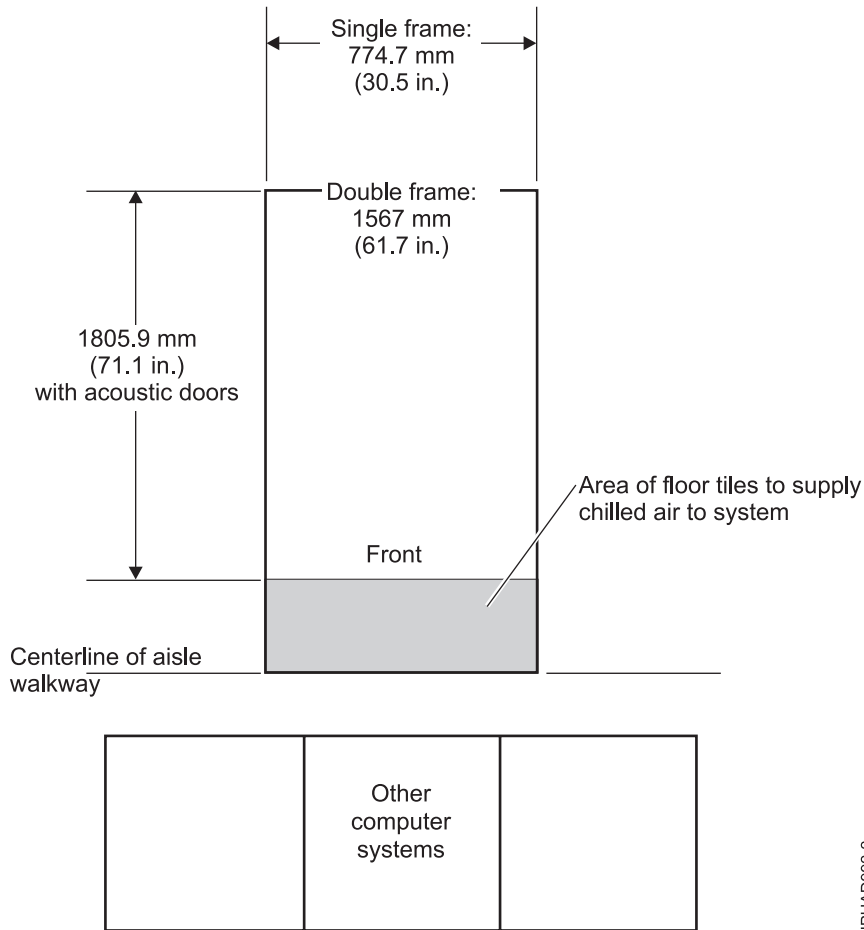
Figure 64. Cooling requirements

### Requirements for the chilled airflow area

Use this information to understand the chilled airflow area that is required for your system.

Use the system cooling requirements tables and the cooling requirements graph to determine the area of floor tiles to supply chilled air to the system.





IPHAD992-2

Figure 65. Chilled airflow area requirements

## Moving the system to the installation site

Several factors must be considered before moving the system to the installation site.

Prior to moving the system to the installation site, do the following tasks:

- Determine the path that must be taken to move the system from the delivery location to the installation site.
- Verify that the height of all doorways, elevators, and small openings are sufficient to allow moving the system to the installation site.
- Verify that the weight limitations of elevators, ramps, floors, floor tiles, and other restricted weight objects are sufficient to allow moving the system to the installation site. If the height or weight of the system can cause a problem when the system is moved to the installation site, contact your local site planner or sales representative.

For more detailed information, see *Access*.

If needed, you can order the height reduction feature 7960 for 9119-FHA. This feature ships the system frame and the expansion frame in two pieces so that it can be assembled at your location. With this feature, the top section of the system frame (including the power subsystem) is removed. The height of the system frame with the upper section removed is reduced by .35 m (14 in.) to approximately 1.64 m

(65 in.). Feature code 6850, Weight Reduction Option, can be ordered to reduce the weight of the rack to below 1133.98 kg (2500 lb). This feature allows the system rack to utilize elevators that have a 1133.98 kg (2500 lb) limit.

To determine a more specific system weight for your configuration, start with the maximum system weight and subtract the component values below.

Component	Weight
Processor book (node)	43.1 kg (95 lb)
I/O drawer	55.8 kg (123 lb)
Bulk power enclosure, single	26.8 kg (59 lb)
Bulk power regulator, single	12.7 kg (28 lb)
Bulk power distributor, single	4.5 kg (10 lb)
Internal battery feature with rails, single	51.7 kg (114 lb)
RIO cable, single	5.4 kg (12 lb)
Power cord, single	4.5 kg (10 lb)
Shipping brackets	11.3 kg (25 lb)
Acoustic cover, single	25.4 kg (56 lb)
Side covers, set	49.9 kg (110 lb)
Base redundant bulk power System (includes two bulk power enclosures, two bulk power regulators, and two bulk power distributors)	134.3 kg (296 lb)
Maximum redundant bulk power system (includes two bulk power enclosures, four bulk power distributors and eight bulk power regulators)	195.0 kg (430 lb)

## 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 to accept the new product based on the installation planning information provided, with assistance from an IBM installation planning representative (IPR) or IBM authorized service provider. 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 IBM 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.

### Related information:

 [Access](#)

## Phase imbalance and BPR configuration

Depending on the number of Bulk Power Regulators (BPRs) in your system, phase imbalance can occur in line currents

All systems are provided with two bulk power assemblies (BPAs), with separate power cords. The number of BPRs in your system will vary by configuration

Table 133. Phase imbalance and BPR configuration

Number of BPRs per BPA	Phase A Line Current	Phase B Line Current	Phase C Line Current
1	Power / Vline	Power / Vline	0
2	0.5 Power / Vline	0.866 Power / Vline	0.5 Power / Vline
3 or 4	0.577 Power / Vline	0.577 Power / Vline	0.577 Power / Vline

**Note:** Power is calculated from *Total system power consumption*. Vline is line-to-line nominal input voltage. Because total system power is divided between two power cords, divide the power number by 2.

**Related reference:**

“Total system power consumption” on page 120

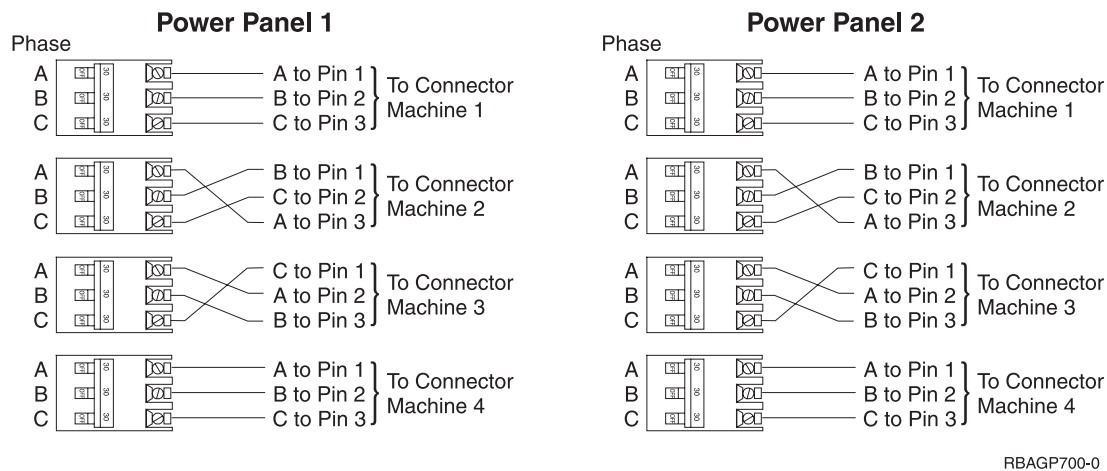
Use the tables to determine the total system power consumption for your server's configuration.

### Balancing power panel loads

Use these methods to ensure that power panel loads are balanced.

The 9119-FHA system can use as many as four bulk power regulators (BPRs) per bulk power assembly (BPA), depending on the system configuration. Systems with three and four BPR configurations present a balanced three-phase load. Configurations with only one or two BPRs have unbalanced loads. . The following figure is an example of feeding several loads of this type from two power panels in a way that balances the load among the three-phases.

**Note:** Use of ground-fault-interrupt (GFI) circuit breakers is not recommended for this system because GFI circuit breakers are earth-leakage-current sensing circuit breakers and this system is a high earth-leakage-current product.



RBAGP700-0

Figure 66. Power panel load balancing

The method illustrated in the preceding figure requires that the connection from the three poles of each breaker to the three-phase pins of a connector be varied. Some electricians might prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three-pole breakers are alternated with single-pole breakers so that the three-pole breakers do not all begin on phase A.

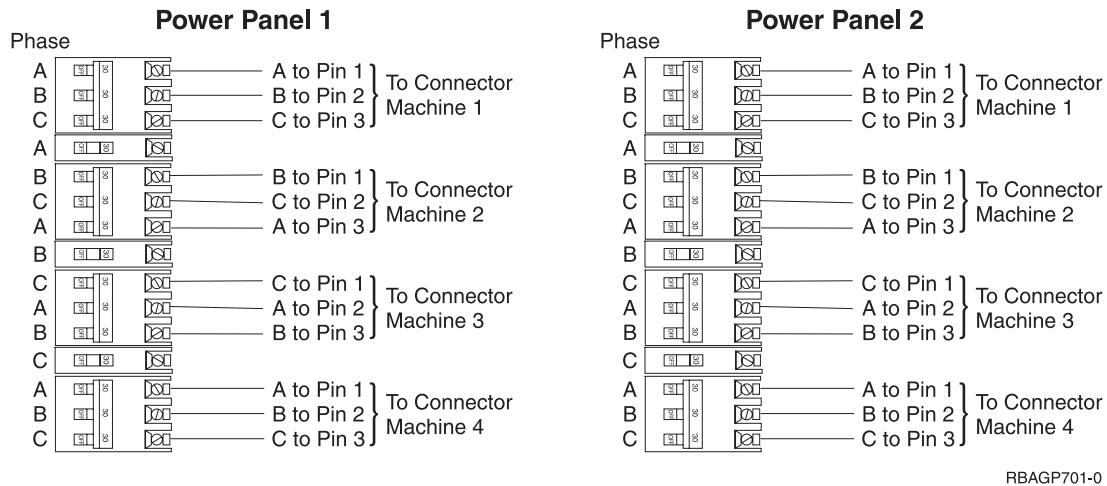


Figure 67. Power panel load balancing

The following figure shows another way of distributing the unbalanced load evenly. In this case, the three-pole breakers are alternated with two-pole breakers.

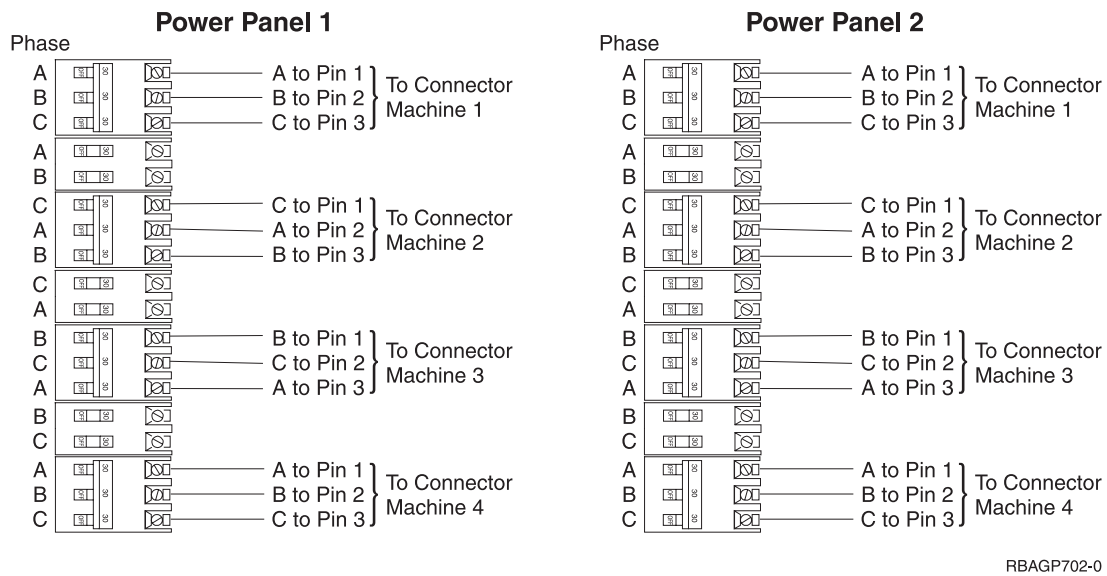


Figure 68. Power panel load balancing

## Dual power installation

To take full advantage of the redundancy and reliability that is built into the computer system, the system must be powered from two distribution panels.

Model 9119-FHA configurations are designed with a fully redundant power system. These systems have two power cords attached to two power input ports which, in turn, power a fully redundant power distribution system within the system.

## Approximate system weights by configuration

Use the approximate system weights tables to calculate the approximate weight of your system based on its configuration of I/O drawers and processor books (nodes).

Table 134. Approximate system weights with acoustical covers without the internal battery feature

Processor Books (Nodes)	I/O drawers		
	1	2	3
1	757 kg (1670 lb)	855 kg (1885 lb)	953 kg (2100 lb)
2	816 kg (1800 lb)	914 kg (2015 lb)	1012 kg (2230 lb)
3	921 kg (2030 lb)	1018 kg (2245 lb)	1116 kg (2460 lb)
4	980 kg (2160 lb)	1077 kg (2375 lb)	1175 kg (2590 lb)
5	1048 kg (2310 lb)	1145 kg (2525 lb)	1243 kg (2740 lb)
6	1132 kg (2495 lb)	1229 kg (2710 lb)	1327 kg (2925 lb)
7	1191 kg (2625 lb)	1288 kg (2840 lb)	1386 kg (3055 lb)
8	1250 kg (2755 lb)	1347 kg (2970 lb)	1445 kg (3185 lb)

Table 135. Approximate system weights with acoustical covers and with the internal battery feature

Processor Books (Nodes)	I/O drawers	
	1	2
1	862 kg (1900 lb)	957 kg (2110 lb)
2	919 kg (2025 lb)	1016 kg (2240 lb)
3	1025 kg (2260 lb)	1123 kg (2475 lb)
4	1084 kg (2390 lb)	1179 kg (2600 lb)
5	1150 kg (2535 lb)	1247 kg (2750 lb)
6	1234 kg (2720 lb)	1331 kg (2935 lb)
7	1293 kg (2850 lb)	1390 kg (3065 lb)
8	1352 kg (2980 lb)	1449 kg (3195 lb)

## Weight distribution

Use the floor loading information to determine the floor loading for various configurations.

The following figure shows the floor loading dimensions for model 9119-FHA. Use this figure in conjunction with the tables to determine the floor loading for various configurations.

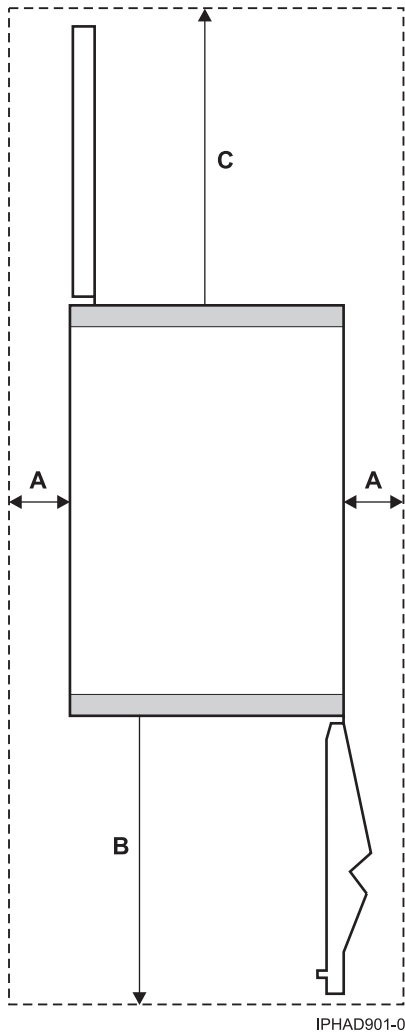


Figure 69. Floor loading dimensions

The following tables show values for calculating floor loading for the model 9119-FHA. Weights include acoustical covers. Width and depth are indicated without covers.

Table 136. 8 processor books and 3 I/O drawers

Condition	a (sides)	b (front)	c (back)	System unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	222.7 lb/ft <sup>2</sup>	1087.2 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	178.8 lb/ft <sup>2</sup>	872.9 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	150.9 lb/ft <sup>2</sup>	736.5 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	150.8 lb/ft <sup>2</sup>	736.2 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	122.9 lb/ft <sup>2</sup>	599.9 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	105.1 lb/ft <sup>2</sup>	513.1 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	114.6 lb/ft <sup>2</sup>	559.5 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	94.7 lb/ft <sup>2</sup>	462.4 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	82.0 lb/ft <sup>2</sup>	400.6 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	94.6 lb/ft <sup>2</sup>	461.7 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	79.1 lb/ft <sup>2</sup>	386.3 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	69.3 lb/ft <sup>2</sup>	338.3 kg/m <sup>2</sup>

Table 137. 4 processor books and 2 I/O drawers

Condition	a (sides)	b (front)	c (back)	System unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	169.8 lb/ft <sup>2</sup>	829.3 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	137.7 lb/ft <sup>2</sup>	672.3 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	117.2 lb/ft <sup>2</sup>	572.3 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	117.2 lb/ft <sup>2</sup>	572.1 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	96.7 lb/ft <sup>2</sup>	472.2 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	83.7 lb/ft <sup>2</sup>	408.6 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	90.6 lb/ft <sup>2</sup>	442.6 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	76.1 lb/ft <sup>2</sup>	371.4 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	66.8 lb/ft <sup>2</sup>	326.1 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	76.0 lb/ft <sup>2</sup>	371.0 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	64.7 lb/ft <sup>2</sup>	315.7 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	57.5 lb/ft <sup>2</sup>	280.5 kg/m <sup>2</sup>

Table 138. 2 processor books and 1 I/O drawer

Condition	a (sides)	b (front)	c (back)	System unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	132.3 lb/ft <sup>2</sup>	646.2 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	108.5 lb/ft <sup>2</sup>	529.8 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	93.3 lb/ft <sup>2</sup>	455.8 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	93.3 lb/ft <sup>2</sup>	455.6 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	78.1 lb/ft <sup>2</sup>	381.6 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	68.5 lb/ft <sup>2</sup>	334.4 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	73.7 lb/ft <sup>2</sup>	359.6 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	62.9 lb/ft <sup>2</sup>	306.9 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	56.0 lb/ft <sup>2</sup>	273.3 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	62.8 lb/ft <sup>2</sup>	306.5 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	54.4 lb/ft <sup>2</sup>	265.6 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	49.1 lb/ft <sup>2</sup>	239.5 kg/m <sup>2</sup>

Table 139. 8 processor books, 2 I/O drawers and internal battery feature

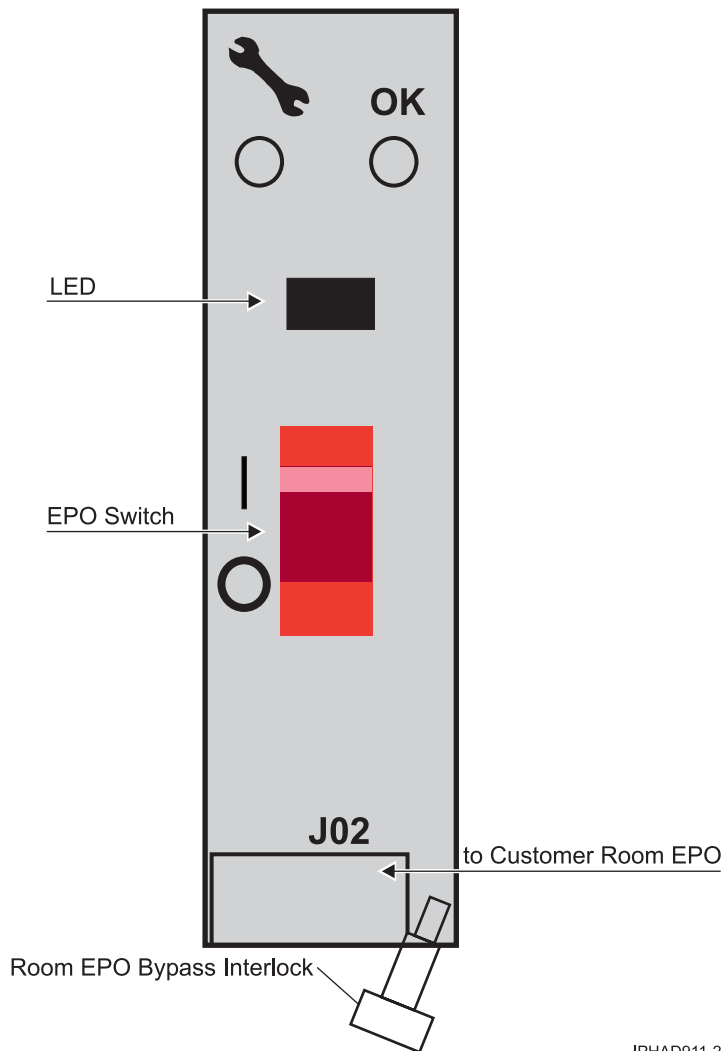
Condition	a (sides)	b (front)	c (back)	System unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	223.3 lb/ft <sup>2</sup>	1090.4 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	179.3 lb/ft <sup>2</sup>	875.4 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	151.3 lb/ft <sup>2</sup>	738.6 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	151.2 lb/ft <sup>2</sup>	738.2 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	123.2 lb/ft <sup>2</sup>	601.5 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	105.4 lb/ft <sup>2</sup>	514.4 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	114.9 lb/ft <sup>2</sup>	560.9 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	94.9 lb/ft <sup>2</sup>	463.5 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	82.2 lb/ft <sup>2</sup>	401.5 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	94.8 lb/ft <sup>2</sup>	462.9 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	79.3 lb/ft <sup>2</sup>	387.2 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	69.4 lb/ft <sup>2</sup>	339.0 kg/m <sup>2</sup>

Floor loading for the system is illustrated in the Proposed Floor Layout for Multiple Systems in *Considerations for multiple system installations*.

## Unit emergency power off

The server has a unit emergency power off (EPO) switch on the front of the first frame (A frame). When the switch is reset, the utility power is confined to the system power compartment, and all volatile data is lost.

Refer to the following figure, which shows a simplified unit EPO panel.



IPHAD911-2

Figure 70. Unit emergency power off

It is possible to attach the computer room emergency power off (EPO) system to the unit EPO. When this is done, resetting the computer room EPO disconnects all power from the power cords and the internal battery backup unit, if it is provided. All volatile data will be lost in this case also.

If the room EPO is not connected to the unit EPO, resetting the computer room unit EPO removes alternating current power from the system. If the interlock bypass feature is used, the system remains powered for a short time based on system configuration.

## Computer room emergency power off

You can incorporate the integrated battery backup into a computer room emergency power off (EPO) system. Otherwise, volatile data can be lost.

When the integrated battery backup is installed and the computer room EPO is reset, the batteries engage and the computer continues to run. It is possible to attach the computer room EPO circuit to the unit EPO. When this is done, resetting the computer room EPO disconnects all power from the power cords and from the internal battery backup unit. In this event, all volatile data will be lost.



To incorporate the integrated battery backup into the computer room EPO circuit, a cable must connect to the back of the unit EPO panel.

This figure illustrates the back of the unit EPO panel with the computer room EPO cable plugging into the system. Notice the switch actuator. After it is moved to make the cable connection possible, the computer room EPO cable must be installed for the system to power on.

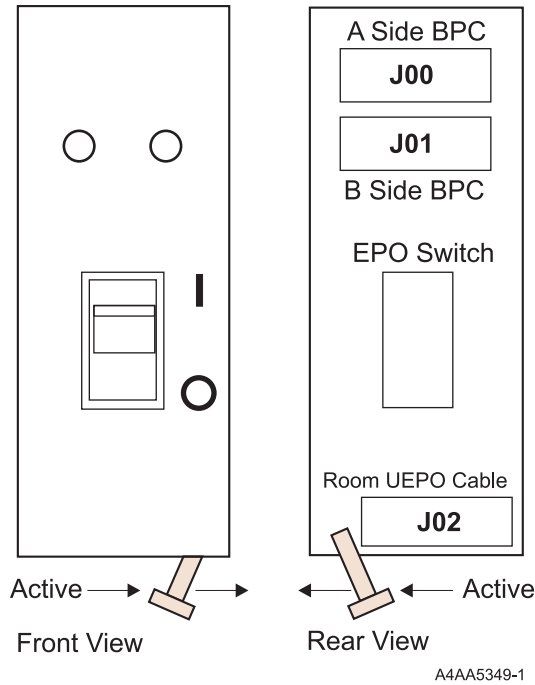
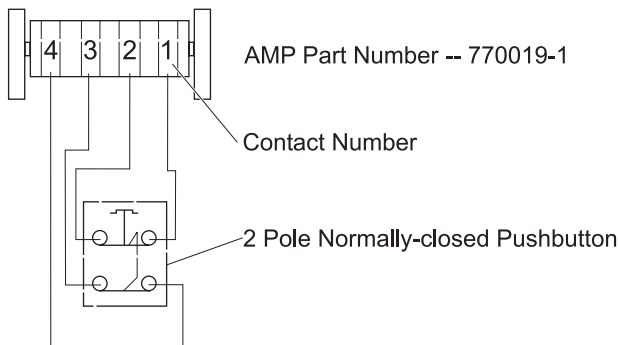


Figure 71. Computer room emergency power off

In the following figure, AMP connector 770019-1 is needed to connect to the unit EPO panel. For computer room EPO cables using wire sizes #20 - #24 AWG, use AMP pins (part number 770010-4). This connection should not exceed 5 Ohms, which is approximately 61 m (200 ft) of #24 AWG.



Room UEPO Switch Schematic

Figure 72. AMP connector

## Machine holdup times

Use this information to determine the typical machine holdup times (time versus load) for fresh and aged batteries.

The following criteria apply to both tables:

- All times are listed in minutes
- Machine load is listed in total alternating current (ac) input power (power for both power cords combined)
- A fresh battery is defined as 2.5 years old or less.
- An aged battery is defined as 6.5 years.

**Note:** Battery capacity decreases gradually as the battery ages (from fresh-battery value to aged-battery value). The system diagnoses a failed-battery condition if the capacity decreases below the aged-battery value.

*Table 140. Typical machine holdup time versus load for fresh battery*

<b>Machine load</b>	<b>3.33 kW</b>	
Integrated battery backup configuration	N	R
1 BPR	7.0	21.0
2 BPR	21.0	50.0
3 BPR	32.0	68.0
<b>Machine load</b>	<b>6.67 kW</b>	
Integrated battery backup configuration	N	R
1 BPR	2.1	7.0
2 BPR	7.0	21.0
3 BPR	12.0	32.0
<b>Machine load</b>	<b>10 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR	4.0	11.0
3 BPR	7.0	21.0
<b>Machine load</b>	<b>13.33 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR	2.1	7.0
3 BPR	4.9	12.0
<b>Machine load</b>	<b>16.67 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR		
3 BPR	3.2	9.5
<b>Machine load</b>	<b>20 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR		
3 BPR	2.1	7.0
<b>Machine load</b>	<b>21.67 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		

Table 140. Typical machine holdup time versus load for fresh battery (continued)

<b>Machine load</b>	<b>3.33 kW</b>	
2 BPR		
3 BPR	1.7	6.5
<b>Note:</b> N mean non-redundant. R means redundant.		

Table 141. Typical machine holdup time versus load for aged battery

<b>Machine load</b>	<b>3.3 kW</b>	
Integrated battery backup configuration	N	R
1 BPR	4.2	12.6
2 BPR	12.6	30.0
3 BPR	19.2	41.0
<b>Machine load</b>	<b>6.67 kW</b>	
Integrated battery backup configuration	N	R
1 BPR	1.3	4.2
2 BPR	4.2	12.6
3 BPR	7.2	19.2
<b>Machine load</b>	<b>10 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR	2.4	6.6
3 BPR	4.2	12.6
<b>Machine load</b>	<b>13.33 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR	1.3	4.2
3 BPR	2.9	7.2
<b>Machine load</b>	<b>16.67 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR		
3 BPR	1.9	5.7
<b>Machine load</b>	<b>20 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR		
3 BPR	1.3	4.2
<b>Machine load</b>	<b>21.67 kW</b>	
Integrated battery backup configuration	N	R
1 BPR		
2 BPR		
3 BPR	1.0	3.9

Table 141. Typical machine holdup time versus load for aged battery (continued)

Machine load	3.3 kW
Note: N mean non-redundant. R means redundant.	

## Model 9119-590, 9406-595, and 9119-595 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

The IBM eServer™ i5 and eServer p5 model 590 and 595 consist of multiple components, as summarized in the following table.

Table 142. Model 9119-590, 9406-595, and 9119-595 components

Model	Description	Minimum per system	Maximum per system
FC6251 (9119-590, 9119-595, 9406-595)	Slimline door set for primary rack (front and rear) See <i>Doors and covers</i> .	1	1
FC6252 (9119-590, 9119-595, 9406-595)	Acoustic door set for primary rack (front and rear) See <i>Doors and covers</i> .	1	1
FC8691 (9119-590, 9119-595)	Optional expansion frame  (Based on number of I/O and switch drawers installed.)	0	1
FC8294 ( 9406-595)	Optional base 1.8 m rack	0	1
FC6253 (9119-590, 9119-595)	Slimline door set for 8691 (front and rear)	0	1
FC6254 (9119-590, 9119-595)	Acoustical door set for 8691 (front and rear)	0	1
9119-595 (FC8970)	16-core, 2.1 GHz processor book	1 <sup>10</sup>	4
9119-595 and 9406-595 (FC8968)	16-core, 2.3 GHz processor book	1 <sup>10</sup>	4
9119-590 (FC8967)	16-core, 2.1 GHz processor book	1 <sup>10</sup>	2
9406-595 (FC8966)	16-core, 1.9 GHz processor book	1 <sup>10</sup>	4
9406-595 (FC8981)	16-core, 1.65 GHz processor book	1 <sup>10</sup>	4
9119-590 (FC7981)	16-core, 1.9 GHz processor book	1 <sup>10</sup>	2
9119-595 (FC7813)	16-core, 1.9 GHz processor book	1 <sup>10</sup>	4
9119-595 (FC8969)	16-core, 1.9 GHz processor book		
9119-595 (FC7988)	16-core, 1.65 GHz processor book	1 <sup>10</sup>	4
FC5792 (9119-595)	Optional base rack. See <i>Planning for 5792 base rack</i> .		
Various	Hardware Management Console (HMC) <sup>6</sup>	0 <sup>4</sup>	2 <sup>4</sup>

Table 142. Model 9119-590, 9406-595, and 9119-595 components (continued)

Model	Description	Minimum per system	Maximum per system
7040-61D 5791 (9119-590, 9119-595) 5794 (9119-590, 9119-595)	Optional I/O drawer (20 PCI cards max., 16 disk drives maximum)	0 (9406) 1 (9119)	8-core or 16-core: 6 drawers maximum <sup>1</sup>  32-core: 12 drawers maximum <sup>2</sup>  48-core and 64-core: 4 drawers maximum <sup>3</sup>  9406-595 <sup>9</sup>
FC6200 or FC6201 (9119-590, 9119-595)	Optional integrated battery backup feature	0	6
FC3757 (9119-590, 9119-595, 9406-595)	Service Shelf Tool Kit <sup>8</sup>	1	1
FC9194 ( 9406-595)	Base PCI-X Expansion tower (shipped with a 9406-595)	1	1

**Note:**

1. For the 9119-590 and 9119-595 the 16-core processor configuration supports up to 6 I/O drawers.
2. For the 9119-590 and 9119-595, the 32-core processor configurations support up to 12 I/O drawers.
3. For the 9119-590 and 9119-595, the 48-core and 64-core processor configurations support a maximum of 12 I/O drawers, which require a FC5792 frame.
4. An HMC can connect to multiple systems (therefore, an HMC might not need to be ordered), or up to two HMCs can connect to the system for redundancy.
5. For the 9119-590 and 9119-595 the 32-core, 48-core, and 64-core processor configurations are based on the combining of multiple 16-core processors. The 8-core processor configuration is a 16-core with eight processors available for upgrade on demand.
6. For model 590 and 595, a Hardware Management Console must be provided within the same room and within 8 m (26 ft) of the server. Or, as an alternative to the local HMC requirement, it is acceptable for you to provide a supported device (such as, a PC), with connectivity and authority to operate through a remotely-attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the server.
7. The 32-core processor configuration of the 9119-590 supports a maximum of eight I/O drawers.
8. The FC3757 Service Shelf Tool Kit contains six separate tool kits that are required for the installation and maintenance of the 9119-590, 9119-595, and 9406-595 processor books and memory cards. Each kit weighs ≤ 40 lb. Without this feature, installation and maintenance might be delayed. At least one FC3757 is required on site where one or more model 590 or 595 are located.
9. A number 4643 indicates that a 7040-61D I/O drawer is installed in the 24-inch primary rack of a model 9406-595. One to four 4643s might be installed. Only I/O features supported by the AIX® and Linux operating systems can be installed in the 7040-61D. Other IBM i I/O towers or drawers might be attached by using HSL/RIO loops.
10. Minimum per system is based on one processor with this feature code. Processor feature codes cannot be mixed.

Table 143. Dimensions and weight<sup>8</sup>

Dimensions	Slimline doors <sup>1</sup>		Acoustical doors <sup>1</sup>	
	1 Frame	2 Frames	1 Frame	2 Frames
Height	2025 mm (79.7 in.)	2025 mm (79.7 in.)	2025 mm (79.7 in.)	2025 mm (79.7 in.)
Width	785 mm (30.9 in.)	1575 mm (62.0 in.)	785 mm (30.9 in.)	1575 mm (62.0 in.)
Depth	1326 mm (52.2 in.)	1326 mm (52.2 in.)	1681 mm (66.2 in.)	1681 mm (66.2 in.)

Table 144. Weight<sup>10</sup> - model 9119-595 maximum configuration

Number of frames	With integrated battery backup and slimline doors	Without integrated battery backup with slimline doors	With integrated battery backup and with acoustical doors	Without integrated battery backup and with acoustical doors
Single frame	1419 kg (3128 lb)	1358 kg (2995 lb)	1427 (3147 lb)	1367 kg (3014 lb)
Double frame	2441 kg (5381 lb)	2381 kg (5249 lb)	2458 (5420 lb)	2398 (5287 lb)

Table 145. Weight<sup>10</sup> - model 9406-595 configuration - Single frame<sup>12, 13</sup>

Without integrated battery backup with slimline doors	Without integrated battery backup and with acoustical doors
1358 kg (2995 lb)	1367 kg (3014 lb)

Table 146. Weight<sup>10</sup> - model 9119-590 maximum configuration

Number of frames	With integrated battery backup and with slimline doors	Without integrated battery backup and with slimline doors	With integrated battery backup and with acoustical doors	Without integrated battery backup and with acoustical doors
Single frame	1419 kg (3128 lb)	1358 kg (2995 lb)	1427 kg (3147 lb)	1367 kg (3014 lb)
Double frame	2230 kg (4917 lb)	1960 kg (4321 lb)	2248 kg (4956 lb)	1977 kg (4359 lb)

**Note:** Weight does not include the required I/O tower. See the 9194 I/O expansion unit specification sheet for more details

Table 147. Shipping dimensions and weight<sup>9</sup>

Dimensions	Measurement
Height	2311 mm (91 in.)
Width	940 mm (37 in.)
Depth	1511 mm (59.5 in.)
Weight	Varies by configuration

Table 148. Electrical and thermal characteristics (3-phase) - 9119-590 and 9119-595

Electrical characteristics	Properties		
Rated voltage and frequency (three-phase)	200 - 240 V ac at 50 - 60 Hz	380 - 415 V ac at 50 - 60 Hz	480 V ac at 50 - 60 Hz
Rated current, power cord with 100 A plug FC 8686 or 8687 (amperes per phase)	60	32	24
Rated current, power cord with 60 A plug, FC 8688 or 8689 (amperes per phase)	48		

Table 148. Electrical and thermal characteristics (3-phase) - 9119-590 and 9119-595 (continued)

Electrical characteristics	Properties		
Rated current, all other power cords (amps per phase)	60	32	24
Maximum power (1.9 GHz, 2.1 GHz, and 2.3 GHz processors)	22.7 kW		
Maximum power (1.65 GHz processor)	20.3 kW		
Power factor	0.99	0.99	0.99
Inrush current (maximum) <sup>3</sup>	163 A		
Thermal output (maximum for 1.9 GHz, 2.1 GHz, and 2.3 GHz processors)	77.5 kBtu/hr	77.5 kBtu/hr	77.5 kBtu/hr
Thermal output (maximum for 1.65 GHz processor)	69.3 kBtu/hr	69.3 kBtu/hr	69.3 kBtu/hr
<b>Note:</b> For additional information, see <i>Total system power consumption</i>			

Table 149. Electrical and thermal characteristics (3-phase) - 9406-595

Electrical properties	Characteristics		
Rated voltage and frequency (single phase)	200 to 240 V ac at 50 to 60 Hz	380 to 415 V ac at 50 to 60 Hz	480 V ac at 50 to 60 Hz
Rated current, power cord with 100 A plug FC 8686 or 8687 (amperes per phase)	60	32	24
Rated current, power cord with 60 A plug, FC 8688 or 8689 (amperes per phase)	48	--	--
Rated current, all	60	32	24
Maximum power (1.65 GHz processor)	19.4 kW	19.4 kW	19.4 kW
Power factor	0.99	0.97	0.93
Inrush current (maximum) <sup>3</sup>	163 A	163 A	163 A
Thermal output (maximum for 1.65 GHz processor)	66.2 kBtu/hr	66.2 kBtu/hr	66.2 kBtu/hr
Phase	9406-595, 9119-595, 9119-590	3	
Dual power feature code	Standard <sup>7</sup>		
Branch circuit breaker and cord information	See <i>Breaker rating and cord information</i>		
<b>Note:</b> For additional information, see <i>Total system power consumption</i>			

Table 150. Environment temperatures

Environment	Temperatures
Recommended operating temperature <sup>5</sup> (16-core, 32-core)	10 - 32°C (50 - 89.6°F)
Recommended operating temperature <sup>5</sup> (48-core and 64-core)	10 - 28°C (50 - 82.4°F)

Table 150. Environment temperatures (continued)

Environment	Temperatures
Nonoperating temperature (All models)	10 - 43°C (50 - 109.4°F)
Storage temperature (All models)	1 - 60°C (33.8 - 140°F)
Shipping temperature (All models)	-40 - 60°C (-40 - 140°F)

Table 151. Environment specifications

Properties	Operating	Nonoperating	Storage <sup>4</sup>	Shipping <sup>4</sup>
Maximum wet bulb	23 °C (73.4 °F)	23 °C (73.4 °F)	27 °C (80.6 °F)	29 °C (84.2 °F)
Noncondensing relative humidity	8 - 80 %	8 - 80 %	5 - 80 %	5 to 100 %
Maximum altitude (operating)	8-core, 16-core, 32-core - 3048 m (10000 ft)  48-core, 64-core - 2133 m (7000 ft)			

Table 152. Acoustical noise emissions<sup>6, 15</sup>

Product configuration	L <sub>WAd</sub> (Bels) <sup>6</sup>		L <sub>pAM</sub> (dB) <sup>6</sup> (bystander, 1 m)	
	Operating	Idle	Operating	Idle
Typical configuration with two processors, two I/O drawers, and bulk power unit; acoustical door set	7.6	7.6	59	59
Typical configuration with two processors, two I/O drawers, and bulk power unit; slimline door set	8.3	8.3	65	65
Maximum configuration with four processors, four I/O drawers, and bulk power unit; acoustical door set	7.9	7.9	61	61
Maximum configuration with four processors, four I/O drawers, and bulk power unit; slimline door set	8.6 <sup>11</sup>	8.6 <sup>11</sup>	68 <sup>11</sup>	68 <sup>11</sup>

**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000–94, Notice 2000–72); People's Republic of China Commodity Inspection Law

**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950-1; CAN/CSA C22.2 No. 60950-1; EN 60950-1; IEC 60950-1 including all national differences



Table 153. Notes

<p><b>Note:</b></p> <ol style="list-style-type: none"><li>1. Doors are not installed during product shipment to the customer.</li><li>2. Refer to <i>Approximate system weights by configuration</i> for the approximate weight of your system configuration.</li><li>3. Inrush currents occur only at initial application of power (short duration for charging capacitors). No inrush currents occur during the normal power off-on cycle.</li><li>4. When an IBM-approved vapor bag and desiccant packets are used to protect the system, the storage specifications are valid for 6 months and the shipping specifications are valid for 1 month. Otherwise, storage and shipping specifications are valid for two weeks each.</li><li>5. For the 8-core, 16-core, and 32-core processor configurations, the upper limit of the dry bulb temperature must be derated 1°C (1.8 °F) per 219 m (719 ft) above 1295 m (4250 ft). Maximum altitude is 3048 m (10000 ft). For the 48-core and 64-core configurations, the upper limit of the dry bulb temperature must be derated 1°C (1.8 °F) per 210 m (688 ft) above 1295 m (4250 ft). Maximum altitude is 2133 m (7000 ft).</li><li>6. <math>L_{wAd}</math> is the upper-limit A-weighted sound level; <math>L_{pAM}</math> is the mean A-weighted sound pressure measured at the 1-meter bystander positions; 1 B = 10 dB.</li><li>7. Dual power and power cords are standard on the Model 9119-590, 9406-595, and 9119-595. For maximum availability, each of the power cords should be fed from independent power grids.</li><li>8. For specific configuration weights, see <i>Approximate system weights by configuration</i>. The feature code 7960 (Compact Handling Option) allows the processor or expansion frame to pass through doors that are less than 2.0 m (79.5 in.). The top 8U section of the frame, including the power subsystem, is removed at the factory and shipped separately for installation at the customer location. The height of the rack with the upper section removed is approximately 1.65 m (65 in.).</li><li>9. Shipping dimensions are indicated for each frame. Each frame is shipped separately.</li><li>10. See <i>Approximate system weights by configuration</i> for detailed information on weights based on configuration.</li><li>11. <b>Attention:</b> Your server installation might be subject to government regulations (such as those prescribed by OSHA or European Community Directives that cover noise level exposure in the workplace. The model 9119-590, 9119-595, and 9406-595 is available with an optional acoustical door feature that can reduce the likelihood of exceeding noise level exposure limits for densely populated racks. The actual sound pressure levels in your installation will depend on a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where the racks are installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. It is recommended that a qualified person, such as an industrial hygienist, be consulted to determine whether the sound pressure levels to which employees might be exposed exceed regulatory limits.</li><li>12. The 9406-595 has a maximum of four 7040-61D 24-inch I/O drawers in the primary processor rack. It does not support a double or secondary rack</li><li>13. The 9406-595 does not support internal battery backup.</li><li>14. The cabling requirements of model 595 limit the distance between the server frame and a separately powered I/O frame. See <i>Special considerations for model 595 cabling</i> for details.</li><li>15. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</li></ol>
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**Related reference:**

“Planning for 5792 base rack” on page 327

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“9094 base I/O expansion unit, 9194 I/O expansion unit, or 5094 expansion unit” on page 438

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

“Special requirements for model 595 cabling” on page 670

The distance between the server frame and the I/O frame is limited by the RIO-G cable length.

## Breaker rating and cord information

Use the Breaker rating and cord information table to determine the circuit breaker rating for the power cords used with your server.

**Table 154. Breaker rating and cord information**

3-phase supply voltage (50/60 Hz)	200 - 240 V ac	200 - 240 V ac	380 - 415 V ac	480 V ac
Recommended customer-circuit-breaker rating <sup>1</sup>	60 A (60-A plug) or 80 A (100-A plug)	63 A (no plug)	32 A (no plug)	30 A (30A plug)
Cord information	1.8 m (6 ft) and 4.3 m (14 ft) 6 AWG power cord (60-A plug), or 1.8 m (6 ft) and 4.3 m (14 ft) 6 AWG power cord (100-A Plug)	14 foot, 6 AWG power cord, (electrician installed)	14 foot, 8 AWG power cord, (electrician installed)	6 and 14 foot, 8AWG power cord (30A plug)
Recommended receptacle	IEC 60309, 60 A, type 460R9W (not provided) or IEC 60309, 100A, type 4100R9W (not provided)	Not specified, electrician installed	Not specified, electrician installed	IEC 60309, 30 A, type 430R7W (not provided)

<sup>1</sup>The exact circuit breaker ratings might not be available in all countries. Where the specified circuit breaker ratings are not acceptable, use the nearest available rating. Use of a time delayed circuit breaker is recommended. Use of a GFI circuit breaker is not recommended.

<sup>2</sup>When possible, use metal backbox with power cords using IEC 60309 plugs.

## Power cord features

Use the Power cord features table to view the power cord specifications available for your server.

The following three-phase power cord features are available for the three-phase model 9119-590, 9406-595, and 9119-595.

**Table 155. Power cord features**

Supply type	Nominal voltage range	Voltage tolerance	Frequency range
Two redundant three-phase power cords	200 - 480 V ac	180 - 509 V ac	47 - 63 Hz

**Table 156. Power cord features**

Feature code	Description	Voltage (V ac)	Plug
8697	Power cord, 8 AWG, 4.3 m (14 ft)	480	IEC 60309 30 A plug
8698	Power cord, 8 AWG, 1.8 m (6 ft)	480	IEC 60309 30 A plug
8688	Power cord, 6 AWG, 4.3 m (14 ft)	200-240	IEC 60309 60 A plug
8689	Power cord, 6 AWG, 1.8 m (6 ft)	200-240	IEC 60309 60 A plug
8686	Power cord, 6 AWG, 4.3 m (14 ft)	200-240	IEC 60309 100 A plug
8687	Power cord, 6 AWG, 1.8 m (6 ft)	200-240	IEC 60309 100 A plug
8694 <sup>1</sup>	Power cord, 6 AWG, 4.3 m (14 ft)	380-415	no plug
8677 <sup>1</sup>	Power cord, 8 AWG, 4.3 m (14 ft)	380-415	no plug

<sup>1</sup>These power cords are shipped without a plug or receptacle. An electrician might be required to install the plug and receptacle to meet applicable country or region electrical codes.

## Doors and covers

Doors and covers are an integral part of the system and are required for product safety, proper airflow and cooling, and electromagnetic compatibility compliance.

The following rear door options are available for your server:

- Enhanced acoustical cover option

This feature provides a low-noise option for sites with stringent acoustical requirements and where a minimal system footprint is not critical. The acoustical cover option consists of a special front and rear doors that are approximately 250 mm (10 in.) deep and contain acoustical treatment that lowers the noise level of the machine by approximately 7 dB (0.7 B) compared to the slimline doors. This reduction in noise emission levels means that the noise level of a single model system with slimline covers is about the same as the noise level of five model systems with acoustical covers.

- Slimline cover option

This feature provides an option to take up less floor space and cost less, when space is be more critical than acoustical noise levels. The slimline cover option consists of a front door, which is approximately 100 mm (4 in.) deep, and a rear door, which is approximately 50 mm (2 in.) deep. No acoustical treatment is available for this option.

- Rear Door Heat Exchanger

The heat exchanger is a water-cooled device that mounts on the rear of the IBM 19-inch and 24-inch racks to cool the air that is heated and exhausted by devices inside the rack. A supply hose delivers chilled, conditioned water to the heat exchanger. A return hose delivers warmed water back to the water pump or chiller. Each heat exchanger can remove up to 50 000 Btu (or approximately 15 000 watts) of heat from your data center. For detailed information on preparing your data center for using the heat exchanger, see *Planning for the installation of rear door heat exchangers*. For detailed information about installing a heat exchanger on your rack, see *Installing the rear door heat exchanger*.

**Note:** For declared levels of acoustical noise emissions, refer to the *Acoustics*.

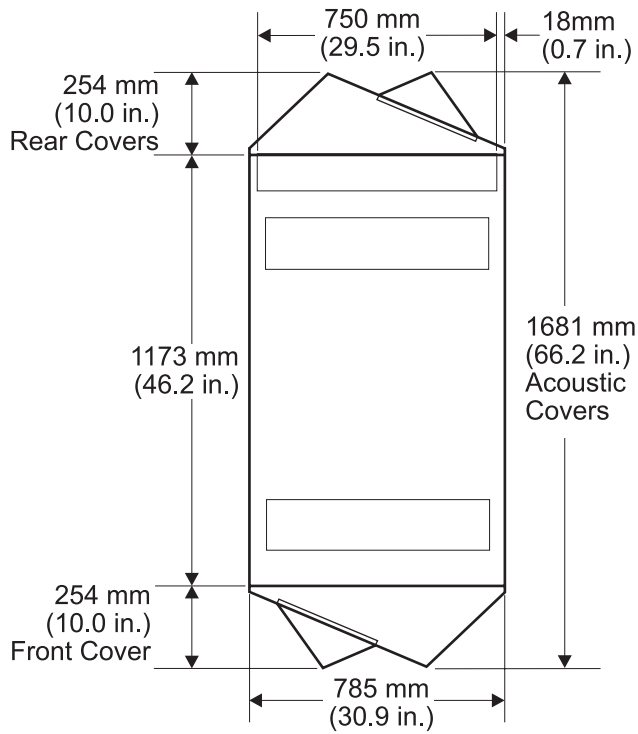
**Related information:**

 [Planning for the installation of rear door heat exchangers](#)

## Plan views

Dimensional planning information is shown in this top down view of your server.

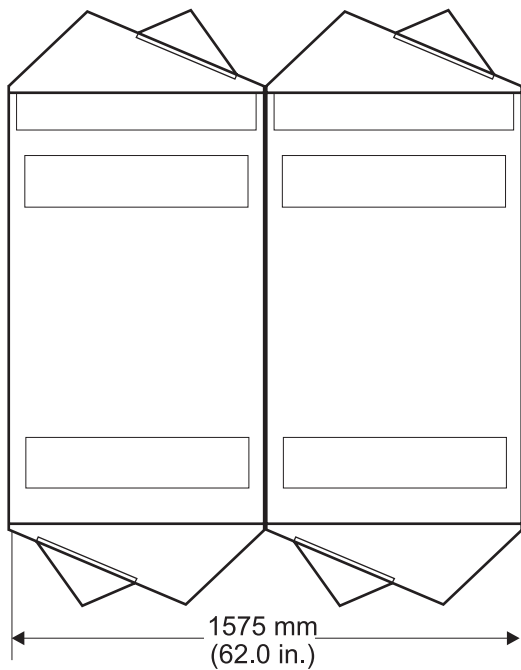
The following figure shows dimensional planning information for single-frame systems.



IPHAD905-1

Figure 73. Plan view for single-frame systems with acoustical doors

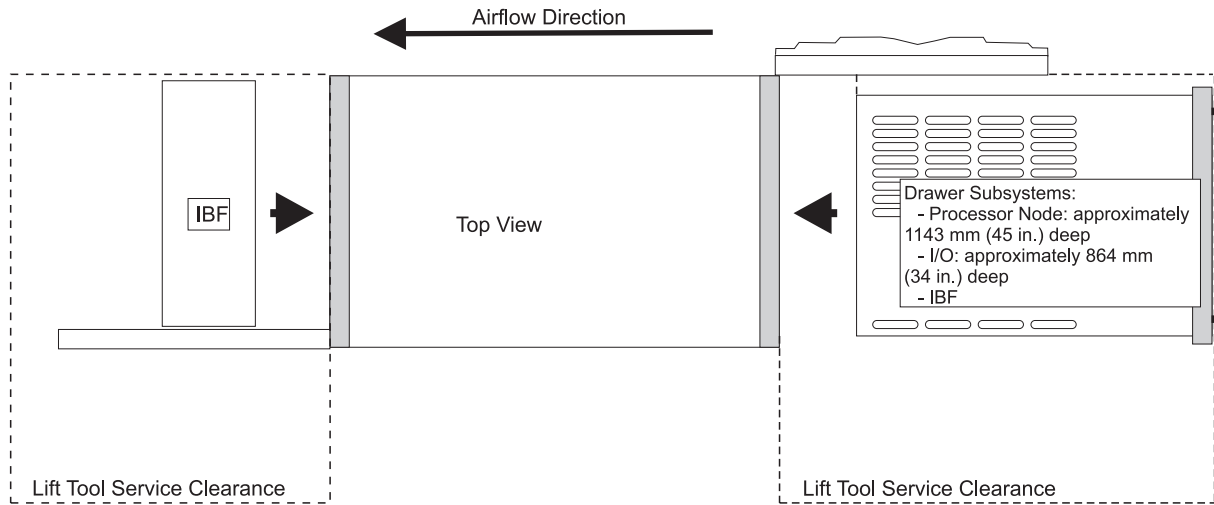
The following figure shows dimensional planning information for double-frame systems.



IPHAD906-0

Figure 74. Plan view for double-frame systems with acoustical doors





Floor Plan Considerations for Single Units

A4AA5731-1

Figure 76. Floor plan considerations for single units

## Cutting and placing floor panels

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

Use the following procedure to cut and place floor panels in the raised floor. The x-y alphanumeric grid positions are used to identify relative positions of cutout floor panels that might be cut in advance.

1. Measure the panel size of the raised floor.
2. Verify the floor panel size. The floor panel size illustrated is 600 mm (23.6 in.) and 610 mm (24 in.) panels.
3. Ensure adequate floor space is available to place the frames over the floor panels exactly as shown in the figure. For front-to-back and side-to-side clearances, refer to *Considerations for multiple system installations*. Use the plan view, if necessary. Consider all obstructions above and below the floor.
4. Identify the panels needed, and list the total quantity of each panel required for the installation.
5. Cut the required quantity of panels. When cutting the panels, you must adjust the size of the cut for the thickness of the edge molding you are using. The dimensions shown in the figure are finished dimensions. For ease of installation, number each panel as it is cut, as shown in the following figure.

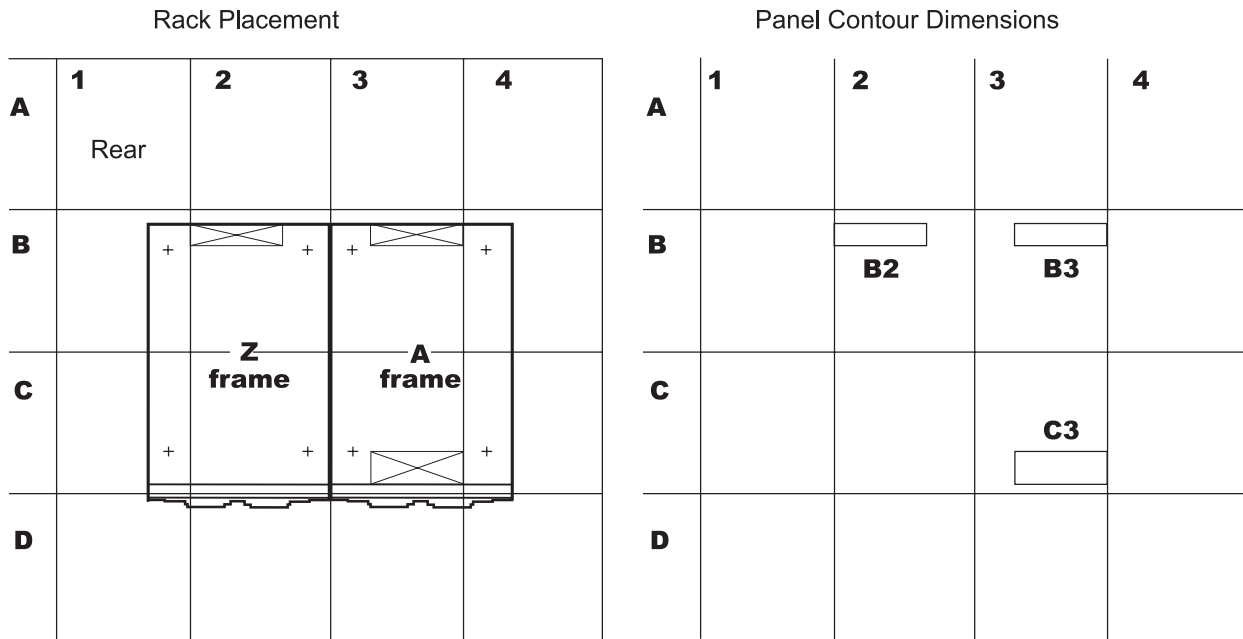
**Note:** Depending on the panel type, additional panel support (pedestals) might be required to restore structural integrity of the panel. Consult the panel manufacturer to ensure that the panel can sustain a concentrated load of 476 kg (1050 lb). For multiple frame installation, it is possible that two casters will produce loads as high as 953 kg (2100 lb).

6. Use Raised floor with 610 mm (24 in.) floor panels figure to install the panels in the proper positions.

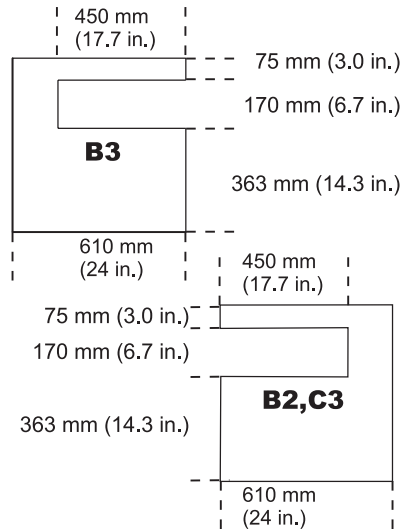
### Note:

- a. This floor-tile arrangement is recommended so that the casters or leveling pads are placed on separate floor tiles to minimize the weight on a single floor tile. Furthermore, it is recommended that tiles bearing the weight (having casters or leveling pads on the tiles) be uncut to retain the strength of the floor tile.
- b. The following figure is intended only to show relative positions and accurate dimensions of floor cutouts. The figure is not intended to be a machine template and is not drawn to scale.

## Raised floor with 610 mm (24 in.) floor panels figure



Rack Entry/Exit	(mm)	(in.)
Front	117 x 403	4.6 x 15.9
Rear	117 x 403	4.6 x 15.9



IPHAD927-3

Figure 77. Raised floor with 610 mm (24 in.) floor panels figure

### Related reference:

“Considerations for multiple-system installations” on page 163

Learn about the installation requirements for a multiple-system installation.

## Securing the rack

Securing your rack to a concrete (nonraised) floor or to a raised floor prevents movement when vibrations occur.

**Note:** Securing the rack is an optional procedure. See *Vibration and shock* for more information.

The following can be ordered by the customer as additional rack-securing options for the model 9119-590, 9406-595, and 9119-595.

- Request for Price Quotation (RPQ) 8A1183 for attaching the rack-mounting plates to the concrete floor (nonraised floor)
- RPQ 8A1185 to attach the rack to a concrete floor when on a raised floor 241 - 298.5 mm (9.5 - 11.75 in. high)
- RPQ 8A1186 to attach the rack to a concrete floor when on a raised floor 298.5 - 406.4 mm (11.75 - 16 in. high)

Before the service representative can perform the tie-down procedure, you must complete the floor preparation described in *Cutting and placing floor panels* and the procedures described in *Attaching the rack to a concrete (nonraised) floor* or *Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor*.

**Related reference:**

“Cutting and placing floor panels” on page 150

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

“Attaching the rack to a concrete (nonraised) floor” on page 153

Use this procedure to attach the rack to a concrete (nonraised) floor.

“Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor” on page 155

Use these steps to attach your rack to a 228.6 mm to 330.2 mm (9 in. to 13 in. depth). floor.

**Related information:**

 Vibration and shock

## Installing the frame tie-down kit

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

The following procedures describe how to install a frame tie down kit and floor tie-down hardware to secure an IBM rack to a concrete floor beneath a 228.6 mm to 330.2 mm (9 in. to 13 in. depth) or a 304.8 mm to 558.8 mm (12 in. to 22 in. depth) raised-floor environment or to a nonraised floor.

## Positioning the rack

Use this procedure to unpack and position your rack.

To unpack and position the rack, do the following:

**Note:** Before attempting to position the rack, see *Moving the system to the installation site*.

1. Remove all packing and tape from the rack.
2. Place the last floor covering exactly adjacent and in the front of the final installation location.
3. Position the rack according to the customer floor plan.
4. Lock each caster wheel by tightening the thumbscrew on the caster.

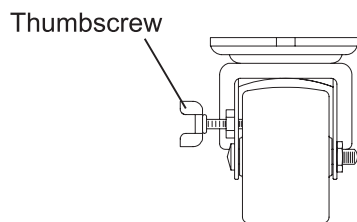


Figure 78. Caster thumbscrew



5. While moving the system to its final installed location and during relocation, it might be necessary to lay down floor covering, such as Lexan sheets, to prevent floor panel damage.

**Related reference:**

“Moving the system to the installation site” on page 177

Several factors must be considered before moving the system to the installation site.

### **Attaching the rack to a concrete (nonraised) floor**

Use this procedure to attach the rack to a concrete (nonraised) floor.

**Attention:** It is your responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

**Note:** Obtain the service of a qualified structural engineer to determine appropriate anchoring of the mounting plates. A minimum of five anchor bolts for each mounting plate must be used to secure the plates to the concrete floor. Because some of the drilled holes might be aligned with concrete reinforcement rods below the surface of the concrete floor, additional holes must be drilled. Each mounting plate must have at least five usable holes, two that are on the right-hand sides and the other two are on opposite ends, and one hole at the center. The mounting plates should be able to withstand 1134 kg (2500 lb) pulling force on each end.

1. Be sure the rack is in the correct location. To ensure that the holes are in the correct location, the diagonal distance of the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side-to-side distance) and 1019 mm (40.1 in.) (the front-to-back distance).

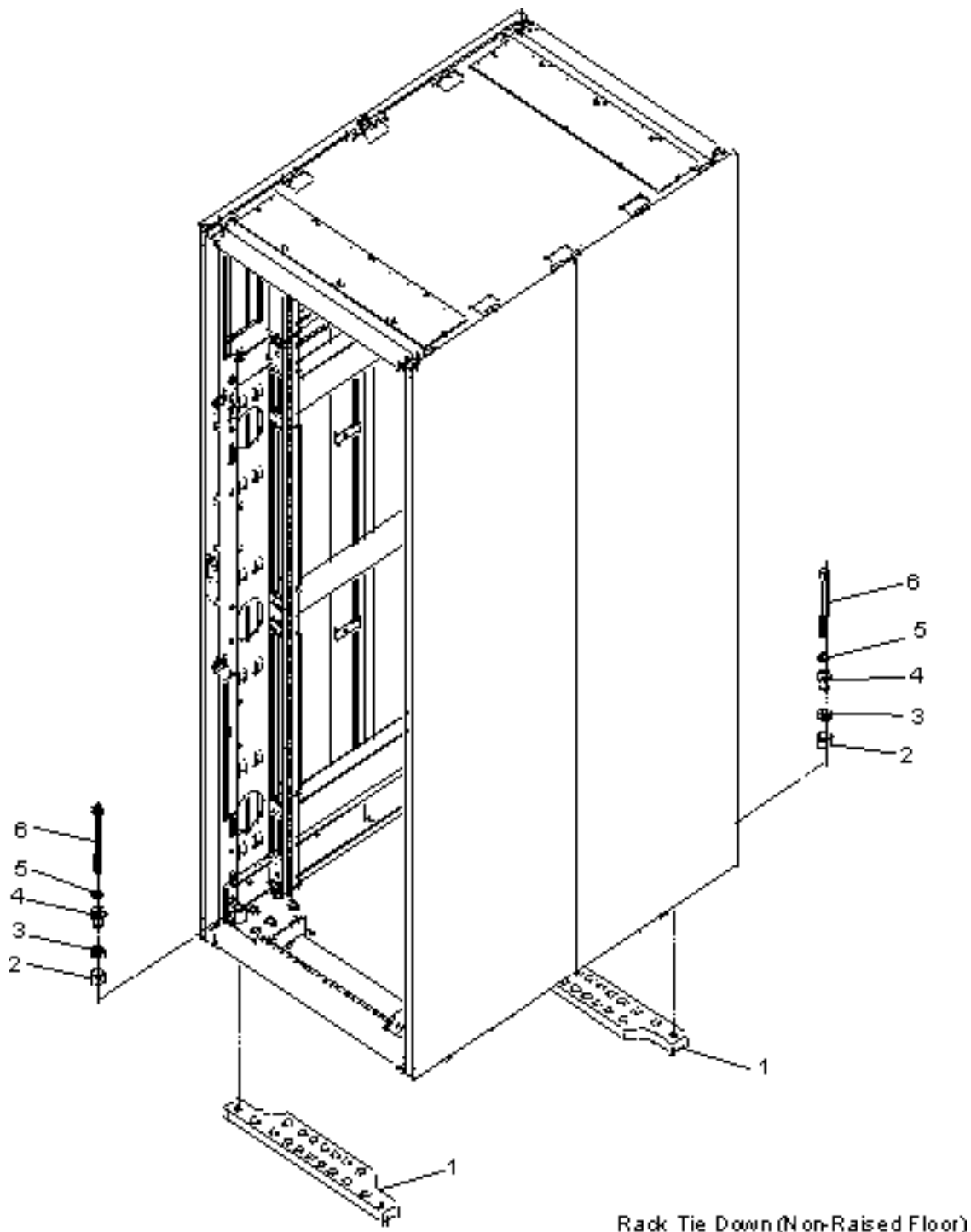


Figure 79. Rack tie down (nonraised floor)

2. Place the mounting plates (item 1 in the preceding figure), front and rear, in the approximate mounting position under the system rack.
3. To align the mounting plates to the system rack, do the following:
  - a. Place the four rack-mounting bolts (item 6 in the preceding figure) through the plate assembly holes at the bottom of the rack. Install the bushings and washers (item 4 and 5 in the preceding figure) to ensure bolt positioning.



Use the following to determine your next step:

1. If the rack is being attached to a short-depth raised-floor environment 228.6 - 330.2 mm (9 - 13 in. depth), install the Raised Floor Tie Down Kit (Part number 16R1102) described in the following table.

*Table 157. Raised Floor Tie Down Kit (Part number 16R1102)*

Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P2999	4	Turnbuckle Assembly

2. If the rack is being attached to a deep, raised-floor environment 304.8 - 558.8 mm (12 - 22 in. depth), install the Raised Floor Tie Down Kit (Part number 16R1103) described in the following table.

*Table 158. Raised Floor Tie Down Kit (Part number 16R1103)*

Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P3000	4	Turnbuckle Assembly

It is the your responsibility to ensure that the following steps are completed before the service representative performs the tie-down procedure.

**Note:** To accommodate a floor with a depth of more than 558.8 mm (22 in.), a steel beam or a steel channel adapter for mounting the subfloor eyebolts are required. The customer must supply the floor eyebolts.

Consider the following when preparing the floor for the tie-down procedure:

- The hardware is designed to support a frame weighing no more than 1429 kg (3150 lb).
- The estimated maximum concentrated load on one caster for a 1429 kg (3150 lb) system is 476.3 kg (1050 lb). For a multiple-system installation, one floor tile might bear a total concentrated load of 952.5 kg (2100 lb).

To install the eyebolts, do the following steps:

1. Obtain the service of a qualified structural engineer to determine the appropriate installation of the eyebolts.
2. Consider the following before installing the eyebolts:
  - Floor eyebolts must be securely anchored to the concrete floor.
  - For a single-frame installation, four 1/2-in. diameter by 13-inch subfloor eyebolts should be secured to the subfloor.
  - The minimum height of the center of the internal diameter is 2.54 mm (1 in.) above the concrete floor surface.
  - The maximum height is 63.5 mm (2.5 in.) above the concrete floor surface. A height greater than 63.5 mm can cause excessive lateral deflection to the tie-down hardware.
  - The eyebolt's internal diameter should be 1-3/16 inch, and each eyebolt should be able to withstand 1224.7 kg (2700 lb). The customer should obtain the services of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to ensure that the raised floor and the building can support the floor-loading specifications.

- To ensure that the holes are in the correct location, the diagonal distance of the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side-to-side distance) and 1019 mm (40.1 in.) (the front-to-back distance)
3. Verify that the four eyebolts are positioned to match the dimensions is given in the following figures.

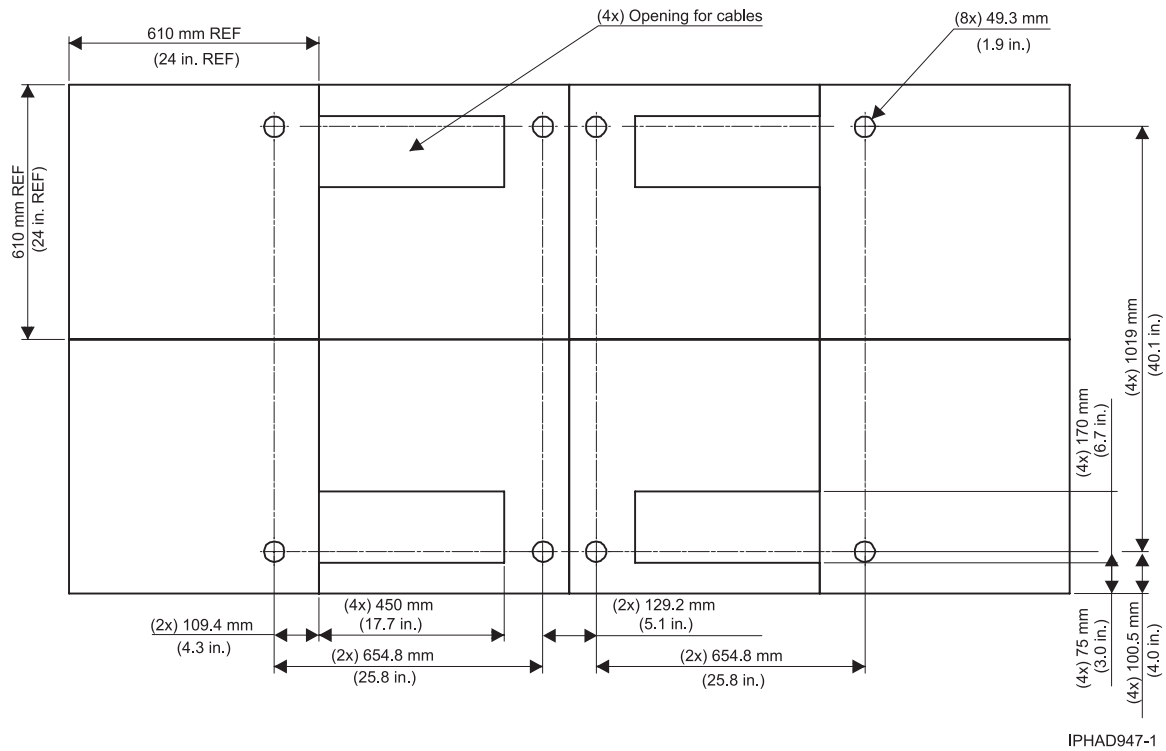


Figure 81. Eyebolt positioning for 610 mm (24 in.) floor tile layout

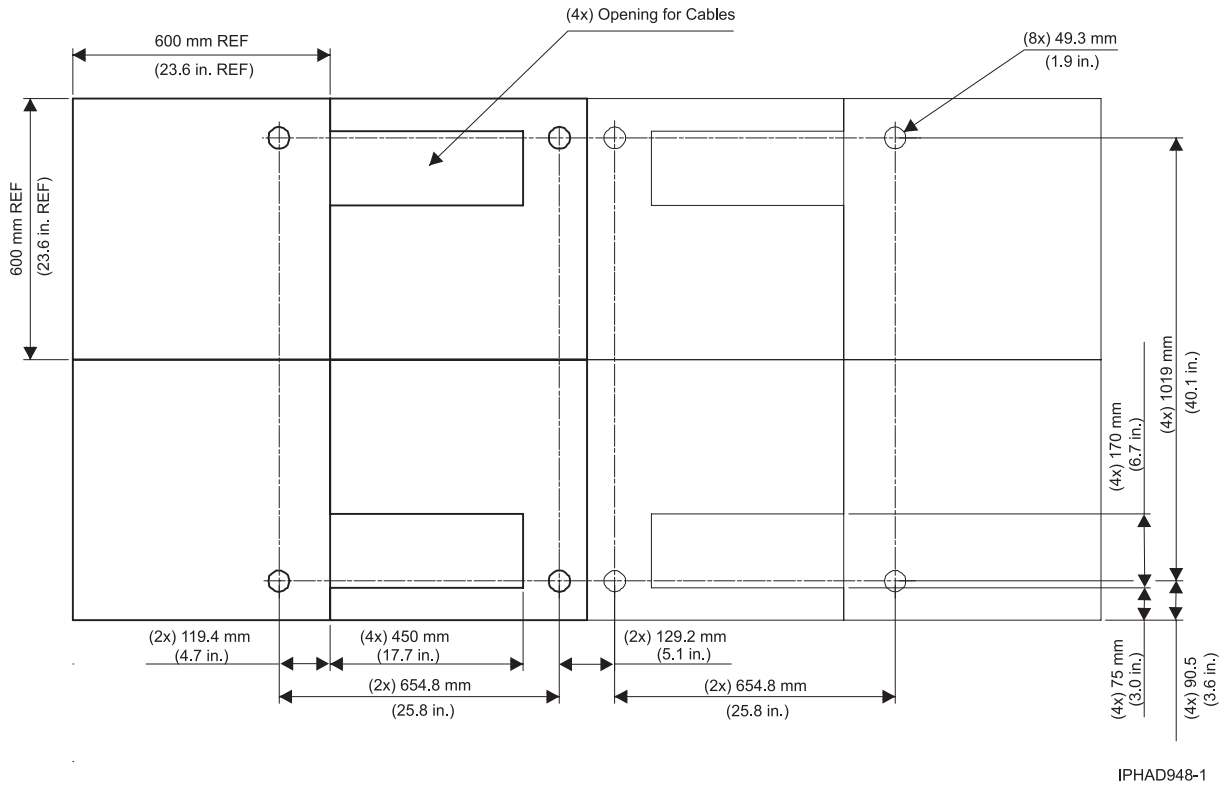
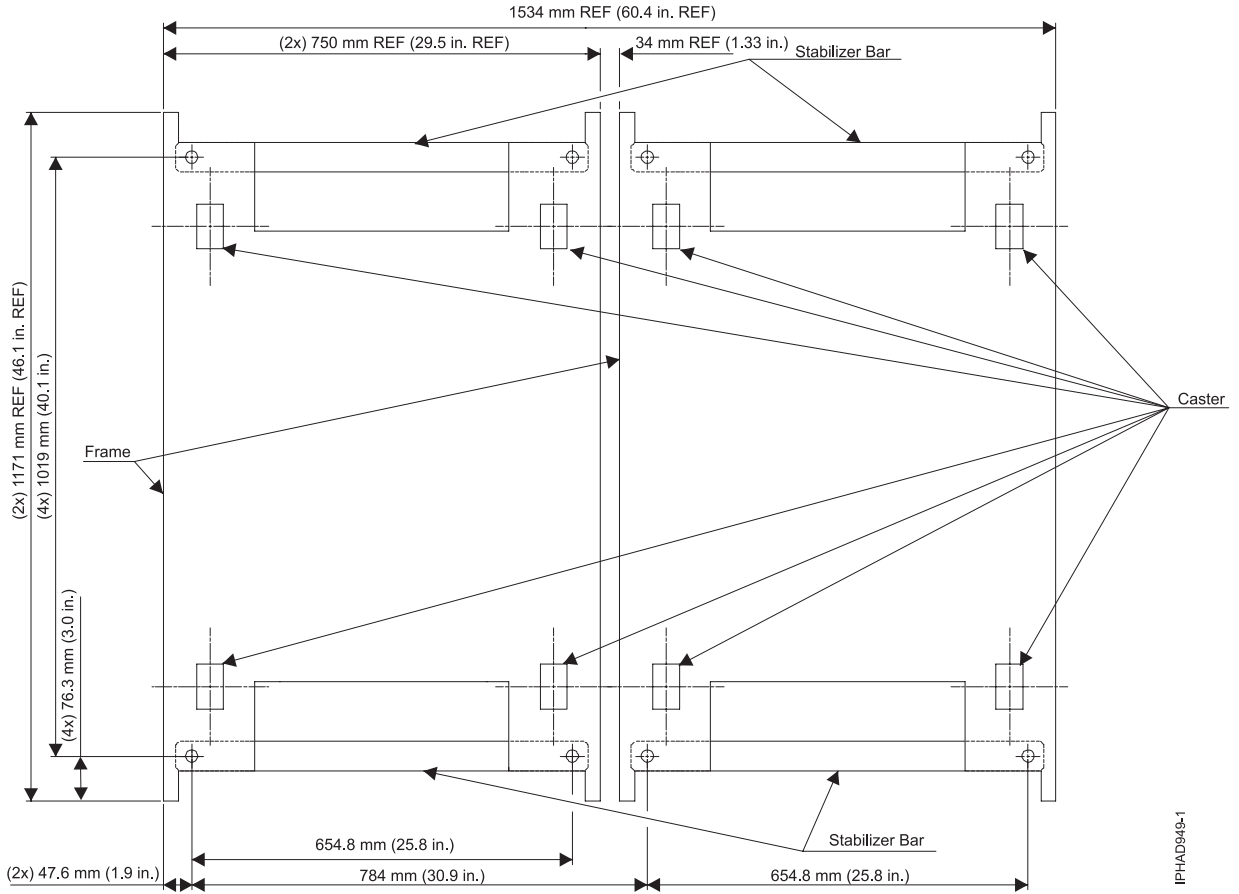


Figure 82. Eyebolt positioning for 600 mm (23.6 in.) floor tile layout



IPHAD949-1

Figure 83. Stabilizer bar layout (top view)

4. Install the eyebolts to the floor. The service representative can now install the frame.

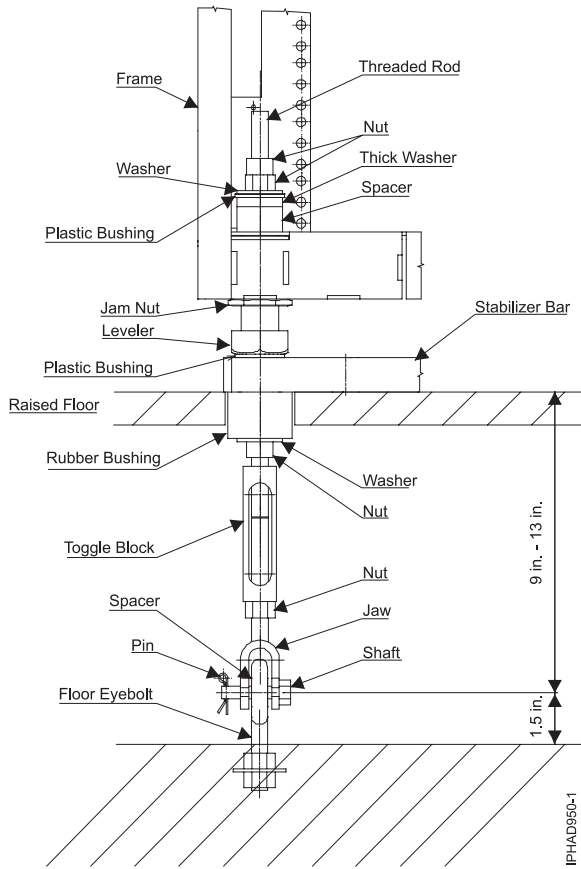


Figure 84. Turnbuckle assembly frame tie-down hardware for 228.6 mm to 330.2 mm (9 in. to 13 in.) raised floor (Part number 44P2999)



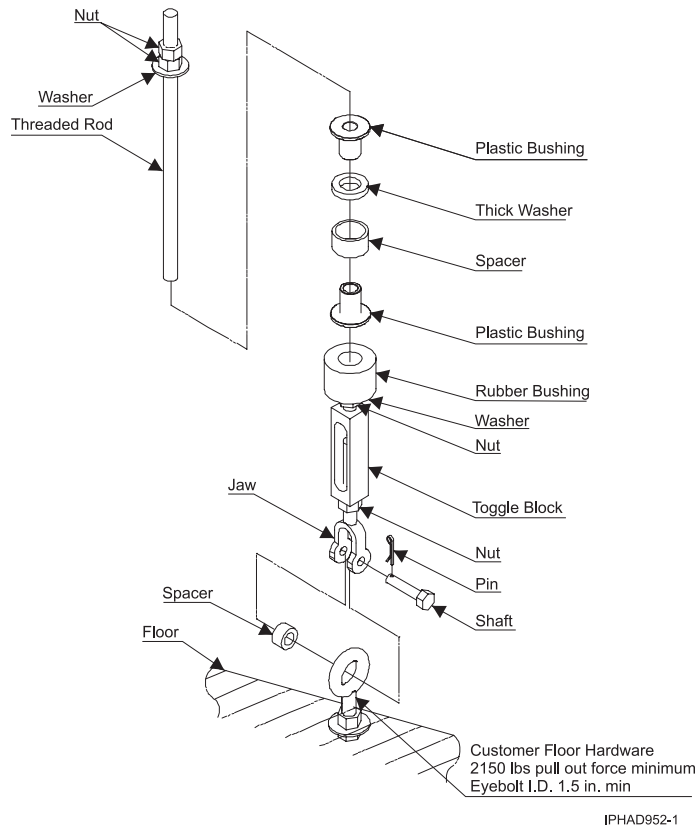


Figure 85. Turnbuckle assembly frame tie-down hardware for 228.6 mm to 330.2 mm (9 in. to 13 in.) raised floor (Part number 44P2999)

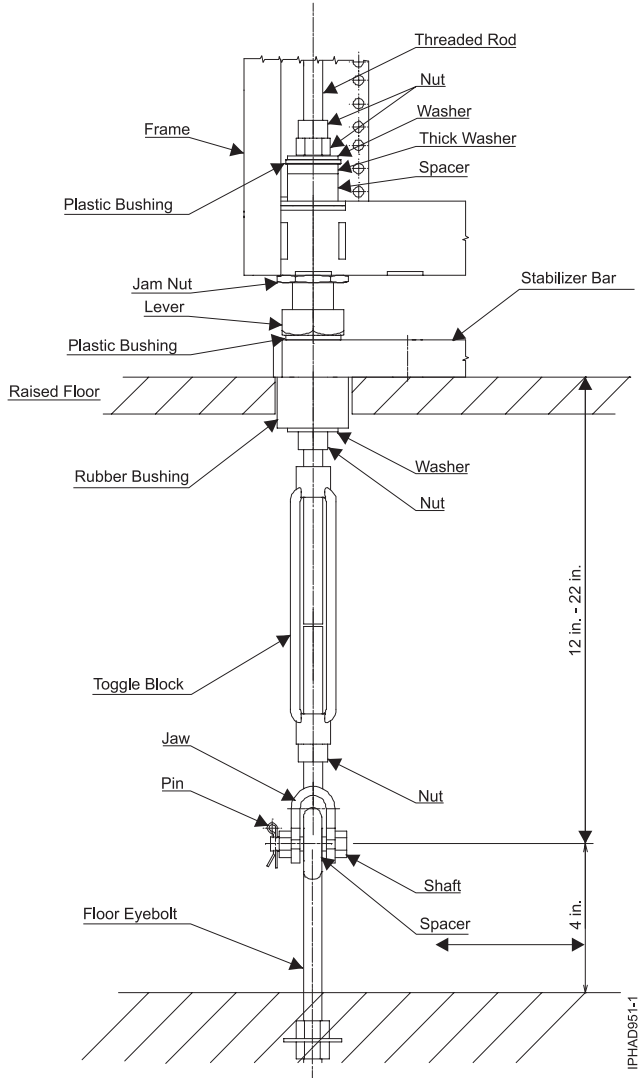
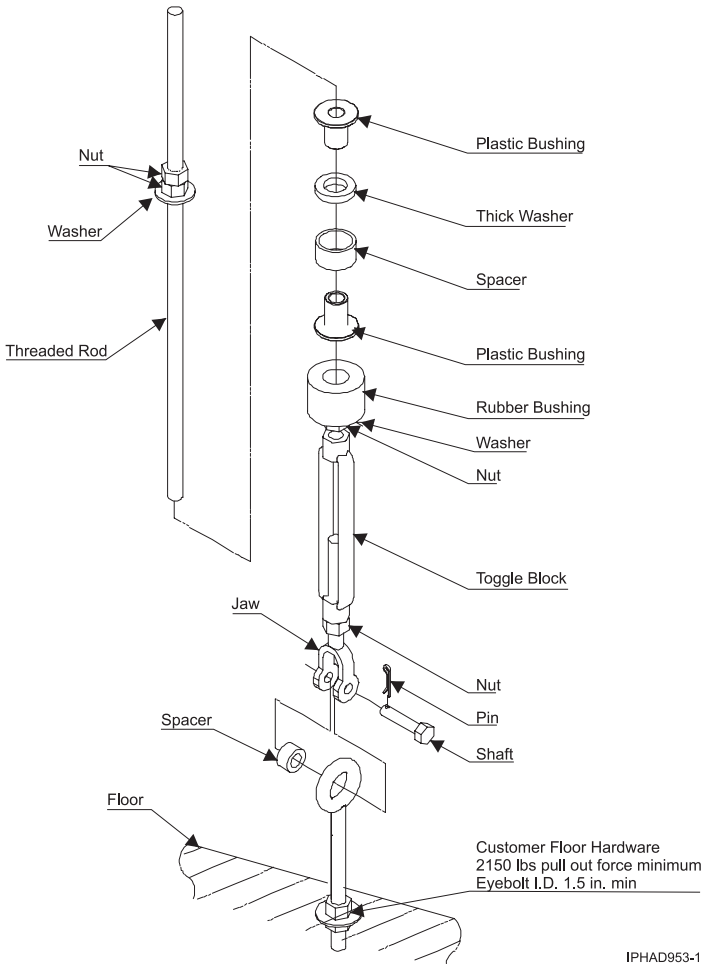


Figure 86. Turnbuckle assembly frame tie-down hardware for 304.8 mm to 558.8 mm (12 in. to 22 in.) raised floor (Part number 44P3000)



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Figure 87. Turnbuckle assembly frame tie-down hardware for 304.8 mm to 558.8 mm (12 in. to 22 in.) raised floor (Part number 44P3000)

## Considerations for multiple-system installations

Learn about the installation requirements for a multiple-system installation.

In a multiple-system installation, it is possible that a floor tile with cable cutouts (refer to *Cutting and placing floor panels*) will bear two concentrated static loads up to 476 kg (1050 lb) per caster and leveler. Thus, the total concentrated load can be as high as 953 kg (2100 lb). Contact the floor tile manufacturer or consult a structural engineer to ensure that the raised floor assembly can support this load.

When you are integrating a model 9119-590, 9406-595, and 9119-595 into an existing multiple-system environment, or when adding additional systems to an installed 9119-590, 9406-595, and 9119-595 consider the following factors:

- Minimum aisle width

For multiple rows of systems containing one or more model 9119-590, 9406-595, or 9119-595 the minimum aisle width in the front of the system is 1219 mm (48 in.) and 914 mm (36 in.) in the rear of the system to allow room to perform service operations. The front and rear service clearances should be at least 1219 mm (48 in.) and 914 mm (36 in.), respectively. Service clearances are measured from the edges of the frame (with doors open) to the nearest obstacle.

- Thermal interactions

Systems should be faced front-to-front and rear-to-rear to create "cold" and "hot" aisles to maintain effective system thermal conditions, as shown in the following figure.

Cold aisles need to be of sufficient width to support the airflow requirements of the installed systems as indicated in *Cooling requirements*. The airflow per tile will be dependent on the underfloor pressure and perforations in the tile. A typical underfloor pressure of 0.025 in. of water will supply 300-400 cfm through a 25% open 2 ft by 2 ft floor tile.

Proposed Floor Layout for Multiple Systems

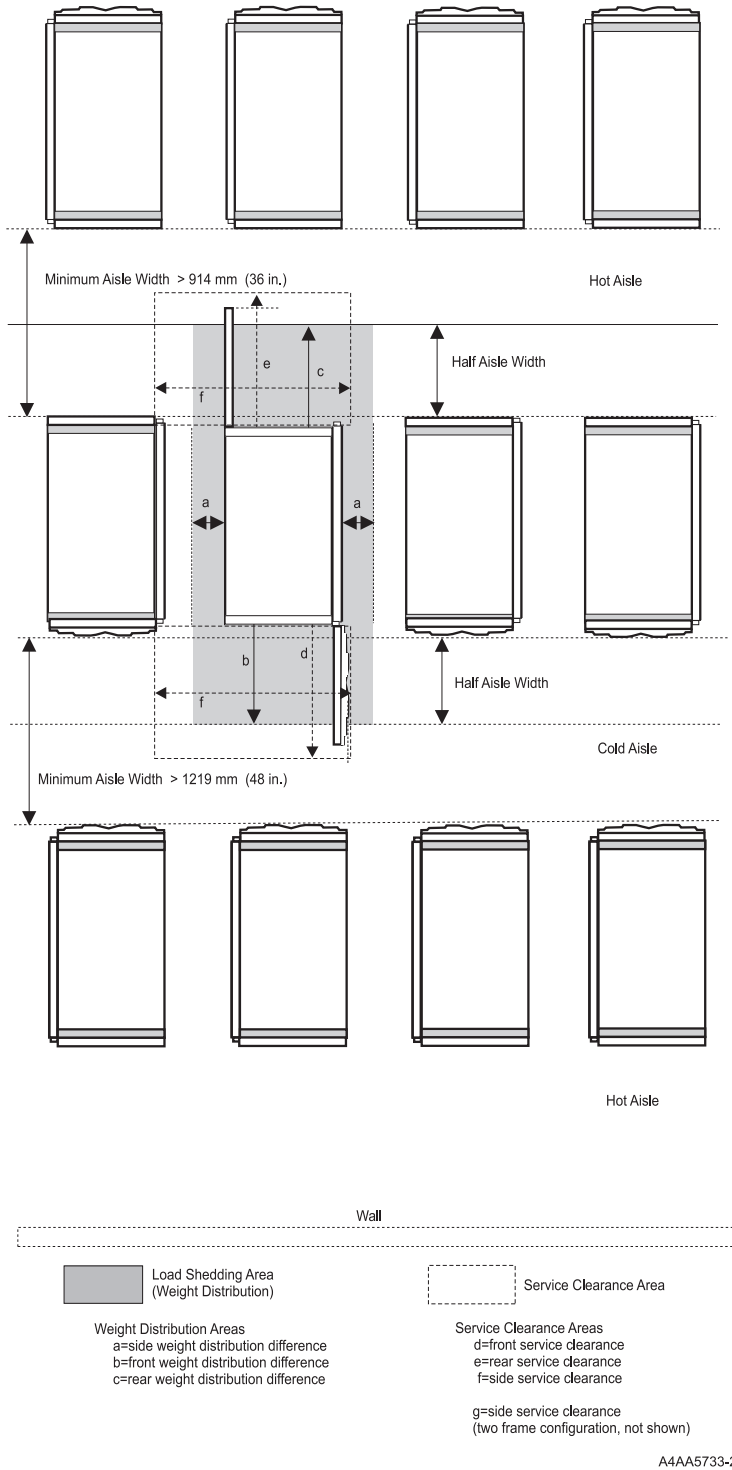


Figure 88. Proposed floor layout for multiple systems

Related reference:

“Cutting and placing floor panels” on page 150

These guidelines specify how to make the necessary openings in the raised floor for installing your

server.

“Cooling requirements” on page 174

Use the system cooling requirements table in conjunction with the cooling requirements graph and chilled airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

## Service clearances

The service clearance area is the area around the server that is needed for IBM service representatives to service the server.

The minimum service clearance for systems with slimline doors is shown in the following figures.

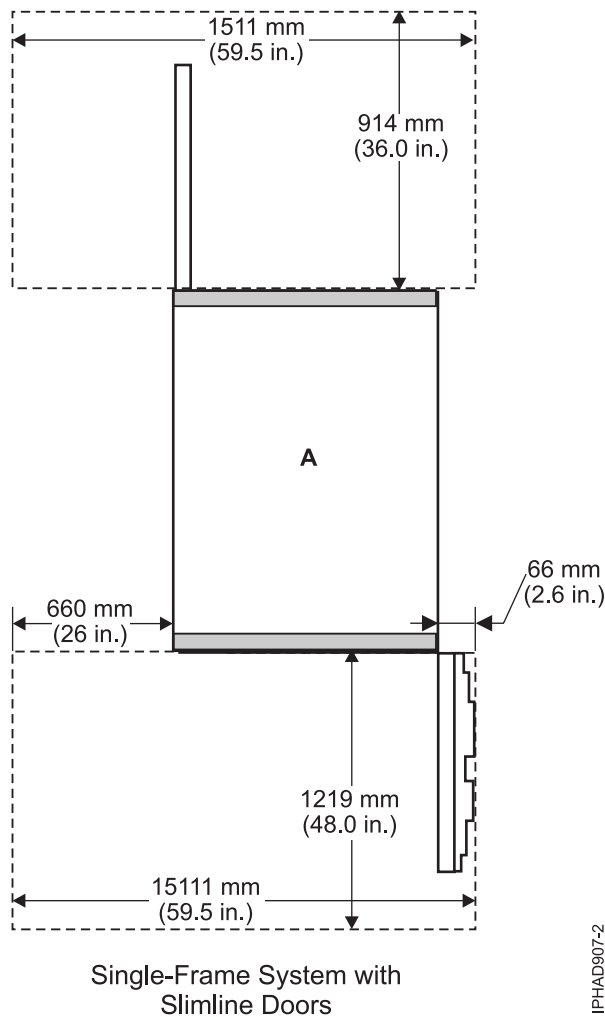
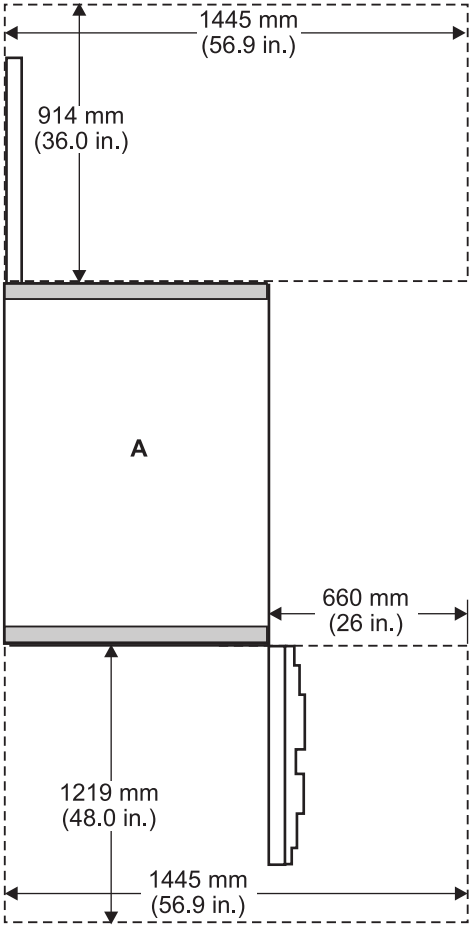
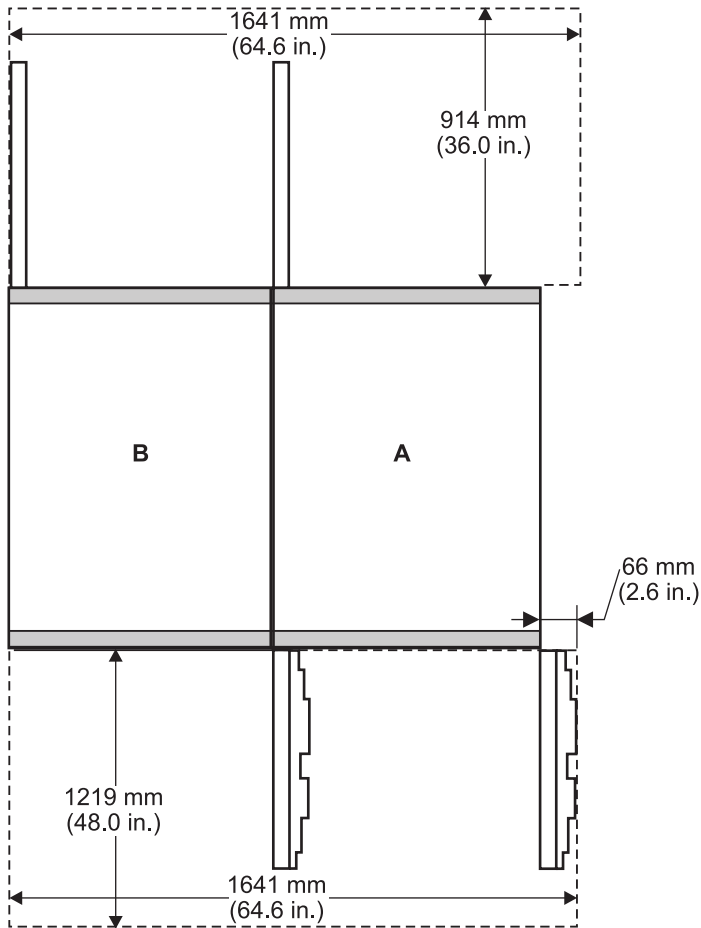


Figure 89. Service clearances for single frame systems with slimline doors



Single-Frame System with Slimline Doors (with alternative right-side service clearance) IPHAD908-2

Figure 90. Service clearances for single frame systems with slimline doors (with alternative right-side service clearance)



Double-Frame System  
with Slimline Doors

IPHAD909-0

Figure 91. Service clearances for double-frame systems with slimline doors

The minimum service clearance for systems with acoustical doors is shown in the following figures.



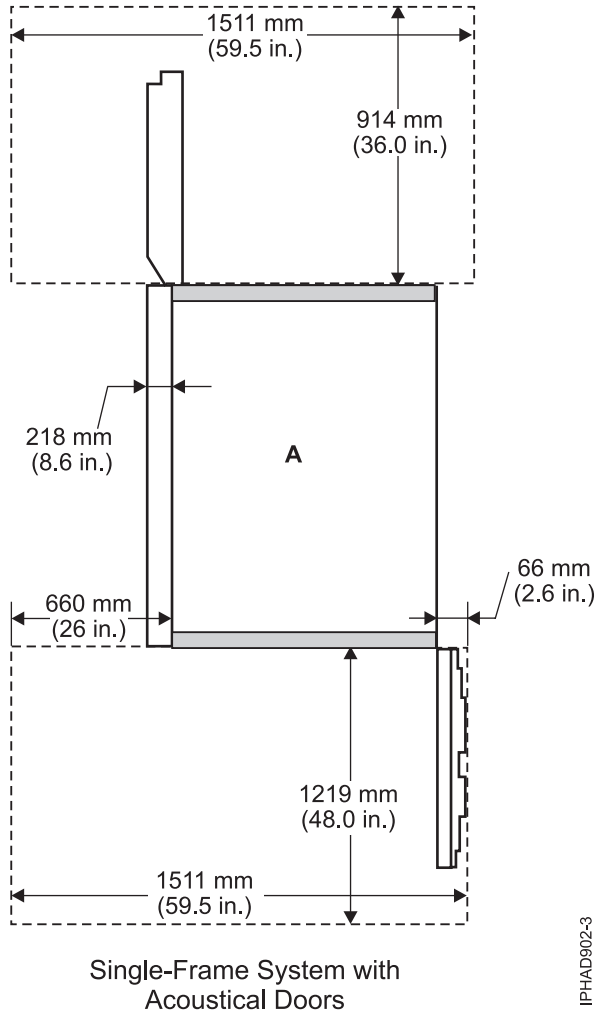
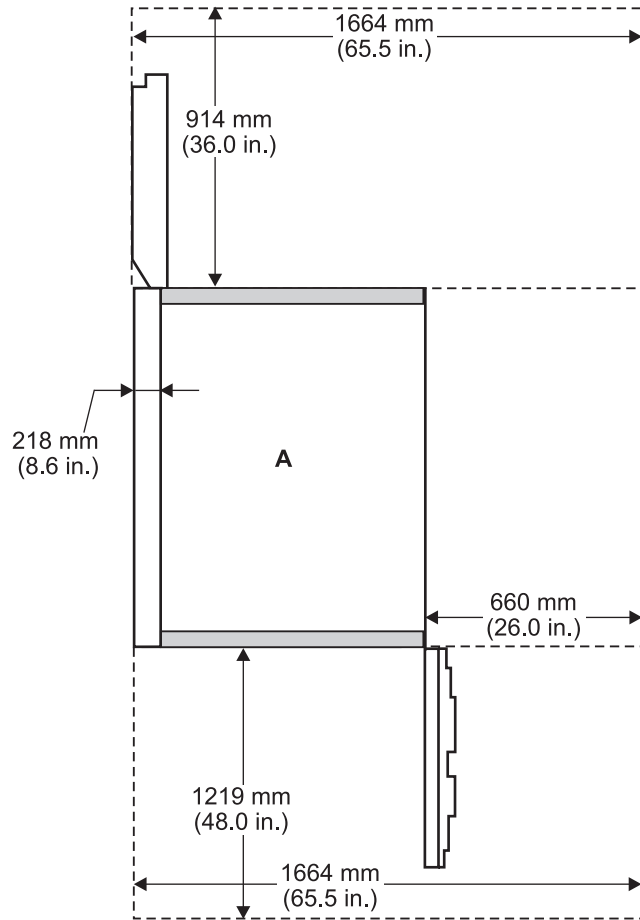


Figure 92. Service clearances for single-frame systems with acoustical doors



Single-Frame System with  
Acoustical Doors (with  
alternative right-side service  
clearance)

IPHAD903-2

Figure 93. Service clearances for single-frame systems with acoustical doors (with alternative right-side service clearance)

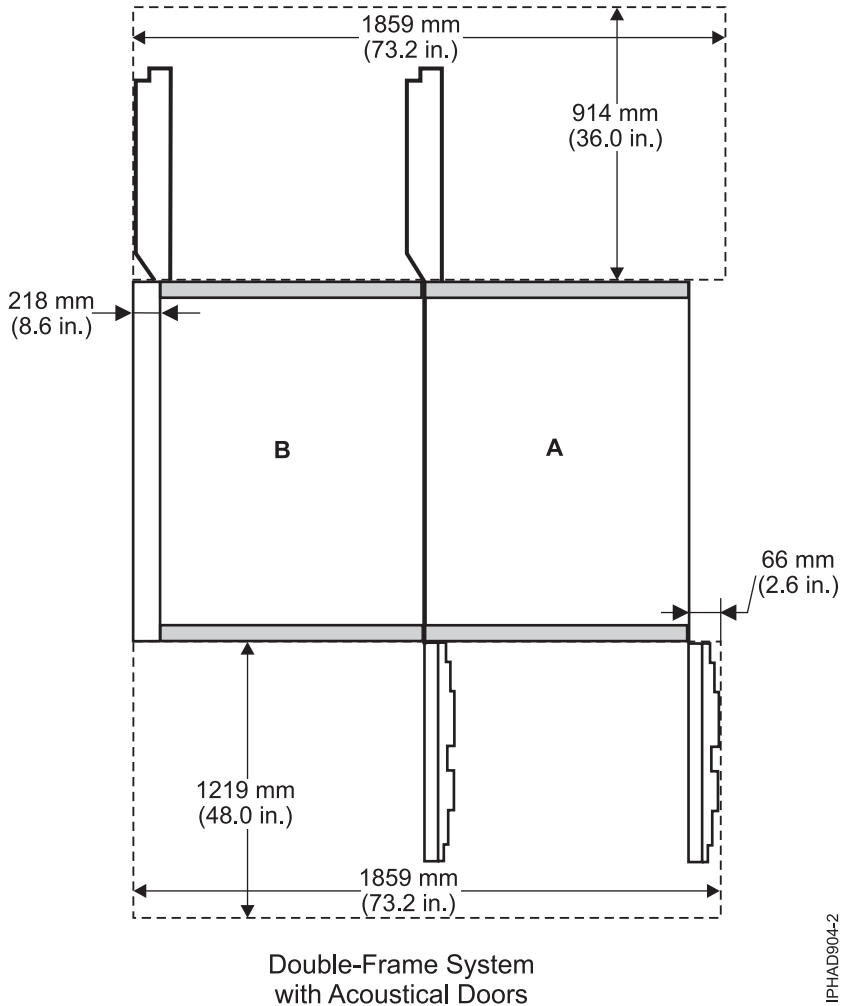


Figure 94. Service clearances for double-frame systems with acoustical doors

Refer to the figure in *Raised-floor requirements and preparation* for service clearances shown in a raised-floor installation.

**Related reference:**

“Raised-floor requirements and preparation” on page 149

A raised floor is required for model 9119-595 and its associated racks to ensure optimal performance and to comply with electromagnetic compatibility requirements.

**ASHRAE declarations**

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

These guidelines are available at *ASHRAE Technical Committee*.

Table 159. ASHRAE declarations

Description	Typical Heat Release	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Minimum configuration	6.1 kW	635	1080	915	1556

Table 159. ASHRAE declarations (continued)

Description	Typical Heat Release	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
Maximum configuration	22.7 kW	1760 cfm	2992 m <sup>3</sup> /hr	2460 cfm	4182 m <sup>3</sup> /hr
Typical configuration	13.0 kW	1310 cfm	2227 m <sup>3</sup> /hr	1790 cfm	3043 m <sup>3</sup> /hr
ASHRAE Class	3				
Minimum configuration	16-core with a single I/O drawer				
Maximum configuration	64-core with 4 I/O drawers				
Typical configuration	32-core with 4 I/O drawers				

See Model 9119-590, 9406-595, 9119-595 server specifications for Weight and Overall system dimension.

**Airflow Diagram**  
Cooling scheme F-R

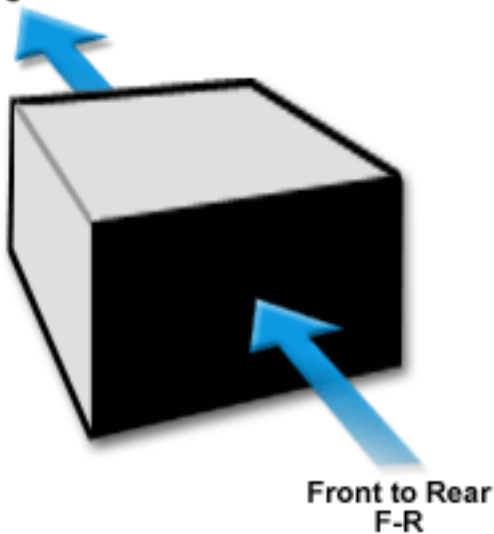


Figure 95. Airflow figure for server mounted in a rack

**Related information:**

[ASHRAE Technical Committee](#)  
ASHRAE guidelines are available in this website

**Total system power consumption**

The following table contains the maximum power requirements for model 9119-590, 9406-595, and 9119-595.

Table 160. System power requirements for 1.9 GHz, 2.1 GHz, or 2.3 GHz processor systems (9119-595, and 9406-595) - (kW)<sup>2</sup>

I/O drawers and switches	Processor books			
	1	2	3	4
0	5.3	9.7	13.2	16.7
1	6.1	10.5	14.0	17.5
2	7.0	11.3	14.8	18.3

Table 160. System power requirements for 1.9 GHz, 2.1 GHz, or 2.3 GHz processor systems (9119-595, and 9406-595) - (kW)<sup>2</sup> (continued)

I/O drawers and switches	Processor books			
	1	2	3	4
3	7.7	12.1	15.6	19.1 <sup>1</sup>
4	8.5	12.9	16.4	19.8 <sup>1</sup>
5	9.3	13.7		
6	10.1	14.4		
7		15.2		
8		16.1		
9		16.9		
10		17.7		
11		18.4 <sup>1</sup>		
12		19.2 <sup>1</sup>		

**Note:**

- 100 A power cord is required unless a 5792 optional base rack is ordered and the noted drawers are installed in the 5792 rack. See *Planning for 5792 base rack*.
- To obtain the kBtu/hr value, multiply the kW value times 3.413.

Table 161. System power requirements for 1.65 GHz processor systems (9406-595, 9119-590, and 9119-595- (kW)<sup>1</sup>

I/O drawers and switches	Processor books			
	1	2	3	4
0	5.1	9.3	12.5	15.7
1	6.1	10.2	13.5	16.6
2	7.0	11.2	14.4	17.6
3	7.9	12.1	15.3	
4	8.8	13.0	16.2	
5	9.8	13.9		
6	10.7	14.8		
7		15.8		
8		16.7		
9		17.6		
10		18.5		
11				
12				

**Note:**

- To obtain the kBtu/hr value, multiply the kW value times 3.413.

Maximum configurations are based on 16 memory cards per processor book, 16 disk drives per I/O drawer. 20 PCI cards per I/O drawer and 16 switch cards per HPS switch. To determine the typical power consumption for a specific configuration, subtract the following typical power values.

Table 162. Typical power values

Component	Typical power value (W)
Disk drives	20
I/O PCI card	20
Memory cards	100
Switch card	30

**Related reference:**

“Planning for 5792 base rack” on page 327

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

## Cooling requirements

Use the system cooling requirements table in conjunction with the cooling requirements graph and chilled airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

The model 9119-590, 9406-595, and 9119-595 require air for cooling. As shown in *Considerations for multiple system installation* rows of model 9119-590, 9406-595, and 9119-595 systems must face front-to-front. The use of a raised floor is recommended to provide air through perforated floor panels placed in rows between the fronts of systems (the cold aisles shown in *Considerations for multiple system installation*).

The following table provides system cooling requirements based on system configuration. The letter designations in the table correspond to the letter designations in the graph shown in *Cooling requirements graph*.

Table 163. System cooling requirements for 1.9 GHz, 2.1 GHz, or 2.3 GHz processor systems (9119-595 and 9406-595)

Number of I/O drawers	Number of processor books			
	1	2	3	4
0	B	D	F	H
1	C	E	F	H
2	C	E	G	H
3	C	E	G	I
4	D	F	G	I
5	D	F		
6	E	G		
7		G		
8		G		
9		H		
10		H		
11		H		
12		I		

Table 164. System cooling requirements for 1.65 GHz processor systems (9406-595, 9119-590, and 9119-595)

Number of I/O drawers	Number of processor books			
	1	2	3	4
0	B	D	E	F

Table 164. System cooling requirements for 1.65 GHz processor systems (9406-595, 9119-590, and 9119-595) (continued)

Number of I/O drawers	Number of processor books			
	1	2	3	4
1	B	D	E	G
2	C	D	F	G
3	C	E	F	G
4	C	E	F	H
5	D	E		
6	D	F		
7		F		
8		G		
9		G		
10		G		
11		H		
12		H		

**Related reference:**

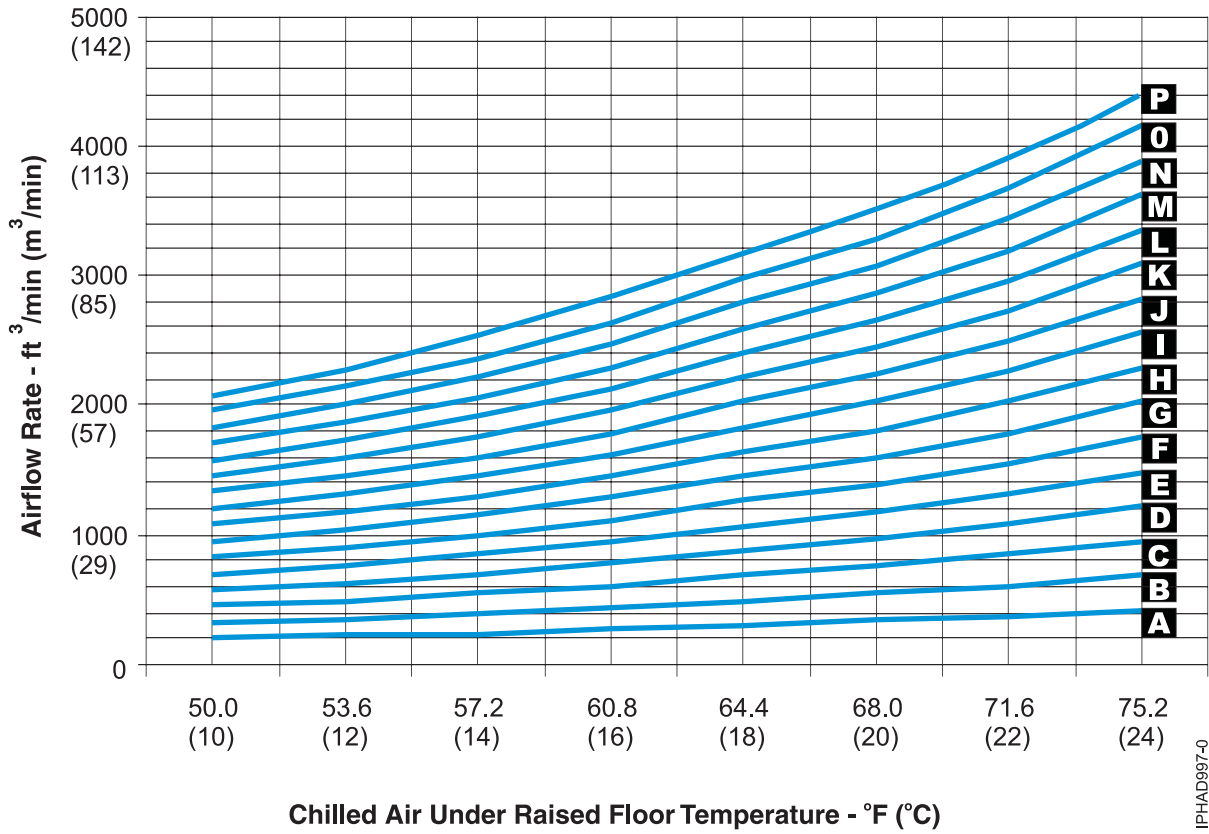
“Considerations for multiple-system installations” on page 163

Learn about the installation requirements for a multiple-system installation.

**Cooling requirements graph**

Use the cooling requirements graph in conjunction with the cooling requirements tables and the chilled airflow area graphic to determine the area of the floor tiles to supply chilled air to the system.

## System Cooling Requirements



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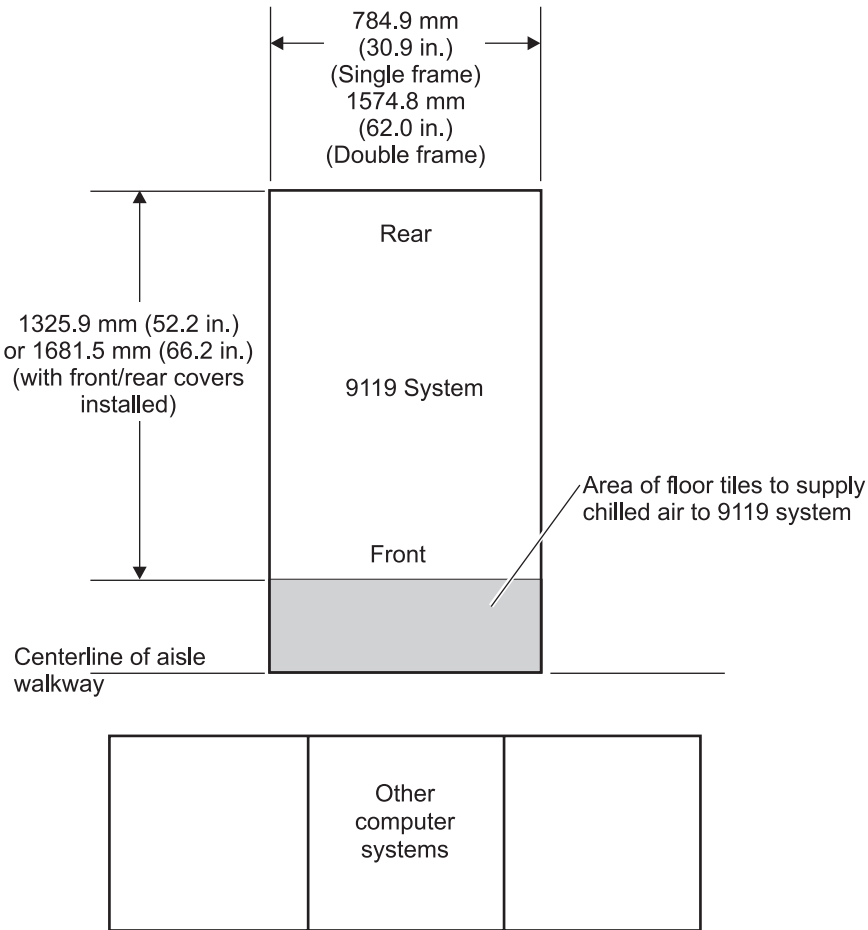
Figure 96. Cooling requirements graph

### Requirements for the chilled airflow area

The Chilled airflow area figure shows the chilled airflow area required for a system.

Use the system cooling requirements tables and the cooling requirements graph to determine the area of floor tiles to supply chilled air to the system.





IPHAD910-1

Figure 97. Chilled airflow area

## Moving the system to the installation site

Several factors must be considered before moving the system to the installation site.

Prior to moving the system to the installation site, you should:

- Determine the path that must be taken to move the system from the delivery location to the installation site.
- Verify that the height of all doorways, elevators, and so on are sufficient to allow moving the system to the installation site.
- Verify that the weight limitations of elevators, ramps, floors, floor tiles, and so on are sufficient to allow moving the system to the installation site. If the height or weight of the system can cause a problem when the system is moved to the installation site, you should contact your local site planning or sales representative.

For more detailed information, see *Access*.

If needed, a height reduction feature ( 7960 for ) might be ordered. This feature allows for the system frame and the expansion frame to be shipped in two pieces and assembled at your location. With this feature, the top section of the system frame (including the power subsystem) is removed. The height of

the system frame with the upper section removed is reduced by .35 m (14 in.) to approximately 1.64 m (65 in.). For planning purposes, the weight of the rack top frame and components are shown in the following table.

Table 165. Weight of rack top frame and components

	Weight	
	lb	kg
Bulk Power Assembly (Max value. Varies by Configuration)	179	81.2
Bulk Power Enclosure	45	20.4
Bulk power Controller	10	4.5
Bulk Power Regulator	28	12.7
Bulk Power Distributor	10	4.5
Bulk Power Hub	10	4.5
Side Cover, pair	110	49.9
Front acoustic door, system unit	56	25.4
Rear acoustic door, system unit	36	16.3
Front and Rear Acoustic door, I/O rack	56	25.4
Front and rear slimline door	33	15

## 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 to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM authorized service provider. 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 IBM 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.

#### Related information:

 Acoustics

## Phase imbalance and BPR configuration

Use the Phase imbalance and BPR configuration table to determine the phase imbalance of your server's configuration.

Depending on the number of Bulk Power Regulators (BPRs) in your system, phase imbalance can occur in line currents. All systems are provided with two bulk power assemblies (BPAs), with separate power cords. Phase currents will be divided between two power cords in normal operation. The following table illustrates phase imbalance as a function of BPR configuration. For information about power consumption, see *Total system power consumption*.

Table 166. Phase imbalance and BPR configuration

Number of BPRs per BPA	Phase A Line Current	Phase B Line Current	Phase C Line Current
1	Power / Vline	Power / Vline	0
2	0.5 Power / Vline	0.866 Power / Vline	0.5 Power / Vline
3	0.577 Power / Vline	0.577 Power / Vline	0.577 Power / Vline

**Note:** Power is calculated from *Total system power consumption*. Vline is line-to-line nominal input voltage. Because total system power is divided between two power cords, divide the power number by 2.

**Related reference:**

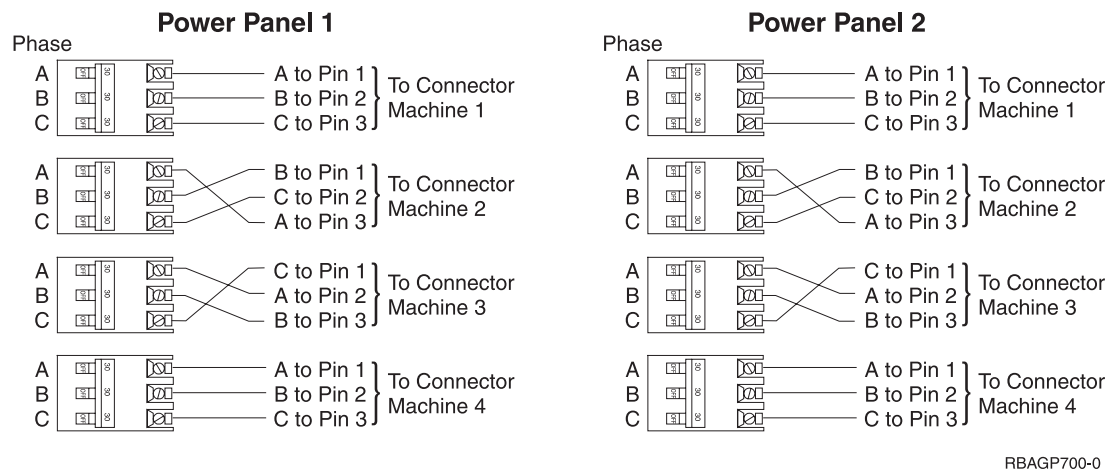
“Total system power consumption” on page 172

## Balancing power panel loads

Use these methods to ensure that power panel loads are balanced.

When three-phase power is used, and depending on the system configuration, the phase currents can be fully balanced or unbalanced. System configurations with three BPRs per BPA have balanced power panel loads, while configurations with only one or two have unbalanced loads. With two BPRs per BPA, two of the three-phases draw an equal amount of current, and are, nominally, 57.8% of the current on the third phase. With one BPR per BPA, two of three-phases carry an equal amount of current, with no current drawn on the third phase. The following figure is an example of feeding several loads of this type from two power panels in a way that balances the load among the three-phases.

**Note:** Use of ground-fault-interrupt (GFI) circuit breakers is not recommended for this system because GFI circuit breakers are earth-leakage-current sensing circuit breakers and this system is a high earth-leakage-current product.



RBAGP700-0

Figure 98. Power panel load balancing

The method illustrated in the preceding figure requires that the connection from the three poles of each breaker to the three-phase pins of a connector be varied. Some electricians might prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three-pole breakers are alternated with single-pole breakers, so that the three-pole breakers do not all begin on Phase A.

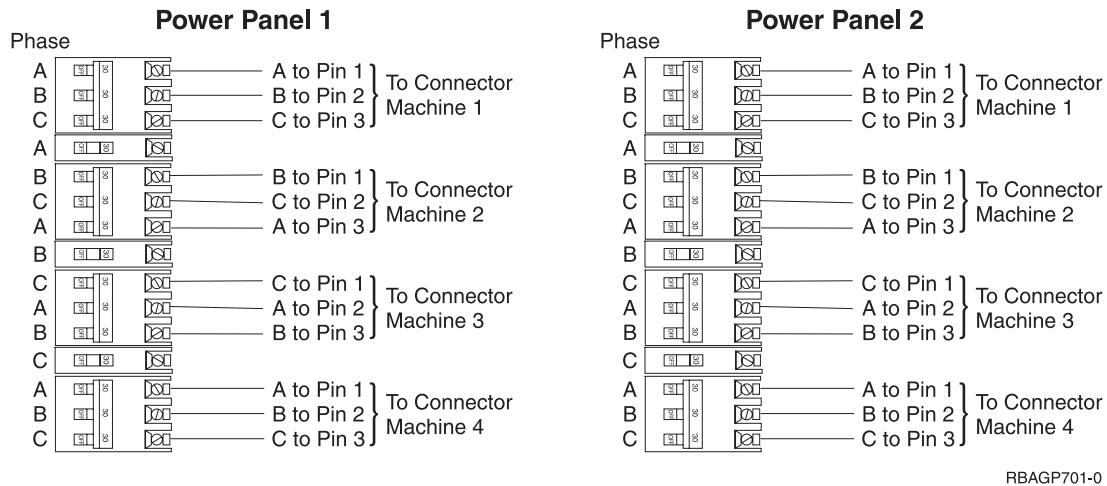


Figure 99. Power panel load balancing

The following figure shows another way of distributing the unbalanced load evenly. In this case, the three-pole breakers are alternated with two-pole breakers.

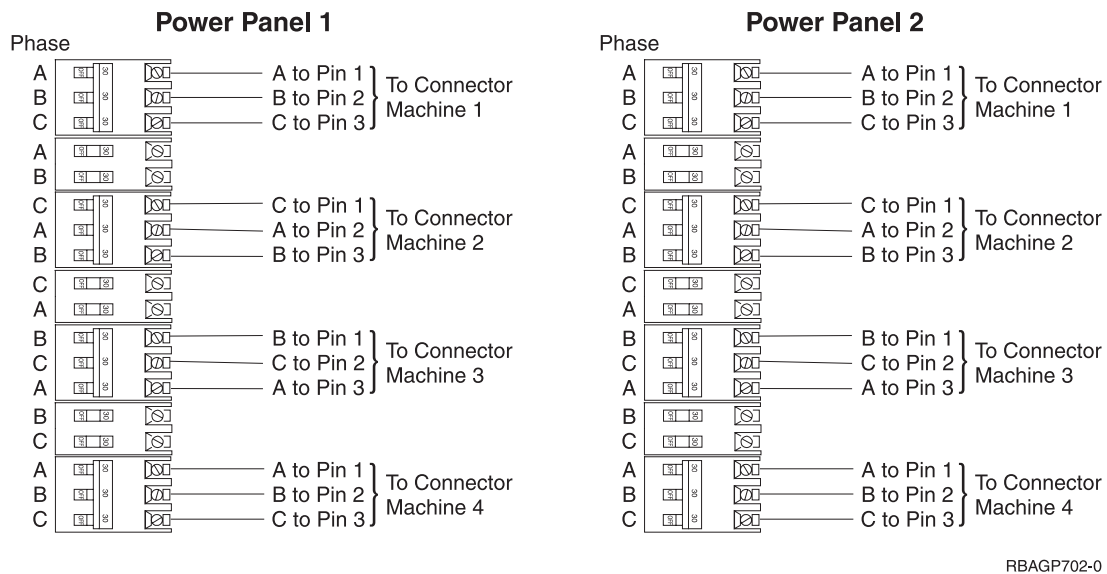


Figure 100. Power panel load balancing

## Configuring power cords

Use the Single-frame system power cord configuration and Double-frame system power cord configuration figures to route power cords through floor tile cutouts.

The power cords exit the system from different points of the frame as indicated in the following figure. For raised-floor applications, it is recommended that both cords be routed to the rear of the frame and through the same floor-tile cutout. For more information about raised-floor applications, refer to *Cutting and placing floor panels*.

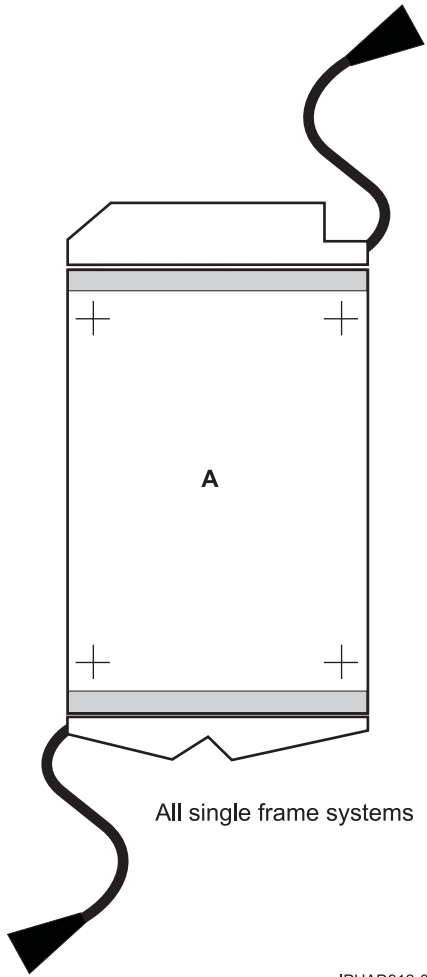
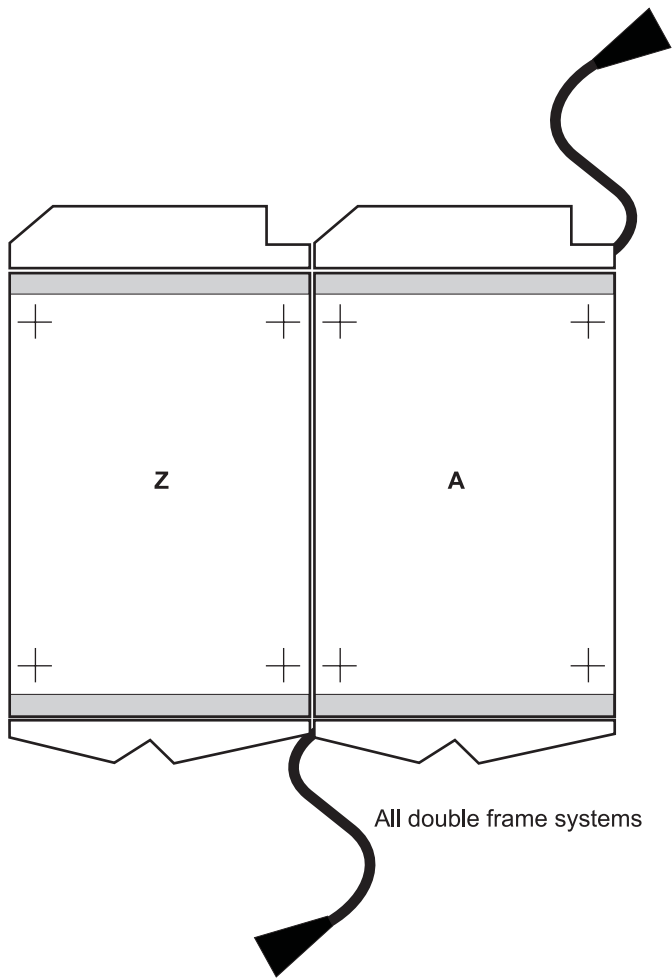


Figure 101. Single-frame system power cord configuration



IPHAD913-0

Figure 102. Double-frame system power cord configuration

**Related reference:**

“Cutting and placing floor panels” on page 150

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

**Dual power installation**

To take full advantage of the redundancy and reliability that is built into the computer system, the system must be powered from two distribution panels.

The model 9119-590, 9406-595, and 9119-595 configurations are designed with a fully redundant power system. These systems have two power cords attached to two power input ports which, in turn, power a fully redundant power distribution system within the system.

**Approximate system weights by configuration**

Use the Approximate system weights tables to calculate the approximate weight of your system based on its configuration.

If the system that you order has a frame that weighs more than 1134 kg (2500 lb) when it is shipped from the factory, a weight-distribution plate is provided for the system. This plate is used to minimize the point loading from casters and leveling pads.

Table 167. Approximate system weights with acoustical covers and with integrated battery backup – kg (lb)<sup>1, 2, 3</sup>

I/O drawers and switches with redundant integrated battery backup (non-redundant available)	Processor books			
	1	2	3	4
0	809 (1784)	1075 (2370)	1246 (2747)	1223 (2697)
1	908 (2002)	1092 (2408)	1263 (2785)	1322 (2915)
2	1125 (2480)	1309 (2887)	1368 (3017)	1427 (3147)
3	1534 (3382)	1719 (3789)		
4	1639 (3614)	1824 (4021)		
5	1744 (3846)	1929 (4253)		
6	1853 (4085)	2037 (4492)		
7		2143 (4724)		
8		2248 (4956)		
9		2353 (5188)		
10		2458 (5420)		
11				
12				

**Note:**

1. A primary rack with one or two processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC8691. A primary frame with three or four processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC5792.
2. The 9119-590 with two processor books supports a maximum of eight I/O drawers.
3. The integrated battery backup option is not available for model the 9406-595.

Table 168. Approximate system weights with acoustical covers and without integrated battery backup – kg (lb)<sup>1, 2</sup>

I/O drawers and switches without integrated battery backup	Processor books			
	1	2	3	4
0	719 (1585)	895 (1972)	975 (2150)	952 (2100)
1	818 (1803)	912 (2010)	992 (2188)	1051 (2318)
2	944 (2082)	1039 (2290)	1098 (2420)	1157 (2550)
3	1050 (2315)	1158 (2522)	1203 (2652)	1262 (2782)
4	1155 (2547)	1249 (2754)	1308 (2884)	1367 (3014)
5	1564 (3448)	1658 (3656)		
6	1669 (3680)	1764 (3888)		
7		1869 (4120)		
8		1977 (4359)		
9		2082 (4591)		
10		2188 (4823)		
11		2293 (5055)		
12		2398 (5287)		

Table 168. Approximate system weights with acoustical covers and without integrated battery backup – kg (lb)<sup>1</sup>,  
<sup>2</sup> (continued)

I/O drawers and switches without integrated battery backup	Processor books			
	1	2	3	4
<b>Note:</b> 1. A primary rack with one or two processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC8691. A primary frame with three or four processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC5792. 2. The 9119-590 with two processor books supports a maximum of eight I/O drawers.				

Table 169. Approximate system weights with slimline covers and with integrated battery backup – kg (lb)<sup>1, 2, 3</sup>

I/O drawers and switches with redundant integrated battery backup (non-redundant available)	Processor books			
	1	2	3	4
0	801 (1765)	985 (2371)	1156 (2748)	1215 (2678)
1	900 (1983)	1084 (2389)	1255 (2766)	1314 (2896)
2	1116 (2461)	1301 (2868)	1360 (2998)	1419 (3128)
3	1517 (3344)	1619 (3750)		
4	1622 (3576)	1806 (3982)		
5	1727 (3808)	1911 (4214)		
6	1836 (4047)	2020 (4453)		
7		2125 (4685)		
8		2230 (4917)		
9		2335 (5149)		
10		2441 (5381)		
11				
12				
<b>Note:</b> 1. A primary rack with one or two processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC8691. A primary frame with three or four processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC5792. 2. The 9119-590 with two processor books supports a maximum of eight I/O drawers. 3. The integrated battery backup option is not available for model 9406-595.				

Table 170. Approximate system weights with slimline covers and without integrated battery backup – kg (lb)<sup>1, 2</sup>

I/O drawers and switches without integrated battery backup	Processor books			
	1	2	3	4
0	710 (1566)	886 (1953)	967 (2131)	944 (2081)
1	809 (1784)	903 (1991)	984 (2169)	1043 (2299)



Table 170. Approximate system weights with slimline covers and without integrated battery backup – kg (lb)<sup>1</sup>.  
<sup>2</sup> (continued)

I/O drawers and switches without integrated battery backup	Processor books			
	1	2	3	4
2	936 (2063)	1030 (2271)	1089 (2401)	1148 (2531)
3	1041 (2295)	1135 (2503)	1194 (2633)	1253 (2763)
4	1146 (2527)	1241 (2735)	1299 (2865)	1358 (2995)
5	1547 (3410)	1641 (3618)		
6	1652 (3642)	1746 (3850)		
7		1852 (4082)		
8		1960 (4321)		
9		2065 (4553)		
10		2170 (4785)		
11		2276 (5017)		
12		2381 (5249)		

**Note:**

1. A primary rack with one or two processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC8691. A primary frame with three or four processor books and either greater than four I/O drawers or greater than two I/O drawers and two integrated battery backup units requires a FC5792.
2. The 9119-590 with two processor books supports a maximum of eight I/O drawers.

## Weight distribution

Use the Floor loading dimensions figure and the Floor loading for system tables to determine the floor loading for various configurations.

The following figure shows the floor loading dimensions for the model 9119-590, 9406-595, and 9119-595. Use this figure in conjunction with the floor loading tables to determine the floor loading for various configurations.

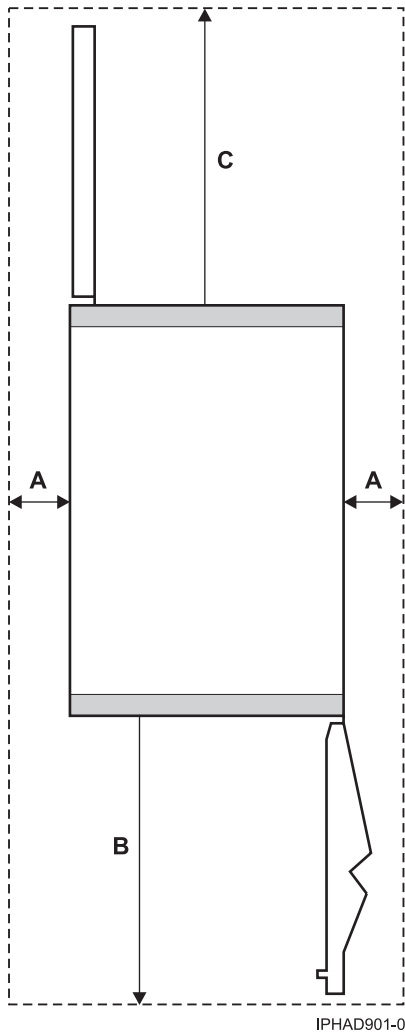


Figure 103. Floor loading dimensions

The following table shows the values used for calculating floor loading for model 9119-590, 9406-595, and 9119-595. Weights include covers, width and depth are indicated without covers.

Table 171. Floor loading for system with 2 processor books, 12 drawers, and without integrated battery backup

a (sides)		b (front)		c (back)		2 frames	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	198.6	969.6
25	1.0	508	20.0	508	20.0	158.3	772.9
25	1.0	762	30.0	762	30.0	133.2	650.4
254	10.0	254	10.0	254	10.0	159.8	780.3
254	10.0	508	20.0	508	20.0	128.5	627.6
254	10.0	762	30.0	762	30.0	109.0	532.4
508	20.0	254	10.0	254	10.0	133.0	649.4
508	20.0	508	20.0	508	20.0	108.0	527.1
508	20.0	762	30.0	762	30.0	92.3	450.8
762	30.0	254	10.0	254	10.0	115.1	562.0

Table 171. Floor loading for system with 2 processor books, 12 drawers, and without integrated battery backup (continued)

a (sides)		b (front)		c (back)		2 frames	
762	30.0	508	20.0	508	20.0	94.2	459.9
762	30.0	762	30.0	762	30.0	81.2	396.3

Table 172. Floor loading for systems with 4 processor books, 4 drawers, and without integrated battery backup

a (sides)		b (front)		c (back)		2 frames	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	223.3	1090.5
25	1.0	508	20.0	508	20.0	177.3	865.8
25	1.0	762	30.0	762	30.0	148.6	725.7
254	10.0	254	10.0	254	10.0	151.2	738.3
254	10.0	508	20.0	508	20.0	121.9	595.3
254	10.0	762	30.0	762	30.0	103.7	506.2
508	20.0	254	10.0	254	10.0	114.9	561.0
508	20.0	508	20.0	508	20.0	94.0	459.1
508	20.0	762	30.0	762	30.0	81.0	395.7
762	30.0	254	10.0	254	10.0	94.8	462.9
762	30.0	508	20.0	508	20.0	78.6	383.8
762	30.0	762	30.0	762	30.0	68.5	334.5

Table 173. Floor loading for system with 2 processor books, 10 drawers, and with integrated battery backup

a (sides)		b (front)		c (back)		2 frames	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	203.2	992.1
25	1.0	508	20.0	508	20.0	161.9	790.3
25	1.0	762	30.0	762	30.0	136.1	664.4
254	10.0	254	10.0	254	10.0	163.4	797.8
254	10.0	508	20.0	508	20.0	131.3	641.0
254	10.0	762	30.0	762	30.0	111.3	543.3
508	20.0	254	10.0	254	10.0	135.9	663.5
508	20.0	508	20.0	508	20.0	110.2	537.9
508	20.0	762	30.0	762	30.0	94.1	459.6
762	30.0	254	10.0	254	10.0	117.5	573.7
762	30.0	508	20.0	508	20.0	96.0	468.9
762	30.0	762	30.0	762	30.0	82.7	403.6

Table 174. Floor loading for system with 4 processor books, 2 drawers, and with integrated battery backup

a (sides)		b (front)		c (back)		2 frames	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	232.5	1135.3

Table 174. Floor loading for system with 4 processor books, 2 drawers, and with integrated battery backup (continued)

a (sides)		b (front)		c (back)		2 frames	
25	1.0	508	20.0	508	20.0	184.4	900.2
25	1.0	762	30.0	762	30.0	154.4	753.6
254	10.0	254	10.0	254	10.0	157.1	766.8
254	10.0	508	20.0	508	20.0	126.4	617.2
254	10.0	762	30.0	762	30.0	107.3	524.0
508	20.0	254	10.0	254	10.0	119.1	581.3
508	20.0	508	20.0	508	20.0	97.2	474.7
508	20.0	762	30.0	762	30.0	83.6	408.3
762	30.0	254	10.0	254	10.0	98.0	478.7
762	30.0	508	20.0	508	20.0	81.1	395.9
762	30.0	762	30.0	762	30.0	70.5	344.3

Floor loading for the system is illustrated in the Proposed Floor Layout for Multiple Systems in *Considerations for multiple system installations*.

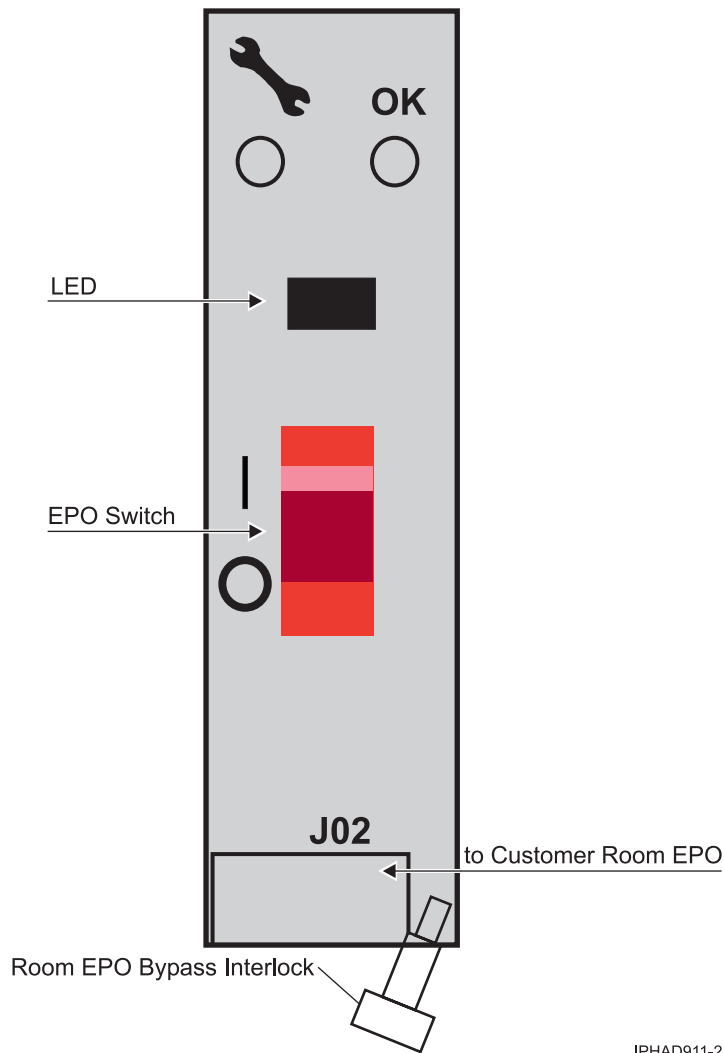
**Related reference:**

“Considerations for multiple-system installations” on page 163  
 Learn about the installation requirements for a multiple-system installation.

**Unit emergency power off**

You can incorporate the integrated battery backup into a computer room emergency power off (EPO) system. Otherwise, volatile data can be lost.

The server has a unit emergency power off (UEPO) switch on the front of the first frame (A Frame). Refer to the following figure, which shows a simplified UEPO panel.



IPHAD911-2

Figure 104. Unit emergency power off figure

When the switch is reset, the utility power is confined to the system power compartment. All volatile data will be lost.

It is possible to attach the computer room emergency power off (EPO) system to the system UEPO. When this is done, resetting the computer room EPO disconnects all power from the power cords and the internal battery backup unit, if it is provided. All volatile data will be lost in this case also.

If the room EPO is not connected to the UEPO, resetting the computer room EPO removes ac power from the system. If the interlock bypass feature is used, the system remains powered for a short time based on system configuration.

## Computer room emergency power off

You can incorporate the integrated battery backup into a computer room emergency power off (EPO) system. Otherwise, volatile data can be lost.

When the integrated battery backup is installed and the room EPO is reset, the batteries engage and the computer continues to run. It is possible to attach the computer room EPO system to the machine EPO. When this is done, resetting the room EPO disconnects all power from the power cords and the internal battery backup unit. In this event, all volatile data will be lost.

To incorporate the integrated battery backup into the room Emergency Power Off systems (EPO), a cable must connect to the back of the system EPO panel. The following figures illustrate how this connection is made.

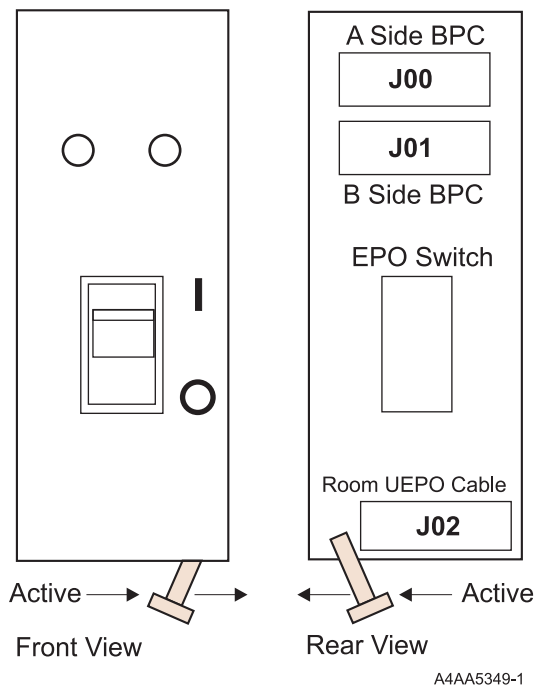
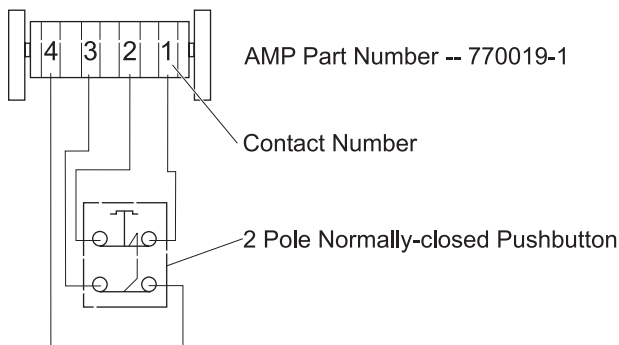


Figure 105. Computer room emergency power off figure

The preceding figure illustrates the back of the machine UEPO panel with the room EPO cable plugging into the machine. Notice the switch actuator. After it is moved to make the cable connection possible, the room EPO cable must be installed for the machine to power on.

In the following figure, an AMP connector 770019-1 is needed to connect to the system EPO panel. For room EPO cables using wire sizes #20 AWG to #24 AWG, use AMP pins (part number 770010-4). This connection should not exceed 5 Ohms, which is approximately 61 m (200 ft) of #24 AWG.



Room UEPO Switch Schematic

Figure 106. AMP connector figure

## Machine holdup times

Use the Typical machine holdup time tables to determine the typical machine holdup times (time versus load) for fresh and aged batteries.

The following criteria apply to both tables.

- All times are listed in minutes
- Machine load is listed in total ac input power (power for both power cords combined)
- A fresh battery is defined as 2.5 years old or less.
- An aged battery is defined as 6.5 years.

**Note:** Battery capacity decreases gradually as the battery ages (from fresh-battery value to aged-battery value). The system diagnoses a failed-battery condition if the capacity decreases below the aged-battery value.

*Table 175. Typical machine holdup time versus load for fresh battery*

Typical machine holdup time versus load for fresh battery														
Machine load	3.33 kW		6.67 kW		10 kW		13.33 kW		16.67 kW		20 kW		21.67 kW	
Integrated battery backup configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	7.0	21.0	2.1	7.0										
2 BPR	21.0	50.0	7.0	21.0	4.0	11.0	2.1	7.0						
3 BPR	32.0	68.0	12.0	32.0	7.0	21.0	4.9	12.0	3.2	9.5	2.1	7.0	1.7	6.5

N=Non-redundant, R=Redundant

*Table 176. Typical machine holdup time versus load for aged battery*

Typical machine holdup time versus load for aged battery														
Machine load	3.3 kW		6.67 kW		10 kW		13.33 kW		16.67 kW		20 kW		21.67 kW	
Integrated battery backup configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	4.2	12.6	1.3	4.2										
2 BPR	12.6	30.0	4.2	12.6	2.4	6.6	1.3	4.2						
3 BPR	19.2	41.0	7.2	19.2	4.2	12.6	2.9	7.2	1.9	5.7	1.3	4.2	1.0	3.9

N=Non-redundant, R=Redundant

## Model 9125-F2A server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

*Table 177. Model 9125-F2A components*

Model	Description	Minimum per system	Maximum per system
FC 5770 <sup>1</sup>	42 EIA unit, 24-inch rack (60-inch deep)	1	1
FC 5798	PCI-X I/O drawer (4U)	0	4
FC 6872 <sup>2</sup>	Water cooling option	1	1
FC 6874	Slimline doors (front and rear) with integrated rear heat exchanger	0	1
FC 6875	Acoustic doors (front and rear) with integrated rear heat exchanger	0	1
FC 7298	32-core, 4.7 GHz, POWER6 <sup>®</sup> processor (2U)	1	14

<sup>1</sup> The customer must choose between either acoustical doors or slimline doors during the order process. Slimline doors take up slightly less floor space in front of the rack but provide no noise reduction and generally do not meet industry acoustical noise limits. See *Doors and covers for model 9125-F2A*.

<sup>2</sup> Maximum water coolant contained in a rack of 12 CEC drawers and 1 disk enclosure: 100 liters (26.5 gallons).

Table 178. Dimensions

Dimensions	Slimline doors	Acoustical doors
Height	2013 mm (79.5 in.)	2013 mm (79.5 in.)
Width	785 mm (30.9 in.)	785 mm (30.9 in.)
Depth	1785 mm (70.3 in.)	1939 mm (76.3 in.)

<sup>1</sup>The front and rear doors are shipped separately from the rack assembly.

Table 179. Weight

<b>Maximum total system weight</b>
1680 kg (3703 lb)
For configuration weight, see <i>Approximate system weights by configuration</i> .

Table 180. Electrical and thermal characteristics (Three-phase)

Electrical and thermal characteristics	Properties		
Rated voltage and frequency	200 - 240 V ac at 50 - 60 Hz	380 - 480 V ac at 50 - 60 Hz	
Rated current (Amps)	100 A	60 A	
Power consumption	See <i>Total system power consumption</i>		
Typical power factor	0.99	0.96	0.96
Thermal output <sup>1</sup>			
Dual power feature code	Standard		
Branch circuit breaker and cord	See <i>Breaker rating and cord information</i>		

<sup>1</sup>Power draw and heat load vary greatly by configuration. When planning for an electrical system, it is important to use maximum values. However, when planning for heat load, you can use the IBM Systems Energy Estimator to obtain a heat output estimate based on a specific configuration. See The IBM Systems Energy Estimator Web site for more information.

Table 181. Inrush current. Inrush current per phase of each line cord to BPE

BPR number	208 V ac amperage	208 time (micro seconds)	480 V ac amperage	480 time (micro seconds)
Zero	100	20	120	20
One	110	150	140	150
Two	140	150	170	150
Three	170	150	210	150
Four	200	150	250	150

The environment must adhere to all American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) class 1 specifications except for operating temperature range and the wet bulb temperature. The maximum allowable operating temperature is reduced for altitudes above 4250 feet as shown in the *Operating inlet air temperature versus elevation* graphic.



Table 182. Environmental specifications 2100 meters (6890 ft) <sup>1, 2</sup>

ASHRAE	Class 1 (Except for temperature range)			
Operating temperature (maximum inlet (Dry bulb) (0 - 2100 m (0 - 6890 ft) altitude)	10 - 28°C (50 - 82.4°F)			
Nonoperating temperature	10 - 43°C (50 - 109°F)			
Storage temperature	1 - 60°C (34 - 140°F)			
Shipping temperature	-40 - 60°C (-40 - 140°F)			
Maximum altitude	3000 meters (9843 ft)			
	Operating	Nonoperating	Storage	Shipping
Noncondensing relative humidity	20 - 80%	20 - 80%	5 - 80%	5 - 100%

<sup>1</sup>When an IBM-approved vapor bag and desiccant packets are used to protect the system, the storage specifications are valid for 6 months and the shipping specifications are valid for 1 month. Otherwise, storage and shipping specifications are valid for 2 weeks each.

<sup>2</sup>The upper limit of the dry bulb temperature must be derated above 2100 m (6890 ft), as is shown in Operating inlet air temperature versus elevation. The maximum altitude is 3000 m (9843 ft).

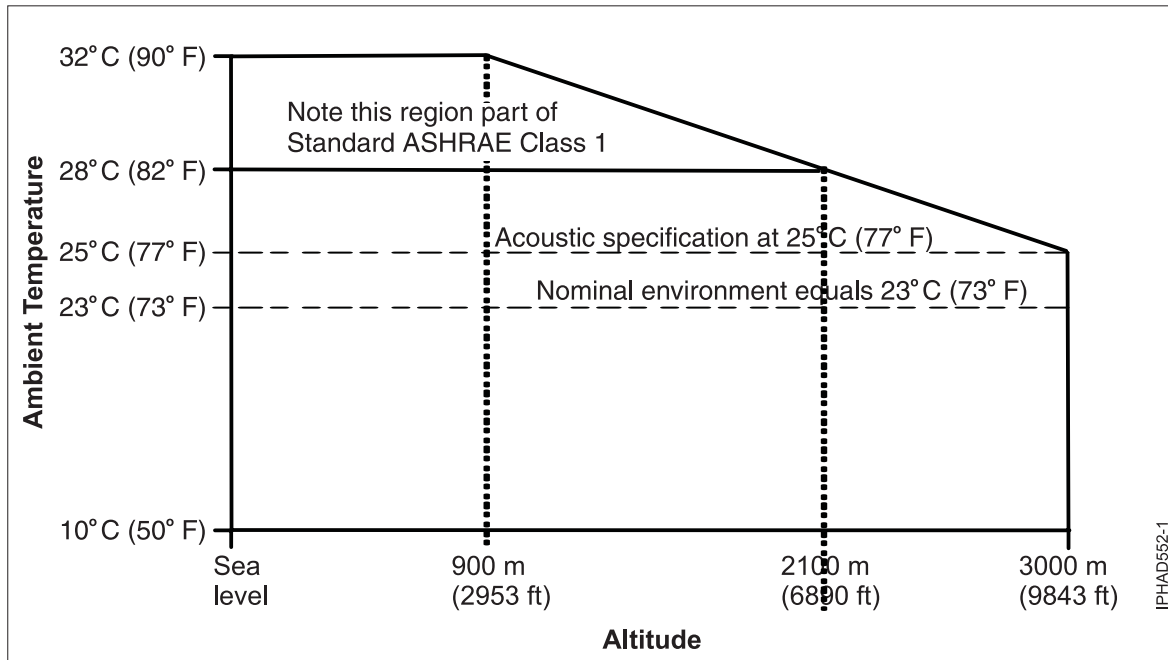


Figure 107. Operating inlet air temperature versus elevation

Table 183. Declared acoustical noise emissions for the 9125-F2A

Product configuration	Declared A-Weighted Sound Power Level, $L_{WAd}$ (B)		Declared A-Weighted Sound Pressure Level, $L_{pAm}$ (dB)	
	Operating	Idling	Operating	Idling
Typical configuration with acoustical door set: seven processor nodes, two modular water units, and one bulk power assembly. All air moving devices at nominal speeds.	8.2 <sup>4</sup>	8.2 <sup>4</sup>	65	65
Typical configuration with nonacoustical (slimline) door set: seven processor nodes, two modular water units, and one bulk power assembly. All air moving devices at nominal speeds.	8.5	8.5	68	68
Maximum configuration with acoustical door set: fourteen processor nodes, two modular water units, and one bulk power assembly. All air moving devices at nominal speeds.	8.7 <sup>5</sup>	8.7 <sup>5</sup>	70	70
Maximum configuration with nonacoustical (slimline) door set: fourteen processor nodes, two modular water units, and one bulk power assembly. All air moving devices at nominal speeds.	8.9 <sup>5</sup>	8.9 <sup>5</sup>	72	72

Table 183. Declared acoustical noise emissions for the 9125-F2A (continued)

Product configuration	Declared A-Weighted Sound Power Level, L <sub>WAd</sub> (B)		Declared A-Weighted Sound Pressure Level, L <sub>pAm</sub> (dB)	
	Operating	Idling	Operating	Idling
<p><sup>1</sup>Declared level L<sup>WAd</sup> is the upper-limit A-weighted sound power level. Declared level L<sup>pAm</sup> is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.</p> <p><sup>2</sup>All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.</p> <p><sup>3</sup>1 Bel (B) equals 10 Decibels (dB).</p> <p><sup>4</sup>Meets IT Product Noise Limits for, <i>Generally Unattended Data Center</i>, per Statskontoret Technical Standard 26:6.  <b>Note:</b> <sup>5</sup> Government regulations (such as those prescribed by Occupational Safety and Health Administration (OSHA) or European Community Directives) might govern noise level exposure in the workplace and might apply to you and your server installation. This IBM system is available with an optional acoustical door feature that can help reduce the noise emitted from this system. The actual sound pressure levels in your installation depend on a variety of factors, including the number of racks in the installation, the size, materials, the configuration of the room where you designate the racks to be installed, the noise levels from other equipment, the room ambient temperature, and employees' location in relation to the equipment. Compliance with such government regulations also depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Consult qualified experts in this field to determine whether you are in compliance with the applicable regulations.</p>				

Table 184. Service clearances

Front	Back
1549.4 mm (61 in.)	914.4 mm (36 in.)
<p><sup>1</sup>Service clearances are always referenced off of the side covers or the front and back of the frame, and not the front and back doors.</p> <p><sup>2</sup>There is no side service clearance required next to the frame on either side.</p> <p><sup>3</sup>Side service clearance is required in the front and back of the frame.</p> <p><sup>4</sup>Air flow is from the front of the frame to the back of the frame.</p> <p><sup>5</sup>Note the dimension from the back of the frame to the floor tile grid alignment point. It is extremely important that this point on the frame is aligned properly to the floor tile. It is essential that the weight distribution plates and floor tile cutouts correspond to the features on the base of the frame.</p>	

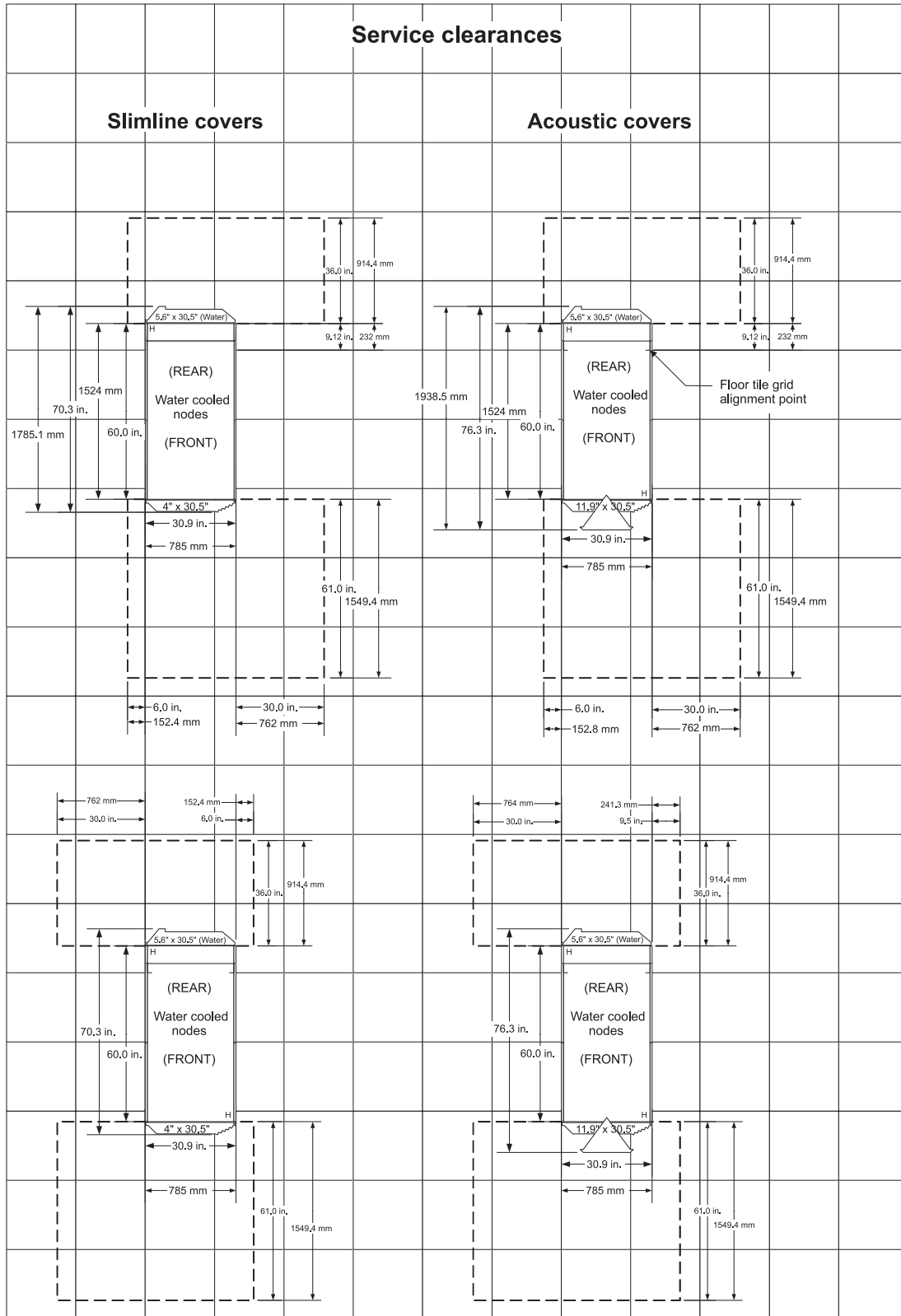
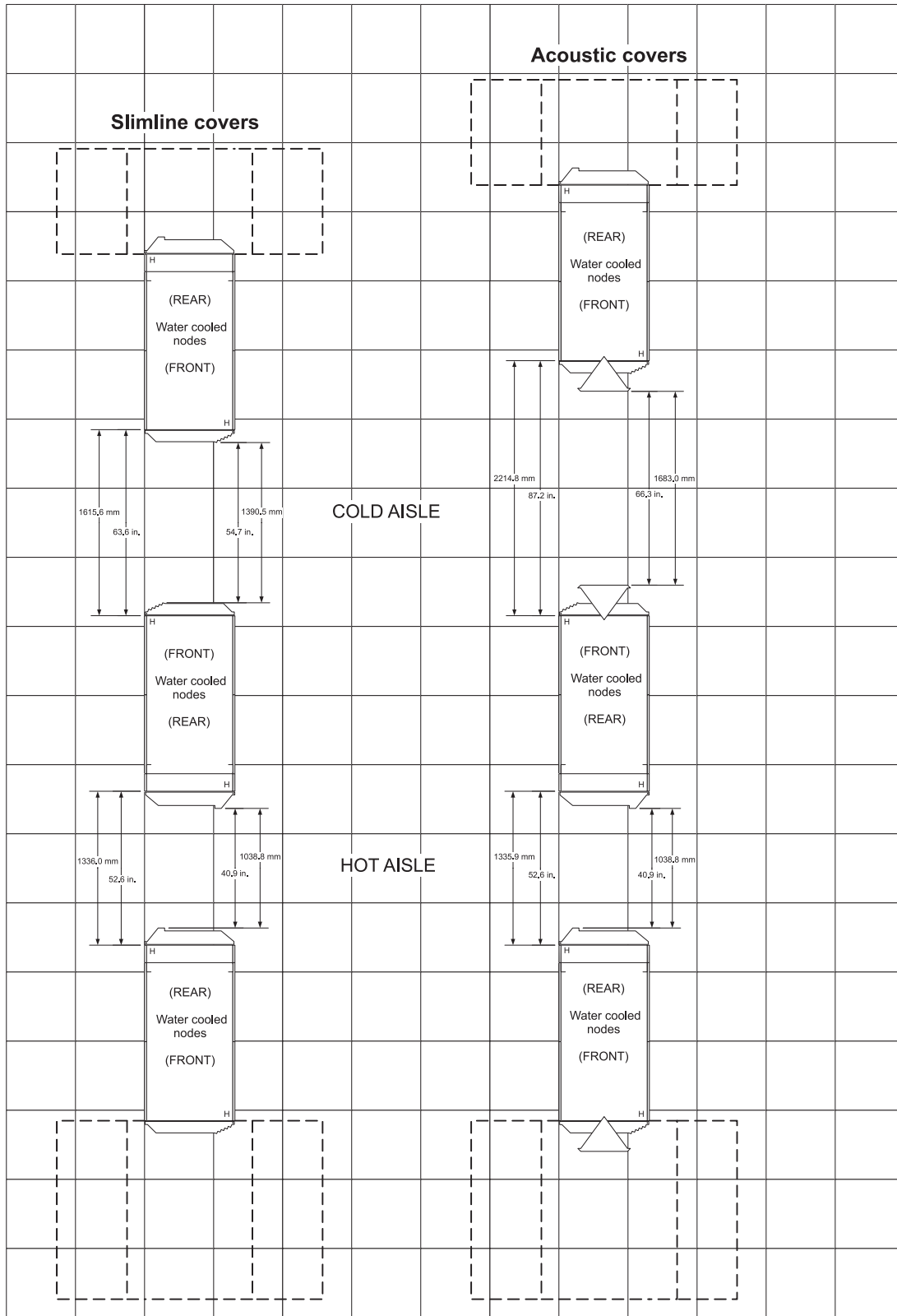
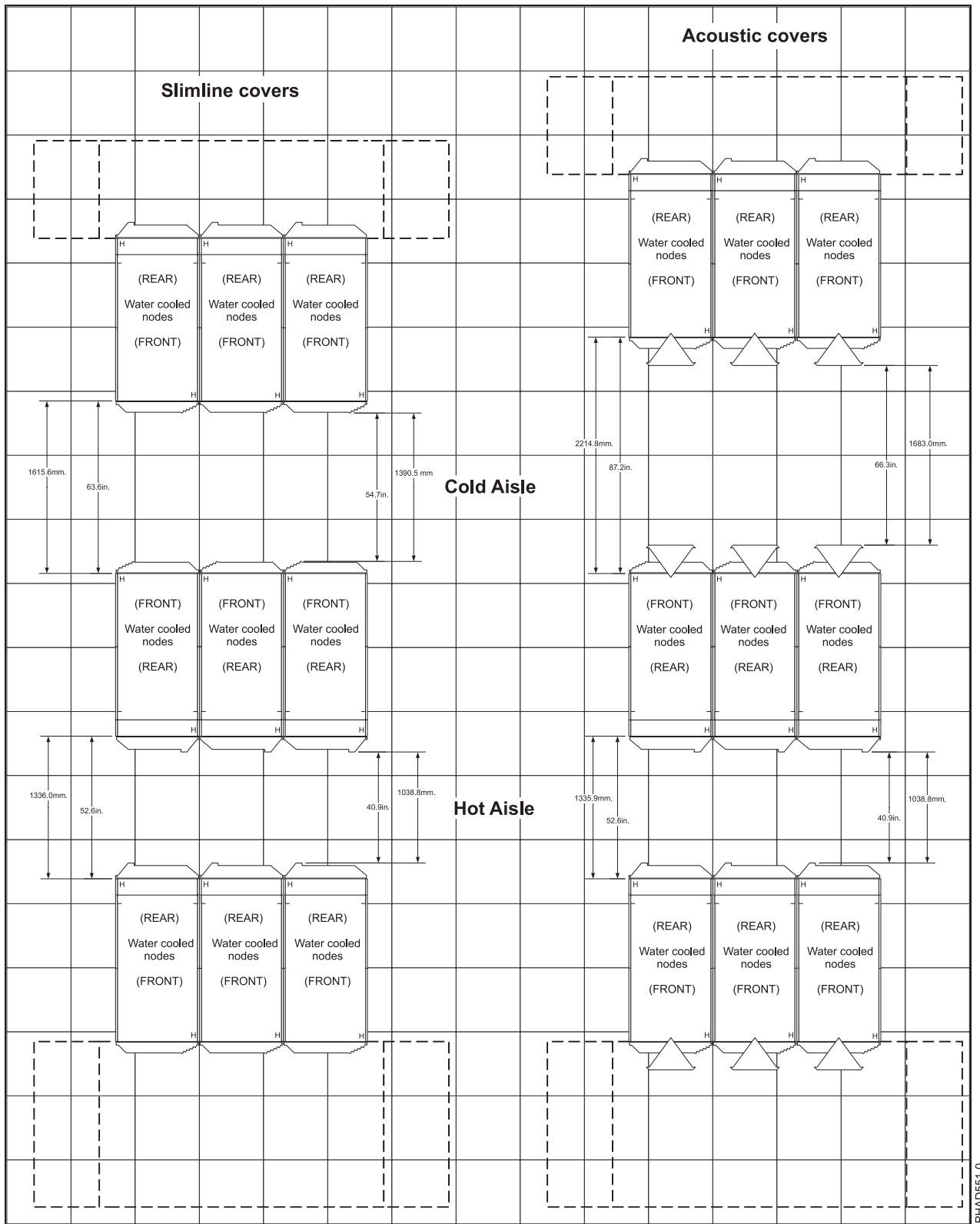


Figure 108. Service clearance



IPHAD550-1

Figure 109. Multiple frames - Hot aisle and cold aisle



IPHAD551-0

Figure 110. Multiple frames - Hot aisle and cold aisle

To effectively plan for model 9125-F2A, you need to see the following topics and incorporate the information into your server planning, as appropriate.

## Electromagnetic compatibility compliance

This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 2004/108/EC; BSMI (CNS-13438, 2006 - Certification in Taiwan is for 220 V ac /60 Hz only); AS/NZS CISPR 22: 2006; ICES/NMB-003; Korean EMI/EMC (RLL Notice 2007-69, Notice 2007-71); People's Republic of China Commodity Inspection Law

## Breaker rating and cord information

Use the breaker rating and cord information to determine the circuit breaker rating for the power cords used with your server.

### Voltage, frequency, and circuit breaker rating

Table 185. Voltage, frequency, and circuit breaker rating

Input configuration	Three-phase and ground (not neutral)	Three-phase and ground (not neutral)
Rated nominal voltage and frequency	200 - 240 Volts alternating current V ac at 50 - 60 Hz	380 - 480 Volts alternating current V ac at 50 - 60 Hz
Rated current (amperes per phase)	100 A	60 A
Acceptable voltage tolerance at machine power cord	180 - 259	333 - 508

**Note:** The voltage ranges are standard world wide alternating current voltages. The machine runs voltage 180 - 508 V ac. This range represents some nonstandard nominal voltages. If operation from a nonstandard voltage is required, contact IBM for guidance with selecting the correct power cord. This server is designed to tolerate momentary power line disturbances beyond the acceptable voltage tolerance range.

## Power cord information

The frame has four power cords. Frames configured with less than four processor books and without I/O drawers only require two of the power cords for voltage ranges up to 415 V ac. Frames configured with less than four processor books and up to three I/O drawers only require two of the power cords for voltage range of 480 V ac. If it is possible that additional processor books will be added in the future, feeds should be installed for four power cords.

Power cords are available in two current ratings, 60 - 100 A, two facility termination styles, IEC-60309 and un-terminated, and two lengths 1.83 m (6 ft) and 4.27 m (14 ft). The required current rating is dependent on the input voltage that the machine is connected to. You can select the desired length and termination style.

Table 186. Power cord information

Model	Description	Wire size	Customer side plug	Facilities Water Tight Examples		
				Receptacle	Connector	Inlet
FC 8693	Power cord: 6 ft (380-480 V ac)  Three-phase IEC-603309 <sup>1</sup>	15R7496  #6 American wire gauge  Type PPE	41V2338 60 A / 480 V ac 460P7V05	460R7W	460C7W	460B7W
FC 8694	Power cord: 14 ft (380-480 V ac)  Three-phase Un-terminated	41U0426  #6 American wire gauge  DP-1	No Connector (Cut end)			

Table 186. Power cord information (continued)

Model	Description	Wire size	Customer side plug	Facilities Water Tight Examples		
				Receptacle	Connector	Inlet
FC 8695	Power cord: 14 ft (200-240 V ac)  Three-phase Un-terminated	41V2339  #4 American wire gauge  Type PPE	No Connector (Cut end)			
FC 8696	Power cord: 14 ft (200-240 V ac)  Three-phase IEC-603309	41V2339  #4 American wire gauge  Type PPE	11J4847 100 A / 250 V ac 4100P9V01	4100R9W	4100C9W	4100B9W
FC 8696 and Request for Price Quotation (RPQ) 8A1668	Power Cord, 6 ft  Three-phase IEC-603309		100 A			
FC 8699	Power cord: 14 ft (380-480 V ac)  Three-phase IEC-603309	15R7496  #6 American wire gauge  Type PPE	41V2338 60 A / 480 V ac 460P7V05	460R7W	460C7W	460B7W
8699 and RPQ 8A1668	Power Cord, 6 ft  Three-phase IEC-603309		60 A			

<sup>1</sup>This is required in Chicago, USA.

## Advantages of using high input voltages

The 9125-F2A has a 180 - 508 V ac three-phase universal power input so that it can be installed in any geography in the world. For some installations, you can choose to run the system from a higher voltage (380 - 480 V ac) or a lower voltage (200 - 240 V ac). When this choice is available, the higher voltage group provides several advantages:

1. Power cords, power cord connectors, if applicable, and building wiring are all smaller, which can reduce the installation cost and complexity.
2. Step down transformers on the computer floor are not required, which can reduce the installation cost significantly.
3. Energy efficiency and typically the building infrastructure that feeds power to it will be higher, which reduces operating costs.

This is an example of energy efficiency for North America.

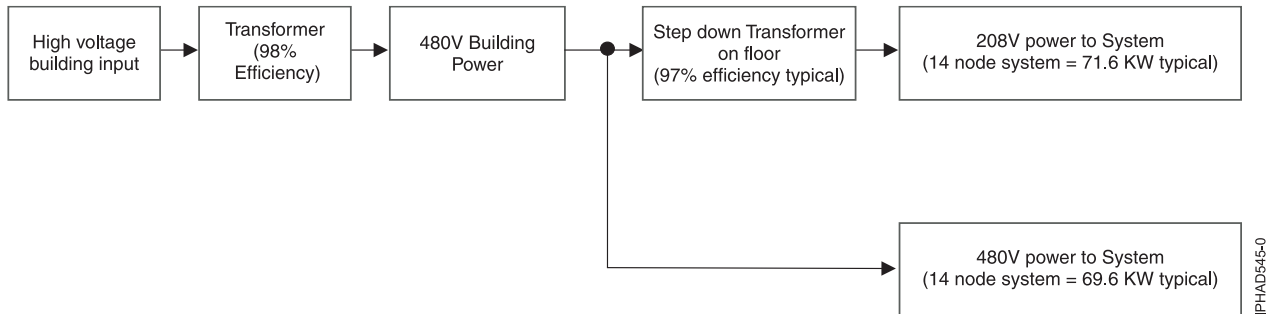


Figure 111. Low versus high line cost of ownerships



## Doors and covers for model 9125-F2A

Doors and covers are an integral part of the system and are required for product safety, proper airflow and cooling, electromagnetic compatibility compliance, and, for certain options, acoustical noise reduction.

The following rear door options are available for model 9125-F2A:

- Acoustical door option, with a rear door heat exchanger that is integrated  
This feature provides a specially designed, noise-reducing door set for those who want lower noise levels in their data center or who might want to meet certain acoustical or noise exposure requirements. The acoustical door option consists of a special front door, approximately 250 mm (10 in.) in depth, which contains acoustical treatment and which lowers the noise level of the system by approximately 5 dB (0.5 B) compared to the slimline door option. An integrated rear door heat exchanger is delivered with the door kit.
- Slimline door option, with a rear door heat exchanger that is integrated  
This feature provides an option to take up less floor space, when space might be more critical than acoustical noise levels. The slimline door option consists of a front door, approximately 100 mm (4 in.) in depth, and can be used in conjunction with the required rear door heat exchanger previously described. Acoustical treatment is not available for the slimline door option, and the 9125-F2A system generally does not meet industry acoustical noise limits with this option installed. A rear door heat exchanger that is integrated is delivered with the door kit.

For declared levels of acoustical noise emissions, refer to the *Model 9125-F2A server specifications*.

## Plan views

Dimensional planning information is shown in this top-down view of your server.

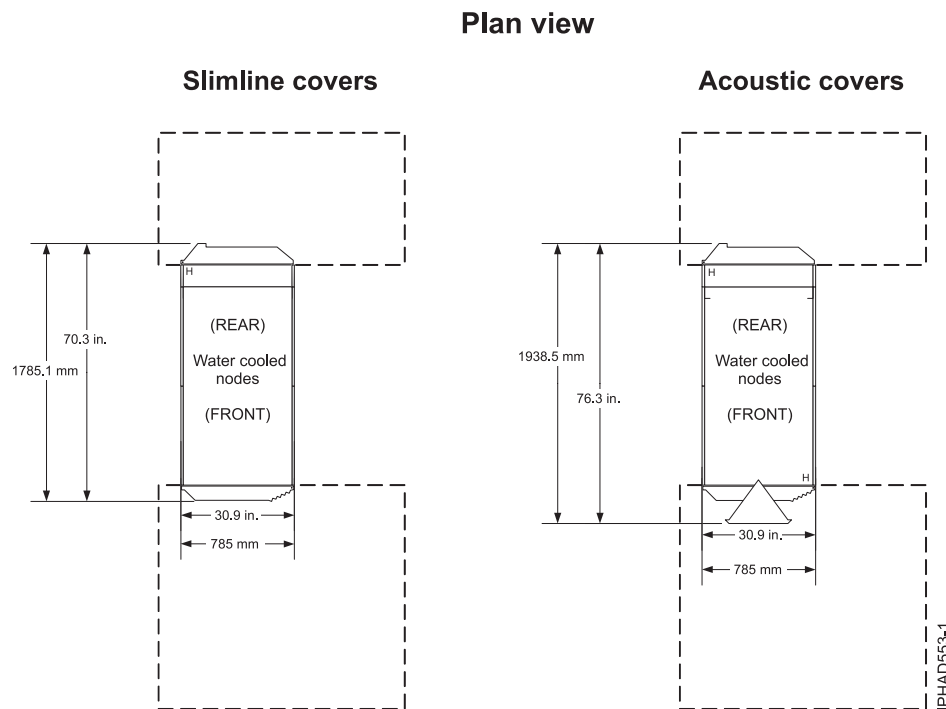


Figure 112. Service clearance

## Raised-floor requirements and preparation

A raised floor is required for model 9125-F2A to ensure optimal performance and to comply with electromagnetic compatibility requirements.

Use these guidelines when setting up a system in a datacenter:

- A raised floor is required to enable the water cooling hoses, power line cords, and signal cables to exit the rack. Top exits for hoses, line cords, and cables are not supported. There are acceptable alternatives to a raised floor, such as a structurally sound pedestal or troughs in a poured concrete floor.
- A raised floor is required for all cabling on the system. Overhead cabling is not supported.
- See *Plan views* for the service clearances and external dimensions for both the standard and acoustic door options.

**Note:** The rack must be aligned to the floor tile grid as displayed in Service clearances in *Model 9125-F2A server specifications* to enable use of the weight distribution hardware and to facilitate proper floor tile cutouts.

- Multiple rack floor plan layouts using a standard hot and cold aisle cooling technique are shown in *Plan views*. The layout in the *Plan views* graphic shows the most compact floor plan layouts possible on the smaller 600 mm floor tile grid.

**Note:** When multiple rows of systems are deployed, the minimum aisle width between 9125-F2A models is a function of aligning the racks with the floor tiles rather than the minimum service clearances.

- Floor strength must be considered when determining floor plan layouts. To accommodate the most compact floor plan layouts, the concentrated load for the raised floor must be 896 kg/m<sup>2</sup>(183 lb / ft<sup>2</sup>) or greater. If the floor does not have a load rating at least this high, the layout will have to be spread out to distribute the weight over the floor area, or the floor will have to be modified to improve its capability. See *Approximate system weights by configuration* for instructions on how to calculate the floor loading for given floor plan layouts.

### Related concepts:

“Approximate system weights by configuration” on page 259

Use the tables to calculate the approximate weight of your system based on its configuration.

### Related reference:

“Plan views” on page 201

Dimensional planning information is shown in this top-down view of your server.

## Cutting and placing floor panels

These guidelines specify how to make the necessary openings in a raised floor for installing a model 9125-F2A.

### Installation of facilities power, cooling, and cable management hardware

Installations of plumbing, signal cable troughs, electrical power, and air conditioning are your responsibilities, and they should be performed by licensed professionals.

### Cutting floor tiles

Raised floor cutouts must be positioned in accordance with the provided dimensions. They must be protected by molding that is not electrically conductive, appropriately sized, with edges treated to prevent cable damage and to prevent casters from rolling into the floor cutouts.

The following examples of floor cutouts are properly positioned and fitted with molding.

**Note:** The hose positioning fixture was designed to hold the hoses in place and to be used as template for both back and front tile cutouts.

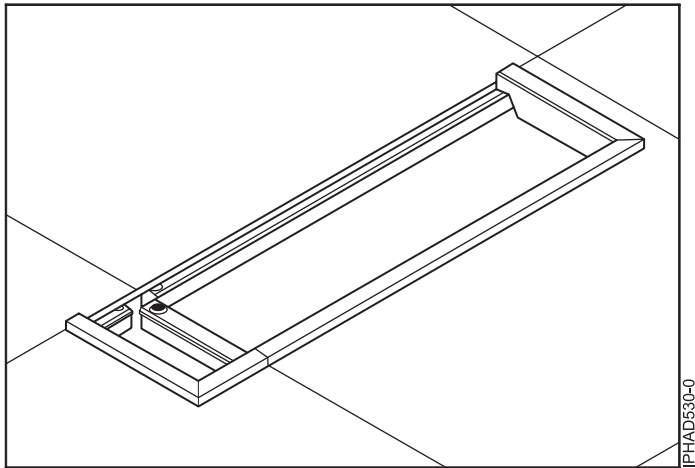


Figure 113. Rear cutout with molding

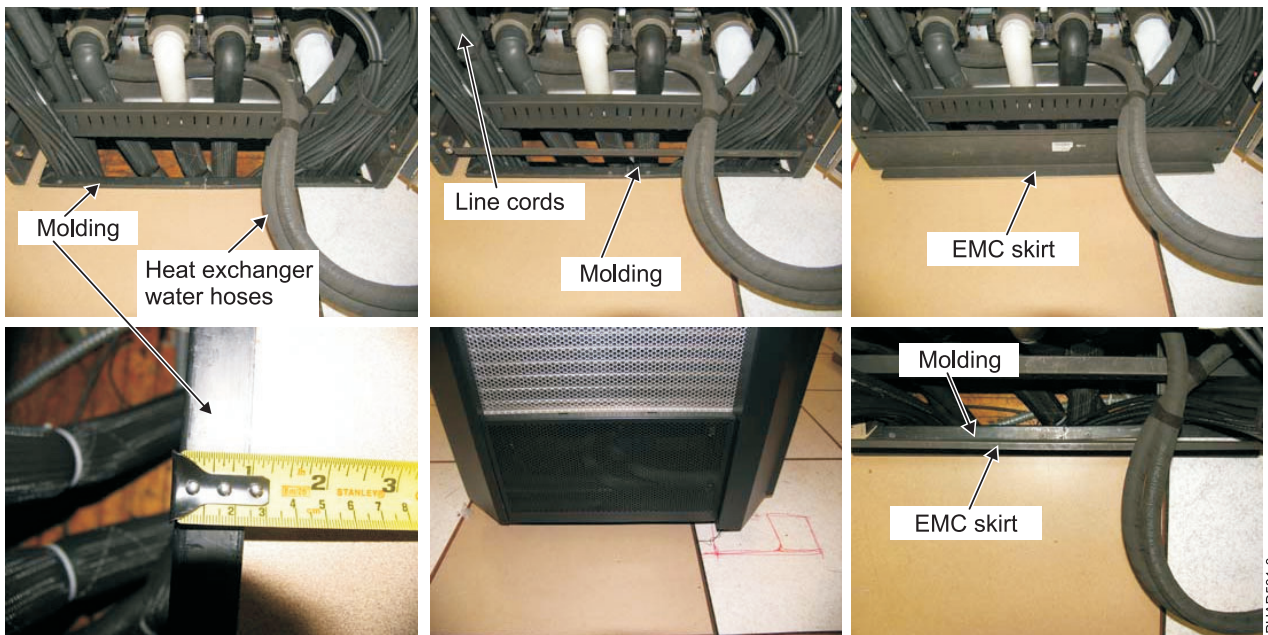
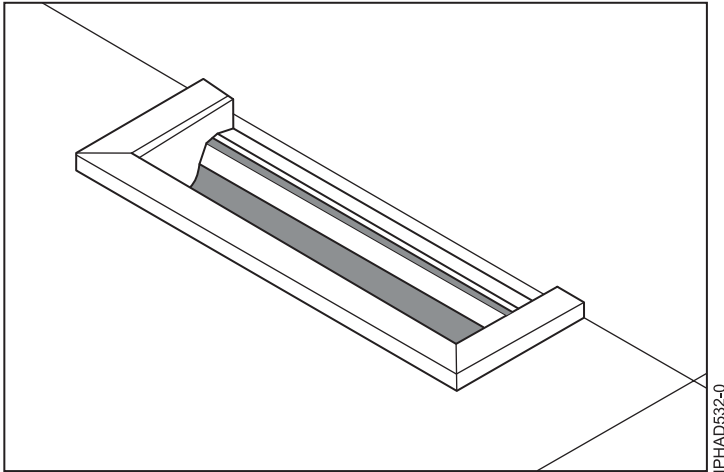


Figure 114. Rear cutout images



IPHAD532-0

Figure 115. Front cutout with molding



IPHAD533-0

Figure 116. Front cutout images

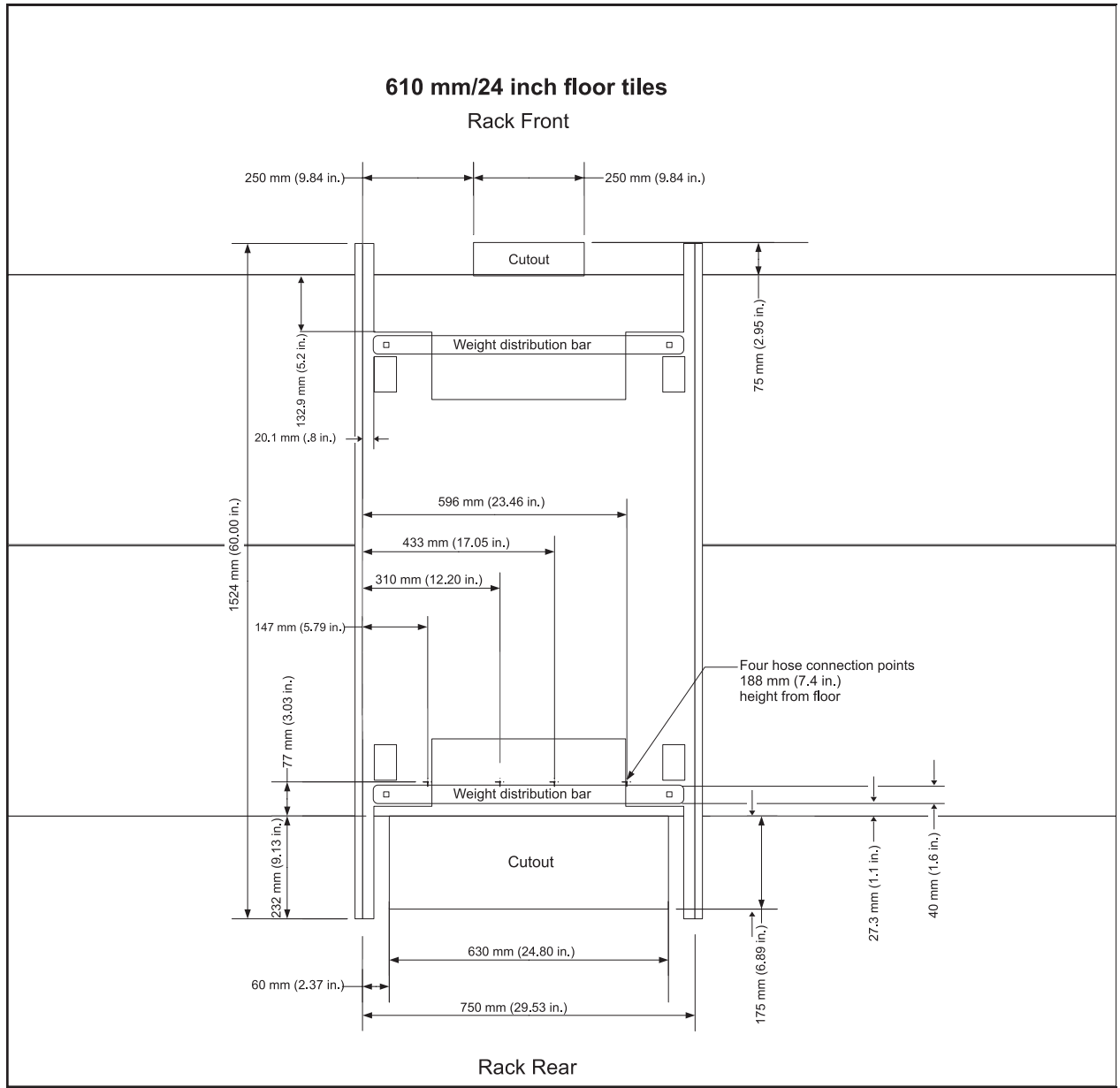


Figure 117. 610 mm Floor tile cutout definition

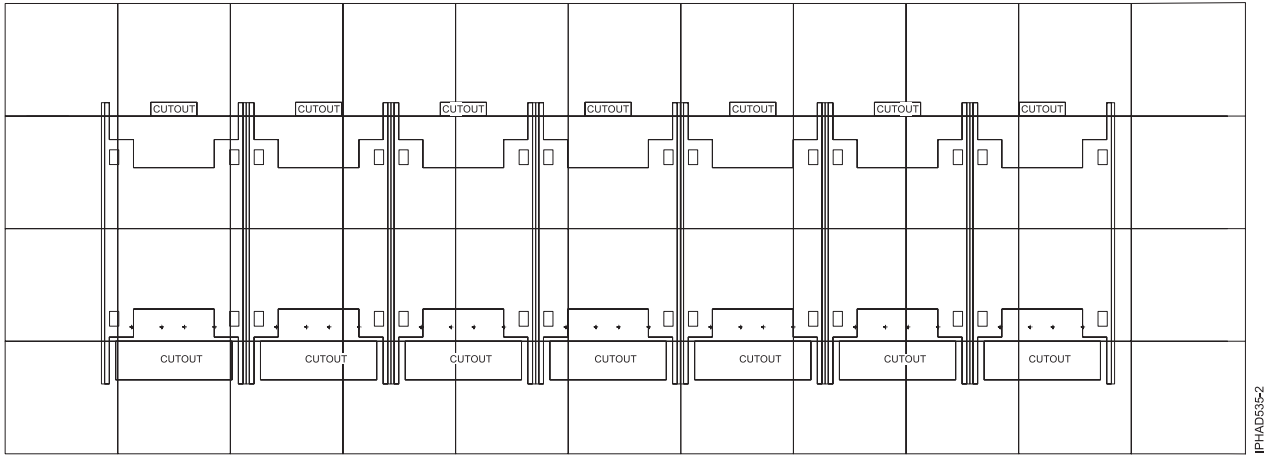


Figure 118. 610 mm tile cutout with multiple frames (first frame centered on tile)

**Note:** The cutout of individual tiles varies from tile to tile. All tiles are not cut exactly the same.

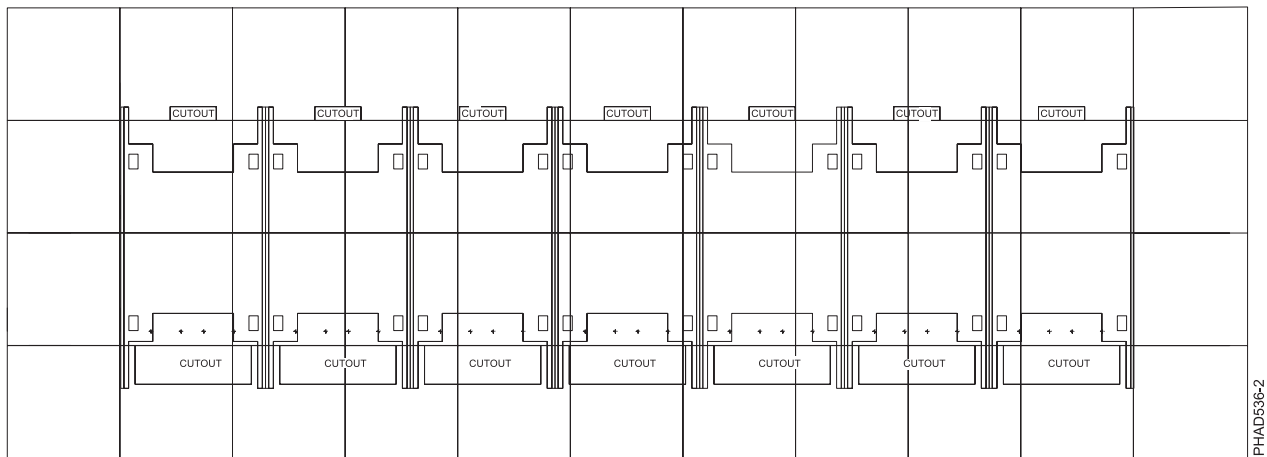


Figure 119. 610 mm tile cutout with multiple frames (first frame on edge of tile)

**Note:** The cutout of individual tiles varies from tile to tile. All tiles are not cut exactly the same.

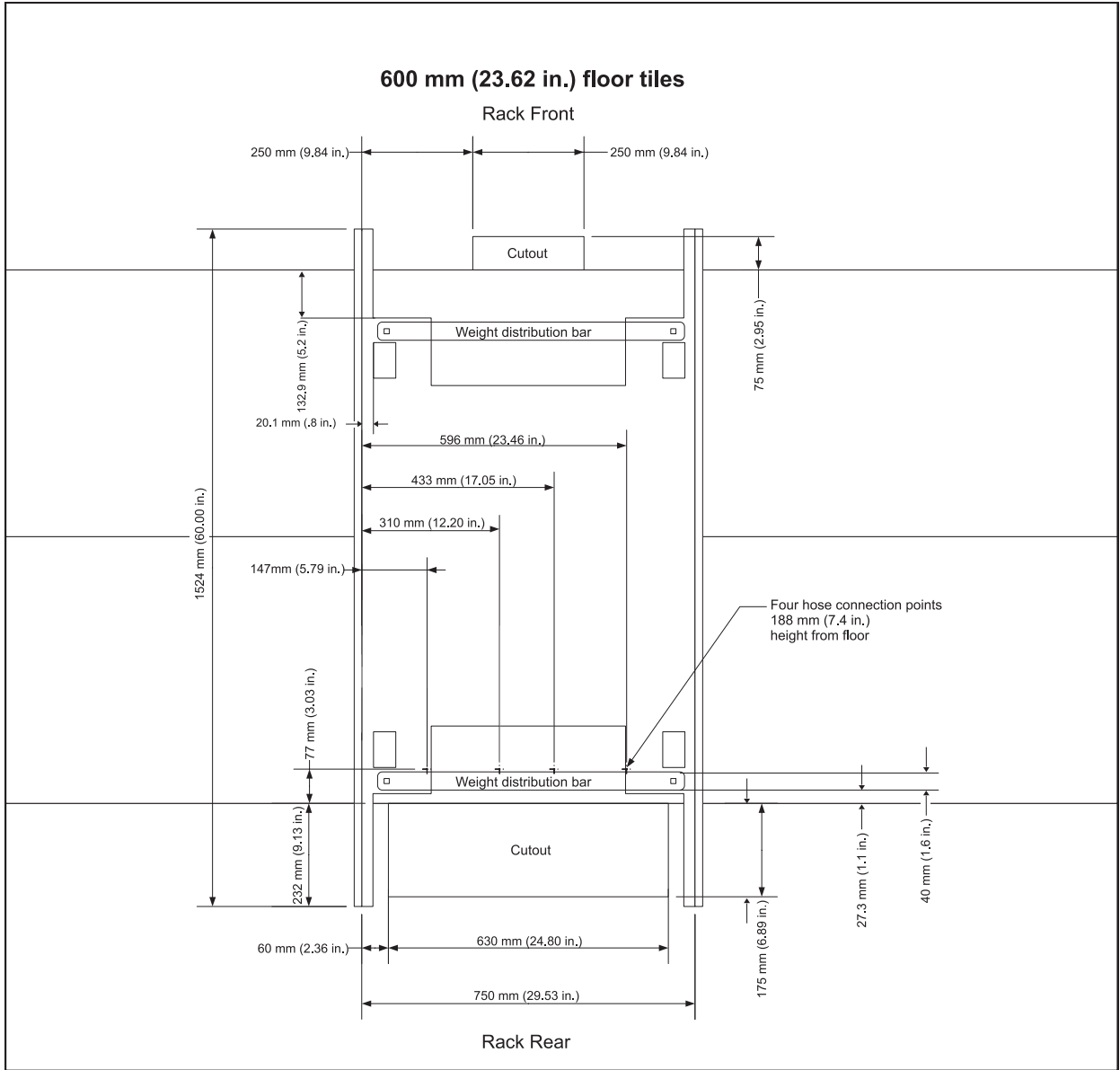


Figure 120. 600 mm Floor tile cutout

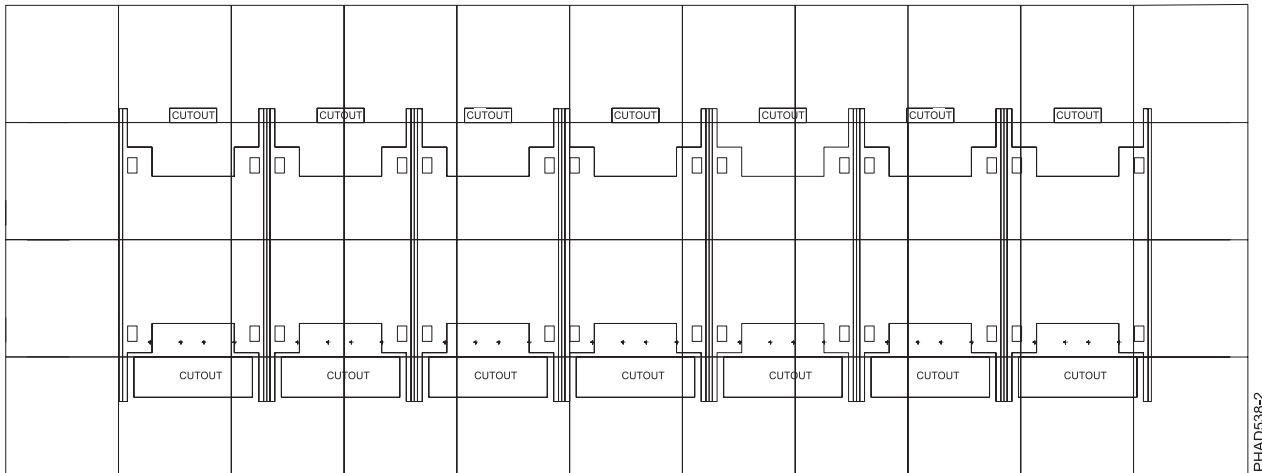


Figure 121. 600 mm tile cutout with multiple frames (first frame on edge of tile)

**Note:** The cutout of individual tiles varies from tile to tile. All tiles are not cut exactly the same.

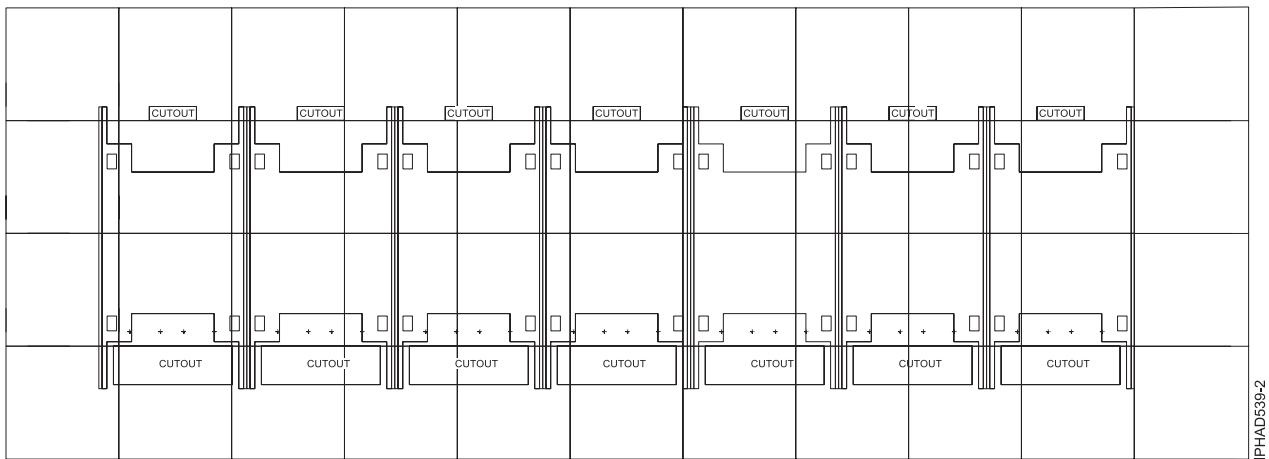


Figure 122. 600 mm tile cutout with multiple frames (first frame centered on tile)

**Note:** The cutout of individual tiles varies from tile to tile. All tiles are not cut exactly the same.

## 9125-F2A installation

This procedure describes how to install a model 9125-F2A.

1. Position the rack with the weight distribution hardware installed, over the raised floor cutouts.
2. Position the signal cable trough, facility chilled water distribution plumbing, and the facility power distribution under the floor in the appropriate locations.
3. Attach the cooling water hose assemblies and power line cords to the building facility.

This graphic shows a side view of a typical 9125-F2A installation that displays what is above and below the raised floor.



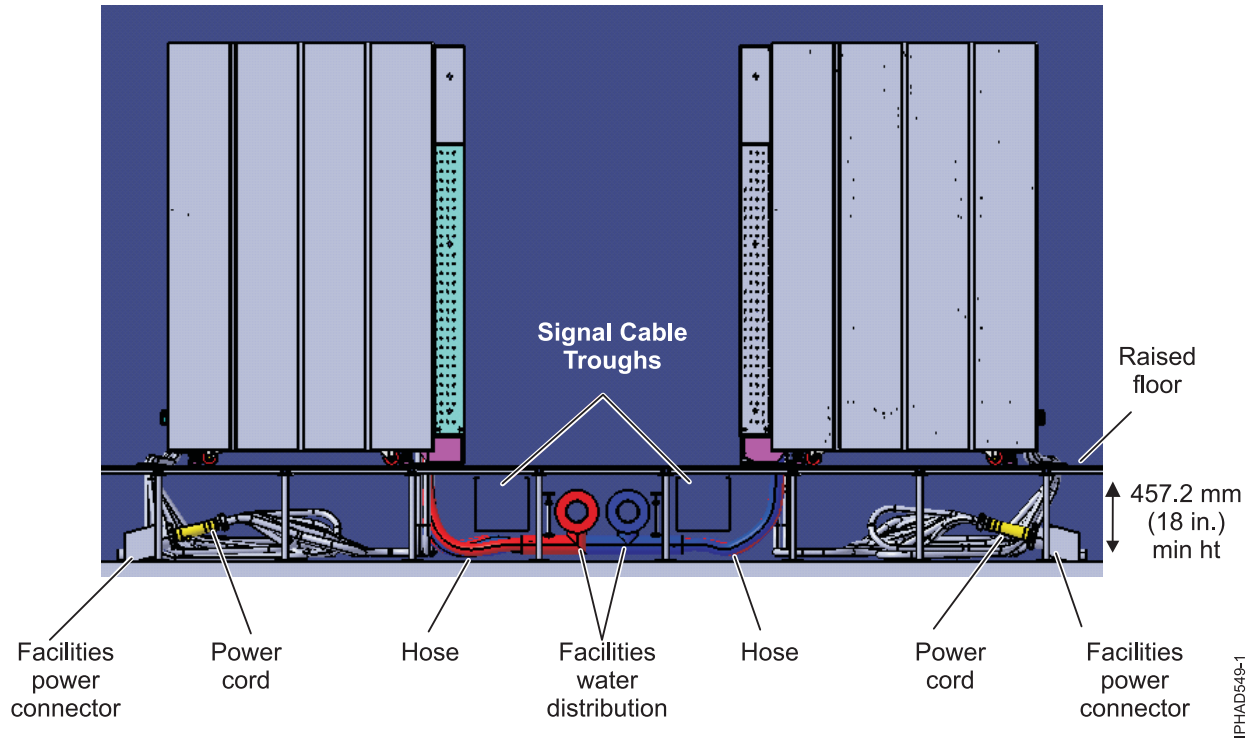


Figure 123. Floor cutout view of two racks

## Installing the frame tie-down kit

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

The following procedures describe how to install a frame tie-down kit and floor tie-down hardware to secure an IBM rack to a concrete floor beneath a 228.6 - 330.2 mm (9 -13 in. depth) or a 304.8 - 558.8 mm (12 - 22 in. depth) raised-floor environment or to a nonraised floor.

### Positioning the rack

Use this procedure to unpack and position your rack.

**Important:** See *Moving the system to the installation site* before attempting to position the rack.

To unpack and position the rack, do the following:

1. Remove all packing and tape from the rack.
2. Place the last floor covering exactly adjacent and in the front of the final installation location.
3. Position the rack according to the customer floor plan.

**Note:** While moving the system to its final installed location and during relocation, it might be necessary to lay down floor covering, such as Lexan sheets, to prevent damage to the floor panels.

4. Lock each caster wheel by tightening the thumbscrew on the caster.

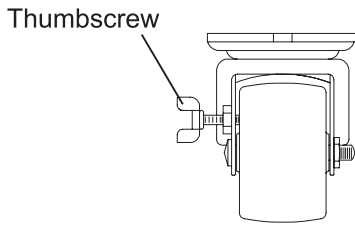


Figure 124. Caster thumbscrew

**Related reference:**

“Moving the system to the installation site” on page 251  
 Several factors must be considered before moving the system to the installation site.

**Securing the rack**

Prevent movement when vibrations occurs by securing your rack to a concrete (nonraised) floor or to a raised floor.

Securing the rack is an optional procedure.

The following features can be ordered by the customer as additional rack-securing options for model 9125-F2A:

- FC 7937 to attach the rack to a concrete floor when the server is on a raised floor 228.6 - 330.2 mm (9 - 13 in. depth)
- FC 7938 to attach the rack to a concrete floor when the server is on a raised floor 304.8 - 558.8 mm (12 - 22 in. depth)

**Note:** Do not remove the orange-colored shipping bracket from systems that have the tie-down feature.

Before the service representative can perform the tie-down procedure, you must complete the floor preparation described in the *Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor* topic.

**Related reference:**

“Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor”  
 Use these steps to attach your rack to a 228.6 - 330.2 mm (9 - 13 in. depth). floor.

**Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor**

Use these steps to attach your rack to a 228.6 - 330.2 mm (9 - 13 in. depth). floor.

**Attention:** The frame tie downs are intended to secure a frame weighing less than 1429 kg (3150 lb). These tie downs are designed to secure the frame on a raised floor installation.

Complete the appropriate step for your raised floor environment:

1. If the rack is being attached to a short-depth-raised-floor-environment 228.6 - 330.2 mm (9 - 13 in. deep) install the Raised floor tie-down kit (part number 16R1102) described in the following table.

Table 187. Raised floor tie-down kit part number 16R1102

Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P2999	4	Turnbuckle Assembly

2. If the rack is being attached to a deep-raised-floor-environment 304.8 - 558.8 mm (12 - 22 in. deep) install the Raised floor tie-down kit (part number 16R1103) described in the following table.

Table 188. Raised floor tie-down kit part number 16R1103

Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P3000	4	Turnbuckle Assembly

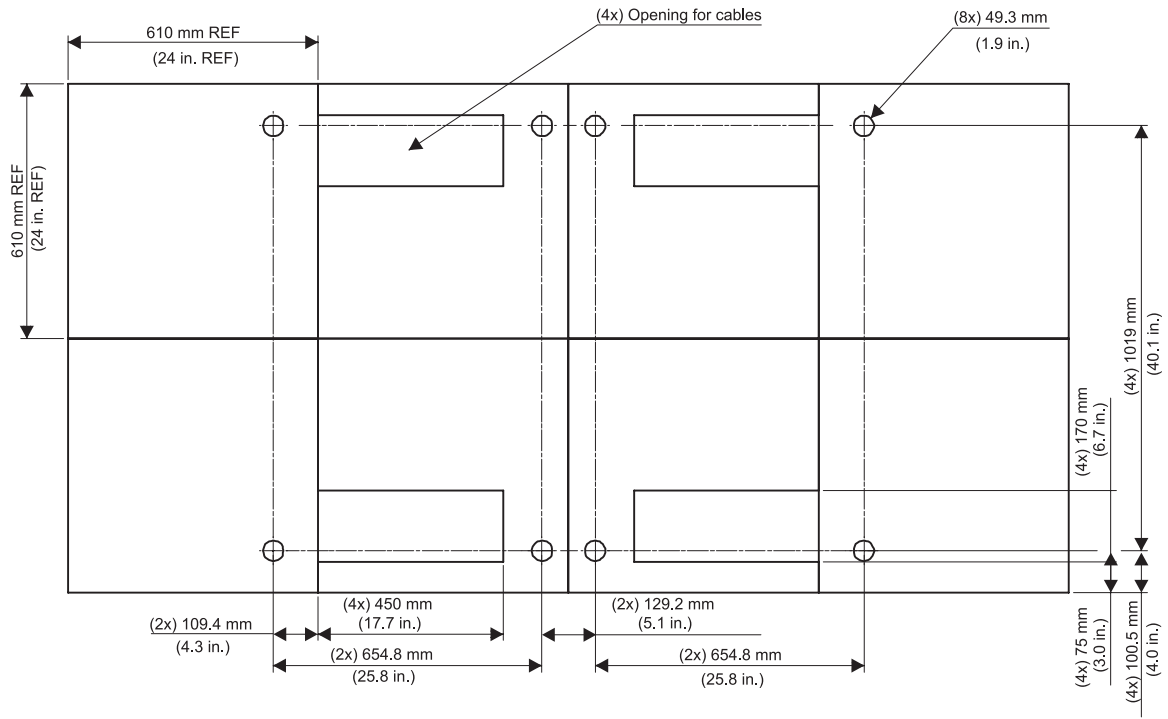
**Note:** To accommodate a floor with a depth of more than 558.8 mm (22 in.), a steel beam or a steel channel adapter for mounting the subfloor eyebolts is required. The customer must supply the floor eyebolts.

Consider the following requirements when preparing the floor for tie-down:

- The hardware is designed to support a frame weighing no more than 1578.5 kg (3480 lb).
- The estimated maximum concentrated load on one caster for a 1578.5 kg (3480 lb) system is 526.2 kg (1160 lb). For a multiple-system installation, it is possible that one floor tile will bear a total concentrated load of 1052.3 kg (2320 lb).

To install the eyebolts, do the following steps:

1. Obtain the service of a qualified structural engineer to determine the appropriate installation of the eyebolts.
2. Consider the following before you install the eyebolts:
  - Floor eyebolts must be securely anchored to the concrete floor.
  - For a single frame installation, four 1/2 in. wide by 13 in. long eyebolts should be secured to the subfloor.
  - The minimum height of the center of the internal diameter is 2.54 mm (1 in.) above the concrete floor surface.
  - The maximum height is 63.5 mm (2.5 in.) above the concrete floor surface. Higher than 63.5 mm (2.5 in.) can cause excessive lateral deflection to the tie-down hardware.
  - The eyebolt's internal diameter should be 1-3/16 inch, and each eyebolt should be able to withstand 1224.7 kg (2700 lb). The customer should obtain the services of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to ensure that the raised floor and the building can support the floor-loading specifications.
  - To ensure that the holes are in the correct location, the diagonal distance between the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side-to-side distance) and 1019 mm (40.1 in.) (the front-to-back distance).
3. Verify that the four eyebolts are positioned to match the dimensions shown in the following figures.



IPHAD947-1

Figure 125. Eyebolt positioning for 610 mm (24 in.) floor tile layout

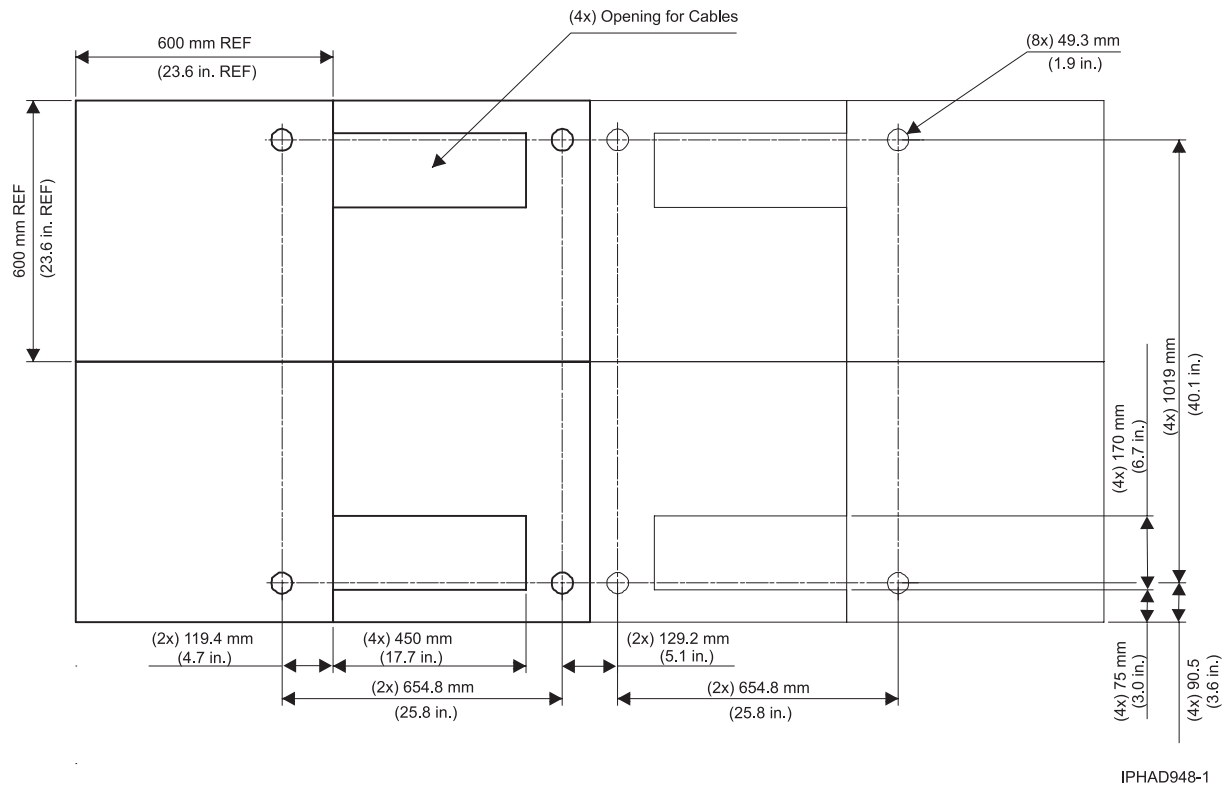
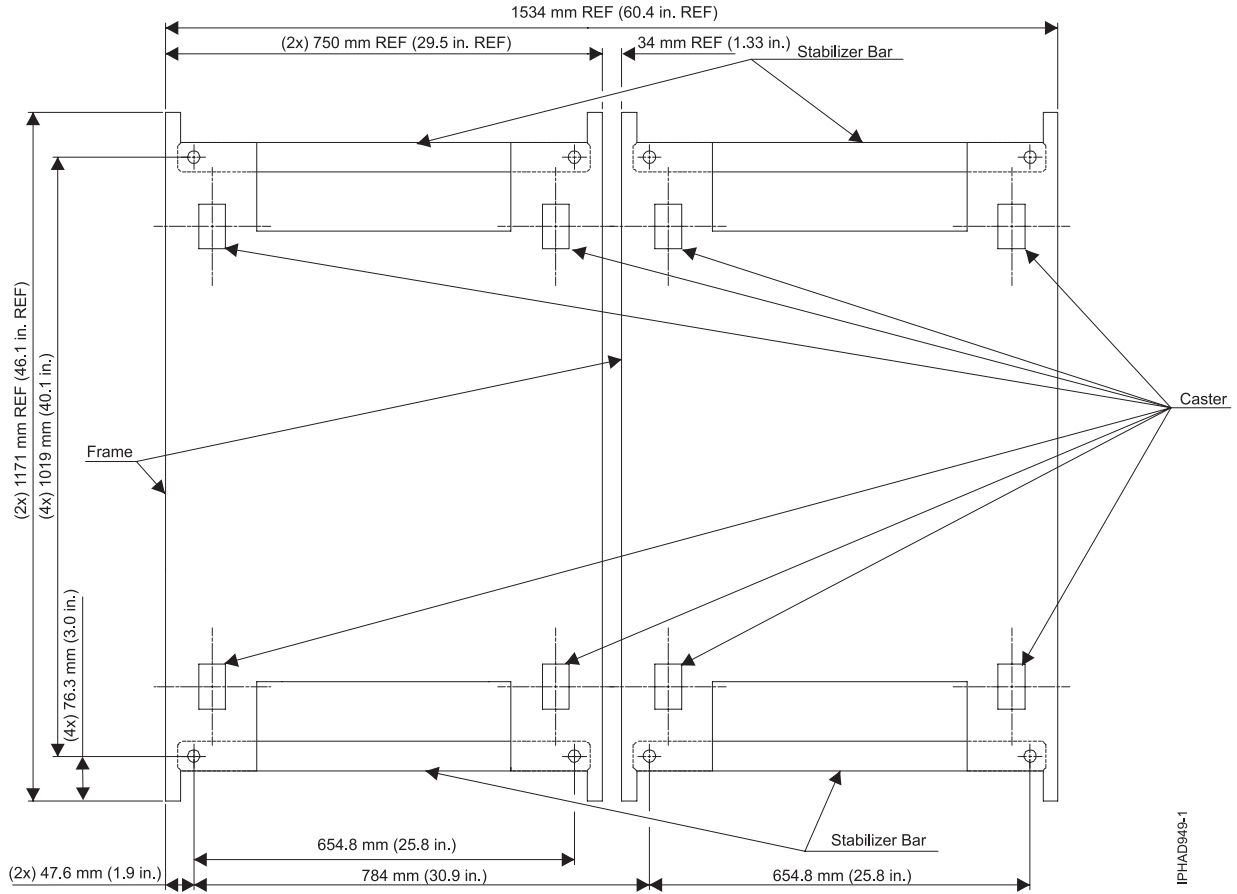


Figure 126. Eyebolt positioning for 600 mm (23.6 in.) floor tile layout



IPHAD949-1

Figure 127. Stabilizer bar layout (top view)

4. Install the eyebolts by using the following figures:

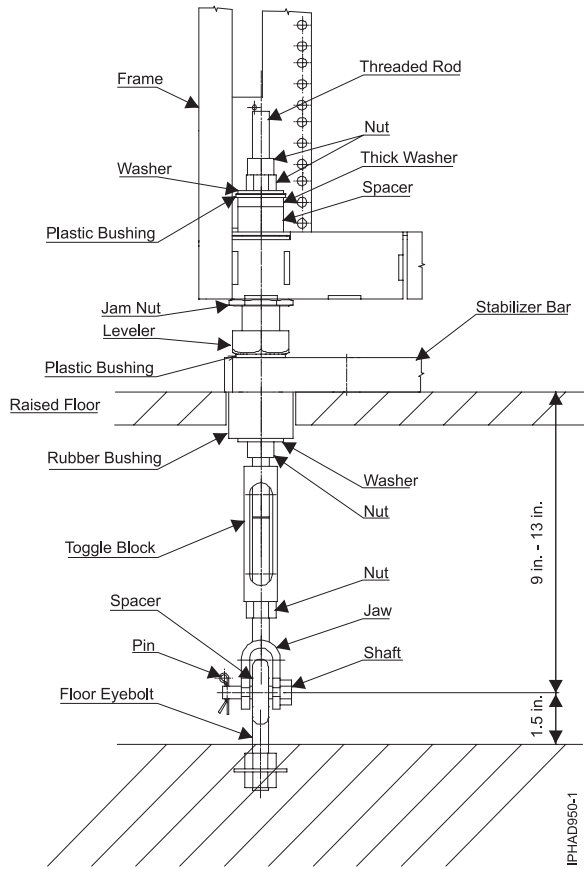


Figure 128. Turnbuckle assembly frame tie-down hardware for 228.6 - 330.2 mm (9 - 13 in.) raised floor (part number 44P2999)

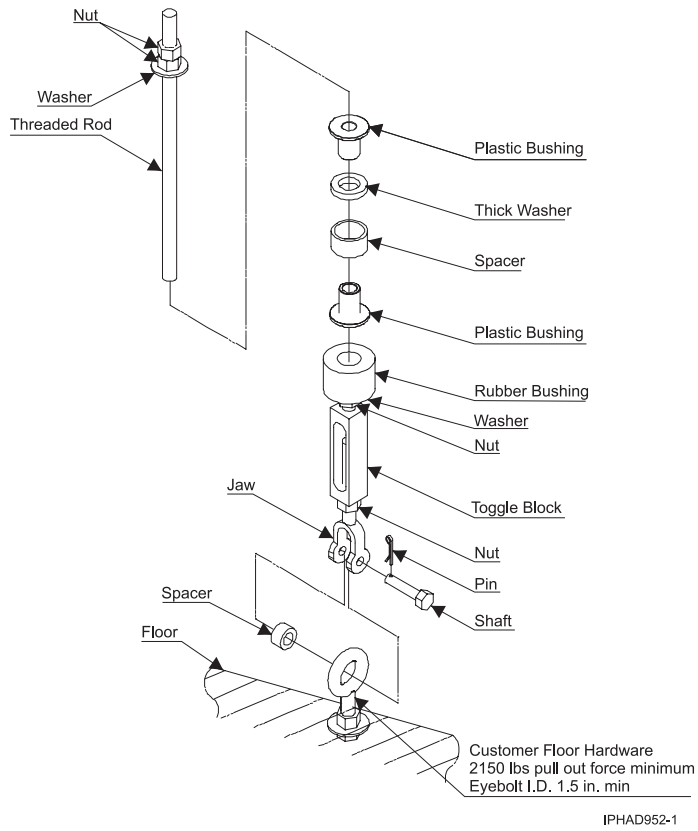


Figure 129. Turnbuckle assembly frame tie-down hardware for 228.6 - 330.2 mm (9 - 13 in.) raised floor (part number 44P2999)



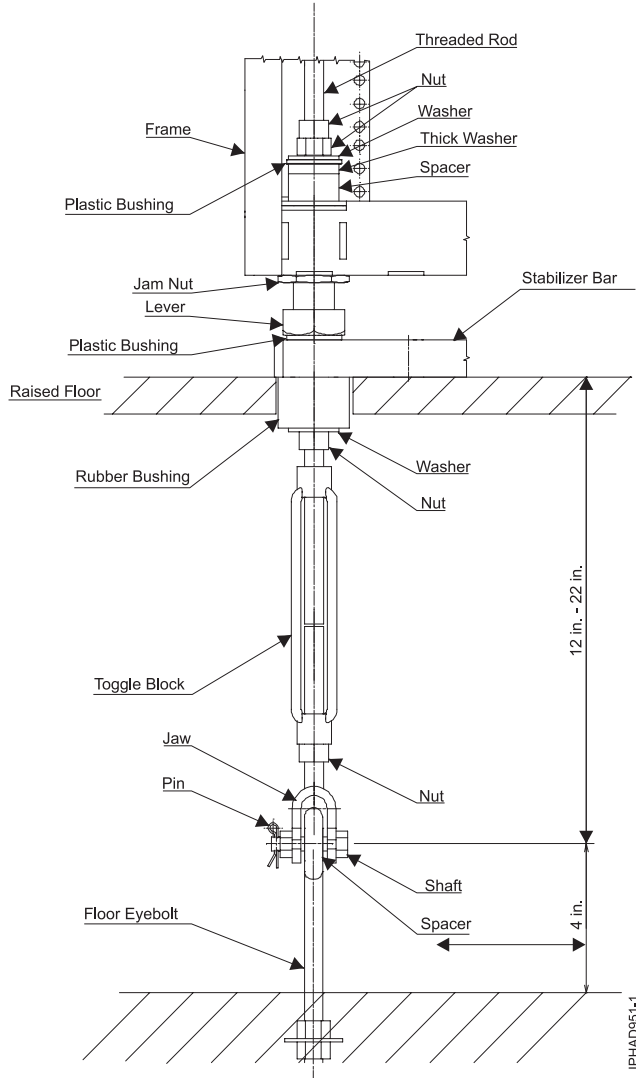


Figure 130. Turnbuckle assembly frame tie-down hardware for 304.8 - 558.8 mm (12 - 22 in.) raised floor (part number 44P3000)

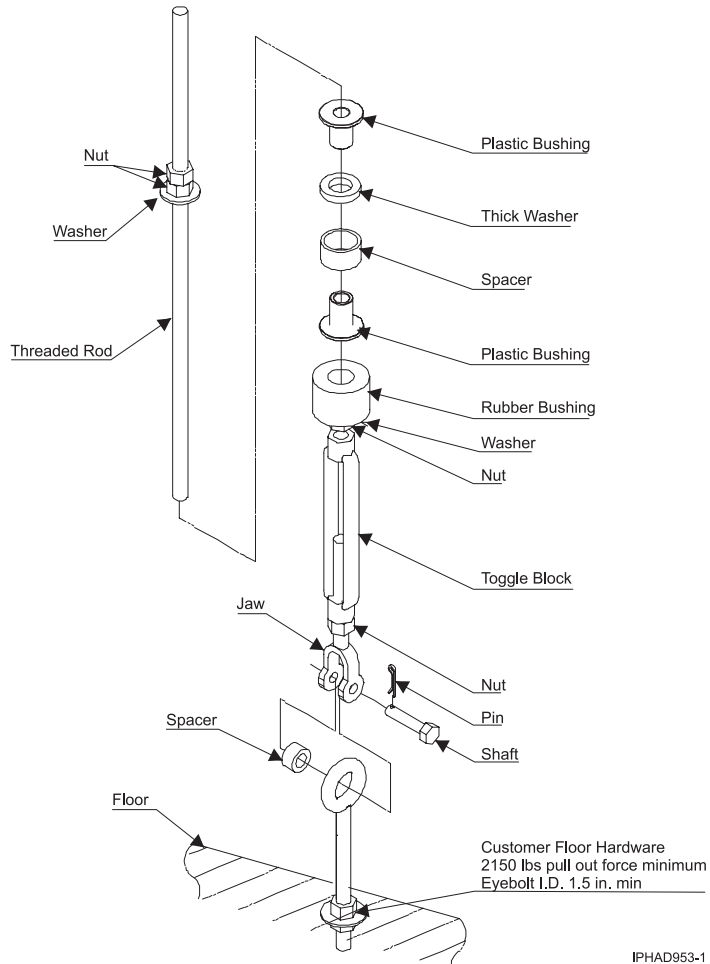


Figure 131. Turnbuckle assembly frame tie-down hardware for 304.8 - 558.8 mm (12 - 22 in.) raised floor (part number 44P3000)

## Positioning and installing the frame

This topics shows how to position and install a 9125-F2A frame.

All 9125-F2A frames are delivered with weight distribution plates. The installation of these plates is required. Install the front cutout tile after the frame is in place. This will remove the possibility of accidentally rolling the frame into the cutout.

These images show the installation of the weight distribution plates.

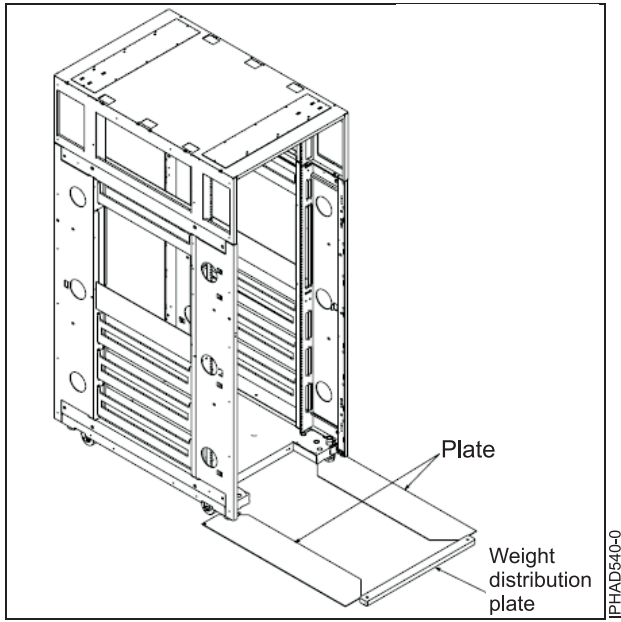


Figure 132. Frame with installation plate and weight distribution plate

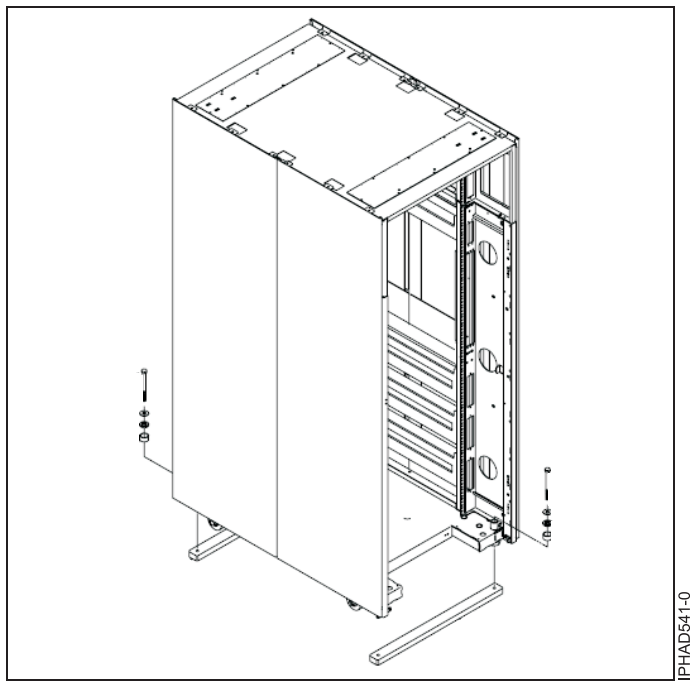


Figure 133. Frame with weight distribution plate and bolts

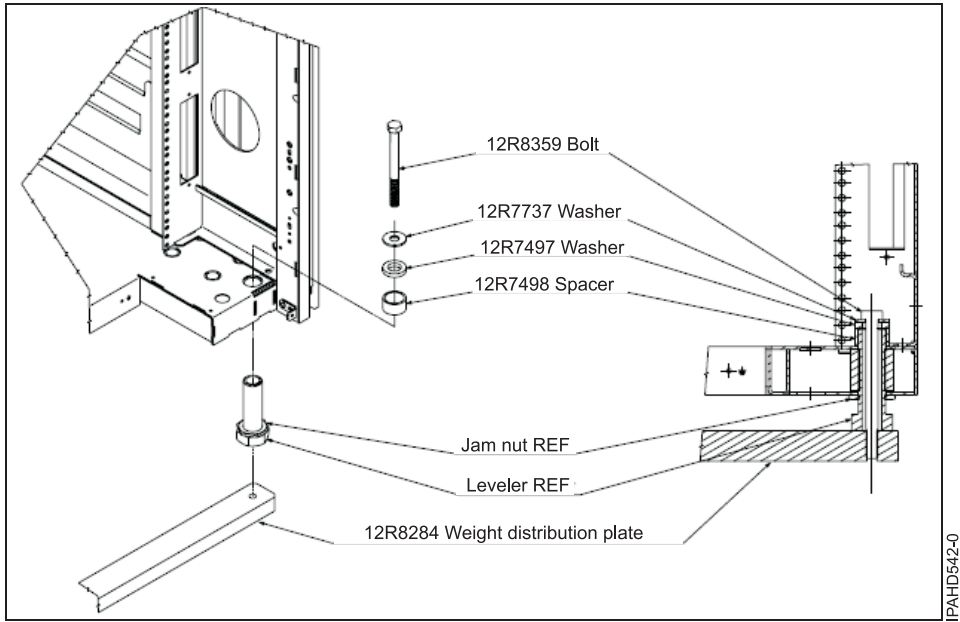


Figure 134. Close-up view of bolt and weight distribution plate

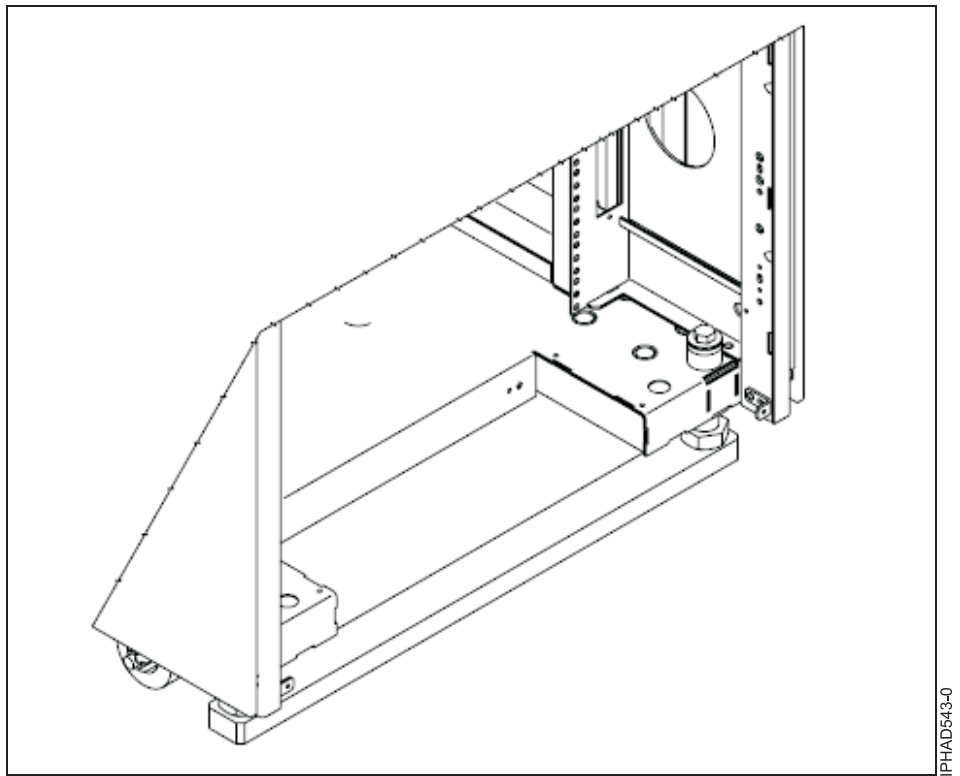


Figure 135. Close-up view of weight distribution installed

## Total system power consumption

Use the System tables to determine the total system power consumption for your server's configuration.

**Table 189. Rack power**

I/O drawers		1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	Maximum (Watts)	7700	13900	20000	26200	32400	38600	44800	50900	57100	63300	69500	75700	81800	88000
	Typical (Watts)	6500	11500	16500	21500	26500	31500	36500	41500	46500	51500	56500	61500	66600	71600
1	Maximum (Watts)	8800	15000	21200	27300	33500	39700	45900	52100	58200	64400	70600	76800		
	Typical (Watts)	7600	12600	17600	22600	27600	32600	37600	42700	47700	52700	57700	62700		
2	Maximum (Watts)		16100	22300	28500	34600	40800	47000	53200	59400	65500				
	Typical (Watts)		13800	18800	23800	28800	33800	38800	43800	48800	53800				
3	Maximum (Watts)			23400	29600	35800	41900	48100	54300						
	Typical (Watts)			19900	24900	29900	34900	39900	44900						
4	Maximum (Watts)				30700	36900	43100								
	Typical (Watts)				26000	31000	36000								

Bulk power assembly (BPA) Input Power (Power Cord Power) 200 - 240 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full- feature I/O, two PCIe, two 10 GB Ethernet adapters, two disk drives, two quad port 4x host channel adapters

Total 4 Power Cord Power (Watts)

**Table 190. Rack power**

I/O drawers		1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	Maximum (Watts)	7500	13500	19500	25000	31500	37500	43500	49500	55600	61600	67600	73600	79600	85600
	Typical (Watts)	6300	11200	16100	20900	25800	30700	35500	40400	45300	50100	55000	59900	64700	69600
1	Maximum (Watts)	8600	14600	20600	26600	32600	38600	44600	50600	56600	62700	68700	74700		
	Typical (Watts)	7400	12300	17100	22000	26900	31800	36600	41500	46400	51200	56100	61000		
2	Maximum (Watts)		15700	21700	27700	33700	39700	45700	51700	57700	63700				
	Typical (Watts)		13400	18200	23100	28000	32800	37700	42600	47400	52300				
3	Maximum (Watts)			22800	28800	34800	40800	46800	52800						
	Typical (Watts)			19300	24200	29100	33900	38800	43700						
4	Maximum (Watts)				29900	35900	41900								
	Typical (Watts)				25300	30200	35000								

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer.)

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

BPA Input Power (Power Cord Power) 380 - 480 V ac

32 W at 4.7G Hz (water cooled), 128 GB or 256 GB memory, full- feature I/O, two PCIe, two 10 GB Ethernet adapters, two disk drives, two quad port 4x host channel adapters

Total 4 Power Cord Power (Watts)

## Air cooling requirements

When planning an installation, the facility air cooling system must have enough capacity to cool two 9125-F2A frames with the rear door heat exchanger opened and the other 9125-F2A racks with the rear door heat exchanger closed.

This assures proper air cooling during typical service scenarios and certain equipment faults in the 9125-F2A frame.

Even though more than 70% of the system heat is transferred from the processor to water through the processor cold plates and the rear door heat exchanger, some heat still exits the frame into the room under normal operating conditions. During a service scenario, with the rear door heat exchanger door opened, only the processor cold plates transfer heat to water. The door in the open position provides no heat transfer to water.

Table 191. Maximum watts, British thermal unit per hour (BTU) hr, to Water and Air

	Normal conditions (rear door heat exchanger Eff equal 54% and closed)	Service scenario (rear door heat exchanger open)
Heat to water through cold plates	43000 W (146700 BTU/hr)	43000 W (146700 BTU/hr)
Heat to water through rear door heat exchanger	24300 W (82900 BTU/hr)	0
Heat to air	20700 W (70631 BTU/hr)	45000 W (153546 BTU/hr)

The following tables provide maximum and typical heat load to air and water as a function of system configuration with both the rear door heat exchanger closed and opened.

Table 192. Heat load (Watts), low line voltage, rear door heat exchanger closed.

Rack power dissipation 200 - 240 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			1	2	3	4	5
0	Maximum (Watts)	Water	5600	10 300	15 000	19 800	24 600
		Air	2100	3600	5000	6400	7800
	Typical (Watts)	Water	4800	8700	12 700	16 600	20 600
		Air	1700	2800	3800	4900	5900
1	Maximum (Watts)	Water	6200	10 900	15 700	20 400	25 100
		Air	2600	4100	5500	6 900	8 400
	Typical (Watts)	Water	5400	9300	13 300	17 200	21 200
		Air	2200	3300	4300	5400	6400
2	Maximum (Watts)	Water	na	11 500	16 300	21 000	25 700
		Air	na	4600	6000	7500	8900
	Typical (Watts)	Water	na	10 000	13 900	17 900	21 800
		Air	na	3800	4900	5900	7000
3	Maximum (Watts)	Water	na	na	16 900	21 600	26 400
		Air	na	na	6500	8 000	9 400
	Typical (Watts)	Water	na	na	14 500	18 500	22 400
		Air	na	na	5400	6400	7500
4	Maximum (Watts)	Water	na	na	na	22 200	27 000
		Air	na	na	na	8500	9900
	Typical (Watts)	Water	na	na	na	19 100	23 000
		Air	na	na	na	na	na

Table 193. Heat load (Watts), low line voltage, rear door heat exchanger closed.

Rack power dissipation 200 - 240 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			6	7	8	9	10
0	Maximum (Watts)	Water	29 300	34 100	38 800	43 500	48 300
		Air	9300	10 700	12 100	13 600	15 000
	Typical (Watts)	Water	24 500	28 500	32 400	36 400	40 300
		Air	7000	8000	9100	10 100	11 200
1	Maximum (Watts)	Water	29 900	34 700	39 400	44 100	48 900
		Air	9 800	11 200	12 700	14 100	15 500
	Typical (Watts)	Water	25 100	29 100	33 100	37 000	41 000
		Air	7500	8500	9600	10 700	11 700
2	Maximum (Watts)	Water	30 500	35 300	40 000	44 800	49 500
		Air	10 300	11 700	13 200	14 600	16 000
	Typical (Watts)	Water	25 800	29 700	33 700	37 600	41 600
		Air	8000	9100	10 100	11 200	12 200
3	Maximum (Watts)	Water	31 100	35 900	40 600	na	na
		Air	10 800	12 200	13 700	na	na
	Typical (Watts)	Water	26 400	30 300	34 300	na	na
		Air	8500	9600	10 600	na	na
4	Maximum (Watts)	Water	31 700	na	na	na	na
		Air	11 400	na	na	na	na
	Typical (Watts)	Water	27 000	na	na	na	na
		Air	na	na	na	na	na

Table 194. Heat load (Watts), low line voltage, rear door heat exchanger closed.

Rack power dissipation 200 - 240 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			10	11	12	13	14
0	Maximum (Watts)	Water	48 300	53 100	57 800	62 500	67 300
		Air	15 000	16 400	17 900	19 300	20 700
	Typical (Watts)	Water	40 300	44 300	48 200	52 300	56 200
		Air	11 200	12 200	13 300	14 300	15 400
1	Maximum (Watts)	Water	48 900	53 700	58 400	na	na
		Air	15 500	16 900	18 400	na	na
	Typical (Watts)	Water	41 000	44 900	48 900	na	na
		Air	11 700	12 800	13 800	na	na
2	Maximum (Watts)	Water	49 500	na	na	na	na
		Air	16 000	na	na	na	na
	Typical (Watts)	Water	41 600	na	na	na	na
		Air	12 200	na	na	na	na
3	Maximum (Watts)	Water	na	na	na	na	na
		Air	na	na	na	na	na
	Typical (Watts)	Water	na	na	na	na	na
		Air	na	na	na	na	na
4	Maximum (Watts)	Water	na	na	na	na	na
		Air	na	na	na	na	na
	Typical (Watts)	Water	na	na	na	na	na
		Air	na	na	na	na	na

Table 195. Heat load (BTUs), low line voltage, rear door heat exchanger closed

I/O drawers			1	2	3	4	5
0	Maximum (BTUs)	Water	19 113	35 154	51 195	67 577	83 960
		Air	7167	12 287	17 065	21 843	26 621
	Typical (BTUs)	Water	16 382	29 693	43 345	56 656	70 308
		Air	5802	9556	12 969	16 724	20 137
1	Maximum (BTUs)	Water	21 161	37 202	53 584	69 625	85 666
		Air	8874	13 993	18 772	23 550	28 669
	Typical (BTUs)	Water	18 430	31 741	45 393	58 704	72 356
		Air	7509	11 263	14 676	18 430	21 843

**Table 195. Heat load (BTUs), low line voltage, rear door heat exchanger closed (continued)**

I/O drawers			1	2	3	4	5
2	Maximum (BTUs)	Water	na	39 250	55 632	71 673	87 714
		Air	na	15 700	20 478	25 598	30 376
	Typical (BTUs)	Water	na	34 130	47 441	61 093	74 403
		Air	na	12 969	16 724	20 137	23 891
3	Maximum (BTUs)	Water	na	na	57 680	73 721	90 103
		Air	na	na	22 185	27 304	32 082
	Typical (BTUs)	Water	na	na	49 489	63 141	76 451
		Air	na	na	18 430	21 843	25 598
4	Maximum (BTUs)	Water	na	na	na	75 769	92 151
		Air	na	na	na	29 011	33 789
	Typical (BTUs)	Water	na	na	na	65 188	78 499
		Air	na	na	na	na	na

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer).

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 196. Heat load (BTUs), low line voltage, rear door heat exchanger closed**

I/O drawers			6	7	8	9	10
0	Maximum (BTUs)	Water	100 001	116 383	132 424	148 466	164 848
		Air	31 741	36 519	41 297	46 417	51 195
	Typical (BTUs)	Water	83 619	97 271	110 581	124 233	137 544
		Air	23 891	27 304	31 058	34 471	38 226
1	Maximum (BTUs)	Water	102 049	118 431	134 472	150 513	166 896
		Air	33 447	38 226	43 345	48 123	52 902
	Typical (BTUs)	Water	85 666	99 318	112 970	126 281	139 933
		Air	25 598	29 011	32 765	36 519	39 932
2	Maximum (BTUs)	Water	104 097	120 479	136 520	152 902	168 944
		Air	35 154	39 932	45 052	49 830	54 608
	Typical (BTUs)	Water	88 055	101 366	115 018	128 329	141 981
		Air	27 304	31 058	34 471	38 226	41 639
3	Maximum (BTUs)	Water	106 144	122 527	138 568	na	na
		Air	36 860	41 639	46 758	na	na
	Typical (BTUs)	Water	90 103	103 414	117 066	na	na
		Air	29 011	32 765	36 178	na	na
4	Maximum (BTUs)	Water	108 192	na	na	na	na
		Air	38 908	na	na	na	na
	Typical (BTUs)	Water	92 151	na	na	na	na
		Air	na	na	na	na	na

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer).

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 197. Heat load (BTUs), low line voltage, rear door heat exchanger closed**

I/O drawers			11	12	13	14
0	Maximum (BTUs)	Water	181 230	197 271	213 313	229 695
		Air	55 973	61 093	65 871	70 649
	Typical (BTUs)	Water	151 196	164 507	178 500	191 811
		Air	41 639	45 393	48 806	52 560



Table 197. Heat load (BTUs), low line voltage, rear door heat exchanger closed (continued)

I/O drawers			11	12	13	14
1	Maximum (BTUs)	Water	183 278	199 319	na	na
		Air	57 680	62 799		
	Typical (BTUs)	Water	153 244	166 896	na	na
		Air	43 686	47 099		
2	Maximum (BTUs)	Water	na	na	na	na
		Air				
	Typical (BTUs)	Water	na	na	na	na
		Air				
3	Maximum (BTUs)	Water	na	na	na	na
		Air				
	Typical (BTUs)	Water	na	na	na	na
		Air				
4	Maximum (BTUs)	Water	na	na	na	na
		Air				
	Typical (BTUs)	Water	na	na	na	na
		Air				

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer.)

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

Table 198. Heat load (Watts), high line voltage, rear door heat exchanger closed.

Rack power dissipation 380 - 480 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			1	2	3	4	5
0	Maximum (Watts)	Water	5500	10 100	14 800	19 400	24 100
		Air	2000	3400	4700	6100	7400
	Typical (Watts)	Water	4700	8600	12 500	16 300	20 200
		Air	1600	2600	3600	4600	5600
1	Maximum (Watts)	Water	6100	10 700	15 400	20 000	24 700
		Air	2500	3900	5200	6600	7900
	Typical (Watts)	Water	5200	9100	13 000	16 900	20 800
		Air	2200	3200	4100	5100	6100
2	Maximum (Watts)	Water	na	11 300	16 000	20 600	25 300
		Air		4400	5700	7100	8400
	Typical (Watts)	Water	na	9700	13 600	17 500	21 400
		Air		3700	4600	5600	6600
3	Maximum (Watts)	Water	na	na	16 500	21 200	25 900
		Air			6300	7600	8900
	Typical (Watts)	Water	na	na	14 200	18 100	22 000
		Air			5100	6100	7100
4	Maximum (Watts)	Water	na	na	na	21 800	26 400
		Air				8100	9500
	Typical (Watts)	Water	na	na	na	18 700	22 600
		Air					

Table 199. Heat load (Watts), high line voltage, rear door heat exchanger closed.

Rack power dissipation 380 - 480 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			6	7	8	9	10
0	Maximum (Watts)	Water	28 700	33 400	38 000	42 700	47 400
		Air	8800	10 100	11 500	12 900	14 200
	Typical (Watts)	Water	24 100	27 900	31 800	35 700	39 600
		Air	6600	7600	8600	9600	10 500
1	Maximum (Watts)	Water	29 300	34 000	38 600	43 300	48 000
		Air	9300	10 600	12 000	13 300	14 700
	Typical (Watts)	Water	24 700	28 500	32 400	36 300	40 200
		Air	7100	8100	9100	10 100	11 000
2	Maximum (Watts)	Water	29 900	34 600	39 200	43 900	48 500
		Air	9800	11 100	12 500	13 800	15 200
	Typical (Watts)	Water	25 200	29 100	33 000	36 900	40 800
		Air	7600	8600	9600	10 500	11 500
3	Maximum (Watts)	Water	30 500	35 200	39 800	na	na
		Air	10 300	11 600	13 000	na	na
	Typical (Watts)	Water	25 800	29 700	33 600	na	na
		Air	8100	9100	10 100	na	na
4	Maximum (Watts)	Water	31 100	na	na	na	na
		Air	10 800	na	na	na	na
	Typical (Watts)	Water	26 400	na	na	na	na
		Air					

Table 200. Heat load (Watts), high line voltage, rear door heat exchanger closed.

Rack power dissipation 380 - 480 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			11	12	13	14
0	Maximum (Watts)	Water	52 000	56 700	61 300	66 000
		Air	15 600	16 900	18 300	19 600
	Typical (Watts)	Water	43 500	47 400	51 200	55 100
		Air	11 500	12 500	13 500	14 500
1	Maximum (Watts)	Water	52 600	57 300	na	na
		Air	16 100	17 400	na	na
	Typical (Watts)	Water	44 100	48 000	na	na
		Air	12 000	13 000	na	na
2	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air	na	na	na	na
3	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air	na	na	na	na
4	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air				

Table 201. Heat load (BTUs), high line voltage, rear door heat exchanger closed

I/O drawers			1	2	3	4	5
0	Maximum (BTUs)	Water	18772	34471	50512	66212	82253
		Air	6826	11604	16041	20819	25256
	Typical (BTUs)	Water	6041	29352	42663	55632	68943
		Air	5461	8874	12287	15700	19113
1	Maximum (BTUs)	Water	20819	36519	52560	68260	84301
		Air	8533	13311	17748	22526	26963
	Typical (BTUs)	Water	17748	31058	44369	57680	70990
		Air	7509	10922	13993	17406	20819

**Table 201. Heat load (BTUs), high line voltage, rear door heat exchanger closed (continued)**

I/O drawers			1	2	3	4	5
2	Maximum (BTUs)	Water		38567	54608	70308	86349
		Air		15017	19454	24232	28669
	Typical (BTUs)	Water		33106	46417	59728	73038
		Air		12628	15700	19113	22526
3	Maximum (BTUs)	Water			56315	72356	88397
		Air			21502	25939	30376
	Typical (BTUs)	Water			48465	61775	75086
		Air			17406	20819	24232
4	Maximum (BTUs)	Water				74403	90103
		Air				27645	32424
	Typical (BTUs)	Water				63823	77134
		Air				22526	25939

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer).

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 202. Heat load (BTUs), high line voltage, rear door heat exchanger closed**

I/O drawers			6	7	8	9	10
0	Maximum (BTUs)	Water	97953	113994	129694	145735	161776
		Air	30034	34471	39250	44028	48465
	Typical (BTUs)	Water	82253	95223	108533	121844	135155
		Air	22526	25939	29352	32765	35837
1	Maximum (BTUs)	Water	100001	116042	131742	147783	163824
		Air	31741	36178	40956	45393	50171
	Typical (BTUs)	Water	84301	97271	110581	123892	137203
		Air	24232	27645	31058	34471	37543
2	Maximum (BTUs)	Water	102049	118090	133790	149831	165531
		Air	33447	37884	42663	47099	51878
	Typical (BTUs)	Water	86008	99318	112629	125940	139250
		Air	25939	29352	32765	35837	39250
3	Maximum (BTUs)	Water	104097	120138	135837		
		Air	35154	39591	44369		
	Typical (BTUs)	Water	88055	101366	114677		
		Air	27645	31058	34471		
4	Maximum (BTUs)	Water	106144				
		Air	36860				
	Typical (BTUs)	Water	90103				
		Air	29352				

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer).

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 203. Heat load (BTUs), high line voltage, rear door heat exchanger closed**

I/O drawers			11	12	13	14
0	Maximum (BTUs)	Water	177476	193517	209217	225258
		Air	53243	57680	62458	66895
	Typical (BTUs)	Water	148466	161776	174746	188056
		Air	39250	42663	46076	49489

**Table 203. Heat load (BTUs), high line voltage, rear door heat exchanger closed (continued)**

I/O drawers			11	12	13	14
1	Maximum (BTUs)	Water	179524	195565		
		Air	54949	59386		
	Typical (BTUs)	Water	150513	163824		
		Air	40956	44369		
2	Maximum (BTUs)	Water				
		Air				
	Typical (BTUs)	Water				
		Air				
3	Maximum (BTUs)	Water				
		Air				
	Typical (BTUs)	Water				
		Air				
4	Maximum (BTUs)	Water				
		Air				
	Typical (BTUs)	Water				
		Air				

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer.)

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 204. Heat load (Watts), low line voltage, rear door heat exchanger open.**

**Rack Power Dissipation 200 - 240 V ac**

**32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters**

I/O drawers			1	2	3	4	5
0	Maximum (Watts)	Water	3100	6100	9200	12300	15300
		Air	4600	7800	10800	13900	17100
	Typical (Watts)	Water	2700	5400	8200	10900	13600
		Air	3800	6100	8300	10600	12900
1	Maximum (Watts)	Water	3100	6100	9200	12300	15300
		Air	5700	8900	12000	15000	18200
	Typical (Watts)	Water	2700	5400	8200	10900	13600
		Air	4900	7200	9400	11700	14000
2	Maximum (Watts)	Water		6100	9200	12300	15300
		Air		10000	13100	16200	19300
	Typical (Watts)	Water		5400	8200	10900	13600
		Air		8400	10600	12900	15200
3	Maximum (Watts)	Water	9200	12300	15300	18400	21500
		Air	14200	17300	20500	23500	26600
	Typical (Watts)	Water	8200	10900	13600	16300	19100
		Air	11700	14000	16300	18600	20800
4	Maximum (Watts)	Water				12300	15300
		Air				18400	21600
	Typical (Watts)	Water				10900	13600
		Air				15100	17400

Table 205. Heat load (Watts), low line voltage, rear door heat exchanger open.

Rack Power Dissipation 200 - 240 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			6	7	8	9	10
0	Maximum (Watts)	Water	18400	21500	24600	27600	30700
		Air	20200	23300	26300	29500	32600
	Typical (Watts)	Water	16300	19100	21800	24500	27200
		Air	15200	17400	19700	22000	24300
1	Maximum (Watts)	Water	18400	21500	24600	27600	30700
		Air	21300	24400	27500	30600	33700
	Typical (Watts)	Water	16300	19100	21800	24500	27200
		Air	16300	18500	20900	23200	25500
2	Maximum (Watts)	Water	18400	21500	24600	27600	30700
		Air	22400	25500	28600	31800	34800
	Typical (Watts)	Water	16300	19100	21800	24500	27200
		Air	17500	19700	22000	24300	26600
3	Maximum (Watts)	Water	24600				
		Air	29700				
	Typical (Watts)	Water	21800				
		Air	23100				
4	Maximum (Watts)	Water	18400				
		Air	24700				
	Typical (Watts)	Water	16300				
		Air	19700				

Table 206. Heat load (Watts), low line voltage, rear door heat exchanger open.

Rack Power Dissipation 200 - 240 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

I/O drawers			11	12	13	14
0	Maximum (Watts)	Water	33800	36800	39900	43000
		Air	35700	38900	41900	45000
	Typical (Watts)	Water	30000	32700	35400	38100
		Air	26500	28800	31200	33500
1	Maximum (Watts)	Water	33800	36800		
		Air	36800	40000		
	Typical (Watts)	Water	30000	32700		
		Air	27700	30000		
2	Maximum (Watts)	Water				
		Air				
	Typical (Watts)	Water				
		Air				
3	Maximum (Watts)	Water				
		Air				
	Typical (Watts)	Water				
		Air				
4	Maximum (Watts)	Water				
		Air				
	Typical (Watts)	Water				
		Air				

Table 207. Heat load (BTUs), low line voltage, rear door heat exchanger open

I/O drawers			1	2	3	4	5
0	Maximum (BTUs)	Water	10580	20819	31400	41980	52219
		Air	15700	26621	36860	47441	58362
	Typical (BTUs)	Water	9215	18430	27987	37202	46417
		Air	12969	20819	28328	36178	44028
1	Maximum (BTUs)	Water	10580	20819	31400	41980	52219
		Air	19454	30376	40956	51195	62117
	Typical (BTUs)	Water	9215	18430	27987	37202	46417
		Air	16724	24574	32082	39932	47782

**Table 207. Heat load (BTUs), low line voltage, rear door heat exchanger open (continued)**

I/O drawers			1	2	3	4	5
2	Maximum (BTUs)	Water		20819	31400	41980	52219
		Air		34130	44710	55291	65871
	Typical (BTUs)	Water		18430	27987	37202	46417
		Air		28669	36178	44028	51878
3	Maximum (BTUs)	Water			31400	41980	52219
		Air			48465	59045	69967
	Typical (BTUs)	Water			27987	37202	46417
		Air			39932	47782	55632
4	Maximum (BTUs)	Water				41980	52219
		Air				62799	73721
	Typical (BTUs)	Water				37202	46417
		Air				51536	59386

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer).

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 208. Heat load (BTUs), low line voltage, rear door heat exchanger open**

I/O drawers			6	7	8	9	10
0	Maximum (BTUs)	Water	62799	73380	83960	94199	104779
		Air	68943	79523	89762	100684	111264
	Typical (BTUs)	Water	55632	65188	74403	83619	92834
		Air	51878	59386	67236	75086	82936
1	Maximum (BTUs)	Water	62799	73380	83960	94199	104779
		Air	72697	83277	93858	104438	115018
	Typical (BTUs)	Water	55632	65188	74403	83619	92834
		Air	55632	63141	71332	79182	87032
2	Maximum (BTUs)	Water	62799	73380	83960	94199	104779
		Air	76451	87032	97612	108533	118772
	Typical (BTUs)	Water	55632	65188	74403	83619	92834
		Air	59728	67236	75086	82936	90786
3	Maximum (BTUs)	Water	62799	73380	83960		
		Air	80206	90786	101366		
	Typical (BTUs)	Water	55632	65188	74403		
		Air	63482	70990	78840		
4	Maximum (BTUs)	Water	62799				
		Air	84301				
	Typical (BTUs)	Water	55632				
		Air	67236				

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer).

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 209. Heat load (BTUs), low line voltage, rear door heat exchanger open**

I/O drawers			11	12	13	14
0	Maximum (BTUs)	Water	115359	125598	136179	146759
		Air	121844	132766	143005	153585
	Typical (BTUs)	Water	102390	111605	120820	130035
		Air	90445	98294	106486	114336

**Table 209. Heat load (BTUs), low line voltage, rear door heat exchanger open (continued)**

I/O drawers			11	12	13	14
1	Maximum (BTUs)	Water	115359	125598		
		Air	125598	136520		
	Typical (BTUs)	Water	102390	111605		
		Air	94540	102390		
2	Maximum (BTUs)	Water				
		Air				
	Typical (BTUs)	Water				
		Air				
3	Maximum (BTUs)	Water				
		Air				
	Typical (BTUs)	Water				
		Air				
4	Maximum (BTUs)	Water				
		Air				
	Typical (BTUs)	Water				
		Air				

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer.)

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 210. Heat load (Watts), high line voltage, rear door heat exchanger open.**

**Rack Power Dissipation 380 - 480 V ac**

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

**Total rack power to water and air with rear door heat exchanger closed (Watts)**

I/O drawers			1	2	3	4	5
0	Maximum (Watts)	Water	3100	6100	9200	12 300	15 300
		Air	4400	7400	10 300	13 200	16 200
	Typical (Watts)	Water	2700	5400	8200	10 900	13 600
		Air	3600	5800	7900	10 000	12 200
1	Maximum (Watts)	Water	3100	6100	9200	12 300	15 300
		Air	5500	8500	11 400	14 300	17 300
	Typical (Watts)	Water	2700	5400	8200	10 900	13 600
		Air	4700	6900	8900	11 100	13 300
2	Maximum (Watts)	Water	na	6100	9200	12 300	15 300
		Air		9600	12 500	15 400	18 400
	Typical (Watts)	Water		5400	8200	10 900	13 600
		Air	na	8000	10 000	12 200	14 400
3	Maximum (Watts)	Water	na	na	9200	12 300	15 300
		Air			13 600	16 500	19 500
	Typical (Watts)	Water			8200	10 900	13 600
		Air	na	na	11 100	13 300	15 500
4	Maximum (Watts)	Water	na	na	na	12 300	15 300
		Air				17 600	20 600
	Typical (Watts)	Water	na	na	na	10 900	13 600
		Air					

Table 211. Heat load (Watts), high line voltage, rear door heat exchanger open.

Rack Power Dissipation 380 - 480 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

Total rack power to water and air with rear door heat exchanger closed (Watts)

I/O drawers			5	6	7	8	9	10
0	Maximum (Watts)	Water	15 300	18 400	21 500	24 600	27 600	30 700
		Air	16 200	19 100	22 000	24 900	28 000	30 900
	Typical (Watts)	Water	13 600	16 300	19 100	21 800	24 500	27 200
		Air	12 200	14 400	16 400	18 600	20 800	22 900
1	Maximum (Watts)	Water	15 300	18 400	21 500	24 600	27 600	30 700
		Air	17 300	20 200	23 100	26 000	29 000	32 000
	Typical (Watts)	Water	13 600	16 300	19 100	21 800	24 500	27 200
		Air	13 300	15 500	17 500	19 700	21 900	24 000
2	Maximum (Watts)	Water	15 300	18 400	21 500	24 600	27 600	30 700
		Air	18 400	21 300	24 200	27 100	30 100	33 000
	Typical (Watts)	Water	13 600	16 300	19 100	21 800	24 500	27 200
		Air	14 400	16 500	18 600	20 800	22 900	25 100
3	Maximum (Watts)	Water	15 300	18 400	21 500	24 600	na	na
		Air	19 500	22 400	25 300	28 200	na	na
	Typical (Watts)	Water	13 600	16 300	19 100	21 800	na	na
		Air	15 500	17 600	19 700	21 900	na	na
4	Maximum (Watts)	Water	15 300	18 400	na	na	na	na
		Air	20 600	23 500	na	na	na	na
	Typical (Watts)	Water	13 600	16 300	na	na	na	na
		Air						

Table 212. Heat load (Watts), high line voltage, rear door heat exchanger open.

Rack Power Dissipation 380 - 480 V ac

32 W at 4.7 GHz (water cooled), 128 GB or 256 GB memory, full feature I/O, 2 PCIe, two 10 GB Ethernet adapters, two disk drives, 2 quad port 4x host channel adapters

Total rack power to water and air with rear door heat exchanger closed (Watts)

I/O drawers			11	12	13	14
0	Maximum (Watts)	Water	33 800	36 800	39 900	43 000
		Air	33 800	36 800	39 700	42 600
	Typical (Watts)	Water	30 000	32 700	35 400	38 100
		Air	25 000	27 200	29 300	31 500
1	Maximum (Watts)	Water	33 800	36 800	na	na
		Air	34 900	37 900	na	na
	Typical (Watts)	Water	30 000	32 700	na	na
		Air	26 100	28 300	na	na
2	Maximum (Watts)	Water	na	na	na	na
		Air				
	Typical (Watts)	Water	na	na	na	na
		Air	na	na	na	na
3	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air	na	na	na	na
4	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air				

Table 213. Heat load (BTUs), high line voltage, rear door heat exchanger open. Total rack power to water and air with rear door heat exchanger closed (Watts)

I/O drawers			1	2	3	4	5
0	Maximum (Watts)	Water	10 580	20 819	31 400	41 980	52 219
		Air	15 017	25 256	35 154	45 052	55 291
	Typical (Watts)	Water	9215	18 430	27 987	37 202	46 417
		Air	12 287	19 795	26 963	34 130	41 639



**Table 213. Heat load (BTUs), high line voltage, rear door heat exchanger open (continued). Total rack power to water and air with rear door heat exchanger closed (Watts)**

I/O drawers			1	2	3	4	5
1	Maximum (Watts)	Water	10 580	20 819	31 400	41 980	52 219
		Air	18 772	29 011	38 908	48 806	59 045
	Typical (Watts)	Water	9215	18 430	27 987	37 202	46 417
		Air	16 041	23 550	30 376	37 884	45 393
2	Maximum (Watts)	Water	na	20 819	31 400	41 980	52 219
		Air	na	32 765	42 663	52 560	62 799
	Typical (Watts)	Water	na	18 430	27 987	37 202	46 417
		Air	na	27 304	34 130	41 639	49 147
3	Maximum (Watts)	Water	na	na	31 400	41 980	52 219
		Air	na	na	46 417	56 315	66 554
	Typical (Watts)	Water	na	na	27 987	37 202	46 417
		Air	na	na	37 884	45 393	52 902
4	Maximum (Watts)	Water	na	na	na	41 980	52 219
		Air	na	na	na	60 069	70 308
	Typical (Watts)	Water	na	na	na	37 202	46 417
		Air	na	na	na	na	na

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer.)

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 214. Heat load (BTUs), high line voltage, rear door heat exchanger open. Total rack power to water and air with rear door heat exchanger closed (Watts)**

I/O drawers			6	7	8	9	10
0	Maximum (Watts)	Water	62 799	73 380	83 960	94 199	104 779
		Air	65 188	75 086	84 984	95 564	105 462
	Typical (Watts)	Water	55 632	65 188	74 403	83 619	92 834
		Air	49 147	55 973	63 482	70 990	78 158
1	Maximum (Watts)	Water	62 799	73 380	83 960	94 199	104 779
		Air	68 943	78 840	88 738	98 977	109 216
	Typical (Watts)	Water	55 632	65 188	74 403	83 619	92 834
		Air	52 902	59 728	67 236	74 745	81 912
2	Maximum (Watts)	Water	62 799	73 380	83 960	94 199	104 779
		Air	72 697	82 595	92 492	102 731	112 629
	Typical (Watts)	Water	55 632	65 188	74 403	83 619	92 834
		Air	56 315	63 482	70 990	78 158	85 666
3	Maximum (Watts)	Water	62 799	73 380	83 960	na	na
		Air	76 451	86 349	96 247	na	na
	Typical (Watts)	Water	55 632	65 188	74 403	na	na
		Air	60 069	67 236	74 745	na	na
4	Maximum (Watts)	Water	62 799	na	na	na	na
		Air	80 206	na	na	na	na
	Typical (Watts)	Water	55 632	na	na	na	na
		Air	na	na	na	na	na

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer.)

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

**Table 215. Heat load (BTUs), high line voltage, rear door heat exchanger open. Total rack power to water and air with rear door heat exchanger closed (Watts)**

I/O drawers			11	12	13	14
0	Maximum (Watts)	Water	115 359	125 598	136 179	146 759
		Air	115 359	125 598	135 496	145 394
	Typical (Watts)	Water	102 390	111 605	120 820	130 035
		Air	85 325	92 834	100 001	107 510
1	Maximum (Watts)	Water	115 359	125 598	na	na
		Air	119 114	129 353	na	na
	Typical (Watts)	Water	102 390	111 605	na	na
		Air	89 079	96 588	na	na
2	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air	na	na	na	na
3	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air	na	na	na	na
4	Maximum (Watts)	Water	na	na	na	na
		Air	na	na	na	na
	Typical (Watts)	Water	na	na	na	na
		Air	na	na	na	na

<sup>1</sup>The power for the full-feature configured processor book is previously defined. It is configured with a full-feature I/O unit, two 10 GB Ethernet adapters, two quad port 4x host channel adapters (HCA), 2 PCIe adapters, and 64 dual inline memory module (DIMMs), either 2 GB or 4 GB per DIMM.

<sup>2</sup>Subtract 170 W (Watts) 580 British thermal unit per hour (Btu/hr) per processor book if lite I/O is substituted for full-featured I/O, subtract 92 W (314 BTU/hr) from water power, and subtract 78 W from air power.

<sup>3</sup>Subtract 75 W (256 BTU/hr) for each Quad Port 4x InfiniBand adapter removed from a processor book, subtract 41 W (140 BTU/hr) from water power and 34 W from air power.

<sup>4</sup>Subtract 34 W (116 BTU/hr) for each PCI adapter removed from the I/O drawer or from the processor book I/O unit, subtract 18 W (61 BTU/hr) from water power, and subtract 16 W (55 BTU/hr) from air power. (The configuration contains two adapter slots per processor book and 20 adapter slots per I/O drawer).

<sup>5</sup>Subtract 22 W (75 BTU/hr) from an I/O drawer for every disk removed, 12 W (41 BTU/hr) from water power, and 10 W (34 BTU/hr) from air power. (The I/O drawer configuration contains 16 disk bays per drawer).

<sup>6</sup>Maximum power is under conditions of maximum ambient room temperature, most aggressive workload, and water-cooled component manufacturing tolerances. Typical power is under conditions of typical ambient room temperature (22 C), typical workload, and nominal component manufacturing tolerances.

A fully configured 14-processor book water system with fans at maximum revolutions per minute (RPM) has an airflow of approximately 3000 cubic feet per minute (CFM). Air flow enters the side of the frame and exits the rear side of the frame.

The following tables shows airflow as a function of rack configuration. In most applications, rack airflow can be at the typical values shown in the table. In a case that the room is at or near maximum temperature, and an aggressive workload is being run, rack airflow can reach the maximum values shown in the table. Be sure to plan for the maximum values, and use the numbers for a fully configured rack if you anticipate an upgrade to a partially populated rack in the future. Failure to provide adequate return airflow to the building air conditioner from the rear door can result in excessive recirculation of frame exit air to the frame air inlet. The maximum operating inlet air temperature of the 9125-F2A cannot be exceeded under any condition.

**Table 216. System airflow through rack (CFM)**

I/O drawers		1	2	3	4	5
0	Maximum (Watts)	670	840	1010	1180	1350
	Typical (Watts)	300	390	490	580	680
1	Maximum (Watts)	870	1040	1210	1380	1550
	Typical (Watts)	450	540	640	730	830
2	Maximum (Watts)		1240	1410	1580	1750
	Typical (Watts)		690	790	880	980
3	Maximum (Watts)			1610	1780	1950
	Typical (Watts)			940	1030	1130
4	Maximum (Watts)				1980	2150
	Typical (Watts)				1180	1280

**Table 217. System airflow through rack (CFM)**

I/O drawers		6	7	8	9	10
0	Maximum (Watts)	1520	1690	1860	2030	2200
	Typical (Watts)	780	870	970	1060	1160

Table 217. System airflow through rack (CFM) (continued)

I/O drawers		6	7	8	9	10
1	Maximum (Watts)	1720	1890	2060	2230	2400
	Typical (Watts)	930	1020	1120	1210	1310
2	Maximum (Watts)	1920	2090	2260	2430	2600
	Typical (Watts)	1080	1170	1270	1360	1460
3	Maximum (Watts)	2120	2290	2460		
	Typical (Watts)	1230	1320	1420		
4	Maximum (Watts)	2320				
	Typical (Watts)	1380				

Table 218. System airflow through rack (CFM)

I/O drawers		11	12	13	14
0	Maximum (Watts)	2370	2540	2710	2880
	Typical (Watts)	1260	1350	1450	1540
1	Maximum (Watts)	2570	2740		
	Typical (Watts)	1410	1500		
2	Maximum (Watts)				
	Typical (Watts)				
3	Maximum (Watts)				
	Typical (Watts)				
4	Maximum (Watts)				
	Typical (Watts)				

## Water cooling requirements

Follow these requirements when using water cooling for the 9125-F2A.

### Determining minimum required system flow and pressure

- Allowable system inlet water temperature range is 6 - 16°C (43 - 61°F), using standard building chilled water (BCW). A special water system for model 9125-F2A is typically not required.
- Required flow rate to the cabinet is 3.7 - 79.4 lpm (1 -21 gpm), depending on inlet water temperature and the number of nodes populated in the rack. Colder inlet water temperatures require less flow than warmer water temperatures. Racks that are partially populated with nodes require less flow than maximum populated racks.
- Minimum water pressure required across the hose ends is 0.34 - 2.32 bar (5 - 33.7 psi), depending on the minimum flow required.

### Determining minimum required system flow and pressure for a normal operating system

1. Determine the inlet water temperature. This is the temperature of the chilled water that is present in the room where the system is installed.
2. Determine the minimum design flow rate for your rack configuration using tables Required building chilled water flow, pressure drop and Required building chilled water flow, pressure drop and outlet temperature (English units). Under normal operating conditions the flow into the frame will be double that of the numbers shown in the tables. This is because both Water Conditioning Units (WCU) in the frame operate simultaneously.

**Note:** If there is a possibility that you will add nodes to a partially populated system at a later date, you should plan for it during the initial installation.

3. Determine the minimum pressure required across the ends of the hoses to provide the flow rate determined in the step above. Maximum continuous operating pressure must not exceed 2.32 bars (33.7 psi).

### Determining additional required system flow for a fault condition

Define the maximum facility pressure drop that can be present across the ends of the model 9125-F2A hoses, and locate the equivalent pressure drop in tables Required building chilled water flow, pressure drop and Required building chilled water flow, pressure drop and outlet temperature (English units). The

corresponding flow rate multiplied by two represents the maximum flow a single rack could experience under a worst-case fault condition. The facility must be able to accommodate this condition for at least one 9125-F2A racks in the installation.

Table 219. Required building chilled water flow, pressure drop °C (1 of 2)

Nodes	Cooling capacity with two active WCUs	Required Chilled Water per WCU	Required Chilled Water per WCU				
			6	7	8	9	10
2	4.9	Flow (lpm)	3.7	4	4.4	4.9	5.5
		Pressure Drop (Bar)	0.34	0.34	0.34	0.34	0.34
		Outlet temperature °C	25.1	24.4	23.8	23.2	22.7
4	9.7	Flow (lpm)	8.4	9.1	9.9	10.8	11.9
		Pressure Drop (Bar)	0.34	0.34	0.34	0.34	0.34
		Outlet temperature °C	22.7	22.4	22.2	22.0	21.8
6	14.6	Flow (lpm)	13	14	15.1	16.5	18.1
		Pressure Drop (Bar)	0.34	0.34	0.34	0.34	0.34
		Outlet temperature °C	22.2	22.0	21.8	21.7	21.6
8	19.5	Flow (lpm)	17.5	18.9	20.5	22.3	24.5
		Pressure Drop (Bar)	0.34	0.34	0.34	0.34	0.34
		Outlet temperature °C	21.9	21.8	21.7	21.5	21.4
10	24.4	Flow (lpm)	22.2	23.9	25.9	28.3	31.2
		Pressure Drop (Bar)	0.34	0.34	0.34	0.34	0.39
		Outlet temperature °C	21.8	21.6	21.5	21.4	21.2
12	29.2	Flow (lpm)	26.9	29	31.5	34.6	38.4
		Pressure Drop (Bar)	0.34	0.34	0.4	0.47	0.58
		Outlet temperature °C	21.6	21.5	21.3	21.1	20.9
14	34.1	Flow (lpm)	31.7	34.4	37.5	41.3	46.2
		Pressure Drop (Bar)	0.4	0.47	0.55	0.67	0.82
		Outlet temperature °C	21.4	21.2	21.1	20.8	20.6

Table 220. Required building chilled water flow, pressure drop °C (2 of 2)

Nodes	Cooling capacity with two active WCUs	Required Chilled Water per WCU	Required Chilled Water per WCU					
			11	12	13	14	15	16
2	4.9	Flow (lpm)	6.2	7	8.1	9.6	11.5	14.4
		Pressure Drop (Bar)	0.34	0.34	0.34	0.34	0.34	0.34
		Outlet temperature °C	22.3	21.9	21.6	21.3	21.1	20.9
4	9.7	Flow (lpm)	13.2	14.8	16.9	19.7	23.6	29.5
		Pressure Drop (Bar)	0.34	0.34	0.34	0.34	0.34	0.35
		Outlet temperature °C	21.6	21.4	21.3	21.1	20.9	20.7
6	14.6	Flow (lpm)	20.1	22.6	25.9	30.3	36.8	47.8
		Pressure Drop (Bar)	0.34	0.34	0.34	0.37	0.53	0.88
		Outlet temperature °C	21.4	21.3	21.1	20.9	20.7	20.4
8	19.5	Flow (lpm)	27.3	30.8	35.5	42.2	53.1	77.8
		Pressure Drop (Bar)	0.34	0.38	0.5	0.69	1.08	2.23
		Outlet temperature °C	21.2	21.1	20.9	20.6	20.3	19.6
10	24.4	Flow (lpm)	34.9	39.8	46.5	57.1	78.5	
		Pressure Drop (Bar)	0.48	0.62	0.83	1.23	2.27	
		Outlet temperature °C	21.0	20.8	20.5	20.1	19.5	

Table 220. Required building chilled water flow, pressure drop °C (2 of 2) (continued)

Nodes	Cooling capacity with two active WCUs	Required Chilled Water per WCU	11	12	13	14	15	16
12	29.2	Flow (lpm)	43.3	50	60.1	79		
		Pressure Drop (Bar)	0.73	0.96	1.36	2.3		
		Outlet temperature °C	20.7	20.4	20.0	19.3		
14	34.1	Flow (lpm)	52.8	62.5	79.4			
		Pressure Drop (Bar)	1.06	1.47	2.32			
		Outlet temperature °C	20.3	19.8	19.2			

Table 221. Required building chilled water flow, pressure drop and outlet temperature (English units) °F (1 of 2)

Nodes	Cooling capacity with two active WCUs	Required Chilled Water per WCU	42.8	44.6	46.4	48.2	50.0	51.8
2	16.6	Flow (gpm)	1	1.1	1.2	1.3	1.5	1.6
		Pressure Drop (psid)	5	5	5	5	5	5
		Outlet temperature °F	77.1	75.9	74.8	73.8	72.9	72.1
4	33.3	Flow (gpm)	2.2	2.4	2.6	2.8	3.1	3.5
		Pressure Drop (psid)	5	5	5	5	5	5
		Outlet temperature °F	72.8	72.3	71.9	71.6	71.2	70.9
6	49.9	Flow (gpm)	3.4	3.7	4	4.4	4.8	5.3
		Pressure Drop (psid)	5	5	5	5	5	5
		Outlet temperature °F	71.9	71.6	71.3	71.1	70.8	70.5
8	66.6	Flow (gpm)	4.6	5	5.4	5.9	6.5	7.2
		Pressure Drop (psid)	5	5	5	5	5	5
		Outlet temperature °F	71.5	71.3	71.0	70.8	70.5	70.2
10	83.2	Flow (gpm)	5.9	6.3	6.8	7.5	8.2	9.2
		Pressure Drop (psid)	5	5	5	5	5.6	7
		Outlet temperature °F	71.2	71.0	70.7	70.4	70.2	69.8
12	99.9	Flow (gpm)	7.1	7.7	8.3	9.1	10.1	11.4
		Pressure Drop (psid)	5	5	5.7	6.9	8.4	10.5
		Outlet temperature °F	70.9	70.6	70.4	70.0	69.7	69.2
14	116.5	Flow (gpm)	8.4	9.1	9.9	10.9	12.2	14
		Pressure Drop (psid)	5.8	6.8	8	9.6	12	15.4
		Outlet temperature °F	70.6	70.2	69.9	69.5	69.1	68.5

Table 222. Required building chilled water flow, pressure drop and outlet temperature (English units) °F (2 of 2)

Nodes	Cooling capacity with two active WCUs	Required Chilled Water per WCU	53.6	55.4	57.2	59.0	60.8
2	16.6	Flow (gpm)	1.9	2.1	2.5	3	3.8
		Pressure Drop (psid)	5	5	5	5	5
		Outlet temperature °F	71.5	70.9	70.4	69.9	69.6
4	33.3	Flow (gpm)	3.9	4.5	5.2	6.2	7.8
		Pressure Drop (psid)	5	5	5	5	5.1
		Outlet temperature °F	70.6	70.3	70.0	69.7	69.3

Table 222. Required building chilled water flow, pressure drop and outlet temperature (English units) °F (2 of 2) (continued)

Nodes	Cooling capacity with two active WCU's	Required Chilled Water per WCU	53.6	55.4	57.2	59.0	60.8
6	49.9	Flow (gpm)	6	6.8	8	9.7	12.6
		Pressure Drop (psid)	5	5	5.3	7.7	12.8
		Outlet temperature °F	70.3	70.0	69.7	69.3	68.7
8	66.6	Flow (gpm)	8.1	9.4	11.2	14	20.5
		Pressure Drop (psid)	5.5	7.2	10.1	15.6	32.4
		Outlet temperature °F	69.9	69.6	69.1	68.5	67.3
10	83.2	Flow (gpm)	10.5	12.3	15.1	20.7	
		Pressure Drop (psid)	9	12.1	17.9	32.9	
		Outlet temperature °F	69.4	68.9	68.2	67.0	
12	99.9	Flow (gpm)	13.2	15.9	20.9		
		Pressure Drop (psid)	13.9	19.8	33.3		
		Outlet temperature °F	68.7	68.0	66.8		
14	116.5	Flow (gpm)	16.5	21			
		Pressure Drop (psid)	21.3	33.7			
		Outlet temperature °F	67.7	66.5			

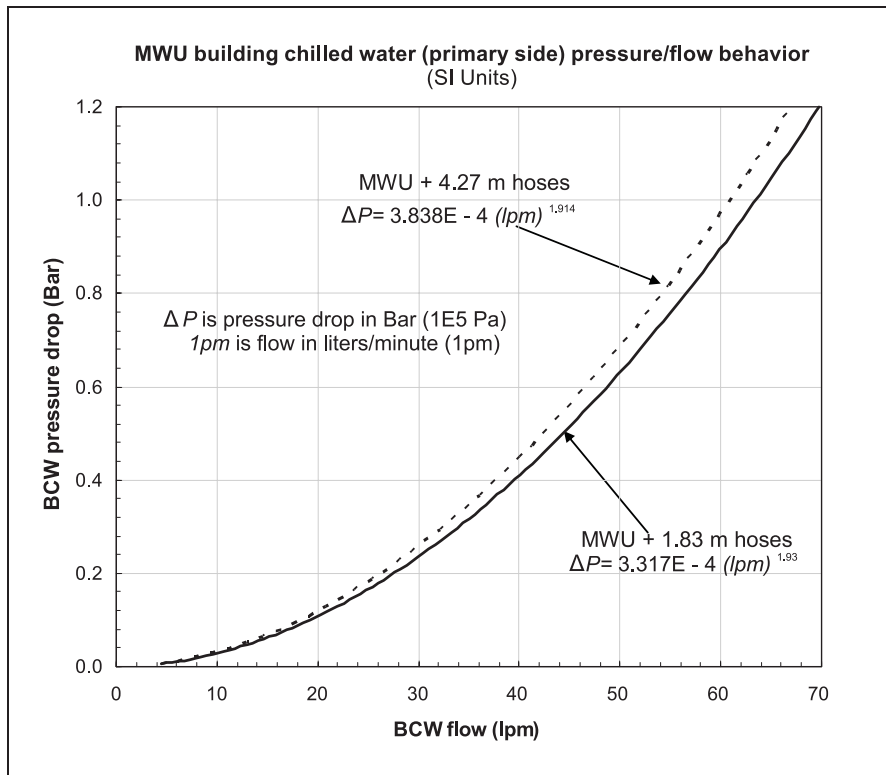


Figure 136. Pressure versus flow with a 427 cm (14 ft) hose – International System of Units (SI units)

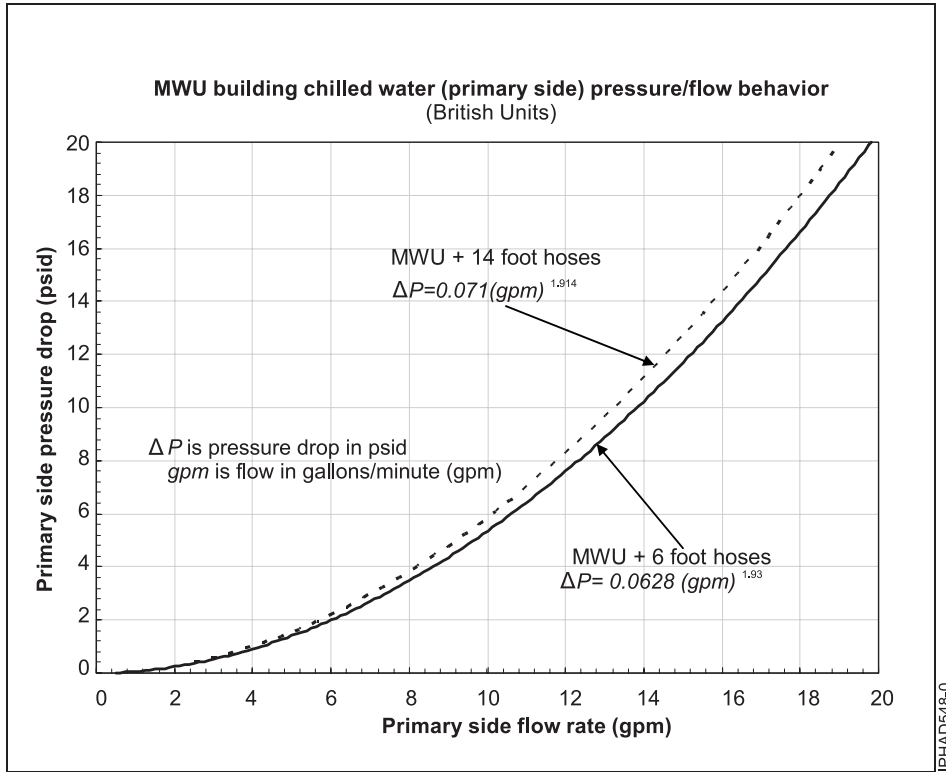


Figure 137. Pressure versus flow with a 427 cm (14 ft ) hose – English units

**Note:** Curves are with MWU inlet valve in the fully opened position. The customer pressure-versus-flow behavior of the system will not match this curve under normal operating conditions because the valve position adjusts to regulate the flow to maintain a fixed system-side water temperature.

### Principal of operation

- Two pairs of hoses and two WCU's are in parallel at the water cooling input of the model 9125-F2A. Normally both of the WCU's operate in parallel to cool the rack, with half of the water flow circulating through each of the water cooling units. The control valve in the WCU regulates the flow of water that goes through it in order to maintain the proper water temperature of the system-side water in the 9125-F2A. If the facility water temperature gets cooler, the valve opening will shrink. If the facility water temperature gets hotter, the valve will become more open. There must be enough pressure across the ends of the hoses to force the minimum required amount of water through the WCUs. This information is available in Determining minimum required system flow and pressure.
- The 9125-F2A has two pairs of hoses and two WCUs. This allows the system to continue to function even if one of the WCUs should experience some type of failure. If a WCU fails in a way that does not enable it to cool the load, the other WCU will pick up the entire rack load. In this case, the valve in the functioning WCU will open wider to increase the water flow through it to maintain system temperatures. In addition, water will likely be shut off to the rear door heat exchanger of the rack to shed the water cooling load, so the single WCU can cool the processors in the rack. This causes the heat that is exhausted to the room to rise. By removing the WCU from the front side, the faulty WCU can be replaced concurrently, without shutting the system down to restore the rack water cooling system to its fully redundant state. It is possible that a faulty WCU could have its input valve stuck in the full opened position. If this happens, the rack will require two times the amount of available water flow until the faulty WCU is repaired. The facility must be capable of providing this additional flow for this fault case. This information is available in Determining minimum required system flow and pressure.

- The system-side water is completely isolated from facility water by the water-to-water heat exchangers in the WCUs. Heat is transferred from the system-side water to the facility water by thermal conduction through the water-to-water heat exchangers. System-side water is maintained by IBM service personnel using special water treated with a corrosion inhibitor.
- Provided that the room dew point is within class 1 specification, condensation will not form on the system side of the water cooling system. This is because the system-side water is regulated above the temperature at which condensation occurs. Condensation will not form on the facility-side water-cooling system because the components, including the quick disconnects and hoses, are insulated. Protection against condensation at the point where the hoses connect to facility plumbing and condensation protection of the facility side plumbing itself is a customer responsibility.

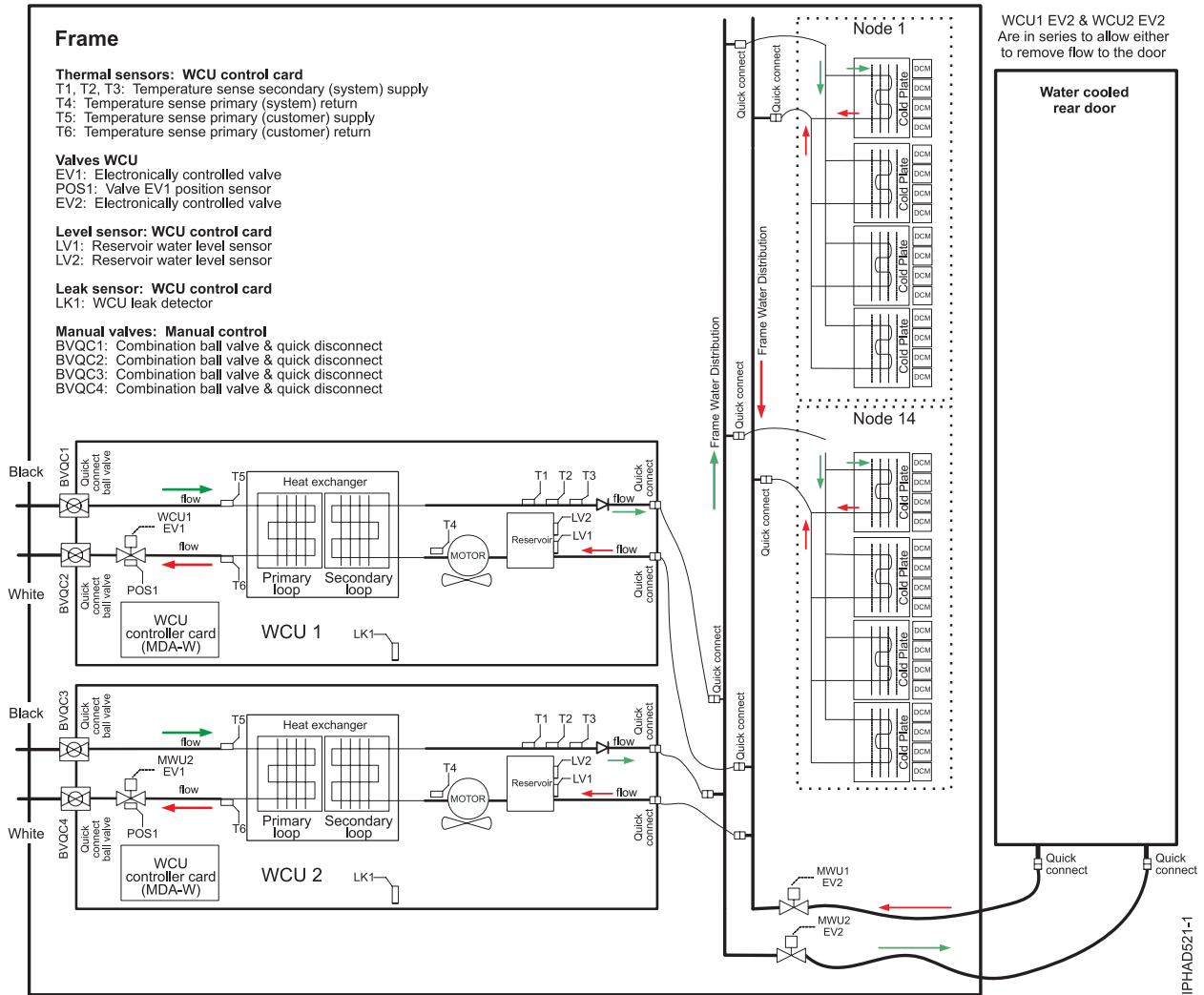


Figure 138. Simplified schematic of water cooling system

### Calculating building chilled water return temperature (SI units)

$$T^{\text{return}} (\text{°C}) = T^{\text{supply}} (\text{°C}) + 14.4 (Q^{\text{MWU}} (\text{kW}) / (\text{MWU BCW Flow (lpm)}))$$

Return water temperature can be calculated under normal operating conditions using the previous table, *Required Building Chilled Water Flow per MWU (lpm)*.



### Examples in SI units

$T_{\text{supply}}(^{\circ}\text{C}) = 10$ . That is, the facilities water is 10 °C.

Frame Heat Load(kw) = 34.1. The heat load to water in kilowatts of the system is 34.1 kW.

Frame BCW Flow(gpm) = 44.9. The flow of the facilities water is 44.9 liters per minute.

$$T^{\text{return}} = 10 + 14.4 (34.1/44.9) = 20.9 \text{ }^{\circ}\text{C}$$

### Calculating building chilled water return temperature (English units)

$$T^{\text{return}} (^{\circ}\text{F}) = T^{\text{supply}} (^{\circ}\text{F}) + 2.0 (Q^{\text{MWU}} (\text{kBTU/hr}) / (\text{MWU BCW Flow (gpm)}))$$

Return water temperature can be calculated under normal operating conditions using the *Required Building Chilled Water Flow per MWU (gpm)* table.

### Examples in English units

$T_{\text{supply}}(^{\circ}\text{F}) = 50$ . That is, the facilities water is 50 °F.

Frame Heat Load(kw) = 116.5 The heat load to water in Kilo British Thermal Units (kBTU) per hour of the system is 116.5 kBTU per hour.

Frame BCW Flow(gpm) = 11.9. The flow of the facilities water is 11.9 gallons per minute.

$$T^{\text{return}} = 50 + 2.0 (116.5/11.9) = 69.6 \text{ }^{\circ}\text{F}$$

### Facility water momentary flow interruption and out of specification temperature

The system is designed to tolerate a momentary interruption of facility water flow or temperature increase that might occur as a result of a failure in the facility water distribution system.

#### Momentary interruption of facility water flow

The system can tolerate complete loss of facilities water flow for 60 seconds. There is a high probability that nodes will be powered off by thermal protection circuits internal to the 9125-F2A if loss of flow exceeds this time.

#### Over-temperature of facility water

The system can tolerate a 14°C (26°F) temperature rise above the maximum facilities operating temperature at a given flow rate. It should be assumed that the system will be powered off by the thermal protection circuits internal to the 9125-F2A for facility water temperatures greater than this maximum temperature rise. Continuous operation in an over-temperature condition of 1 - 14°C (2 - 25°F) cannot be sustained, even though the system will run without powering down. When the maximum allowable facility water temperature of 16°C (60.8°F) is exceeded, or when the system-side water temperature cannot be regulated, an error is sent to the customer, and corrective action is required.

#### Under-temperature facility water

If facility water is below the minimum allowable temperature of 4.4 °C (40 °F) an error will be surfaced to the customer and corrective action will be required. The only problem that can result from under-temperature facility water is condensation on the facility side of the system. The temperature at which condensation might occur is dependant on the severity of the facility water under-temperature and the air temperature and humidity in the room.

## Facility water quality and fowling

In general the 9125-F2A requires standard building chilled water temperatures without any special requirements.

**Note:** The facility water flows only through the facility side of the water-to-water heat exchanges located in the bottom rear of the rack. Therefore, contaminated facility water cannot damage components within the rack other than the WCUs.

The quality of the facilities water is as follows.

- Total hardness must not exceed 200 mg/L as calcium carbonate.
- The pH must be 7 - 9.
- Turbidity must be less than 10 Nephelometric Turbidity Unit (NTU).
- Bacteria must be less than 1000 10 colony forming unit (CFU)/ml.
- Water should be as free of particulate matter as feasible.

**Note:** Facility water should be tested by qualified personnel to determine whether it meets these requirements.

## Deionized water with benzotriazole solution installation and maintenance

IBM is responsible for supplying and maintaining the internal frame secondary loop side water. This protects the system processor books and distribution plumbing from damage that could result from the use of contaminated water.

IBM supplies a water solution that is mixed with benzotriazole (BTA), a corrosion inhibitor, for the internal secondary cooling loop of the frame when it is installed and when any repairs are performed that require water to be added.

IBM uses certified suppliers for the water solution that satisfy all pertinent environmental control requirements.

## Deionized water with benzotriazole disposal

The customer must dispose of the water solution in accordance with applicable laws and regulations and product characteristics at the time of disposal.

## Internal frame water solutions

IBM will supply the system-side water.

## Water and benzotriazole solution

Benzotriazole (BTA) is mixed with the deionized (DI) water to a concentration of 1000 parts per million by weight.

## Deionized water

The deionized water used in IBM water cooling systems conforms to type II, grade A specifications in ASTM D1193-06 entitled, standard specifications for reagent water. Specifications are as follows:

- Electrical resistivity at 25 °C > 0.5 MΩ•cm
- Total organic carbon < 50 µg/L
- Sodium < 5 µg/L
- Chloride < 5 µg/L

- Total Silica < 3 µg/L
- Total organic carbon < 50 µg/L
- Heterotrophic bacteria count (HBC) less than 10 colony forming unit (cfu) / 1000 mL as measured per ASTM F1094 or IBM approved equivalent

## **Benzotriazole**

Benzotriazole (BTA) is purchased from Sigma-Aldrich or an alternative IBM approved supplier, and is defined as follows:

- Product Name: Benzotriazole, 99%
- Product Number: B11400
- Brand: Aldrich Chemical
- Substance Name: 1H-Benzotriazole
- Chemical abstracts service number: 95-14-7
- Formula: C<sup>6</sup>H<sup>5</sup>N<sup>3</sup>
- Molecular weight: 119.12

## **Connection of facility water to the system**

Two pairs of insulated 25.4 mm (1 in.) inside diameter (38.4 mm outside diameter / 1.51 in.) hoses, which are specified by IBM, connect facility water to the system. The hoses are available in 1.83 m (6 ft) and 4.27 m (14 ft) lengths, and can be purchased from IBM or purchased directly from the hose assembly manufacturer using a part number. The hoses must be attached to the facility water source, and the system ends must be properly positioned above the raised floor prior to the server arriving so that the rack can be rolled into positions, up to the hoses, without delay.

## **Installation of IBM system connection hoses in facility**

The following figure shows the four hoses (two supply hoses and two return hoses) connected to the building water manifolds under the raised floor with the ends that connect to the system properly positioned 188 mm (7.4 in.) above the floor.

The facility end of the provided hoses is a cut hose without a fitting. It is the customer's responsibility to determine the connection technique on this side.

It is suggested, but not required, that a shutoff valve be provided in front of the hose assembly as shown. This shutoff valve is not required for maintenance of the equipment, but can be useful if hose removal is ever desired by the customer.

The 1.83 m (6 ft) and 4.27 m (14 ft) hose length is the customer's responsibility and depends on the distance from the facility manifolds to the rack. The facility end of the hose can be cut to the desired length by the hose installer.

Route the hoses through the floor cutout as shown, being sure to avoid sharp edges of metal and to leave some slack in the hose. Cable management is required for signal cables that exit the rear of the rack and must be considered when routing the hoses. In the preceding figure the cable management tray is provided as part of the facility at the rear of the rack.

## **IBM hose assembly ordering information**

Four hoses (two supply and two return) and one hose positioning fixture is required for each rack that will be installed. The hose positioning fixture is removed after the hoses are connected to the system.

Ordered hose kits from IBM arrive with the system. However, it is recommended that you order the hose kits before the system, so that they can be attached to the facilities plumbing in advance. The hose kits must be ordered directly from the hose kit manufacturer.

## Hose assembly ordering information

Two supply hoses, two return hoses, and one hose positioning fixture are required for each rack to be installed.

**Note:** The hose positioning fixture is removed after the hoses are connected to the system.

In order for the hose kits to arrive before the system, the hose kits must be ordered from IBM by ordering the 9125-F2A Site Preparation/Install Support Model 9125-F2B. The 9125-F2A Site Preparation/Install Support Model (9125-F2B) enables the ability to place an order for the Coolant Supply/Return Hoses (#6876 or #6877) prior to delivery of the system. This allows the site chilled water plumbing to be completed ahead of the system arrival, so the hose kits can be attached to facilities plumbing in advance, reducing overall installation time. Order either of the following if hoses are required before the systems.

- 9125-F2B 6876 coolant supply and return hoses, 1.83 m (6 ft)
- 9125-F2B 6877 coolant supply and return hoses, 4.27 m (14 ft)

If it is not necessary to receive the hose kits prior to installation, then you can order the following hose kits:

- Feature code 6876 and part number 45D2215.
  - Two 1.83 m (6 ft) hose assembly (black supply) – P/N 45D0907
  - Two 1.83 m (6 ft) hose assembly (white return) – P/N 45D0908
  - One hose positioning fixture – P/N 45D2245
- Feature code 6877 and part number 45D2214.
  - Two 4.27 m (14 ft) hose assembly (black supply) – P/N 45D1952
  - Two 4.27 m (14 ft) hose assembly (white return) – P/N 45D1951
  - One hose positioning fixture – P/N 45D2245

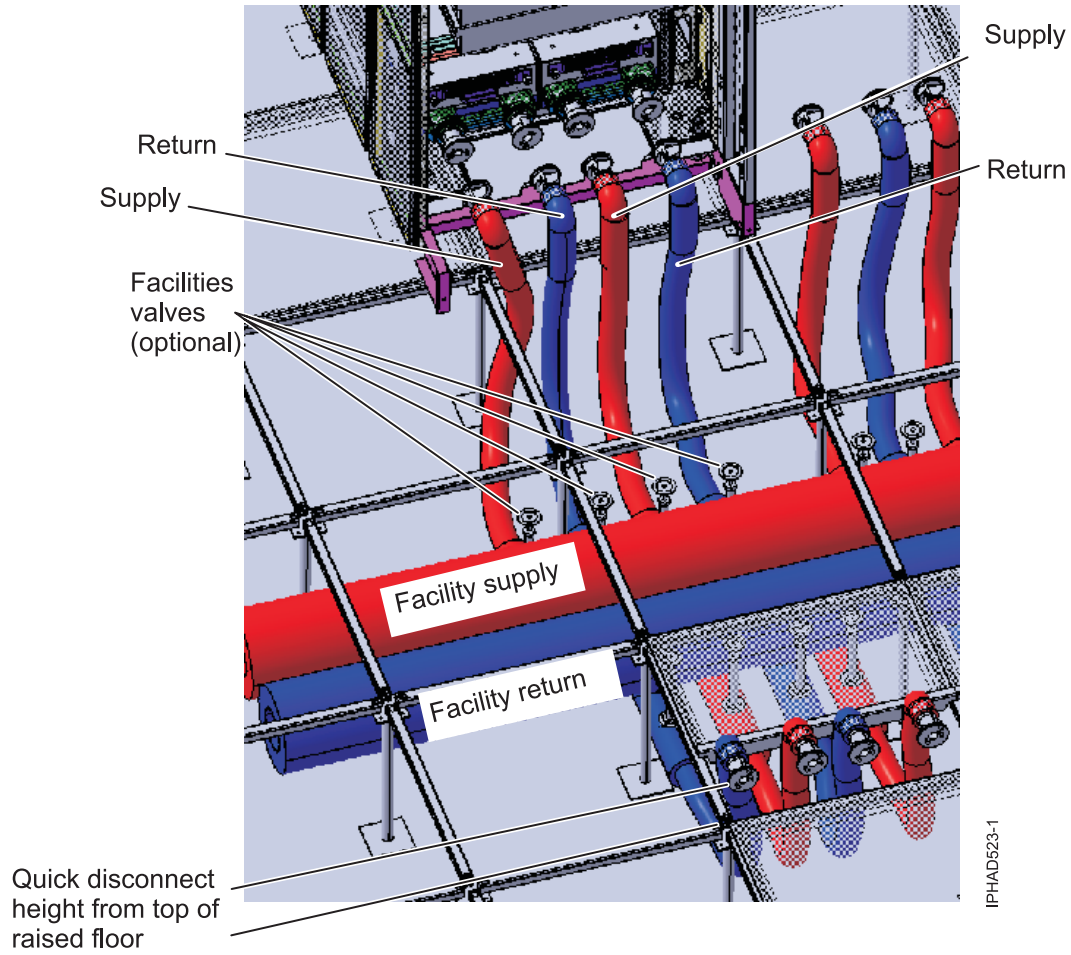


Figure 139. View of properly positioned facilities hoses

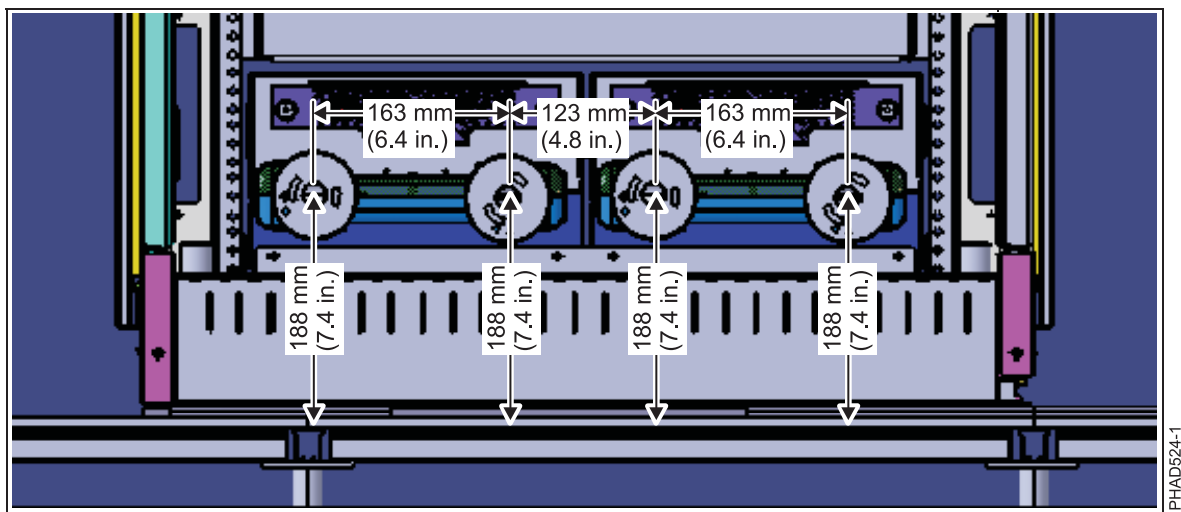


Figure 140. Facility water quick disconnects at rear base of frame

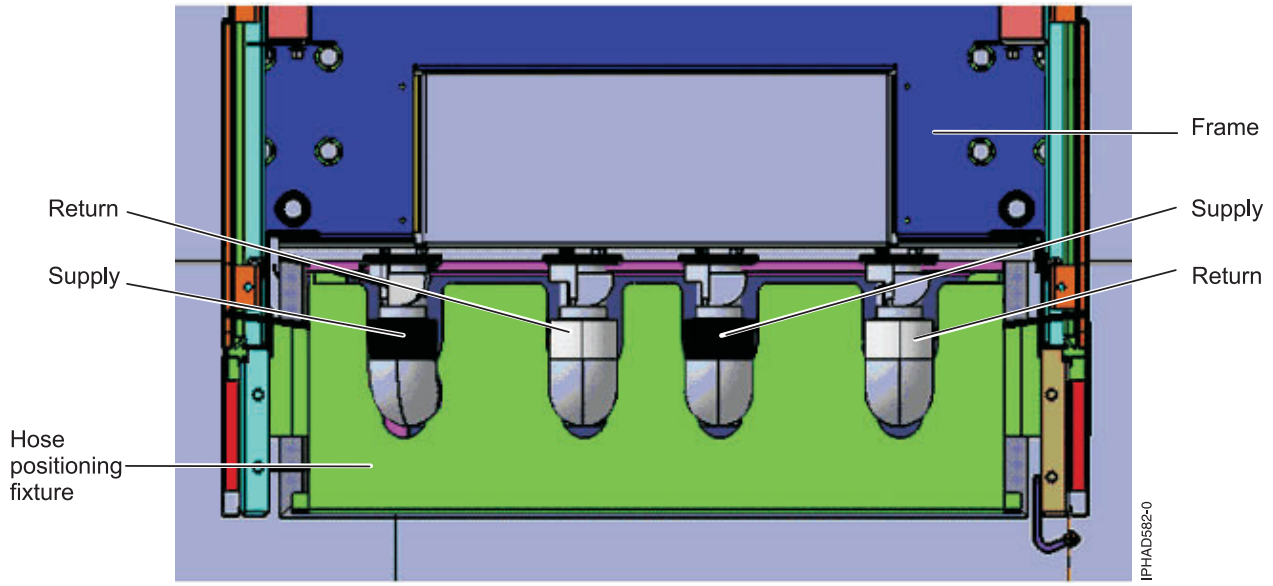


Figure 141. 9125-F2A water hook up locations

## Hose materials

Only IBM hoses can be used to connect to the IBM 9125-F2A server. This protects against leaks and condensation that can result from using insufficient hose assemblies and incompatible quick disconnect couplings.

The hose contains the following components:

- Gates terminator hose: 25.4 mm (1 in.) inner diameter (Gates part number 308504)
- Armacell and Armaflex Hose insulation: Armacell part number APT15838 919-304-3846
- Bentley Harris Expando flame retardant plus protective mesh covering (Bentley Harris part number BSBHFRP-175)
- Aeroquip System-side quick disconnect couplings (IBM part number 45D0909 or 45D0915)
- Aluminum-bronze elbow and stainless steel clamp

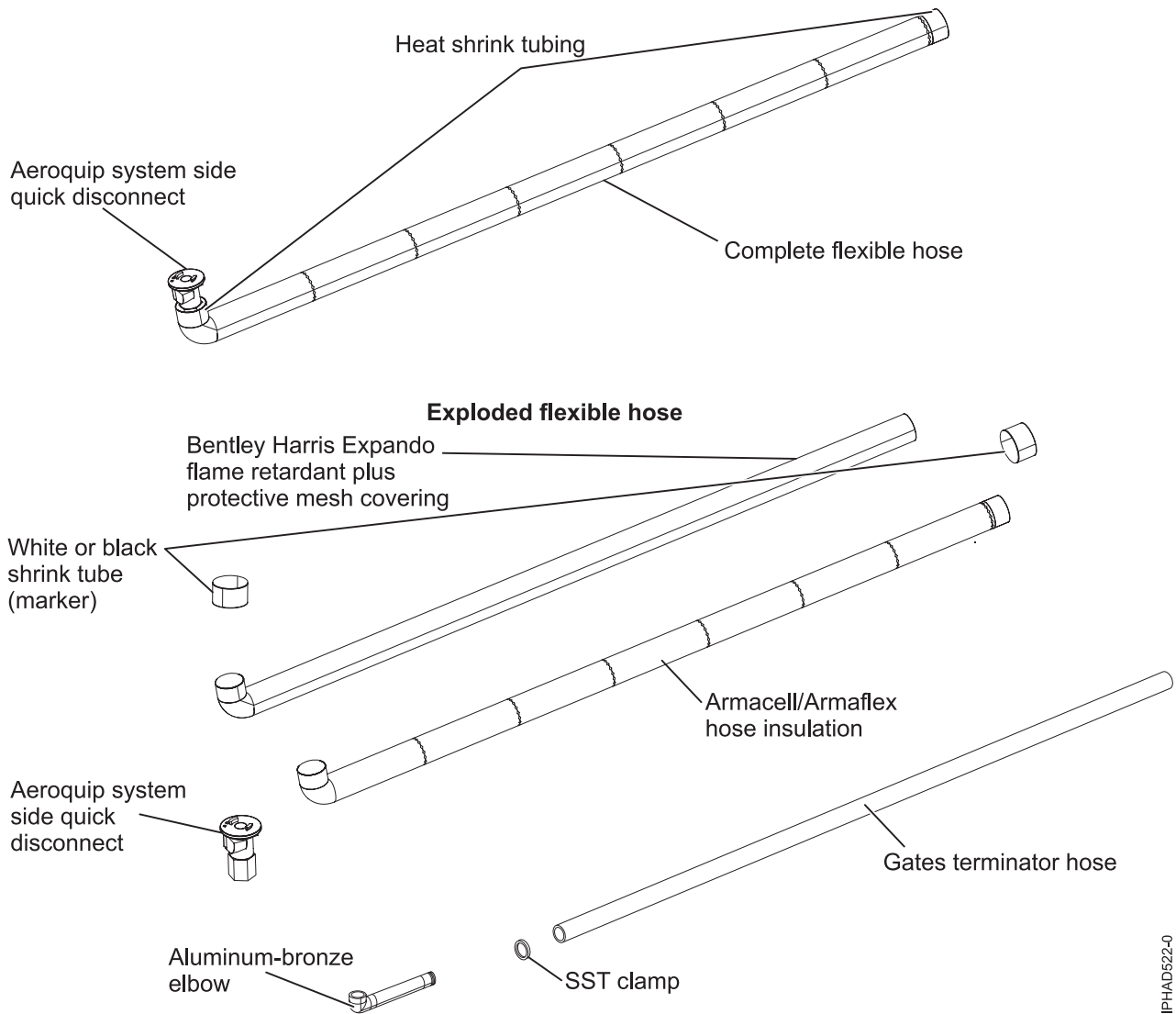
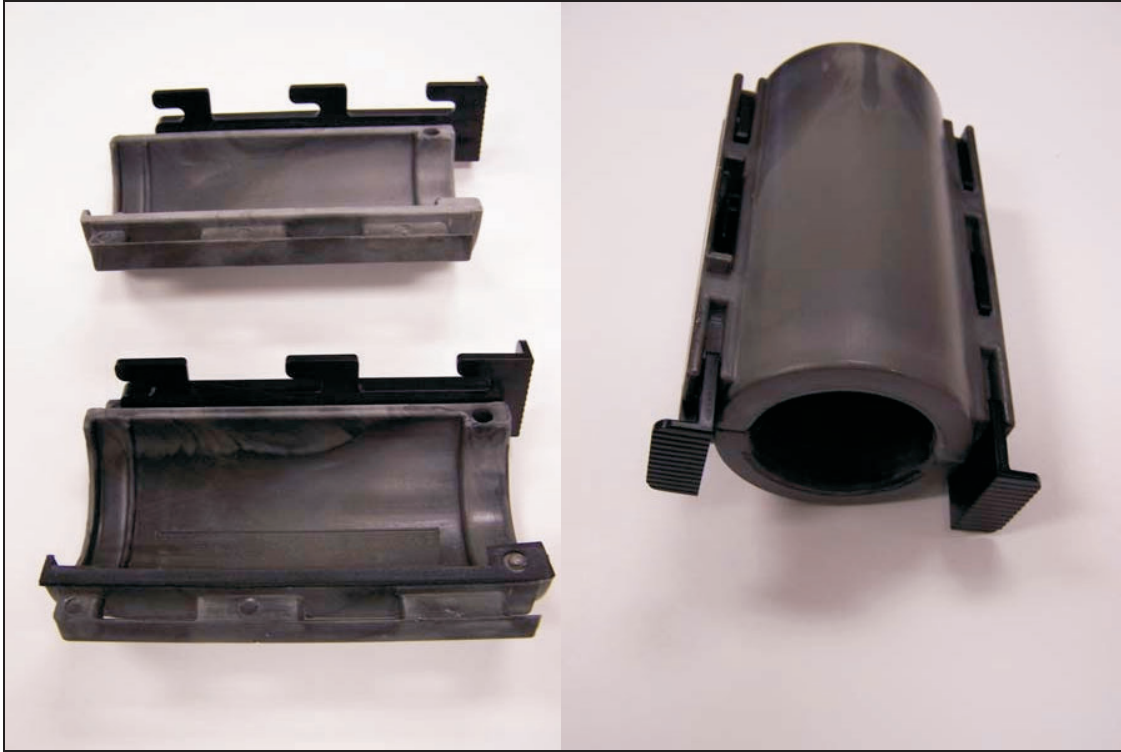


Figure 142. Facilities connection hose

### Quick disconnect couplings insulator information

The quick disconnect coupling insulators shown in the following figure, are shipped with the system.

IPHAD522-0



IPHAD526-0

Figure 143. Quick disconnect coupling insulator open and closed

The quick disconnect couplings insulators must be attached as shown in *Quick disconnect couplings without insulator (left)* and *with insulator (right)* or condensation might occur on the quick disconnect.



IPHAD526-1

Figure 144. Quick disconnect coupling without insulator (left) and with insulator (right)

### Purging air from facilities-side hoses

It is recommended that you purge the air from the facilities connection hoses when the contractor installs the hoses.

The hoses can contain a maximum of 0.51 liters per meter (0.041 gallons per foot) of air.



A hose purge operation is not done when the system is connected to the hoses because it is assumed that purging the hoses is completed by the hose installation contractor if it is thought to be necessary in the facility. The suggested procedure to purge air from the hoses during installation is as follows.

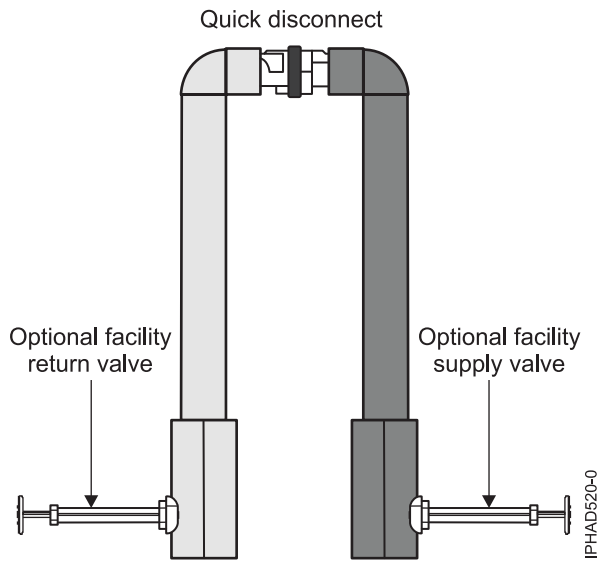


Figure 145. Purge drawing

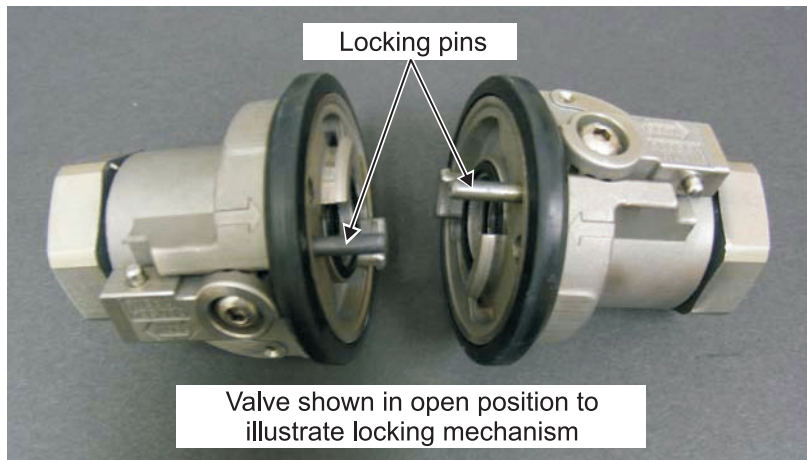


Figure 146. Facilities water quick disconnects (disengaged with both valves opened)

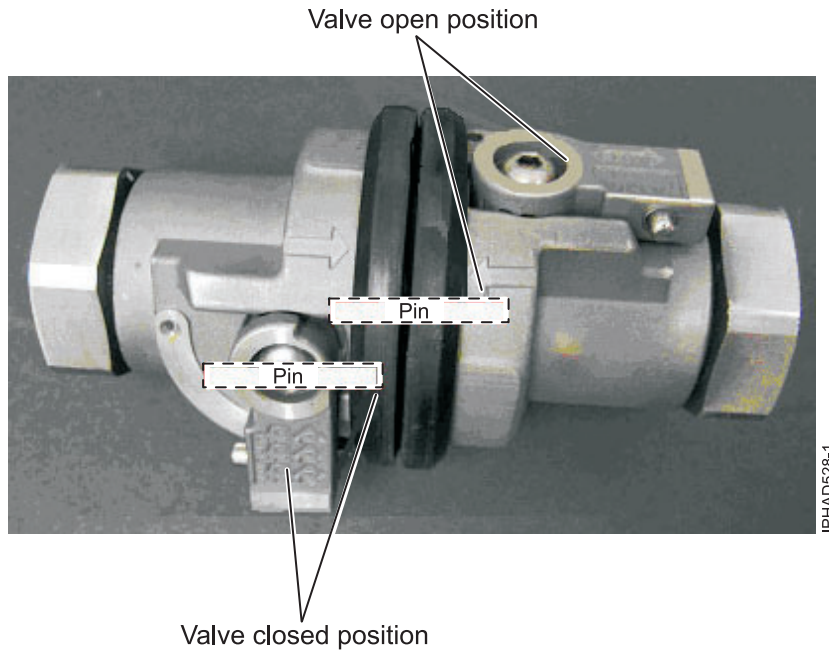


Figure 147. Facilities water quick disconnects (mated with one valve opened)

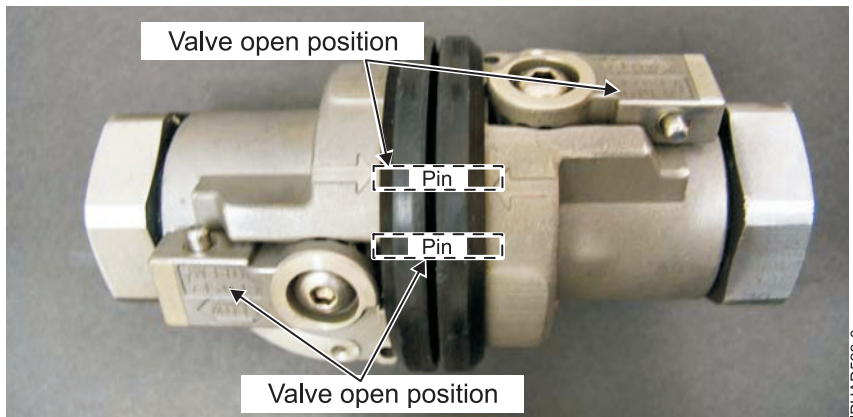


Figure 148. Facilities water quick disconnects (mated with both valves opened)

1. After final connection of the hoses to the facility supply and return is made, connect the supply quick disconnect coupling to the return quick disconnect coupling as shown in the preceding figure.
2. After the connectors are twisted together, open the valve handle on one of the two connectors to lock the quick disconnects together.
3. Slowly open the valve on the other connector, allowing the air trapped in the hoses to be moved slowly into the return side of the facility. Slowly removing the air prevents a large amount of air from entering the return all at once and allows the air to find its way to the facility's high point vent.
4. After purging is complete, disconnect the quick disconnects from one another and place them in their proper locations in the positioning fixture above the raised floor, in preparation for rack installation.

**Note:** Knowledge of how the water cooling system works is beneficial to the mechanical engineering firm, mechanical contracting firm, the plumbing firm, and the customer.

**Related concepts:**

“Air cooling requirements” on page 222

When planning an installation, the facility air cooling system must have enough capacity to cool two 9125-F2A frames with the rear door heat exchanger opened and the other 9125-F2A racks with the rear door heat exchanger closed.

## Moving the system to the installation site

Several factors must be considered before moving the system to the installation site.

### Frame shipping box and frame dimension

Prior to moving the system to the installation site, you should:

1. Determine the path that must be taken to move the system from the delivery location to the installation site.
2. Verify that the height of all doorways, elevators, and other areas are sufficient to allow moving the system to the installation site.
3. Verify that the weight limitations of elevators, ramps, floors, and floor tiles are sufficient to allow moving the system to the installation site.
4. If the height or weight of the system can cause a problem when the system is moved to the installation site, contact your local site planning or sales representative.

Racks are shipped in three packing crates. The packing crates can be moved with a lift truck. The dimensions of the first box are 1778 mm x 940 mm x 2299 mm (70 in. x 37 in. x 90.5 in.) (length, width, height). The frame is typically removed from the shipping crate at the loading dock. After the frame is removed from the packing crate, the frame measures 60 in. x 30.9 in. x 79.5 in. Due to the size and weight of each frame, a professional mover is required for moving the frames to their location on the data center floor. The dimensions of the second box are 84 in. x 42 in. x 41 in. including the pallet. The third box is the ship group packaging with dimensions of 40 in. x 48 in. x 39.5 in. including the pallet.

### Frame size and weight reduction options for tight locations

The width is 785 mm (30.9 in.) and can be reduced to 749 mm (29.5 in.) by removing the side covers on site.

The height is 2019 mm (79.5 in.) and can be reduced to 1549 mm (61 in.) by removing the bulk power assemblies and the top section of the frame. This frame can be ordered at a reduced height from the factory using feature code 7690, or the height reduction can be done in the field. The compact handling option adds a considerable amount of assembly work to the installation.

**Note:** Only order the compact handling option if it is absolutely necessary.

Components can be removed on site to accommodate low payload elevators or other situations. Bulk power regulators (BPR) and server processor books are the best components to remove to reduce frame weight. BPR weight is approximately 13.2 kg (29.1 lb). Maximum processor book weight is approximately 59.9 kg (132 lb).

### Front and rear door shipping box and installation

The front and rear doors are shipped in individual boxes separate from the frame. The frame should be moved to the final location on the data center floor and placed in the final position prior to attaching the front and rear doors. The doors can be removed from their packing boxes on the loading dock or on the data center floor. However, try to keep leaving the covers in their packaging until the time that they are ready to be attached to avoid damaging the covers.

## Planning the route from the receiving dock to the data center

The following should be considered when determining the route to the data center floor:

- Frame weight:
  - Floor loading
  - Floor material
  - Inclines
  - Elevator size and weight capability
- Frame dimensions:
  - Door width and height

## Phase imbalance and BPR configuration

Use the Phase imbalance and Bulk Power Regulators (BPR) configuration table to determine the phase imbalance of your server's configuration.

9125-F2A frames that are configured with eight or more processor books have fully balanced, three-phase power, while smaller configuration might or might not have balanced three-phase power. The proceeding table shows that three bulk power regulators (BPR) per power cord are balanced three-phase configuration, which means equal current is drawn from each of the three-phases of the power cord. However, line cords with a partial population of BPRs present an unbalanced three-phase load to the facility. This topic describes this imbalanced condition and shows how the facility level load can be balanced when multiple imbalanced racks are deployed in an installation.

Table 223. Balanced three-phase (200 - 240 V ac)

Drawers		Number of nodes													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	B PA-B LC 4	0	0	0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
	B PA-B LC 3	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
	B PA-A LC 2	0	0	0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
	B PA-A LC 1	1	2	3 <sup>1</sup>	3	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
1	B PA-B LC 4	0	0	0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
	B PA-B LC 3	1	2	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
	B PA-A LC 2	0	0	0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
	B PA-A LC 1	1	2	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
2	B PA-B LC 4		0	0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
	B PA-B LC 3		2	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
	B PA-A LC 2		0	0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
	B PA-A LC 1		2	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
3	BPA-B LC 4			0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>						
	B PA-B LC 3			3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>						
	B PA-A LC 2			0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>						
	B PA-A LC 1			3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>						

Table 223. Balanced three-phase (200 - 240 V ac) (continued)

Drawers		Number of nodes													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
4	BPA-B LC 4				1	2	2								
	BPA-B LC				3	3	3	3							
	BPA-A LC 2				1	2	2								
	BPA-A LC 1				3	3	3								

<sup>1</sup>Balanced three-phase configurations.

Table 224. Balanced three-phase (380 - 480 V ac)

Drawers		Number of nodes													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	B PA-B LC 2	0	0	0 <sup>1</sup>	0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
	B PA-B LC 1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
	B PA-A LC 2	0	0	0 <sup>1</sup>	0 <sup>1</sup>	1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
	B PA-A LC 1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>
1	B PA-B LC 2	0	0	0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
	B PA-B LC 1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
	B PA-A LC 2	0	0	0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
	B PA-A LC 1	1	2	3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>		
2	B PA-B LC 2		0	0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
	B PA-B LC 1		2	3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
	B PA-A LC 2		0	0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
	B PA-A LC 1		2	3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>	3 <sup>1</sup>	3 <sup>1</sup>				
3	BPA-B LC 2			0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>						
	B PA-B LC 1			3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>						
	B PA-A LC 2			0 <sup>1</sup>	0 <sup>1</sup>	1	2	2	3 <sup>1</sup>						
	B PA-A LC 1			3 <sup>1</sup>	3 <sup>1</sup>	3	3	3	3 <sup>1</sup>						
4	BPA-B LC 2				1	1	2								
	BPA-B LC 1				3	3	3								
	BPA-A LC 2				1	1	2								
	BPA-A LC 1				3	3	3								

<sup>1</sup>Balanced three-phase configurations.

## Balancing power panel loads

Use these methods to ensure that power panel loads are balanced.

There are one to three bulk power regulators (BPRs) for each of the four power cords. Power cords 1 and 2 always have the same configuration of BPRs, and the same is true for power cords 3 and 4. Three-phase balance behavior is as follows for each power cord:

- When three BPRs per power cord are populated, the load for that power cord is balanced three-phase.

- When two BPRs per power cord are populated, two of the three-phases draw an equal amount of current and are nominally 57.8% of the current on the third phase.
- When one BPR per power cord is populated, two of three-phases carry an equal amount of current with no current drawn on the third phase.

**Note:** Ground fault interrupt (GFI) circuit breakers are not recommended for this system because GFI circuit breakers are earth leakage current sensing circuit breakers and this system is a high earth leakage current product.

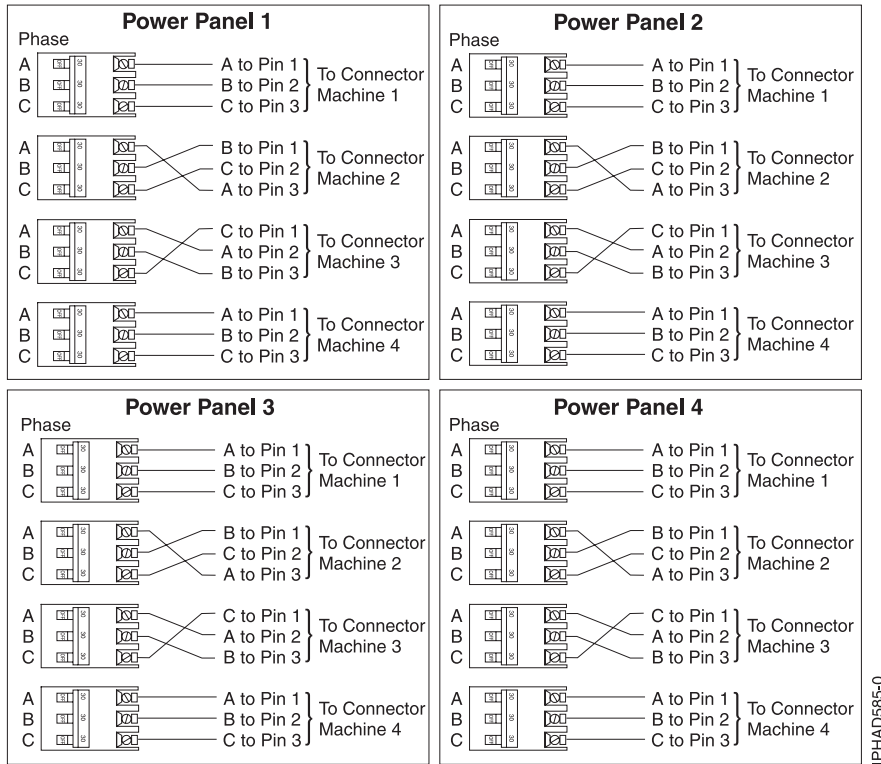
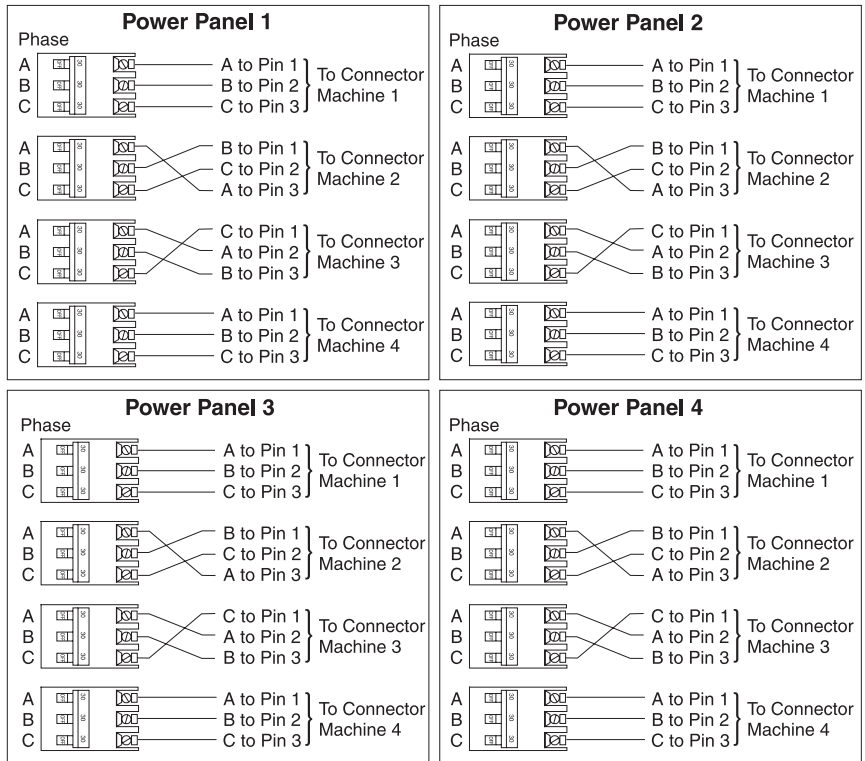


Figure 149. Power-panel load balancing

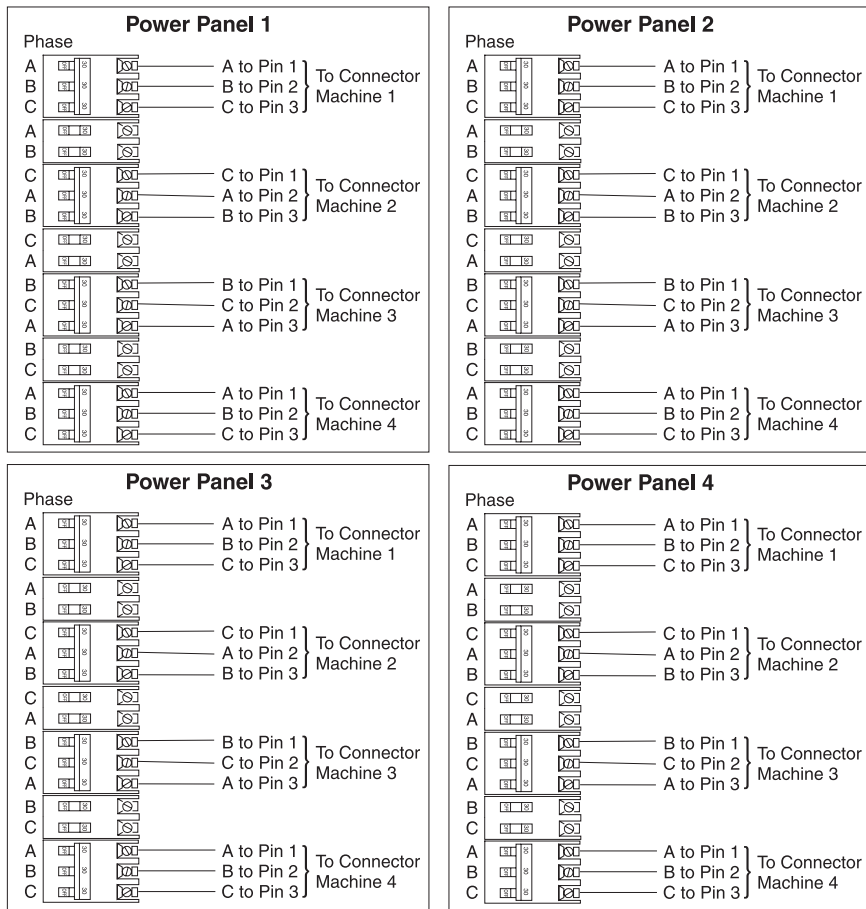
The method illustrated in the preceding figure requires that the connection from the three poles of each breaker to the three-phase pins of a connector be varied. Some electricians might prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three-pole breakers are alternated with single-pole breakers, so that the three-pole breakers do not all begin on Phase A.



IPHAD586-0

Figure 150. Power-panel load balancing

The following figure shows another way of distributing the unbalanced load evenly. In this case, the three-pole breakers are alternated with two-pole breakers.



IPHAD887-0

Figure 151. Power-panel load balancing

## Facility electrical equipment requirements

Follow these requirements and techniques on the 9125-F2A.

The recommended technique to power the 9125-F2A is to run four separately protected three-phase power feeds to a location under the frame, and connect a feed to each of the four frame power cords. If the IEC-60309 plug-equipped power cords are selected, the power cords will be plugged into mating receptacles. For World Trade countries, an unterminated power cord might be selected. If the unterminated power cords are selected, you have the option of installing an appropriately rated plug of his choice and plugging it to the mating receptacle, or hard wiring the power cord into his facility.

Care should be taken to choose the correct power cord length. The 1.83 m (6 ft) and 4.27 m (14 ft) lengths are measured from the exit location at the base of the frame. Some localities might limit the length of power cords to a maximum of 6 ft. The unterminated power cords are available in 4.27 m (14 ft) lengths only, but they can be cut to any desired length when they are terminated at the facility. See *Floor Cutout View of 2 Racks* for a pictorial showing and example of power power cord routing.

The rating of the circuit breaker protecting each power cord should be equal to the power cord rating, for example, 60 A or 100 A. Note that this facility circuit breaker protects only the facility wiring, the full gauge system power cord, and a small amount of full gauge wiring in the primary power compartments of the frame. High speed fusing is incorporated in the front end of each bulk regulator in the frame, and is intended to provide protection in the event of failures within the bulk power regulators. It is suggested that slow trip circuit breakers be used to protect the power cords so that the fuses in the bulk power



regulators open first in the event of a BPR short circuit fault. This circuit breaker coordination can ease troubleshooting and hasten the repair process if such a fault occurs.

Use of ground fault interrupt (GFI) circuit breakers is not recommended for this system because GFI circuit breakers are earth leakage current sensing circuit breakers and this system is a high earth leakage current product.

## **Coordinating line cord over current protection with internal 9125-F2A protection**

Use this information provided to understand the power cord draw.

The maximum phase current a power cord can draw is 90 A RMS, which is limited by electronic circuitry internal to the 9125-F2A. Short circuit fault protection is provided in the extreme front-end of the 9125-F2A Bulk Power Regulators (BPR) by internal fuses. The electronic current limiting circuitry in each BPR protects the fuses from opening under all conditions, including severe line voltage transients and disturbances. If a short circuit fault should occur in a BPR the objective is for the BPR fuse is to clear without tripping your circuit breaker on the associated power cord. In order to achieve this circuit protection coordination, the facility protection must have a slower trip curve than the BPR fusing, whose characteristics are shown by the following curve in the figure.

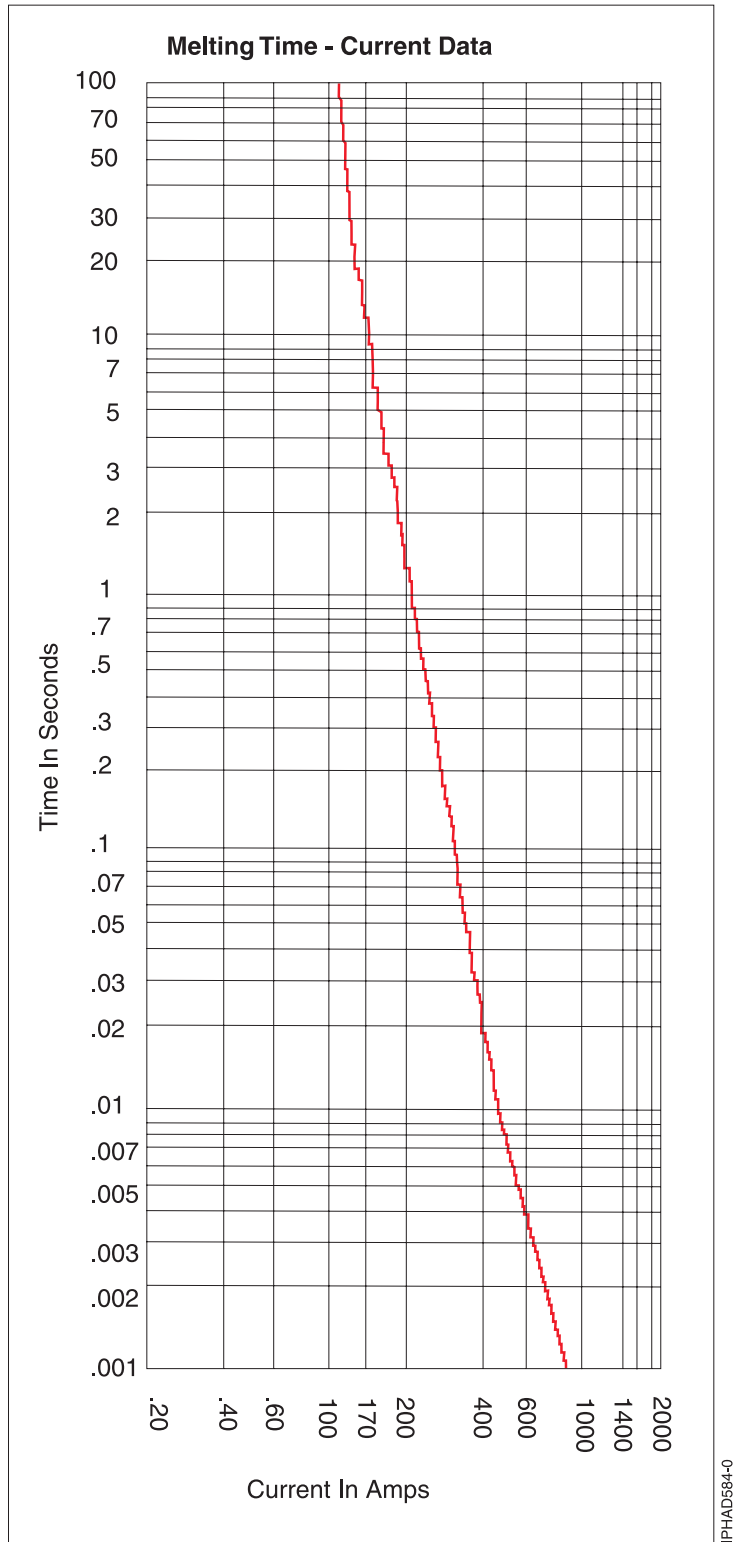


Figure 152. Melting time/ fuse opening time

## Approximate system weights by configuration

Use the tables to calculate the approximate weight of your system based on its configuration.

Table 225. Maximum system weight as installed (lb) with water

I/O drawers	Number of nodes													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	1355	1566	1796	1953	2164	2312	2532	2742	2900	3075	3232	3389	3546	3703
1	1517	1728	1958	2115	2326	2474	2694	2904	3062	3237	3394	3551		
2		1890	2120	2277	2488	2636	2856	3066	3224	3399				
3			2282	2439	2650	2798	3018	3228						
4				2601	2812	2960								

Table 226. Maximum system weight as installed (kg) with water

I/O drawers	Number of nodes													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	615	710	815	886	982	1049	1148	1244	1315	1395	1466	1537	1608	1680
1	688	784	888	959	1055	1122	1222	1317	1389	1468	1539	1611		
2		857	962	1033	1129	1196	1295	1391	1462	1542				
3			1035	1106	1202	1269	1369	1464						
4				1180	1276	1343								

## Floor construction and floor loading

Calculate the floor loads for your server with the proceeding formulas. A floor loading assessment is the evaluation of the concrete sub floor and the raised floor. The weight of the raised floor is considered in the floor loading formula.

The building floor must support the weight of the equipment to be installed. The following pounds-per-square-foot (lb/ft<sup>2</sup>) and kilogram-per-square meter (kg/m<sup>2</sup>) formulas are used to calculate floor loading. For assistance with floor load evaluation, contact a structural engineer that satisfies your local requirements.

$$\frac{\text{Frame Weight [kg]}}{\text{Frame Area} + (\text{Service Area}/2) [\text{m}^2]} + \frac{((75[\text{kg}]/\text{m}^2) \times \text{Service Area}[\text{m}^2])}{\text{Frame Area} + (\text{Service Area}/2)[\text{m}^2]} + (50 [\text{kg}]/\text{m}^2)$$

$$\frac{\text{Frame Weight [lb]}}{\text{Frame Area} + (\text{Service Area}/2) [\text{ft}^2]} + \frac{((15 [\text{lb}]/\text{ft}^2) \times (\text{Service Area}[\text{ft}^2]/1))}{\text{Frame Area} + (\text{Service Area}/2)[\text{ft}^2]} + (10[\text{lb}]/\text{ft}^2)$$

- Frame area equal 1.20 m<sup>2</sup> (12.9 ft<sup>2</sup>)
- Minimum service area equal 1.9 m<sup>2</sup> (20.6 ft<sup>2</sup>)

**Note:** Limited to 1.52 m (60 in.) maximum from frame

- Maximum frame weight equal 1680 kg (3704 lb)

## Floor loading formula notes

When the service clearance area is also used to distribute machine weight (weight distribution/service clearance), 75 kg/m<sup>2</sup> (15lb/ft<sup>2</sup>) is considered for personnel and equipment traffic. The distribution weight is applied over 0.5 of the service clearance up to a maximum of 760 mm (30 in.) as measured from the machine frame.

$$75 \text{ kg}/[\text{m}^2] \times \text{Service Area} [\text{m}^2]/1$$

$$15 \text{ lb}/[\text{ft}^2] \times \text{Service Area} [\text{ft}^2]/1$$

The raised-floor weight plus the cable weight adds 50 kg/m<sup>2</sup> (10 lb/ft<sup>2</sup>) uniformly across the total area used in calculations. (The total area is defined as: machine area + 0.5 service clearance.)

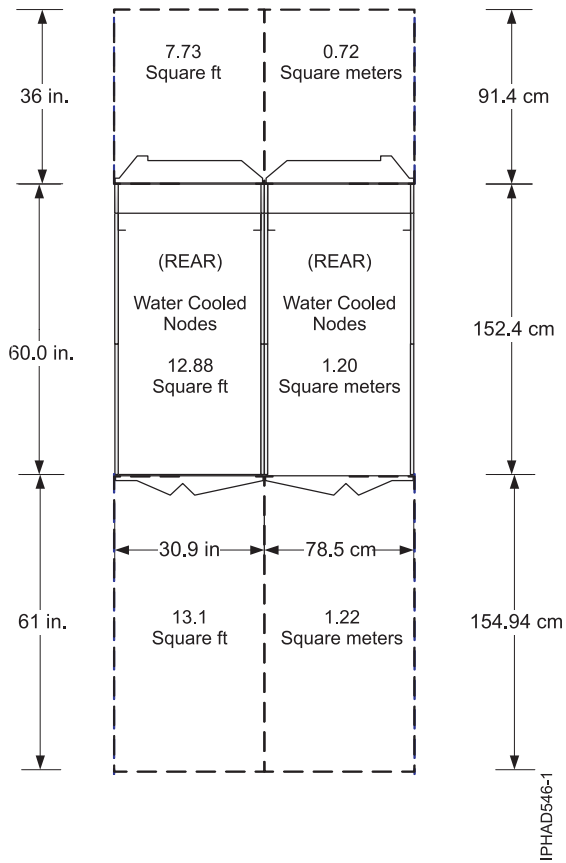


Figure 153. Example of a minimum service clearance area

## Unit emergency power off

The server has a unit emergency power off (EPO) switch on the front of the frame. When the switch is reset, the utility power is confined to the system power compartment, and all volatile data is lost.

Refer to the following figure, which shows a simplified unit EPO panel.

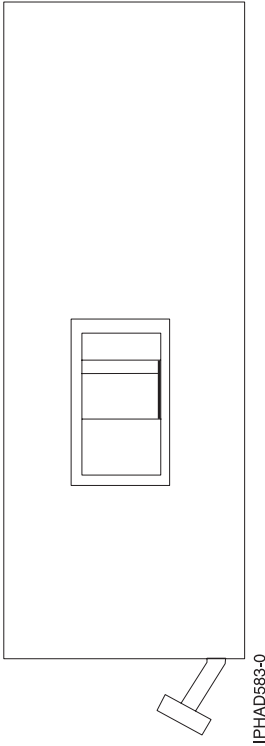


Figure 154. Unit emergency power off

It is possible to attach the computer room emergency power off (EPO) system to the unit EPO. When this is done, resetting the computer room EPO disconnects all power from the power cords and the internal battery backup unit, if it is provided. All volatile data will be lost in this case also.

If the room EPO is not connected to the unit EPO, resetting the computer room unit EPO removes alternating current power from the system. If the interlock bypass feature is used, the system remains powered for a short time based on system configuration.

## Computer room emergency power off

You can incorporate the integrated battery backup into a computer room emergency power off (EPO) system. Otherwise, volatile data can be lost.

When the integrated battery backup is installed and the computer room EPO is reset, the batteries engage and the computer continues to run. It is possible to attach the computer room EPO circuit to the unit EPO. When this is done, resetting the computer room EPO disconnects all power from the power cords and from the internal battery backup unit. In this event, all volatile data will be lost.

To incorporate the integrated battery backup into the computer room EPO circuit, a cable must connect to the back of the unit EPO panel.

This figure illustrates the back of the unit EPO panel with the computer room EPO cable plugging into the system. Notice the switch actuator. After it is moved to make the cable connection possible, the computer room EPO cable must be installed for the system to power on.

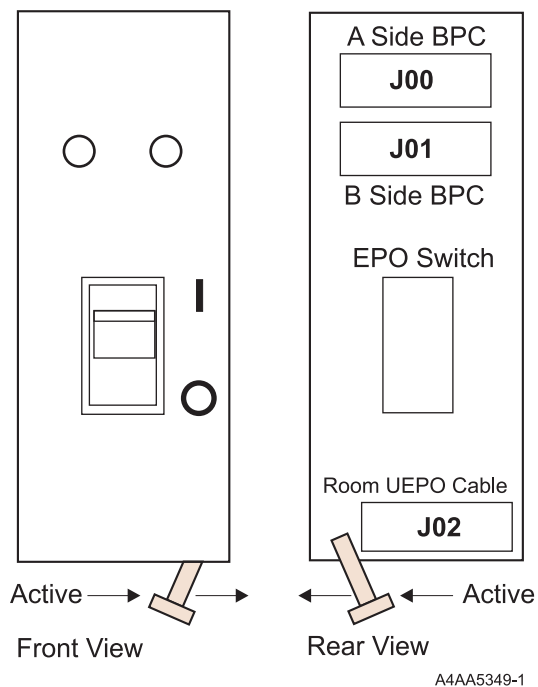
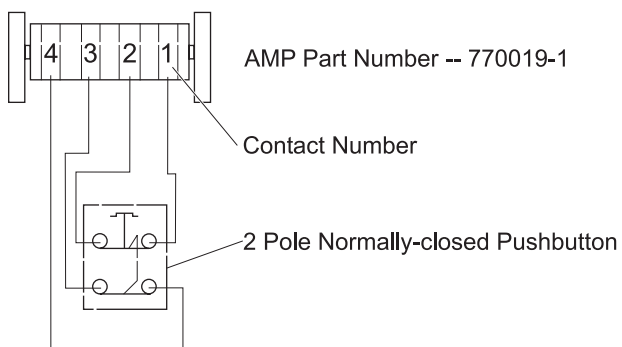


Figure 155. Computer room emergency power off

In the following figure, AMP connector 770019-1 is needed to connect to the unit EPO panel. For computer room EPO cables using wire sizes #20 - #24 AWG, use AMP pins (part number 770010-4). This connection should not exceed 5 Ohms, which is approximately 61 m (200 ft) of #24 AWG.



Room UEPO Switch Schematic

Figure 156. AMP connector

## Model 9406-250 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

Pictured is model 9406-250 server. The model 9406-250 allows the 7102 expansion unit to be attached to one side.



Table 227. Dimensions

Measurements	Width	Width with 7101 or 7102	Depth	Height
Metric	340 mm	550 mm	662 mm	610 mm
English	13.4 in.	21.7 in.	26.1 in.	24.0 in.

Table 228. Maximum configuration weight

Without 7101 or 7102	With 7101 or 7102
38.6 kg (85 lb)	70.5 kg (155 lb)

Table 229. Electrical

Electrical characteristics	Without 7101 or 7102	With 7101 or 7102
kVA (maximum)	0.469	0.815
Rated voltage and frequency <sup>1</sup>	100 - 127 200 - 240 V ac at 50/60 plus or minus 0.5 Hz	
Thermal output (maximum)	1536 Btu/hr	2669 Btu/hr
Power requirements (IP measurement) maximum	450	782
<sup>1</sup> The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.		

Table 230. Electrical

Electrical characteristics	Properties
Power factor	0.95
Inrush current	45 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 231. Temperature requirements

Operating	Nonoperating
10 - 37.8°C (50 - 100°F)	1 - 60°C (33.8 - 140°F)

Table 232. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4 - °F)	27°C (80.6 - °F)
Maximum altitude	3048 m (10 000 ft)	

Table 233. Noise emissions Model 9406-250

	Operating	Idle
L <sub>WAd</sub> (Category 2E, General business)	5.7 bels	5.6 bels
L <sub>pAm</sub> (1-meter bystander)	40 dB	38 dB
For a description of noise emission values, see <i>Acoustics</i> .		

Table 234. Noise emissions Model 9406-250 with 7101 or 7102<sup>1</sup>

	Operating	Idle
L <sub>WAd</sub> (Category 2E, General business)	6.3 bels	6.2 bels
L <sub>pAm</sub> (1-meter bystander)	45 dB	44 dB
For a description of noise emission values, see <i>Acoustics</i> .		

Table 235. Service clearances

Front	Back	Sides	Top
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

**Related information:**

 Acoustics

## Model 9406-270 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server. The 7104 expansion unit requires a power cord. Dimensions are shown for model 9406-270 only.

Pictured is model 9406-270. The 7104 expansion unit is available with model 9406-270.





Table 236. Dimensions

Measurements	9406-270 width	9406-270 with 7104 width	9406-270 depth	9406-270 height
Metric	366 mm	552 mm	728 mm	610 mm
English	14.5 in.	21.9 in.	28.7 in.	24.0 in.

Table 237. Maximum configuration weight

Model 9406-270	Model 9406-270 with 7104
52.7 kg (116 lb)	79.5 kg (175 lb)

Table 238. Electrical Model 9406-270

Power factor	0.95		
Inrush current	41 A	Maximum kVA (each has its own power cord)	0.421
Leakage current (maximum)	3.5 mA	Rated voltage and frequency <sup>3</sup>	100-127/200-240 V ac at 50-60 plus or minus 0.5 Hz
Phase	1	Thermal output (maximum)	1365 Btu/hr

Table 239. Electrical 7104 expansion unit

Power factor	0.95		
Inrush current	41 A	Maximum kVA (each has its own power cord)	0.368
Leakage current (maximum)	3.5 mA	Rated voltage and frequency <sup>3</sup>	100-127/200-240 V ac at 50-60 plus or minus 0.5 Hz
Phase	1	Thermal output (maximum)	1194 Btu/hr

Table 240. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 241. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4 - °F)	27°C (80.6 - °F)
Maximum altitude	3048 m (10 000 ft)	

Table 242. Noise emissions<sup>1</sup>

	Operating	Idle
L <sub>WAd</sub> (Category 2E, General business) 9406-270 only	5.9 bels	5.8 bels
L <sub>WAd</sub> (Category 2E, General business) 9406-270 with 7104	6.3 bels	6.1 bels
L <sub>pAm</sub> (1-meter bystander) 9406-270 only	41 dB	40 dB
L <sub>pAm</sub> (1-meter bystander) 9406-270 with 7104	45 dB	43 dB

Table 243. Service clearances

Measurements	Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 244. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Side and top clearances are optional when operating.</li> <li>3. The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li> </ol>
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**Related information:**

 Acoustics

## Model 9406-520, 9111-520, 9405-520, 9111-285, 9131-52A, 9406-525, and 9407-515 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

Table 245. Dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	EIA units <sup>1</sup>	Weight
Metric	437 mm	584 mm	178 mm	4	43 kg
English	17.20 in.	23 in.	7 in.		95 lb

Table 246. Dimensions - Stand-alone model

Measurements	Width	Depth	Weight
Metric	201 mm	630 mm (without rear cover) 706 mm (with 6587 rear cover)	43 kg
English	7.9 in.	23 in. (without rear cover) 27.8 in. (with 6587 rear cover)	95 lb

Table 247. Shipping dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	Weight
Metric	630 mm	933 mm	584 mm	53 kg
English	24.80 in.	36.75 in.	23 in.	117 lb

Table 248. Shipping dimensions - Rack-mounted drawer (China)

Measurements	Width	Depth	Height	Weight
Metric	679 mm	978 mm	610 mm	53 kg
English	26.75 in.	38.50 in.	24 in.	117 lb

Table 249. Shipping dimensions - Stand-alone model

Measurements	Width	Depth	Height	Weight
Metric	584 mm	880 mm	813 mm	50 kg
English	23 in.	34.65 in.	32 in.	110 lb

Table 250. Shipping dimensions - Stand-alone model (China)

Measurements	Width	Depth	Height	Weight
Metric	616 mm	904 mm	832 mm	63 kg
English	24.25 in.	35.60 in.	32.75 in.	138 lb

Table 251. Electrical

Electrical characteristics	Properties
kVA (maximum)	0.789
Rated voltage and frequency <sup>6</sup>	100 - 127/200 - 240 V ac at 50/60 plus or minus 0.5 Hz
Thermal output (maximum)	2560 Btu/hr
Maximum power consumption	750 W
Power factor	0.95
Inrush current (maximum)	88 A
Leakage current (maximum)	1.2 mA
Phase	1
Dual power feature code	5159
Branch circuit breaker	20 A (maximum)

Table 252. Environment requirements

Environment	Temperature	
Recommended operating temperature <sup>2</sup>	5 - 35°C (41 - 95°F)	
Nonoperating temperature	5 - 45°C (41 - 113°F)	
Shipping temperature	-40 - 60°C (-40 - 140°F)	
	Operating <sup>4</sup>	Nonoperating
Maximum dew point	28°C (82.4°F)	29°C (84.2°F)
Noncondensing humidity	8 - 80%	8 - 80%
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

Table 253. Noise emissions<sup>3, 8, 9</sup>

Product description	Declared A-weighted sound power level, L <sub>wad</sub> (B)		Declared A-weighted sound pressure level, L <sub>pAm</sub> (dB)	
	Operating	Idle	Operating	Idle
9111-285 workstation	5.0	5.0	35	32
9131-52A, 9406-520, 9111-520, and 9405-520 stand-alone model with two power supplies, eight hard drives and acoustic package	5.7	5.6	40	39
9131-52A, 9406-520, 9111-520, and 9405-520 stand-alone model with two power supplies and eight hard drives	6.1	5.9	44	41
9406-520 and 9111-520 rack-mounted server	6.0	5.8	43	42

Table 254. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000-94, Notice 2000-72); People's Republic of China Commodity Inspection Law

**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950-00; EN 60950; IEC 60950 including all National Differences

Table 255. Notes

<p><b>Note:</b></p> <ol style="list-style-type: none"><li>1. See 0551, 0553, 7014, and 0555 rack configurations for typical configurations when the 0551, 0553, 7014, and 0555 rack is populated with various server models.</li><li>2. Class 3 product as defined in ASHRAE Thermal Guidelines for Data Processing Environments. The allowable operating range is 5 - 35°C (41 - 95°F). See the <i>Temperature and humidity design criteria</i> topic.</li><li>3. For a description of noise emission values, see <i>Acoustics</i>.</li><li>4. All Model 520 disk bays should be filled when the unit is shipped from IBM with either disk drives or slot fillers, but if a disk is removed, refill the disk slot with either another disk drive or a disk slot filler. Filling the disk drive slot will help ensure proper airflow for cooling and help maintain optimal EMI compliance. Ordering feature 6598 results in four additional disk slot fillers being shipped.</li><li>5. The model 9405-520 is available as a stand-alone model only.</li><li>6. The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li><li>7. The model 9111-285<sup>8</sup>, is only available as a stand-alone model.</li><li>8. When a tape drive is installed, using the acoustic cover feature will reduce the noise emissions when the tape drive is in use.</li><li>9. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</li></ol>
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## Special Hardware Management Console considerations

When the 9406-520, 9111-520, 9405-520, 9111-285, 9131-52A, 9406-525, and 9407-515 servers are managed by a Hardware Management Console (HMC), the console must be provided within the same room and within 8 m (26 ft) of the server.

**Note:** As an alternative to the local HMC requirement, it is acceptable for you to provide a supported device (such as, a PC), with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the system.

### Related reference:

Chapter 9, "Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack," on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

"0551 rack" on page 445

The 0551 rack specifications provide detailed information for your rack.

"Planning for the 7014-T00 and 7014-T42 racks" on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

"Model 7014-T42, 7014-B42, and 0553 rack" on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

"Model 0555 and 7014-S25 rack" on page 461

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

"0551, 0553, 0555, and 7014 rack configurations" on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

### Related information:

↳ Acoustics

↳ Temperature and humidity design criteria

## Plan view for model 9406-520 and 9111-520

Dimensional planning information is shown in this top down view of your server.

**Note:** A flat, supportive surface is optimal for placement of the 9111-520 and 9406-520 stand-alone model. This allows the front cover to be properly supported.

The following figure shows dimensional planning information for the stand-alone model 9406-520 and 9111-520.

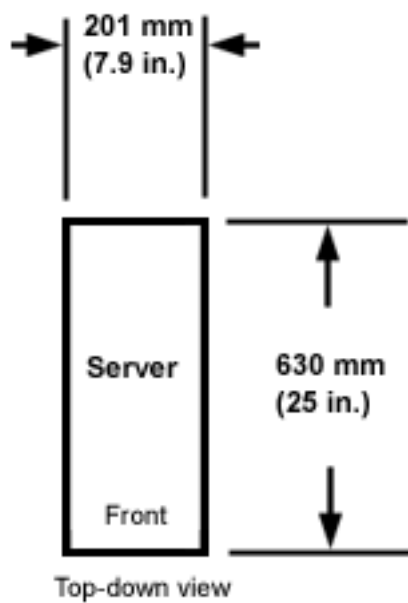


Figure 157. Model 9406-520 and 9111-520 plan view

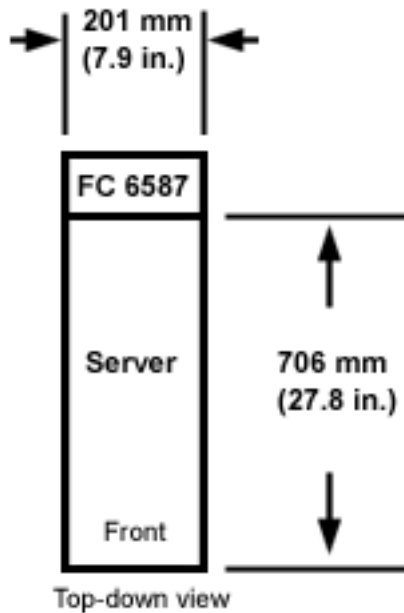


Figure 158. Model 520 plan view with feature code 6587

The feature code 6587 is a decorative rear cover that has sound-deadening capability. This cover is for servers that do not have external I/O attached to a high speed link (HSL) loop. The cover cannot be used if HSL cables are attached to the server.

## ASHRAE declarations

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

The following table and figures show the measurement reporting requirements as defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments. These guidelines are available at *ASHRAE Technical Committee*.

Table 256. ASHRAE declarations

Description	Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		watts	cfm	m <sup>3</sup> /hr	cfm
Configuration 1	420	26	44	40	68
Configuration 2	450	26	44	40	68
Configuration 3	500	30	51	45	76
Configuration 4	485	30	51	45	76
Configuration 5	550	30	51	45	76
Configuration 6	530	30	51	45	76
Configuration 7	560	30	51	45	76
See Model 9406-520, 9111-520, 9405-520, 9111-285, 9131-52A, 9406-525, and 9407-515 server specifications for Weight and Overall system dimension.					
ASHRAE Class	3				

Table 256. ASHRAE declarations (continued)

Description	Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>	Airflow maximum <sup>1</sup> at 35°C (95°F)
Configuration 1	1-core, 1.5 GHz processor, 16 GB memory, eight hard disk drives, six PCI cards, tape, DVD		
Configuration 2	1-core, 1.65 GHz processor, 16 GB memory, eight hard disk drives, four PCI cards, tape, DVD		
Configuration 3	2-core, 1.65 GHz processor, 32 GB memory, eight hard disk drives, five PCI cards, tape, DVD		
Configuration 4	1-core, 1.9 GHz processor, 16 GB memory, eight hard disk drives, three PCI cards, tape, two DVDs		
Configuration 5	2-core, 1.9 GHz processor, 32 GB memory, eight hard disk drives, five PCI cards, tape, DVD		
Configuration 6	2-core, 2.1 GHz, 8 GB memory, eight hard disk drives, two PCI cards, tape, DVD		
Configuration 7	4-core, 1.65 GHz, 8 GB memory, eight hard disk drives, five PCI cards, tape, DVD		
<b>Notes:</b> 1. Airflow for the typical and minimum configurations do not include redundant power supply, feature code 5158. 2. The product safety rating label contains the following information: <ul style="list-style-type: none"> <li>• 100-127/200-240 V ac</li> <li>• 10/5 A   1.0 kVa</li> <li>• 50/60 Hz   1-phase</li> </ul>			

**Airflow Diagram Rack-mount Cooling scheme F-R**

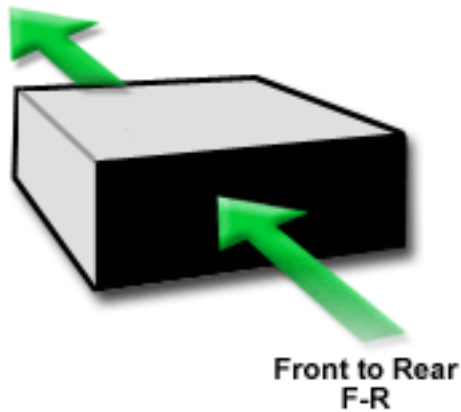


Figure 159. Airflow figure for server mounted in a rack



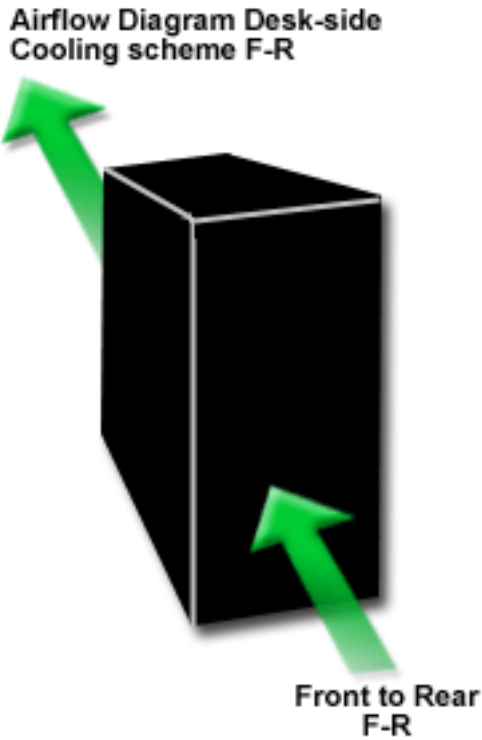


Figure 160. Airflow figure for a stand-alone server

**Related information:**

[ASHRAE Technical Committee](#)  
ASHRAE guidelines are available in this website

## Planning for model 9406-550, 9113-550, OpenPower 720 (9124-720), and 9133-55A server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

**Note:** The following specifications are approximate and do not represent measured data. They are provided for informational purposes only.

Table 257. Dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	EIA Units <sup>3</sup>	Weight
Metric	437 mm	731 mm	178 mm	4	44.7 kg
English	17.2 in.	28.8 in.	7.0 in.		98.5 lb

Table 258. Dimensions - stand-alone server

Measurements	Width	Depth	Height	Weight
Metric	201 mm	779 mm	533 mm	62 kg
English	7.9 in.	30.7 in.	21.0 in.	137 lb

Table 259. Shipping dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	Weight
Metric	648 mm	991 mm	704 mm	80 kg
English	25.5 in.	39 in.	27.7 in.	175 lb

Table 260. Shipping dimensions - Rack-mounted drawer (China)

Measurements	Width	Depth	Height	Weight
Metric	640 mm	965 mm	692 mm	80 kg
English	25.2 in.	38 in.	27.25 in.	1.75 lb

Table 261. Shipping dimensions - stand-alone server<sup>4</sup>

Measurements	Width	Depth	Height	Weight
Metric	648 mm	991 mm	704 mm	80 kg
English	25.5 in.	39 in.	27.7 in.	175 lb

Table 262. Shipping dimensions - stand-alone server (China)<sup>4</sup>

Measurements	Width	Depth	Height	Weight
Metric	640 mm	965 mm	692 mm	80 kg
English	25.2 in.	38 in.	27.25 in.	175 lb
Feature code for drawer mounted in rack			0230 (9113-550), 7886 (9406-550)	
Power distribution Unit (PDU), 0551,7014-T00, 7014-T42 and 0553, and 0555 racks				

Table 263. Electrical

Electrical characteristics	Properties
kVA (maximum)	1.158
Rated voltage, rated amps, and frequency <sup>6</sup>	9113-550, OpenPower 720, 9133-55A
	<b>One processor card installed</b>
	100 - 127 V ac (12 A) to 200-240 V ac (10 A) at 50 to 60 plus or minus 0.5 Hz
	9133-55A, 9113-550
	9406-550OpenPower 720
	<b>Two processor cards installed</b>
	200 - 240 V ac (10 A) at 50 to 60 plus or minus 0.5 Hz
	200 - 240 V ac (10 A) at 50 to 60 plus or minus 0.5 Hz
Thermal output (maximum)	3754 Btu/hr
Maximum power consumption	1100 W
Power factor	0.95
Inrush current (maximum)	85 A
Leakage current (maximum)	1.5 mA

Table 263. Electrical (continued)

Electrical characteristics	Properties
Phase	1
Dual power feature code	Included
Branch circuit breaker	20 A (maximum)

Table 264. Environment requirements

Environment	Temperature	
Recommended operating temperature <sup>2</sup>	5 - 35 °C (41 - 95 °F)	
Nonoperating temperature	5 - 45 °C (41 - 113 °F)	
Shipping temperature	-40 - 60 °C (-40 - 140°F)	
	Operating <sup>5</sup>	Nonoperating
Maximum dew point	28 °C (82.4 - °F)	29 °C (84.2 - °F)
Noncondensing humidity	8 - 80%	8 - 80%
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

Table 265. Noise emissions<sup>1, 10</sup>

Product description	Declared A-weighted sound power level, L <sub>Wad</sub> (B)		Declared A-weighted sound pressure level, L <sub>pAm</sub> (dB)	
	Operating	Idle	Operating	Idle
stand-alone models: 9406-550, 9113-550, OpenPower 720 with two hard drives and non-redundant power	6.0	5.9	42	41
Rack-mounted models:9406-550, 9113-550, OpenPower 720 with two hard drives and non-redundant power	6.1	6.0	44	43
Rack-mounted models:9406-550, 9113-550, OpenPower 720 with eight hard drives and redundant power	6.3	6.2	45	45
Rack-mounted model: 9133-55A with eight hard drives and redundant power	6.8 <sup>9</sup>	6.6 <sup>9</sup>		

Table 266. Service clearances

Clearances	Front	Back	Left/right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000-94, Notice 2000-72); People's Republic of China Commodity Inspection Law

**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950-00; EN 60950; IEC 60950 including all National Differences

Table 267. Notes

**Notes:**

1. For a description of noise emission values, see *Acoustics*.
2. Class 3 product as defined in ASHRAE Thermal Guidelines for Data Processing Environments. The allowable operating range is 5 - 35 °C (41 - 95 °F). See the *Temperature and humidity design criteria* topic for more information.
3. See *0551, 0553, 0555, and 7014 rack configurations* for typical configurations when the 0551, 0553, 0555 or 7014 rack is populated with various server models.
4. stand-alone server is shipped on its side
5. All Model 550 disk bays should be filled when the unit is shipped from IBM with either disk drives or slot fillers, but if a disk is removed, refill the disk slot with either another disk drive or a disk slot filler. Filling the disk drive slot will help ensure proper airflow for cooling and help maintain optimal EMI compliance. Ordering feature 6598 results in four additional disk slot fillers being shipped.
6. The power supplies automatically accept any voltage with the published rated voltage range for a defined processor configuration. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.
7. Configured with two disk drives and non-redundant power system.
8. Configured with eight disk drives and redundant power system.
9. This is an estimated value.
10. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.

## Special Hardware Management Console considerations

When the 9406-550, 9113-550, OpenPower 720, 9133-55A servers are managed by a Hardware Management Console (HMC), the console must be provided within the same room and within 8 m (26 ft) of the server.

**Note:** As an alternative to the local HMC requirement, it is acceptable for you to provide a supported device, such as a PC, with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the system.

**Related reference:**

Chapter 9, "Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack," on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

"0551 rack" on page 445

The 0551 rack specifications provide detailed information for your rack.

"Planning for the 7014-T00 and 7014-T42 racks" on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

"Model 7014-T42, 7014-B42, and 0553 rack" on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

"Model 0555 and 7014-S25 rack" on page 461

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

"0551, 0553, 0555, and 7014 rack configurations" on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

↳ Acoustics

↳ Temperature and humidity design criteria

## Plan view for model 9406-550, 9113-550, and OpenPower 720

Dimensional planning information is shown in this top down view of your server.

**Note:** A flat, supportive surface is optimal for placement of the 9113-550 and 9406-550 stand-alone model. This allows the front cover to be properly supported.

The following figure shows dimensional planning information for the stand-alone model 9406-550 and 9113-550.

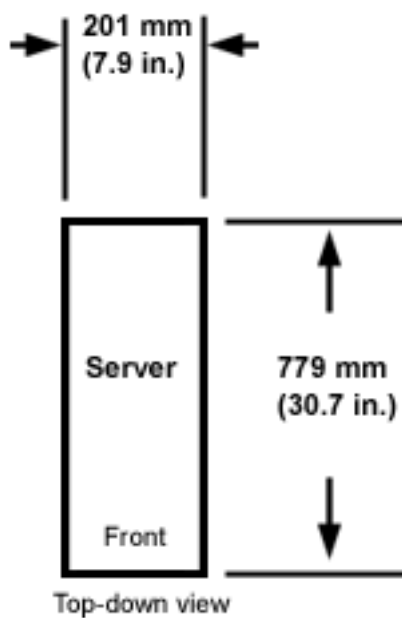


Figure 161. Model 9406-550, 9113-550, plan view

## ASHRAE declarations

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

The following table and figures show the measurement reporting requirements as defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments. These guidelines are available at *ASHRAE Technical Committee*.

Table 268. ASHRAE declarations

Description	Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Configuration 1	500	28	48	45	76
Configuration 2	575	32	60	50	85

Table 268. ASHRAE declarations (continued)

	Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
Configuration 3	800	32	60	50	85
Configuration 4	650	32	60	50	85
Configuration 5	865	32	60	50	85
Configuration 6	925	32	60	50	85
Configuration 7	699	32	60	50	85
Configuration 8	935	32	60	50	85
See <i>Planning for model 9406-550, 9113-550, OpenPower 720 (9124-720), and 9133-55A server specifications</i> for Weight and Overall system dimension.					
ASHRAE Class	3				
Configuration 1	1-core, 1.65 GHz processor, 32 GB memory, eight hard disk drives, five PCI cards, tape, DVD				
Configuration 2	2-core, 1.65 GHz processor, 32 GB memory, eight hard disk drives, four PCI cards, tape, DVD				
Configuration 3	4-core, 1.65 GHz processor, 48 GB memory, eight hard disk drives, four PCI cards, tape, DVD				
Configuration 4	2-core, 1.9 GHz processor, 32 GB memory, eight hard disk drives, five PCI cards, tape, DVD				
Configuration 5	4-core, 1.9 GHz processor, 48 GB memory, eight hard disk drives, five PCI cards, tape, DVD				
Configuration 6	8-core, 1.5 GHz processor, 48 GB memory, eight hard disk drives, five PCI cards, tape, 2 DVDs				
Configuration 7	4-core, 2.1 GHz processor, 12 GB memory, eight hard disk drives, four PCI cards, tape, DVD				
Configuration 8	8-core, 1.65 GHz processor, 16 GB memory, eight hard disk drives, five PCI cards, tape, DVD				
<b>Notes:</b>					
1. Airflow for the typical and minimum configurations.					
2. The product safety rating label contains the following information:					
<ul style="list-style-type: none"> <li>• 100-127/200-240 V ac</li> <li>• 10/10 A   1.0/2.0 kVa</li> <li>• 50/60 Hz   1-phase</li> </ul>					

**Airflow Diagram Rack-mount  
Cooling scheme F-R**

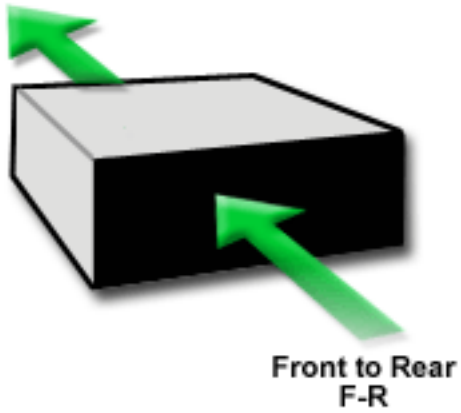


Figure 162. Airflow figure for server mounted in a rack

**Airflow Diagram Desk-side  
Cooling scheme F-R**

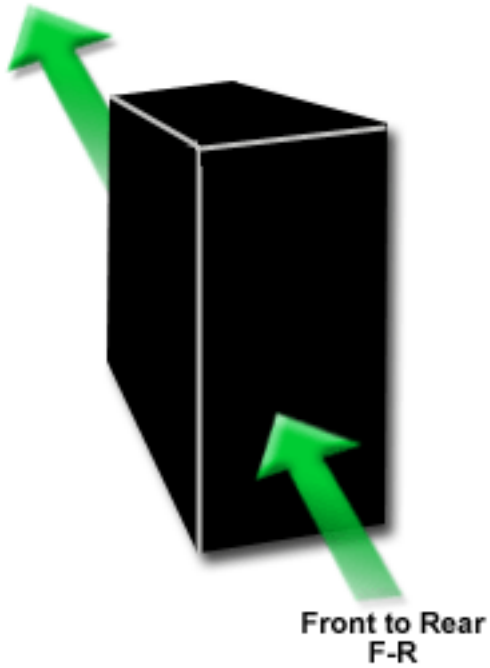


Figure 163. Airflow figure for stand-alone server

**Related information:**

[ASHRAE Technical Committee](#)  
ASHRAE guidelines are available in this website

## Model 9406-570, 9117-570, and 9116-561 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

Pictured is model 9406-570, and 9117-570 server.



Figure 164. Model 9406-570, and 9117-570 server

See *Top down view*

See *ASHRAE declarations*

Table 269. Dimensions

Measurements	Width	Depth	Height	EIA units <sup>1</sup>	Weight
Metric	483 mm	790 mm	174.1 mm	4	63.6 kg
English	19 in.	31.1 in.	6.85 in.		140 lb

Table 270. Shipping dimensions - Rack-mounted drawer

Measurements	Width	Depth	Height	Weight
Metric	648 mm	991 mm	704 mm	80 kg
English	25.5 in.	39 in.	27.7 in.	175 lb

Table 271. Shipping dimensions - Rack-mounted drawer (China)

Measurements	Width	Depth	Height	Weight
Metric	640 mm	965 mm	692 mm	80 kg
English	25.2 in.	38 in.	27.25 in.	175 lb

Table 272. Electrical

Electrical characteristics	Properties
kVA (maximum)	1.368
Rated voltage and frequency <sup>6</sup>	200 - 240 V ac at 50/60 plus or minus 0.5 Hz
Thermal output (maximum) <sup>9</sup>	4437 Btu/hr
Maximum power consumption <sup>4, 7</sup>	1300 W
Power factor	0.95



Table 272. Electrical (continued)

Electrical characteristics	Properties
Inrush current (maximum)	88 A
Leakage current (maximum)	3 mA
Phase	1
Dual power feature code	Included
Branch circuit breaker	20 A maximum
The 9117-570 and 9116-561 are multi-drawer systems. The values represented in the table are for one drawer. To obtain the total for all drawers, multiply the table values by following numbers: FC 0232 and 0261 by 2. FC 0241 by 3. FC 0242 by 4. FC 0231 and 0260 are single drawer systems.	

Table 273. Environment requirements

Environment	Temperature	
Recommended operating temperature	20 - 25 °C (68 - 77 °F)	
Nonoperating temperature <sup>10</sup>	5 - 40 °C (41 - 104 °F)	
Shipping temperature	-40 - 60 °C (-40 - 140 °F)	
	Operating	Nonoperating
Wet bulb temperature	23 °C (73.4 - °F)	27 °C (80.6 - °F)
Noncondensing humidity	8 - 80%	8 - 80% (5 - 100% shipping)
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

Table 274. Noise emissions<sup>2, 8</sup>

Product description	Declared A-weighted sound power level, L <sub>wad</sub> (B)		Declared A-weighted sound pressure level, L <sub>pAm</sub> (dB)	
	Operating	Idle	Operating	Idle
9406-570, 9117-570, and 9116-561, 1.65 and 1.9 GHz, 4-core configuration with four hard drives and two power supplies	6.8	6.8	53 <sup>3</sup>	53 <sup>3</sup>
9406-570, 9117-570, and 9116-561, 1.65 and 1.9 GHz, 4-core configuration with four hard drives and two power supplies and acoustic doors (feature code 6248 or 6249)	6.2 <sup>3</sup>	6.2 <sup>3</sup>	46 <sup>3</sup>	46 <sup>3</sup>
9406-570, 9117-570, and 9116-561, 1.65 and 1.9 GHz, 16-core configuration with four hard drives and two power supplies	7.4	7.3	59	59
9406-570, 9117-570, and 9116-561, 1.65 and 1.9 GHz, 4-core configuration with four hard drives and two power supplies and acoustic doors (feature code 6248 or 6249)	6.8 <sup>3</sup>	6.7 <sup>3</sup>	53 <sup>3</sup>	53 <sup>3</sup>

Table 275. Service clearances

Clearances	Front	Back	Left or right	Top
Operating	762 mm (30 in.)	762 mm (30 in.)		
Nonoperating	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)

**Electromagnetic compatibility compliance:** FCC Part 15, ICES-003

**Safety compliance:** IEC 60950; UL 60950; CSA 60950

Table 276. Notes

**Note:**

1. See 0551, 0553, 0555, or 7014 rack configurations for typical configurations when the 0551, 0553, 0555 or 7014 rack is populated with various server models.
2. For a description of noise emission values, see *Acoustics*.
3. This is an estimated value.
4. Maximum power consumption is specified for each 9117-570 4-core drawer. The 8-core, 12-core, and 16-core configurations are based on the use of multiple 4-core drawers (for example, an 8-core configuration consists of two 4-core drawers, a 12-core configuration consists of three 4-core drawers, and a 16-core configuration consists of four 4-core drawers).
5. All Model 570 disk bays should be filled when the unit is shipped from IBM with either disk drives or slot fillers, but if a disk is removed, refill the disk slot with either another disk drive or a disk slot filler. Filling the disk drive slot will help ensure proper airflow for cooling and help maintain optimal EMI compliance. Ordering feature 6598 results in four additional disk slot fillers being shipped.
6. The power supplies automatically accept any voltage with the published, rated-voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.
7. Maximum power consumption is specified for each 9116-561 8-core drawer. The 8-core and 16-core configurations are based on the use of multiple 8-core drawers (for example, a 16-core configuration consists of two 8-core drawers).
8. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.
9. Thermal output value is for each 4-core drawer configuration.
10. The allowable operating temperature is the same as nonoperating temperature.

## Special Hardware Management Console considerations

When the server is managed by a Hardware Management Console (HMC), the console must be provided within the same room and within 8 m (26 ft) of the server.

**Note:** As an alternative to the local HMC requirement, it is acceptable for you to provide a supported device, such as a PC, with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the system.

## 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 to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM authorized service provider. 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 IBM 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.

**Related reference:**

“0551 rack” on page 445

The 0551 rack specifications provide detailed information for your rack.

“Planning for the 7014-T00 and 7014-T42 racks” on page 464

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 7014-T42, 7014-B42, and 0553 rack” on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 0555 and 7014-S25 rack” on page 461

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Chapter 9, “Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack,” on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

 Acoustics

## **Plan view for model 9406-570, 9117-570, and 9116-561**

Dimensional planning information is shown in this top down view of your server.

The following figure shows dimensional planning information for model 9406-570, 9117-570, and 9116-561.

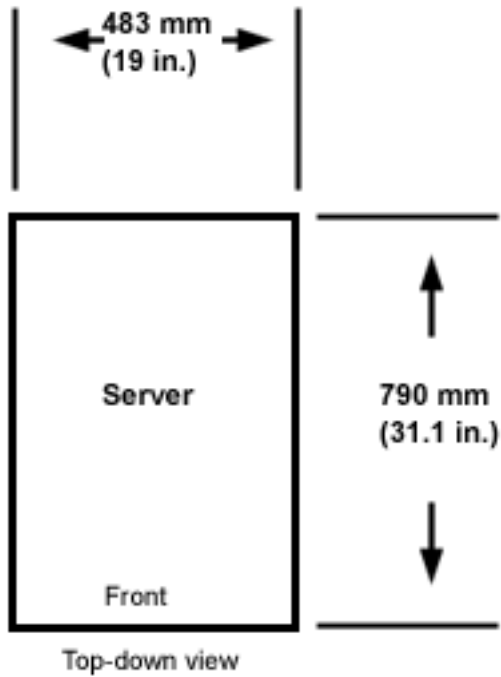


Figure 165. Model 9406-570, 9117-570, and 9116-561 plan view (rack-mount)

## ASHRAE declarations

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

The following table and figures show the measurement-reporting requirements as defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments. These guidelines are available at *ASHRAE Technical Committee*.

Table 277. ASHRAE declarations

Description	Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr
Configuration 1	750	90	153	140	238
Configuration 2	950	90	153	140	238
Configuration 3	910	90	153	140	238
Configuration 4	1000	90	153	140	238
Configuration 5	925	90	153	140	238
See Model 9406-570, 9117-570, and 9116-561 server specifications for Weight and Overall system dimension.					
ASHRAE Class	3				
Configuration 1	4-core, 1.65 GHz processor, 48 GB memory, six hard disk drives, six PCI cards, DVD				

Table 277. ASHRAE declarations (continued)

Description	Typical Heat Release <sup>2</sup>	Airflow nominal <sup>1</sup>	Airflow maximum <sup>1</sup> at 35°C (95°F)
Configuration 2	4-core, 1.9 GHz processor, 12 GB memory, six hard disk drives, five PCI cards, two DVDs		
Configuration 3	8-core, 1.5 GHz processor, 4 GB memory, six hard disk drives, two PCI cards, DVD		
Configuration 4	4-core, 2.2 GHz processor, 32 GB memory, six hard disk drives, four PCI cards, DVD		
Configuration 5	8-core, 1.8 GHz processor, 16 GB memory, six hard disk drives, four PCI cards, two DVDs		

**Notes:**

- Airflow for the typical and minimum configurations.
- The product safety rating label contains the following information:
  - 200-240 V ac
  - 10 A | 2.0 kVa
  - 50/60 Hz | 1-phase

**Airflow Diagram Rack-mount Cooling scheme F-R**

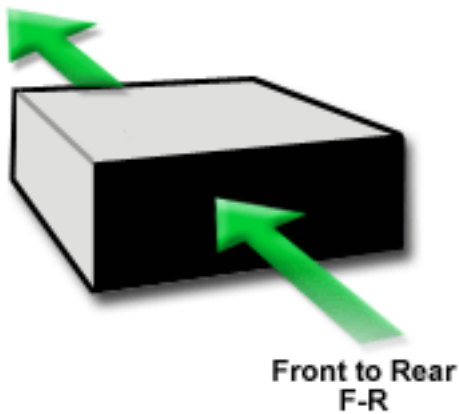


Figure 166. Airflow figure for server mounted in a rack

**Related information:**

[ASHRAE Technical Committee](#)  
ASHRAE guidelines are available in this website

## Model 9406-800 and 9406-810 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.



The 7116 expansion unit is available with model 9406-800 or 9406-810.

The 7116 expansion unit requires a power cord.

Dimensions are shown for model 9406-800 or 9406-810 only.

*Table 278. Dimensions*

Measurements	9406-800 and 9406-810 Width	9406-800 and 9406-810 with 7116 Width	9406-800 and 9406-810 Depth	9406-800 and 9406-810 Height	Height in 0551 rack <sup>2, 4</sup>
Metric	366 mm	552 mm	610 mm	610 mm	16 EIA
English	14.5 in.	21.9 in.	24 in.	24 in.	16 U

*Table 279. Maximum configuration weight*

Model 9406-800 and 9406-810	Model 9406-800 and 9406-810 with 7116
52.7 kg (116 lb)	79.6 kg (175 lb)

*Table 280. Electrical*

Power factor	0.95		Model 9406-800 and 9406-810	7116 expansion unit
Inrush current	41 A	Maximum kVA (each has its own power cord)	0.421	0.368

Table 280. Electrical (continued)

Leakage current (maximum)	3.5 mA	Rated voltage and frequency <sup>5</sup>	100-127/200-240 V ac at 50-60 plus or minus 0.5 Hz	100-127/200-240 V ac at 50-60 plus or minus 0.5 Hz
Phase	1	Thermal output (maximum)	1365 Btu/hr	1194 Btu/hr
Power requirements maximum (watts)			400	350

Table 281. Temperature requirements

<b>Operating</b>	<b>Nonoperating</b>
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 282. Environment requirements

<b>Environment</b>	<b>Operating</b>	<b>Nonoperating</b>
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4 - °F)	27°C (80.6°F)
Maximum altitude	3048 m (10000 ft)	

Table 283. Noise emissions<sup>1</sup>

<b>Property</b>	<b>Operating</b>	<b>Idle</b>
L <sub>WAd</sub> (Category 2E, General business) 9406-800 or 9406-810 only	5.9 bels	5.8 bels
L <sub>WAd</sub> (Category 2E, General business) 9406-800 or 9406-810 with 7116	6.3 bels	6.1 bels
L <sub>pAm</sub> (1-meter bystander) 9406-800 or 9406-810 only	41 dB	40 dB
L <sub>pAm</sub> (1-meter bystander) 9406-800 or 9406-810 with 7116	45 dB	43 dB

Table 284. Service clearances

<b>Front</b>	<b>Back</b>	<b>Sides<sup>3</sup></b>	<b>Top<sup>3</sup></b>
762 mm	1219 mm	762 mm	762 mm
30 in.	48 in.	30 in.	30 in.

Table 285. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Feature code 0133 is manufacturing installed in a rack. Feature code 0137 is field installed in a rack.</li> <li>3. Side and top clearances are optional when operating.</li> <li>4. See <i>0551 rack configurations</i> for typical configurations when the 0551 rack is populated with various server models.</li> <li>5. The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li> </ol>
---

## 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 to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM authorized service provider. 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 IBM 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.

#### **Related reference:**

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

#### **Related information:**

 Acoustics



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## Model 9406-820 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.



The 5074, 5079, 507, or 5078 expansion unit is available with model 9406-820.

*Table 286. Dimensions*

Measurements	Width	Depth	Height
Metric	483 mm	728 mm	610 mm
English	19.0 in.	28.7 in.	24.0 in.

The maximum configuration weight is: 96 kg (210 lb)

*Table 287. Electrical*

Electrical characteristics	Properties
kVA (maximum)	0.862
Rated voltage and frequency	100-127/200-240 V ac at 50-60 plus or minus 0.5 Hz
Thermal output (maximum)	2867 Btu/hr
Power requirements (maximum)	840 W
Power factor	0.95
Inrush current	90 A
Leakage current (maximum)	3.5 mA

Table 287. Electrical (continued)

Electrical characteristics	Properties
Phase	1

Table 288. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 289. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	22.8°C (73°F)	27°C (80.6°F)
Maximum altitude	3048m (10 000 ft)	

Table 290. Noise emissions<sup>1</sup>

Property	Operating	Idle
L <sub>WAd</sub> Category 2E, General Business	6.1 bel	5.9 bel
L <sub>pAm</sub> (1-meter bystander)	43 dB	40 dB

Table 291. Service clearances

Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 292. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>For a description of noise emission values, see <i>Acoustics</i>.</li> <li>Side and top clearances are optional during operation.</li> </ol>
--

**Related reference:**

“HSL, SPCN, RIO, and InfiniBand cable planning” on page 678  
 Use these tables to select your HSL, SPCN, RIO and InfiniBand cables.

**Related information:**

 Acoustics

## Model 9406-825 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.

**Note:** Redundant power and power cords are standard on model 9406-825. The server uses dual alternating current power cords. For maximum availability, each of the power cords should be fed from independent power grids.



The 5094 and 5095 expansion units are available with model 9406-825.

*Table 293. Dimensions*

Dimensions	Width	Depth	Height	Maximum configuration weight	Height in 0551 rack <sup>2, 4</sup>
Metric	445 mm	830 mm	610 mm	110 kg	16 EIA
English	17.5 in.	32.7 in.	24 in.	242 lb	16 U

*Table 294. Electrical*

Electrical characteristics	Property
kVA	1.540
Thermal output (Btu/hr)	4993
Power requirements (watts)	1463
Rated voltage and frequency 3-core, 4-core, 5-core, and 6-core <sup>5</sup>	200 - 240 V ac at 50-60 plus or minus 0.5 Hz
Power factor	0.95
Inrush current	125 A
Leakage current (maximum)	3.5 mA
Phase	1

*Table 295. Temperature requirements*

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

*Table 296. Environment requirements*

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%

Table 296. Environment requirements (continued)

Environment	Operating	Nonoperating
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)
Maximum altitude	3048 m (10 000 ft)	

Table 297. Noise emissions<sup>1</sup>

Property	Operating	Idle
L <sub>WAd</sub> (Category 2D, General business)	6.8 bels	6.8 bels
L <sub>pAm</sub> (1-meter bystander)	50 dB	49 dB

Table 298. Service clearances

Front	Back	Sides <sup>3</sup>	Top <sup>3</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 299. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Feature codes 0134 and 0138 are both field install in rack.</li> <li>3. Side and top clearances are optional when operating.</li> <li>4. See <i>0551 rack configurations</i> for typical configurations when the 0551 rack is populated with various server models.</li> <li>5. The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li> </ol>
---

## Delivery and subsequent transportation of the equipment

### DANGER

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

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#### Related reference:

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

#### Related information:

 Acoustics

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## Model 9406-830 and SB2 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.



The 5074, 5078, or 5079 PCI expansion unit is available with model 9406-830 or model SB2.

*Table 300. Dimensions*

Measurements	Width	Depth	Height	Maximum configuration weight
Metric	483 mm	1080 mm	1270 mm	400 kg
English	19.0 in.	42.5 in.	50.0 in.	881.5 lb

*Table 301. Electrical*

Electrical characteristics	Property
kVA (maximum)	1.684
Rated voltage and frequency <sup>3</sup>	200-240 V ac at 50-60 plus or minus 0.5 Hz
Thermal output (maximum)	5461 Btu/hr

Table 301. Electrical (continued)

Electrical characteristics	Property
Power requirements (maximum)	1600 W
Power factor	0.95
Inrush current	80 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 302. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 303. Environment requirements

Property	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	22.8°C (73°F)	27°C (80.6°F)
Maximum altitude	3048 m (10 000 ft)	

Table 304. Noise emissions

Property	Operating	Idle
L <sub>WAd</sub> (Category 2D, General business)	6.7 bels	6.7 bels
L <sub>pAm</sub> (1-meter bystander)	50 dB	49 dB
For a description of noise emission values, see <i>Acoustics</i> .		

Table 305. Service clearances

Front	Back	Sides <sup>1</sup>	Top <sup>1</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.
<sup>1</sup> Side and top clearances are optional when operating.			

Table 306. Notes

**Note:** The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.

**Related reference:**

“HSL, SPCN, RIO, and InfiniBand cable planning” on page 678  
 Use these tables to select your HSL, SPCN, RIO and InfiniBand cables.

**Related information:**

 [Acoustics](#)

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## Model 9406-840 and SB3 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

Use the following specifications to plan for your server.



The 5074 expansion unit, 5078 expansion unit, 8079 optional 1.8 m model 9406-840 I/O rack or 5079 1.8 m expansion unit are available with model 9406-840 or model SB3 servers.

*Table 307. Dimensions*

Measurements	Maximum configuration weight	Width	Depth	Height
Metric	397 kg	565 mm	1320 mm	1577 mm
English	875 lb	22.3 in.	52.0 in.	62.0 in.

*Table 308. Electrical*

Electrical	Properties
kVA (maximum)	2.526

Table 308. Electrical (continued)

Electrical	Properties
Rated voltage and frequency <sup>3</sup>	200-240 V ac at 50-60 plus or minus 0.5 Hz
Thermal output (maximum)	8191 Btu/hr
Power requirements (maximum)	2400 W
Power factor	0.95
Inrush current	100 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 309. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 310. Environment requirements

	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	22.8°C (73°F)	27°C (80.6°F)
Maximum altitude	3048 m (10000 ft)	

Table 311. Noise emissions<sup>1</sup>

	Operating	Idle
L <sub>WAd</sub> (Category 2D, General business)	7.0 bels	6.9 bels
L <sub>pAm</sub> (1-meter bystander)	51 dB	51 dB

Table 312. Service clearances

Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 313. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Side and top clearances are optional when operating</li> <li>3. The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li> </ol>
---

**Related reference:**

“HSL, SPCN, RIO, and InfiniBand cable planning” on page 678  
 Use these tables to select your HSL, SPCN, RIO and InfiniBand cables.

**Related information:**

 Acoustics



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## Model 9406-870 and 9406-890 server specifications

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

This product meets the technical requirements of IEC 61000-3-3.

Models 9406-870 and 9406-890 have some additional information that is important during planning.



Pictured is model 9406-870 or 9406-890 server with the 9094 expansion unit

*Table 314. Dimensions*

Measurements	Width	Depth	Height
Metric (mm)	785	1494	2025
English (in.)	30.91	58.83	79.72
Depth without covers		1173.5 mm (46.2 in)	
Standard shipping crate	940 mm (37 in.)	1422 mm (56 in.)	2337 mm (92 in.)
Reduced height shipping crate	940 mm (37 in.)	1422 mm (56 in.)	2032 mm (80 in.)

Table 314. Dimensions (continued)

Measurements	Width	Depth	Height
Height reduction feature 0126 System frame is included in two pieces to be fully assembled at customer location.			1.65 m (65 in)

Table 315. Maximum configuration weight

800 kg (1758 lb)
------------------

Table 316. Electrical and thermal

Electrical characteristics	Properties
kVA (maximum) 8-core (9406-870) 16-core (9406-870) 24-core (9406-890) 32-core (9406-890)	6.315
	6.315
	8.201
	10.099
Rated voltage at 50-60 plus or minus 0.5 Hz (3-phase) <sup>3, 4</sup>	200-240 V ac
	380-415 V ac
	480 V ac
Rated current (amperes per phase) 200-240 V ac 380-415 V ac 480 V ac	45 A
	25 A
	20 A
Thermal output (maximum) 8-core (9406-870) 16-core (9406-870) 24-core (9406-890) 32-core (9406-890)	20.478 kBtu/hr
	20.478 kBtu/hr
	26.591 kBtu/hr
	32.744 kBtu/hr
Power requirements maximum 8-core (9406-870) 16-core (9406-870) 24-core (9406-890) 32-core (9406-890)	6000 W
	6000 W
	7791 W
	9594 W
Power factor	0.95
Frequency (Hertz)	50 to 60
Inrush current <sup>3</sup>	163 A
Leakage current	42 mA
Phase	3

Table 317. Temperature requirements

Temperature properties	Temperature
Operating	10 - 32°C (50 - 89.6°F)

Table 317. Temperature requirements (continued)

Temperature properties	Temperature
Nonoperating	10 - 43°C (50 - 109.4°F)
Storage	1 - 60°C (33.8 - 140 °F)
Shipping	-40 - 60°C (-40 - 140 °F)

Table 318. Environment requirements

Properties	Operating	Non operating	Storage	Shipping
Noncondensing humidity	8 - 80%	8 - 100%	5 - 80%	5 - 100%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)	29°C (84.2°F)	29°C (84.2°F)
Maximum altitude	2134 m (7000 ft)			

Table 319. Noise emissions<sup>1</sup>

	Operating	Idle
L <sub>WAd</sub>	7.2 bels	7.2 bels
L <sub>pAm</sub> (1-meter bystander)	54 dB	54 dB

Table 320. Service clearances

Front	Back	Sides <sup>1</sup>	Top <sup>1</sup>
1143 mm	914 mm	762 mm	762 mm
45 in.	36 in.	30 in.	30 in.

Table 321. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>For a description of noise emission values, see <i>Acoustics</i>.</li> <li>Inrush currents occur only at initial application of power (very short duration for charging capacitors). No inrush currents occur during the normal power on or off cycle.</li> <li>The system will function normally with a nominal input voltage in the range of 200-480 V ac, three-phase.</li> <li>The power supplies automatically accept any voltage with the published rated voltage range. If dual power supplies are installed and operating, the power supplies draw approximately equal current from the utility (mains) and provide approximately equal current to the load.</li> </ol> <p><sup>1</sup>Side and top clearances are optional when operating if the building floor loading specifications are met.</p>
--

#### Related information:

 Acoustics

## iSeries 9406-870 and 9406-890 power and height considerations

Special power and height considerations apply to the these servers.

### Doors and covers

Covers are an integral part of the server and are required for product safety and EM compliance.

The enhanced acoustical cover consists of a special rear door which is approximately 200 mm (8 in.) in depth and contains acoustical treatment that lowers the noise level of the machine by approximately 6 dB

compared to a nonacoustical rear door. With this door, the server meets the acoustical *Specifications for Category 1A for Data Processing Areas*, with a declared A-weighted sound power level,  $L_{WA,d}$  of 7.4 bels (B) for the most common system configuration.

## Moving, weight, and height considerations for the 9406-870 and 9406-890

Learn about the unique weight and height considerations for your server.

The customer should determine the path that the system must take to be moved from the delivery location to the installation site. The customer should verify that the height of all doorways, elevators, and so on are sufficient to allow movement of the system to the installation site. The customer should also determine that the weight limitation of elevators, ramps and so on are sufficient to allow movement of the system to the installation site, including considerations for the additional height resulting from the use of protective materials on the floors (such as, 3/8 in. plywood to protect floors during movement of heavy systems. If it is determined that the height or weight of the system can cause a problem in movement to the installation site, contact your local site planning or sales representative. See the *Model 9406-870 and 9406-890 server specifications* for weight and height details.

If height is a concern, order feature code 0126, model 9406-870 and 9406-890 EIA reduction option. This feature indicates that the system frame is to be shipped in two pieces to be fully assembled at the customer's location. The top section of the system frame (including the power subsystem) is removed. The height of the system frame with the upper section removed is approximately 1.65 meters (65 inches).

### Related reference:

“Model 9406-870 and 9406-890 server specifications” on page 297

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

## Power and electrical requirements

Use the power cord options table to determine the circuit breaker rating, power cord specifications, receptacles, and geographic requirements for your server.

Redundant power and power cords are standard on the Servers 9406-870 and 9406-890. The server uses dual alternating current power cords. For maximum availability, each of the power cords should be fed from independent power grids.

The following table illustrates the power cord options for the Servers 9406-870 and 9406-890 with their geographic, breaker rating, and cord information.

Table 322. Power cord options

3-Phase supply voltage (50/60 Hz)	200 - 240 V ac	380 - 415 V ac	480 V ac
Geography	United States, Canada, Japan	Europe, Middle East, Africa, Asia Pacific	United States, Canada
Customer circuit breaker rating (See note 1) (See Note 1)	60 A	30 A	30 A
Cord information	6 and 14 foot, 6 AWG power cord	14 foot, 6 or 8 AWG power cord, (electrician installed)	6 and 14 foot, 10 AWG power cord
Recommended receptacle	IEC 60309, 60 A, type 460R9W (not provided)	Not specified, electrician installed	IEC 60309, 30 A, type 430R7W (not provided)

**Note:** The exact circuit breaker ratings might not be available in all countries. Where the specified circuit breaker ratings are not acceptable, use the nearest available rating. Use of a time delayed circuit breaker is recommended.

## Phase imbalance and bulk power regulator configuration

Use the Phase imbalance as a function of BPR configuration table to determine the phase imbalance of your server's configuration.

Depending on the number of Bulk Power Regulators (BPRs) in your system, phase imbalance can occur in line currents. All systems are provided with 2 bulk power assemblies (BPAs), with separate power cords. The following table illustrates phase imbalance as a function of BPR configuration.

Table 323. Phase imbalance as a function of BPR configuration

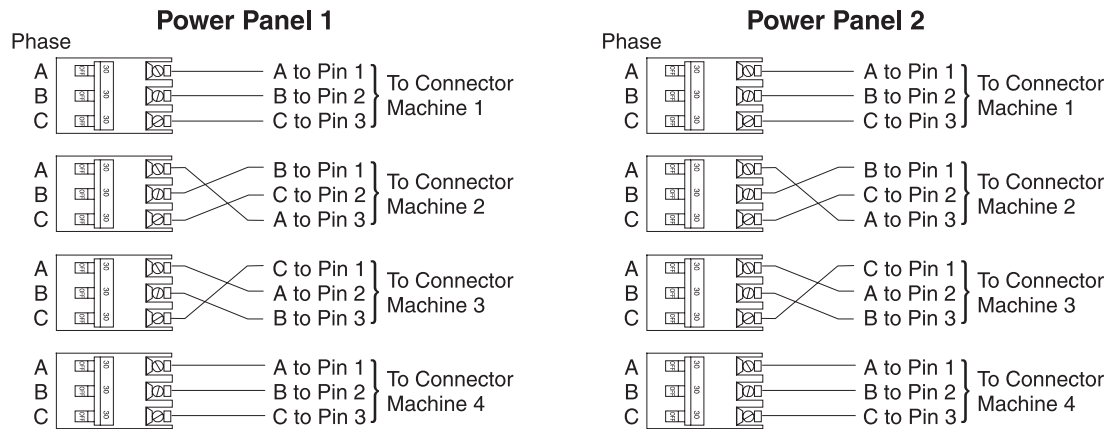
Number of BPRs per BPA	Phase A line current	Phase B line current	Phase C line current
1	Power / V line	Power / V line	0
2	0.5 power / V line	0.866 power / V line	0.5 power / V line

V line is line-to-line nominal input voltage.

## Balancing power panel loads

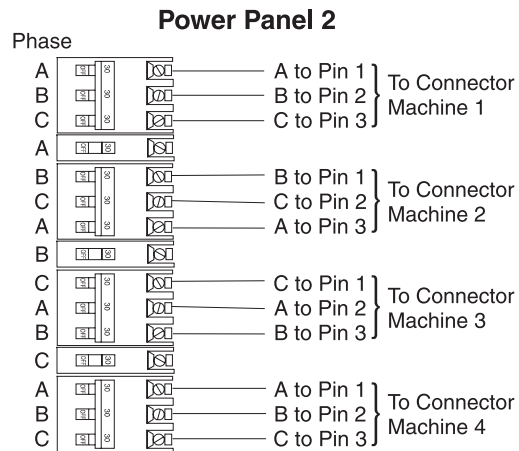
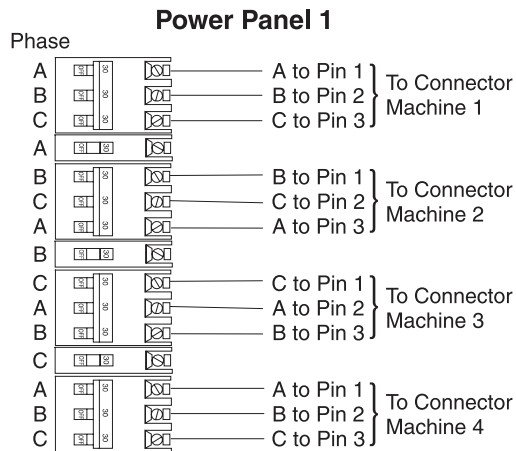
Use these methods to ensure that power panel loads are balanced.

The servers 9406-870 and 9406-890 require three-phase power. Depending on the system configuration, the phase currents can be single phase, line-to-line, or unbalanced. System configurations with two bulk power regulators (BPRs) per bulk power assembly (BPA) have unbalanced power panel loads. With two BPRs per BPA, two of the three-phases draw an equal amount of current, and are, nominally, 57.8% of the current on the third phase. With one BPR per BPA, two of the three-phases carry an equal amount of current, with no current drawn on the third phase. The following figure is an example of feeding several loads of this type from two power panels in a way that balances the load among the three-phases.



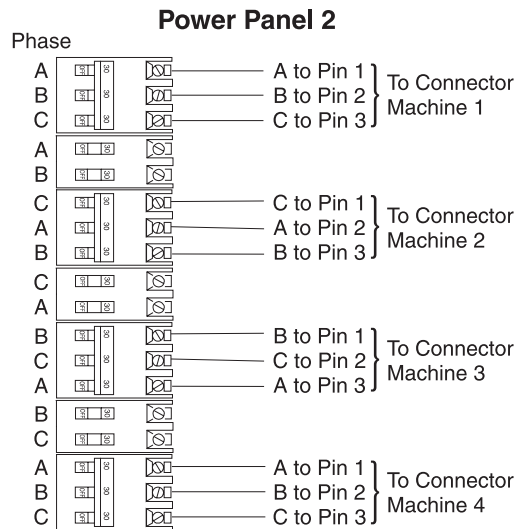
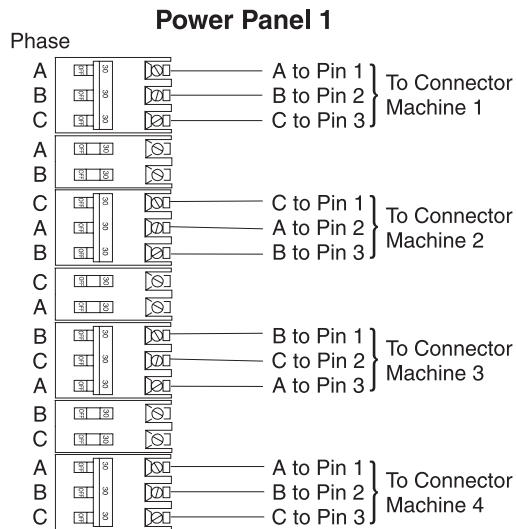
RBAGP700-0

The method illustrated in the preceding figure requires that the connection from the three poles of each breaker to the three-phase pins of a connector be varied. Some electricians might prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three-pole breakers are alternated with single-pole breakers. This way the three-pole breakers do not all begin on Phase A.



RBAGP701-0

The following figure shows another way of distributing the unbalanced load evenly. In this case, the three-pole breakers are alternated with two-pole breakers.



RBAGP702-0

## Power cord configuration

Learn how to route power cords through floor tile cutouts.

The power cords exit the system from different points of the servers 9406-870 and 9406-890 frame as indicated in the following figure.

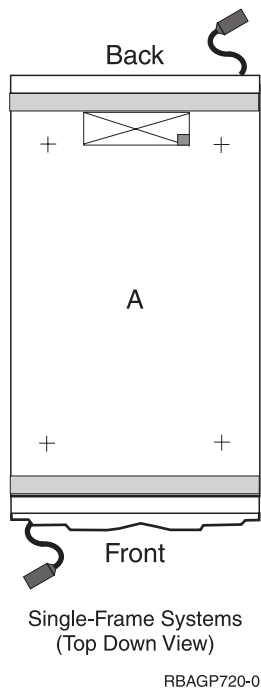


Figure 167. Single frame system power cord configuration

## Checking the facility outlets and power source

Use these guidelines to ensure that appropriate power is available for your servers.

**Attention:** Do not touch the receptacle or the receptacle faceplate with anything other than your test probes before you have met the following requirements.

Performing the following will ensure that appropriate power will be used by the iSeries<sup>®</sup> 9406-870 and 9406-890 system frames. The following checklist is for reference purposes and will likely be performed by a service engineer prior to installation.

1. The iSeries 9406-870 and 9406-890 system frames are equipped to use 200-240 V, 380-415 V, and 480 V alternating current, three-phase. Check that the correct power source is available.
2. Before system installation, locate and turn off the branch circuit breaker. Attach the "Do not operate" tag, S229-0237.
3. All measurements are made with the receptacle faceplate in the normally installed position. If the receptacle case or faceplate is painted, be sure the probe tip penetrates the paint and makes good electrical contact with the metal. Do not use a digital multimeter to measure grounding resistance. Some receptacles are enclosed in metal housings. On receptacles of this type, perform the following steps:
  - a. Check for less than 1 volt from the receptacle case to any grounded metal structure in the building, such as a raised floor metal structure, water pipe, building steel, or similar structure.
  - b. Check for less than 1 volt from receptacle ground pin to a grounded point in the building.
4. Check the resistance from the ground pin of the receptacle to the receptacle case. Check resistance from the ground pin to building ground. The reading should be less than 1.0 ohm, which indicates the presence of a continuous grounding conductor.
5. If any of the checks made in steps 2 and 3 are not correct, remove the power from the branch circuit and make the wiring corrections; then check the receptacle again.
6. Check for infinite resistance between the phase pins. This is a check for a wiring short.

**Attention:** If the reading is other than infinity, do not proceed. You must make the necessary wiring corrections to satisfy the criteria before continuing. Do not turn on the branch circuit, circuit breaker until all the above steps are satisfactorily completed.

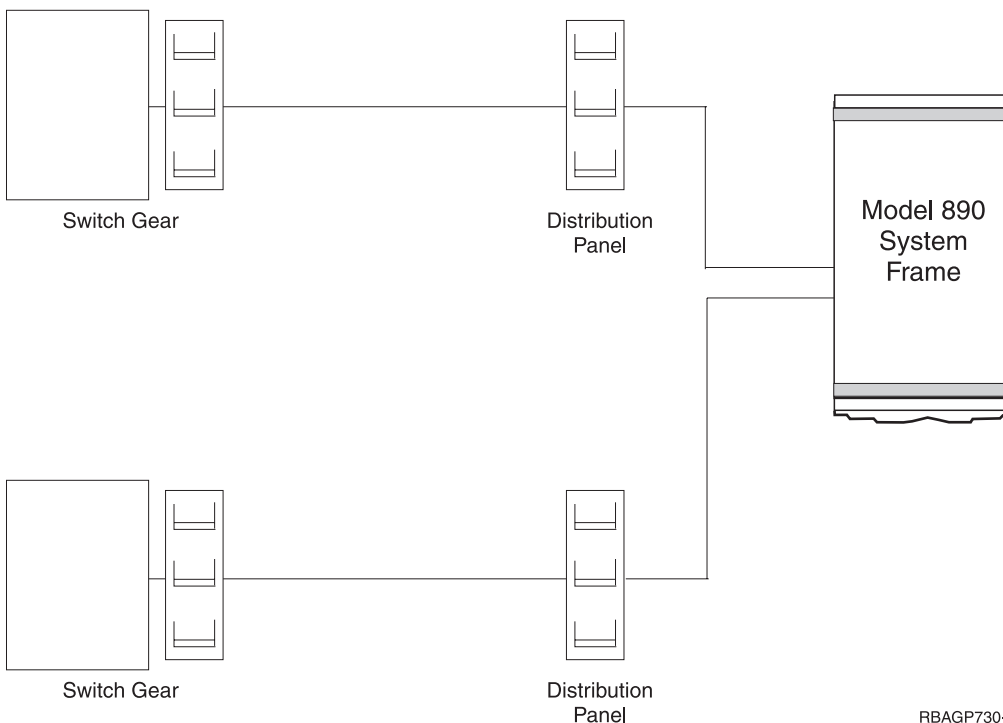
7. Remove the "Do not operate" tag, S229-0237.
8. Turn on the branch-circuit circuit breaker. Measure for appropriate voltages between phases. If no voltage is present on the receptacle case or grounded pin, the receptacle is safe to touch.
9. With an appropriate meter, verify that the voltage at the outlet is correct.
10. Verify that the grounding impedance is correct by using the ECOS 1020, 1023, B7106, or an appropriately approved ground impedance tester.
11. Turn off the branch-circuit circuit breaker.
12. Attach the "Do not operate" tag, S229-0237.
13. You are now ready to install and connect the power cables to the iSeries 9406-870 and 9406-890 system frames.

## Dual power installation

Three dual power installation configurations are available for your server.

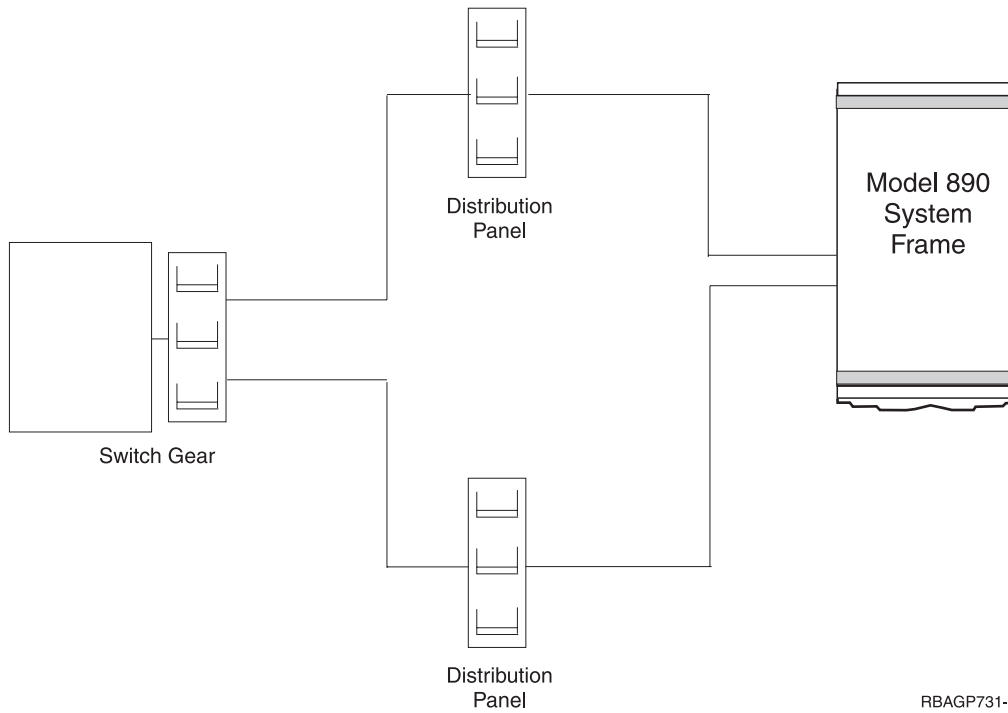
The iSeries 9406-890 system frame is designed with a fully redundant power system. Each system has two power cords attached to two power input ports which, in turn, power a fully redundant power distribution system within the system. To take full advantage of the redundancy and reliability that is built into the computer system, the system must be powered from two distribution panels. There are three possible power installation configurations.

**Dual power installation - redundant distribution panel and switch:** This configuration requires that the system receives power from two separate power distribution panels. Each distribution panel receives power from a separate piece of building switch gear. This level of redundancy is not available in most facilities.

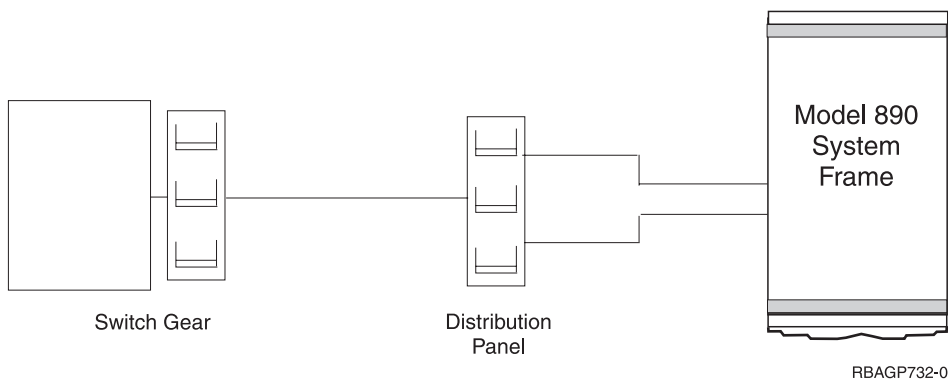




**Dual power installation - redundant distribution panel:** This configuration requires that the system receives power from two separate power distribution panels. The two distribution panels receive power from the same piece of building switch gear. Most facilities should be able to achieve this level of redundancy.



**Single distribution panel - dual circuit breakers:** This configuration requires that the system receives power from two separate circuit breakers in a single power panel. This does not make full use of the redundancy provided by the processor. It is, however, acceptable if a second power distribution panel is not available.



### Additional installation considerations

In the United States, installation must be made in accordance with Article 645 of the National Electric Code (NEC). In Canada, installation must be made in accordance with Article 12-020 of the Canadian Electrical Code (CEC).



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## Chapter 5. Expansion unit and migration tower specifications

Expansion unit and migration tower specifications provide detailed information for your hardware, including dimensions, electrical, power, temperature, environment, and service clearances.

Select a model to view its specifications.

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### 5074 expansion unit or 9079 expansion unit with 5078 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 5074 expansion unit or 9079 expansion unit with 5078 expansion unit.



Table 324. Dimensions

Dimensions	Width	Depth	Height	Maximum configuration weigh
Metric	485 mm	1075 mm	1110 mm	418 kg
English	19.1 in.	42.3 in.	43.8 in.	922 lb

Table 325. Electrical

Electrical characteristics	Properties
kVA (maximum)	1.470
Rated voltage frequency	200 - 240 V ac at 50-60 plus or minus 0.5 Hz
Thermal Output (maximum)	4573 Btu/hr

Table 325. Electrical (continued)

Electrical characteristics	Properties
Power requirements (maximum)	1340 W
Power factor	0.91
Inrush current	90 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 326. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 327. Environment requirements

Properties	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 328. Maximum altitude

3048 m (10 000 ft)
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Table 329. Noise emissions 5074

Properties	Operating	Idle
L <sub>WAd</sub>	6.7 bels	6.6 bels
L <sub>pAm</sub> (1-meter bystander)	48 dB	48 dB
For a description of noise emission values, see <i>Acoustics</i> .		

Table 330. Noise emissions 5074 with 5078 expansion unit

Properties	Operating	Idle
L <sub>WAd</sub>	6.9 bels	6.8 bels
L <sub>pAm</sub> (1-meter bystander)	52 dB	51 dB

Table 331. Service clearances

Front	Back	Sides <sup>1</sup>	Top <sup>1</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.
<sup>1</sup> Side and top clearances are optional during operation.			

**Related information:**

 Acoustics

## 5075 PCI expansion entry tower

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Dimensions are shown for the 5075 PCI expansion unit only.



Table 332. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	52.7 kg	330 mm	690 mm	560 mm
English	116 lb	12.9 in.	27.1 in.	22.0 in.

Table 333. Electrical

Electrical characteristics	Properties
kVA (maximum)	0.316
Rated voltage and frequency	100 - 127 V ac 200-240 V ac at 50-60 plus or minus 0.5 Hz
Thermal output (maximum)	1024 Btu/hr
Power requirements (maximum)	300 W
Power factor	0.95
Inrush current	74 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 334. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4 °F)	1 - 60 °C (33.8 - 140 °F)

Table 335. Environment requirements

Properties	Operating	Nonoperating
Noncondensing Humidity	8 - 80%	8 - 80%
Wet bulb temperature	23 °C (73.4 °F)	27 °C (80.6 °F)
Maximum altitude	3048 m (10 000 ft)	

Table 336. Noise emissions

Properties	Operating	Idle
L <sub>WAd</sub>	6.0 bels	5.7 bels
L <sub>pAm</sub> (1-meter bystander)	42 dB	39 dB
For a description of noise emission values, see <i>Acoustics</i> .		

Table 337. Service clearances

Front	Back	Sides <sup>1</sup>	Top <sup>1</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.
<sup>1</sup> Side and top clearances are optional when operating.			

**Related information:**

 Acoustics

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## 5078 or 0578 expansion unit for 5074 expansion unit, 9079 base, or 0551 IBM i rack

Hardware specifications provide detailed information for your expansion unit, or rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the **5078 or 0578 expansion unit**.

The 5078 or 0578 expansion unit is attached to the top of a 5074, 9079. Or it can be mounted in an 0551 IBM i rack.



Table 338. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height	Height in 0551 rack
Metric	68 kg	485 mm	1075 mm	200 mm	8 EIA
English	150 lb	19.1 in.	42.3 in.	8.0 in.	8 U

Feature code 0578 is PCI expansion unit in a rack.

Table 339. Electrical

Electrical Characteristics	Properties
kVA (maximum)	0.370
Rated voltage and frequency	200-240 V ac at 50-60 plus or minus 0.5 Hz
Thermal output (maximum)	1195 Btu/hr
Power requirements (maximum)	350 W
Power factor	0.95
Inrush current	48 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 340. Temperature requirements

Operating	Non operating
10 - 38°C (50 - 100.4 °F)	1 - 60°C (33.8 - 140°F)

Table 341. Environment requirements

Properties	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 342. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 343. Noise emissions

Properties	Operating	Idle
$L_{WAd}$ - 5078 with 5074 or 9079	5.7 bels	5.7 bels
$L_{pAm}$ (1-meter bystander) - 5078 with 5074 or 9079	40 dB	40 dB
For a description of noise emission values, see <i>Acoustics</i> .		

Table 344. Service clearances

Front	Back	Sides <sup>1</sup>	Top <sup>1</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.
<sup>1</sup> Side and top clearances are optional during operation.			

**Related information:**

 Acoustics

## 0588 and 5088 expansion unit for 5094 expansion unit, 9094 I/O expansion unit, 5074 expansion unit, 9079 I/O expansion unit, or 0551 System i rack

Hardware specifications provide detailed information for your expansion unit or rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the **0588 or 5088 PCI-X expansion unit**.

The 5088 PCI-X expansion unit is attached to the top of a 5094, 9094, 5074.

0588 is mounted in an 0551 system i rack.





Table 345. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height	Height in 0551 rack <sup>2,4</sup>
Metric	68 kg	485 mm	1075 mm	200 mm	8 EIA
English	150 lb	19.1 in.	42.3 in.	8.0 in.	8 U

Table 346. Electrical

Electrical characteristics	Properties
kVA (maximum)	0.370
Rated voltage and frequency	200-240 V ac at 50-60 plus or minus 0.5 Hz
Thermal output (maximum)	1195 Btu/hr
Power requirements (maximum)	350 W
Power factor	0.95
Inrush current	48 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 347. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 348. Environment requirements

Properties	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%

Table 348. Environment requirements (continued)

Properties	Operating	Nonoperating
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 349. Maximum altitude

3048 m (10 000 ft)
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Table 350. Noise emissions<sup>1</sup>

Properties	Operating	Idle
L <sub>WAd</sub> - 5088 with 5094, 9094, or 5074 expansion units	5.7 bels	5.7 bels
L <sub>pAm</sub> (1-meter bystander) - 5088 with 5094, 9094, or 5074 expansion units	40 dB	40 dB

Table 351. Service clearances

Front	Back	Sides <sup>3</sup>	Top <sup>3</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 352. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Feature code 0588 is a PCI-X expansion unit in a rack.</li> <li>3. Side and top clearances are optional during operation.</li> <li>4. See <i>0551 rack configurations</i> for typical configurations when the 0551 rack is populated with various server models.</li> </ol>
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**Related reference:**

“0551, 0553, 0555, and 7014 rack configurations” on page 451  
 The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

 Acoustics

## 5094 expansion unit, 9094 I/O expansion unit with 5088 PCI-X expansion unit, or 9194 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 5094 expansion unit or 9094 expansion unit with 5088 PCI-X expansion unit.



Table 353. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	418 kg	485 mm	1075 mm	1110 mm
English	922 lb	19.1 in.	42.3 in.	43.8 in.

Table 354. Electrical

Electrical characteristics	Properties
kVA (maximum)	1.470
Rated voltage and frequency	200 - 240 V ac at 50-60 plus or minus 0.5 Hz
Thermal output (maximum)	4573 Btu/hr
Power requirements (maximum)	1340 W
Power factor	0.91
Inrush current	90 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 355. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 356. Environmental requirements

Properties	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 357. Maximum altitude

3048 m (10 000 ft)
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Table 358. Noise emissions<sup>1</sup>

Properties	Operating	Idle
L <sub>WAd</sub>	6.7 bels	6.6 bels
L <sub>pAm</sub> (1-meter bystander)	48 dB	48 dB

Table 359. Service clearances

Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 360. Note

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Side and top clearances are optional during operation.</li> </ol>
--

**Related information:**

 Acoustics

## 0595 or 5095 PCI-X expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the PCI-X expansion unit.

Table 361. Dimensions for 5095 expansion unit

Dimensions	Width	Depth (with 30 mm (1.2 in.) front cover and 100 mm (3.9 in.) rear cover)	Height
Metric	217 mm	818 mm	555 mm
English	8.5 in.	32.2 in.	21.9 in.

Table 362. Dimensions for 0595 expansion unit

Dimensions	Width	Depth	Height	Height in 0551 rack <sup>2, 4</sup>
Metric	430 mm	658 mm	217 mm	5 EIA
English	16.9 in.	25.9 in.	8.5 in.	5 U

Table 363. Electrical

Electrical characteristics	Properties
Maximum configuration weight	52.7 kg (116 lb)
kVA (maximum)	0.358
Rated voltage and frequency	100 - 127 or 200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output (maximum)	1161 Btu/hr
Power requirements (maximum)	340 W
Power factor	0.95
Inrush current	60 A
Leakage current (maximum)	3.5 mA
Redundant power and cooling	1

Table 364. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4 °F)	1 - 60 C (33.8 - 140 °F)

Table 365. Environment requirements

Properties	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 366. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 367. Noise emissions<sup>1</sup>

Properties	Operating	Idle
L <sub>WAd</sub>	6.2 bels	6.1 bels
L <sub>pAm</sub> (1-meter bystander)	44 dB	43 dB

Table 368. Service clearances

Front	Back	Sides <sup>3</sup>	Top <sup>3</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 369. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Feature code 0595 is a PCI-X expansion unit in a rack.</li> <li>3. Side and top clearances are optional when operating.</li> <li>4. See <i>0551 rack configurations</i> for typical configurations when the 0551 rack is populated with various server models.</li> </ol>
--

**Related reference:**

“0551, 0553, 0555, and 7014 rack configurations” on page 451  
 The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

 Acoustics

## 5096 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 370. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height	Height in 0551 rack
Metric	280 kg	485 mm	1075 mm	910 mm	18 EIA
English	617 lb	19.1 in.	42.3 in.	35.8 in.	18 U

Table 371. Electrical

Electrical characteristics	Properties
kVA <sup>4</sup>	0.389 - 1.100
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal Output <sup>4</sup>	1075 - 3379 Btu/hr
Power requirements (maximum) <sup>4</sup>	315 - 990 W
Power factor	0.95
Inrush current	42 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 372. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 to 100.4 °F)	1 - 60°C (33.8 - 140 °F)

Table 373. Environment requirements

Properties	Operating	Nonoperating
Noncondensing Humidity	8 - 80%	8 - 80%
Wet bulb temperature	23 °C (73.4 °F)	27 °C (80.6 °F)

Table 374. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 375. Noise emissions<sup>1</sup>

Properties	Operating	Idle
L <sub>WAd</sub>	6.7 bels	6.6 bels
L <sub>pAm</sub> (1-meter bystander)	49 dB	49 dB

Table 376. Service clearances

Front	Back	Sides <sup>3</sup>	Top <sup>3</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 377. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. It is strongly recommended that you get the dual power cord feature (feature 5116) for this I/O expansion unit. Feature 5116 uses two power cords and has two AC boxes.</li> <li>3. Side and top clearances are optional when operating.</li> <li>4. Each tower can have 45 disk drives installed. Each disk drive that is installed adds 15 W, 0.0158 kVa to the power. The range of power represents configurations from no disk drives to 45 disk drives.</li> </ol>
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**Related information:**

 Acoustics

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## 5294 or 8294 1.8 m I/O rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the **5294 or 8294 1.8 m I/O rack**.

There are two 5094 expansions (with side covers and casters removed) in a 5294 1.8 m I/O rack.

Dimensions are shown for the 5294 1.8 m I/O rack only.



Table 378. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	726 kg	1800 mm	650 mm	1020 mm
English	1600 lb	71.0 in.	25.5 in.	40.1 in.

Table 379. Electrical<sup>(1, 2)</sup>

Electrical characteristics	5094(1)	5094 (2)
kVA <sup>4</sup>	1.100	1.100
Rated voltage and frequency	200-240 V ac at 50-60 plus or minus 0.5 Hz	200-240 V ac at 50-60 plus or minus 0.5 Hz
Thermal Output <sup>4</sup>	3379 Btu/hr	3379 Btu/hr
Power requirements (maximum) <sup>4</sup>	990 W	990 W
Power factor	0.91	0.91
Inrush current	50 A	50 A
Leakage current (maximum)	3.5 mA	3.5 mA
Phase	1	1

Table 380. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 381. Environment requirements

Properties	Operating	Non-Operating
Noncondensing Humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)



Table 382. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 383. Noise emissions<sup>1</sup>

Properties	Operating	Idle
L <sub>WAd</sub> Category 2E, General business	7.0 bels	6.9 bels
<L <sub>pA</sub> > <sub>m</sub>	52 dB	52 dB

Table 384. Service clearances

Dimensions	Front	Back	Sides	Top
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 385. Notes

Notes:
1. Because the 5294 1.8 m I/O rack consists of two 5094 PCI-X expansion units, electrical requirements for each 5094 need to be planned for individually. Hence, the (1) and (2) represent the specs for each 5094. The 5094 requires the appropriate receptacle for the power cord included with each 5094
2. The usable length of the power cord for the top/upper 5094 is reduced by 4 ft (1.2 m) because of the routing inside the 1.8 m enclosure. Therefore, a 14 ft (4.3 m) cord results in a usable length of 10 ft (3 m), and a 9 ft (2.7 m) cord results in a usable length of 5 ft (1.5 m).

For information about floor loading, contact your IBM service or Installation Planning representative. Because the thickness of the covers are negligible, the height, width, and depth of the overall dimensions might be used in floor loading calculations.

## 5296 1.8 m I/O rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 386. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	726 kg	650 mm	1020 mm	1800 mm
English	1600 lb	25.5 in.	40.1 in.	71.0 in.

Table 387. Electrical

Electrical characteristics	5096 <sup>1</sup>	5096 <sup>2</sup>
kVA <sup>3</sup>	0.389 - 1.100	0.389 - 1.100
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output (maximum) <sup>3</sup>	1075 - 3379 Btu/hr	1075 - 3379 Btu/hr
Power requirements (maximum) <sup>3</sup>	315 - 990 W	315 - 990 W
Power factor	0.95	0.95
Inrush current	50 A	50 A
Leakage current (maximum)	3.5 mA	3.5 mA

Table 387. Electrical (continued)

Electrical characteristics	5096 <sup>1</sup>	5096 <sup>2</sup>
Phase	1	1

Table 388. Temperature requirements

<b>Operating</b>	<b>Nonoperating</b>
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 389. Environment requirements

<b>Properties</b>	<b>Operating</b>	<b>Non-Operating</b>
Noncondensing Humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 390. Maximum altitude

3048 m (10 000 ft)
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Table 391. Noise emissions<sup>1</sup>

<b>Properties</b>	<b>Operating</b>	<b>Idle</b>
L <sub>WAd</sub> Category 2E, General business	7.0 bels	6.9 bels
L <sub>pAm</sub> (1-meter bystander)	52 dB	52 dB

Table 392. Service clearances

<b>Dimensions</b>	<b>Front</b>	<b>Back</b>	<b>Sides</b>	<b>Top</b>
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 393. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Because the 5296 1.8 m I/O rack consists of two 5096 expansion units, electrical requirements for each 5096 need to be planned for individually. Hence, the (1) and (2) represent the specifications for each 5096. The 5096 requires the appropriate receptacle for the power cord included with each 5096</li> <li>2. The usable length of the power cord for the top/upper 5096 is reduced by 4 ft (1.2 m) because of the routing inside the 1.8 m enclosure. Therefore, a 14 ft (4.3 m) cord results in a usable length of 10 ft (3 m), and a 9 ft (2.7 m) cord results in a usable length of 5 ft (1.5 m).</li> <li>3. Each 5096 can have 45 disk drives installed. Each disk drive that is installed adds 15 W, 0.0158 kVa to the power. The range of power represents configurations from no disk drives to 45 disk drives.</li> </ol>
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For information about floor loading, contact your IBM service or Installation Planning representative. Because the thickness of the covers are negligible, the height, width, and depth of the overall dimensions might be used in floor loading calculations.

## 5786, 5787, 7031-D24, and 7031-T24 expansion units

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 394. Dimensions for rack-mounted expansion unit

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	54 kg	447 mm	660 mm	171 mm
English	120 lb	17.5 in.	26 in.	6.75 in.

Table 395. Dimensions for stand-alone expansion unit with stabilizer foot and decorative covers

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	66 kg	305 mm	655 mm	508 mm
English	145 lb	12.0 in.	26.0 in.	20.0 in.

Table 396. Electrical

Electrical characteristics	Properties
kVA	0.740
Rated voltage and frequency	100 - 127 V ac at 50-60 plus or minus 3 Hz and 12 A 200 - 240 V ac at 50-60 plus or minus 3 Hz and 6.2 A Machine rating with two redundant power cords
Thermal output (maximum)	2382 Btu/hr
Power requirements (maximum) <sup>4</sup>	700 W
Power factor	0.95
Inrush current	55 A per power cord
Leakage current (maximum)	3.10 mA
Phase	1

Table 397. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F) <sup>3</sup>	-40 - 60°C (-40 - 140°F)

Table 398. Environment requirements

Properties	Operating	Non-Operating
Noncondensing Humidity	20 - 80% (allowable) 40 - 55% (recommended)	8 - 80% (including condensing)
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)

Table 399. Maximum altitude

2134 m (7000 ft) above sea level
----------------------------------

Table 400. Noise emissions<sup>1,4</sup>

Models	Properties	Operating	Idle
Single 5786 or 7031-D24 drawer in standard 19-inch rack with 24 hard drives, nominal environmental conditions, and no front or rear doors on rack.	L <sub>WAd</sub>	6.6 bels	6.5 bels
	L <sub>pAm</sub> (1-meter bystander)	49 dB	49 dB
5787 or 7031-T24 tower with 24 hard drives, and nominal environmental conditions.	L <sub>WAd</sub>	6.6 bels	6.5 bels
	L <sub>pAm</sub> (1-meter bystander)	47 dB	47 dB

Table 401. Service clearances for rack-mounted expansion unit

Dimensions	Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
Metric	914 mm	914 mm	914 mm	
English	36 in.	36 in.	36 in.	

Table 402. Service clearances for stand-alone expansion unit

Front	Back	Sides	Top
368.3 mm	381 mm		
14.5 in.	15 in.		

Table 403. Notes

Notes:
1. For a description of noise emission values, see <i>Acoustics</i> .
2. Side and top clearances are optional during operation.
3. The maximum 38°C (100.4 °F) temperature must be derated 1°C (1.8 °F) per 137 m (450 ft) above 1295 m (4250 ft). Maximum altitude is 2134 m (7000 ft).
4. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.

**Safety compliance:** This hardware is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950-00; EN 60950; IEC 60950 including all National Differences

**Related information:**

 Acoustics

## 5790 PCI expansion drawer

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 404. Dimensions for 5790

Measurements	Height	Width	Depth	EIA
Metric	170 mm	220 mm	711 mm	3.8
English	6.6 in.	8.7 in.	28.0 in.	

Table 405. Dimensions for two 5790s with 7311 enclosure

Measurements	Height	Width	Depth	EIA
Metric	178 mm	445 mm	711 mm	4
English	7.0 in.	17.5 in.	28.0 in.	

Table 406. Weight

Measurements	5790	Two 5790 with 7311 enclosure
Metric	16.8 kg	39.1 kg
English	37 lb	86 lb

Table 407. Electrical

Electrical characteristics	Properties
Power source loading per 5790	0.21 kVa
Voltage range	200 - 240 V ac, v dc not supported
Frequency	50 or 60 Hz
Thermal output per 5790	683 Btu/hr
Power requirements for 5790	200 W
Power factor	0.91
Inrush current	64 A

Table 408. Temperature requirements

Measurements	Operating	Nonoperating	Storage
Metric	10 - 38°C	1 - 60°C	1 - 60°C
English	50 - 100.4°F	33.8 - 140°F	33.8 - 140°F

Table 409. Environment requirements

Environment requirements	Operating	Nonoperating	Storage
Noncondensing humidity	8 - 80%	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)	29°C (84.2°F)

Table 410. Altitude

Maximum altitude	3048 m (10 000 ft)		
Noise emissions <sup>1</sup>	Operating	Idle	
L <sub>WAd</sub> , two 5790	5.9 bels	5.9 bels	
<L <sub>pA</sub> > <sub>m</sub> , two 5790	43 dB	43 dB	
Install/Air Flow	Maintenance of service clearance will allow proper airflow.		
<sup>1</sup> For a description of noise emission values, see <i>Acoustics</i> .			

Table 411. Service clearances

Front	Back
762 mm	762 mm
30 in.	30 in.

**Related information:**

 Acoustics

## 5877 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

*Table 412. Dimensions for rack-mounted expansion unit*

Maximum configuration weight	Width	Depth	Height
48 kg (105 lb)	444.5 mm (17.5 in.)	711.2 mm (28 in.)	4U

*Table 413. Electrical*

Electrical characteristics	Properties
kVA (maximum)	0.531 kVA
Rated voltage and frequency	100 - 127 V ac or 200 - 240 V ac at 50 - 60 Hz
Thermal output (maximum)	1760 BTU/hr
Power requirements (maximum)	515 W
Power factor	0.97
Leakage current (maximum)	3.5 mA
Phase	Single
Plug type (Canada and U.S.)	26
Power cord length	14 ft

*Table 414. Temperature requirements*

Operating	Storage	Shipping
10 - 38°C (32 - 100.4°F)	1 - 60°C (33.8 - 140°F)	-40 - 60°C (-40 - 140°F)

*Table 415. Environment requirements*

Properties	Operating	Nonoperating	Storage	Shipping
Noncondensing humidity	Recommended: 34 - 54% Allowable: 20 - 80%	5 - 80%	5 - 80%	5 - 100%

*Table 416. Maximum altitude*

3048 m (10 000 ft)
--------------------

*Table 417. Noise emissions*

Models	Properties
IBM Feature Code 5802 - 4U I/O drawer consists of 18 SSF disk drives, 10 PCI Express 8x slots, and 2 DCAs	L <sup>WAd</sup> (B)
	L <sup>pAm</sup> (dB)

Table 417. Noise emissions (continued)

Models	Properties
<b>Notes:</b> <ol style="list-style-type: none"> <li>1. <math>L^{WAd}</math> is the upper-limit A-weighted sound power level (rounded to the nearest 0.1 bel).</li> <li>2. <math>L^{PA_m}</math> is the mean A-weighted emission sound pressure level measured at the 1 meter bystander positions (rounded to the nearest dB).</li> <li>3. 10 dB (decibel) equals 1 B (bel).</li> <li>4. All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.</li> </ol>	

Table 418. Service clearances

Front	Back	Sides
915 mm (36 in. )	915 mm (36 in. )	914 mm (36 in. )

## Planning for 5792 base rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

The 5792 base rack is an optional second base frame with its own separate connection to AC power that is designed for use with model 590, and 595. A complete set of planning information is provided to address the resulting system.

The 5792 consists of multiple components, as summarized in the following table.

Table 419. 5792 base rack components

Model	Description	Minimum per system	Maximum per system
FC6251	Slimline door set for primary rack (front and rear) See <i>Doors and covers</i> .	1	2
FC6252	Acoustic door set for primary rack (front and rear) See <i>Doors and covers</i> .	1	2
FC8691	Optional expansion frame (16-core and 32-core only)	0	1
Various	Hardware Management Console (HMC) <sup>3</sup>	0 <sup>1</sup>	2 <sup>1</sup>
7040-61D (9119-590 and 9119-595), 5791 and 5794 (9406-595)	Optional I/O drawer (20 PCI cards max., 16 disk drives max.)	0	12 <sup>2</sup>
FC6200 or FC6201	Optional integrated battery backup feature	0	6

**Note:**

1. A Hardware Management Console (HMC) can connect to multiple systems (therefore, a Hardware Management Console might not need to be ordered), or up to two HMCs can connect to the system for redundancy.
2. A maximum of 12 I/O drawers can be connected to a single 590 or 595 frame. Typically, I/O drawers are populated in the server frame first, which reduces the maximum number of drawers available in the 5792 frame.
3. For the 5792 base rack, a Hardware Management Console must be provided within the same room and within 8 m (26 ft) of the server. Or, as an alternative to the local HMC requirement, it is acceptable for you to provide a supported device, such as a PC, with connectivity and authority to operate through a remotely attached HMC. This local device must be in the same room and within 8 m (26 ft) of your server, and provide functional capability equivalent to the HMC that it replaces and that is needed by the service representative to service the server.

Table 420. Dimensions and weight

Physical Characteristic	Slimline doors		Acoustical doors	
	1 Frame	2 Frames	1 Frame	2 Frames
Height	2025 mm (79.7 in.)	2025 mm (79.7 in.)	2025 mm (79.7 in.)	2025 mm (79.7 in.)
Width	785 mm (30.9 in.)	1575 mm (62.0 in.)	785 mm (30.9 in.)	1575 mm (62.0 in.)
Depth	1326 mm (52.2 in.)	1326 mm (52.2 in.)	1681 mm (66.2 in.)	1681 mm (66.2 in.)
Weight - Maximum Configuration <sup>4</sup>	1264 kg (2786 lb)	2659 kg (5863 lb)	1273 kg (2806 lb)	2677 kg (5901 lb)

Table 421. Shipping dimensions and weight

Dimensions	Height	Width	Depth	Weight
Metric	2311 mm	940 mm	1511 mm	Varies by configuration
English	91 in.	37 in.	59.5 in.	Varies by configuration

Table 422. Electrical and thermal characteristics (3-phase)

Electrical characteristics	Properties		
Rated voltage and frequency (three-phase)	200 - 240 V ac at 50 - 60 Hz	380 - 415 V ac at 50 - 60 Hz	480 V ac at 50 - 60 Hz
Rated current, power cord with 100 A plug FC 8686 or 8687 (amperes per phase)	60	32	24
Rated current, power cord with 60 A plug, FC 8688 or 8689 (amperes per phase)	48	--	--
Rated current, all other power cords (amps per phase)	--	32	24
Maximum power	21.4 kW	21.4 kW	21.4 kW
Power factor, typical	0.99	0.97	0.93
Inrush current (maximum) <sup>3</sup>	163 A	163 A	163 A
Thermal output	73 kBtu/hr	73 kBtu/hr	73 kBtu/hr

Table 423. Cord information

Dual power feature code	Standard
Branch circuit breaker and cord information	See <i>Breaker rating and cord information</i>

Table 424. Environment specifications

Recommended operating temperature	Nonoperating temperature (All models)	Storage temperature (All models)	Shipping temperature (All models)
10 - 32 °C (50 - 89.6 °F)	10 - 43 °C (50 - 109.4 °F)	1 - 60 °C (33.8 - 140 °F)	-40 - 60 °C (-40 - 140 °F)



Table 425. Environment requirements

Environment	Operating	Nonoperating	Storage <sup>3</sup>	Shipping <sup>3</sup>
Maximum wet bulb	23 °C (73.4 °F)	27 °C (80.6 °F)	29 °C (84.2 °F)	29 °C (84.2 °F)
Noncondensing relative humidity	8 - 80 %	8 - 80 %	5 - 80 %	5 to 100 %
Maximum altitude <sup>3</sup>	3048 m (10 000 ft)	3048 m (10 000 ft)	3048 m (10 000 ft)	3048 m (10 000 ft)

Table 426. Acoustical noise emissions<sup>1, 5, 6</sup>

Product Configuration	L <sub>WAd</sub> (Bels) <sup>5</sup>		LpAM (dB) <sup>5</sup> (bystander, 1 m)	
	Operating	Idle	Operating	Idle
Single, typical I/O drawer in rack, nominal conditions, slimline door set	7.5	7.5	60	60
Single, typical I/O drawer in rack, nominal conditions, acoustical door set	6.8	6.8	53	53
Single, typical I/O drawer in rack plus bulk power unit, nominal conditions, slimline door set	7.8	7.8	62	62
Single, typical I/O drawer in rack plus bulk power unit, nominal conditions, acoustical door set	7.1	7.1	55	55

**Service clearances:** For a graphical representation of service clearances, see *Service clearances*.

**Seismic considerations:** See *Securing the rack*.

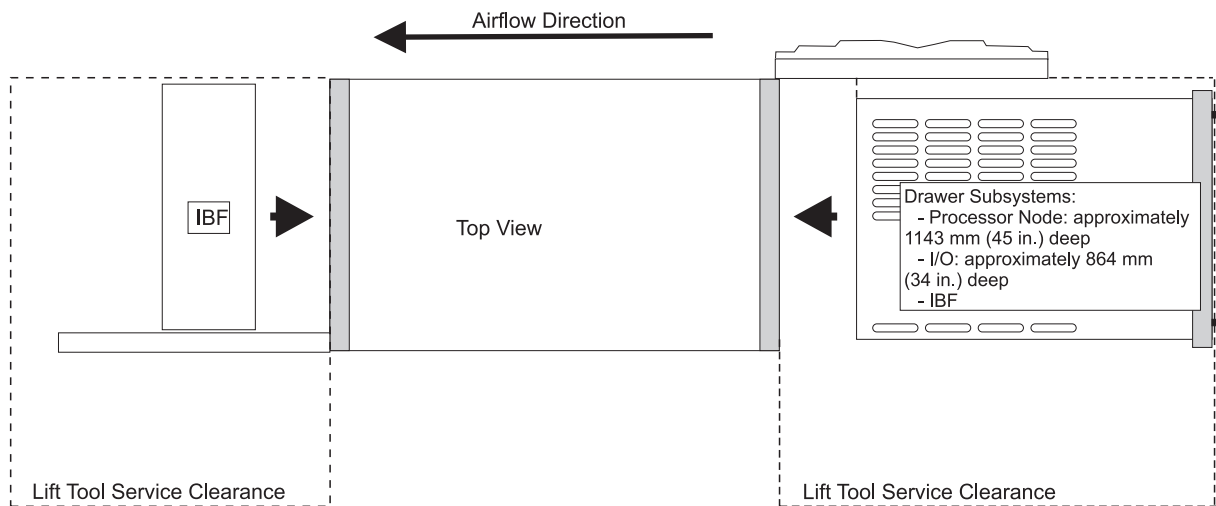
**Electromagnetic compatibility compliance:** This server meets the following electromagnetic compatibility specifications: FCC (CFR 47, Part 15); VCCI; CISPR-22; 89/336/EEC; BSMI (A2/NZS 3548:1995); C-Tick; ICES/NMB-003; Korean EMI/EMC (MIC Notice 2000–94, Notice 2000–72); People's Republic of China Commodity Inspection Law

**Safety compliance:** This server is designed and certified to meet the following safety standards: UL 60950-1; CAN/CSA C22.2 No. 60950-1; EN 60950-1; IEC 60950-1 including all national differences

Table 427. Notes

- Note:**
- Noise levels are only reported for the base machine type.
  - Inrush currents occur only at initial application of power (short duration for charging capacitors). No inrush occurs during normal power off-on cycle.
  - The upper limit of the dry bulb temperature must be derated 1 °C (1.8 °F) per 219 m (719 ft) above 1295 m (4250 ft). Maximum altitude is 3048 m (10000 ft).
  - For specific configuration weights, see *Approximate system weights by configuration* .
  - $L_{wAd}$  is the upper-limit A-weighted sound level;  $LpAM$  is the mean A-weighted sound pressure measured at the 1-meter bystander positions; 1 B = 10 dB.
  - All measurements made in conformance with ISO 7779 and declared in conformance with 9296.

Front-service access is necessary on the 5792 to accommodate a lift tool for the servicing of large drawers (I/O drawers). Front and rear service access is necessary to accommodate the lift tool for servicing of the optional integrated battery backup.



Floor Plan Considerations for Single Units

A4AA5731-1

Figure 168. Floor plan considerations for single units

**Related reference:**

“Model 9119-590, 9406-595, and 9119-595 server specifications” on page 140  
 Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

**Breaker rating and cord information**

Use the Breaker rating and cord information table to determine the circuit breaker rating for the power cords used with your server.

Table 428. Breaker rating and cord information

Voltage (Phase to phase)	200-240 V	200-240 V	380-415 V	480 V
Circuit breaker rating	60 A (60 A plug) or 80 A (100 A plug)	63 A (No plug)	30 A	32 A

Table 428. Breaker rating and cord information (continued)

<b>Note:</b>
1. The exact circuit breaker ratings might not be available in all countries. Where the specified circuit breaker ratings are not acceptable, use the nearest available rating. These recommendations are based on a maximum configuration running in "n-mode."
2. IBM encourages the use of a metal backbox with power cords using IEC 60309 plugs.

## Power cord features

Use the Power cord features table to view the power cord specifications available for your server.

The following three-phase power cord features are available for the 5792:

Table 429. Power cord features

Supply type	Nominal voltage range (V ac)	Voltage tolerance (V ac)	Frequency range (Hz)	
Two redundant three-phase power cords	200-480	180-509	47-63	
<b>Note:</b>				
Feature code	Description	Voltage (V ac)	Plug	Customer receptacle (not provided)
8697	Power cord, 8 AWG, 4.3 m (14 ft)	480	IEC 60309 30 A plug	IEC 60309 Type 430R7W
8698	Power cord, 8 AWG, 1.8 m (6 ft)			
8688	Power cord, 6 AWG, 4.3 m (14 ft)	200-240	IEC 60309 60 A plug	IEC 60309 Type 460R9W
8689	Power cord, 6 AWG, 1.8 m (6 ft)			
8686	Power cord, 6 AWG, 4.3 m (14 ft)	200-240	IEC 60309 100 A plug	IEC 60309 Type 4100R9W
8687	Power cord, 6 AWG, 1.8 m (6 ft)			
8694 <sup>1</sup>	Power cord, 6 AWG, 4.3 m (14 ft)	380-415	Not provided	--
8677 <sup>1</sup>	Power cord, 8 AWG, 4.3 m (14 ft)	380-415		
<b>Note:</b>				
1. These power cords are shipped without a plug or receptacle. An electrician might be required to install the plug and receptacle to meet applicable country or region electrical codes.				

## Doors and covers

Covers are an integral part of the 5792 and are required for product safety, proper airflow and cooling, and electromagnetic compatibility compliance.

The following rear door options are available for the 5792:

- Enhanced acoustical cover option

This feature provides a low-noise option for sites with stringent acoustical requirements and where a minimal system footprint is not critical. The acoustical cover option consists of a special front and rear

doors which are approximately 250 mm (10 in.) deep and contain acoustical treatment that lowers the noise level of the machine by approximately 7 dB (0.7 B) compared to the slimline doors. This reduction in noise emission levels means that the noise level of a single 5792 with slimline covers is about the same as the noise level of five model 5792 systems with acoustical covers.

- Slimline cover option

This feature provides an option to take up less floor space and cost less, when space is be more critical than acoustical noise levels. The slimline cover option consists of a front door, which is approximately 100 mm (4 in) deep, and a rear door, which is approximately 50 mm (2 in) deep. No acoustical treatment is available for this option.

**Note:** For declared levels of acoustical noise emissions, refer to *Planning for 5792 base rack*.

## Plan views

Dimensional planning information is shown in this top down view of your server.

The following figures show dimensional planning information for systems with acoustical doors.

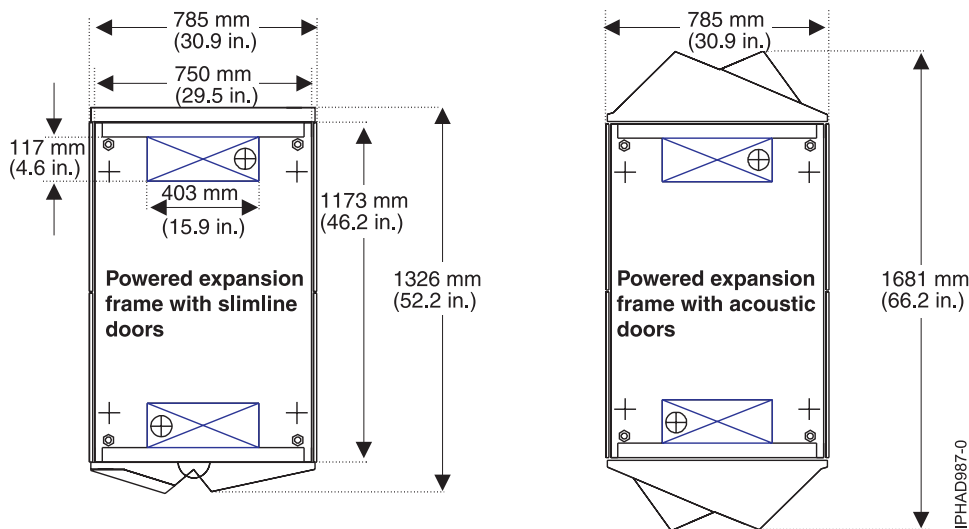


Figure 169. Plan view for single-frame systems with slimline doors and acoustical doors

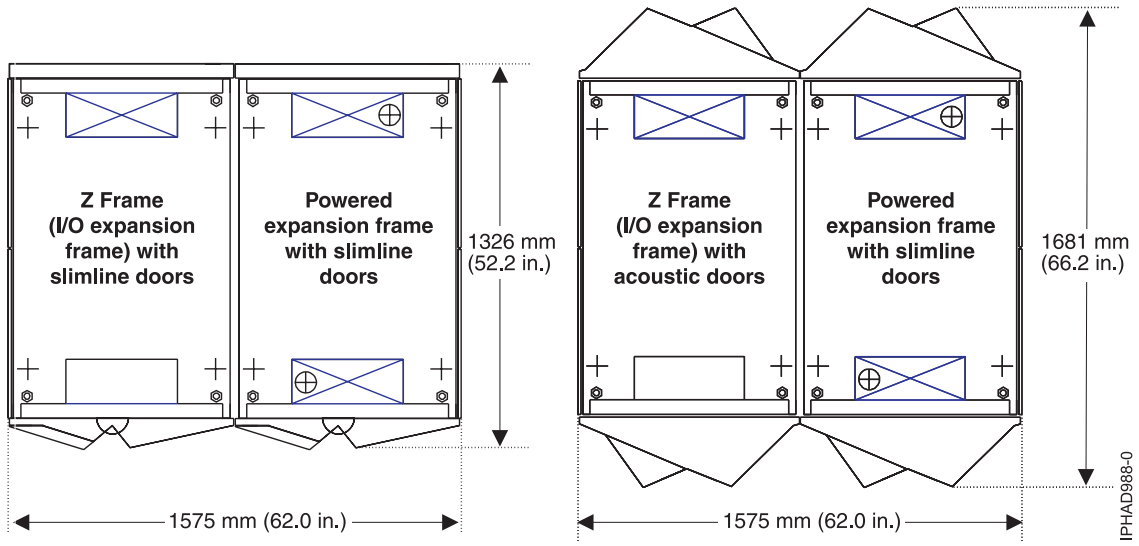


Figure 170. Plan view for double-frame systems with slimline doors and acoustical doors

**Attention:** When moving the rack, note the caster swivel diameters shown in the following figure. Each caster swivels in an approximate 130 mm (5.1 inch) diameter.

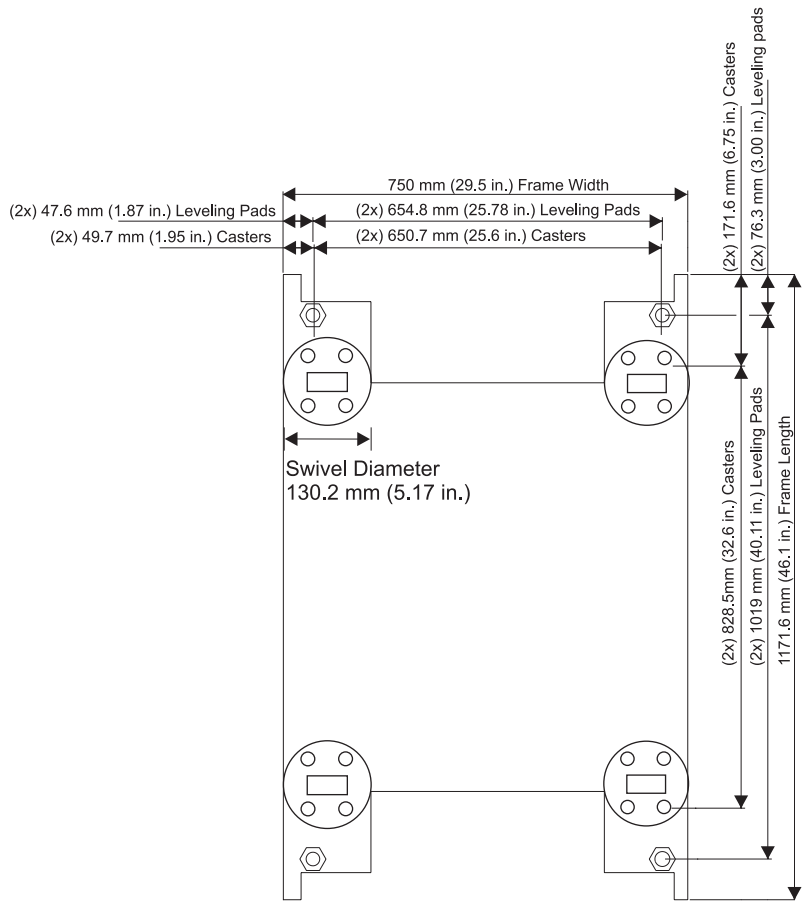


Figure 171. Leveling foot and frame dimensions

## Raised-floor requirements and preparation

A raised-floor is required for the 5792 to ensure optimal performance and to comply with electromagnetic compatibility requirements.

It will also provide optimum system cooling and cable management. Raised-floor cutouts should be protected by electrically nonconductive molding, appropriately sized, with edges treated to prevent cable damage and to prevent casters from rolling into the floor cutouts.

## Cutting and placing floor panels

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

Use the following procedure to cut and place floor panels in the raised floor. The x-y alphanumeric grid positions are used to identify relative positions of cutout floor panels that might be cut in advance.

1. Measure the panel size of the raised floor.
2. Verify the floor panel size. The floor panel size illustrated is 600 mm (23.6 in.) and 610 mm (24 in.) panels.

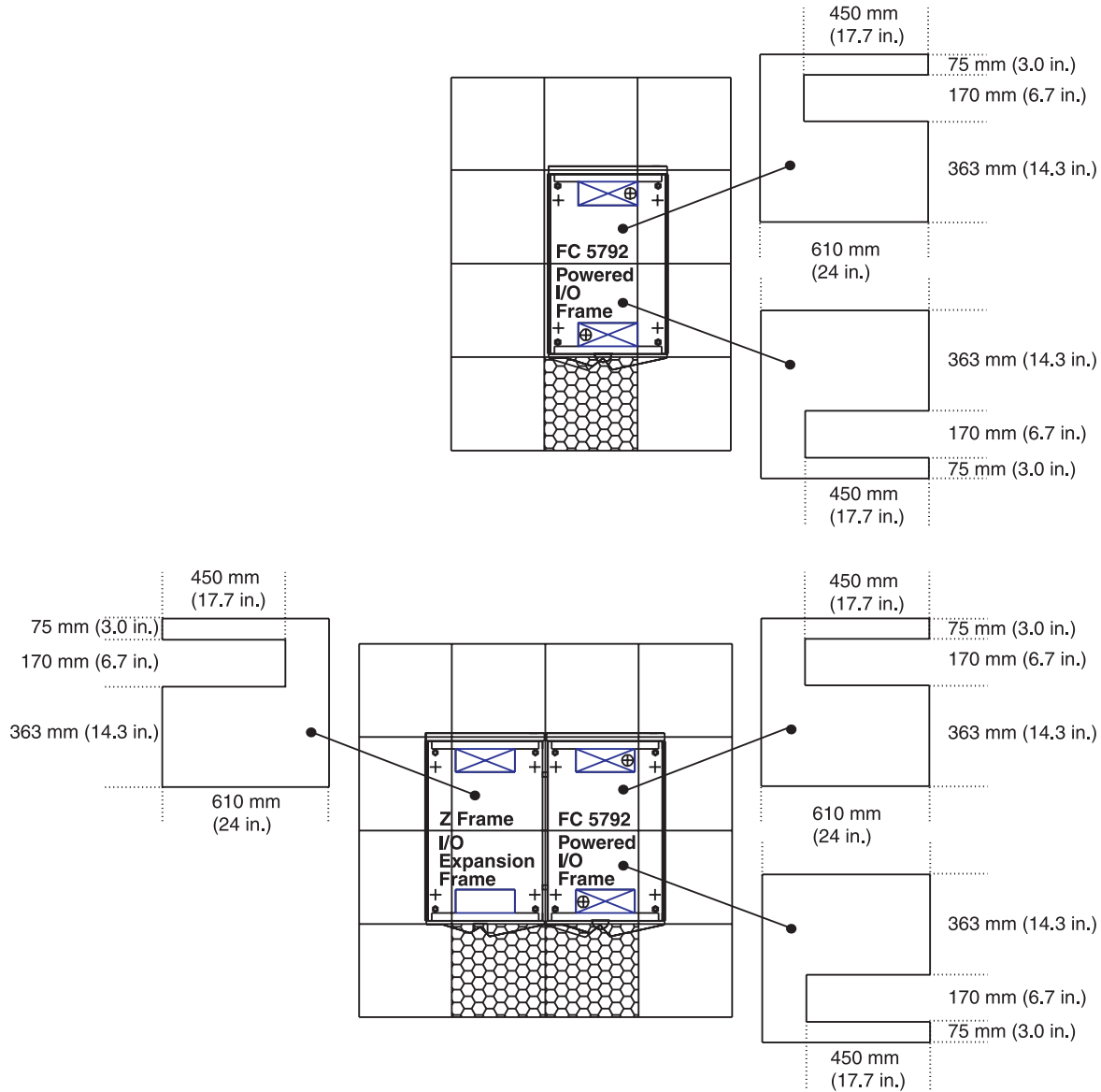
3. Ensure adequate floor space is available to place the frames over the floor panels exactly as shown in the figure. For front-to-back and side-to-side clearances, refer to *Planning for 5792 base rack*. Use the plan view, if necessary. Consider all obstructions above and below the floor.
4. Identify the panels needed, and list the total quantity of each panel required for the installation.
5. Cut the required quantity of panels. When cutting the panels, you must adjust the size of the cut for the thickness of the edge molding you are using. The dimensions shown in the figures are finished dimensions. For ease of installation, number each panel as it is cut, as shown in the following figure.

**Note:** Depending on the panel type, additional panel support (pedestals) might be required to restore structural integrity of the panel. Consult the panel manufacturer to ensure that the panel can sustain a concentrated load of 476 kg (1050 lb). For multiple frame installation, it is possible that two casters will produce loads as high as 953 kg (2100 lb).

6. Use *Raised floor with 610 mm (24 in.) floor panels figure* to install the panels in the proper positions.

**Note:**

- a. This floor-tile arrangement is recommended so that the castors or leveling pads are placed on separate floor tiles to minimize the weight on a single floor tile. Furthermore, it is recommended that the tiles bearing the weight (having castors or leveling pads on the tiles) should be uncut to retain the strength of the floor tile.
- b. The following figure is intended only to show relative positions and accurate dimensions of floor cutouts. The figure is not intended to be a machine template and is not drawn to scale.



**Note:** This figure shows a dual frame configuration. If your installation uses a single frame configuration, use the dimensions associated with the primary frame.

Figure 172. Raised floor with 610 mm (24 in.) floor panels figure

**Related reference:**

“Considerations for multiple-system installations” on page 348  
 Learn about the installation requirements for a multiple-system installation.

### Securing the rack

Securing your rack to a concrete (nonraised) floor or to a raised floor prevents movement when vibrations occur.

**Note:** Securing the rack is an optional procedure. See *Vibration and shock* for more information.

The following can be ordered by the customer as additional rack-securing options for the 5792.



- Request for Price Quotation (RPQ) 8A1183 for attaching the rack-mounting plates to the concrete floor (nonraised floor)
- RPQ 8A1185 to attach the rack to a concrete floor when server is on a raised floor 228.6 - 330.2 mm (9 - 13 in. depth)
- RPQ 8A1186 to attach the rack to a concrete floor when server is on a raised floor 304.8 - 558.8 mm (12 - 22 in. depth)

Before the service representative can perform the tie-down procedure you must complete the floor preparation described in *Cutting and placing floor panels* and the procedures described in *Attaching the rack to a concrete (nonraised) floor* or *Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor*.

**Related reference:**

“Cutting and placing floor panels” on page 334

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

“Attaching the rack to a concrete (nonraised) floor” on page 338

Use this procedure to attach the rack to a concrete (nonraised) floor.

“Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor” on page 340

Use these steps to attach your rack to a 228.6 mm to 330.2 mm (9 in. to 13 in. depth). floor.

**Related information:**

 Vibration and shock

## Installing the frame tie-down kit

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

The following procedures describe how to install a frame tie down kit and floor tie-down hardware to secure an IBM rack to a concrete floor beneath a 228.6 mm to 330.2 mm (9 in. to 13 in. depth) or a 304.8 mm to 558.8 mm (12 in. to 22 in. depth) raised-floor environment or to a nonraised floor.

## Positioning the rack

Use this procedure to unpack and position your rack.

To unpack and position the rack, do the following:

**Note:** See *Moving the system to the installation site* before attempting to position the rack.

1. Remove all packing and tape from the rack.
2. Place the last floor covering exactly adjacent and in the front of the final installation location.
3. Position the rack according to the customer floor plan.
4. Lock each caster wheel by tightening the thumbscrew on the caster.

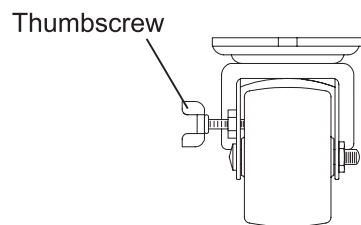


Figure 173. Caster thumbscrew

5. While moving the system to its final installed location and during relocation, it might be necessary to lay down floor covering, such as Lexan sheets, to prevent floor panel damage.

**Related reference:**

“Moving the system to the installation site” on page 360

Several factors must be considered before moving the system to the installation site.

### **Attaching the rack to a concrete (nonraised) floor**

Use this procedure to attach the rack to a concrete (nonraised) floor.

It is your responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

**Note:** You should obtain the service of a qualified structural engineer to determine appropriate anchoring of the mounting plates. A minimum of three anchor bolts for each mounting plate must be used to secure the plates to the concrete floor. Because some of the drilled holes might be aligned with concrete reinforcement rods below the surface of the concrete floor, additional holes must be drilled. Each mounting plate must have at least three usable holes, two that are on opposite sides and opposite ends of each other, and one hole at the center. The mounting plates should be able to withstand 1134 kg (2500 lb) of pulling force on each end.

1. Be sure the rack is in the correct location. To ensure that the holes are in the correct location, the diagonal distance of the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side-to-side distance) and 1019 mm (40.1 in.) (the front-to-back distance).

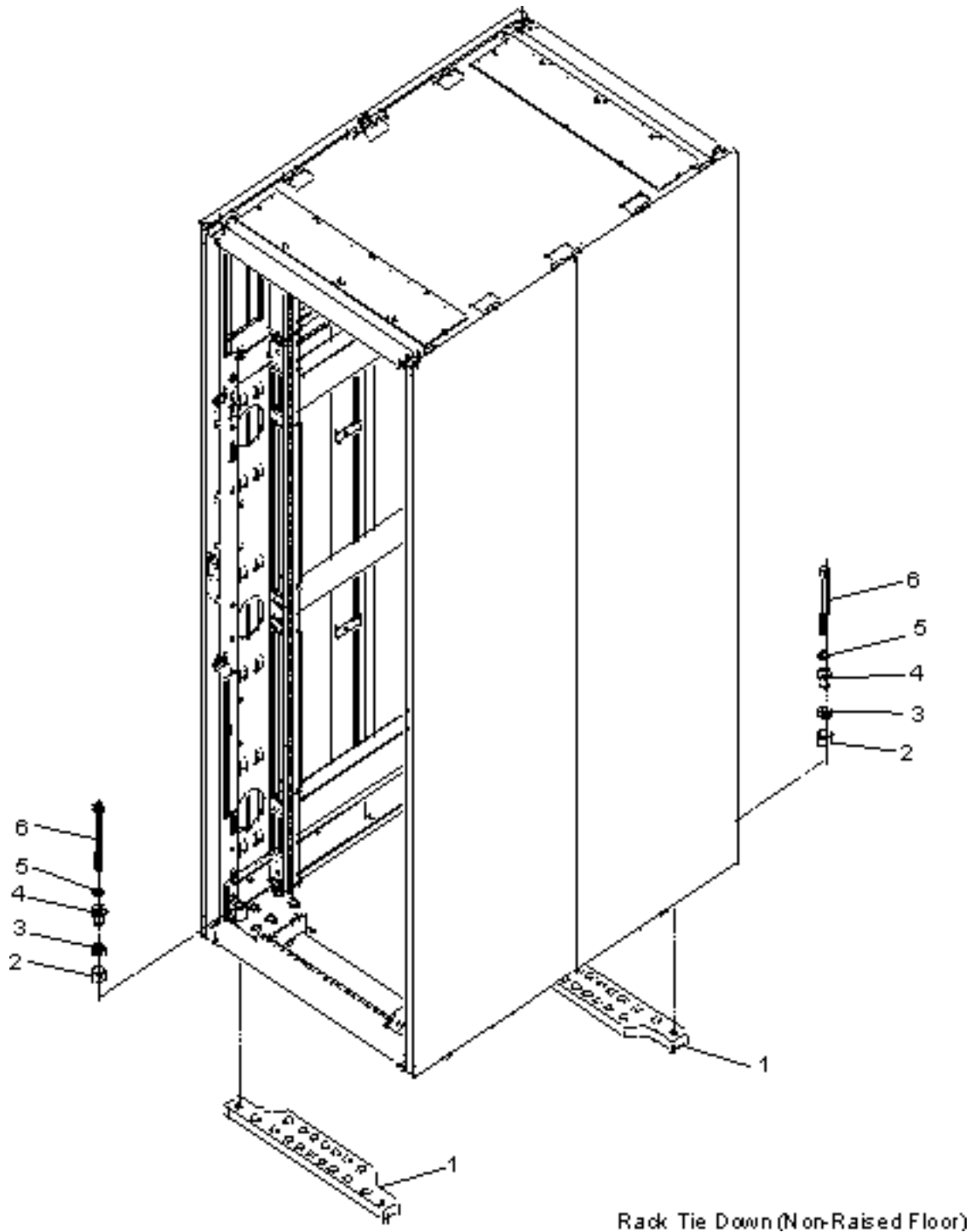


Figure 174. Rack tie down (nonraised floor)

2. Place the mounting plates (item 1 shown in the previous figure), front and back, in the approximate mounting position under the system rack.
3. To align the mounting plates to the system rack, do the following:
  - a. Place the four rack-mounting bolts (item 6 shown in the previous figure) through the plate assembly holes at the bottom of the rack. Install the bushings and washers (item 4 and 5 shown in the figure) to ensure bolt positioning.

**Note:** The plastic bushing is intended to provide electrical insulation between the frame and the ground. When such insulation is not required, the plastic bushing does not need to be installed.

- b. Position the mounting plates (item 1 shown in the previous figure) under the four rack-mounting bolts (item 6 shown in the previous figure) so that the mounting bolts are centered directly over the tapped holes.
  - c. Turn the rack-mounting bolts (item 6 shown in the previous figure) three or four rotations into the tapped holes.
4. Mark the floor around the edge of the mounting plates, as shown in the following figure.

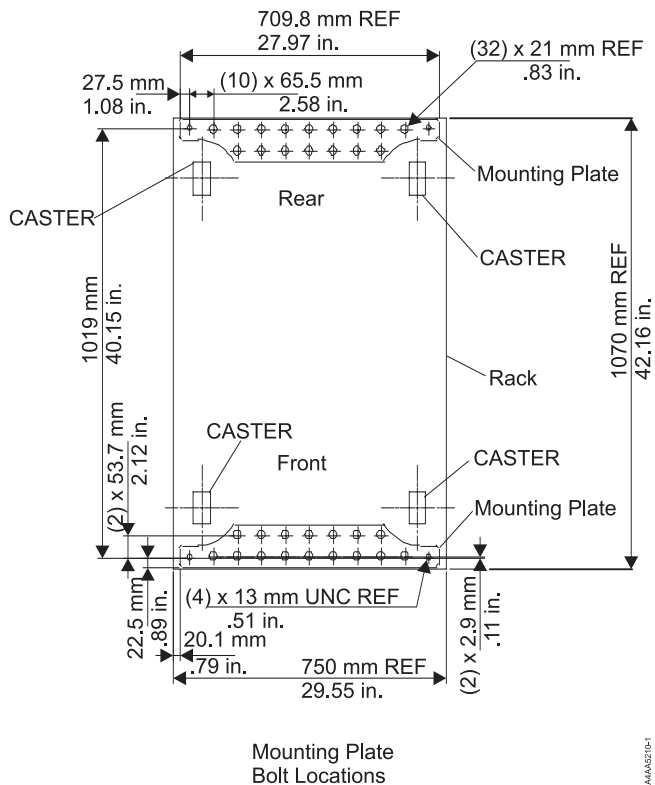


Figure 175. Mark floor around edge of mounting plates

5. Remove the mounting bolts from the threaded holes.
6. Move the rack away from the mounting plates.
7. Mark the floor at the center of each hole in the mounting plate (including tapped holes).
8. Remove the mounting plates from the marked locations.
9. At the marked location of the tapped mounting holes, drill two holes approximately 19 mm (.75 in.) to allow clearance for the ends of the two rack-mounting bolts. The ends of the rack-mounting bolts might protrude past the thickness of the mounting plate. Drill one hole in each group of anchor bolt location marks as indicated on the marked floor.
10. Using at least five heavy duty concrete anchoring bolts for each mounting plate, mount the mounting plates to the concrete floor.

### Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor

Use these steps to attach your rack to a 228.6 mm to 330.2 mm (9 in. to 13 in. depth). floor.

**Attention:** The frame tie downs are intended to secure a frame weighing less than 1429 kg (3150 lb). These tie downs are designed to secure the frame on a raised floor installation.

Use the following to determine your next step:

1. If the rack is being attached to a short depth raised floor environment 228.6 mm to 330.2 mm (9 in. to 13 in. depth) install the Raised Floor Tie Down Kit (Part number 16R1102) described in the following table.

Table 430. Raised Floor Tie Down Kit (Part number 16R1102)

228.6 mm to 330.2 mm (9 in. to 13 in.) Raised Floor Tie Down Kit (Part number 16R1102)			
Item	Part Number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P2999	4	Turnbuckle Assembly

2. If the rack is being attached to a deep raised floor environment 304.8 mm to 558.8 mm (12 in. to 22 in. depth) install the Raised Floor Tie Down Kit (Part number 16R1103) described in the following table.

Table 431. Raised Floor Tie Down Kit (Part number 16R1103)

304.8 mm to 558.8 mm (12 in. to 22 in.) Raised Floor Tie Down Kit (Part number 16R1103)			
Item	Part Number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P3000	4	Turnbuckle Assembly

It is the customer's responsibility to ensure the following steps are completed before the service representative performs the tie-down procedure.

**Note:** To accommodate a floor with a depth of more than 558.8 mm (22 in.), a steel beam or a steel channel adapter for mounting the subfloor eyebolts are required. The customer must supply the floor eyebolts.

Consider the following when preparing the floor for tie-down:

- The hardware is designed to support a frame weighing no more than 1578.5 kg (3480 lb).
- The estimated maximum concentrated load on one caster for a 1578.5 kg (3480 lb)-system is 526.2 kg (1160 lb). For a multiple system installation, it is possible that one floor tile will bear a total concentrated load of 1052.3 kg (2320 lb).

To install the eyebolts, do the following:

1. Obtain the service of a qualified structural engineer to determine appropriate installation of the eyebolts.
2. Consider the following before installing the eyebolts:
  - Floor eyebolts must be securely anchored to the concrete floor.
  - For a single frame installation, four 1/2-in. diameter by 13-inch subfloor eyebolts should be secured to the subfloor.
  - The minimum height of the center of the internal diameter is 2.54 mm (1 in.) above the concrete floor surface.
  - The maximum height is 63.5 mm (2.5 in.) above the concrete floor surface. A height greater than 63.5 mm (2.5 in.) can cause excessive lateral deflection to the tie-down hardware.
  - The eyebolt's internal diameter should be 1-3/16 inch, and each eyebolt should be able to withstand 1224.7 kg (2700 lb). The customer should obtain the service of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to ensure that the raised floor can support the floor-loading specifications.

- To ensure that the holes are in the correct location, the diagonal distance of the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side to side distance) and 1019 mm (40.1 in.) (the front to back distance)

3. Verify that the four eyebolts are positioned to match the dimensions is given in the following figures.

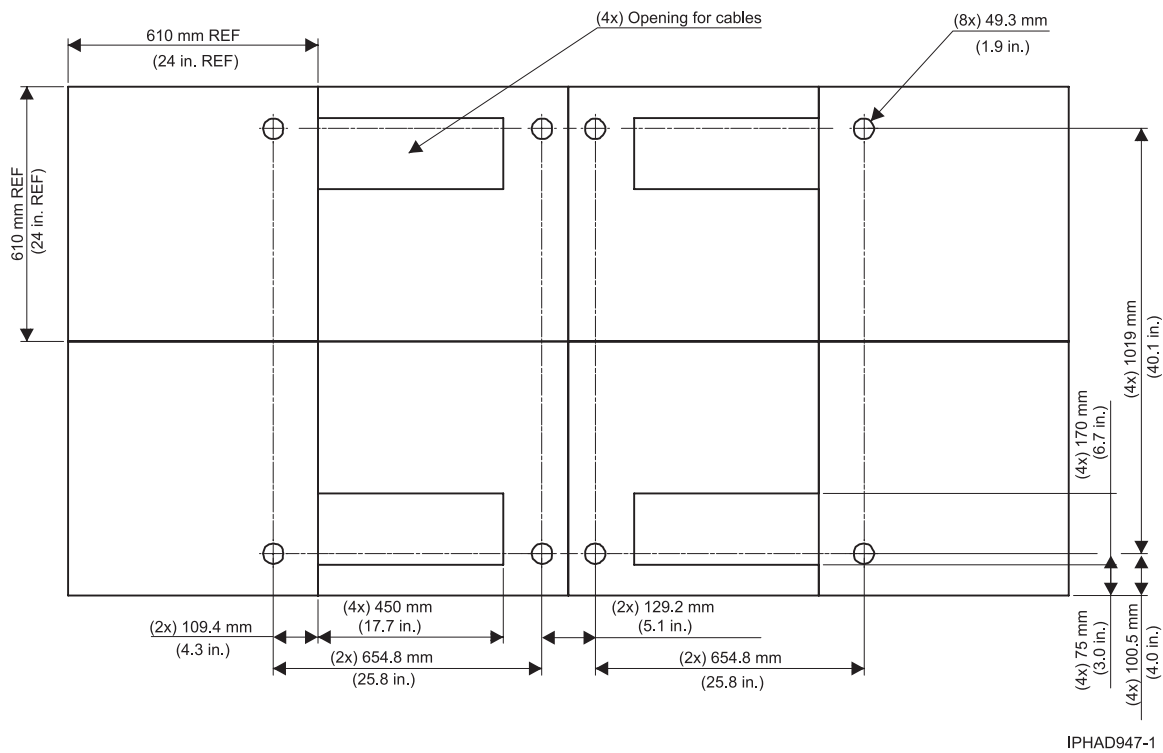


Figure 176. Eyebolt positioning for 610 mm (24 in.) floor tile layout

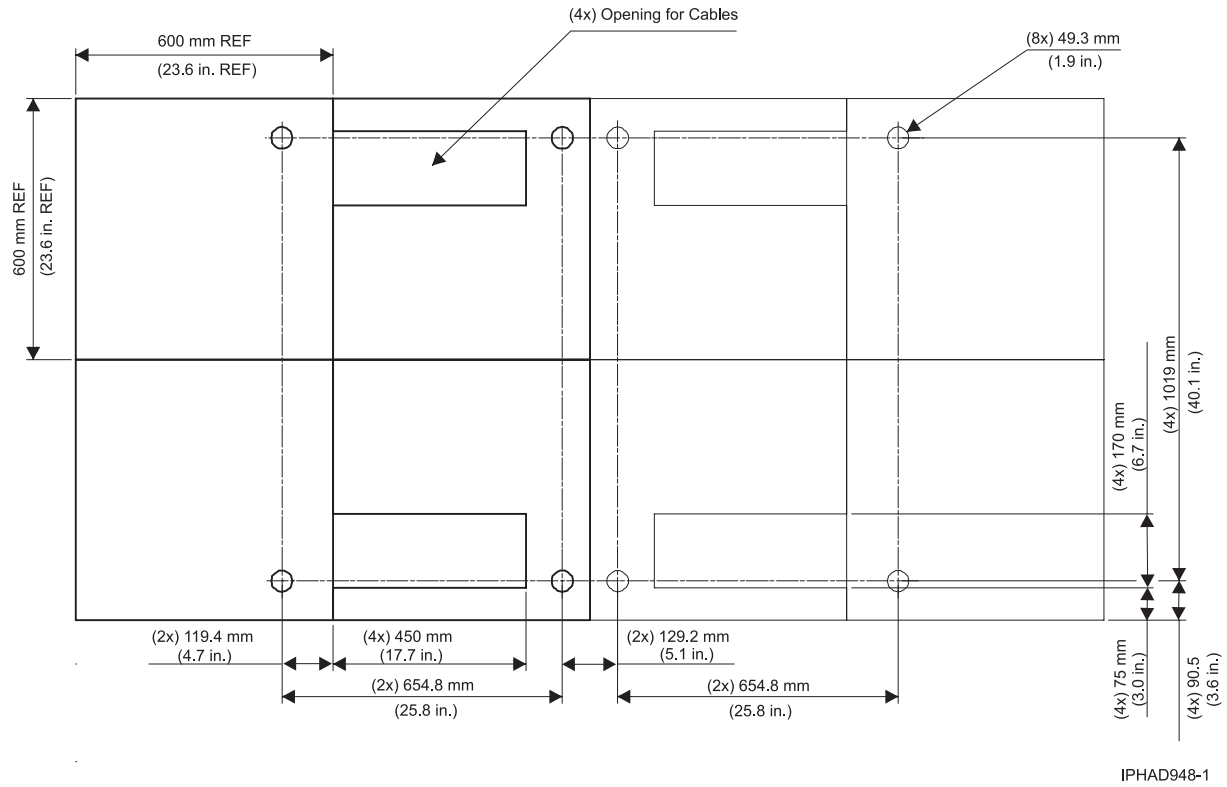
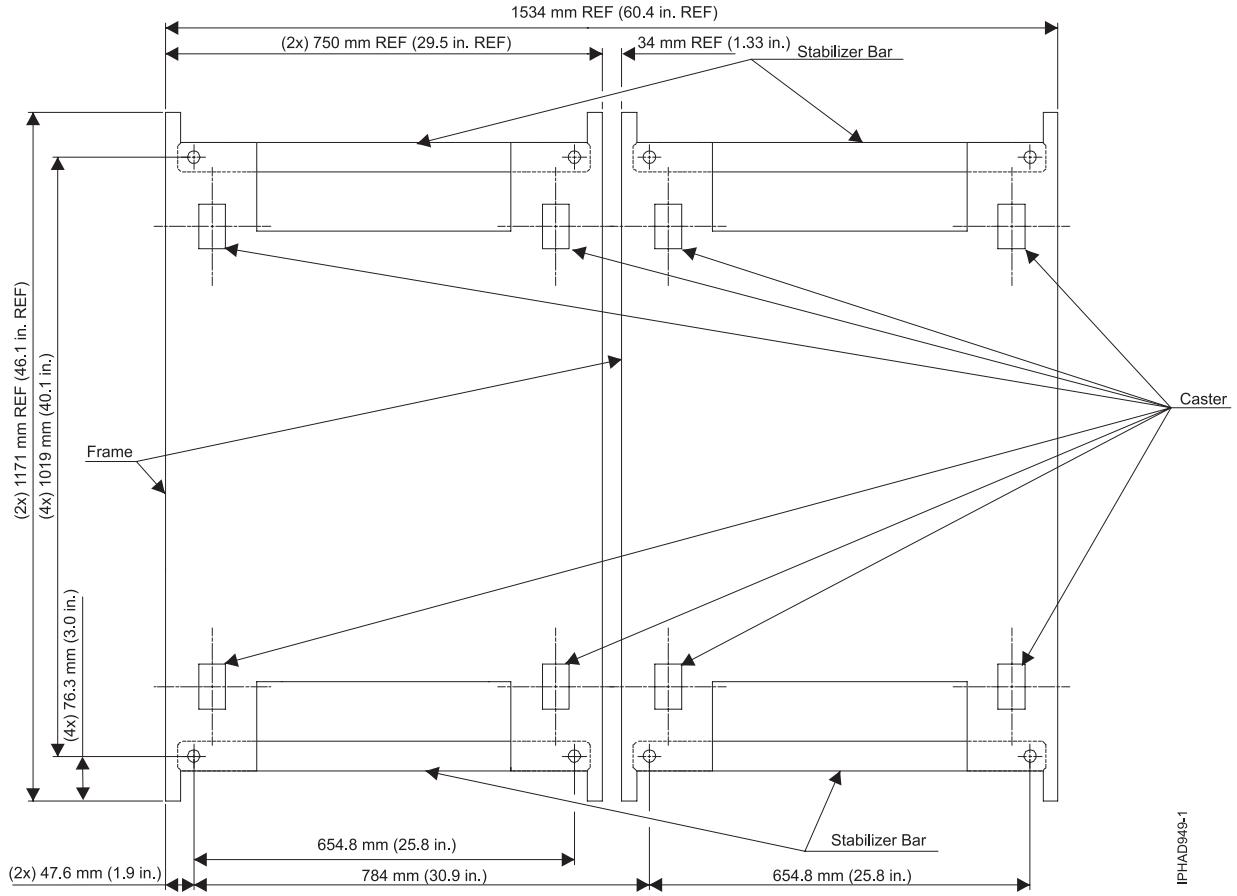


Figure 177. Eyebolt positioning for 600 mm (23.6 in.) floor tile layout



IPHAD949-1

Figure 178. Stabilizer bar layout (top view)

4. Install the eyebolts to the floor.



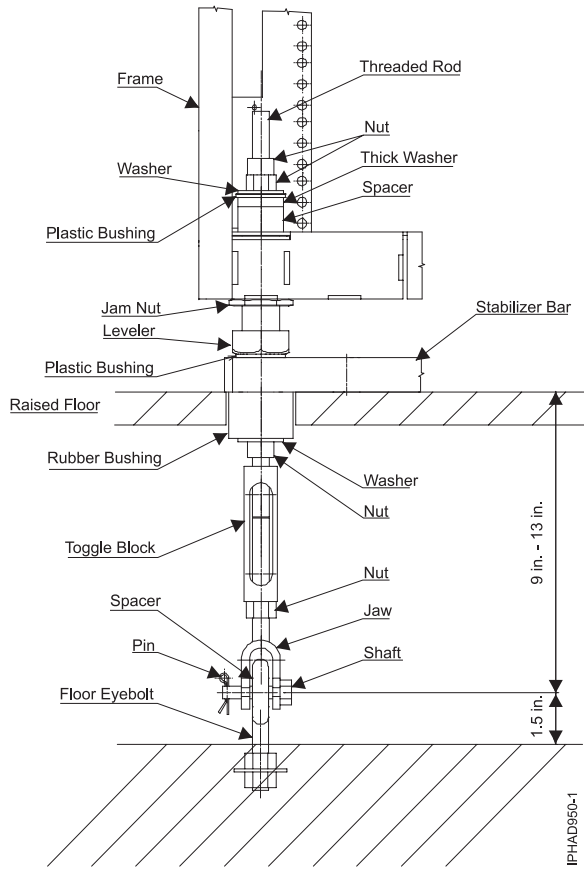


Figure 179. Turnbuckle assembly frame tie-down hardware for 228.6 mm to 330.2 mm (9 in. to 13 in.) raised floor (Part number 44P2999)

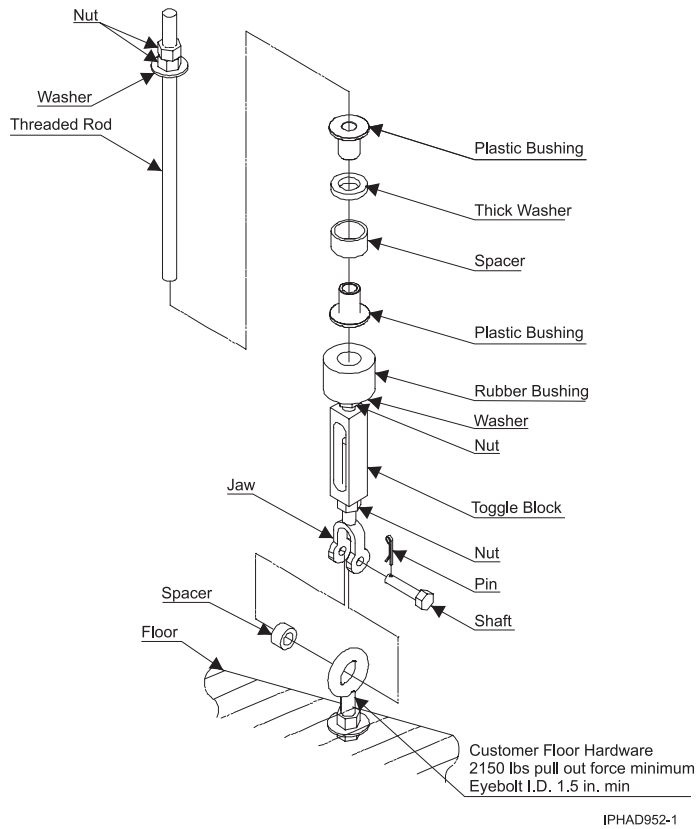


Figure 180. Turnbuckle assembly frame tie-down hardware for 228.6 mm to 330.2 mm (9 in. to 13 in.) raised floor (Part number 44P2999)

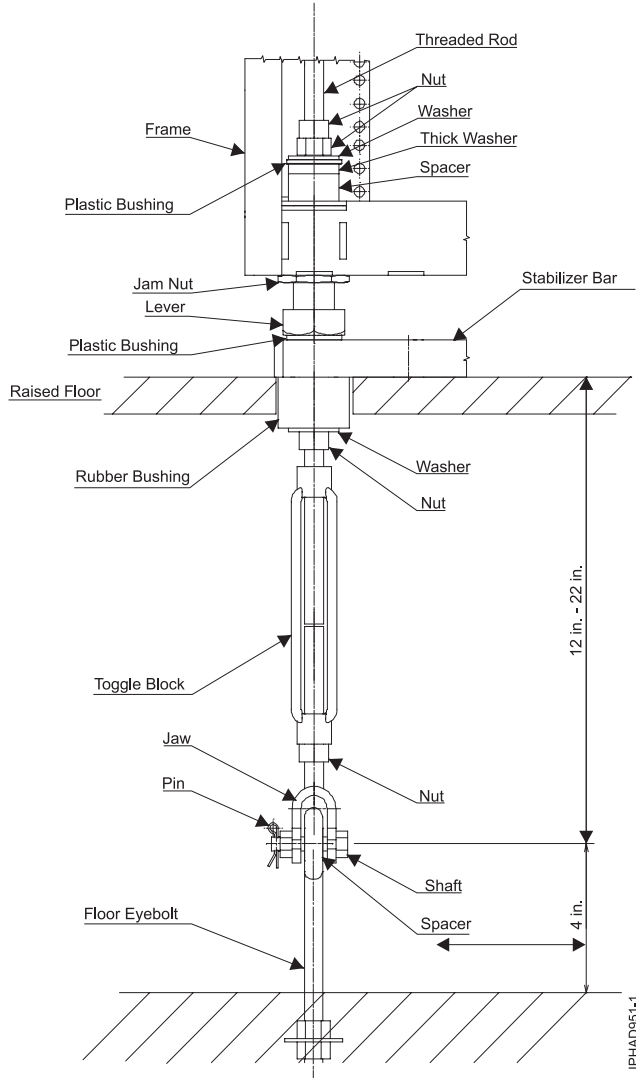


Figure 181. Turnbuckle assembly frame tie-down hardware for 304.8 mm to 558.8 mm (12 in. to 22 in.) raised floor (Part number 44P3000)

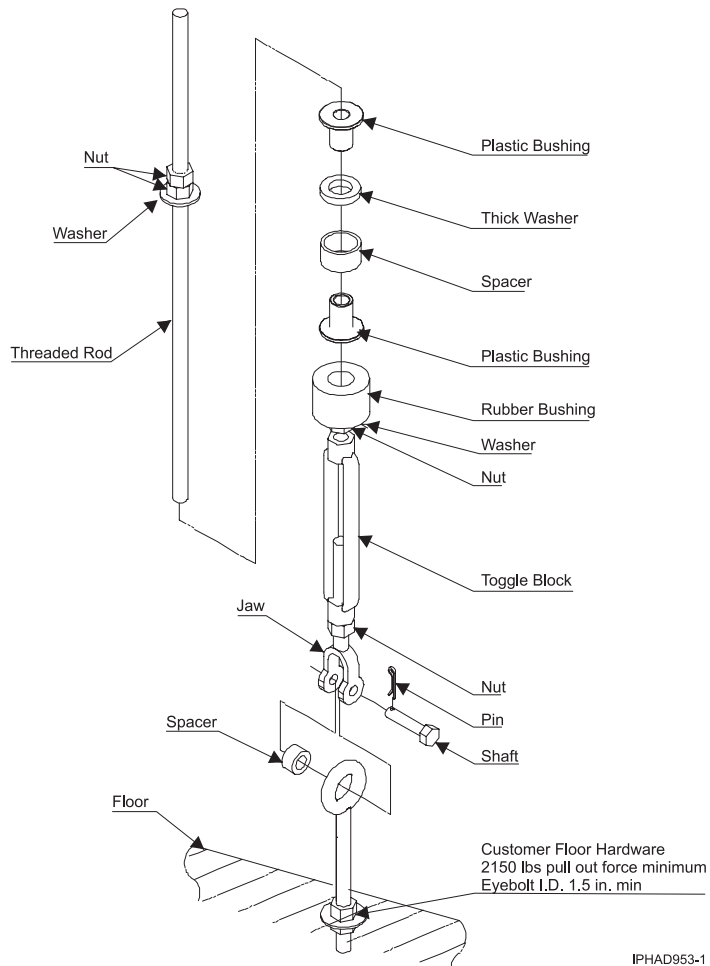


Figure 182. Turnbuckle assembly frame tie-down hardware for 304.8 mm to 558.8 mm (12 in. to 22 in.) raised floor (Part number 44P3000)

## Considerations for multiple-system installations

Learn about the installation requirements for a multiple-system installation.

When you are integrating a 5792 with a model 9119-590 and other products in your data center, there are several factors to consider:

- Minimum aisle width

The minimum aisle width in the front of the system is 1041 mm (41 in.) to allow room to perform service operations. The minimum aisle width in the rear of the system is 914 mm (36 in.) to allow room to perform service operations. The front and rear service clearances should be at least 1143 mm (45 in.) and 914 mm (36 in.), respectively. Service clearances are measured from the edges of the frame with frame extenders to the nearest obstacle.

- Thermal interactions

Systems should be faced front-to-front and rear-to-rear to create "cold" and "hot" aisles to maintain effective system thermal conditions, as shown in the following figure.

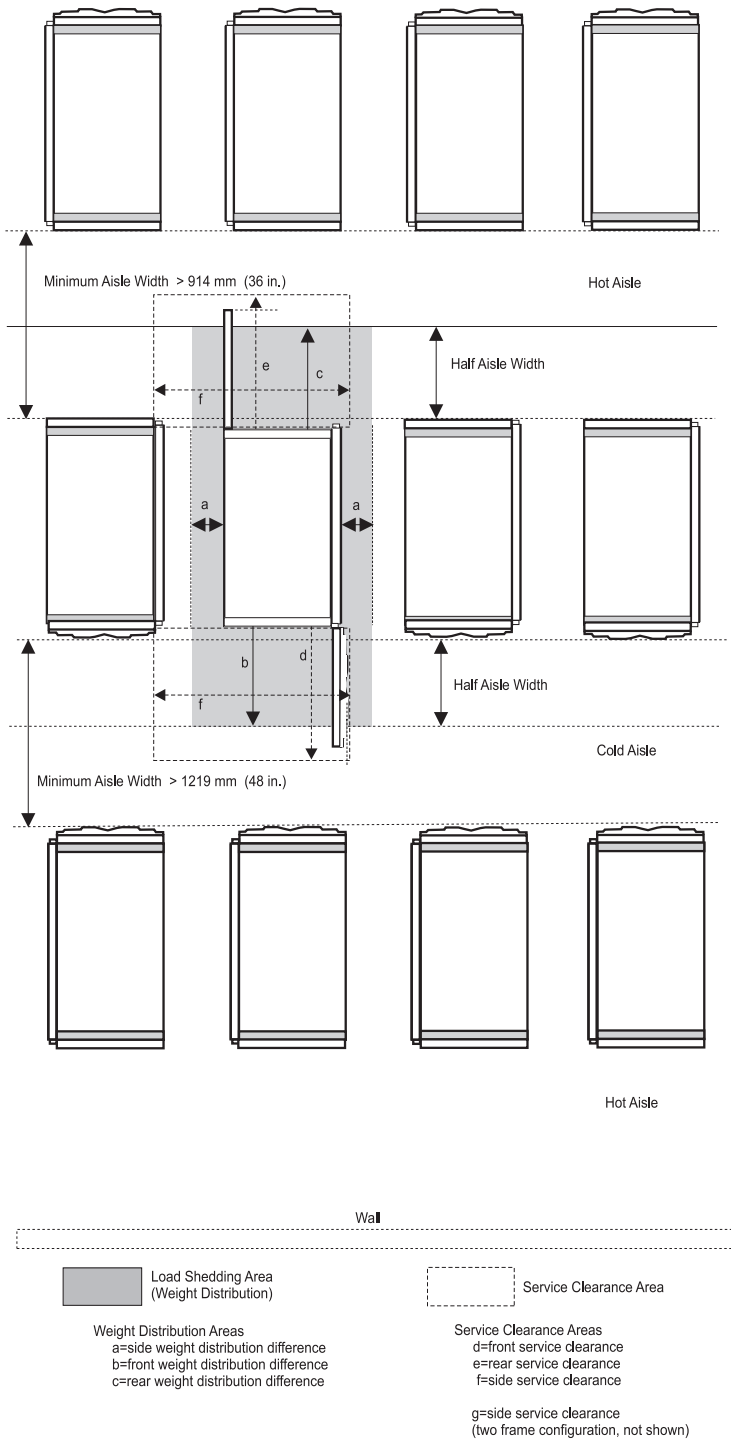
Cold aisles need to be of sufficient width to support the airflow requirements of the installed systems as indicated in *Cooling requirements*. The airflow per tile will be dependent on the under floor pressure

and perforations in the tile. A typical under floor pressure of 0.025 in. of water will supply 300-400 cfm through a 25% open 0.61 m by 0.61 m (2 ft by 2 ft) floor tile.

- Floor tile requirements

In a multiple frame installation, it is possible that a floor tile with cable cutouts (refer to *Cutting and placing floor panels*) will bear two concentrated static loads up to 408 kg (900 lb) per caster or leveler. Thus, the total concentrated load can be as high as 816 kg (1800 lb). Contact the floor tile manufacturer or consult a structural engineer to ensure that the raised floor assembly can support this load.

Proposed Floor Layout for Multiple Systems



A4AA5733-2

Figure 183. Proposed floor layout for multiple systems

Related reference:

“Cooling requirements” on page 358

Use the system cooling requirements table in conjunction with the cooling requirements graph and chilled

airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

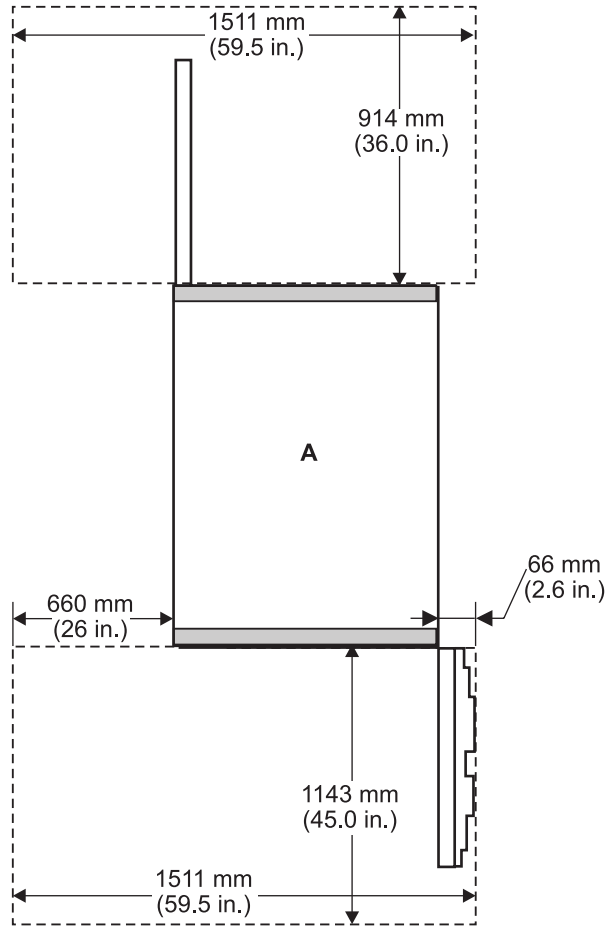
“Cutting and placing floor panels” on page 334

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

## Service clearances

The service clearance area is the area around the server that is needed for IBM service representatives to service the server.

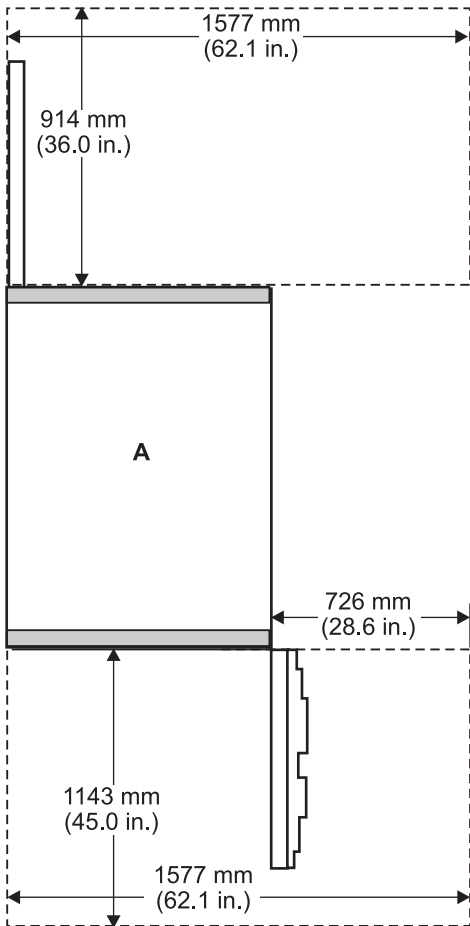
The minimum service clearance for systems with slimline doors is shown in the following figure.



Single-Frame System with  
Slimline Doors

IPHAD916-0

Figure 184. Service clearances for system with slimline doors

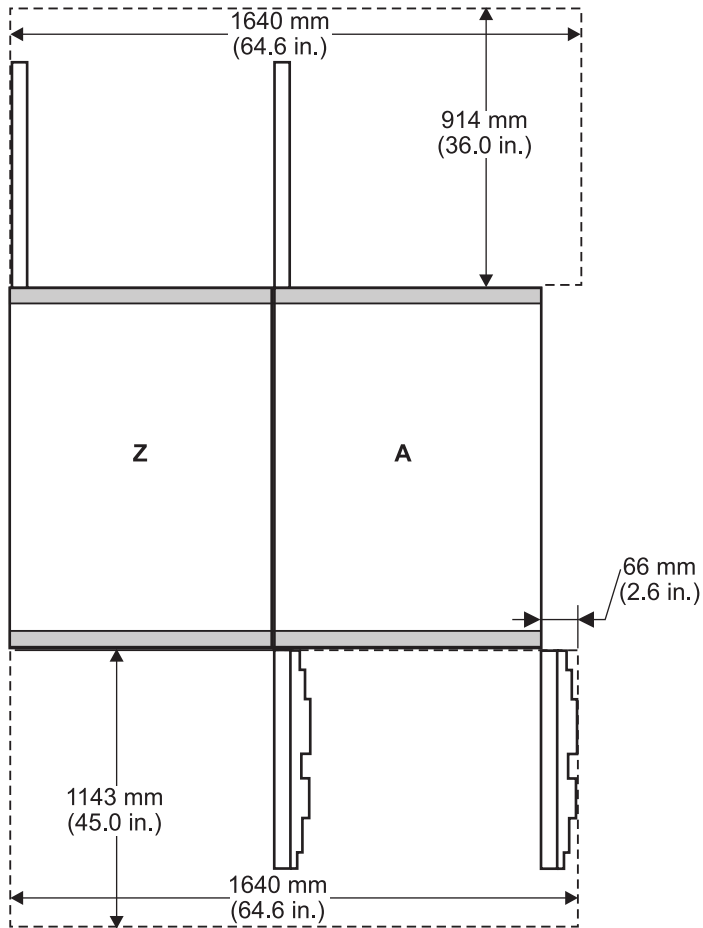


Single-Frame System with  
Slimline Doors (with alternative  
right-side service clearance)

IPHAD917-1

Figure 185. Service clearances for single-frame systems with slimline doors (with alternative right-side service clearance)



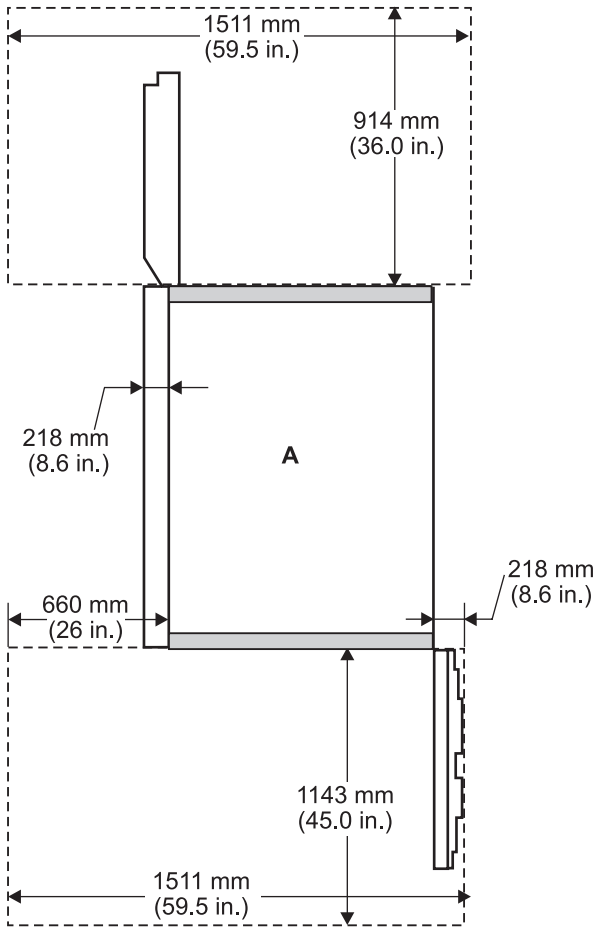


Double-Frame System  
with Slimline Doors

IPHAD918-0

Figure 186. Service clearances for double-frame systems with slimline doors

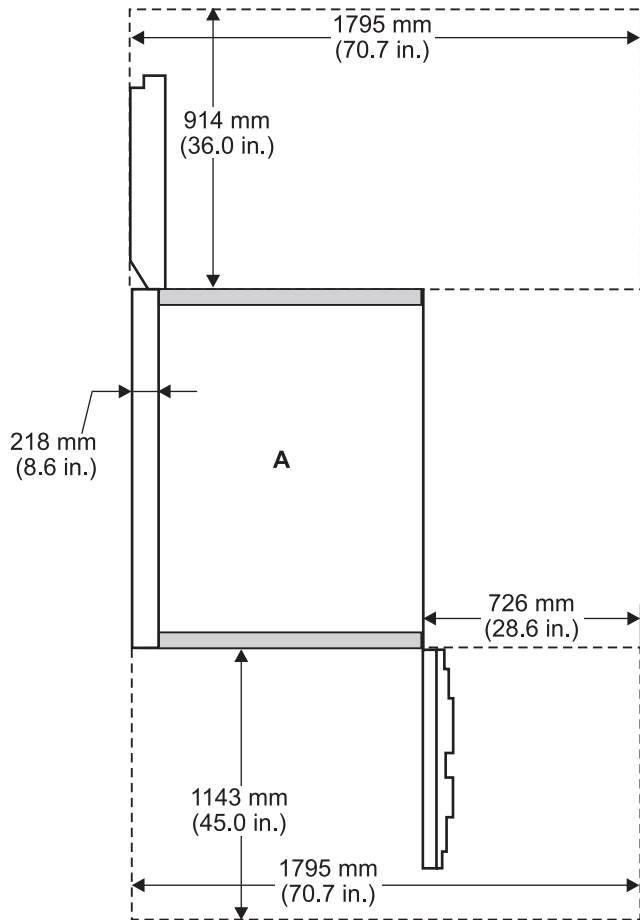
The minimum service clearance for systems with acoustical doors is shown in the following figure.



Single-Frame System with  
Acoustical Doors

IPHAD919-1

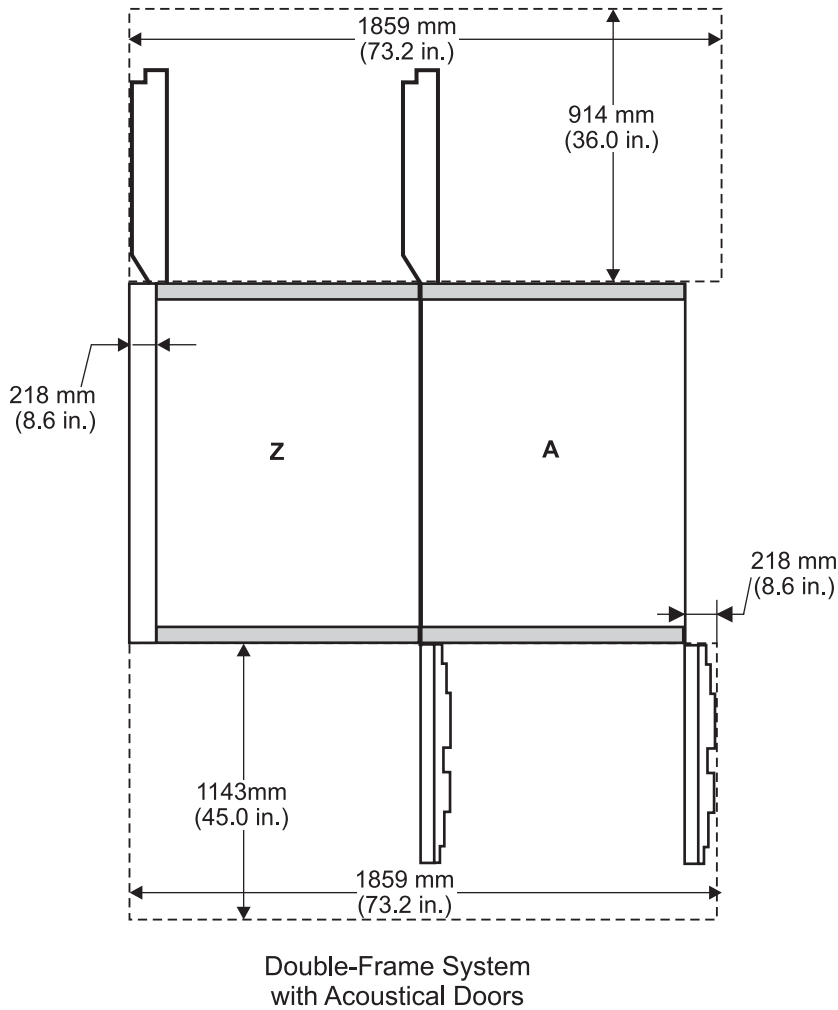
Figure 187. Service clearances for single-frame system with acoustical doors



Single-Frame System with  
Acoustical Doors (with  
alternative right-side service  
clearance)

IPHAD920-1

Figure 188. Service clearances for single-frame system with acoustical doors (with alternative right side service clearance)



IPHAD921-1

Figure 189. Service clearances for double-frame system with acoustical doors

Refer to the figure in *Raised-floor requirements and preparation* for service clearances shown in a raised-floor installation.

**Related reference:**

“Raised-floor requirements and preparation” on page 334

A raised-floor is required for the 5792 to ensure optimal performance and to comply with electromagnetic compatibility requirements.

**ASHRAE declarations**

Use the ASHRAE declarations table and figures to determine the measurement reporting requirements defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments.

These guidelines are available at *ASHRAE Technical Committee*.

Table 432. ASHRAE declarations

Description	Typical Heat Release watts	Airflow nominal <sup>1</sup>		Airflow maximum <sup>1</sup> at 35°C (95°F)	
		cfm	m <sup>3</sup> /hr	cfm	m <sup>3</sup> /hr

Table 432. ASHRAE declarations (continued)

Minimum configuration	1500	410	697	580	985
Maximum configuration	14400	2060	2990	2560	373876
Typical configuration	6200	1010	1716	1300	2209
See <i>Planning for 5792 base rack</i> for Weight and Overall system dimension.					
ASHRAE Class	3				
Minimum configuration	One I/O drawer				
Maximum configuration	12 I/O drawers				
Typical configuration	5 I/O drawers				
<b>Note:</b>					
1. Airflow for the typical and minimum configurations do not include redundant power supply, feature code 5158.					

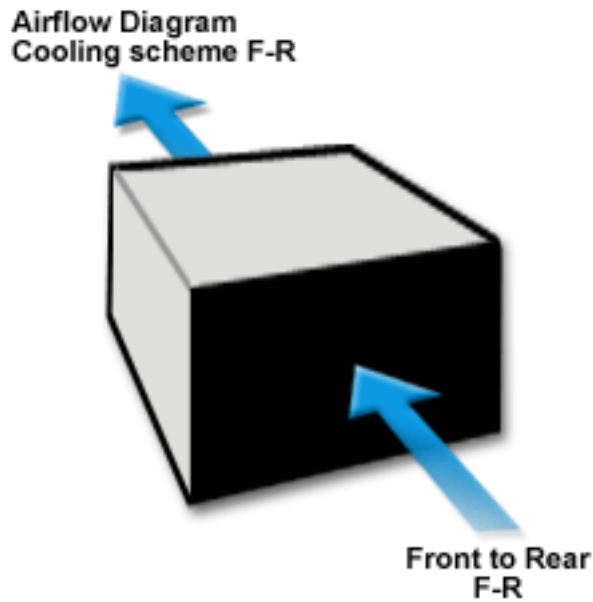


Figure 190. Airflow figure for server mounted in a rack

**Related information:**

[ASHRAE Technical Committee](#)  
ASHRAE guidelines are available in this website

**Total system power consumption**

Use the Total system power consumption table to determine the total system power consumption for your server's configuration.

The following table provides input power ranges based on system configuration.

Table 433. Total system power consumption

Configuration - number of I/O drawers and switches	AC power (kW)
1	1.5
2	2.7

Table 433. Total system power consumption (continued)

3	3.7
4	5.0
5	6.2
6	7.4
7	8.5
8	9.7
9	10.9
10	12.0
11	13.2
12	14.4

**Note:**

- Configurations are based in 16 disk drives per I/O drawer and 20 PCI cards per I/O drawer. To determine the typical power consumption for a specific configuration, subtract the following typical power values for each unpopulated disk drive or PCI card:
  - Each PCI card - 20 W
  - Each disk drive - 20 W

## Cooling requirements

Use the system cooling requirements table in conjunction with the cooling requirements graph and chilled airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

The 5792 requires air for cooling. As shown in *Considerations for multiple system installations*, rows of 5792 systems must face front-to-front. The use of a raised floor is recommended to provide air through perforated floor panels placed in rows between the fronts of systems (the cold aisles shown in *Considerations for multiple system installations*).

The following table provides system cooling requirements based on system configuration. The letter designations in the table correspond to the letter designations in the graph shown in Cooling requirements graph.

Table 434. System cooling requirements based on system configuration

Configuration -number of I/O drawers and switches	AC power (kW)
1	A
2	A
3	A
4	B
5	B
6	C
7	C
8	D
9	D
10	E
11	E
12	F

**Related reference:**

“Considerations for multiple-system installations” on page 348  
Learn about the installation requirements for a multiple-system installation.

**Cooling requirements graph**

Use the cooling requirements graph in conjunction with the cooling requirements tables and the chilled airflow area graphic to determine the area of the floor tiles to supply chilled air to the system.

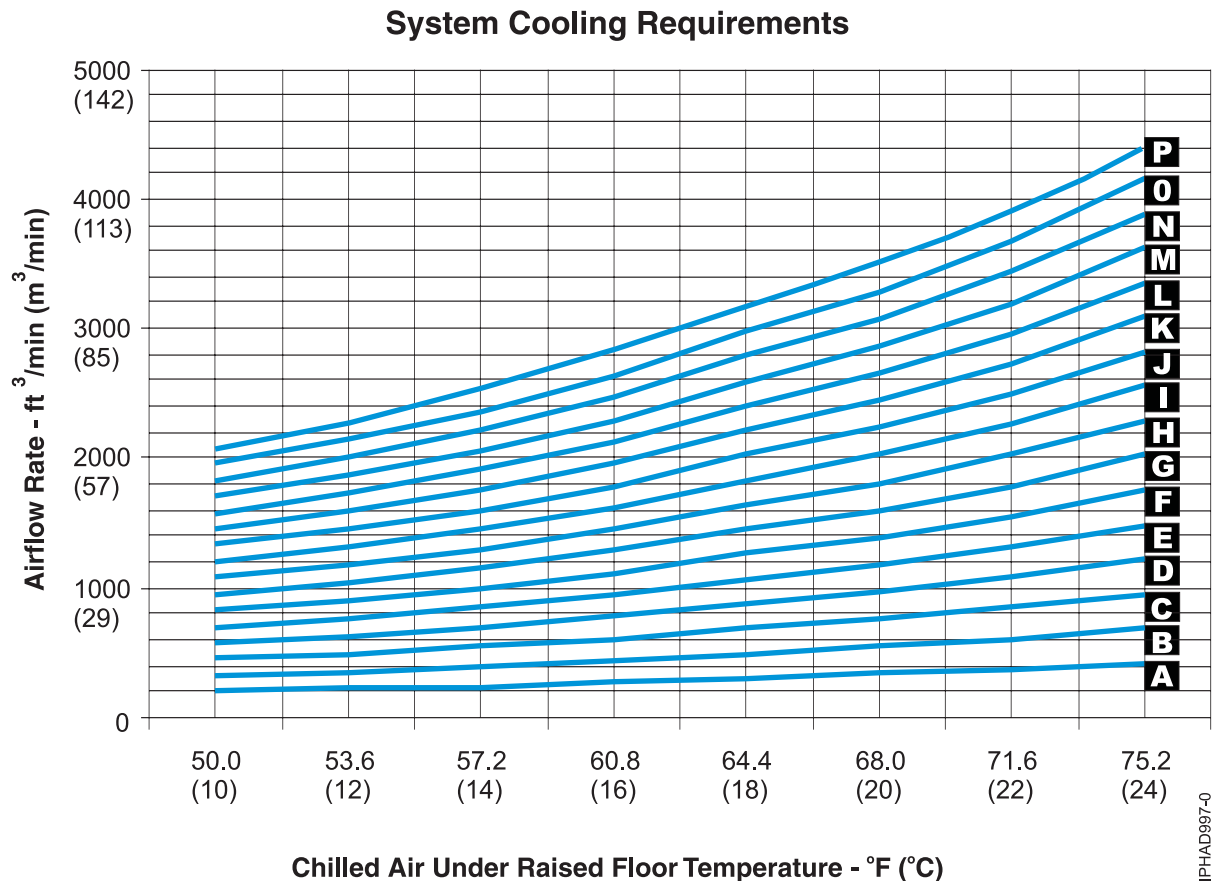
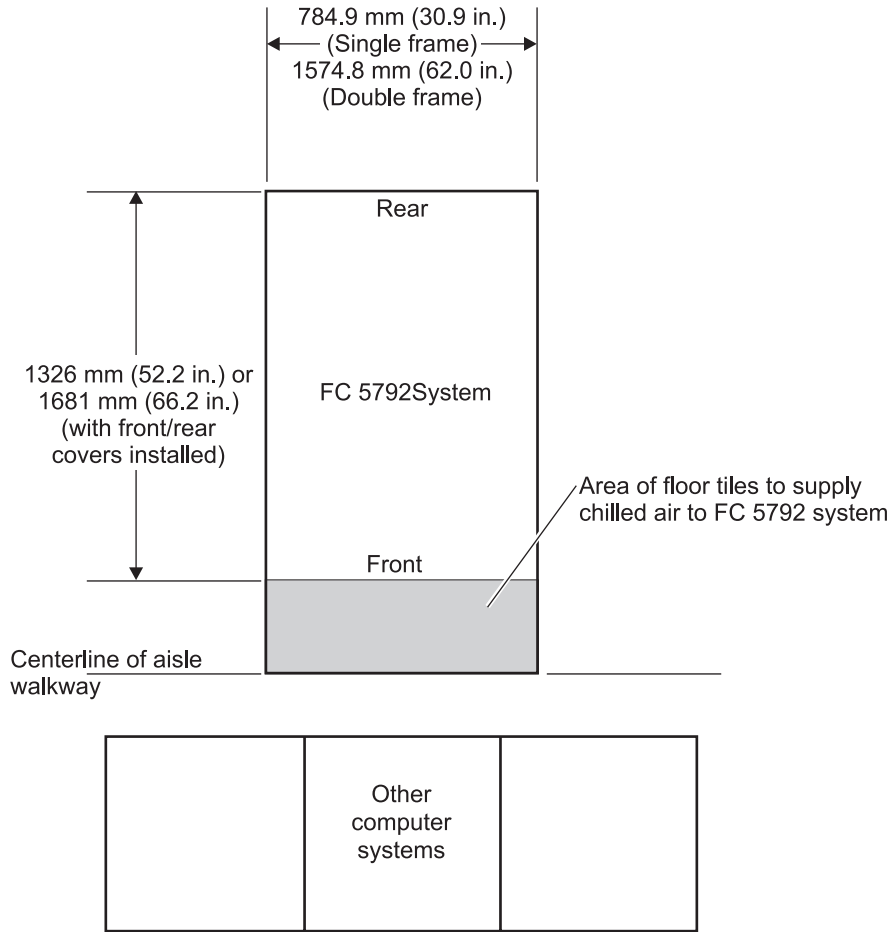


Figure 191. Cooling requirements

**Requirements for the chilled airflow area**

The Chilled airflow area figure shows the chilled airflow area required for a system.

Use the system cooling requirements tables and the *Cooling requirements graph* to determine the area of floor tiles to supply chilled air to the system.



IPHAD922-3

Figure 192. Chilled airflow area

## Moving the system to the installation site

Several factors must be considered before moving the system to the installation site.

You should determine the path that must be taken to move the system from the delivery location to the installation site. You should verify that the height of all doorways, elevators, and so on are sufficient to allow moving the system to the installation site. You should also verify that the weight limitations of elevators, ramps, floors, floor tiles, and so on, are sufficient to allow moving the system to the installation site. If the height or weight of the system can cause a problem when the system is moved to the installation site, you should contact your local site planning or sales representative. For more detailed information, see *Access*.

## 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 to accept the new product based on the installation planning information provided, with assistance from an IBM Installation Planning Representative (IPR) or IBM



authorized service provider. 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 IBM 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.

**Related information:**

 Acoustics

## Phase imbalance and BPR configuration

Use the Phase imbalance and BPR configuration table to determine the phase imbalance of your server's configuration.

Depending on the number of Bulk Power Regulators (BPRs) in your system, phase imbalance can occur in line currents. All systems are provided with two bulk power assemblies (BPAs), with separate power cords. Phase currents will be divided between two power cords in normal operation. The following table illustrates phase imbalance as a function of BPR configuration. For information about power consumption, see *Total system power consumption*.

*Table 435. Phase imbalance and BPR configuration*

Number of BPRs per BPA	Phase A Line Current	Phase B Line Current	Phase C Line Current
1	Power / Vline	Power / Vline	0
2	0.5 Power / Vline	0.866 Power / Vline	0.5 Power / Vline
3	0.577 Power / Vline	0.577 Power / Vline	0.577 Power / Vline

**Note:** Power is calculated from *Total system power consumption*. Vline is line-to-line nominal input voltage. Because total system power is divided between two power cords, divide the power number by 2.

**Related reference:**

“Total system power consumption” on page 357

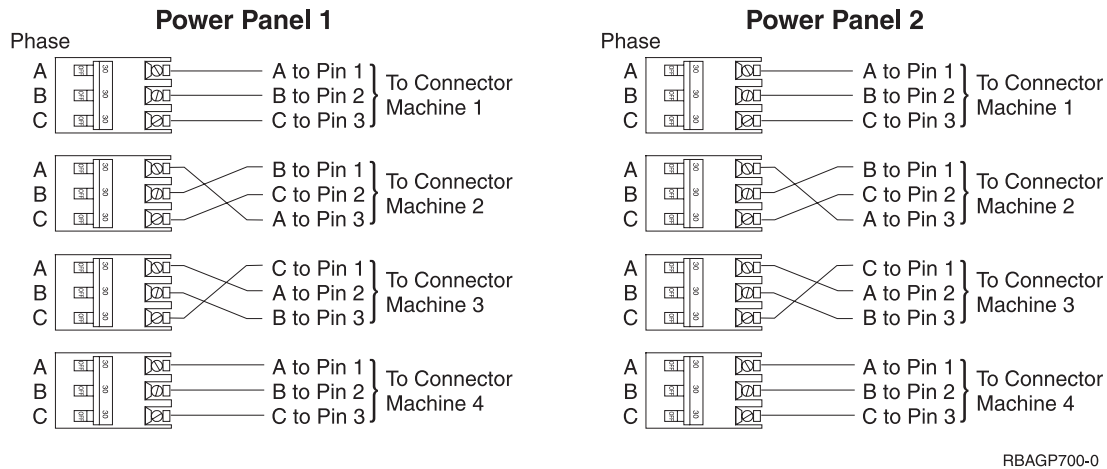
Use the Total system power consumption table to determine the total system power consumption for your server's configuration.

## Balancing power panel loads

Use these methods to ensure that power panel loads are balanced.

When three-phase power is used, and depending on the system configuration, the phase currents can be fully balanced or unbalanced. System configurations with three BPRs per BPA have balanced power panel loads, while configurations with only one or two have unbalanced loads. With two BPRs per BPA, two of the three-phases draw an equal amount of current, and are, nominally, 57.8% of the current on the third phase. With one BPR per BPA, two of three-phases carry an equal amount of current, with no current drawn on the third phase. The following figure is an example of feeding several loads of this type from two power panels in a way that balances the load among the three-phases.

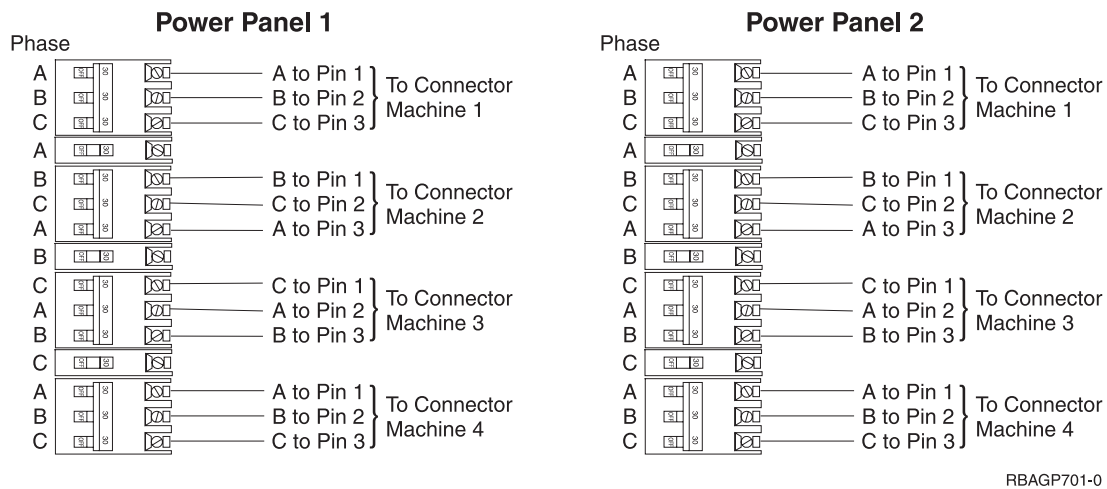
**Note:** Use of ground-fault-interrupt (GFI) circuit breakers is not recommended for this system because GFI circuit breakers are earth-leakage-current sensing circuit breakers and this system is a high earth-leakage-current product.



RBAGP700-0

Figure 193. Power panel load balancing

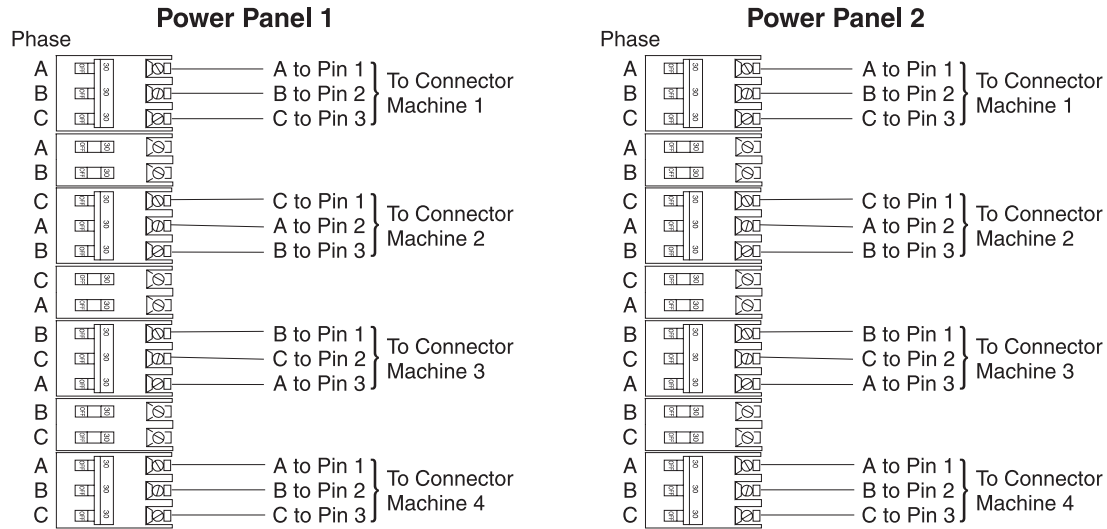
The method illustrated in the preceding figure requires that the connection from the three poles of each breaker to the three-phase pins of a connector be varied. Some electricians might prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three-pole breakers are alternated with single-pole breakers, so that the three-pole breakers do not all begin on Phase A.



RBAGP701-0

Figure 194. Power panel load balancing

The following figure shows another way of distributing the unbalanced load evenly. In this case, the three-pole breakers are alternated with two-pole breakers.



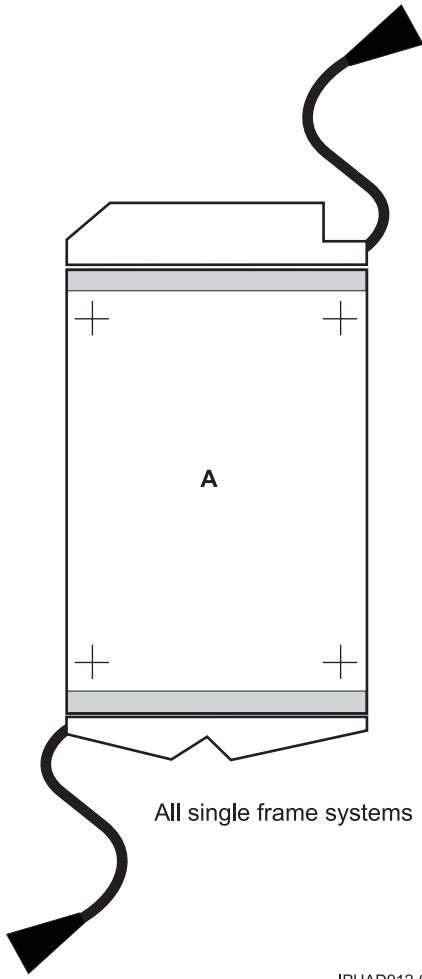
RBAGP702-0

Figure 195. Power panel load balancing

## Power cord configuration

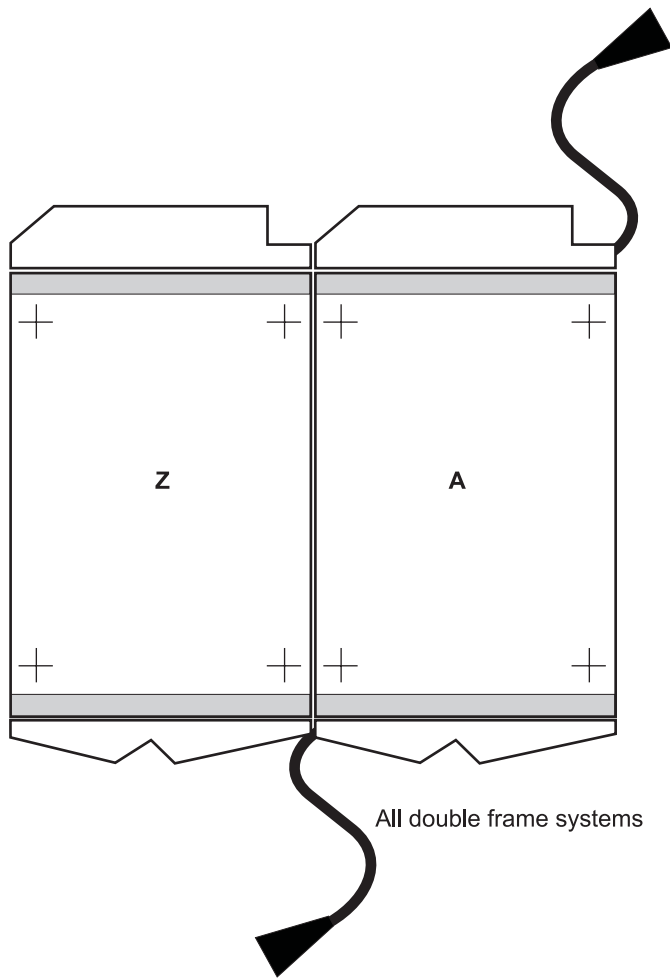
Use the Single-frame system power cord configuration and Double-frame system power cord configuration figures to route power cords through floor tile cutouts.

The power cords exit the system from different points of the frame as indicated in the following figure. For raised-floor applications, it is recommended that both cords be routed to the rear of the frame and through the same floor-tile cutout.



IPHAD912-0

Figure 196. Single-frame system power cord configuration



IPHAD913-0

Figure 197. Double-frame system power cord configuration

## Dual power installation

Some 5792 configurations are designed with a fully redundant power system. These systems have two power cords attached to two power input ports which, in turn, power a fully redundant power distribution system within the system. To take full advantage of the redundancy and reliability that is built into the computer system, the system must be powered from two distribution panels.

## Approximate system weights by configuration

Use the Approximate system weight by configuration tables to calculate the approximate weight of your system based on its configuration.

Table 436. Approximate system weight by configuration without integrated battery backup and with acoustic doors

Number of I/O drawers	System weight - kg (lb)	A-frame weight - kg (lb)
1	549 (1211)	549 (1211)
2	649 (1431)	649 (1431)
3	749 (1651)	749 (1651)
4	852 (1878)	852 (1878)
5	952 (2098)	952 (2098)

Table 436. Approximate system weight by configuration without integrated battery backup and with acoustic doors (continued)

6	1051 (2318)	1051 (2318)
7	1173 (2586)	1173 (2586)
8	1273 (2806)	1273 (2806)
9	1680 (3704)	1254 (2765)
10	1780 (3924)	1255 (2767)
11	1880 (4144)	1256 (2769)
12	1980 (4364)	1257 (2771)

**Note:**

1. I/O drawers are populated based on the number of processor books in the server frame.

Table 437. Approximate system weight by configuration with integrated battery backup and with acoustic doors

Number of I/O drawers	System weight - kg (lb)	A-frame weight - kg (lb)
1	640 (1410)	640 (1410)
2	739 (1630)	739 (1630)
3	839 (1850)	839 (1850)
4	942 (2077)	942 (2077)
5	1042 (2297)	1042 (2297)
6	1142 (2517)	1142 (2517)
7	1658 (3655)	1143 (2519)
8	1758 (3875)	1144 (2521)
9	1861 (4102)	1148 (2530)
10	1960 (4322)	1149 (2534)
11	2060 (4542)	1149 (2534)
12	2159 (4760)	1149 (2534)

**Note:**

1. I/O drawers are populated based on the number of processor books in the server frame.

Table 438. Approximate system weight by configuration without integrated battery backup and with slimline doors

Number of I/O drawers	System weight - kg (lb)	A-frame weight - kg (lb)
1	541 (1192)	541 (1192)
2	641 (1412)	641 (1412)
3	740 (1632)	740 (1632)
4	843 (1859)	843 (1859)
5	943 (2079)	943 (2079)
6	1043 (2299)	1043 (2299)
7	1164 (2567)	1164 (2567)
8	1264 (2787)	1264 (2787)
9	1672 (3685)	1246 (2746)
10	1771 (3905)	1247 (2750)
11	1871 (4125)	1247 (2750)
12	1971 (4345)	1248 (2752)

Table 438. Approximate system weight by configuration without integrated battery backup and with slimline doors (continued)

<b>Note:</b>
1. I/O drawers are populated based on the number of processor books in the server frame.

Table 439. Approximate system weight by configuration with integrated battery backup and with slimline doors

Number of I/O drawers	System weight - kg (lb)	A-frame weight - kg (lb)
1	631 (1391)	631 (1391)
2	731 (1611)	731 (1611)
3	831 (1831)	831 (1831)
4	934 (2058)	934 (2058)
5	1033 (2278)	1033 (2278)
6	1133 (2498)	1133 (2498)
7	1649 (3636)	1134 (2500)
8	1749 (3856)	1135 (2502)
9	1842 (4083)	1139 (2511)
10	1952 (4303)	1141 (2515)
11	2052 (4523)	1141 (2515)
12	2151 (4741)	1141 (2515)

<b>Note:</b>
1. I/O drawers are populated based on the number of processor books in the server frame.

## Weight distribution

Use the Floor loading for system tables to determine the floor loading for various configurations.

The following table shows the values used for calculating floor loading for the 5792. The weights specified include covers, while the width and depth are indicated without covers.

Table 440. Floor loading for system with 8 I/O drawers and without integrated battery backup

Floor loading for system with 8 I/O drawers and without integrated battery backup							
a (sides)		b (front)		c (back)		1 frame	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	208.9	1020.2
25	1.0	508	20.0	508	20.0	166.3	811.8
25	1.0	762	30.0	762	30.0	139.7	681.9
254	10.0	254	10.0	254	10.0	142.1	693.6
254	10.0	508	20.0	508	20.0	114.9	561.0
254	10.0	762	30.0	762	30.0	98.0	478.3
508	20.0	254	10.0	254	10.0	108.4	529.1
508	20.0	508	20.0	508	20.0	89.0	434.7
508	20.0	762	30.0	762	30.0	77.0	375.8
762	30.0	254	10.0	254	10.0	89.7	438.2
762	30.0	508	20.0	508	20.0	74.7	364.8
762	30.0	762	30.0	762	30.0	65.4	319.1

Table 440. Floor loading for system with 8 I/O drawers and without integrated battery backup (continued)

<b>Note:</b>							
1. Service clearance is independent from weight distribution distance and must be at least 1143 mm (45 in.) for the front of the frame and 914 mm (36 in.) for the rear of the frame (measured from the base frame).							
2. Weight distribution area should not be overlapped.							
3. Floor loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.							

Table 441. Floor loading for systems with 6 I/O drawers and with integrated battery backup

Floor loading for systems with 6 I/O drawers and with integrated battery backup							
a (sides)		b (front)		c (back)		1 frame	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	189.0	922.9
25	1.0	508	20.0	508	20.0	151.0	737.1
25	1.0	762	30.0	762	30.0	127.2	621.2
254	10.0	254	10.0	254	10.0	129.4	631.7
254	10.0	508	20.0	508	20.0	105.2	513.4
254	10.0	762	30.0	762	30.0	90.1	439.7
508	20.0	254	10.0	254	10.0	99.3	485.0
508	20.0	508	20.0	508	20.0	82.1	400.8
508	20.0	762	30.0	762	30.0	71.3	348.3
762	30.0	254	10.0	254	10.0	82.7	403.9
762	30.0	508	20.0	508	20.0	69.3	338.5
762	30.0	762	30.0	762	30.0	61.0	297.8

<b>Note:</b>							
1. Service clearance is independent from weight distribution distance and must be at least 1143 mm (45 in.) for the front of the frame and 914 mm (36 in.) for the rear of the frame (measured from the base frame).							
2. Weight distribution area should not be overlapped.							
3. Floor loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.							

Table 442. Floor loading for system with 12 I/O drawers and without integrated battery backup

Floor loading for system with 12 I/O drawers and without integrated battery backup							
a (sides)		b (front)		c (back)		2 frames	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	167.5	817.7
25	1.0	508	20.0	508	20.0	134.4	656.3
25	1.0	762	30.0	762	30.0	113.8	555.7
254	10.0	254	10.0	254	10.0	135.5	661.6
254	10.0	508	20.0	508	20.0	109.9	536.4
254	10.0	762	30.0	762	30.0	93.9	458.4
508	20.0	254	10.0	254	10.0	113.4	553.9
508	20.0	508	20.0	508	20.0	92.9	453.7
508	20.0	762	30.0	762	30.0	80.1	391.3



Table 442. Floor loading for system with 12 I/O drawers and without integrated battery backup (continued)

762	30.0	254	10.0	254	10.0	98.7	482.1
762	30.0	508	20.0	508	20.0	81.6	398.5
762	30.0	762	30.0	762	30.0	71.0	346.5

**Note:**

1. Service clearance is independent from weight distribution distance and must be at least 1143 mm (45 in.) for the front of the frame and 914 mm (36 in.) for the rear of the frame (measured from the base frame).
2. Weight distribution area should not be overlapped.
3. Floor loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.

Table 443. Floor loading for system with 12 I/O drawers and with integrated battery backup

Floor loading for system with 12 I/O drawers and with integrated battery backup							
a (sides)		b (front)		c (back)		2 frames	
mm	in.	mm	in.	mm	in.	lb/ft <sup>2</sup>	kg/m <sup>2</sup>
25	1.0	254	10.0	254	10.0	181.3	885.3
25	1.0	508	20.0	508	20.0	145.1	708.3
25	1.0	762	30.0	762	30.0	122.4	597.9
254	10.0	254	10.0	254	10.0	146.2	714.0
254	10.0	508	20.0	508	20.0	118.1	576.7
254	10.0	762	30.0	762	30.0	100.6	491.1
508	20.0	254	10.0	254	10.0	122.0	595.9
508	20.0	508	20.0	508	20.0	99.5	485.9
508	20.0	762	30.0	762	30.0	85.5	417.4
762	30.0	254	10.0	254	10.0	105.9	517.0
762	30.0	508	20.0	508	20.0	87.1	425.4
762	30.0	762	30.0	762	30.0	75.4	368.3

**Note:**

1. Service clearance is independent from weight distribution distance and must be at least 1143 mm (45 in.) for the front of the frame and 914 mm (36 in.) for the rear of the frame (measured from the base frame).
2. Weight distribution area should not be overlapped.
3. Floor loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.

Floor loading for the system is illustrated in the Proposed Floor Layout for Multiple Systems in *Considerations for multiple system installations*.

**Related reference:**

“Considerations for multiple-system installations” on page 348

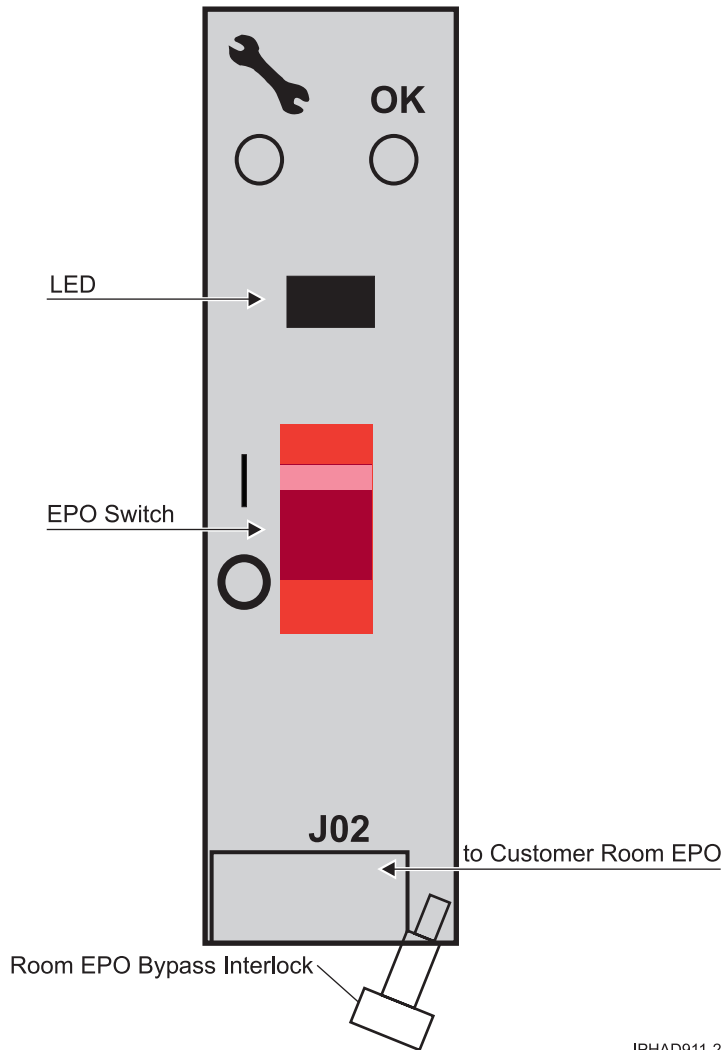
Learn about the installation requirements for a multiple-system installation.

## Unit emergency power off

The server has a unit emergency power off (UEPO) switch on the front of the first frame (A Frame).

When the switch is reset, the utility power is confined to the system power compartment, and all volatile data is lost.

The server has a unit emergency power off (UEPO) switch on the front of the first frame (A Frame). Refer to the following figure, which shows a simplified UEPO panel.



IPHAD911-2

Figure 198. Unit emergency power off

When the switch is reset, the utility power is confined to the system power compartment. All volatile data will be lost.

It is possible to attach the computer room emergency power off (EPO) system to the system UEPO. When this is done, resetting the computer room EPO disconnects all power from the power cords and the internal battery backup unit, if it is provided. All volatile data will be lost in this case also.

If the room EPO is not connected to the UEPO, resetting the computer room EPO removes ac power from the system. If the interlock bypass feature is used, the system remains powered for a short time based on system configuration.

## Computer room emergency power off

You can incorporate the integrated battery backup into a computer room emergency power off (EPO) system. Otherwise, volatile data can be lost.

When the integrated battery backup is installed and the room EPO is reset, the batteries will engage and the computer will continue to run. It is possible to attach the computer room EPO system to the machine EPO. When this is done, resetting the room EPO will disconnect all power from the power cords and the internal battery backup unit. In this event all volatile data will be lost.

To incorporate the integrated battery backup into the room Emergency Power Off systems (EPO), a cable must be made to connect to the back of the system EPO panel. The following figures illustrate how this connection is made.

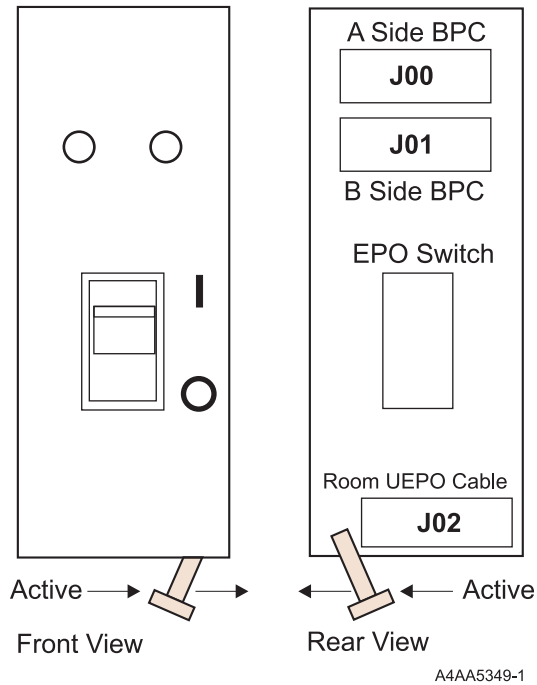
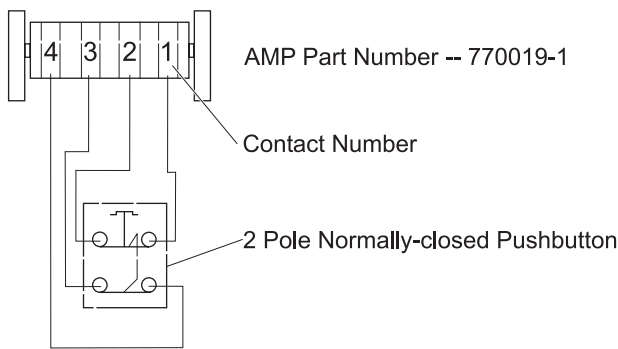


Figure 199. Computer room emergency power off

The preceding figure illustrates the back of the machine UEPO panel with the room EPO cable plugging into the machine. Notice the switch actuator. After it is moved to make the cable connection possible, the room EPO cable must be installed for the machine to power on.

In the following figure, an AMP connector 770019-1 is needed to connect to the system EPO panel. For room EPO cables using wire sizes #20 AWG to #24 AWG, use AMP pins (part number 770010-4). This connection should not exceed 5 Ohms, which is approximately 200 ft(61 m) of #24 AWG.



Room UEPO Switch Schematic

Figure 200. AMP connector figure

## Machine holdup times

Use the Typical machine holdup time tables to determine the typical machine holdup times (time versus load) for fresh and aged batteries.

The following criteria apply to both tables.

- All times are listed in minutes
- Machine load is listed in total ac input power (power for both power cords combined)
- A fresh battery is defined as 2.5 years old or less.
- An aged battery is defined as 6.5 years.

**Note:** Battery capacity decreases gradually as the battery ages (from fresh-battery value to aged-battery value). The system diagnoses a failed-battery condition if the capacity decreases below the aged-battery value.

Table 444. Typical machine-holdup time versus load for fresh battery

Typical machine holdup time vs. load for fresh battery														
Machine load	3.3 kW		6.67 kW		10 kW		13.33 kW		16.67 kW		20 kW		21.67 kW	
Integrated battery backup configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	7.0	21.0	2.1	7.0										
2 BPR	21.0	50.0	7.0	21.0	4.0	11.0	2.1	7.0						
3 BPR	32.0	68.0	12.0	32.0	7.0	21.0	4.9	12.0	3.2	9.5	2.1	7.0	1.7	6.5
N=Non-redundant, R=Redundant														

Table 445. Typical machine-holdup time versus load for aged battery

Typical machine holdup time vs. load for aged battery														
Machine load	3.3 kW		6.67 kW		10 kW		13.33 kW		16.67 kW		20 kW		21.67 kW	
Integrated battery backup configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	4.2	12.6	1.3	4.2										
2 BPR	12.6	30.0	4.2	12.6	2.4	6.6	1.3	4.2						
3 BPR	19.2	41.0	7.2	19.2	4.2	12.6	2.9	7.2	1.9	5.7	1.3	4.2	1.0	3.9
N=Non-redundant, R=Redundant														

## 5802 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 446. Dimensions for rack-mounted expansion unit

Maximum configuration weight	Width	Depth	Height
54 kg (120 lb)	444.5 mm (17.5 in.)	711.2 mm (28 in.)	4U

Table 447. Electrical

Electrical characteristics	Properties
kVA (maximum)	.768 kVA
Rated voltage and frequency	100 - 127 V ac or 200 - 240 V ac at 50 - 60Hz
Thermal output (maximum)	2542 BTU/hr
Power requirements (maximum)	745 W
Power factor	.97
Leakage current (maximum)	3.5 mA
Phase	Single
Plug type (Canada and U.S.)	26
Power cord length	14 ft

Table 448. Temperature requirements

Operating	Storage	Shipping
10 - 38°C (32 - 100.4°F)	1 - 60°C (33.8 - 140°F)	-40 - 60°C (-40 - 140°F)

Table 449. Environment requirements

Properties	Operating	Nonoperating	Storage	Shipping
Noncondensing humidity	Recommended: 34 - 54% Allowable: 20 - 80%	5 - 80%	5 - 80%	5 - 100%

Table 450. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 451. Noise emissions

Models	Properties	Operating	Idle
IBM Feature Code 5802 - 4U I/O drawer consists of 18 SSF disk drives, 10 PCI-Express 8x slots, and 2 DCAs	L <sup>WAd</sup> (B)	7.0	7.0
	L <sup>PAm</sup> (dB)	52	52
<b>Notes:</b>			
1. L <sup>WAd</sup> is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1 B).			
2. L <sup>PAm</sup> is the mean A-weighted emission sound pressure level measured at the 1-meter bystander positions (rounded to the nearest dB).			
3. 10 dB (decibel) = 1 B (bel).			
4. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.			

Table 452. Service clearances

Front	Back	Sides
915 mm (36 in. )	915 mm (36 in. )	914 mm (36 in. )

## 5886 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 453. Dimensions for rack-mounted expansion unit

Dimensions	Weight (with no drives installed)	Width	Depth (including front bezel)	Height
Metric	17.7 kg	445 mm	521 mm	89 mm
English	39 lb	17.5 in.	20.5 in.	3.5 in.

Table 454. Electrical

Electrical characteristics	Properties
kVA <sup>4</sup>	0.358
Rated voltage and frequency	100 - 240 V ac at 50 - 60 Hz
Thermal Output <sup>4</sup>	1160 Btu/hr
Power requirements (maximum)	340 W
Power factor	0.95
Inrush current	55 A per power cord
Leakage current (maximum)	3.10 mA
Phase	1

Table 455. Maximum altitude

2134 m (7000 ft) above sea level
----------------------------------

Table 456. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F) <sup>3</sup>	-40 - 60°C (-40 - 140°F)

Table 457. Environmental requirements

Environment	Operating	Nonoperating
Noncondensing humidity	20 - 80% (allowable) 40 - 55% (recommended)	8 - 80% (including condensing)
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)

Table 458. Noise emissions<sup>1, 4</sup>

Properties		Operating	Idle
Single 5886 drawer in standard 19-inch rack with 24 hard drives, nominal environmental conditions, and no front or rear doors on rack.	L <sub>WAd</sub>	6.6 bels	6.5 bels
	L <sub>pAm</sub> (1-meter bystander)	49 dB	49 dB

Table 459. Service clearances for rack-mounted expansion unit

Dimensions	Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
Metric	914 mm	914 mm	914 mm	
English	36 in.	36 in.	36 in.	

Table 460. Service clearances for stand-alone expansion unit

Dimensions	Front	Back
Metric	368.3 mm	381 mm
English	14.5 in.	15 in.

Table 461. Hardware specifications

Notes:
1. For a description of noise emission values, see <i>Acoustics</i> .
2. Side and top clearances are optional during operation.
3. The maximum 38°C (100.4°F) temperature must be derated 1°C (1.8 °F) per 137 m (450 ft) above 1295 m (4250 ft). Maximum altitude is 2134 m (7000 ft).
4. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.

**Safety compliance:** This hardware is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950-00; EN 60950; IEC 60950 including all National Differences

**Related information:**

 Acoustics

## Planning for 6954 and 6953 racks

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

The 6954 base rack is an optional second base frame with its own separate connection to AC power that is designed for use with model 9119-FHA. A complete set of planning information is provided to address the resulting system.

Table 462. 6954 base rack components

Feature code	Description	Minimum per system	Maximum per system
6869	Slimline door set for FC 6954 rack	1	2
6870	Acoustic door set for FC 6954 rack	1	2
6953	Optional non-powered expansion rack		

**Note:**

1. A Hardware Management Console (HMC) can connect to multiple systems (therefore, a Hardware Management Console might not need to be ordered), or up to two HMCs can connect to the system for redundancy.
2. A maximum of 16 I/O drawers using one FC 6954 and one FC 6953 can be connected to the 9119-FHA rack. Typically, I/O drawers are populated in the server frame first, which reduces the maximum number of drawers available in the 6954 frame.

Table 463. Full system weights (no doors)

Physical characteristics	Weight
Powered I/O rack	1275 kg (2810 lb)
Powered I/O rack and expansion rack	2341 kg (5160 lb)

Table 464. Cover weights

Physical characteristics	Weight
One acoustic door	25 kg (56 lb)
One non-acoustic door	15 kg (33 lb)

Table 465. Dimensions and weight

Physical characteristics	Slim Line		Acoustic	
	One frame	Two frame	One frame	Two frame
Number of frames	One frame	Two frame	One frame	Two frame
Height	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)	2024.38 mm (79.7 in.)
Width	784.86 mm (30.9 in.)	1567.18 mm (61.7 in.)	784.86 mm (30.9 in.)	1567.18 mm (61.7 in.)
Depth	1485.9 mm (58.5 in.)	1485.9 mm (58.5 in.)	1805.94 mm (71.1 in.)	1805.94 mm (71.1 in.)

Table 466. Maximum rack weights

Physical characteristics	Weight
Powered I/O rack	1388 kg (3060 lb)
Powered I/O rack and bolt on expansion rack	2567 kg (5660 lb)

Table 467. Powered I/O rack without the internal battery feature

I/O drawers	Weight
1	571 kg (1258 lb)
2	668 kg (1473 lb)
3	766 kg (1688 lb)
4	863 kg (1903 lb)
5	986 kg (2174 lb)
6	1084 kg (2389 lb)
7	1181 kg (2604 lb)
8	1279 kg (2819 lb)

Table 468. Powered I/O rack with bolt on expansion rack, without the internal battery feature

I/O drawers	Weight
9	1750 kg (3858 lb)
10	1847 kg (4073 lb)
11	1945 kg (4288 lb)
12	2068 kg (4559 lb)
13	2165 kg (4774 lb)
14	2263 kg (4989 lb)
15	2360 kg (5204 lb)



Table 468. Powered I/O rack with bolt on expansion rack, without the internal battery feature (continued)

I/O drawers	Weight
16	2458 kg (5419 lb)

Table 469. Powered I/O rack with the internal battery feature

I/O drawers	Weight
1	777 kg (1712 lb)
2	874 kg (1927 lb)
3	972 kg (2142 lb)
4	1095 kg (2413 lb)
5	1192 kg (2628 lb)
6	1290 kg (2843 lb)
7	1387 kg (3058 lb)

Table 470. Powered I/O rack with bolt on expansion rack, with the internal battery feature

I/O drawers	Weight
8	1858 kg (4097 lb)
9	1956 kg (4312 lb)
10	2053 kg (4527 lb)
11	2176 kg (4798 lb)
12	2274 kg (5013 lb)
13	2371 kg (5228 lb)
14	2469 kg (5443 lb)
15	2566 kg (5658 lb)

Table 471. Shipping dimension and weight per rack

Physical characteristics	Dimensions
Height	231 cm (91 in.)
Width	94 cm (37 in.)
Depth	162 cm (63.5 in.)
Weight	1134 kg (2500 lb)

Table 472. System Rating. The system rating varies by configuration. See *Total system power consumption* for which system configurations will have the higher rating.

	US, Canada, Japan		US High Voltage		World Trade Corporation		World Trade Corporation	
Voltage and frequency	200 - 240 V ac at 50 - 60 Hz		480 V ac at 50 - 60 Hz		200 - 240 V ac at 50 - 60 Hz		380 - 415 V ac at 50 - 60 Hz	
System rating, I/O rack	48 A	63 A	24 A	24 A	48 A	63 A	34 A	34 A

Table 473. Electrical and thermal characteristics

Electrical and thermal characteristics	Properties
Maximum power for one fully configured powered I/O rack (FC 6954)	9.8 kW
Maximum power for one fully configured powered I/O rack (FC 6954) and one fully configured non powered I/O rack (FC 6953)	19.7 kW
Power factor, typical	99
Inrush current	134
Thermal output for one fully configured powered I/O rack (FC 6954)	3.34 kBTU/hr
Thermal output power for one fully configured powered I/O rack (FC 6954) and one fully configured non powered I/O rack (FC 6953)	6.72 kBTU/hr

Table 474. Environment specifications

Environment	Properties	Operating	Storage	Shipping
Temperature	8 - 32-core	50 - 89.6°F (10 - 32°C)	33.8 - 140°F (1 - 60°C)	-40 - 140°F (-40 - 60°C)
Temperature	40 - 64-core	50 - 82.4°F (10 - 28°C)	33.8 - 140°F (1 - 60°C)	-40 - 140°F (-40 - 60°C)
Relative humidity		20 - 80%	5 - 80%	5 - 100%
Maximum altitude	8 - 32 core	3048 m (10 000 ft)		
	40 - 64 core	2133 m (7000 ft)		

Table 475. Declared acoustical noise emissions for powered I/O rack for the 9119-FHA

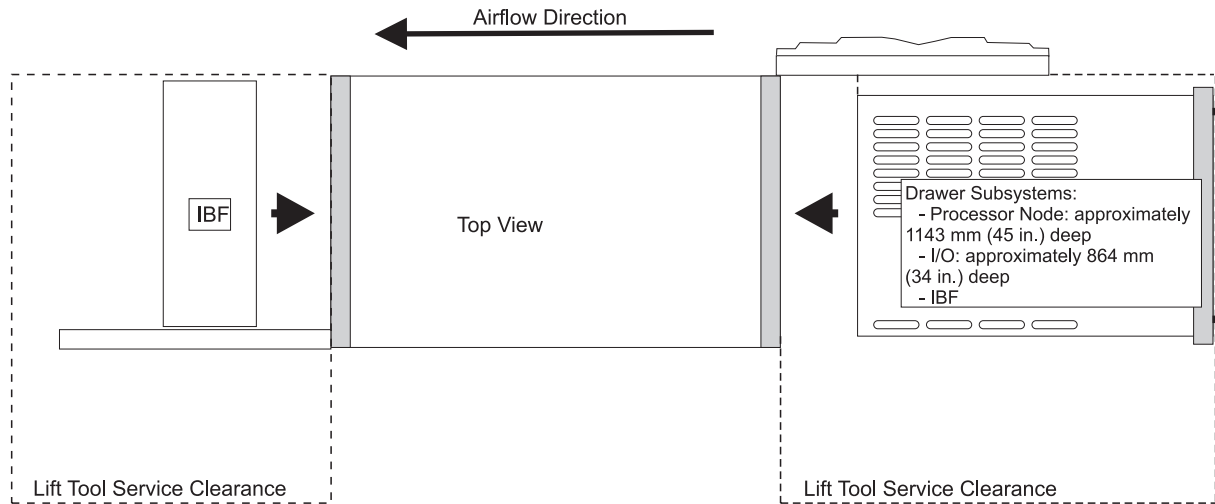
Product Configuration	Declared A-Weighted Sound Power Level, L <sub>WAd</sub> (B)		Declared A-Weighted Sound Pressure Level, L <sub>pAm</sub> (dB)	
	Operating	Idling	Operating	Idling
Single I/O drawer alone in rack with acoustical door set. Blowers at nominal speeds.	7.0	7.0	52	52
Single I/O drawer alone in rack with nonacoustical (slimline) door set. Blowers at nominal speeds.	7.5	7.5	59	59
Bulk power assembly alone in rack with acoustical door set. Blowers at nominal speeds.	6.9	6.9	52	52

Table 475. Declared acoustical noise emissions for powered I/O rack for the 9119-FHA (continued)

Product Configuration	Declared A-Weighted Sound Power Level, $L_{WAd}$ (B)		Declared A-Weighted Sound Pressure Level, $L_{pAm}$ (dB)	
	Operating	Idling	Operating	Idling
Bulk power assembly alone in rack with Non-Acoustical (Slimline) Door Set. Blowers at nominal speeds.	7.5	7.5	59	59
Typical configuration of powered I/O rack with acoustical door set: 4 I/O drawers and bulk power assembly. Blowers at nominal speeds.	7.7 <sup>5</sup>	7.7 <sup>5</sup>	59	59
Typical configuration of powered I/O rack with nonacoustical (slimline) Door set: 4 I/O drawers and bulk power assembly. Blowers at nominal speeds.	8.2	8.2	66	66
Maximum configuration of powered I/O rack with acoustical door set: 8 I/O drawers and bulk power assembly. Blowers at nominal speeds.	7.9 <sup>4</sup>	7.9 <sup>4</sup>	61	61
Maximum configuration of powered I/O rack with nonacoustical (slimline) door set: 8 I/O drawers and bulk power assembly. Blowers at nominal speeds.	8.4	8.4	68	68
<p><sup>1</sup>Declared level <math>L_{WAd}</math> is the upper-limit A-weighted sound power level. Declared level <math>L_{pAm}</math> is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.</p> <p><sup>2</sup>All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</p> <p><sup>3</sup><b>B, dB</b>, abbreviations for bels and decibels, respectively, where 1 B = 10 dB.</p> <p><sup>4</sup>Meets IT Product Noise Limits for, <i>Generally Unattended Data Center</i>, per Statskontoret Technical Standard 26:6.</p> <p><sup>5</sup>Meets IT Product Noise Limits for, <i>Generally Attended Data Center</i>, per Statskontoret Technical Standard 26:6.</p>				

Front-service access is necessary on the 6954 to accommodate a lift tool for the servicing of large drawers (I/O drawers). Front and rear service access is necessary to accommodate the lift tool for servicing of the

optional integrated battery backup.



Floor Plan Considerations for Single Units

A4AA5731-1

Figure 201. Floor plan considerations for single units

**Related reference:**

“Model 9119-FHA server specifications” on page 87

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.

**Power cord and breaker information**

Use the breaker rating and cord information tables to determine the circuit breaker rating for the power cords used with your server.

Table 476. Powered I/O rack

	US, Canada, Japan		US High Voltage		World Trade Corporation			
	200 - 240 V ac		480 V ac		200 - 240 V ac		380 - 415 V ac	
	Lower rated power cord set	Higher rated power cord set	Lower rated power cord set	Higher rated power cord set	Lower rated power cord set	Higher rated power cord set	Lower rated power cord set	Higher rated power cord set
Plug Rating Needed	60 A	100 A <sup>1</sup>	30 A	30 A <sup>1</sup>	No plug	No plug <sup>1</sup>	No plug	No plug <sup>1</sup>
System Rating, I/O rack	48 A	63 A <sup>1</sup>	24 A	24 A <sup>1</sup>	48 A	63 A <sup>1</sup>	34 A	34 A <sup>1</sup>
Recommended circuit breaker rating	60 A	80 A <sup>1</sup>	30 A	30 A <sup>1</sup>	60 A	80A <sup>1</sup>	40 A	40 A <sup>1</sup>
Cord size	6 AWG	6 AWG <sup>1</sup>	8 AWG	8 AWG <sup>1</sup>	6 AWG	6 AWG <sup>1</sup>	8 AWG	8 AWG <sup>1</sup>
Recommended receptacle (Not provided)	IEC60309, 60 A, type 460R9W	IEC60309, 100 A, type 4100R9W <sup>1</sup>	IEC60309, 30 A, type 430R7W	IEC60309, 30 A, type 430R7W <sup>1</sup>	Not specified, electrician installed	Not specified, electrician installed <sup>1</sup>	Not specified, electrician installed	Not specified, electrician installed <sup>1</sup>
Power Cord Feature Code 4.3 m (14 ft)	8688	8686	8697	8697	8694	8694	8677	8677

<sup>1</sup>One frame requires the lower rated power cord set. Two frames require the higher rated power cord set.

**Related reference:**

“Total system power consumption” on page 416

Use the tables to determine the total system power consumption for your server's configuration.

**Doors and covers**

Covers are an integral part of the 6954 and are required for product safety, proper airflow and cooling, and electromagnetic compatibility compliance.

The following rear door options are available for the 6954:

- Acoustical door option

This feature provides a specially designed, noise-reducing door set for those who want lower noise levels in their data center or who might want to meet certain acoustical or noise exposure requirements. The acoustical door option consists of a special front door, approximately 250 mm (10 in.) in depth. It contains acoustical treatment and when used with the required rear door heat exchanger, it lowers the noise level of the machine by approximately 7 dB (0.7 B) in comparison to the slimline door option.

- Slimline cover option

This feature provides an option to take up less floor space, when space is be more critical than acoustical noise levels. The slimline door option consists of a front and rear door set, approximately 100 mm (4 in.) in depth, to be used in conjunction with the required rear-door heat exchanger previously described. No acoustical treatment is available for the slimline door option, and the 9119-FHA system generally does not meet industry acoustical noise limits with this option installed. The slimline door set is offered as a selectable option for those who are more concerned with floor space than noise levels because each slimline door is about 100 mm (4 in.) less deep than each acoustical door.

**Note:** For declared levels of acoustical noise emissions, refer to *Planning for 6954 base rack*.

## Plan views

The Powered I/O frame, FC 6954, can be placed on either side of the 9119-FHA. The maximum distance between the frames is limited by the Infiniband (IB) frame to frame communication cables, which are 8 m (26.2 ft) long. When determining the maximum distance the Powered I/O frame can be placed from the 9119-FHA, make sure to account for the following three lengths:

1. The distance from IB cable plug location of the 9119-FHA CEC frame to the under floor.
2. The distance along the under floor.
3. The distance from the underfloor to the Powered I/O expansion frame IB cable plug location.

The non-powered I/O frame, FC 6953, must be on the left side of the powered I/O frame, when facing the front of the rack.

Dimensional planning information is shown in this top down view of your server.

The following figure shows dimensional planning information for single-frame systems.

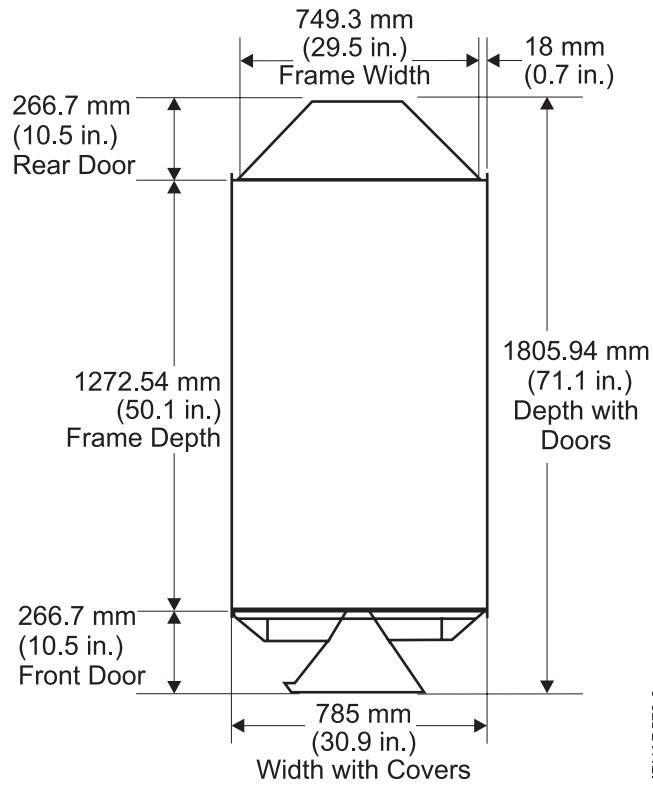


Figure 202. Plan view for single-frame systems with acoustical doors

The following figure shows dimensional planning information for double-frame systems.

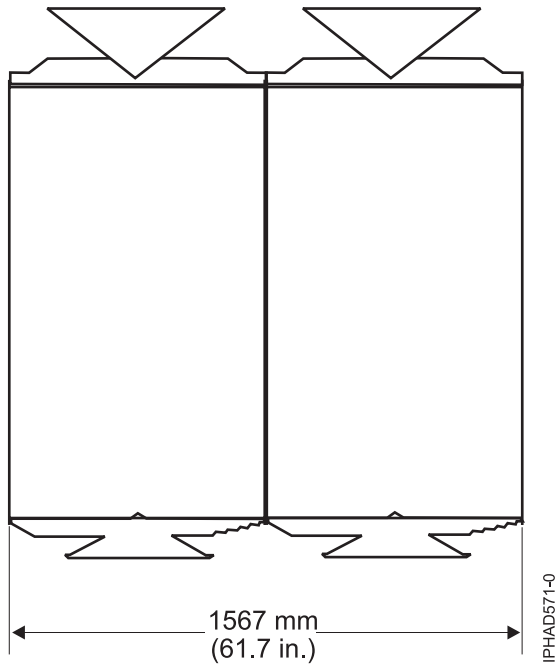


Figure 203. Plan view for double-frame systems with acoustical doors

The following figure shows dimensional planning information for single-frame systems.

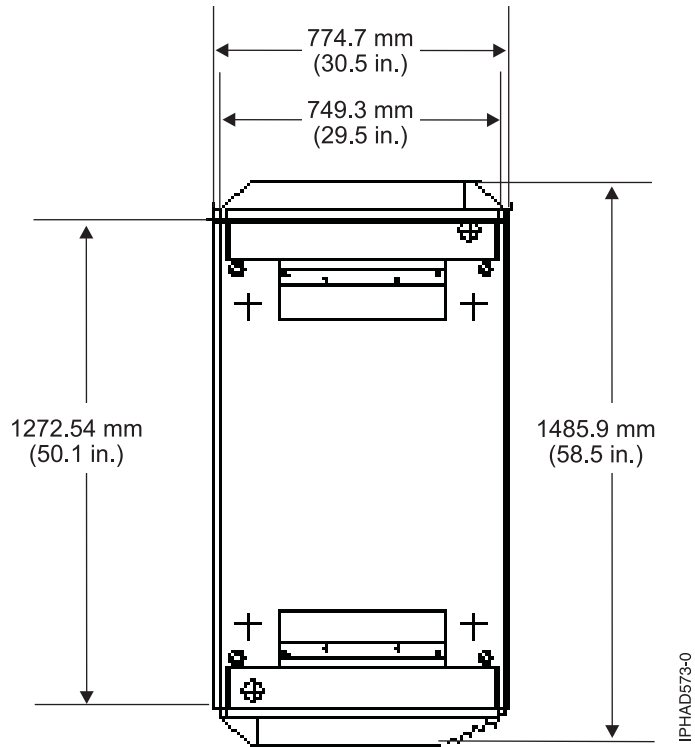


Figure 204. Plan view for single-frame systems with slimline doors

The following figure shows dimensional planning information for single-frame systems.



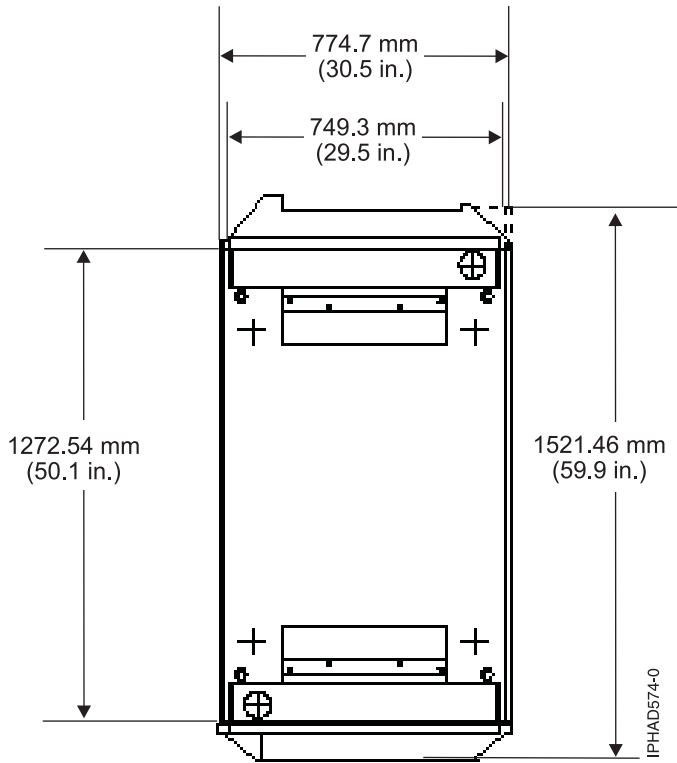


Figure 205. Plan view for single-frame systems with slimline doors and a Rear door heat exchanger

**Attention:** When moving the rack, note the caster swivel diameters shown in the following figure. Each caster swivels in an approximate 130 mm (5.1 in.) diameter.

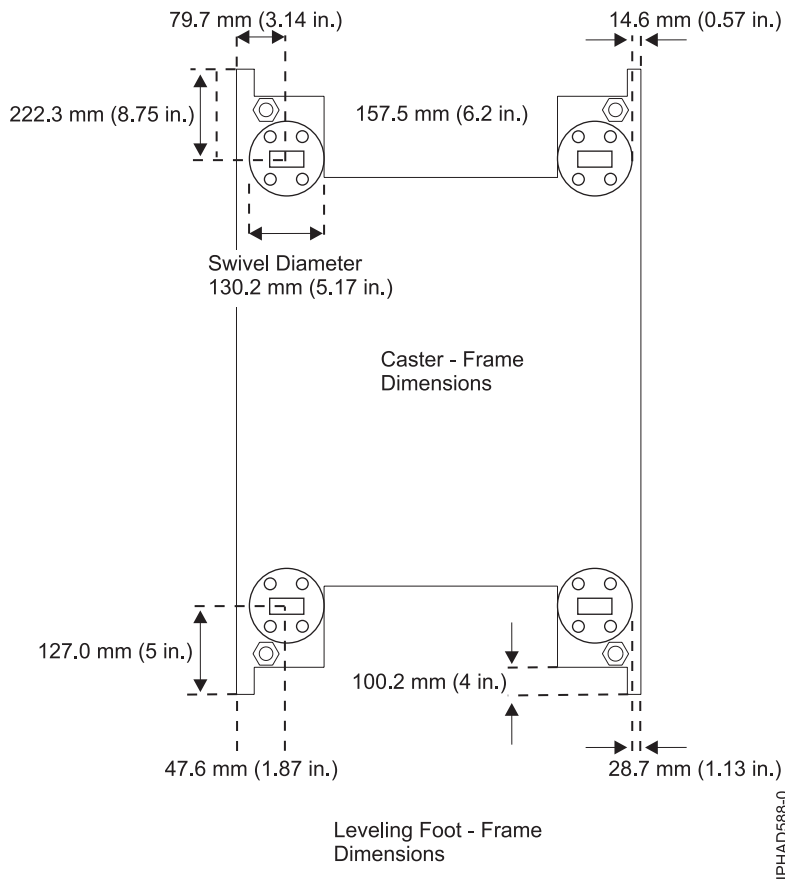


Figure 206. Leveling foot and frame dimensions

## Installing the frame tie-down kit

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

The following procedures describe how to install a frame tie-down kit and floor tie-down hardware to secure an IBM rack to a concrete floor beneath a 228.6 - 330.2 mm (9 -13 in. depth) or a 304.8 - 558.8 mm (12 - 22 in. depth) raised-floor environment or to a nonraised floor.

### Positioning the rack

Use this procedure to unpack and position your rack.

To unpack and position the rack, do the following steps:

**Note:** Before attempting to position the rack, see *Moving the system to the installation site*.

1. Remove all packing and tape from the rack.
2. Place the last floor covering exactly adjacent and in the front of the final installation location.
3. Position the rack according your floor plan.
4. Lock each caster wheel by tightening the thumbscrew on the caster.

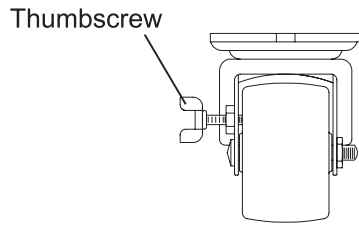


Figure 207. Caster thumbscrew

- While moving the system to its final installed location and during relocation, it might be necessary to lay down floor covering, such as Lexan sheets, to prevent floor panel damage.

## Securing the rack

Securing your rack to a concrete (nonraised) floor or to a raised floor prevents movement when vibrations occur.

**Note:** Securing the rack is an optional procedure. See *Vibration and shock* for more information..

Before the service representative can perform the tie-down procedure, you must complete the floor preparation described in *Cutting and placing floor panels* and *Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor*.

### Related reference:

“Cutting and placing floor panels” on page 395

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

## Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor

Use these steps to attach your rack to a 228.6 mm to 330.2 mm (9 in. to 13 in. depth). floor.

**Attention:** The frame tie downs are intended to secure a frame weighing less than 1429 kg (3150 lb). These tie downs are designed to secure the frame on a raised-floor installation.

Use the following to determine your next step:

- If the rack is being attached to a short-depth raised-floor environment 228.6 - 330.2 mm (9 - 13 in. depth), install the Raised floor tie-down kit (part number 16R1102) described in the following table.

Table 477. Raised floor tie-down kit 228.6 - 330.2 mm (9 - 13 in. depth)

Raised floor tie-down kit (part number 16R1102)			
Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar
3	44P2999	4	Turnbuckle Assembly

- If the rack is being attached to a deep, raised-floor environment 304.8 - 558.8 mm (12 - 22 in. depth), install the Raised floor tie-down kit (part number 16R1103) described in the following table.

Table 478. Raised floor tie-down kit 304.8 - 558.8 mm (12 - 22 in. depth)

Raised floor tie-down kit (part number 16R1103)			
Item	Part number	Quantity	Description
1	44P3438	1	Wrench
2	44P2996	2	Stabilizer bar

Table 478. Raised floor tie-down kit 304.8 - 558.8 mm (12 - 22 in. depth) (continued)

Raised floor tie-down kit (part number 16R1103)			
3	44P3000	4	Turnbuckle Assembly

It is your responsibility to ensure that the following steps are completed before the service representative performs the tie-down procedure.

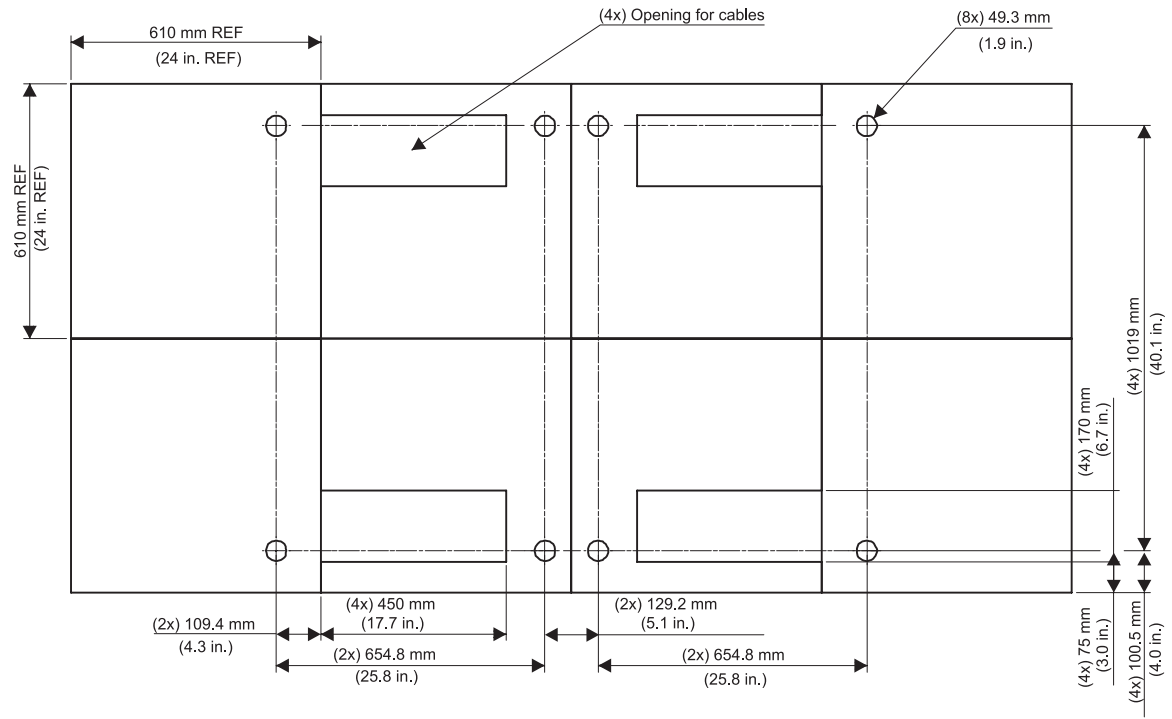
**Note:** To accommodate a floor with a depth of more than 558.8 mm (22 in.), a steel beam or a steel channel adapter for mounting the sub-floor eyebolts are required. The customer must supply the floor eyebolts.

Consider the following when preparing the floor for tie-down procedure:

- The hardware is designed to support a frame weighing no more than 1429 kg (3150 lb).
- The estimated maximum concentrated load on one caster for a 1429 kg (3150 lb) system is 476.3 kg (1050 lb). For a multiple-system installation, one floor tile might bear a total concentrated load of 952.5 kg (2100 lb).

To install the eyebolts, do the following steps:

1. Obtain the service of a qualified structural engineer to determine the appropriate installation of the eyebolts.
2. Consider the following before installing the eyebolts:
  - Floor eyebolts must be securely anchored to the concrete floor.
  - For a single-frame installation, four 1/2-in. diameter by 13-in. sub-floor eyebolts should be secured to the sub-floor.
  - The minimum height of the center of the internal diameter is 2.54 mm (1 in.) above the concrete floor surface.
  - The maximum height is 63.5 mm (2.5 in.) above the concrete floor surface. A height greater than 63.5 mm (2.5 in.) can cause excessive lateral deflection to the tie-down hardware.
  - The eyebolt's internal diameter should be 1-3/16 inch, and each eyebolt should be able to withstand 1224.7 kg (2700 lb). The customer should obtain the services of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to ensure that the raised floor and the building can support the floor-loading specifications.
  - To ensure that the holes are in the correct location, the diagonal distance of the center of the holes should be 1211.2 mm (47.7 in.). The distance between the center holes to the center of the next holes should be 654.8 mm (25.8 in.) (the side-to-side distance) and 1019 mm (40.1 in.) (the front-to-back distance).
3. Verify that the four eyebolts are positioned to match the dimensions in the following figures.



IPHAD947-1

Figure 208. Eyebolt positioning for 610 mm (24 in.) floor tile layout

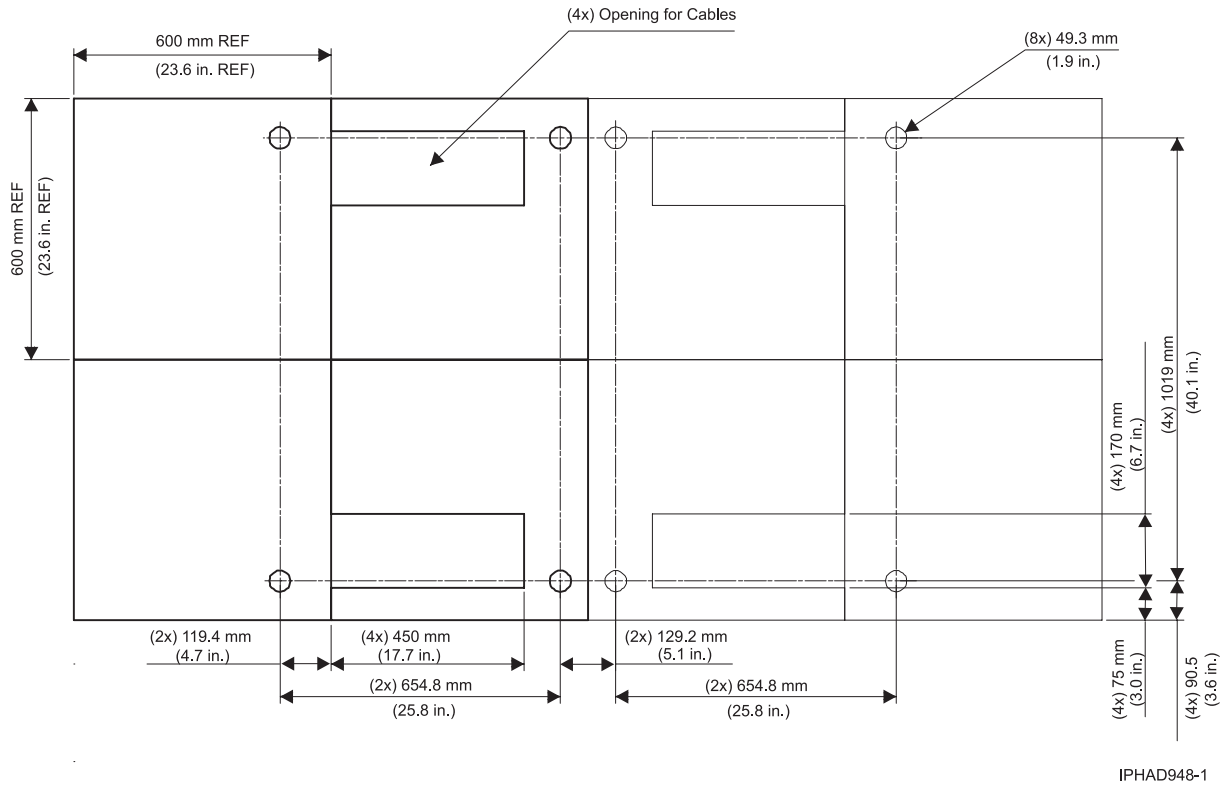


Figure 209. Eyebolt positioning for 600 mm (23.6 in.) floor tile layout

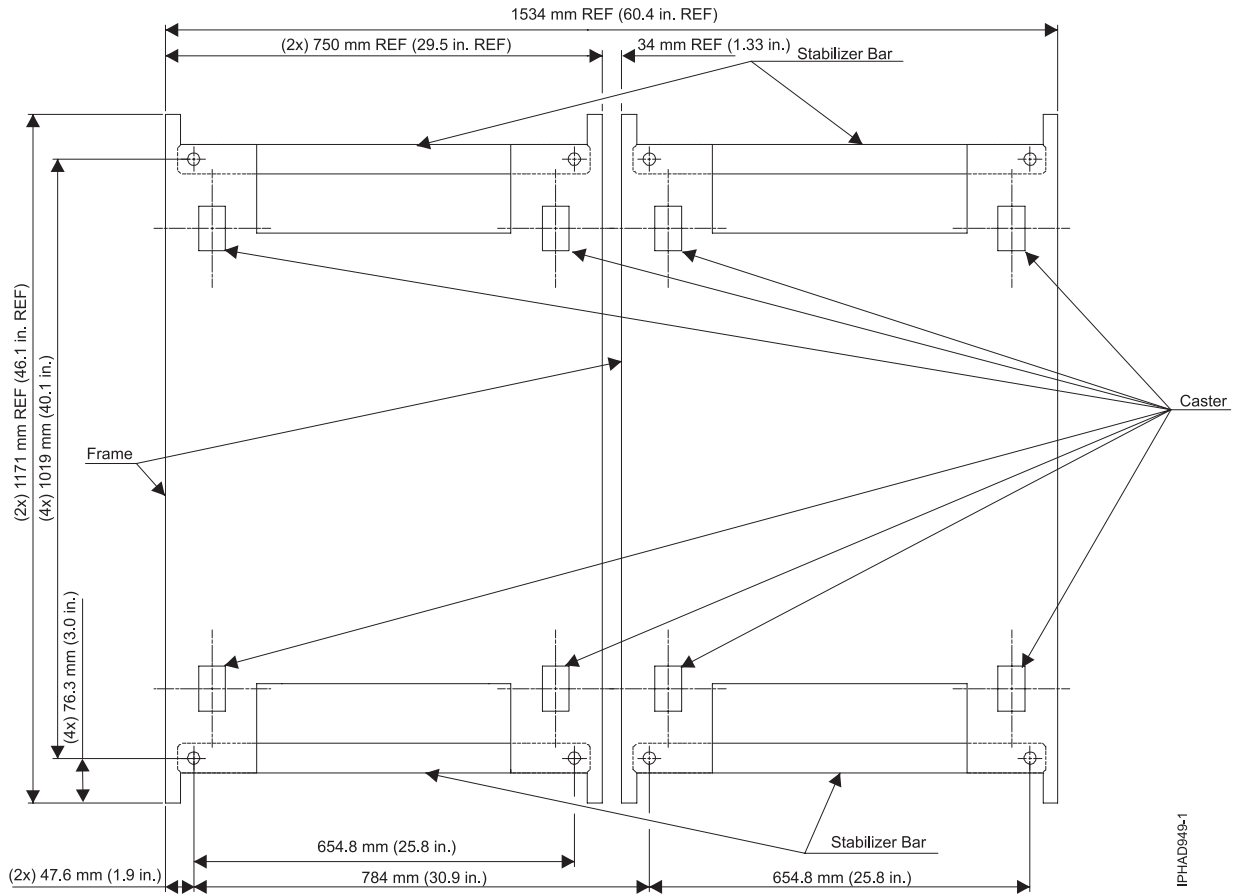


Figure 210. Stabilizer bar layout (top view)

4. Install the eyebolts to the floor. The service representative can now install the frame.

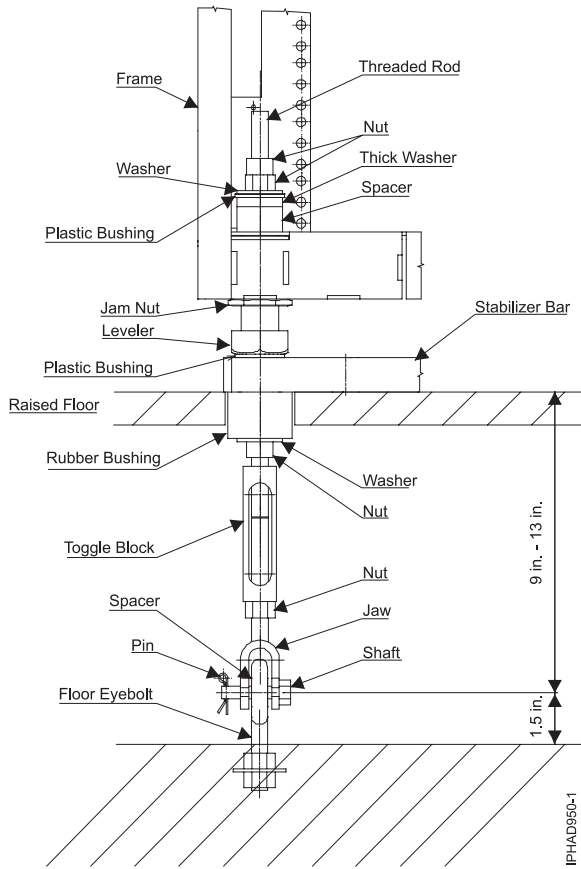


Figure 211. Turnbuckle assembly frame tie-down hardware for 228.6 - 330.2 mm (9 - 13 in.) raised floor (part number 44P2999)



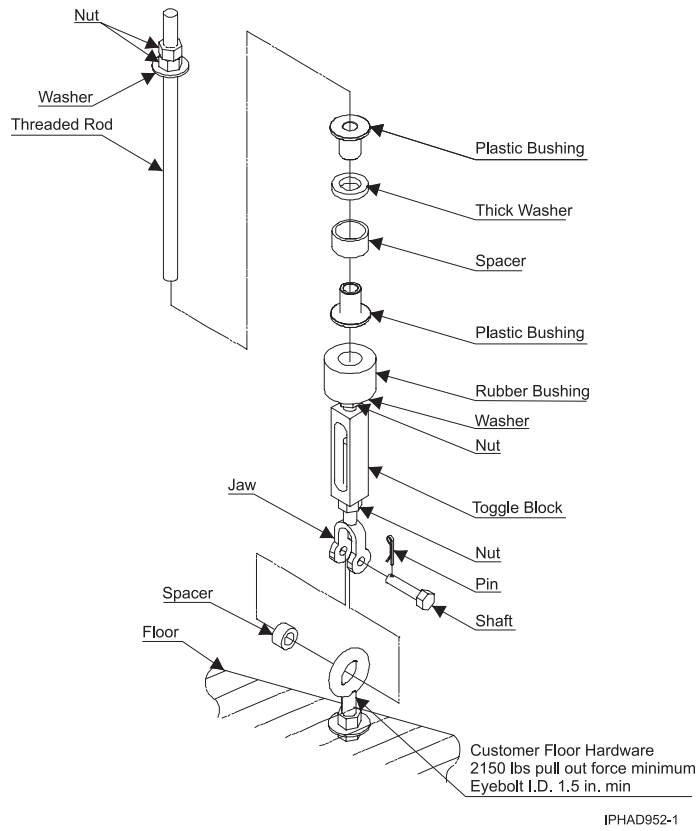


Figure 212. Turnbuckle assembly frame tie-down hardware for 228.6 - 330.2 mm (9 - 13 in.) raised floor (part number 44P2999)

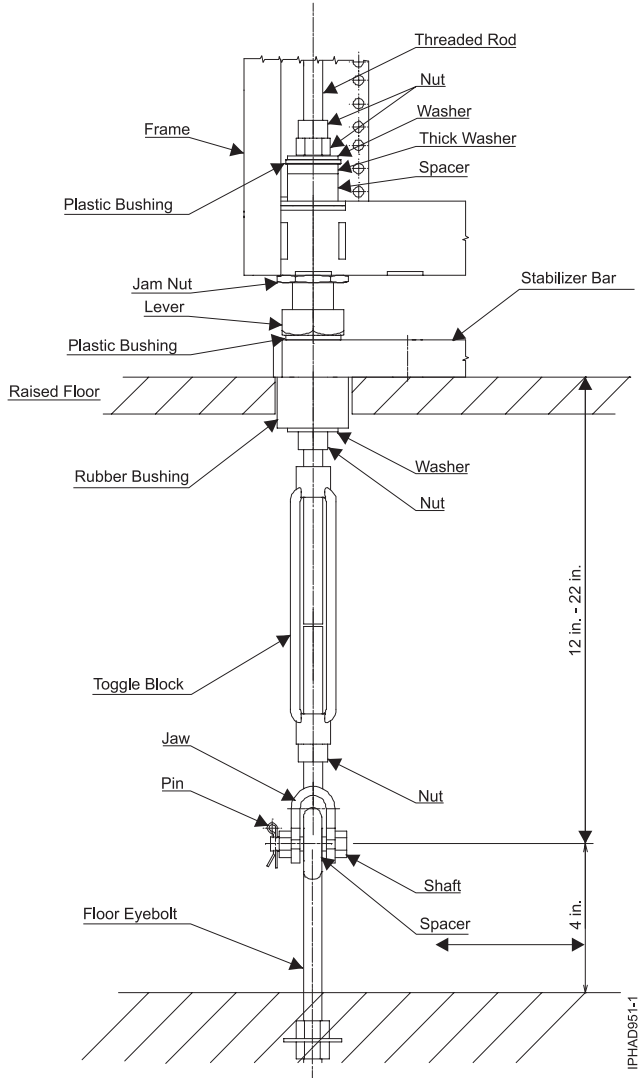


Figure 213. Turnbuckle assembly frame tie-down hardware for 304.8 - 558.8 mm (12 - 22 in.) raised floor (part number 44P3000)

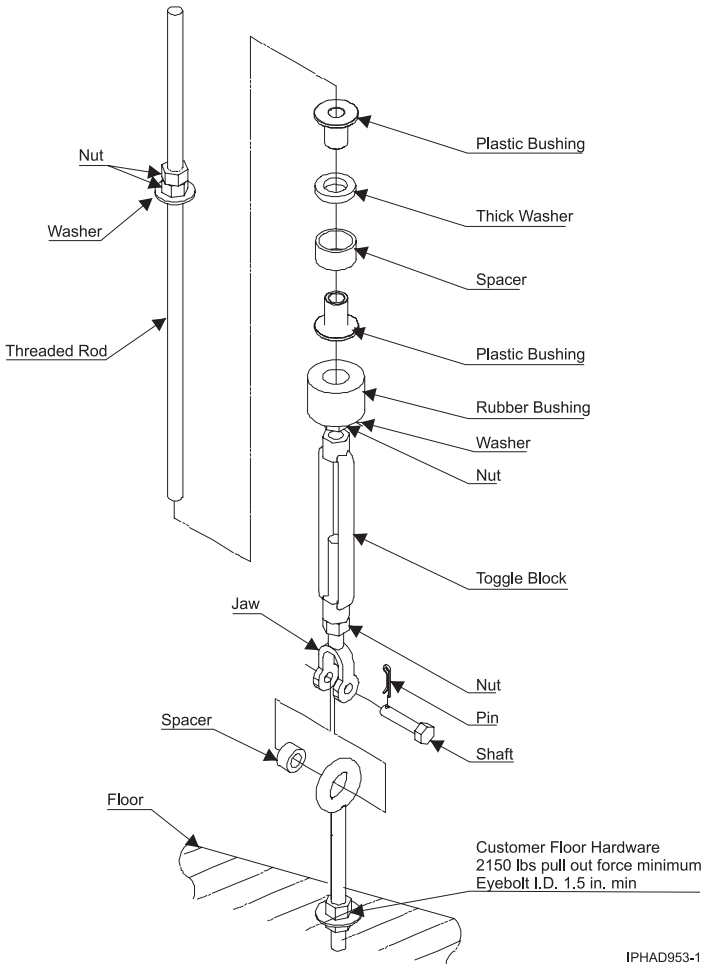


Figure 214. Turnbuckle assembly frame tie-down hardware for 304.8 - 558.8 mm (12 - 22 in.) raised floor (part number 44P3000)

## Cutting and placing floor panels

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

Use the following procedure to cut and place floor panels in the raised floor. The x-y alphanumeric grid positions are used to identify relative positions of cutout floor panels that might be cut in advance.

1. Measure the panel size of the raised floor.
2. Verify the floor panel size. The floor panel size illustrated is 600 mm (23.6 in.) and 610 mm (24 in.) panels.
3. Ensure adequate floor space is available to place the frames over the floor panels exactly as shown in the following figures. For front-to-back and side-to-side clearances, refer to *Considerations for multiple-system installations*. Use the plan view, if necessary. Consider all obstructions above and below the floor.
4. Identify the panels needed, and list the total quantity of each panel required for the installation.
- 5.

**Important:** Cut the required quantity of panels. When cutting the panels, you must adjust the size of the cut for the thickness of the edge molding you are using. The dimensions shown in the figures are finished dimensions. For ease of installation, number each panel as it is cut.

**Note:** For a multiple frame installation, two casters could produce loads as high as 2750 lb.

**Notes:**

1. The weight distribution bar is a requirement for a model 9119-FHA on a raised floor. It is needed to maintain the integrity of the floor that holds the weight of the frame.
2. This floor-tile arrangement is recommended so that the casters or leveling pads are placed on separate floor tiles to minimize the weight on a single floor tile. Load bearing tiles that have cutouts might require additional pedestals to keep their structural integrity. Additionally, the cutouts span two tiles. Raised floors utilizing a stringer system should leave the stringer intact.
3. The *Raised floor with 610 mm (24 in.) floor panels figure* and *Raised floor with 600 mm (23.6 in.) floor panels figure* are intended only to show relative positions and accurate dimensions of floor cutouts. The figures are not intended to be a machine template and is not drawn to scale.

**Raised floor with 610 mm (24 in.) floor panels figure**

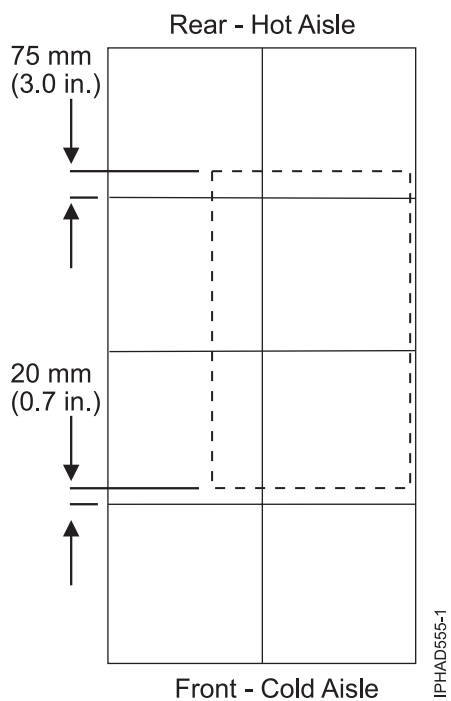


Figure 215. Rack placement for 610 mm (24 in.) tiles

This image shows an overview perspective of the rack placement on floor tiles. The dashed lines represent the rack. The solid lines are used for dimensions.

1. The rear of the server is placed 75 mm (3.0 in.) measuring up from the bottom edge of the first row tile.
2. The front of the server is placed 20 mm (0.7 in.) measuring up from the bottom edge of the third row tile.

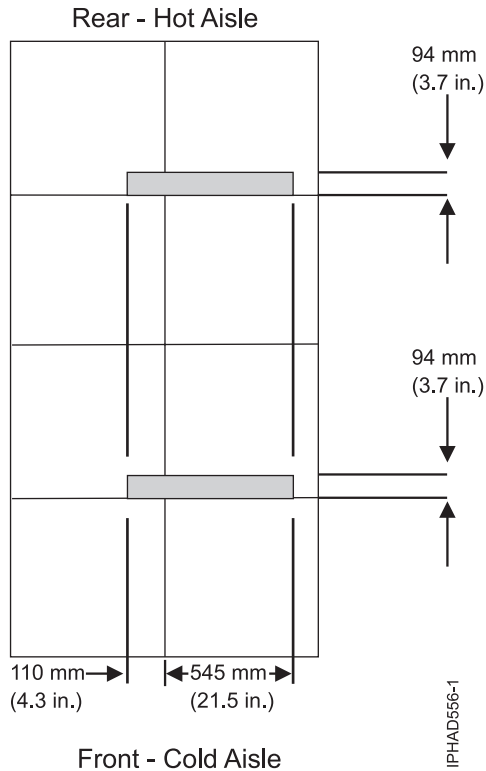


Figure 216. Cable cutout placement 610 mm (24 in.) tiles

This figure shows the floor cutouts for the cables. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width of the first cutout is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
2. The second cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width of the second cutout is 110 (4.3 in.) mm measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).

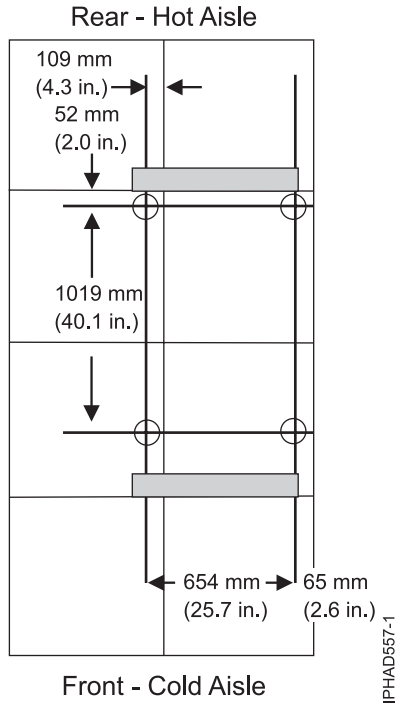


Figure 217. Single rack tiedown hole pattern

This figure shows the location of the rack tiedown for a single rack. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first circle, located on the top left, is 109 mm (4.3 in.) measuring from the right edge of the first column tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
2. The second circle, located on the top right, is 65 mm (2.6 in.) measuring from the right edge of the second column tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
3. The third circle, located on the bottom left, is 109 mm (4.3 in.) measuring from the right edge of the first column tile. It is 1019 mm (40.1 in.) measuring down from the first circle.
4. The fourth circle, located on the bottom right, is 65 mm (2.6 in.) measuring from the right edge of the second column tile. It is 1019 mm (40.1 in.) measuring down from the second circle.

Refer to *Install the frame tie-down kit* for instructions on how to install a frame tie-down kit and floor tie-down hardware.

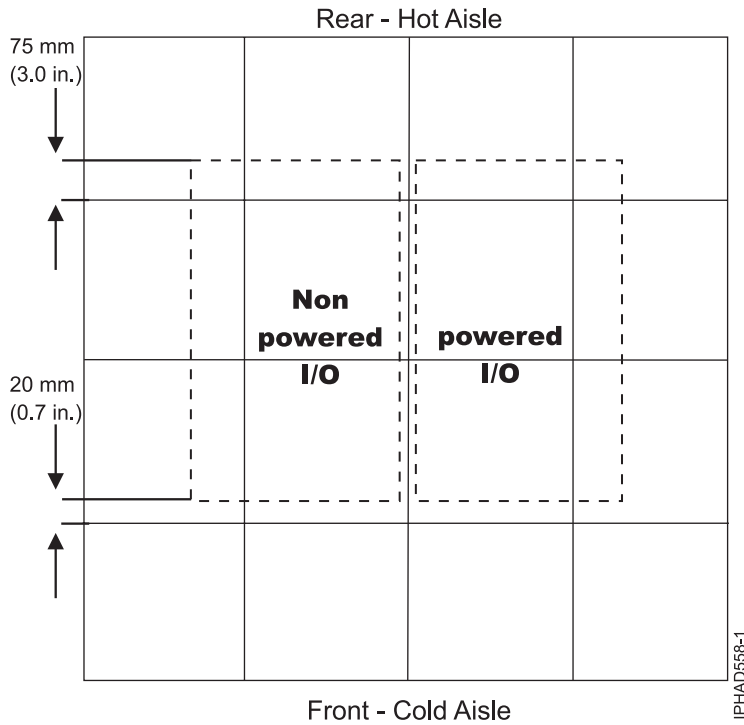


Figure 218. Two rack placement on 610 mm (24 in.) tiles

This an overview image of the placement of two racks on the tiles. The dashed lines represents the racks.

1. The rear of the server is placed 75 mm (3.0 in.) measuring up from the bottom edge of the first row tile.
2. The front of the server is placed 20 (0.7 in.) mm measuring up from the bottom edge of the third row tile.

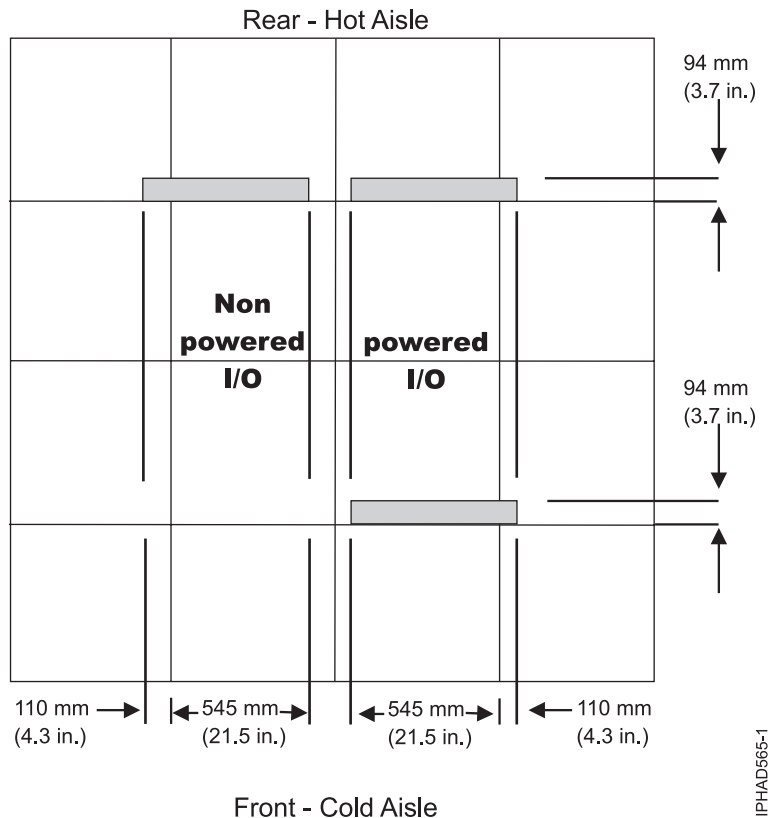


Figure 219. Cable cutout placement for two racks for 610 mm (24 in.) tiles

This is an overview image of the floor cutouts. The solid lines are used for the dimensions.

1. The first cutout, located on the top left, is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
2. The second cutout, located on the top right, is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width is 545 mm (21.5 in.) measuring left from the right edge of the second column tile. Continue cutting out an additional 110 mm (4.3 in.) measuring right from the left edge of the third column tile. The total width of the cutout is 655 mm (25.8 in.).
3. The third cutout, located on the bottom left, is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
4. The fourth cutout, located on the bottom right, is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width is 545 mm (21.5 in.) measuring left from the right edge of the third column tile. Continue cutting out an additional 110 mm (4.3 in.) measuring right from the left edge of the third column tile. The total width of the cutout is 655 mm (25.8 in.).



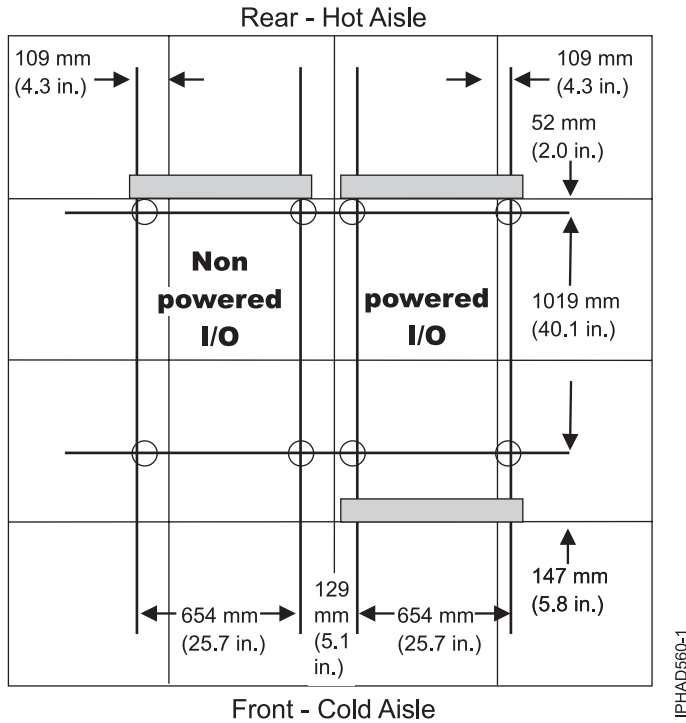


Figure 220. Two rack tiedown hole placement

This figure shows the location of the rack tiedowns needed for two racks. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first circle located, on the top left, is 109 mm (4.3 in.) measuring left from the right edge of the first column tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
2. The second circle, located in the top left center, is 64.5 mm (2.5 in.) measuring left from the right edge of the second column tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
3. The third circle, located in the top right center, is 64.5 mm (2.5 in.) measuring right from the left edge of the third tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
4. The fourth circle, located on the top right, is 109 mm (4.3 in.) measuring right from the left edge of the third column tile. It is 52 mm (2.0 in.) measuring down from the top edge of the second row tile.
5. The fifth circle located, on the bottom left, is 109 mm (4.3 in.) measuring right from the left edge of the first column tile. It is 1019 mm (40.1 in.) measuring down from the first circle.
6. The sixth circle, located in the bottom left center, is 64.5 mm (2.5 in.) measuring left from the right edge of the second tile. It is 1019 mm (40.1 in.) measuring down from the second circle.
7. The seventh circle, located in the bottom right center, is 64.5 mm (2.5 in.) measuring right from the left edge of the third column tile. It is 1019 mm (40.1 in.) measuring down from the third circle.
8. The eighth circle, located on the bottom right, is 109 mm (4.3 in.) measuring right from the left edge of the fourth column tile. It is 1019 mm (40.1 in.) measuring down from the fourth circle.

Refer to *Installing the frame tie-down kit* for instructions on how to install a frame tie-down kit and floor tie-down hardware.

## Raised floor with 600 mm (23.6 in.) floor panels figure

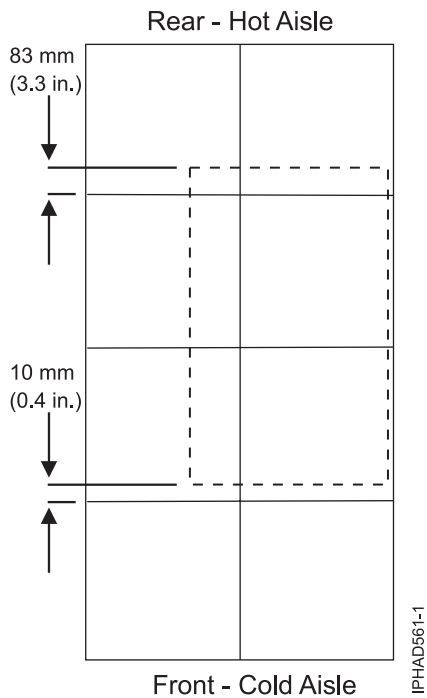


Figure 221. Rack placement for 600 mm (23.6 in.) tiles

This image shows an overview perspective of the rack placement on the floor tiles. The dashed lines represent the rack. The solid lines are used for dimensions.

1. The rear of the server is placed 83 mm (3.3 in.) measuring up from the bottom edge of the first row tile.
2. The front of the server is placed 10 mm (0.4 in.) measuring up from the bottom edge of the third row tile.

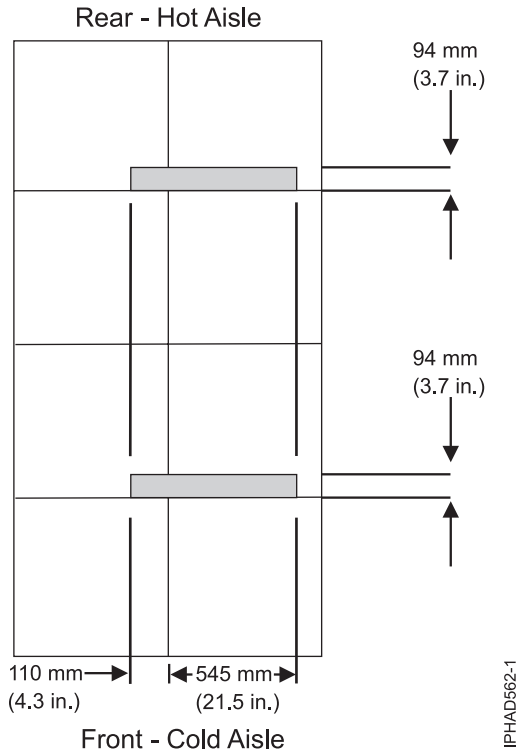


Figure 222. Cable cutout placement 600 mm (23.6 in.) tiles

This figure shows the floor cutouts for the cables. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width of the first cutout is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
2. The second cutout is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width of the second cutout is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).

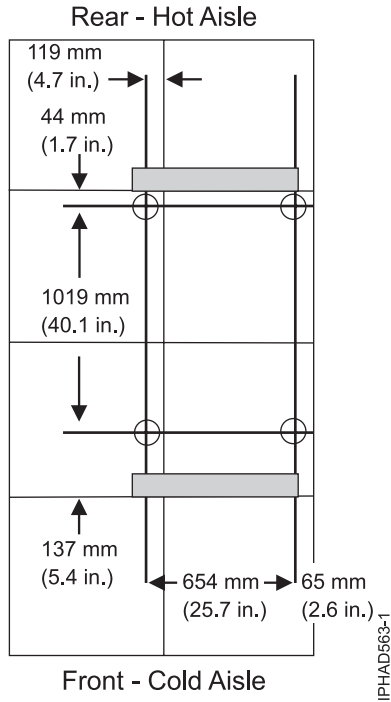


Figure 223. Rack tiedown hole pattern

This figure shows the location of the rack tiedown for a single rack. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first circle, located on the top left, is 119 mm (4.7 in.) measuring from the right edge of the first column tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
2. The second circle, located on the top right, is 65 mm (2.6 in.) measuring from the right edge of the second column tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
3. The third circle, located on the bottom left, is 119 mm (4.7 in.) measuring from the right edge of the first column tile. It is 1019 mm (40.1 in.) measuring down from the first circle.
4. The fourth circle, located on the bottom right, is 65 mm (2.6 in.) measuring from the right edge of the second column tile. It is 1019 mm (40.1 in.) measuring down from the second circle.

Refer to *Installing the frame tie-down kit* for instructions on how to install a frame tie-down kit and floor tie-down hardware.

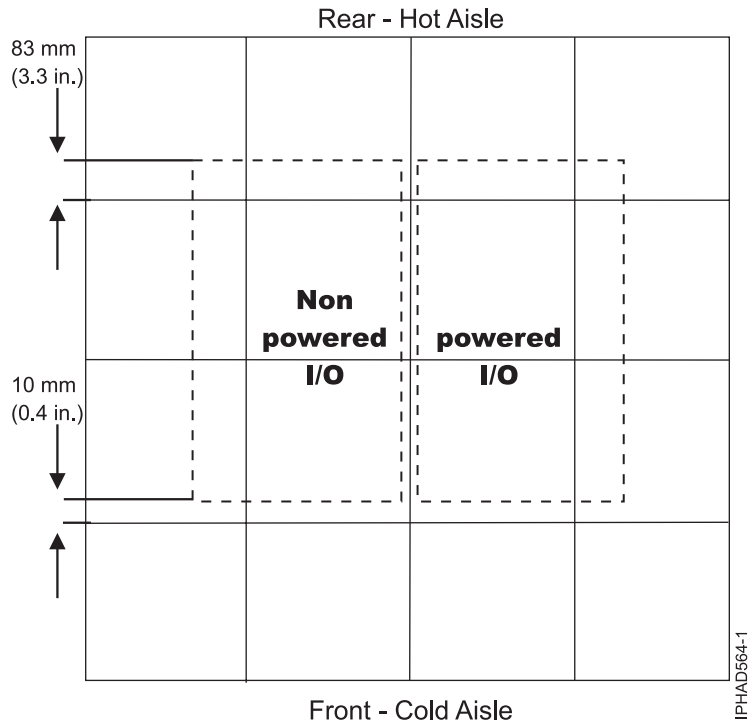


Figure 224. Two rack placement on 600 mm (23.6 in.) tiles

- This an overview image of the placement of two racks on the tiles. The dashed lines represents the racks.
1. The rear of the server is placed 83 mm (3.3 in.) measuring up from the bottom edge of the first row tile.
  2. The front of the server is placed 10 mm (0.4 in.) measuring up from the bottom edge of the third row tile.

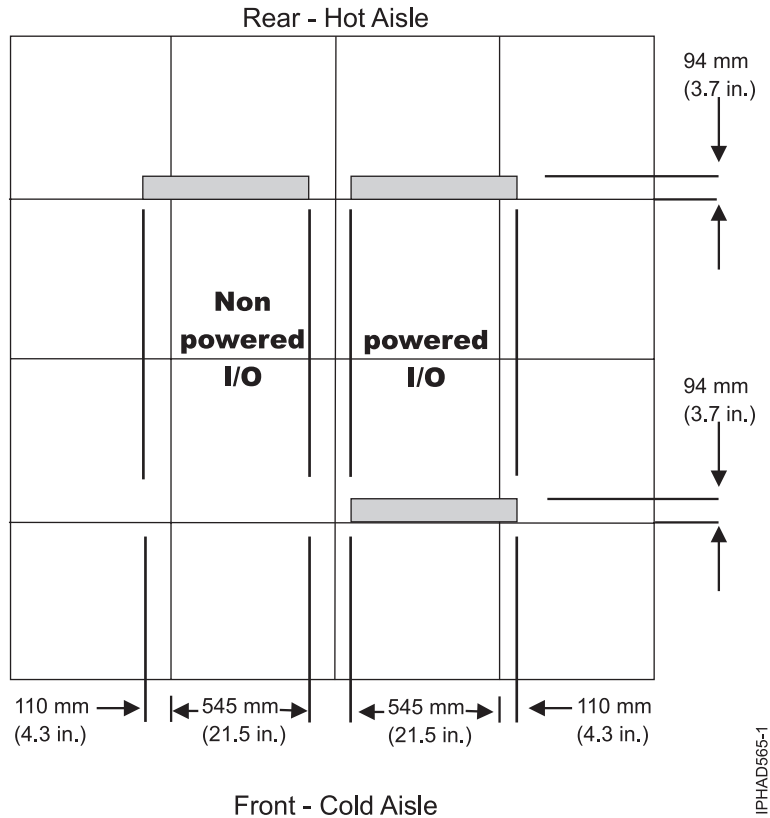


Figure 225. Two cable cutout placement for 600 mm (23.6 in.) tiles

This is an overview image of the floor cutouts. The solid lines are used for the dimensions.

1. The first cutout, located on the top left, is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
2. The second cutout, located on the top right, is 94 mm (3.7 in.) high measuring up from the bottom edge of the first row tile. The width is 545 mm (21.5 in.) measuring left from the right edge of the second column tile. Continue cutting out an additional 110 mm (4.3 in.) measuring right from the left edge of the third column tile. The total width of the cutout is 655 mm (25.8 in.).
3. The third cutout, located on the bottom left, is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width is 110 mm (4.3 in.) measuring left from the right edge of the first column tile. Continue cutting out an additional 545 mm (21.5 in.) measuring right from the left edge of the second column tile. The total width of the cutout is 655 mm (25.8 in.).
4. The fourth cutout, located on the bottom right, is 94 mm (3.7 in.) high measuring up from the bottom edge of the third row tile. The width is 545 mm (21.5 in.) measuring left from the right edge of the third column tile. Continue cutting out an additional 110 mm (4.3 in.) measuring right from the left edge of the third column tile. The total width of the cutout is 655 mm (25.8 in.).

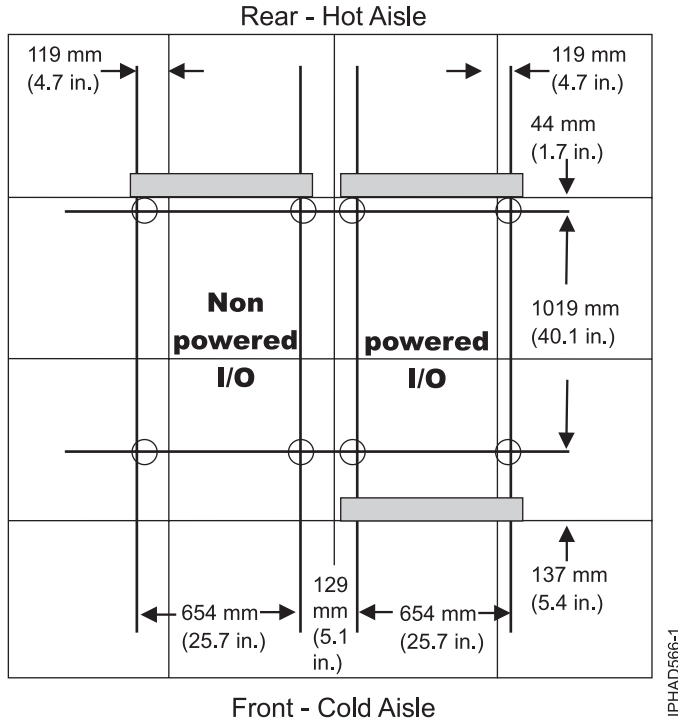


Figure 226. Rack placement for 600 mm (23.6 in.) tiles

This figure shows the location of the rack tiedowns needed for two racks. The solid rectangles indicate the cutouts, and the solid lines are used for dimensions.

1. The first circle located, on the top left, is 119 mm (4.7 in.) measuring left from the right edge of the first column tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
2. The second circle, located in the top left center, is 64.5 mm (2.5 in.) measuring left from the right edge of the second column tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
3. The third circle, located in the top right center, is 64.5 mm (2.5 in.) measuring right from the left edge of the third tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
4. The fourth circle, located on the top right, is 119 mm (4.7 in.) measuring right from the left edge of the third column tile. It is 44 mm (1.7 in.) measuring down from the top edge of the second row tile.
5. The fifth circle located, on the bottom left, is 119 mm (4.7 in.) measuring right from the left edge of the first column tile. It is 1019 mm (40.1 in.) measuring down from the first circle.
6. The sixth circle, located in the bottom left center, is 64.5 mm (2.5 in.) measuring left from the right edge of the second column tile. It is 1019 mm (40.1 in.) measuring down from the second circle.
7. The seventh circle, located in the bottom right center, is 64.5 mm (2.5 in.) measuring right from the left edge of the third column tile. It is 1019 mm (40.1 in.) measuring down from the third circle.
8. The eighth circle, located on the bottom right, is 119 mm (4.7 in.) measuring right from the left edge of the fourth column tile. It is 1019 mm (40.1 in.) measuring down from the fourth circle.

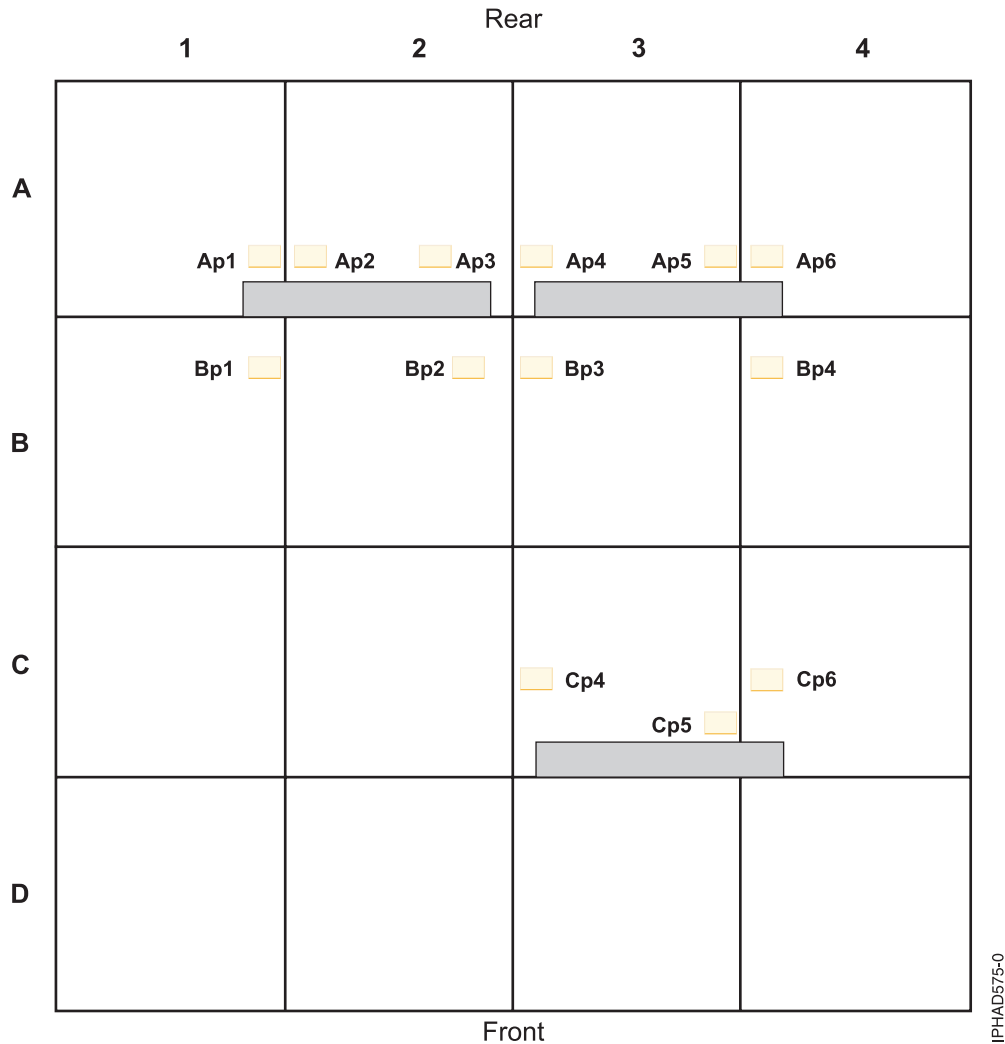
Refer to *Installing the frame tie-down kit* for instructions on how to install a frame tie-down kit and floor tie-down hardware.

### Additional pedestal placement

Placing large cutouts in the raised floor tiles, such as the cutouts needed for the 9119-FHA, can substantially change the structural integrity of each tiles. Additional support pedestals might be needed.

Pedestals might be placed approximately under each caster position to prevent tiles from sagging. Pedestals might also be used to support the cut corners of floor tiles. Pedestals might be needed for tiles where the equipment is moving across, even though they are not permanent load bearing tiles. All pedestals should be installed and adjusted to barely contact the underside of each floor panel, before the frames are rolled into place. All pedestal locations are recommendations. Each facility is unique and additional pedestal supports might be needed for certain floors. You are responsible for verifying all floor loading capacities and requirements to determine where any additional pedestals might be needed.

**Note:** Use the following figure as an example of where the floor pedestals should be placed. It is only intended to show relative positions. This figure is not drawn to scale.



IPHAD575-0

Figure 227. Additional pedestal placement

**Important:** Extra pedestals might be placed as shown.

1. Pedestals Bp1, Bp2, Bp3, Bp4, Cp4, and Cp6 might be placed approximately under each caster position to prevent floor tiles from sagging.
2. Pedestals Ap1, Ap2, Ap3, Ap4, Ap5, and Ap6 might be used to support the cut corners of floor tiles A1, A2, A3, and A4. Although these floor tiles are not load-bearing, equipment, moving in the row where these floor panels sit, might place high loads momentarily on the tiles.

**Related reference:**



“Considerations for multiple-system installations”

Learn about the installation requirements for a multiple-system installation.

“Installing the frame tie-down kit” on page 105

This procedure describes how to install a frame tie-down kit and floor tie-down hardware.

## Securing the rack

Securing your rack to a concrete (nonraised) floor or to a raised floor prevents movement when vibrations occur.

**Note:** Securing the rack is an optional procedure. See *Vibration and shock* for more information..

Before the service representative can perform the tie-down procedure, you must complete the floor preparation described in *Cutting and placing floor panels* and *Attaching the rack to a 9 - 13 in. or 12 - 22 in. floor*.

### Related reference:

“Cutting and placing floor panels” on page 395

These guidelines specify how to make the necessary openings in the raised floor for installing your server.

## Considerations for multiple-system installations

Learn about the installation requirements for a multiple-system installation.

When you are integrating a 6954 with a model 9119-FHA and other products in your data center, there are several factors to consider:

- Minimum aisle width

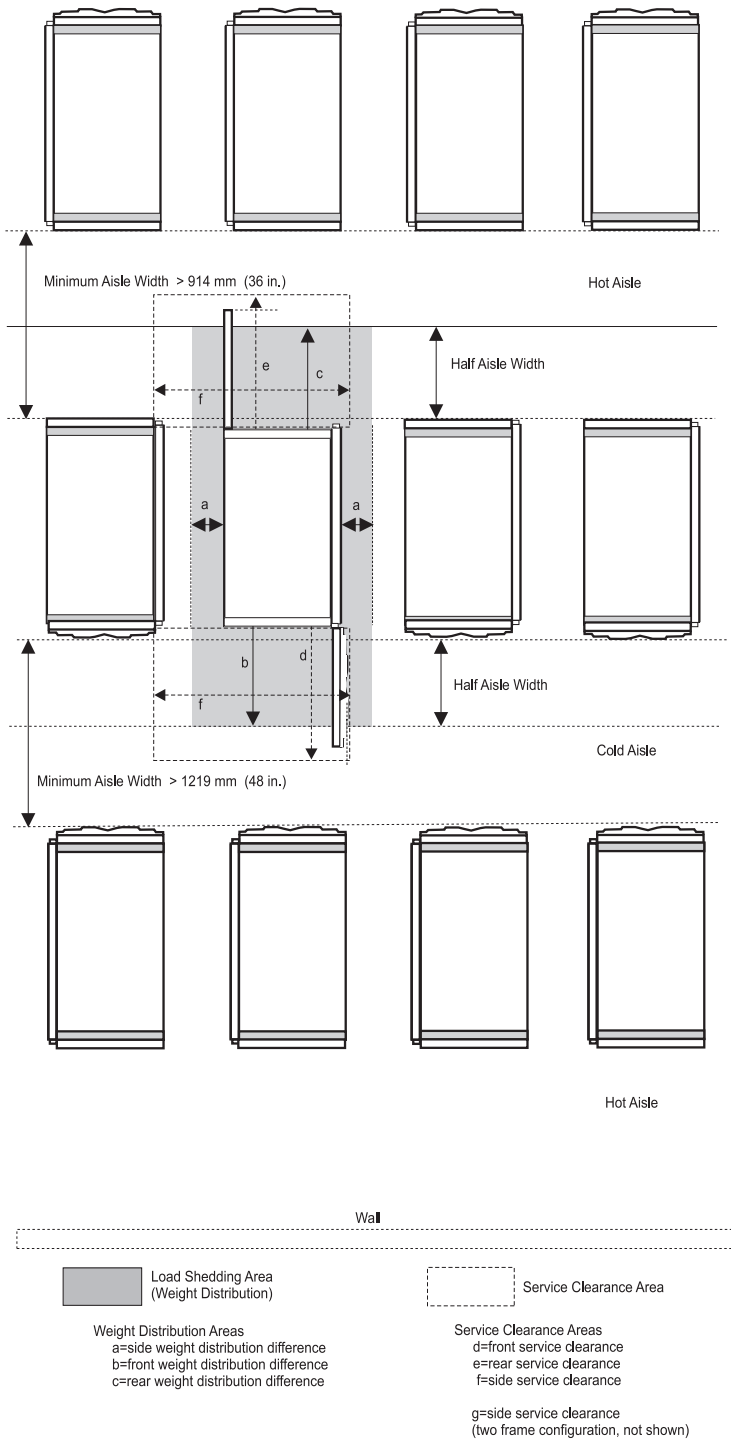
The minimum aisle width in the front of the system is 1219 mm (48 in.) to allow room to perform service operations. The minimum aisle width in the rear of the system is 1219 mm (48 in.) to allow room to perform service operations. Service clearances are measured from the edges of the frame with frame extenders to the nearest obstacle.

- Thermal interactions

Systems should be faced front-to-front and rear-to-rear to create "cold" and "hot" aisles to maintain effective system thermal conditions, as shown in the following figure.

Cold aisles need to be of sufficient width to support the airflow requirements of the installed systems as indicated in *Cooling requirements*. The airflow per tile will be dependent on the under floor pressure and perforations in the tile. A typical under floor pressure of 0.025 in. of water will supply 300 - 400 cfm through a 25% open 0.61 m by 0.61 m (2 ft by 2 ft) floor tile.

Proposed Floor Layout for Multiple Systems



A4AA5733-2

Figure 228. Proposed floor layout for multiple systems

Related reference:

“Cooling requirements” on page 417

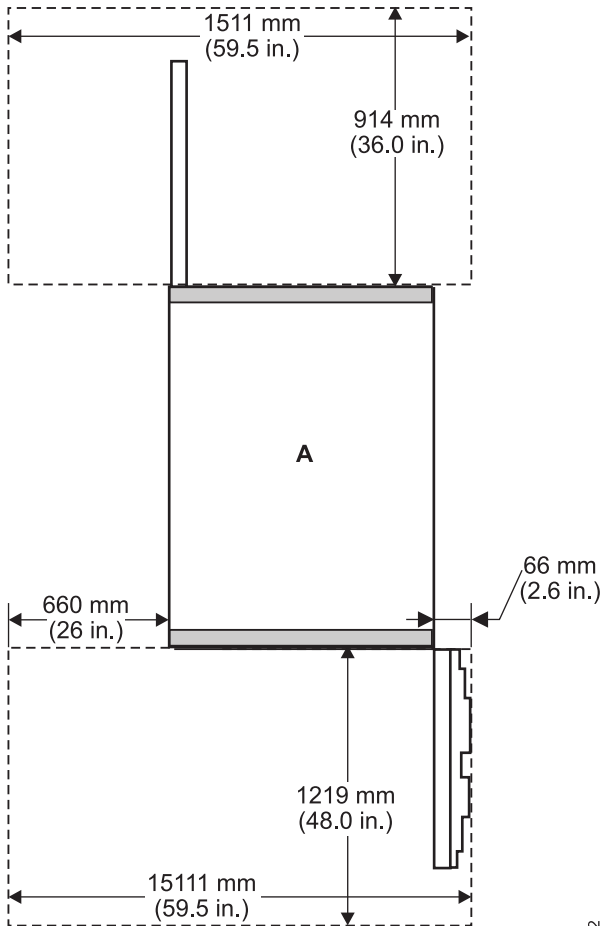
Use the system cooling requirements table in conjunction with the cooling requirements graph and chilled

airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

## Service clearances

The service clearance area is the area around the server that is needed for authorized service representatives to service the server.

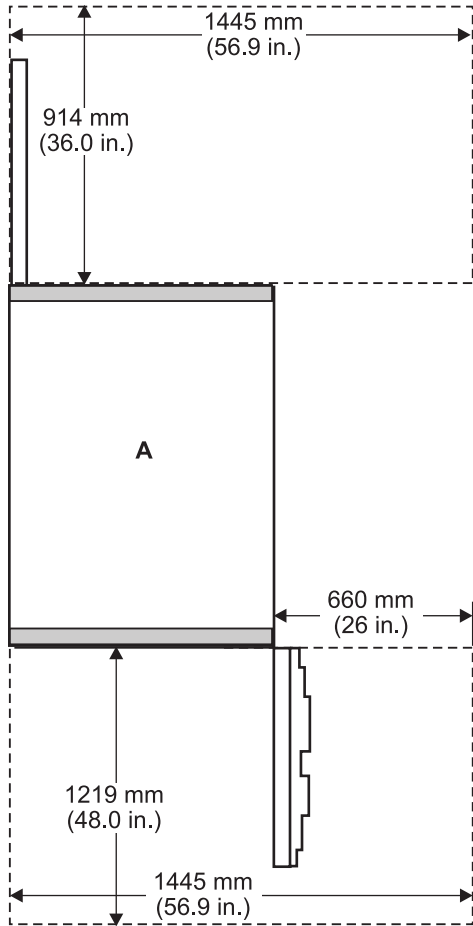
The minimum service clearance for systems with slimline doors is shown in the following figures.



Single-Frame System with  
Slimline Doors

IPHAD907-2

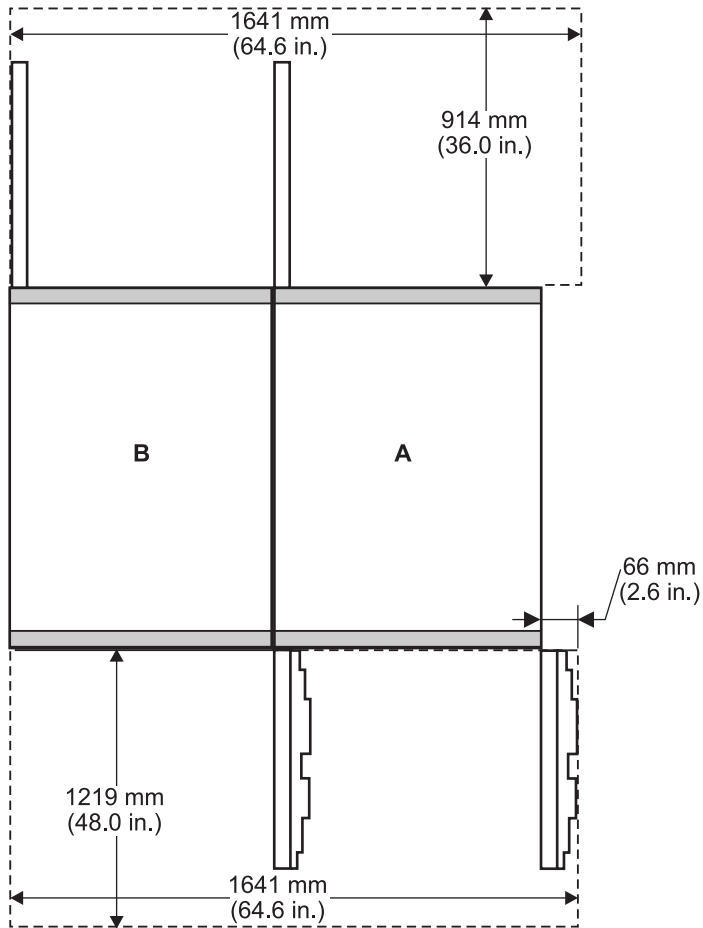
Figure 229. Service clearance for single system unit frame or single I/O rack with slimline doors



Single-Frame System with Slimline Doors (with alternative right-side service clearance)

IPHAD908-2

Figure 230. Service clearance for single system unit frame or single I/O rack with slimline doors (with alternative right side service clearance)



Double-Frame System  
with Slimline Doors

IPHAD909-0

Figure 231. Service clearances for double I/O frame systems with slimline doors

The minimum service clearance for systems with acoustical doors is shown in the following figures.

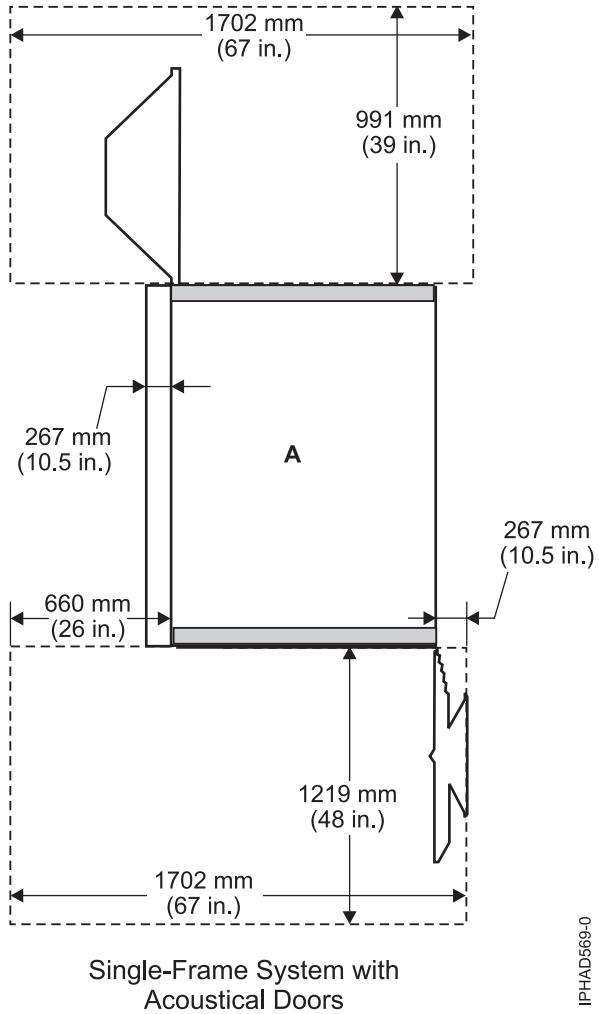
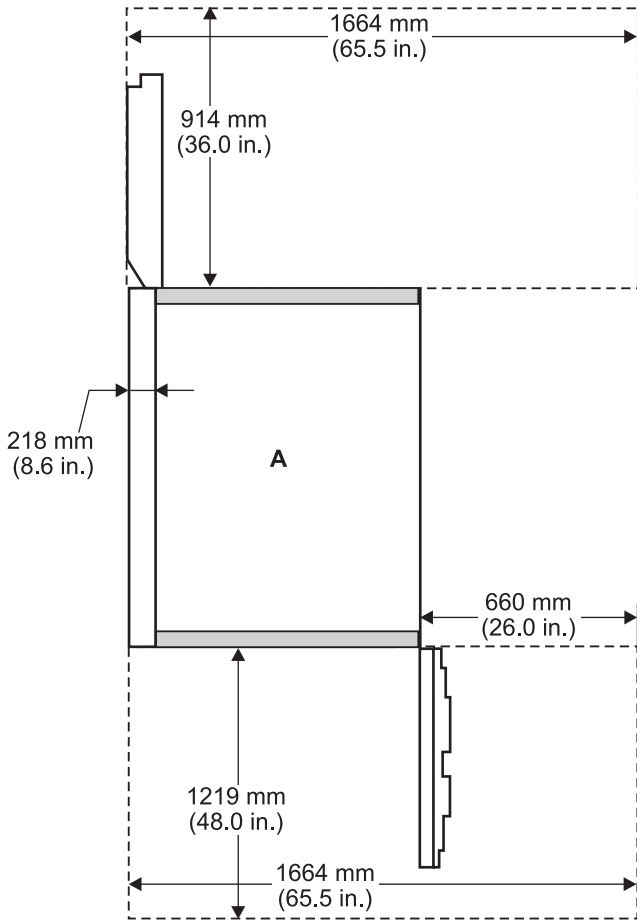


Figure 232. Service clearance for single system unit frame or single I/O rack with acoustic doors



Single-Frame System with Acoustical Doors (with alternative right-side service clearance)

IPHAD903-2

Figure 233. Service clearance for single system unit frame or single I/O rack with acoustic doors (with alternative right side service clearance)

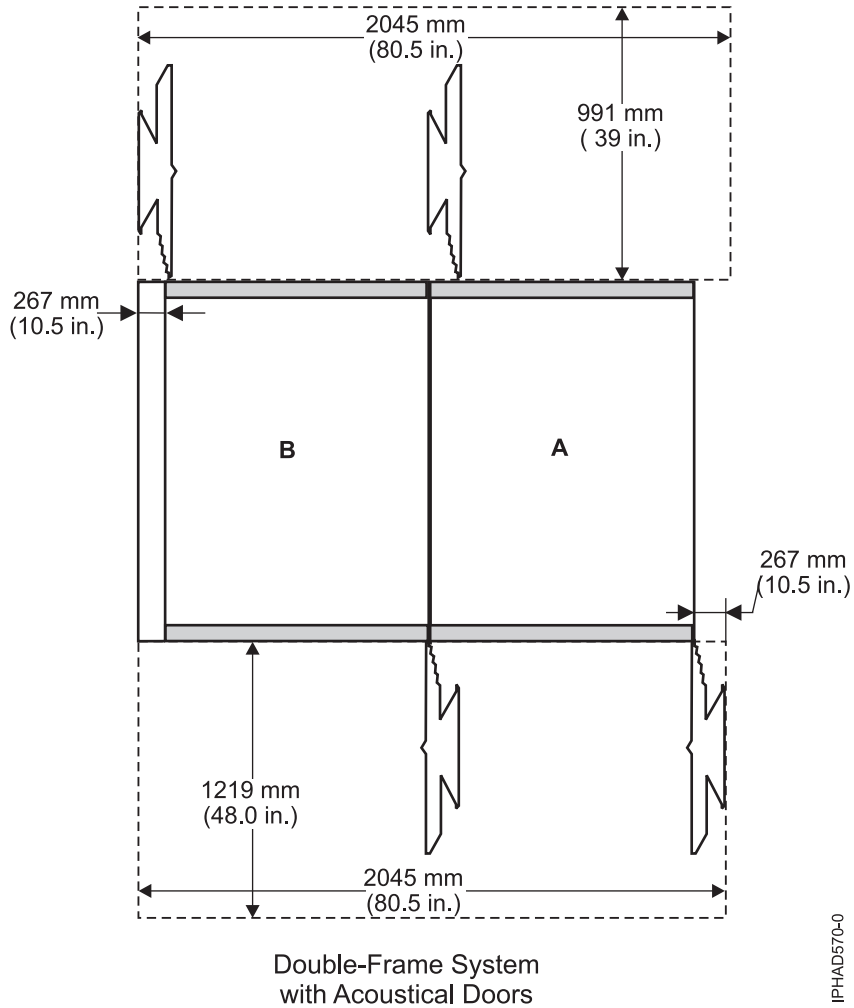


Figure 234. Service clearances for double I/O frame systems with acoustic doors

Refer to the figure in *Raised-floor requirements and preparation* for service clearances that are shown in a raised-floor installation.

**Related reference:**

“Raised-floor requirements and preparation” on page 98

A raised floor is required for model 9119-FHA and its associated racks to ensure optimal performance and to comply with electromagnetic compatibility requirements.

**Total system power consumption**

Use the tables to determine the total system power consumption for your server's configuration.

Table 479. Powered I/O racks

Drawers	kW
1	1.4
2	2.9
3	4.3
4	5.8
5	7.2



Table 479. Powered I/O racks (continued)

Drawers	kW
6	8.7
7	10.1
8	11.6
9	13.0 <sup>1</sup>
10	14.5 <sup>1</sup>
11	15.9 <sup>1</sup>
12	17.4 <sup>1</sup>
13	18.8 <sup>1</sup>
14	20.2 <sup>1</sup>
15	21.7 <sup>1</sup>
16	23.1 <sup>1</sup>
<sup>1</sup> A higher rated line cord is required.	

## Cooling requirements

Use the system cooling requirements table in conjunction with the cooling requirements graph and chilled airflow area graphic to determine the area of floor tiles to supply chilled air to the system.

The 6954 requires air for cooling. As shown in the graphic in *Considerations for multiple system installations*, rows of 6954 systems must face front-to-front. The use of a raised floor is recommended to provide air through perforated floor panels placed in rows between the fronts of systems (the cold aisles shown in the graphic in *Considerations for multiple system installations*).

The following table provides system cooling requirements based on system configuration. The letter designations in the table correspond to the letter designations in the graph shown in *Cooling requirements graph*.

Table 480. System cooling requirements based on system configuration

Letters	Power (kW)
A	1.2
A	2.5
B	3.7
B	4.9
C	6.2
C	7.4
D	8.6
E	9.8
E	11.1
F	12.3
F	13.5
G	14.8
G	16
H	17.2
I	18.5

Table 480. System cooling requirements based on system configuration (continued)

Letters	Power (kW)
I	19.7

**Related reference:**

“Considerations for multiple-system installations” on page 409

Learn about the installation requirements for a multiple-system installation.

**Cooling requirements graph**

Use the cooling requirements graph in conjunction with the cooling requirements tables and the chilled airflow area graphic to determine the area of the floor tiles to supply chilled air to the system.

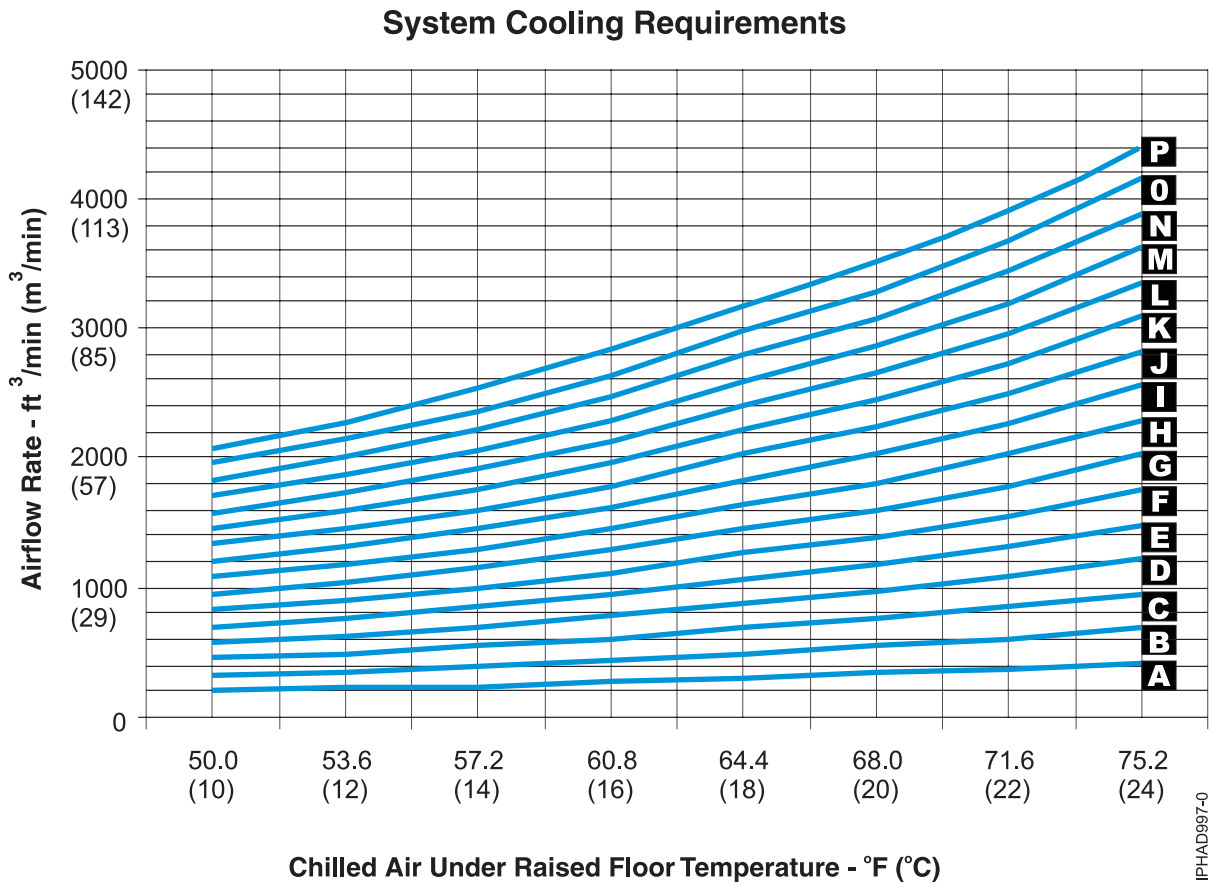
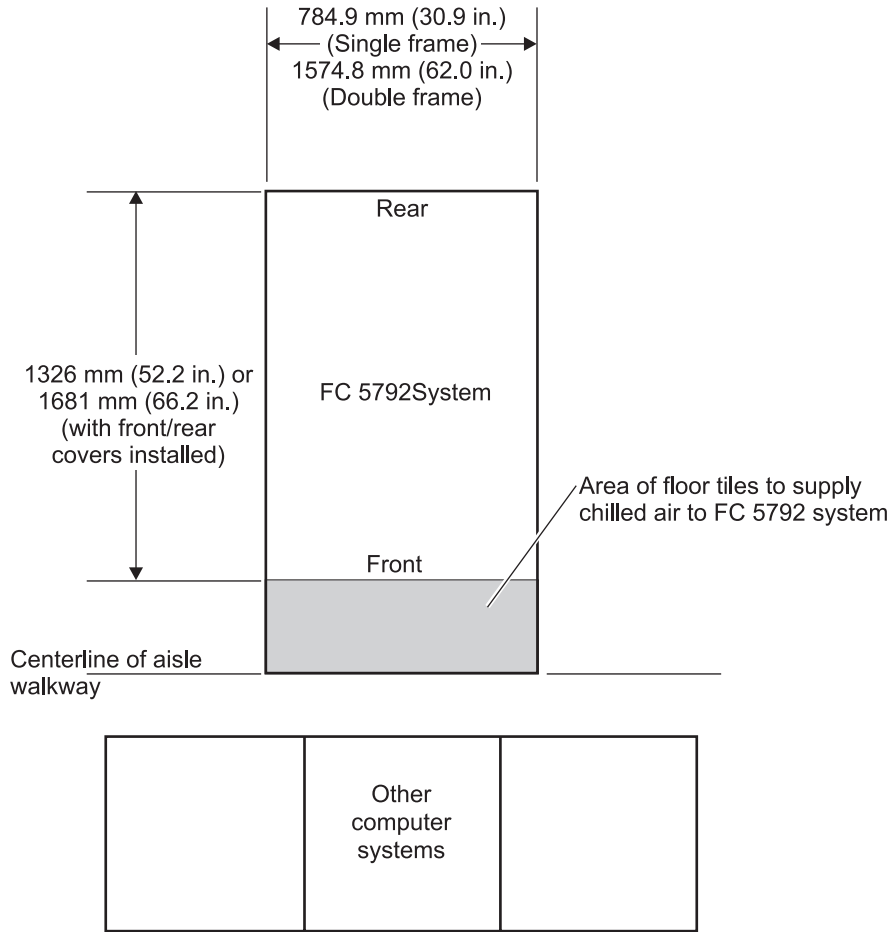


Figure 235. Cooling requirements

**Requirements for the chilled airflow area**

The Chilled airflow area figure shows the chilled airflow area required for a system.

Use the system cooling requirements tables and the *Cooling requirements graph* to determine the area of floor tiles to supply chilled air to the system.



IPHAD922-3

Figure 236. Chilled airflow area

**Related reference:**

“Cooling requirements graph” on page 418

Use the cooling requirements graph in conjunction with the cooling requirements tables and the chilled airflow area graphic to determine the area of the floor tiles to supply chilled air to the system.

**Phase imbalance and BPR configuration balancing power panel loads**

These guidelines specify how to balance power panel loads.

Depending on the number of Bulk Power Regulators (BPRs) in your system, phase imbalance can occur in line currents. All systems are provided with two bulk power assemblies (BPAs) and two separate power cords. Phase currents are divided between two power cords in normal operation.

System configurations with three or four BPRs per BPA have balanced power panel loads, while configurations with only one or two have unbalanced loads. The following figure is an example of feeding several loads of this type from two power panels in a way that balances the load among the three-phases.

**Note:** Use of ground-fault-interrupt (GFI) circuit breakers is not recommended for this system because GFI circuit breakers are earth-leakage-current sensing circuit breakers and this system is a high earth-leakage-current product.

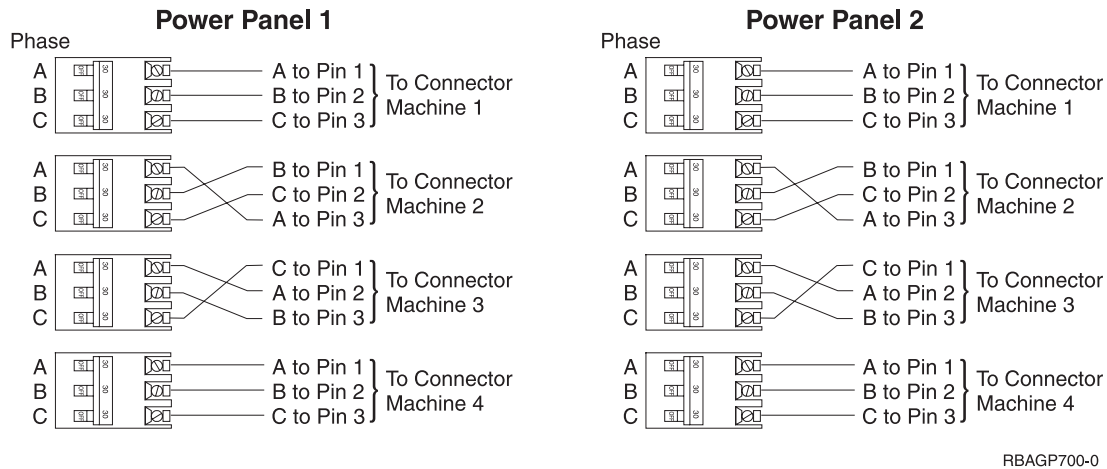


Figure 237. Power panel load balancing

The method illustrated in the preceding figure requires that the connection from the three poles of each breaker to the three-phase pins of a connector be varied. Some electricians might prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three-pole breakers are alternated with single-pole breakers so that the three-pole breakers do not all begin on phase A.

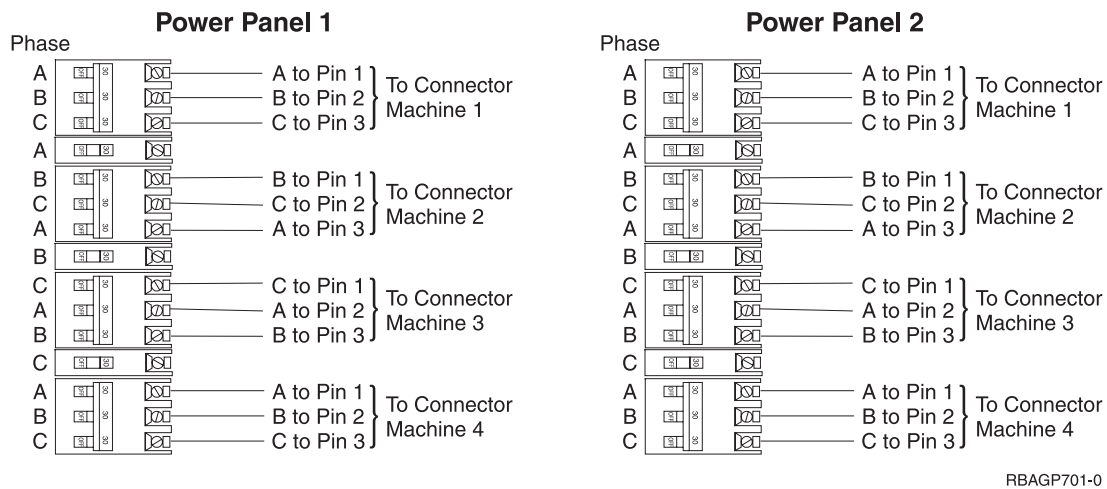
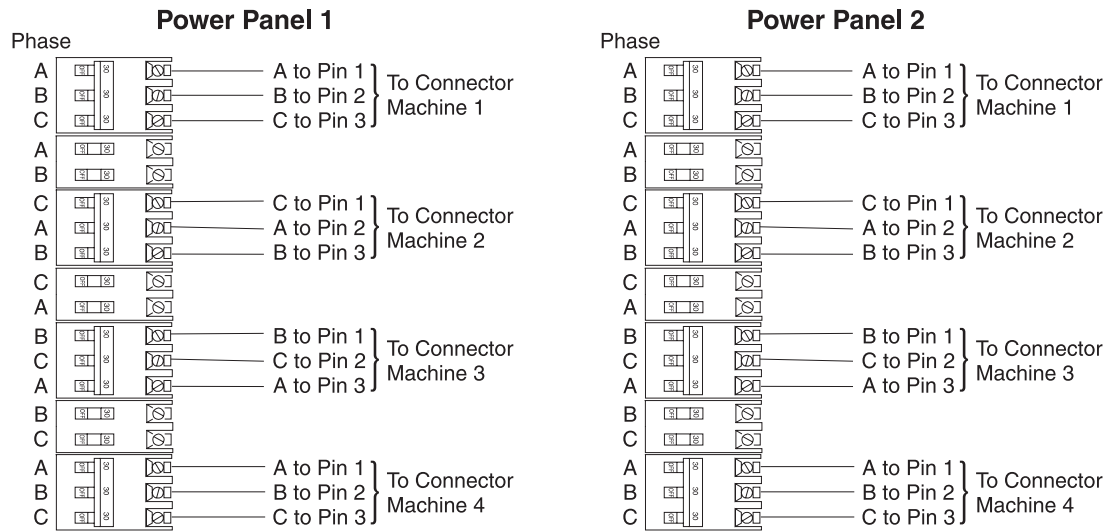


Figure 238. Power panel load balancing

The following figure shows another way of distributing the unbalanced load evenly. In this case, the three-pole breakers are alternated with two-pole breakers.



RBAGP702-0

Figure 239. Power panel load balancing

## Dual power installation

All 6954 configurations are designed with a fully redundant power system. These systems have two power cords attached to two power input ports which power a fully redundant power distribution system within the system. To take full advantage of the redundancy and reliability that is built into the computer system, the system must be powered from two distribution panels.

## Weight distribution

Use the floor loading information to determine the floor loading for various configurations.

The following figure shows the floor loading dimensions for 6954 and 6953 expansion racks. Use this figure in conjunction with the tables to determine the floor loading for various configurations.

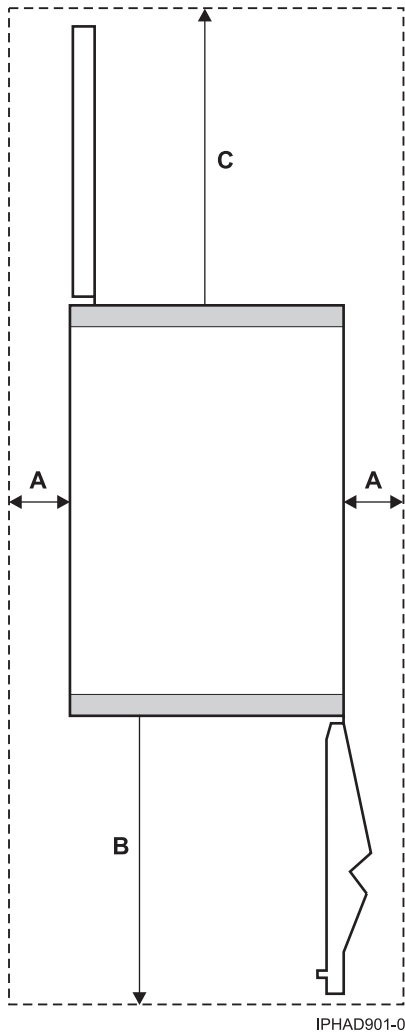


Figure 240. Floor loading dimensions

The following tables show values for calculating floor loading for the 6954 and 6953 expansion racks. Weights include acoustical covers. Width and depth are indicated without covers.

Table 481. Powered I/O rack 8 I/O drawers

Condition	a (sides)	b (front)	c (back)	Powered I/O rack	
				lb/ft <sup>2</sup>	kg/m <sup>2</sup>
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	206.0 lb/ft <sup>2</sup>	1006.0 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	165.8 lb/ft <sup>2</sup>	809.8 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	140.3 lb/ft <sup>2</sup>	684.8 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	140.2 lb/ft <sup>2</sup>	684.6 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	114.6 lb/ft <sup>2</sup>	559.7 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	98.3 lb/ft <sup>2</sup>	480.2 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	107.1 lb/ft <sup>2</sup>	522.7 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	88.8 lb/ft <sup>2</sup>	433.8 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	77.2 lb/ft <sup>2</sup>	377.1 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	88.7 lb/ft <sup>2</sup>	433.2 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	74.6 lb/ft <sup>2</sup>	364.1 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	65.6 lb/ft <sup>2</sup>	320.1 kg/m <sup>2</sup>

Table 482. Powered I/O rack 4 drawers

Condition	a (sides)	b (front)	c (back)	Powered I/O rack	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	146.0 lb/ft <sup>2</sup>	713.0 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	119.2 lb/ft <sup>2</sup>	581.9 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	102.1 lb/ft <sup>2</sup>	498.3 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	102.0 lb/ft <sup>2</sup>	498.1 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	84.9 lb/ft <sup>2</sup>	414.7 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	74.0 lb/ft <sup>2</sup>	361.5 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	79.9 lb/ft <sup>2</sup>	389.9 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	67.7 lb/ft <sup>2</sup>	330.5 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	59.9 lb/ft <sup>2</sup>	292.6 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	67.6 lb/ft <sup>2</sup>	330.1 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	58.1 lb/ft <sup>2</sup>	283.9 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	52.1 lb/ft <sup>2</sup>	254.5 kg/m <sup>2</sup>

Table 483. Powered I/O rack 7 drawers and internal battery feature

Condition	a (sides)	b (front)	c (back)	Powered I/O rack	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	221.6 lb/ft <sup>2</sup>	1081.8 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	177.9 lb/ft <sup>2</sup>	868.7 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	150.1 lb/ft <sup>2</sup>	733.1 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	150.1 lb/ft <sup>2</sup>	732.8 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	122.3 lb/ft <sup>2</sup>	597.2 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	104.6 lb/ft <sup>2</sup>	510.9 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	114.1 lb/ft <sup>2</sup>	557.0 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	94.3 lb/ft <sup>2</sup>	460.5 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	81.7 lb/ft <sup>2</sup>	399.0 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	94.2 lb/ft <sup>2</sup>	459.8 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	78.8 lb/ft <sup>2</sup>	384.9 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	69.0 lb/ft <sup>2</sup>	337.1 kg/m <sup>2</sup>

Table 484. Powered I/O and expansion unit 16 drawers

Condition	a (sides)	b (front)	c (back)	Powered I/O and expansion unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	192.9 lb/ft <sup>2</sup>	941.9 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	155.6 lb/ft <sup>2</sup>	759.9 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	131.9 lb/ft <sup>2</sup>	644.1 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	155.9 lb/ft <sup>2</sup>	761.3 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	126.9 lb/ft <sup>2</sup>	619.4 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	108.4 lb/ft <sup>2</sup>	529.1 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	130.2 lb/ft <sup>2</sup>	635.6 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	106.8 lb/ft <sup>2</sup>	521.6 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	92.0 lb/ft <sup>2</sup>	449.0 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	112.9 lb/ft <sup>2</sup>	551.2 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	93.4 lb/ft <sup>2</sup>	455.9 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	81.0 lb/ft <sup>2</sup>	395.3 kg/m <sup>2</sup>

Table 485. Powered I/O and expansion unit 9 drawers

Condition	a (sides)	b (front)	c (back)	Powered I/O and expansion unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	142.6 lb/ft <sup>2</sup>	696.1 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	116.5 lb/ft <sup>2</sup>	568.7 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	99.9 lb/ft <sup>2</sup>	487.6 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	116.7 lb/ft <sup>2</sup>	569.7 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	96.3 lb/ft <sup>2</sup>	470.3 kg/m <sup>2</sup>

Table 485. Powered I/O and expansion unit 9 drawers (continued)

Condition	a (sides)	b (front)	c (back)	Powered I/O and expansion unit	
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	83.4 lb/ft <sup>2</sup>	407.0 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	98.6 lb/ft <sup>2</sup>	481.6 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	82.3 lb/ft <sup>2</sup>	401.8 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	71.9 lb/ft <sup>2</sup>	351.0 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	86.5 lb/ft <sup>2</sup>	422.5 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	72.9 lb/ft <sup>2</sup>	355.8 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	64.2 lb/ft <sup>2</sup>	313.4 kg/m <sup>2</sup>

Table 486. Powered I/O and expansion unit 15 drawers and internal battery feature

Condition	a (sides)	b (front)	c (back)	Powered I/O and expansion unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	200.6 lb/ft <sup>2</sup>	979.6 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	161.6 lb/ft <sup>2</sup>	789.2 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	136.8 lb/ft <sup>2</sup>	668.0 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	161.9 lb/ft <sup>2</sup>	790.6 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	131.5 lb/ft <sup>2</sup>	642.2 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	112.2 lb/ft <sup>2</sup>	547.7 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	135.0 lb/ft <sup>2</sup>	659.2 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	110.6 lb/ft <sup>2</sup>	539.9 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	95.0 lb/ft <sup>2</sup>	464.0 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	116.9 lb/ft <sup>2</sup>	570.9 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	96.5 lb/ft <sup>2</sup>	471.3 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	83.5 lb/ft <sup>2</sup>	407.8 kg/m <sup>2</sup>

Table 487. Powered I/O and expansion unit 8 drawers and internal battery feature

Condition	a (sides)	b (front)	c (back)	Powered I/O and expansion unit	
1	25.4 mm (1 in.)	254 mm (10 in.)	254 mm (10 in.)	150.3 lb/ft <sup>2</sup>	733.8 kg/m <sup>2</sup>
2	25.4 mm (1 in.)	508 mm (20 in.)	508 mm (20 in.)	122.5 lb/ft <sup>2</sup>	598.0 kg/m <sup>2</sup>
3	25.4 mm (1 in.)	762 mm (30 in.)	762 mm (30 in.)	104.8 lb/ft <sup>2</sup>	511.5 kg/m <sup>2</sup>
4	254 mm (10 in.)	254 mm (10 in.)	254 mm (10 in.)	122.7 lb/ft <sup>2</sup>	599.0 kg/m <sup>2</sup>
5	254 mm (10 in.)	508 mm (20 in.)	508 mm (20 in.)	101.0 lb/ft <sup>2</sup>	493.1 kg/m <sup>2</sup>
6	254 mm (10 in.)	762 mm (30 in.)	762 mm (30 in.)	87.2 lb/ft <sup>2</sup>	425.7 kg/m <sup>2</sup>
7	508 mm (20 in.)	254 mm (10 in.)	254 mm (10 in.)	103.5 lb/ft <sup>2</sup>	505.2 kg/m <sup>2</sup>
8	508 mm (20 in.)	508 mm (20 in.)	508 mm (20 in.)	86.1 lb/ft <sup>2</sup>	420.2 kg/m <sup>2</sup>
9	508 mm (20 in.)	762 mm (30 in.)	762 mm (30 in.)	75.0 lb/ft <sup>2</sup>	366.0 kg/m <sup>2</sup>
10	762 mm (30 in.)	254 mm (10 in.)	254 mm (10 in.)	90.6 lb/ft <sup>2</sup>	442.2 kg/m <sup>2</sup>
11	762 mm (30 in.)	508 mm (20 in.)	508 mm (20 in.)	76.0 lb/ft <sup>2</sup>	371.2 kg/m <sup>2</sup>
12	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	66.8 lb/ft <sup>2</sup>	325.9 kg/m <sup>2</sup>

## 7101 or 7102 expansion unit

Expansion units are optional features that you can attach to your server for additional storage.

Expansion units 7101 and 7102 are optional features that you can order for your model 9406-250. The 7101 or 7102 are physically attached to the right side of the base system tower.

Models 9406-250 can use the optional external uninterruptible power supply that acts like a backup battery unit (BBU). The uninterruptible power supply has power cords that connect the uninterruptible power supply to the base system, the 7101 or 7102 expansion units, and a power cord that connects the uninterruptible power supply to the power outlet.



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## 7104 expansion unit

Expansion units are optional features that you can attach to your server for additional storage.

Expansion units 7104 is an optional feature that you can order for your model 9406-270. The 7104 is physically attached to the right side of the base system tower.

Model 9406-270 can use the optional external IBM uninterruptible power supply that acts like a BBU (Backup Battery Unit). The uninterruptible power supply has power cords that connect the uninterruptible power supply to the base system, the 7104 expansion unit, and a power cord that connects the uninterruptible power supply to the power outlet.

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## 7116 expansion unit

Expansion units are optional features that you can attach to your server for additional storage.

System unit expansion 7116 is an optional feature that you can order for your model 9406-800 or 9406-810. The 7116 is physically attached to the right side of the base system tower.

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## 7214-1U2 media drawer

Hardware specifications provide detailed information for your media drawer, including dimensions, electrical, power, temperature, environment, and service clearances.

*Table 488. Dimensions for rack-mounted media drawer*

Dimensions	Weight	Width	Depth	Height
Metric	12.25 kg	440 mm	735 mm	45 mm
English	27 lb	17.3 in.	28.9 in.	1.7 in.

*Table 489. Electrical*

Electricity characteristics	Properties
kVA (maximum)	0.092
Rated voltage and frequency	100 - 127 V ac or 200 - 240 V ac at 50 - 60 Hz
Thermal output (maximum)	307 Btu/hr
Power requirements (maximum)	90 W
Power factor	0.98
Inrush current	55 A <sup>5</sup>
Leakage current (maximum)	3.10 mA <sup>5</sup>
Phase	1

*Table 490. Temperature requirements*

Operating	Nonoperating
10 - 35°C (50 - 95°F) <sup>3</sup>	-40 - 65°C (-40 - 149°F)

*Table 491. Environmental requirements*

Properties	Operating	Nonoperating
Noncondensing humidity	20 - 80% (allowable) 40 - 55% (recommended)	8 - 80% (including condensing)

Table 491. Environmental requirements (continued)

Properties	Operating	Nonoperating
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)

Table 492. Maximum altitude

2134 m (7000 ft) above sea level
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Table 493. Noise emissions<sup>1, 4</sup>

Properties	Operating	Idle
Single 7214-1U2 media drawer in standard 19-inch rack nominal environmental conditions, and no front or rear doors on rack.	L <sub>WAd</sub>	4.8 bels <sup>5</sup>
	L <sub>pAm</sub> (1-meter bystander)	

Table 494. Service clearances for rack-mounted unit

Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
914 mm	914 mm	914 mm	
36 in.	36 in.	36 in.	

Table 495. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>For a description of noise emission values, see <i>Acoustics</i>.</li> <li>Side and top clearances are optional during operation.</li> <li>The maximum 38 °C (100.4°F) temperature must be derated 1 °C (1.8°F) per 137 m (450 ft) above 1295 m (4250 ft). Maximum altitude is 2134 m (7000 ft).</li> <li>All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.</li> <li>Estimated value.</li> </ol>
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**Safety compliance:** This hardware is designed and certified to meet the following safety standards: UL 60950; CAN/CSA C22.2 No. 60950-00; EN 60950; IEC 60950 including all National Differences

**Related information:**

 Acoustics

## 7311-D10 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 496. Dimensions

Dimensions	Height	Width	Depth
Metric	168 mm	221 mm	711 mm
English	6.6 in.	8.7 in.	28.0 in.

Table 497. Dimensions (two 7311-D10 with drawer enclosure)

Dimensions	Height	Width	Depth
Metric	178 mm	445 mm	711 mm

Table 497. Dimensions (two 7311-D10 with drawer enclosure (continued))

Dimensions	Height	Width	Depth
English	7.0 in.	17.5 in.	28.0 in.

Table 498. Maximum configuration weight

7311-D10	Two 7311-D10 with drawer enclosure
16.8 kg (37 lb)	39.1 kg (86 lb)

Table 499. Electrical

Electrical characteristics	Properties	
kVA (maximum configuration)	0.21	0.42
Rated voltage and frequency	200 - 240 V ac at 50 - 60 Hz, V dc not supported	200 - 240 V ac at 50 - 60 Hz, V dc not supported
Thermal output per 7311-D10 (maximum)	683 Btu/hr	1366 Btu/hr
Power requirements (maximum)	200 W	400 W
Power factor	0.95	0.95
Inrush current per 7311-D10 <sup>2</sup>	64 A	64 A

Table 500. Temperature requirements<sup>3</sup>

Operating	Nonoperating	Storage
10 - 38°C (50 - 100°F)	1 - 60°C (33.8 - 140°F)	1 - 60°C (33.8 -140°F)

Table 501. Environment requirements

Properties	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature <sup>4</sup>	23 °C (73.4°F)	27 °C (80.6°F)

Table 502. Maximum altitude<sup>3, 4</sup>

3048 m (10 000 ft)
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Table 503. Noise emissions<sup>1</sup>

Properties	Operating	Idle
L <sub>WAdr</sub> one 7311-D10	5.6 bels	5.6 bels
L <sub>WAdr</sub> two 7311-D10	5.9 bels	5.9 bels
L <sub>WAdr</sub> four 7311-D10	6.2 bels	6.2 bels
<L <sub>pA</sub> > <sub>m</sub> one 7311-D10	40 dB	40 dB
<L <sub>pA</sub> > <sub>m</sub> two 7311-D10	43 dB	43 dB
<L <sub>pA</sub> > <sub>m</sub> four 7311-D10	46 dB	46 dB

Table 504. Service clearances

Dimensions	Front	Back	Sides
Metric	915 mm	915 mm	915 mm

Table 504. Service clearances (continued)

Dimensions	Front	Back	Sides
English	36 in.	36 in.	36 in.

Table 505. Hardware specifications

<b>Note:</b>
1. For a description of noise emission values, see <i>Acoustics</i> .
2. Inrush currents occur only at initial application of power, no inrush occurs during normal power off-on cycle.
3. The upper limit of the dry bulb temperature must be derated 1°C per 137 m (450 ft) above 915 m (3000 ft).
4. The upper limit of the wet bulb temperature must be derated 1°C per 274 m (900 ft) above 305 m (1000 ft).

**Related information:**

 Acoustics

## 7311-D11 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 506. Dimensions

Dimensions	Height	Width	Depth	Maximum configuration weight 7311-D11	Maximum configuration weight two 7311-D11 with drawer enclosure
Metric	168 mm	221 mm	711 mm	16.8 kg	39.1 kg
English	6.6 in.	8.7 in.	28.0 in.	37 lb	86 lb

Table 507. Electrical

Electrical characteristics	Properties	
kVA	0.21 <sup>1</sup>	0.42 <sup>1</sup>
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output (maximum)	683 Btu/hr <sup>1</sup>	1366 Btu/hr <sup>1</sup>
Power requirements (maximum)	200 W <sup>1</sup>	400 W <sup>1</sup>
Power factor	0.95 <sup>1</sup>	0.95 <sup>1</sup>
Inrush current per 7311-D11	71 A <sup>1</sup>	71 A <sup>1</sup>
Leakage current (maximum)	3 mA <sup>1</sup>	3 mA <sup>1</sup>
Phase	1	1

Table 508. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 509. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%

Table 509. Environment requirements (continued)

Environment	Operating	Nonoperating
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 510. Maximum altitude

3048 m (10 000 ft)
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Table 511. Noise emissions (one 7311-D11 unit) <sup>1</sup>

Properties	Operating	Idle
L <sub>WAd</sub>	5.6 bels	5.6 bels
<L <sub>pA</sub> > <sub>m</sub>	40 dB	40 dB

Table 512. Service clearances

Dimensions	Front	Back	Sides	Top
Metric	915 mm	915 mm	915 mm	915 mm
English	36 in.	36 in.	36 in.	36 in.

Table 513. Note

<p><b>Note:</b></p> <p>1. For a description of noise emission values, see <i>Acoustics</i>.</p>
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For information about floor loading, contact your IBM service or Installation Planning representative. Because the thickness of the covers are negligible, the height, width, and depth of the overall dimensions might be used in floor loading calculations.

**Related information:**

 [Acoustics](#)

## 7311-D20 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 514. Dimensions

Dimensions	Height	Width	Depth
Metric	178 mm	445 mm	610 mm
English	7.0 in.	17.5 in.	24.0 in.

Table 515. Maximum configuration weight

45.9 kg (101 lb)
------------------

Table 516. Electrical

Electrical Characteristics	Properties
kVA	0.358
Rated voltage and frequency	100 - 240 V ac at 50 - 60 Hz, V dc not supported
Thermal output (typical)	775 Btu/hr

Table 516. Electrical (continued)

Electrical Characteristics	Properties
Thermal output (maximum)	1161 Btu/hr
Power requirements (typical)	227 W
Power requirements (maximum)	340 W
Power factor	0.95
Inrush current per 7311-D20 <sup>2</sup>	60 A

Table 517. Temperature requirements<sup>3</sup>

Operating	Nonoperating	Storage
5 - 35°C (41 - 95°F)	1 - 60°C (33.8 - 140°F)	1 - 60°C (33.8 - 140°F)

Table 518. Environment requirements

Environment	Operating	Nonoperating	Storage
Noncondensing humidity	8 - 80%	8 - 80%	5 - 80%
Wet bulb temperature <sup>4</sup>	23°C (73.4°F)	27°C (80.6°F)	29°C (84.2°F)

Table 519. Maximum altitude<sup>3, 4</sup>

3048 m (10 000 ft)
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Table 520. Noise emissions

Properties	Operating	Idle
$L_{WAd}$	6.2 bels	6.1 bels
$\langle L_{pA} \rangle_m$	44 dB	43 dB

Table 521. Service clearances

Dimensions	Front	Back	Sides
Metric	915 mm	915 mm	915 mm
English	36 in.	36 in.	36 in.

Table 522. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. Inrush currents occur only at initial application of power, no inrush occurs during normal power off-on cycle.</li> <li>3. The upper limit of the dry bulb temperature must be derated 1°C per 137 m (450 ft) above 915 m (3000 ft).</li> <li>4. The upper limit of the wet bulb temperature must be derated 1°C per 274 m (900 ft) above 305 m (1000 ft).</li> </ol>
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**Related information:**

 [Acoustics](#)

## 7314-G30 and 5796 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 523. Dimensions I/O drawer only

Dimensions	Height	Width	Depth
Metric	172 mm	224 mm	800 mm
English	6.8 in.	8.8 in.	31.5 in.

Table 524. Dimensions - with required I/O drawer mounting enclosure

Dimensions	Height	Width	Depth
Metric	176 mm	473 mm	800 mm
English	6.9 in.	18.6 in.	31.5 in.

Table 525. Maximum configuration weight

One I/O drawer	Two I/O drawers plus the mounting enclosure
20 kg (44 lb)	45.9 kg (101 lb)

Table 526. Electrical

Electrical characteristics	Properties
kVA	0.275
Rated voltage and frequency	200 - 240 V ac at 50 - 60 Hz, V dc not supported
Thermal output	853 Btu/hr
Power requirements (maximum)	250 W
Power factor	0.91
Inrush current per 7314-G30 <sup>2</sup>	60 A

Table 527. Temperature requirements<sup>3</sup>

Operating	Nonoperating	Storage
10 - 38°C (50 - 100°F)	1 - 60°C (33.8 - 140°F)	1 - 60°C (33.8 - 140°F)

Table 528. Environment requirements

Environment	Operating	Nonoperating	Storage
Noncondensing humidity	8 - 80%	8 - 80%	5 - 80%
Wet bulb temperature <sup>4</sup>	23°C (73.4°F)	27°C (80.6°F)	29°C (84.2°F)

Table 529. Maximum altitude

3048 m (10 000 ft)
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Table 530. Noise emissions<sup>1</sup>

Properties	Operating	Idle
$L_{WA,d}$	6.2 bels	6.1 bels
$\langle L_{pA} \rangle_m$	44 dB	43 dB

Table 531. Service clearances

Dimensions	Front	Back	Sides
Metric	915 mm	915 mm	915 mm
English	36 in.	36 in.	36 in.

Table 532. Notes

Notes:
1. For a description of noise emission values, see <i>Acoustics</i> .
2. Inrush currents occur only at initial application of power, no inrush occurs during normal power off-on cycle.
3. The upper limit of the dry bulb temperature must be derated 1°C per 137 m (450 ft) above 915 m (3000 ft).
4. The upper limit of the wet bulb temperature must be derated 1°C per 274 m (900 ft) above 305 m (1000 ft).

**Related information:**

 Acoustics

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## 8079 optional base 1.8 m model 9406-840 I/O rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 8079 optional base 1.8 m model 9406-840 I/O rack.

The 8079 consists of a 1.8 m rack with a bottom enclosure (9079 Base I/O Tower with side covers and casters removed) and a top enclosure (5074 PCI expansion unit with side covers and casters removed).



Table 533. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	726 kg	650 mm	1020 mm	1800 mm
English	1600 lb	25.5 in.	40.1 in.	71.0 in.



Table 534. Electrical<sup>1</sup>

Electrical characteristics	8079 (1)	8079 (2)
kVA	1.100	1.100
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output (maximum)	3379 Btu/hr	3379 Btu/hr
Power requirements (maximum)	990 W	990 W
Power factor	0.91	0.91
Inrush current	50 A	50 A
Leakage current (maximum)	3.5 mA	3.5 mA
Phase	1	1

Table 535. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 536. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 537. Maximum altitude

3048 m (10 000 ft)
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Table 538. Noise emissions<sup>4</sup>

Properties	Operating	Idle
L <sub>WAd</sub> (Category 2D, General business)	7.0 bels	6.9 bels
L <sub>pAm</sub> (1-meter bystander)	52 dB	52 dB

Table 539. Service clearances<sup>3</sup>

Dimensions	Front	Back	Sides	Top
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 540. Notes

**Notes:**

1. The electrical requirements for the 5074 and 9079 in the 8079 rack need to be planned for individually. The power cords for the 5074 and 9079 must be used to determine the appropriate receptacles.
2. The usable length of the power cord for the 5074 is reduced by 4 ft (1.2 m) because of the routing inside the 1.8 m enclosure. Therefore, a 14 ft (4.3 m) cord results in a usable length of 10 ft (3 m), and a 9 ft (2.7 m) cord results in a usable length of 5 ft (1.5 m).
3. For information about floor loading, contact your IBM service or Installation Planning representative. Because the thickness of the covers are negligible, the height, width, and depth of the overall dimensions might be used in floor loading calculations.
4. For a description of noise emission values, see *Acoustics*.

**Related information:**

 Acoustics

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## 8094 and 5097 base I/O expansion unit optional 1.8 m rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 8094 and 5097 base I/O expansion unit (for servers 9406-870 and 9406-890) optional 1.8 m rack.

The 8094 base I/O expansion unit consists of a 1.8 m rack with a bottom enclosure (9094 expansion unit with side covers and casters removed) and a top enclosure (5074 PCI-X expansion unit with side covers and casters removed).



Table 541. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	726 kg	650 mm	1020 mm	1800 mm

Table 541. Dimensions (continued)

Dimensions	Maximum configuration weight	Width	Depth	Height
English	1600 lb	25.5 in.	40.1 in.	71.0 in.

Table 542. Electrical<sup>1</sup>

Electrical characteristics	8094 base I/O expansion unit (1)	8094 base I/O expansion unit (2)
kVA	1.100 (est.)	1.100 (est.)
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output (maximum)	3379 Btu/hr (est.)	3379 Btu/hr (est.)
Power requirements (maximum)	990 W (est.)	990 W (est.)
Power factor	0.91	0.91
Inrush current	50 A (est.)	50 A (est.)
Leakage current (maximum)	3.5 mA	3.5 mA
Phase	1	1

Table 543. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 544. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4 °F)	1 - 60°C (33.8 - 140°F)

Table 545. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 546. Noise emissions<sup>4</sup>

Properties	Operating	Idle
$L_{WAd}$ Category 2E, General business	7.0 bels	6.9 bels
$\langle L_{pA} \rangle_m$ (dB)	52 dB	52 dB

Table 547. Service clearances<sup>3</sup>

Dimensions	Front	Back	Sides	Top
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 548. Notes

**Notes:**

1. The electrical requirements for the 5094 and 9094 in the 8094 base I/O expansion unit need to be planned for individually. The power cords for the 5094 and 9094 must be used to determine the appropriate receptacles.
2. The usable length of the power cord for the 5094 is reduced by 4 ft (1.2 m) because of the routing inside the 1.8 m enclosure. Therefore, a 14 ft (4.3 m) cord results in a usable length of 10 ft (3 m), and a 9 ft (2.7 m) cord results in a usable length of 5 ft (1.5 m).
3. For information about floor loading, contact your IBM service or Installation Planning representative. Because the thickness of the covers are negligible, the height, width, and depth of the overall dimensions might be used in floor loading calculations.
4. For a description of noise emission values, see *Acoustics*.

**Related information:**

 Acoustics

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## 9074 base I/O enclosure

The 9074 Base I/O Enclosure is included with models 9406-830 and SB2. The 9074 is the lower part of the system.

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## 9079 base I/O expansion unit or 5074 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 9079 base I/O expansion unit or 5074 expansion unit.

The 9079 base I/O expansion unit is included with models 9406-840 and SB3.

Dimensions are shown for the 9079 base I/O expansion unit or 5074 expansion unit. Measurements do not include models 9406-840 or SB3.



Table 549. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height	Height in 0551 rack <sup>2</sup>
Metric	280 kg	485 mm	1075 mm	910 mm	18 EIA

Table 549. Dimensions (continued)

Dimensions	Maximum configuration weight	Width	Depth	Height	Height in 0551 rack <sup>2</sup>
English	617 lb	19.1 in.	42.3 in.	35.8 in.	18 U

Table 550. Electrical

Electrical characteristics	Properties
kVA	1.100
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output	3379 Btu/hr
Power requirements (maximum)	990 W
Power factor	0.9
Inrush current	42 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 551. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 552. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 553. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 554. Noise emissions

Properties	Operating	Idle
L <sub>WAd</sub>	6.7 bels	6.6 bels
L <sub>pAm</sub> (1-meter bystander)	49 dB	49 dB

Table 555. Service clearances

Dimensions	Front	Back	Sides <sup>3</sup>	Top <sup>3</sup>
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 556. Note

**Notes:**

1. For a description of noise emission values, see *Acoustics*.
2. Feature code 0574 is equivalent to the 5074 expansion unit. Feature code 0123 is equivalent to a 5074 lower unit in the rack.
3. Side and top clearances are optional when operating.

**Related information:**

 Acoustics

## 9094 base I/O expansion unit, 9194 I/O expansion unit, or 5094 expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 9094, 9194 base I/O expansion unit, or the 5094 expansion unit.

The 9094, 9194 base I/O expansion unit is included with models 9406-870 and 9406-890. The 5094 is available with models 9406-870 and 9406-890.

Dimensions are shown for the 9094 base I/O expansion unit or 5094 expansion unit. Measurements do not include models 9406-870 and 9406-890.



Table 557. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height	Height in 0551 rack <sup>3</sup>
Metric	280 kg	485 mm	1075 mm	910 mm	18 EIA
English	617 lb	19.1 in.	42.3 in.	35.8 in.	18 U

Table 558. Electrical

Electrical characteristics	Properties
kVA	1.100
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal Output	3379 Btu/hr
Power requirements (maximum)	990 W
Power factor	0.9
Inrush current	42 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 559. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 560. Environment requirements

Environment	Operating	Nonoperating
Noncondensing Humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 561. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 562. Noise emissions<sup>1</sup>

Properties	Operating	Idle
L <sub>WAd</sub>	6.7 bels	6.6 bels
L <sub>pAm</sub> (1-meter bystander)	49 dB	49 dB

Table 563. Service clearances

Dimensions	Front	Back	Sides <sup>4</sup>	Top <sup>4</sup>
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 564. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For a description of noise emission values, see <i>Acoustics</i>.</li> <li>2. It is strongly recommended that you get the dual line cord feature (feature 5114) for this I/O expansion unit. Feature 5114 uses 2 power cords and has 2 AC boxes.</li> <li>3. Feature code 0694 is equivalent to the 5094 expansion unit.</li> <li>4. Side and top clearances are optional when operating.</li> </ol>
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**Related information:**

 [Acoustics](#)

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## 5079 1.8 m storage and PCI expansion unit

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 5079 1.8 m storage and PCI expansion unit.

There are two 5074 expansions (with side covers and casters removed) in a 5079 1.8 m storage and PCI expansion unit.

Dimensions are shown for the 5079 1.8 m storage and PCI expansion unit only.



Table 565. Dimensions

Dimensions	Maximum configuration weight	Height	Width	Depth
Metric	726 kg	1800 mm	650 mm	1020 mm
English	1600 lb	71.0 in.	25.5 in.	40.1 in.

Table 566. Electrical

Electrical characteristics	5074 <sup>1</sup>	5074 <sup>2</sup>
kVA	1.100	1.100
Rated voltage and frequency	200 - 240 at 50 - 60 plus or minus 0.5 Hz	200 - 240 at 50 - 60 plus or minus 0.5 Hz
Thermal Output (maximum)	3379 Btu/hr	3379 Btu/hr
Power requirements (maximum)	990 W	990 W
Power factor	0.91	0.91
Inrush current	50 A	50 A
Leakage current (maximum)	3.5 mA	3.5 mA
Phase	1	1



Table 567. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 568. Environment requirements

Environment	Operating	Nonoperating
Noncondensing Humidity	8 - 80%	8 - 80%
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)

Table 569. Maximum altitude

3048 m (10 000 ft)
--------------------

Table 570. Noise emissions

Properties	Operating	Idle
$L_{wAd}$ Category 2E, General Business	7.0 bels	6.9 bels
$\langle L_{pA} \rangle_m$	52 dB	52 dB

Table 571. Service clearances

Dimensions	Front	Back	Sides	Top
Metric	762 mm	762 mm	762 mm	762 mm
English	30 in.	30 in.	30 in.	30 in.

Table 572. Notes

<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Because the 5079 1.8 m storage and PCI expansion unit consists of two 5074 storage/PCI expansions, electrical requirements for each 5074 need to be planned for individually. Hence, the (1) and (2) represent the specs for each 5074. The 5074 requires the appropriate receptacle for the power cord included with each 5074.</li> <li>2. The usable length of the power cord for the upper 5074 is reduced by 1.2 m (4 ft) because of the routing inside the 1.8 m enclosure. Therefore, a 4.3 m (14 ft) cord results in a usable length of 3 m (10 ft), and a 2.7 m (9 ft) cord results in a usable length of 1.5 m (5 ft).</li> <li>3. For a description of noise emission values, see <i>Acoustics</i>.</li> </ol>
--

For information about floor loading, contact your IBM service or installation planning representative. Because the thickness of the covers are negligible, the height, width, and depth of the overall dimensions might be used in floor loading calculations.

**Related reference:**

“5074 expansion unit or 9079 expansion unit with 5078 expansion unit ” on page 307

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

**Related information:**

 Acoustics



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## Chapter 6. Rack specifications

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

For information on previously released pSeries racks, see the IBM Systems Information Center.

For non-IBM rack specifications, see *Specifications for non-IBM rack installation*.

Select your rack model to view its specifications.

### **Related reference:**

Chapter 12, "Rack installation procedures for racks not purchased at IBM," on page 725

Learn the requirements and specifications for installing IBM systems into racks that were not purchased at IBM.

"5079 1.8 m storage and PCI expansion unit" on page 440

Hardware specifications provide detailed information for your expansion unit, including dimensions, electrical, power, temperature, environment, and service clearances.

"5294 or 8294 1.8 m I/O rack" on page 319

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

"Planning for 5792 base rack" on page 327

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

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### **0550 model 9406-830 rack**

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Pictured is the 0550 iSeries rack.

When ordered by itself, the 0550 rack provides an empty 1.8 meter tall rack (36 EIA units of total vertical space).



Table 573. Dimensions

Dimensions	Maximum configuration weight <sup>1</sup>	Width	Depth	Height
Metric	644 kg	650 mm	1020 mm	1800 mm
English	1417 lb	25.5 in.	40.0 in.	71.0 in.

Table 574. Electrical

Electrical characteristics	Properties
kVA (maximum)	1.684
Rated voltage and frequency	200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output (maximum)	5461 Btu/hr
Power requirements (maximum)	1600 W
Power factor	0.95
Inrush current	80 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 575. Service clearance

Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 576. Notes

**Notes:**

1. The 1.8 meter rack has 10 EIA units of space remaining. This space will be filled with a 5 EIA filler panel, a 3 EIA filler panel, and two of the 1 EIA filler panels. Because the rack does not have power distribution, the model 9406-830 requires a power cord of sufficient length to reach the receptacle. The power cord for model 9406-830 must be used to determine the appropriate receptacle.
2. Side and top clearances are optional when operating.

**Related reference:**

“High-speed link information” on page 671

High-speed link (HSL) cables connect systems to I/O enclosures, IXA cards in System x<sup>®</sup> expansion units and other systems.

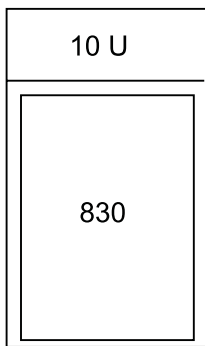
“0550 rack configuration”

The 0550 rack configuration is provided to assist in planning for your 0550 rack.

## 0550 rack configuration

The 0550 rack configuration is provided to assist in planning for your 0550 rack.

When ordered by itself, the 0550 provides an empty 1.8 meter rack (36 EIA units of total space). The configuration for the 0551 rack is:



RBAGP815-0

Feature Code	0550 <sup>1</sup>
Top rack specify	none
Bottom rack specify	none
PDU support	0 to 4 <sup>2</sup>
Power cords	Model 9406-830 <sup>3</sup> , PDU

**Note:**

1. Ten EIA units of space not managed by the configurator.
2. Feature codes 5160, 5161, and 5162.
3. Model 9406-830 does not plug into a power distribution unit.

## 0551 rack

The 0551 rack specifications provide detailed information for your rack.

Pictured is the **0551 rack**

The 0551 provides an empty 1.8 m rack (36 EIA units of total space). See the plug types for specific information on the power distribution units.

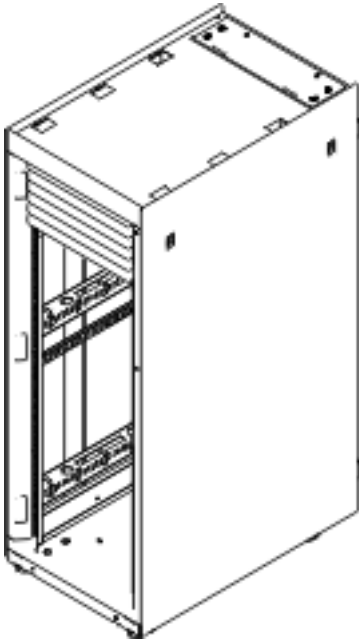


Table 577. Dimensions

Dimensions	Maximum configuration weight	Width	Depth	Height
Metric	The weight of the empty rack is 244 kg (535 lb). Click the appropriate link to see the weight for what is installed. 0123, 0133, 0134, 0578, 0588, 0595, 0137, 0138, 9406-570 and 9117-570,0574, 0694, 7884	650 mm	1020 mm	1800 mm
English		25.5 in.	40.0 in.	71.0 in.

Table 578. Electricity

Electrical characteristics	Properties
Click the appropriate link to see the electrical characteristics for what is installed.	0123, 0133, 0134, 0578, 0588, 0595, 0137, 0138, 9406-570 and 9117-570,0574, 0694, 7884

Table 579. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F )

Table 580. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	22.8°C (73°F)	22.8°C (73°F)

Table 580. Environment requirements (continued)

Environment	Operating	Nonoperating
Maximum altitude	3048 m (10000 ft)	3048 m (10000 ft)
Noise emissions <sup>4</sup>	Rack noise levels are a function of the number and type of drawers installed. See your server or hardware specifications for specific requirements	Rack noise levels are a function of the number and type of drawers installed. See your server or hardware specifications for specific requirements

Table 581. Service clearances

Front	Back	Sides <sup>2</sup>	Top <sup>2</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 582. Notes

Notes:
<ol style="list-style-type: none"> <li>1. The 1.8 meter rack has 10 EIA units of space remaining. This space will be filled with a 5 EIA filler panel, a 3 EIA filler panel, and two of the 1 EIA filler panels. Because the rack does not have power distribution, the model 830 requires a power cord of sufficient length to reach the receptacle. The power cord for model 830 must be used to determine the appropriate receptacle.</li> <li>2. Side and top clearances are optional during operation.</li> <li>3. Acoustic doors are available for the IBM racks. Feature code 6248 is available for the 0551 and 7014-T00 racks. Feature code 6249 is available for the 0553 and 7014-T42 racks. The overall sound reduction is approximately 6 dB. The doors add 381 mm (15 in.) to the depth of the racks.</li> <li>4. For a description of noise emission values, see <i>Acoustics</i>.</li> </ol>

See *0551 or 7014 rack configurations* for typical configurations when the 0551 or 7014 rack is populated with various server models.

## Caster and leveler locations

The following diagram provides the caster and leveler locations for the 7014-T00, 7014-T42, 0551, 0553 and 0555 racks.

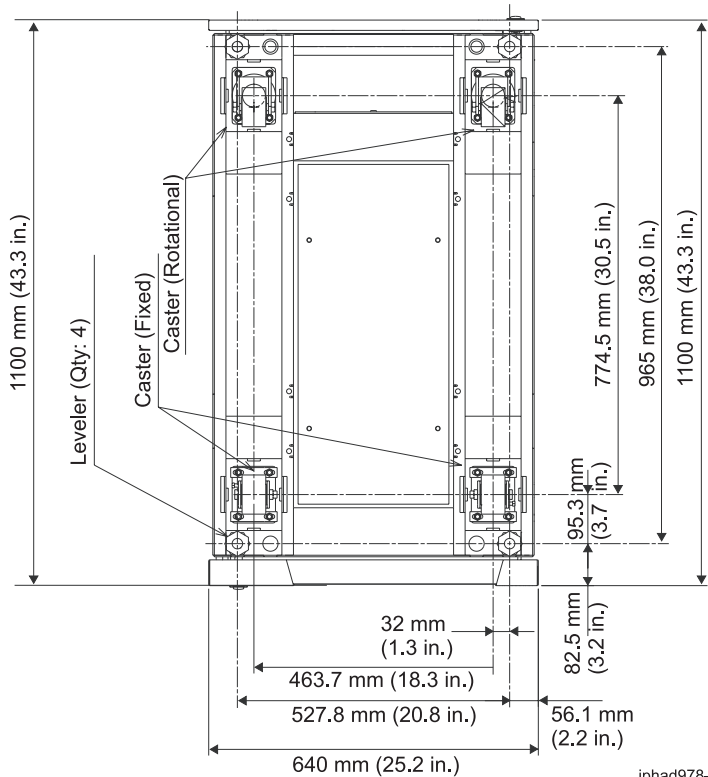


Figure 241. Caster and leveler locations

iphad978-0

**Related reference:**

Chapter 9, “Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack,” on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

**Related information:**

Acoustics

**Model 7014-T42, 7014-B42, and 0553 rack**

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

**Note:** Before installing rear door heat exchangers on your 7014-T42 rack, see *Planning for the installation of rear door heat exchangers*.

Table 583. Dimensions

Dimensions	Properties
Height	2015 mm (79.3 in.)
Capacity	42 usable EIA units
Height with PDP - DC only	Not applicable
Width without side panels	623 mm (24.5 in.)
Width with side panels	644 mm (25.4 in.)



Table 583. Dimensions (continued)

Dimensions	Properties
Depth with back door only	1042 mm (41.0 in.)
Depth with back door and front door	1098 mm (43.3 in.)
Depth with sculptured style front door	1147 mm (45.2 in.)
Weight Base rack (empty)	261 kg (575 lb)
Weight Full rack	930 kg (2045 lb) See 7014-T00, 7014-T42 and 0553 rack weight distribution and floor loading
Weight Slim doors	15.4 kg (34 lb)
Weight Side covers	16.3 kg (36 lb)

Table 584. Electrical<sup>1</sup>

Electrical characteristics	Properties
DC rack voltage (nominal)	-48 V dc
Power source loading maximum in kVa <sup>2</sup>	See <i>Power cord options for the 7014, 0551, 0553, and 0555 racks</i> for details
Voltage range (V dc)	-40 - -60
AC rack	683 Btu/hr
Power source loading maximum in kVa (per PDB) <sup>3</sup>	135 W
Voltage range (V ac)	200 - 240
Frequency (Hz)	50 or 60

Table 585. Service clearances<sup>1</sup>

Front	Back	Sides
915 mm (36 in.)	915 mm (36 in.)	915 mm (36 in.)

See your server or hardware specifications for specific requirements.

See your server or hardware specifications for specific requirements.

Rack noise levels are a function of the number and type of drawers installed. See your server or hardware specifications for specific requirements<sup>3</sup>.

Rack airflow requirements are a function of the number and type of drawers installed<sup>4</sup>. Refer to the individual drawer specifications.

Table 586. Notes

**Note:**

1. Recommended minimum vertical service clearance from floor is 2439 mm (8 ft)
2. When installing a model 9117-570 or 9406-570 in a 7014-T42 rack, there are restrictions to what height the rack installation can begin so that SMP and FSP flex assemblies are accommodated. The installation configurations are as follows:
  - 16-core configurations (16U) start installation between EIA 1 through EIA 21
  - 12-core configurations (12U) start installation between EIA 1 though EIA 25
  - 8-core configurations (8U) start installation between EIA 1 through EIA 29
  - 4-core configurations (4U) start installation between EIA 1 through EIA 37, EIA 37 through 39 (does not use SMP or SMP flex assemblies)

Associated I/O platforms can be mounted in the upper locations of the rack.
3. Acoustic doors are available for the IBM racks. Feature code 6248 is available for the 0551 and 7014-T00 racks. Feature code 6249 is available for the 0553 and 7014-T42 racks. The overall sound reduction is approximately 6 dB. The doors add 381 mm (15 in.) to the depth of the racks.
4. All rack installations require careful site and facilities planning designed to address both the cumulative drawer heat output and provide the airflow volume rates necessary to comply with drawer temperature requirements.

### Caster and leveler locations

The following diagram provides the caster and leveler locations for the 7014-T00, 7014-T42, 0551, 0553, and 0555 racks.

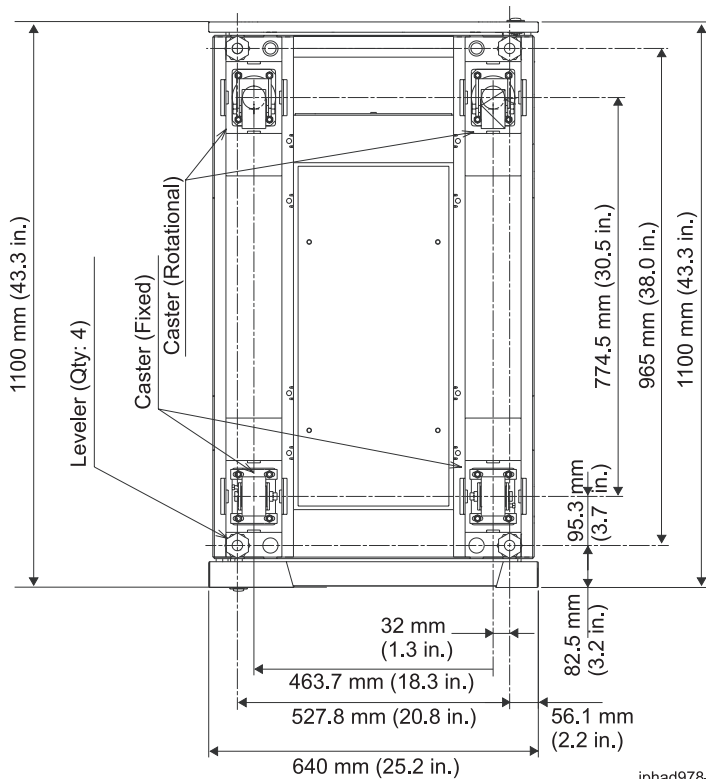


Figure 242. Caster and leveler locations

iphad978-0

#### Related reference:

Chapter 9, "Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack," on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various

configurations and specifications are provided.

**Related information:**

➔ Planning for the installation of rear door heat exchangers

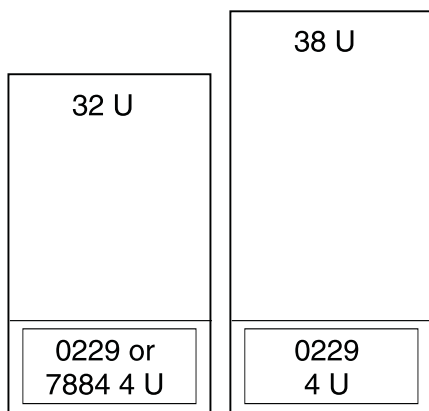
## 0551, 0553, 0555, and 7014 rack configurations

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

The various configurations for the 0551, 7014, 0553 and 0555 racks are:

- 9406 feature code 7884, 9111 rack content specify code 0229 - 9406-520 and 9111-520 in rack
- 9113 rack content specify code 0230, 9406 rack content specify code 7886
- 9406-570 and 9117-570 in rack, 9117 rack content specify codes 0231, 0232, 0241, 0242
- Feature code 0123 - 5074 lower expansion unit in rack; Feature code 0574 - 5074 equivalent
- Feature code 0694 - 5094 equivalent
- Feature code 0133 - Manufacturing install in rack (models 9406-800 and 9406-810); Feature code 0137 - Field install in rack (models 9406-800 and 9406-810)
- Feature code 0134 - Field install in rack (model 9406-825); Feature code 0138 - Field install in rack (model 9406-825)
- Feature code 0578 - PCI-X expansion unit in rack
- Feature code 0588 - PCI-X expansion unit in rack
- Feature code 0595 - PCI-X expansion unit in rack

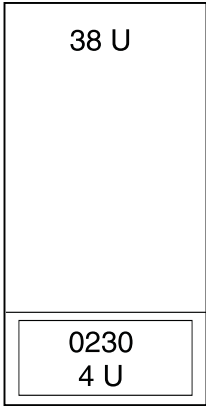
**9406 feature code 7884, 9111 rack content specify code 0229 - 9406-520 and 9111-520 in rack**



IPHAD607-1

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , 7014 <sup>13</sup> , 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	7884, 0229
PDU support	0 to 4 <sup>2</sup>
Power cords	7884, PDU <sup>3</sup>

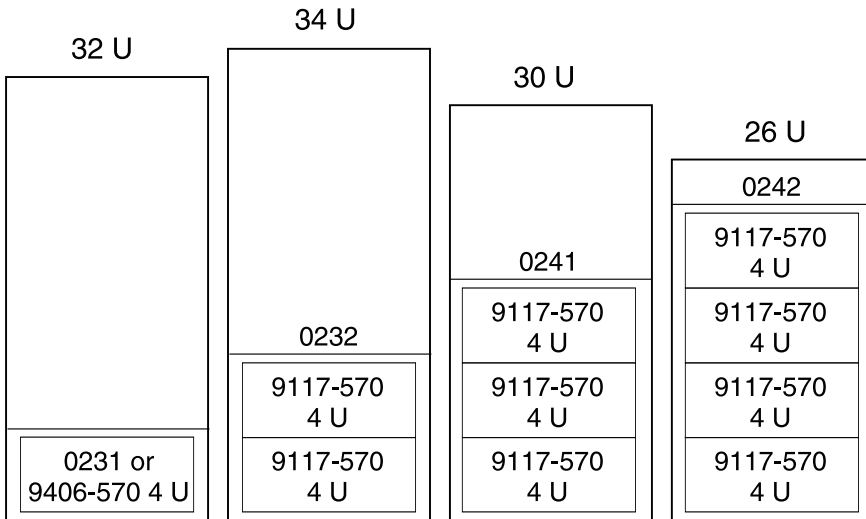
**9113 rack content, specify code 0230; 9406 rack content, specify code 7886**



IPHAD613-0

IBM rack	7014 <sup>13</sup>
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0230 (9113-550), 7886 (9406-550)
PDU support	0 to 4 <sup>2</sup>
Power cords	PDU <sup>4</sup>

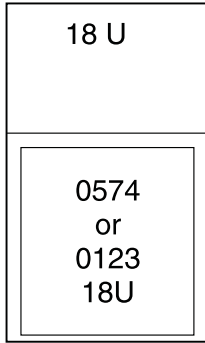
**9406-570 in rack, 9117-570 rack content, specify codes 0231, 0232, 0241, 0242**



IPHAD608-1

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , 7014 <sup>13</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0231, 0232, 0241, 0242
PDU support	0 to 4 <sup>2</sup>
Power cords	PDU <sup>4</sup>

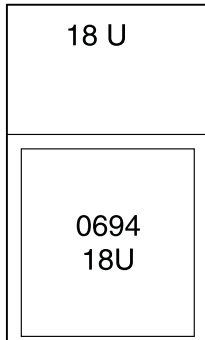
**Feature code 0123 - 5074 lower expansion unit in rack; Feature code 0574 - 5074 equivalent**



IPHAD600-0

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	0123
Rack, specify code	0574
PDU support	0 to 4 <sup>2</sup>
Power cords	0123, 0574, PDU <sup>5</sup>

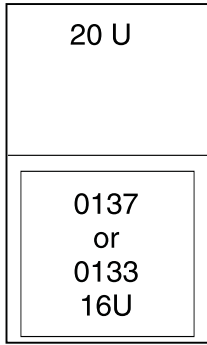
**Feature code 0694 - 5094 equivalent**



IPHAD601-0

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0694
PDU support	0 to 4 <sup>2</sup>
Power cords	0694, PDU <sup>6</sup>

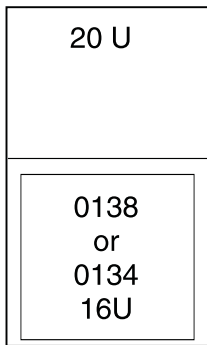
**Feature code 0133 - Manufacturing install in rack (models 9406-800 and 9406-810); Feature code 0137 - Field install in rack (models 9406-800 and 9406-810)**



IPHAD602-0

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0133 <sup>9</sup> , 0137 <sup>9</sup>
PDU support	0 to 4 <sup>2</sup>
Power cords	0133, 0137, PDU <sup>4</sup>

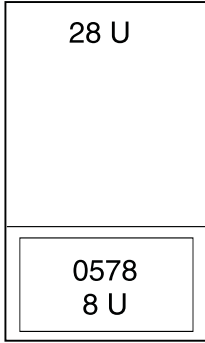
**Feature code 0134 - Field install in rack (model 9406-825); Feature code 0138 - Field install in rack (model 9406-825)**



IPHAD603-0

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0134 <sup>10</sup> , 0138 <sup>10</sup>
PDU support	0 to 4 <sup>2</sup>
Power cords	0134, 0138, PDU <sup>4</sup>

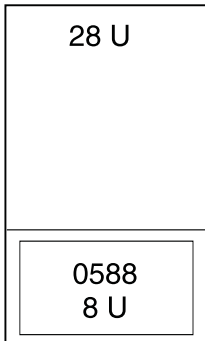
**Feature code 0578 - PCI-X expansion unit in rack**



IPHAD604-0

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0578
PDU support	0 to 4 <sup>2</sup>
Power cords	PDU <sup>8</sup>

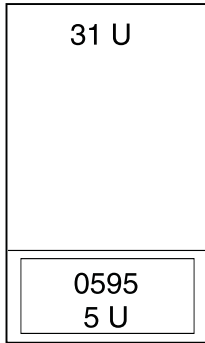
**Feature code 0588 - PCI-X expansion unit in rack**



IPHAD605-0

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0588
PDU support	0 to 4 <sup>2</sup>
Power cords	PDU <sup>12</sup>

**Feature code 0595 - PCI-X expansion unit in rack**



IPHAD606-0

IBM rack	0551 <sup>1</sup> , 0553 <sup>1</sup> , and 0555
Top rack, specify code	
Bottom rack, specify code	
Rack, specify code	0595
PDU support	0 to 4 <sup>2</sup>
Power cords	0595, PDU <sup>11</sup>

**Notes:**

- 0551 is an empty 1.8 meter rack with 36 EIA units of total space. 0553 is a 2.0 meter rack with 42 EIA units of total space.
- 0551, 0553, and 0555 feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.
- If units plug into a power distribution unit (PDU), power jumper cord feature code 6458, 6459, 6095, or 9911 is required. If redundant power supply (feature code 5158) is ordered, a second power jumper cord feature code is required.
- If unit plugs into a PDU, two feature code 6458, 6459, 6095, or 9911 power jumper cords are required.
- Feature code 0123 or 0574 do not plug into a PDU.
- Feature code 0125 does not plug into a PDU.
- Supported only on MES orders and includes a rack shelf with rail assembly, adapter plate, and cable-management-arm assembly.
- 0578 includes two rack power cords that plug into a PDU.
- Field install in rack feature is used to mount a model 9406-270, 9406-800, or 9406-810 system unit (14 U) with attached expansion unit. This feature provides a rack shelf (2 U) with rail assembly, cable-management-arm assembly, adapter plate, and a pair of lift covers.
- Field install in rack feature is used to mount a model 9406-825 system unit (14 U). This feature provides a rack shelf (2 U), cable-management-arm assembly, adapter plate, and a pair of lift covers.
- If unit plugs into a PDU, feature code 1422 is required. If redundant power supply (feature code 5138) is ordered, a second feature code 1422 is required.
- 0588 comes with two rack power cords that plug into a PDU.
- 7014-T00 is a 1.8 meter rack with 36 EIA units of total space. 7014-T42 is a 2.0 meter rack with 42 EIA units of total space. The rack includes one PDU, feature code 9188, 9176, 9177, or 9178.

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**0551 model 9406-270 rack system units**

Server specifications provide detailed information for your server, including dimensions, electrical, power, temperature, environment, and service clearances.



Pictured is the 0551 model 9406-270 Rack system units. The 0551 consists of two model 9406-270s with 7104 system unit expansions installed in a 1.8 m rack. Specify code 0121 represents the first model 9406-270 in the rack (on the bottom). Specify code 0122 represents the second model 9406-270 in the rack (on the top).



Table 587. Dimensions

Dimensions	Maximum configuration weight <sup>1</sup>	Height	Width	Depth
Metric	403 kg	1800 mm	650 mm	1020 mm
English	885 lb	71.0 in.	25.5 in.	40.0 in.

Table 588. Electrical

Electrical characteristics	Properties
kVA (maximum)	0.789
Rated voltage and frequency	100 - 127 or 200 - 240 V ac at 50 - 60 plus or minus 0.5 Hz
Thermal output (maximum)	2560 Btu/hr
Power requirements (maximum)	750 W
Power factor	0.95
Inrush current	41 A
Leakage current (maximum)	3.5 mA
Phase	1

Table 589. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 590. Environment requirements

Environment	Operating	Nonoperating
Wet bulb temperature	23°C (73.4°F)	27°C (80.6°F)
Maximum altitude	3048 m (10 000 ft)	3048 m (10 000 ft)

Table 591. Noise emissions<sup>5</sup>

Properties	Operating	Idle
L <sub>WAd</sub> (Category 2E, General business)	6.6 bels	6.3 bels
<L <sub>pA</sub> > <sub>m</sub>	48 dB	46 dB

Table 592. Service clearances

Front	Back	Sides <sup>3</sup>	Top <sup>3</sup>
762 mm	762 mm	762 mm	762 mm
30 in.	30 in.	30 in.	30 in.

Table 593. Notes

Notes:
<ol style="list-style-type: none"> <li>The 1.8 meter rack has 6 EIA units of space remaining. This space will be filled with a 3 EIA filler panel and three of the 1 EIA filler panels.</li> <li>Only the 4.3 m (14 ft) power cord features are offered for racked 9406-270 systems. There are a total of four power cords that are routed through cable management arms. Also, there is a cable management device that might be used to restrict the length of the power cord exiting the bottom of the rack (for cities like Chicago). See model 9406-270 Cable Poster Addendum included with the 0551 model 9406-270 rack.</li> <li>Side and top clearances are optional when operating.</li> <li>The rack does not have power distribution. Each model 9406-270 and 7104 requires a power cord of sufficient length to reach the receptacle. The power cord feature codes for model 9406-270s must be used to determine the appropriate receptacles.</li> <li>For a description of noise emission values, see <i>Acoustics</i>.</li> </ol>

See *High Speed Link (HSL) cable requirements*

**Related reference:**

“High-speed link information” on page 671

High-speed link (HSL) cables connect systems to I/O enclosures, IXA cards in System x expansion units and other systems.

**Related information:**

 [Acoustics](#)

## Model 0554 and 7014-S11 rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 594. Dimensions

Dimension	Properties
Height	611 mm (24 in.)
Capacity	11 usable EIA units
Height with PDP - DC only	Not applicable

Table 594. Dimensions (continued)

Dimension	Properties
Width without side panels	Not applicable
Width with side panels	518 mm (20.4 in.)
Depth without doors	820 mm (32.3 in.)
Depth with front door	873 mm (34.4 in.)
Depth with sculptured style front door	Not applicable
Weight Base rack (empty)	36 kg (80 lb)
Weight Full rack <sup>1</sup>	218 kg (481 lb)

Table 595. Electrical<sup>β</sup>

Electrical characteristics	Properties
DC rack voltage (nominal)	Not applicable
Power source loading maximum in kVa	Not applicable
Voltage range (V dc)	Not applicable
AC rack	See your server or hardware specifications for specific requirements
Power source loading maximum in kVa (per PDU)	See your server or hardware specifications for specific requirements
Voltage range (V ac)	See your server or hardware specifications for specific requirements
Frequency (Hz)	50 or 60

Table 596. Service clearances<sup>2</sup>

Front	Back	Sides
915 mm (36 in.)	254 mm (10 in.)	71 mm (2.8 in.)

See your server or hardware specifications for specific temperature requirements

See your server or hardware specifications for specific humidity requirements

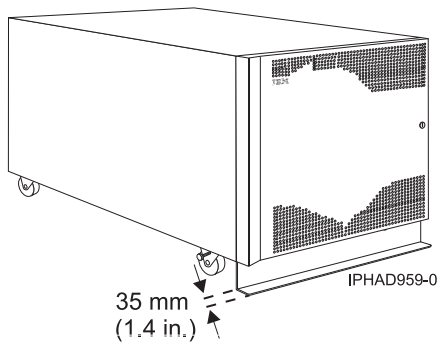
Rack noise levels are a function of the number and type of drawers installed. See your server or hardware specifications for specific requirements.

Rack airflow requirements are a function of the number and type of drawers installed. Refer to the individual drawer specifications.

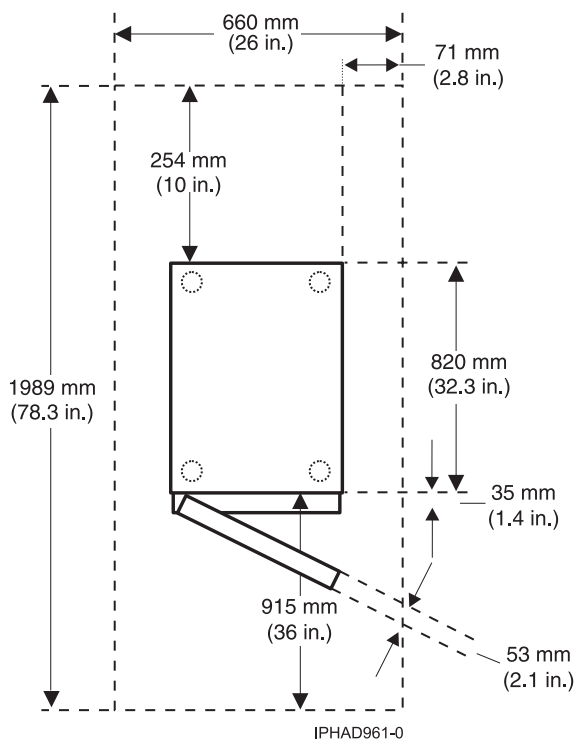
Table 597. Notes

Note:
1. Configuration dependent, base rack weight plus the weight of the drawers mounted in the rack. The rack can support up to a maximum weight of 15.9 kg (35 lb) per EIA unit.
2. Recommended minimum vertical service clearance from floor is 2439 mm (8 ft).
3. The 7188 power distribution unit used with this rack is mounted horizontally and requires one EIA unit of space.

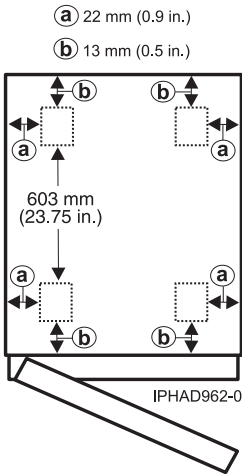
## Model 0554 and 7014-S11 rack operational clearances



### Model 0554 and 7014-S11 with stabilizer bar



### Model 0554 and 7014-S11 plan view



Model 0554 and 7014-S11 castor locations

## Model 0555 and 7014-S25 rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 598. Dimensions

Dimensions	Properties
Height	1240 mm (49 in.)
Capacity	25 usable EIA units
Height with PDP - DC only	Not applicable
Width without side panels	590 mm (23.2 in.)
Width with side panels	610 mm (24 in.)
Depth with back door only	996 mm (39.2 in.)
Depth with back door and front door	1000 mm (39.4 in.)
Depth with sculptured style front door	Not applicable
Weight	
Base rack (empty)	98 kg (217 lb)
Full rack <sup>1</sup>	665 kg (1467 lb)

Table 599. Electrical<sup>8</sup>

Electrical characteristics	Properties
DC rack voltage (nominal)	Not applicable
Power source loading maximum in kVa	Not applicable
Voltage range (V dc)	Not applicable
AC rack	See your server or hardware specifications for specific requirements
Power source loading maximum in kVa (per PDU)	See your server or hardware specifications for specific requirements
Voltage range (V ac)	See your server or hardware specifications for specific requirements

Table 599. Electrical<sup>B</sup> (continued)

Electrical characteristics	Properties
Frequency (Hz)	50 or 60

Table 600. Service clearance

Front	Back	Sides
915 mm (36 in.)	760 mm (30 in.)	915 mm (36 in.)

See your server or hardware specifications for specific Temperature requirements

See your server or hardware specifications for Humidity specific requirements

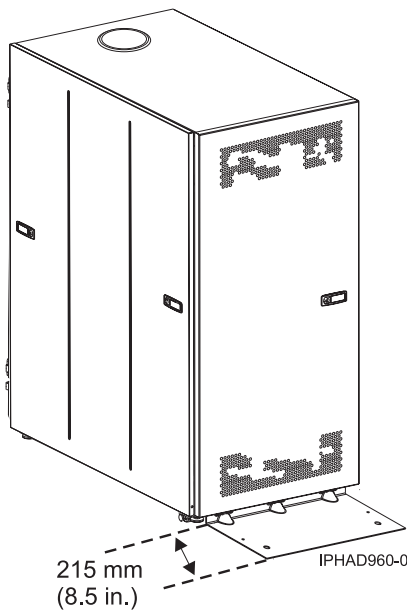
Rack noise levels are a function of the number and type of drawers installed. See your server or hardware specifications for specific requirements

Rack airflow requirements are a function of the number and type of drawers installed. Refer to the individual drawer specifications.

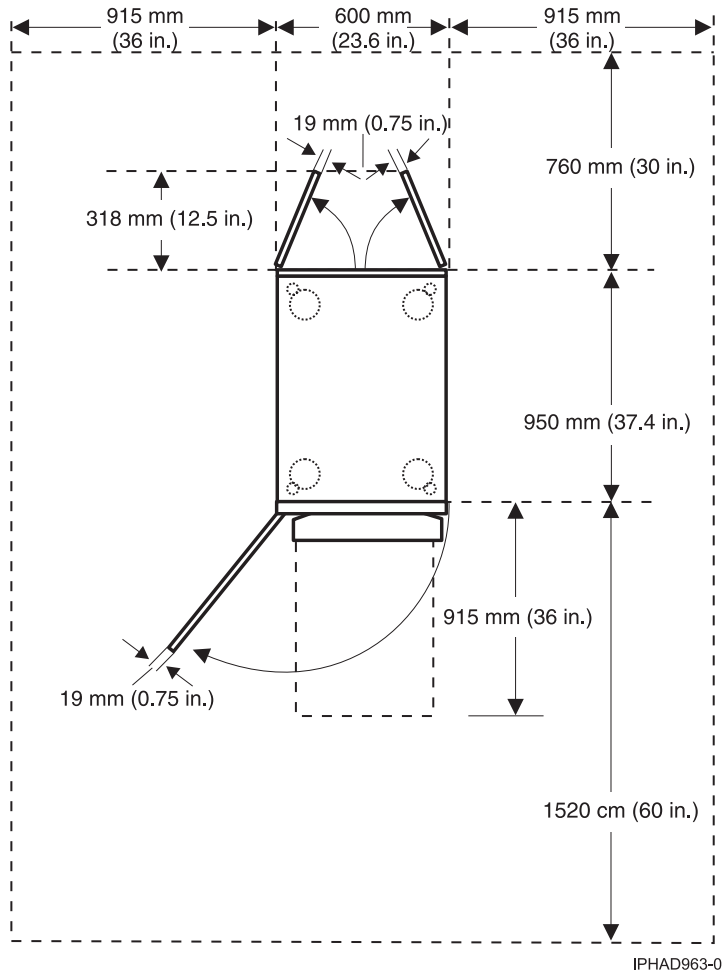
Table 601. Notes

Note:
1. Configuration dependent, base rack weight plus the weight of the drawers mounted in the rack. The rack can support up to a maximum weight of 22.7 kg (50 lb) per EIA unit.
2. Recommended minimum vertical service clearance from floor is 2439 mm (8 ft).
3. The 7188 power distribution unit used with this rack is mounted horizontally and requires one EIA unit of space.

## Model 0555 and 7014-S25 rack operational clearances

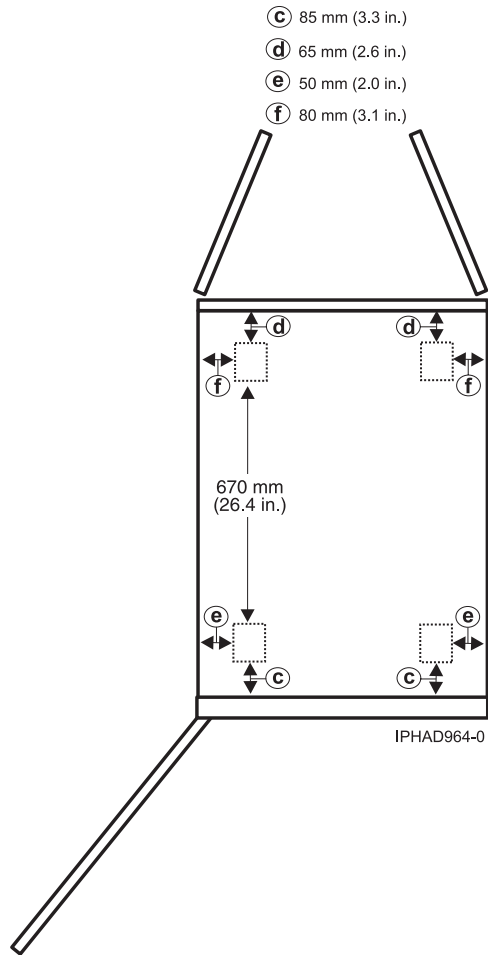


Model 0555 and 7014-S25 with stabilizer foot



IPHAD963-0

Model 0555 and 7014-S25 plan view



Model 0555 and 7014-S25 castor locations

## Planning for the 7014-T00 and 7014-T42 racks

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

The following provide specifications for the 7014-T00, and 7014-T42 or 0553 racks.

### Related reference:

“Model 7014-T00 rack” on page 465

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

“Model 7014-T42, 7014-B42, and 0553 rack” on page 448

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.



## Model 7014-T00 rack

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

Table 602. Dimensions

Dimensions	Properties
Height	1804 mm (71.0 in.)
Capacity	36 usable EIA units
Height with PDP - DC only	1926 mm (75.8 in.)
Width without side panels	623 mm (24.5 in.)
Width with side panels	644 mm (25.4 in.)
Depth with rear door only	1042 mm (41.0 in.)
Depth with rear door and front door	1098 mm (43.3 in.)
Depth with sculptured style front door	1147 mm (45.2 in.)

Table 603. Weight

Base rack (empty)	Full rack
244 kg (535 lb)	816 kg (1795 lb)  See 7014-T00, 7014-T42 and 0553 rack weight distribution and floor loading

Table 604. Electrical<sup>1</sup>

Electrical characteristics	Properties
DC rack voltage (nominal)	-48 V dc
Power source loading maximum in kVa <sup>2</sup>	See <i>Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack</i> for details
Voltage range (V dc)	-40 - -60
AC rack	683 Btu/hr
Power source loading maximum in kVa (per PDB) <sup>3</sup>	135 W
Voltage range (V ac)	200 - 240
Frequency (Hz)	50 or 60

Table 605. Service clearances

Front	Back	Sides
915 mm (36 in.)	915 mm (36 in.)	915 mm (36 in.)

See your server or hardware specifications for specific temperature requirements

See your server or hardware specifications for specific humidity requirements

Rack noise levels are a function of the number and type of drawers installed. See your server or hardware specifications for specific requirements<sup>5</sup>

Rack airflow requirements are a function of the number and type of drawers installed<sup>4</sup>. Refer to the individual drawer specifications.

Table 606. Note

**Note:**

1. The total rack power should be derived from the sum of the power used by the drawers in the rack.
2. The power distribution panel (PDP) on the DC-powered rack can hold up to eighteen (nine per power source) 48-volt, 20 - 50 amperes circuit breakers (configuration dependent). Each power source supports up to 8.4 kVa.
3. Each ac power distribution bus (PDB) can supply 4.8 kVa. A rack can have up to four PDBs as required by the drawers mounted in the rack.
4. All rack installations require careful site and facilities planning designed to both address the cumulative drawer heat output and provide the airflow volume rates necessary to comply with drawer temperature requirements.
5. Acoustic doors are available for the IBM racks. Feature code 6248 is available for the 0551 and 7014-T00 racks. Feature code 6249 is available for the 0553 and 7014-T42 racks. The overall sound reduction is approximately 6 dB. The doors add 381 mm (15 in.) to the depth of the racks.

**Related reference:**

Chapter 9, "Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack," on page 487

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

## 7014-T00, 7014-T42, and 0553 service clearances and caster location

Use the Service clearances and caster location for 7014-T00, 7014-T42 and 0553 racks figure to plan the correct service clearances and caster locations for your rack.

The service clearances and caster locations are shown in the following figure:

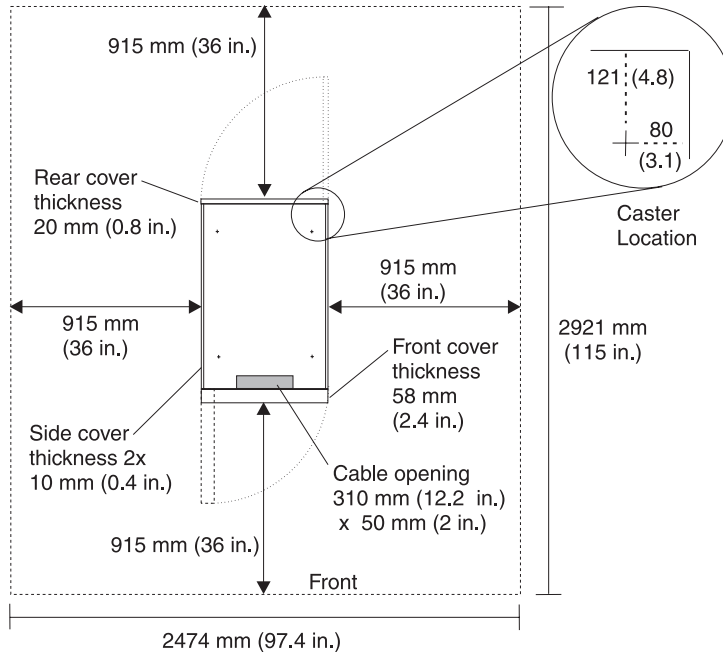
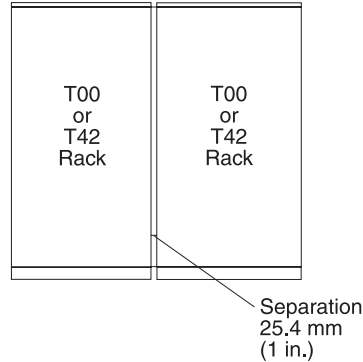


Figure 243. Service clearances and caster location for 7014-T00, 7014-T42, and 0553 racks

**Note:** Rack units are large and heavy and are not easily moved. Because maintenance activities require access at both the front and back, extra room needs to be allowed. The footprint shows the radius of the swinging doors on the I/O rack. The figure shows the minimum space required.

## 7014-T00, 7014-T00, and 0553 racks multiple attachment

7014-T00, 7014-T42 or 0553 racks can be bolted together in a multiple rack arrangement. This figure shows that arrangement.



A kit is available including the bolts, spacers, and decorative trim pieces to cover the 25.4 mm (1 in.) space. For service clearances, see the service clearances as shown in the table for the *Model 7014-T00 rack*.

### Related reference:

“Model 7014-T00 rack” on page 465

Hardware specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

## 7014-T00, 7014-T42, and 0553 rack weight distribution and floor loading

Racks can be heavy when populated with several drawers. Use the Weight distribution distances for racks when loaded and Floor loading for racks when loaded tables to ensure proper floor loading and weight distribution.

The 7014-T00, 7014-T42, and 0553 racks can be extremely heavy when several drawers are present. The following table shows the necessary weight distribution distances for the 7014-T00, 7014-T42, and 0553 racks when loaded.

Table 607. Weight distribution distances for racks when loaded

Rack	System weight (1) lb (kg)	Width (2) in. (mm)	Depth (2) in. (mm)	Weight distribution distance (3)	
				Front and back in. (mm)	Left and right in. (mm)
7014-T00 (4)	1795 (816)	24.5 (623)	40.2 (1021)	20.3 (515.6), 18.8 (477.5)	18.4 (467.4)
7014-T00 (5)	1795 (816)	24.5 (623)	40.2 (1021)	20.3 (515.6), 18.8 (477.5)	0.0 (0.0)
7014-T00 (6)	1795 (816)	24.5 (623)	40.2 (1021)	20.3 (515.6), 18.8 (477.5)	22 (559)
7014-T42 and 0553 (4)	2045 (930)	24.5 (623)	40.2 (1021)	20.3 (515.6), 18.8 (477.5)	18.4 (467.4)
7014-T42 and 0553 (5)	2045 (930)	24.5 (623)	40.2 (1021)	20.3 (515.6), 18.8 (477.5)	0.0 (0.0)
7014-T42 and 0553(6)	2045 (930)	24.5 (623)	40.2 (1021)	20.3 (515.6), 18.8 (477.5)	27 (686)

The following table shows the necessary floor loading for the 7014-T00, 7014-T42 and 0553 racks when loaded.

Table 608. Floor loading for racks when loaded

Rack	Floor loading			
	Raised kg/m <sup>2</sup>	Non-raised kg/m <sup>2</sup>	Raised lb/ft <sup>2</sup>	Non-raised lb/ft <sup>2</sup>
7014-T00 (4)	366.7	322.7	75	66
7014-T00 (5)	734.5	690.6	150.4	141.4
7014-T00 (6)	341	297	70	61
7014-T42 and 0553 (4)	403	359	82.5	73.5
7014-T42 and 0553 (5)	825	781	169	160
7014-T42 and 0553(6)	341.4	297.5	70	61

The following notes are for both of the preceding tables.

**Note:**

1. Maximum weight of fully populated rack, units are lb with kg in parentheses.
2. Dimensions without covers, units are inches with mm in parentheses.
3. The weight distribution distance in all four directions is the area around the rack perimeter (minus covers) necessary to distribute the weight beyond the perimeter of the rack. Weight distribution areas cannot overlap with adjacent computer equipment weight distribution areas. Units are inches with mm in parentheses.
4. Weight distribution distance is 1/2 the service clearance values shown in the figure plus cover thickness.
5. No left and right weight distribution distance.
6. Left and right weight distribution distance required for a 70 lb/ft<sup>2</sup> raised floor loading objective.

## Chapter 7. Hardware management console specifications

Hardware management console (HMC) specifications provide detailed information for your HMC, including dimensions, electrical, power, temperature, environment, and service clearances.

### 7042-C07 desktop Hardware Management Console specifications

Hardware specifications provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environmental specifications.

The HMC controls managed systems, including the management of logical partitions and the use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your HMC.

Table 609. Hardware Management Console specifications

Measurements	Width	Depth	Height	Weight (minimum configuration as shipped)	Weight (maximum configuration)
Metric	438 mm	540 mm	216 mm	16.3 kg	25.2 kg
English	17.25 in.	21.25 in.	8.5 in.	36 lb	56 lb
<b>Electrical<sup>1</sup></b>					
Power source loading			0.106 kVa to 0.352 kVa		
Input voltage			100 - 127 V ac (low range)		
			200 - 240 V ac (high range)		
Frequency (hertz)			47 Hz to 53 Hz (low range)		
			57 Hz to 63 Hz (high range)		
Thermal output (minimum)			630 Btu/hr. (185 watts)		
Thermal output (maximum)			1784 Btu/hr. (523 watts)		
Maximum altitude (Server off)			2133 m (7000 ft)		
<b>Air temperature requirements</b>					
<b>Operating</b>			<b>Shipping</b>		
10 to 32°C (50 to 89.6°F)			-40 to 60°C (-40 - 140°F)		
<b>Humidity requirements</b>					
	<b>Operating</b>		<b>Nonoperating</b>		
Noncondensing humidity	8 - 80%		8 - 80%		
<b>Noise emissions<sup>2</sup></b>					
<b>Product description</b>	<b>Declared A-weighted sound power level, L<sub>WAd</sub> (bels)</b>		<b>Declared A-weighted sound pressure level, L<sub>pAm</sub> (dB)</b>		
	Operating	Nonoperating	Operating	Nonoperating	

Table 609. Hardware Management Console specifications (continued)

One hard disk drive configuration	5.2	4.8	37	33
<b>Notes:</b> 1. Power consumption and heat output vary depending on the number and type of optional features installed and the power management optional features in use. 2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with IS) 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.				

## 7042-CR6 rack-mounted Hardware Management Console specifications

Hardware specifications provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, environmental requirements, and noise emissions.

The HMC controls managed systems, including the management of logical partitions and the use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your HMC.

Table 610. Dimensions

Width	Depth	Height	Weight (maximum configuration)
440 mm (17.3 in.)	711 mm (28.0)	43 mm (1.7 in.)	15.9 kg (35.1 lb)

Table 611. Electrical requirements

Electrical characteristics	Properties
Maximum measured power	675 W
Maximum kVA	0.7 kVA
Minimum thermal output	662 BTU/hr
Maximum thermal output	2302 BTU/hr
Input voltage low range	100 V ac - 127 V ac
Input voltage high range	200 V ac - 240 V ac
Frequency (Hertz)	47 - 63 Hz

Table 612. Environmental requirements

Environment	Temperature
Recommended operating temperature	10°C - 35°C (50°C - 95°F)
Nonoperating temperature	5°C - 45°C (41°C - 113°F)
Maximum altitude	3048 m (10000 ft)
Operating humidity	8% - 80%
Nonoperating humidity	20% - 80%

Table 613. Noise emissions (Maximum configuration)<sup>1</sup>

	Idling	Operating
L <sub>WAd</sub>	6.1 bels	6.1 bels

<sup>1</sup> These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.

## 7042-CR5 rack-mounted Hardware Management Console specifications

Hardware specifications provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, environmental requirements, and noise emissions.

The HMC controls managed systems, including the management of logical partitions and the use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your HMC.

Table 614. Dimensions

Width	Depth	Height	Weight (maximum configuration)
440 mm (17.3 in.)	711 mm (28 in.)	43 mm (1.69 in.)	15.4 kg (34 lb)

Table 615. Electrical

Electrical characteristics	Properties
Maximum measured power	350 W
Maximum kVA	0.362 kVA <sup>1</sup>
Maximum thermal output	1195 BTU/hr
Input voltage low range	100 V ac - 127 V ac
Input voltage high range	200 V ac - 240 V ac

1. Value based on a configuration with one 2.3 GHz processor, 4 x 1 GB memory, six disk, 2 PCI, and one DVD

Table 616. Environment requirements

Environment	Temperature
Recommended operating temperature	10 - 35°C (50.0 - 95.0°F)
Nonoperating temperature	-40 - 60°C (-104 -140°F)
Maximum altitude	2133 m (6998.0 ft)
Operating humidity	8 - 80%
Nonoperating humidity	8 - 80%
Maximum thermal output	2302 BTU/hr

## 7310-C03 desktop Hardware Management Console specifications

Hardware specifications for model 7310-C03 provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environment.

The HMC controls managed systems, including the management of logical partitions and the use of Capacity on Demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Dimensions				
	Width	Depth	Height	Weight
Metric	425 mm	425 mm	140 mm	12.0 kg
English	16.7 in.	16.7 in.	5.5 in.	26.5 lb
Electrical				
Power source loading			0.11 kVa to 0.35 kVa	
Input voltage			100 V ac to 127 V ac 200 V ac to 240 V ac	
Frequency (hertz)			50 Hz to 60 Hz	
Thermal output (minimum)			375 Btu/hr. (110 watts)	
Thermal output (maximum)			1195 Btu/hr. (350 watts)	
Maximum altitude			3048 m (10000 ft)	
Air temperature requirements				
Operating		Nonoperating		
10 to 35°C (50 to 95°F) at altitude 0 to 914 m (2999 ft)		10 to 43°C (50 to 109.4°F)		
Humidity requirements				
	Operating		Nonoperating	
Noncondensing humidity	8 - 80%		8 - 80%	
Noise emissions <sup>1</sup>				
	Operating		Nonoperating	
L <sub>WAd</sub>	6.5 bels		6.5 bels	
<b>Note:</b> For a description of noise emission values, see <i>Acoustics</i> .				

### Related information:

 Acoustics

## 7310-C04 desktop Hardware Management Console specifications

Hardware specifications provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environment.

The HMC controls managed systems, including the management of logical partitions and use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.



Dimensions					
	Width	Depth	Height	Weight (minimum configuration as shipped)	Weight (maximum configuration)
Metric	442 mm	401 mm	146 mm	11.0 kg	14.0 kg
English	17.4 in.	15.8 in.	5.7 in.	24 lb	31 lb
Electrical <sup>1</sup>					
Power source loading			0.09 kVa to 0.32 kVa		
Input voltage			90 V ac to 100 V ac (low range)		
			137 V ac to 265 V ac (high range)		
Frequency (hertz)			47 Hz to 53 Hz (low range)		
			57 Hz to 63 Hz (high range)		
Thermal output (minimum)			256 Btu/hr. (75 watts)		
Thermal output (maximum)			1058 Btu/hr. (310 watts)		
Maximum altitude			2134 m (7000 ft)		
Air temperature requirements					
Operating			Nonoperating		
10 to 35°C (50 to 95°F) at altitude 0 to 2134 m (7000 ft)			10 to 43°C (50 to 109.4°F)		
10 to 32°C (50 to 89.6°F) at altitude 914 m (2999 ft) to 2133 m (6998 ft)					
Humidity requirements					
	Operating		Nonoperating		
Noncondensing humidity	8 - 80%		8 - 80%		
Noise emissions <sup>2</sup>					
	Operating		Nonoperating		
L <sub>WA</sub> d	4.4 bels		4.3 bels		
L <sub>pAm</sub> (1-meter bystander position)	31 dB		29 dB		
L <sub>pAm</sub> (.5-meter operator position)	35 dB		33 dB		
Notes:					
1. Power consumption and heat output vary depending on the number and type of optional features installed and the power management optional features in use.					
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with IS) 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.					

## 7310-C05 desktop Hardware Management Console specifications

Hardware specifications for model 7310-C05 provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environmental specifications.

The HMC controls managed systems, including the management of logical partitions and use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your HMC.

Table 617. Hardware Management Console specifications

Dimensions					
	Width	Depth	Height	Weight (minimum configuration as shipped)	Weight (maximum configuration)
Metric	438 mm	540 mm	216 mm	16.3 kg	20.8 kg
English	17.25 in.	21.25 in.	8.5 in.	36 lb	45.8 lb
Electrical <sup>1</sup>					
Power source loading			0.106 kVa to 0.352 kVa		
Input voltage			100 - 127 V ac (low range)		
			200 - 240 V ac (high range)		
Frequency (hertz)			47 Hz to 53 Hz (low range)		
			57 Hz to 63 Hz (high range)		
Thermal output (minimum)			361 Btu/hr. (106 watts)		
Thermal output (maximum)			1201 Btu/hr. (352 watts)		
Maximum altitude			2134 m (7000 ft)		
Air temperature requirements					
Operating			Nonoperating and shipping		
10 to 35°C (50 to 95°F)			0 to 60°C (-32 to 140°F)		
Humidity requirements					
	Operating		Nonoperating		
Noncondensing humidity	8 - 80%		8 - 80%		
Noise emissions <sup>2</sup>					
Product description	Declared A-weighted sound power level, $L_{WAd}$ (bels)		Declared A-weighted sound pressure level, $L_{pAm}$ (dB)		
	Operating	Nonoperating	Operating	Nonoperating	
One hard disk drive configuration	5.2	4.8	37	33	
<b>Notes:</b>					
1. Power consumption and heat output vary depending on the number and type of optional features installed and the power management optional features in use.					
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with IS) 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.					

## 7310-C06 and 7042-C06 desktop Hardware Management Console specifications

Hardware specifications for models 7310-C06 and 7042-C06 provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environmental specifications.

The HMC controls managed systems, including the management of logical partitions and use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your HMC.

Table 618. Hardware Management Console specifications

<b>Dimensions</b>					
	<b>Width</b>	<b>Depth</b>	<b>Height</b>	<b>Weight (minimum configuration as shipped)</b>	<b>Weight (maximum configuration)</b>
Metric	438 mm	540 mm	216 mm	16.3 kg	20.8 kg
English	17.25 in.	21.25 in.	8.5 in.	36 lb	45.8 lb
<b>Electrical<sup>1</sup></b>					
Power source loading			0.106 kVa to 0.352 kVa		
Input voltage			100 - 127 V ac (low range)		
			200 - 240 V ac (high range)		
Frequency (hertz)			47 Hz to 53 Hz (low range)		
			57 Hz to 63 Hz (high range)		
Thermal output (minimum)			361 Btu/hr. (106 watts)		
Thermal output (maximum)			1201 Btu/hr. (352 watts)		
Maximum altitude			2134 m (7000 ft)		
<b>Air temperature requirements</b>					
<b>Operating</b>			<b>Nonoperating and shipping</b>		
10 to 35°C (50 to 95°F)			0 to 60°C (-32 to 140°F)		
<b>Humidity requirements</b>					
	<b>Operating</b>		<b>Nonoperating</b>		
Noncondensing humidity	8 - 80%		8 - 80%		
<b>Noise emissions<sup>2</sup></b>					
<b>Product description</b>	<b>Declared A-weighted sound power level, L<sub>WAd</sub> (bels)</b>		<b>Declared A-weighted sound pressure level, L<sub>pAm</sub> (dB)</b>		
	Operating	Nonoperating	Operating	Nonoperating	
One hard disk drive configuration	5.2	4.8	37	33	
<b>Notes:</b>					
1. Power consumption and heat output vary depending on the number and type of optional features installed and the power management optional features in use.					
2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with IS) 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.					

## 7310-CR2 rack-mounted Hardware Management Console specifications

Hardware specifications provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environmental specifications.

The Hardware Management Console (HMC) controls managed systems, including the management of logical partitions and use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

This HMC mounts in a 19-inch system rack. The 0551 rack is recommended. This rack operates with a voltage range of 200 V ac to 240 V ac. For additional information about this rack, see *0551 rack*.

Use the following specifications to plan for your HMC.

Dimensions				
	Width	Depth	Height	Weight
Metric	440 mm	660 mm	43 mm	12.7 kg
English	17.3 in.	25.98 in.	1.69 in.	28.4 lb
Electrical				
Power source loading			0.11 kVa to 0.35 kVa	
Input voltage			100 V ac to 127 V ac 200 V ac to 240 V ac	
Frequency (hertz)			50 Hz to 60 Hz	
Thermal output (minimum)			375 Btu/hr. (110 watts)	
Thermal output (maximum)			1195 Btu/hr. (350 watts)	
Maximum altitude			3048 m (10000 ft)	
Air temperature requirements				
Operating		Nonoperating		
10 to 3 °C (50 to 95°F) at altitude 0 to 914 m (2999 ft)		10 to 43°C (50 to 109.4 - °F)		
10 to 32 - °C (50 to 89.6°F) at altitude 914 m (2999 ft) to 2133 m (6998 ft)				
Humidity requirements				
	Operating		Nonoperating	
Noncondensing humidity	8 - 80%		8 - 80%	
Noise Emissions <sup>1</sup>				
	Operating		Nonoperating	
L <sub>WAd</sub>	6.5 bels		6.5 bels	
Note:				
1. For a description of noise emission values, see <i>Acoustics</i> .				

### Related reference:

“0551 rack” on page 445

The 0551 rack specifications provide detailed information for your rack.

**Related information:**

 Acoustics

## 7310-CR3 rack-mounted Hardware Management Console specifications

Hardware specifications provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environmental specifications.

The Hardware Management Console (HMC) controls managed systems, including the management of logical partitions and use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

This HMC mounts in a 19-inch system rack. The 0551 rack is recommended. This rack operates with a voltage range of 200 V ac to 240 V ac. For additional information about this rack, see *0551 rack*.

Use the following specifications to plan for your HMC.

Dimensions					
	Width	Depth	Height	Weight (minimum configuration)	Weight (maximum configuration)
Metric	440 mm	686 mm	43 mm	12.7 kg	15.6 kg
English	17.32 in.	27.0 in.	1.69 in.	28 lb	35 lb
Electrical <sup>1</sup>					
Power source loading			0.172 kVa to 0.550 kVa		
Input voltage			100 V ac to 127 V ac (low range)		
			200 V ac to 240 V ac (high range)		
Frequency (hertz)			50 Hz to 60 Hz		
Thermal output (minimum)			587 Btu/hr. (172 watts)		
Thermal output (maximum)			1878 Btu/hr. (550 watts)		
Maximum altitude			2133 m (6998 ft)		
Air temperature requirements					
Operating			Nonoperating		
10 to 35°C (50 to 95°F) at altitude 0 to 2133 m (6998 ft)			10 to 43°C (50 to 109.4°F)		
Humidity requirements					
Operating			Nonoperating		
Noncondensing humidity			8 - 80%		
Noise emissions <sup>2</sup>					
Operating			Nonoperating		
L <sub>WAd</sub>			6.9 bels		

Dimensions
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Power consumption and heat output vary depending on the number and type of optional features installed and the power management optional features in use.</li> <li>2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with IS) 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.</li> </ol>

**Related reference:**

“0551 rack” on page 445

The 0551 rack specifications provide detailed information for your rack.

## 7310-CR4 and 7042-CR4 Hardware Management Console specifications

Hardware specifications for models 7310-CR4 and 7042-CR4 provide detailed information for your Hardware Management Console (HMC), including dimensions, electrical, power, temperature, and environmental specifications.

The Hardware Management Console (HMC) controls managed systems, including the management of logical partitions and use of capacity on demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to IBM for analysis. The HMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your HMC.

Dimensions				
	Width	Depth	Height	Weight (maximum configuration)
Metric	440 mm	711 mm	43 mm	15.6 kg
English	17.3 in.	28.0 in.	1.69 in.	34 lb
Electrical <sup>1</sup>				
Power source loading			0.194 kVa to 0.700 kVa	
Input voltage			100 V ac to 127 V ac (low range)	
			200 V ac to 240 V ac (high range)	
Frequency (hertz)			50 Hz to 60 Hz	
Thermal output (minimum)			662 Btu/hr. (194 watts)	
Thermal output (maximum)			2390 Btu/hr. (700 watts)	
Maximum altitude			2133 m (6998 ft)	
Air temperature requirements				
Operating		Nonoperating		
10 to 35°C (50 to 95°F) at altitude 0 to 914 m (2998.7 ft)		-40 to 60°C (-104 - 140°F)		
Humidity requirements				
	Operating		Nonoperating	
Noncondensing humidity	8 - 80%		8 - 80%	

<b>Dimensions</b>		
<b>Noise emissions<sup>2</sup></b>		
	<b>Operating</b>	<b>Nonoperating</b>
L <sub>WAd</sub>	6.8 bels	6.8 bels
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Power consumption and heat output vary depending on the number and type of optional features installed and the power management optional features in use.</li> <li>2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with IS) 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.</li> </ol>		

This HMC mounts in a 19-inch system rack. The following IBM racks can be used with this HMC:





## Chapter 8. Uninterruptible power supply

To meet the power protection needs of IBM servers, uninterruptible power supplies are available for System i<sup>®</sup>, System p<sup>®</sup>, and Power Systems<sup>™</sup> configurations. The uninterruptible power supply is the IBM type 9910.

The IBM 9910 uninterruptible power supply solutions are compatible with the power requirements for System i and System p servers and have passed IBM testing procedures. The uninterruptible power supplies are intended to provide a single source for purchase and protection of IBM servers. All 9910 uninterruptible power supplies include a premium warranty package that is designed to enhance the potential for return on investment over the uninterruptible power supplies available on the market today.

Type 9910 uninterruptible power supply solutions are available from *Eaton*.

### 1827 service processor communications port to uninterruptible power supply cable for System i5<sup>®</sup>, System p5, and Power Systems

The 1827 is a 140 mm (5.5 in.) service processor communications port to uninterruptible power supply cable for System i5, System p5<sup>®</sup>, and Power Systems models. Uninterruptible power supply communications is supported through a designated service processor communications port through the 1827 cable. See the following figures.

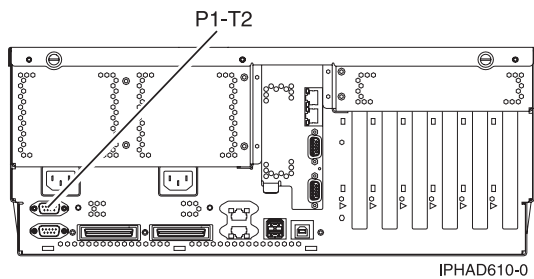


Figure 244. Models 520 and 52A rear view with cable installation location

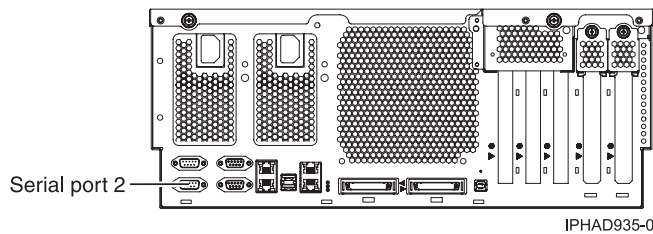


Figure 245. Models 550 and 55A rear view with connection port

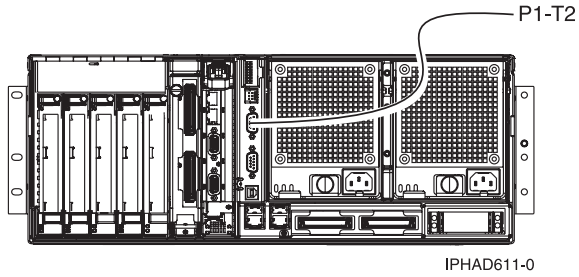


Figure 246. Models 570, 561, and MMA rear view with connection port

**Note:**

On some models, a label by the ports shows the serial port symbol and a number 2 or S2 instead of the location P1-T2 or P1-T4. Here are examples: On a model 9409-M50, figure 249 shows the UPS port as P1-T2. On the frame of the M50, this will be the serial symbol and the number 2. In Figure 248, a model M25 shows the connection as P1-T4. The label on the back will be the serial symbol and S2.

The cover of the system has a label that matches the figures in this section.

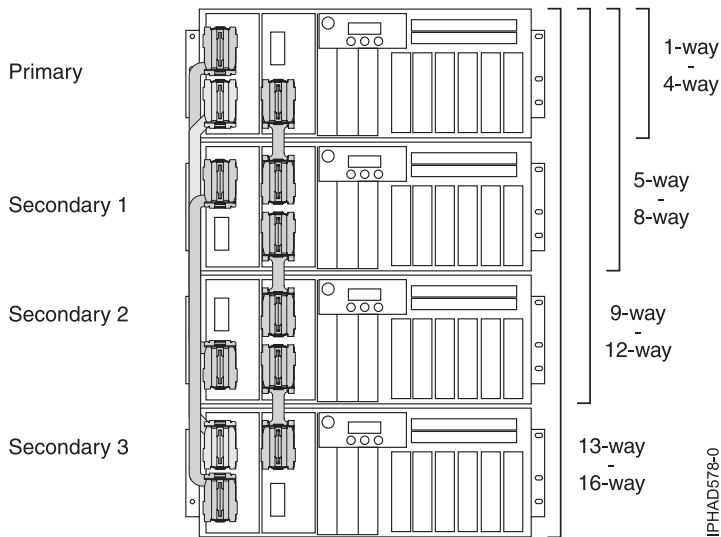


Figure 247. Models 570, 561, and MMA drawer layout

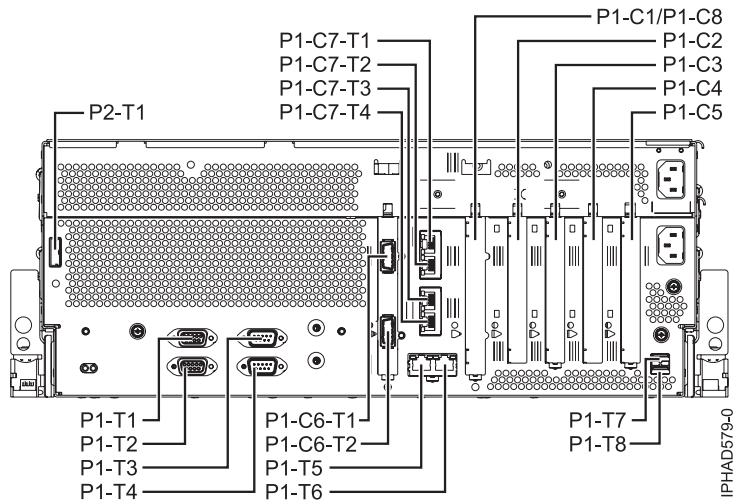


Figure 248. IBM Power 520 (8203-E4A, 9407-M15, 9408-M25) System Serial Cable 2 (P1-T4)

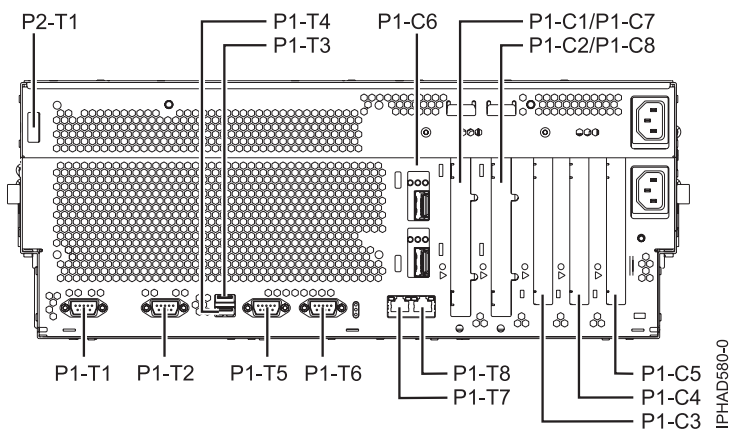


Figure 249. IBM Power 550 (8204-E8A and 9409-M50) System Serial Port 2 (P1-T2)

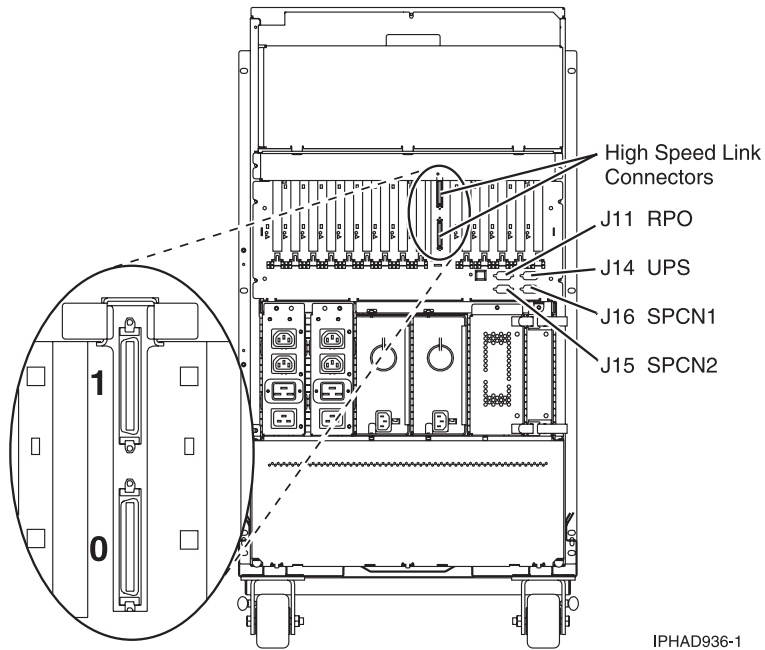


Figure 250. Model 9406-595 and 9194 base PCI-X expansion tower rear view with J14 connection port

**Note:** The 8-core, 12-core, and 16-core processor configurations for the model 570 consist of several 4-core processors connected together. At a minimum, the 1827 uninterruptible power supply converter cable must be connected to the 4-core drawer that has the operator's panel on the front of the unit. If models 570 and 561 have the redundant FSP option, the uninterruptible power supply converter cable should be connected to P1-T2 on the Secondary 1 drawer, see the previous figure. Model MMA comes with a redundant FSP and the 1827 should be connected to both the primary and secondary 1 drawers.

The service processor communications port supports two modes: RS-232 service processor communications port mode and uninterruptible power supply mode. Only one mode is supported at a time. The service processor will detect the presence of an uninterruptible power supply attached through service processor communications port through the 1827 cable when the server is started and set the control hardware to condition the signals for the uninterruptible power supply. The mode cannot be changed unless the system is started again. The following figure shows the converter cable wiring.

**Note:** Serial ports are rendered useless for AIX use when an Hardware Management Console (HMC) is connected. However, platform connection to the UPS, which is managed by the FSP, is independent of an HMC being attached. Whether or not an HMC is connected, the designated serial port for UPS attach will setup correctly in feature code 1827 is connected before power is applied to the server (UPS attach is detected on FSP IPL). The serial ports are not standard EIA-232 ports. Therefore, the UPS must be attached through the 1827 cable and a relay contact interface (such as IBM type 9910, feature code 2939) via the UPS to use the IBM platform managed solution.

To use a standard UPS manufacturer serial interface and UPS monitoring application for the AIX operating system, an asynchronous adapter (such as 2943 and 5723) must be installed and configured in AIX. The IBM i operating system only supports the IBM platform managed solution.

For the 9194, the 1827 convertor cable is not needed. Plug the System i uninterruptible power supply communications cable provided by the uninterruptible power supply supplier into the J14 port.

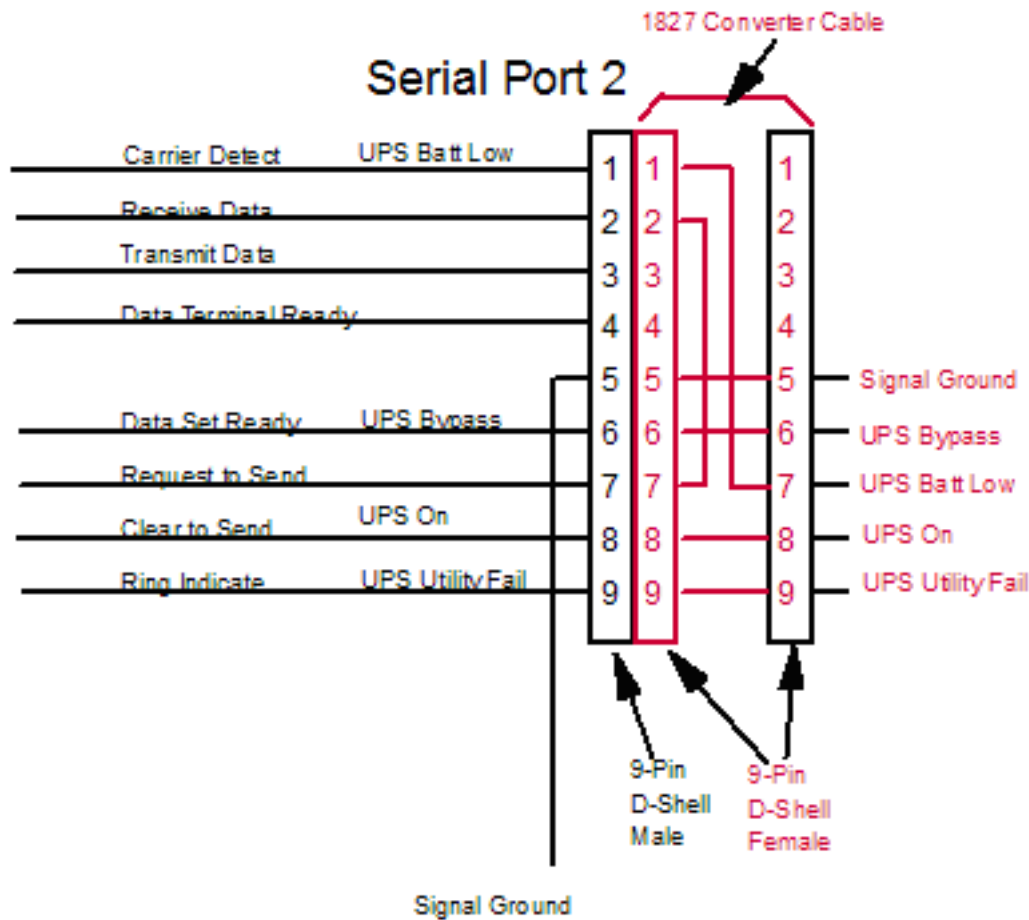
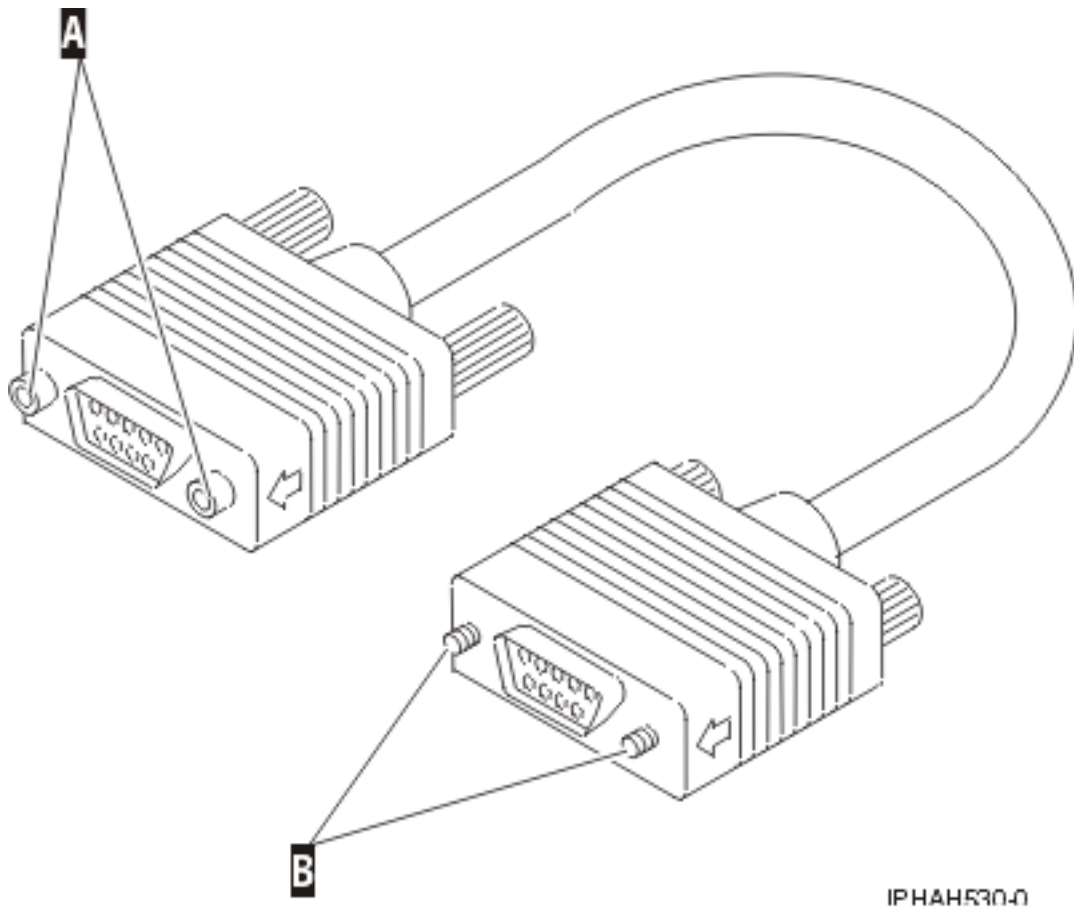


Figure 251. 1827 converter cable schematic for System i5 servers

Both ends of the cable have a female 9-pin D-shell connector. The following figure shows the serial to uninterruptible power supply converter cable end (designated B) that plugs into the service processor communications port on the 9406-520, 9406-550, and the 9406-570. It has external threads that mate with the cable retention on the service processor communications port. The other end of the cable (designated A) plugs into the uninterruptible power supply vendor-supplied cable for System i communications. It has threads that mate with the cable external threads on the uninterruptible power supply.



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Figure 252. Uninterruptible power supply connector for the uninterruptible power supply communications cable

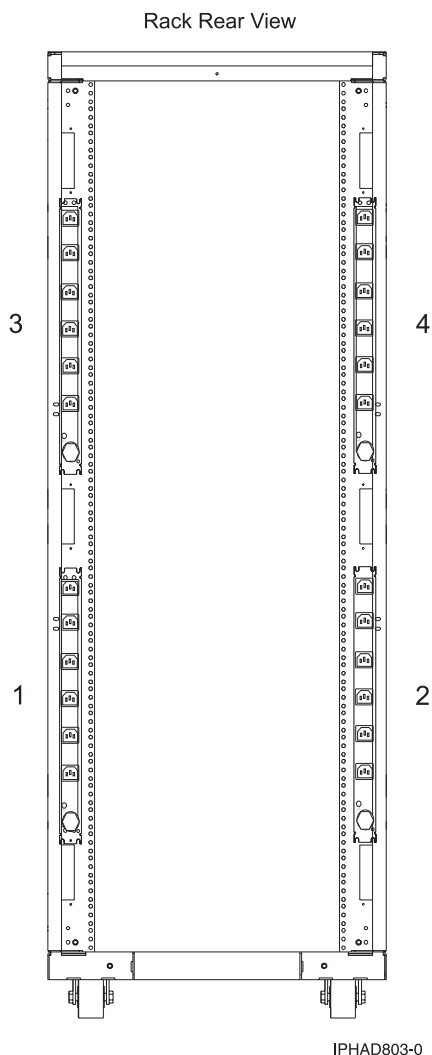
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## Chapter 9. Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack

Power distribution units (PDUs) can be used with the 7014, 0551, 0553 and 0555 racks. The various configurations and specifications are provided.

### Power distribution unit

The following figure shows the four vertical PDU locations in a rack.



Power distribution units (PDUs) are required with 7014-T00, 7014-T42 IBM racks and optional with 7014-B42, 0553, and 0555 racks, except with a 0578 or 0588 expansion unit. If a PDU is not defaulted or ordered, a power cord is provided with each individual rack-mounted drawer for connection to a country-specific utility mains receptacle or uninterruptible power supply. See the individual rack-mounted drawer specifications for the appropriate power cords.

## 9188 or 7188 universal PDU

Table 619. 9188 or 7188 universal PDU features

PDU Number	Racks usage	Supported power cords
9188 universal PDU	7014-T00 and 7014-T42 racks	<ul style="list-style-type: none"> <li>• 6458</li> <li>• 6671</li> <li>• 6672</li> <li>• 6489</li> <li>• 6491</li> <li>• 6492</li> <li>• 6653</li> <li>• 6654</li> <li>• 6655</li> <li>• 6656</li> <li>• 6657</li> <li>• 6658</li> </ul>
7188 universal PDU	7014-T00, 7014-T42, 0551, 0553, and 0555 racks.	<ul style="list-style-type: none"> <li>• 6458</li> <li>• 6671</li> <li>• 6672</li> <li>• 6489</li> <li>• 6491</li> <li>• 6492</li> <li>• 6653</li> <li>• 6654</li> <li>• 6655</li> <li>• 6656</li> <li>• 6657</li> <li>• 6658</li> </ul>

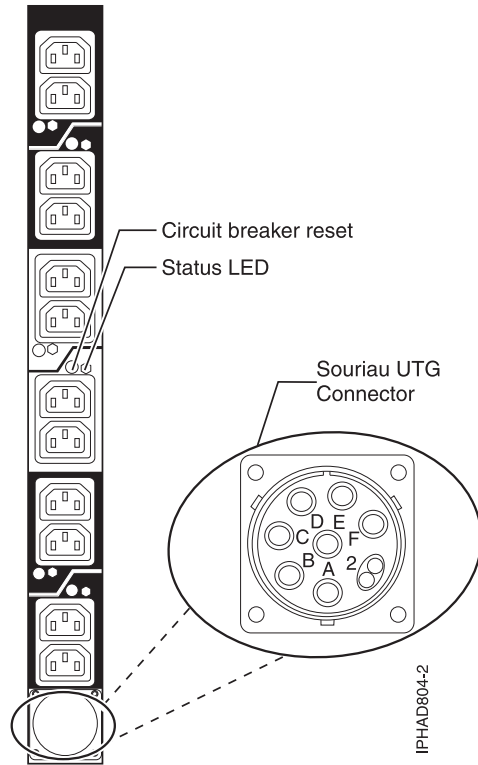
The amperage rating of the PDU is either 16 A, 24 A, or 48 A, single phase or three-phase, depending on the power cord.

**Note:** All power cords are 4.3 m (14 ft). For installation in Chicago, only 2.8 m (6 ft) of the 4.3 m (14 ft) power cord can extend beyond the perimeter of the rack frame. If more than 2.8 m (6 ft) can exit the rack, retain any additional cordage within the rack frame with Velcro ties in the cable management space until 2.8 (6 ft) or less exits the rack.

The PDU has twelve customer-usable IEC 320-C13 outlets rated at 200 - 240 V ac. There are six groups of two outlets fed by six circuit breakers. Each outlet is rated up to 10 A (220 - 240 V ac) or 12 A (200 - 208 V ac), but each group of two outlets is fed from one 20 A circuit breaker derated to 16 A. The following IEC 320-C13 to IEC 320-C14 power cords are available to supply power from the PDU outlet to the rack-mounted device:

- 1422 - 3.0 m (10 ft)
- 6458 - 4.3 m (14 ft)
- 6459 - 3.7 m (12 ft)
- 6095 - 3.0 m - 4.3 m (10 ft - 14 ft)
- 9911 - 4.3 m (14 ft)





To calculate the power loading requirements and proper loading sequence for the 7188 and 9188 PDU, see *Power load calculating for 7188 or 9188 power distribution units*.

## 9176 or 7176 single phase PDU

Table 620. 9176 or 7176 single phase PDU features

PDU Number	Racks usage	Supported power cords
9176 or 7176 single phase PDU	7014 IBM racks	<ul style="list-style-type: none"> <li>• 6458</li> <li>• 6671</li> <li>• 6672</li> <li>• 6442, 9800, or 9824               <ul style="list-style-type: none"> <li>– 200 V ac; 4.3 m (14 ft) locking power cord (L6-30P)</li> </ul> </li> <li>• 6443 or 9801               <ul style="list-style-type: none"> <li>– 200 V ac; 4.3 m (14 ft) watertight power cord (3750DP)</li> </ul> </li> <li>• 6444 or 9822               <ul style="list-style-type: none"> <li>– 200 V ac; 4.3 m (14 ft) PDL 250 V ac; 30 A plug</li> </ul> </li> <li>• 6447 or 9826               <ul style="list-style-type: none"> <li>– 200 V ac; 4.3 m (14 ft) PDL 250 V ac; 30 A plug Right Angle</li> </ul> </li> <li>• 6448 or 9835               <ul style="list-style-type: none"> <li>– 200 V ac; 4.3 m (14 ft) 250 V ac, 30 A Korean plug</li> </ul> </li> <li>• 6449 or 9986               <ul style="list-style-type: none"> <li>– 200 V ac; 1.8 m (6 ft) locking power cord (L6-30P) Chicago</li> </ul> </li> <li>• 6450 or 9987               <ul style="list-style-type: none"> <li>– 200 V ac; 1.8 m (6 ft) watertight power cord (3750DP) Chicago</li> </ul> </li> </ul>

## 9177 or 7177 single phase PDU

Table 621. 9177 or 7177 single phase PDU features

PDU Number	Racks usage	Supported power cords
9177 or 7177 single phase PDU	7014 IBM racks	<ul style="list-style-type: none"> <li>• 6458</li> <li>• 6671</li> <li>• 6672</li> <li>• 6445 or 9823               <ul style="list-style-type: none"> <li>– 200 V ac; 4.3 m (14 ft) (IEC 60309, 3-pin, 32 A; plug type 46)</li> </ul> </li> </ul>

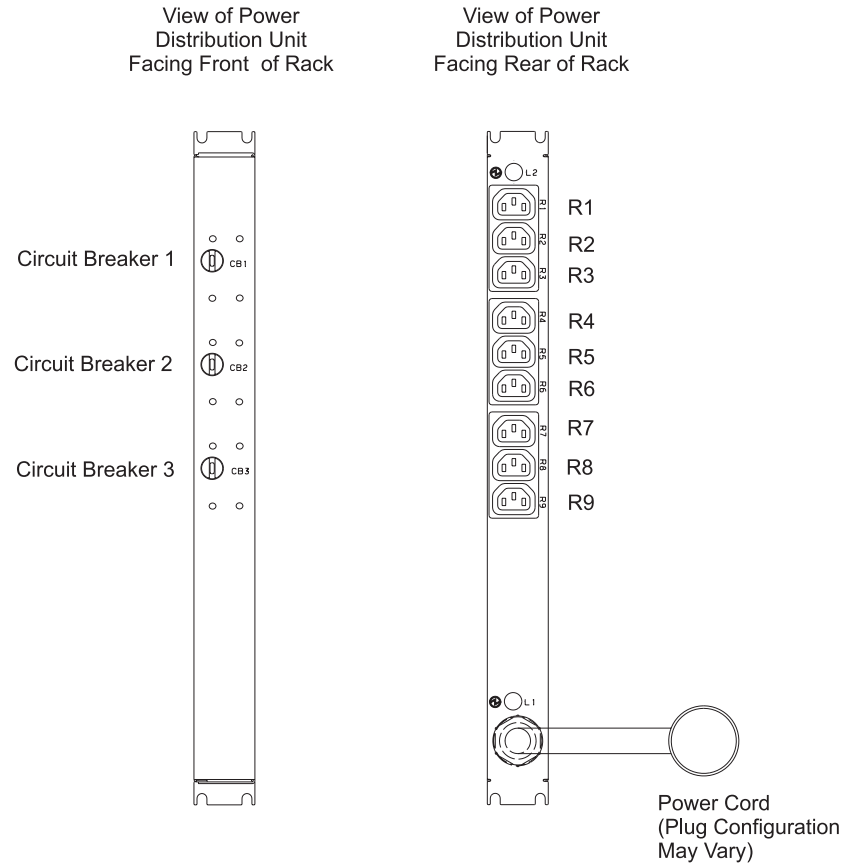
## 9178 or 7178 three-phase wye PDU

Table 622. 9178 or 7178 three-phase wye PDU features

PDU Number	Racks usage	Supported power cords
9178 or 7178 three-phase wye PDU	7014 IBM racks	<ul style="list-style-type: none"> <li>• 6458</li> <li>• 6671</li> <li>• 6672</li> <li>• 400 V ac; 4.3 m (14 ft) (IEC 60309, 5-pin, 16 A; plug type 46)</li> </ul>

The PDUs have nine customer-usable IEC 320-C13 outlets rated at 200-240 V ac. There are three groups of three outlets fed by three circuit breakers. Each outlet is rated up to 10 A, but each group of three outlets is fed from one 15 A circuit breaker. The following IEC 320-C13 to IEC 320-C14 power cords are available to supply from the PDU outlet to the rack-mounted device:

- 6095 - 3.0 m – 4.3 m (10 ft – 14 ft)
- 9911 - 4.3 m (14 ft)



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## 5160 single phase PDU

Table 623. 5160 single phase PDU features

PDU Number	Racks usage	Supported power cords
5160 single phase PDU	0551, 0553, and 0555 IBM racks	<ul style="list-style-type: none"> <li>• 6458</li> <li>• 6671</li> <li>• 6672</li> <li>• 1426</li> <li>• 1427</li> <li>• 1446</li> <li>• 1447</li> <li>• 1448</li> </ul>

## 5161 single phase PDU

Table 624. 5161 single phase PDU features

PDU Number	Racks usage	Supported power cords
5161 single phase PDU	0551, 0553, and 0555 IBM racks	<ul style="list-style-type: none"><li>• 6458</li><li>• 6671</li><li>• 6672</li><li>• 6458</li><li>• 6671</li><li>• 6672</li><li>• 6458</li><li>• 6671</li><li>• 6672</li><li>• 1449</li></ul>

## 5163 three-phase wye PDU

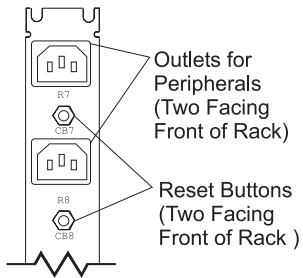
Table 625. 5163 three-phase wye PDU features

PDU Number	Racks usage	Supported power cords
5163 three-phase wye PDU	0551, 0553, and 0555 IBM racks	<ul style="list-style-type: none"><li>• 6458</li><li>• 6671</li><li>• 6672</li><li>• 1477</li></ul>

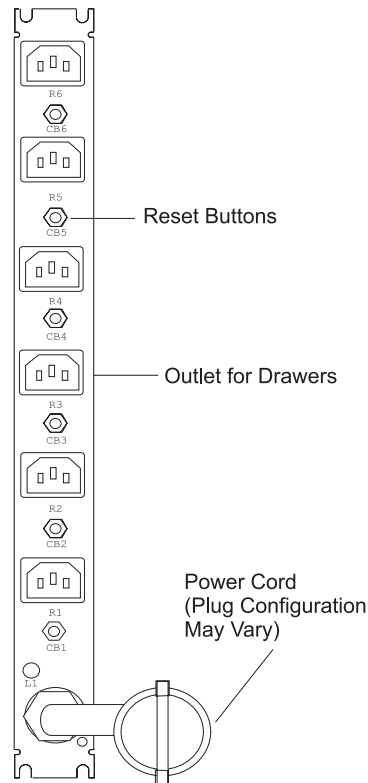
The PDUs have six customer-usable IEC 320-C13 outlets rated at 200-240 V ac. Each outlet is rated 8 A and is protected by a circuit breaker. The following IEC 320-C13 to IEC 320-C14 power cords are available to supply from the PDU outlet to the rack-mounted device:

- 1422 - 3.0 m (10 ft)
- 6458 - 4.3 m (14 ft)
- 6459 - 3.7 m (12 ft)

View of Power Distribution Unit Facing Front of Rack



View of Power Distribution Unit Facing Rear of Rack



IPHAD806-0

## Typical rack and PDU configurations

See 0551, 0553, 7014, and 0555 rack configurations for typical configurations and PDUs when the rack is populated with various server models.

## Power distribution unit plus specifications

The power distribution unit plus (PDU+) has power-monitoring capabilities. The PDU+ is an intelligent ac power distribution unit (PDU+) that monitors the amount of power being used by the devices that are plugged into it. The PDU+ provides twelve C13 power outlets and receives power through a Souriau UTG connector. It can be used in many geographies and for many applications by varying the PDU-to-wall power cord, which must be ordered separately. Each PDU+ requires one PDU-to-wall power cord. When the PDU+ is connected to a dedicated power source, it conforms to UL60950, CSA C22.2-60950, EN-60950, and IEC-60950 standards.

## 5889 PDU+

Table 626. 5889 PDU+ features

PDU Number	Racks usage	Supported power cords
5889 PDU+	7014 IBM racks	<ul style="list-style-type: none"><li>• 6458</li><li>• 6671</li><li>• 6672</li><li>• 6489</li><li>• 6491</li><li>• 6492</li><li>• 6653</li><li>• 6654</li><li>• 6655</li><li>• 6656</li><li>• 6657</li><li>• 6658</li></ul>

Table 627. 5889 PDU+ specifications

PDU number	5889
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)	5.4 kg (11.8 lb)
Operating temperature at 0 - 914 m (0 - 3000 ft) (room ambient)	10 - 32°C (50 - 90°F)
Operating temperature at 914 - 2133 m (3000 - 7000 ft) (room ambient)	10 - 35°C (50 - 95°F)
Operating humidity	8 - 80% (noncondensing)
Localized air temperature in PDU	60 °C (140°F) maximum
Rated frequency (all feature codes)	50 - 60 Hz
Circuit breakers	Six double-pole branch rated circuit breakers rated at 20 A
Power outlet	12 IEC 320-C13 outlets rated at 10 A (VDE) or 15 A (UL/CSA)

## 7189 PDU+

Table 628. 7189 PDU+ features

PDU Number	Racks usage	Supported power cords
7189 PDU+	7014 IBM racks	<ul style="list-style-type: none"><li>• 6489</li><li>• 6491</li><li>• 6492</li><li>• 6653</li></ul>

Table 629. 7189 PDU+ specifications

PDU number	7189
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)	5.4 kg (11.8 lb)
Operating temperature at 0 - 914 m (0 - 3000 ft) (room ambient)	10 - 32°C (50 - 90°F)
Operating temperature at 914 - 2133 m (3000 - 7000 ft) (room ambient)	10 - 35°C (50 - 95°F)
Operating humidity	8 - 80% (noncondensing)
Localized air temperature in PDU	60°C (140°F) maximum
Rated frequency (all feature codes)	50 - 60 Hz
Circuit breakers	Six double-pole branch rated circuit breakers that are rated at 20 A
Power outlet <sup>1</sup>	Six IEC 320-C19 outlets rated at 16 A (VDE) or 20 A (UL/CSA)
<sup>1</sup> FC 7189 also contains 3 C13 connectors that are located in the back of the PDU. These connectors are not accessible when the PDU is installed in a rack.	

## 7196 PDU+

Table 630. 7196 PDU+ features

PDU Number	Racks usage	Supported power cords
7196 PDU+	7014 IBM racks	<ul style="list-style-type: none"> <li>Fixed power cord with IEC 60309, 3P+E, 60 A plug</li> </ul>
	7014-B42,	<ul style="list-style-type: none"> <li>6653</li> <li>6654</li> <li>6655</li> <li>6656</li> <li>6657</li> <li>6658</li> <li>7196</li> </ul>

Table 631. 7196 PDU+ specifications

PDU number	7196
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

Table 631. 7196 PDU+ specifications (continued)

Weight (not including power cord)	6.3 kg (13.8 lb)
Weight of power cord (approximate)	5.4 kg (11.8 lb)
Operating temperature at 0 - 914 m (0 - 3000 ft) (room ambient)	10 - 32°C (50 - 90°F)
Operating temperature at 914 - 2133 m (3000 - 7000 ft) (room ambient)	10 - 35°C (50 - 95°F)
Operating humidity	8 - 80% (noncondensing)
Localized air temperature in PDU	60 °C (140 °F) maximum
Rated frequency (all feature codes)	50 - 60 Hz
Circuit breakers	Six double-pole branch rated circuit breakers that are rated at 20 A
Power outlet <sup>1</sup>	Six IEC 320-C19 outlets rated at 16 A (VDE) or 20 A (UL/CSA)

<sup>1</sup>FC 7196 also contains 3 C13 connectors that are located in the back of the PDU. These connectors are not accessible when the PDU is installed in a rack.

## 7109 PDU+

Table 632. 7109 PDU+ features

PDU Number	Racks usage	Supported power cords
7109 PDU+	0551, 0553, and 0555 IBM racks	<ul style="list-style-type: none"> <li>• 6458</li> <li>• 6671</li> <li>• 6672</li> <li>• 6489</li> <li>• 6491</li> <li>• 6492</li> <li>• 6653</li> <li>• 6654</li> <li>• 6655</li> <li>• 6656</li> <li>• 6657</li> <li>• 6658</li> </ul>

Table 633. 7109 PDU+ specifications

PDU number	7109
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)	5.4 kg (11.8 lb)
Operating temperature at 0 - 914 m (0 - 3000 ft) (room ambient)	10 - 32°C (50 - 90°F)



Table 633. 7109 PDU+ specifications (continued)

Operating temperature at 914 - 2133 m (3000 - 7000 ft) (room ambient)	10 - 35°C (50 - 95°F)
Operating humidity	8 - 80% (noncondensing)
Localized air temperature in PDU	60°C (140°F) maximum
Rated frequency (all feature codes)	50 - 60 Hz
Circuit breakers	Six double-pole branch rated circuit breakers that are rated at 20 A
Power outlet	12 IEC 320-C13 outlets rated at 10 A (VDE) or 15 A (UL/CSA)

**Related reference:**

“Power load calculating for 7188 or 9188 power distribution units” on page 622  
Learn how to calculate the power load for power distribution units.

“0551, 0553, 0555, and 7014 rack configurations” on page 451

The 0551 or 7014-T00 provide a 1.8 meter rack (36 EIA units of total space). The 7014-T42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).



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## Chapter 10. Planning for power

Planning the power for your system requires knowledge of your server's power requirements, the power requirements of compatible hardware, and the uninterruptible power supply needs for your server. Use this information to build a complete power plan.

Before you begin your planning tasks, be sure you have completed the items in the following checklist:

- Know your server power requirements.
- Know your compatible hardware requirements.
- Know your uninterruptible power supply needs.

### Review power considerations

Complete the following checklist:

- Consult a qualified electrician regarding power needs.
- Determine an uninterruptible power supply vendor.
- Complete your server information form or forms.

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### Determining your power requirements

Use these guidelines to ensure that your server has the proper power to operate.

Your server can have power requirements different from a PC (such as, different voltage and different plugs). IBM supplies power cords with an attached plug that corresponds to the power outlet most commonly used in the country or region to which the product is being shipped. You are responsible for supplying the proper power outlets.

- Plan for system electrical service. For information on power requirements for a specific model, refer to the electrical section in the server specifications for that particular server. For information on power requirements for expansion units or peripherals, select the appropriate device from the list of compatible hardware specifications. For equipment not listed, check your equipment documentation (owner's manuals) for specifications.
- Determine your server's *plug and receptacle types: By model* so you can have the proper outlets installed.

**Tip:** Print a copy of your plug and receptacle table and give it to your electrician. The table contains information needed for installing outlets.

- Write down power information in your *Server Information Form 3A*. Include:
  - Plug type
  - Input voltage
  - Power cord length (optional)
- Plan for power outages. Consider purchasing an uninterruptible power supply to protect your system against power fluctuations and outages. If your company owns a uninterruptible power supply, involve your uninterruptible power supply vendor with any type of uninterruptible power supply modification.
- Plan an emergency power-off switch. As a safety precaution, you should provide some method for disconnecting power to all equipment in your server area. Put emergency power-off switches in locations readily accessible to your systems operator and at designated exits from the room.
- Ground your system. Electrical grounding is important both for safety and correct operation. Your electrician should follow your national and local electrical codes when installing the electrical wiring, outlets, and power panels. These codes take precedence over any other recommendations.



## Workstation Information Form 3B

Use this form to record the type and quantity of cables you need for your server.

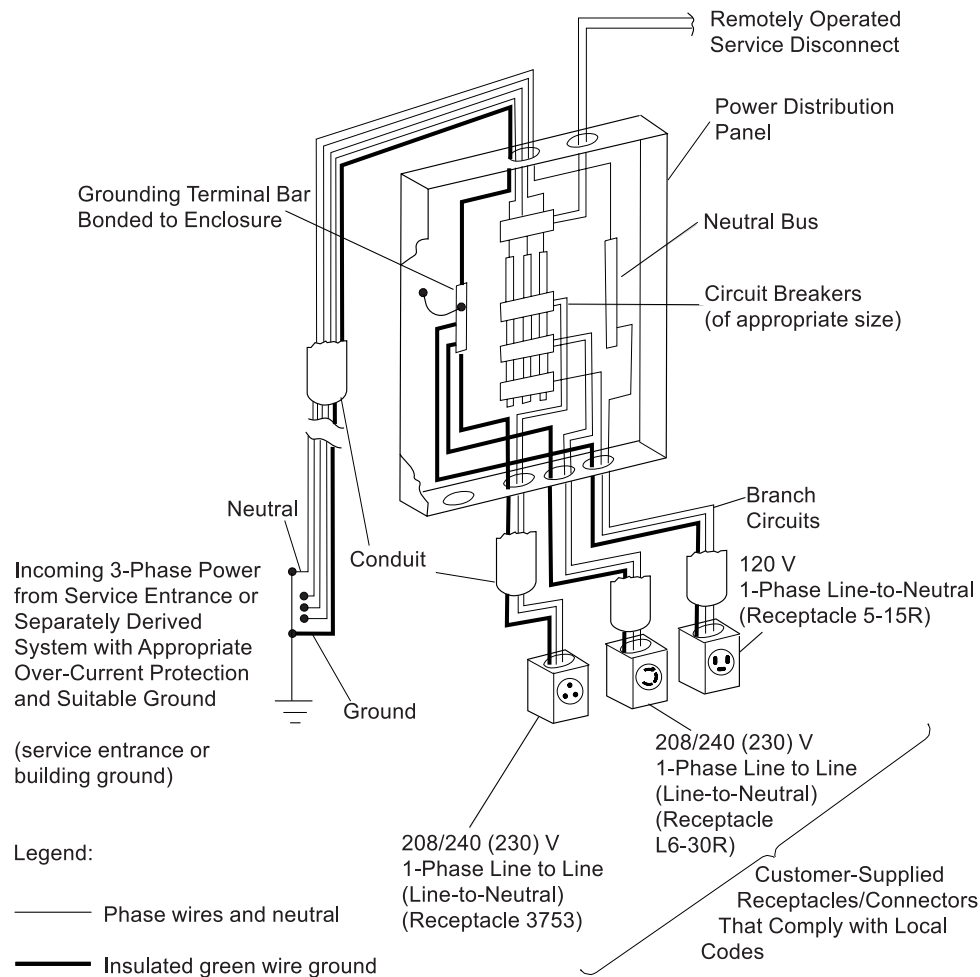
Part number	Device type	Device description	Device location	Cable length	Plug type/Input voltage	Telephone contact
Licensed Programs						

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### Determining power cord, plug, and receptacle type

To determine what power cord, plug, and receptacle type your server or system requires, you need to know the country or region in which your server or system will reside, your server or system model, and the voltage and amperage of your power supply.

The server or system and all of the expansion units and attached equipment will require an isolated power supply. This means, it must have its own circuit. Use an uninterruptible power supply to help protect both the server and its data.



**Note:** 1. The receptacles must match the plug types ordered on your data processing equipment.  
2. For loads requiring a neutral, attach computer/data processing equipment only.

RV2C031-3

Figure 253. Typical power distribution system that is grounded properly

## Plugs and receptacles: By country or region

Choose the country or region in which your system will be installed to see the plugs and receptacles used.

- Abu Dhabi
- Afghanistan
- Albania
- Algeria
- Andorra
- Angola
- Anguilla
- Argentina

- Armenia
- Aruba
- Australia
- Austria
- Azores
- Bahamas
- Bahrain
- Bangladesh
- Barbados
- Belarus
- Belgium
- Belize
- Benin
- Bermuda
- Bolivia
- Bonaire
- Bosnia
- Botswana
- Brazil
- Brunei
- Bulgaria
- Burkina Faso
- Burundi
- Caicos Islands
- Cambodia
- Cameroon
- Canada
- Canary Islands
- Cape Verde Islands
- Cayman Islands
- Central African Republic
- Chad
- Chile
- China
- Colombia
- Congo
- Costa Rica
- Croatia
- Curacao
- Cyprus
- Czech Republic
- Dahomey
- Denmark
- Djibouti
- Dominica

- Dominican Republic
- Ecuador
- Egypt
- El Salvador
- Equatorial Guinea
- Eritrea
- Estonia
- Ethiopia
- Faero Islands
- Fiji
- Finland
- France
- French Guiana
- French Polynesia
- Gabon
- Gambia
- Georgia
- Germany
- Ghana
- Greece
- Greenland
- Grenada
- Grenadines
- Guadeloupe
- Guam
- Guatemala
- Guinea
- Guinea-Bissau
- Haiti
- Honduras
- Hong Kong S.A.R. of the PRC
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Israel
- Italy
- Ivory Coast
- Jamaica
- Japan
- Jordan
- Kazakhstan



- Kenya
- Kirghizia
- Kuwait
- Laos
- Latvia
- Lebanon
- Lesotho
- Liberia
- Libya
- Liechtenstein
- Lithuania
- Luxembourg
- Macao S.A.R. of the PRC
- Macedonia
- Malagasy Republic
- Malawi
- Malaysia
- Mali
- Malta
- Martinique
- Mauritania
- Mexico
- Moldavia
- Mongolia
- Monaco
- Montserrat
- Morocco
- Mozambique
- Myanmar
- Namibia
- Nepal
- Netherlands
- Netherlands Antilles
- Nevis
- New Caledonia
- New Zealand
- Nicaragua
- Niger
- Nigeria
- North Korea
- Norway
- Oman
- Pakistan
- Panama
- Papua New Guinea

- Paraguay
- People's Republic of China
- Peru
- Philippines
- Poland
- Portugal
- Principe
- Puerto Rico
- Qatar
- Reunion
- Romania
- Russia
- Rwanda
- Sabah
- Samoa, Western
- Sao Tome Island
- Saudi Arabia
- Senegal
- Serbia
- Seychelles
- Sierra Leone
- Singapore
- Slovakia
- Slovenia
- Somalia
- South Africa
- South Korea
- Spain
- Sri Lanka
- St. Kitts
- St. Lucia
- St. Martin
- St. Vincent
- Sudan
- Suriname
- Swaziland
- Sweden
- Switzerland
- Syria
- Tahiti
- Taiwan
- Tanzania
- Thailand
- Tobago
- Togo

- Tortola (BVI)
- Trinidad
- Tunisia
- Turkey
- Turks Islands
- Uganda
- Ukraine
- United Arab Emirates
- United Kingdom
- United States
- Uruguay
- Uzbekistan
- Venezuela
- Vietnam
- Virgin Islands
- Western Samoa
- Yemen
- Zaire
- Zambia
- Zimbabwe

**Plug and receptacle types: 2 , 12**

Use the Plugs and receptacles types table to determine the plugs and receptacles available for your country or region.

Table 634. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
200V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, and 9406-825</li> <li>• Expansion units 5075, 5077, 5095, 7104 and 7116</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 2
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12
<b>Countries or regions</b>		
Paraguay, Uruguay		

**Plug and receptacle types: 12, 18**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 635. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104, 7316, 9316</li> <li>• 9406-8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 18
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12
<b>Countries or regions</b>		
Afghanistan, Cape Verde Islands, Indonesia, Paraguay, Suriname, Uruguay		

### Plug and receptacle types: 12, 22

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 636. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 9406-8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 22
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12
<b>Countries or regions</b>		
Bangladesh, Sri Lanka		

**Plug and receptacle types: 23, 12**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 637. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 13A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 9406-8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 23
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12
<b>Countries or regions</b>		
Brunei, Hong Kong S.A.R. of the PRC, Malaysia (Plug Type 23), Myanmar		

**Plug and receptacle types: 18, 46 (P+N+E) [32A]**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 638. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Model 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 18
250V 32A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 rack</li> </ul>	Type 46 (P+N+E) [32A]
<b>Countries or regions</b>		
<p>Albania, Algeria, Andorra, Angola, Armenia, Austria, Azores, Belarus, Belgium, Benin, Bosnia, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Congo, Croatia, Dahomey, Djibouti, Egypt, Equatorial Guinea, Ethiopia, Faero Islands, France, French Guiana, French Polynesia, Gabon, Georgia, Germany, Greece, Greenland, Guadeloupe, Guinea, Guinea-Bissau, Hungary, Iceland, Iran, Ivory Coast, Kazakhstan, Kirghizia, Laos, Lebanon, Luxembourg, Macau S.A.R. of the PRC, Macedonia, Malagasy Republic, Mali, Martinique, Mauritania, Moldavia, Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Principe, Reunion, Romania, Rwanda, Sao Tome Island, Senegal, Serbia, Slovakia, Slovenia, Somalia, Spain, Syria, Tahiti, Togo, Tunisia, Ukraine, Uzbekistan, Vietnam, Zaire, Zimbabwe</p>		

**Plug and receptacle types: 18, 46 (3P+N+E)**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.



Table 639. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5095, 7116, 7104</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• Model 9406-250, 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> <li>• 9409-M50</li> </ul>	Type 18
250V 16A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 46 (3P+N+E)
<b>Countries or regions</b>		
Czech Republic, Estonia, Ethiopia, Finland, Lithuania, Russia, Sweden, Turkey		

**Plug and receptacle types: 22, 46 (P+N+E) [32A]**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 640. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 9406-8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 22 f2346
250V 32A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 Racks</li> </ul>	Type 46 (P+N+E) [32A]
<b>Countries or regions</b>		
Swaziland, Uganda		

**Plug and receptacle types: 23, 46 (P+N+E) [32A]**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 641. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 13A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251 base I/O expansion unit</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Model 9406-250, 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 23
250V 32A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 46 (P+N+E) [32A]
<b>Countries or regions</b>		
Abu Dhabi, Bahrain, Botswana, Cyprus, Dominica, Gambia, Ghana, Grenada, Grenadines, Guyana, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Lesotho, Liberia, Malawi, Malaysia, Malta, Namibia, Nepal, Nigeria, Oman, Qatar, Sabah, Saudi Arabia, Seychelles, Sierra Leone, Singapore, St. Lucia, St. Vincent, Sudan, Tanzania, United Arab Emirates, United Kingdom, Zambia		

**Plug and receptacle types: 24, 46 (P+N+E) [16A], 46 (3P+N+E)**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 642. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5075, 5077, 508x, 5095, 7116, 7104</li> <li>• 9251 base I/O expansion unit</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 24
250V 16A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-720, 9406-830, SB2</li> <li>• Expansion unit 5074, 5079, 5094</li> <li>• 8xxx base I/O Rack</li> <li>• 9074 and 9094 base I/O enclosure</li> </ul>	Type 46 (P+N+E) [16A]
250V 16A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, SB1</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 055 racks</li> </ul>	Type 46 (3P+N+E)
<b>Countries or regions</b>		
Liechtenstein, Switzerland		

**Plug and receptacle types: 25, 46 (P+N+E) [32A]**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 643. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-720, 9406-820, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 25
250V 32A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 46 (P+N+E) [32A]
<b>Countries or regions</b>		
Chile, Eritrea, Italy, Libya		

### Plug and receptacle types: 4, 10, 12

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 644. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
125V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 4
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-570, and 9117-570</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5077, 5075, 5074, 5079, 5094, 5095, 508x, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251 base I/O expansion unit</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2, 9074, 9079</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9111-285, 9131-52A, 9133-55A</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> </ul>	Type 10
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12

Table 644. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
<b>Countries or regions</b>		
Colombia, Mexico		

### Plug and receptacle types: 4, 5, 12

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 645. Plug and receptacle types

Voltage and amperage	Models	Plug receptacle type
125V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570, and OpenPower 720</li> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 4

Table 645. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug receptacle type
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, and OpenPower 720</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5074, 5075, 5077, 5079, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• 9251 base I/O expansion unit</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2, 9074, 9079</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 5
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> <li>• OpenPower 720</li> </ul>	Type 12
<b>Countries or regions</b>		
<p>Anguilla, Antigua, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Bonaire, Caicos Islands, Cayman Islands, Costa Rica, Curacao, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Nevis, Nicaragua, Panama, Philippines, Puerto Rico, St. Kitts, St. Martin, Taiwan, Tobago, Tortola (BVI), Trinidad, Turks Islands, Venezuela, Virgin Islands, Yemen</p>		

**Plug and receptacle types: 2, 12**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.



Table 646. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
200V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, and 9406-825</li> <li>• Expansion units 5075, 5077, 5095, 7104 and 7116</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 2
250V 30A	<ul style="list-style-type: none"> <li>• 53x Processor Side</li> <li>• Model SB1</li> <li>• Models 9406-730, 740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551</li> </ul>	Type 12
<b>Countries or regions</b>		
Argentina		

**Plug and receptacle types: 6, 54, PDL**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 647. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 507x, 508x, 5095, 7116, 7104</li> <li>• 9251 base I/O expansion unit</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 6
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-720</li> <li>• Expansion unit 5065, 5066, 5079(x2), 5074, 5094</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-830, SB2</li> </ul>	Type 54
250V 32A	<ul style="list-style-type: none"> <li>• Models 9406-730, 740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type PDL
<b>Countries or regions</b>		
Australia, Fiji, New Zealand, Papua New Guinea		

**Plug and receptacle types: 46 (P+N+E) [32A], 70, 73**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 648. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 25A	<ul style="list-style-type: none"> <li>• 0550 and 0551 racks</li> <li>• Models 9406-840, SB3</li> </ul>	Type 46 (P+N+E) [32A]

Table 648. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
100V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-800, 9406-810, and 9406-820</li> <li>• Expansion units 5075, 5077, 5095, 7104, 7116</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 70
200-240 V 10A	<ul style="list-style-type: none"> <li>• 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9406-500, 9406-510, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251</li> <li>• 7314-G30, 5796</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 73
250V 60A 415V 30A	<ul style="list-style-type: none"> <li>• Models 9406-870, 9406-890</li> </ul>	No plug, shipped without cord
<b>Countries or regions</b>		
Brazil		

**Plug and receptacle types: 4, 7, 51, 5, 10, 34, 40, 12**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 649. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
125V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 4
125V 15A Locking	<ul style="list-style-type: none"> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> </ul>	Type 7
125V 13A/15A Water Resistant	<ul style="list-style-type: none"> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> </ul>	Type 51

Table 649. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570, and OpenPower 720</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5074, 5075, 5077, 5079, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• 9251 base I/O expansion unit</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2, 9074, 9079</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 5

Table 649. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
250V 15A Locking	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570 9117-570, and OpenPower 720</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9111-285, 9131-52A, 9133-55A</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> </ul>	Type 10
250V 10A/15A Water Resistant	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9131-52A, 9133-55A</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> </ul>	Type 34
250V 30A Water Resistant	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 40
250V 30A Locking	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12
<b>Countries or regions</b>		
Canada		

## Plug and receptacle types: 18, 46 (P+N+E) [32A]

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 650. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7104, 7116,</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074, 9094 base I/O enclosure</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 18
250V 25A	<ul style="list-style-type: none"> <li>• 0550 and 0551 racks</li> <li>• Models 8234-EMA, 9406-840 SB3</li> </ul>	Type 46 (P+N+E) [32A]
250V 60A 415V 30A	<ul style="list-style-type: none"> <li>• Models 9406-870, 9406-890</li> </ul>	No plug, shipped without cord
<b>Countries or regions</b>		
Canary Islands		

## Plug and receptacle types: 25, 12

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 651. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Model 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 25
250V 30A	<ul style="list-style-type: none"> <li>• 53x Processor Side</li> <li>• Model SB1</li> <li>• Models 9406-730, 740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551</li> </ul>	Type 12
<b>Countries or regions</b>		
Chile		

**Plug and receptacle types: 62, 12, 72**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 652. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12



Table 652. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
250V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• Expansion units 507x, 508x, 5095, 7116, 7104</li> <li>• 9251 base I/O expansion unit</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 62
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-720</li> <li>• Expansion unit 5065, 5066, 5079(x2), 5074, 5094</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-830, SB2</li> </ul>	Type 72
<b>Countries or regions</b>		
People's Republic of China		

**Plug and receptacle types: 19, 46 (3P+N+E), 46 (P+N+E) [16A]**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 653. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• Expansion units 507x, 508x, 5095, 7116, 7104</li> <li>• 9251 base I/O expansion unit</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 19
250V 16A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-720, 9406-830, SB2</li> <li>• Expansion I/O units 5074, 5079, 5094</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> </ul>	Type 46 (P+N+E) [16A]
250V 16A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 46 (3P+N+E)
<b>Countries or regions</b>		
Denmark		

**Plug and receptacle types: 32, 46 (P+N+E) [32A], 46 (3P+N+E)**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 654. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-720, 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 32
250V 16A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 46 (3P+N+E)
<b>Countries or regions</b>		
Israel		

**Plug and receptacle types: 34, 10, 12, 57, 59**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 655. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 10A/15A Water Resistant	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• Model 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9131-52A, 9133-55A</li> <li>• 9406-525</li> <li>• 9407-515</li> </ul>	Type 34
250V 20A Locking	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, and OpenPower 720</li> <li>• Model 9406-720</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5074, 5075, 5077, 5079, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• 9251 base I/O expansion unit</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2, 9074, 9079</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9111-285, 9131-52A, 9133-55A</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> </ul>	Type 10
250V 30A Locking	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12

Table 655. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
200 - 240 V 12 A	<ul style="list-style-type: none"> <li>• OpenPower 710, 9110-510, OpenPower 720, 5786, 5787, 7031-D24, 9111-520, 9113-550, 9117-570, 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 57
250V 15A	<ul style="list-style-type: none"> <li>• Expansion units 5070, 5072, 5080, 5082</li> <li>• OpenPower 710, 9110-510, OpenPower 720, 5786, 5787, 7031-D24, 7031-T24, 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 59
<b>Countries or regions</b>		
Japan		

**Plug and receptacle types: 66, KP**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 656. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
200-240 V 10 A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570 and expansion units used with IBM System i5 and System p5 , 5786, 5787, 7031-D24, 7031-T24, 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7311-D11</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 66
250V 32A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type KP
<b>Countries or regions</b>		
North Korea, South Korea		

**Plug and receptacle types: 18, 46 (3P+N+E)**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 657. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• 9406-520,</li> <li>• 9111-520</li> <li>• 9406-550,</li> <li>• 9113-550</li> <li>• 9406-570</li> <li>• 9117-570</li> <li>• 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7104, 7116,</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• 9406-270</li> <li>• 9406-800</li> <li>• 9406-810</li> <li>• 9406-820</li> <li>• 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 18
250V 16A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 46 (3P+N+E)
<b>Countries or regions</b>		
Latvia		

**Plug and receptacle types: 22, 46 (P+N+E) [32A]**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 658. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 22
250V 32A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 rack</li> </ul>	Type 46 (P+N+E) [32A]
<b>Countries or regions</b>		
Pakistan		

**Plug and receptacle types: 4, 5, 12**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.



Table 659. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
125V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570 9117-570, and OpenPower 720</li> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 4

Table 659. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-5709117-570, and OpenPower 720</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5074, 5075, 5077, 5079, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• 9251 base I/O expansion unit</li> <li>• Models 9406-270, 9406-720, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2, 9074, 9079</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7314-G30, 5796</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 5
250V 30A Locking	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12
<b>Countries or regions</b>		
Peru		

**Plug and receptacle types: 22, 46 (3+N+E)**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 660. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 16A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Model 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 22
250V 32 A	<ul style="list-style-type: none"> <li>• Models 8234-EMA, 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 46 (P+N+E)
<b>Countries or regions</b>		
South Africa		

**Plug and receptacle types: 5, 12**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 661. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, and OpenPower 720</li> <li>• Model 9406-720</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5074, 5075, 5077, 5079, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• 9251 base I/O expansion unit</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2, 9074, 9079</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 5
250V 30A	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740</li> <li>• Models 9406-840 SB3</li> <li>• 0550 and 0551 racks</li> <li>• OpenPower 720</li> </ul>	Type 12
<b>Countries or regions</b>		
Thailand		

**Plug and receptacle types: 4, 7, 51, 5, 10, 34, 40, 12**

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 662. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
125V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550</li> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> <li>• Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 4
125V 15A Locking	<ul style="list-style-type: none"> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> <li>• Models 9406-270, 9406-800, 9406-820, 9406-825</li> </ul>	Type 7
125V 13A/15A Water Resistant	<ul style="list-style-type: none"> <li>• Expansion units 5070, 5072, 5075, 5077, 5080, 5082, 5095, 7104, 7116</li> </ul>	Type 51

Table 662. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
250V 15A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, and OpenPower 720</li> <li>• Model 9406-720</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5074, 5075, 5077, 5079, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> <li>• 9251 base I/O expansion unit</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2, 9074, 9079</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> <li>• 8204-E8A</li> <li>• 5886</li> <li>• 7214-1U2</li> <li>• 8203-E4A</li> <li>• 9407-M15</li> <li>• 9408-M25</li> <li>• 9409-M50</li> </ul>	Type 5

Table 662. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
250V 15A Locking	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, and OpenPower 720</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• Model 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9111-285, 9131-52A, 9133-55A</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> </ul>	Type 10
250V 10A/15A Water Resistant	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 9406-830, SB2</li> <li>• Model 9406-720</li> <li>• Expansion units 507x, 508x, 5094, 5095, 7116, 7104</li> <li>• 8xxx base I/O Rack</li> <li>• 9251 base I/O expansion unit</li> <li>• 9074 and 9094 base I/O enclosure</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9131-52A, 9133-55A</li> <li>• 5096</li> <li>• 5296</li> <li>• 9406-525</li> <li>• 9407-515</li> </ul>	Type 34
250V 30A Water Resistant	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 40
250V 30A Locking	<ul style="list-style-type: none"> <li>• Models 9406-730, 9406-740, 9406-840, SB3</li> <li>• 0550 and 0551 racks</li> </ul>	Type 12

Table 662. Plug and receptacle types (continued)

Voltage and amperage	Models	Plug and receptacle type
<b>Countries or regions</b>		
United States		

### Plug and receptacle types: 6, 54, 46 (P+N+E) [32A]

Use the Plugs and receptacles table to determine the plugs and receptacles available for your country or region.

Table 663. Plug and receptacle types

Voltage and amperage	Models	Plug and receptacle type
250V 10A	<ul style="list-style-type: none"> <li>• Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570</li> <li>• 53x I/O Side</li> <li>• Expansion units 5070, 5071, 5072, 5073, 5075, 5077, 508x, 5095, 5094</li> <li>• 9251 base I/O expansion unit</li> <li>• 5786, 5787, 7031-D24, 7031-T24</li> <li>• 9115-505, 9111-285, 9131-52A, 9133-55A</li> <li>• 7037-A50</li> <li>• 7047-185</li> <li>• 9116-561</li> <li>• 7314-G30, 5796</li> <li>• 9406-525</li> <li>• 9407-515</li> <li>• 9117-MMA</li> <li>• 9406-MMA</li> </ul>	Type 6
250V 15A	<ul style="list-style-type: none"> <li>• Model SB2</li> <li>• Model 9406-720</li> <li>• Expansion unit 5033, 5034, 5035, 5065, 5066</li> <li>• 9251, 9079 base I/O expansion unit</li> <li>• 9074 base I/O enclosure</li> </ul>	Type 54
250V 32A	<ul style="list-style-type: none"> <li>• 53x Processor Side</li> <li>• Models SB1</li> <li>• Models 9406-730, 9406-740</li> </ul>	Type 46 (P+N+E) [32A]
<b>Countries or regions</b>		
Western Samoa		

### Plug type 12 countries or regions

Listed are countries or regions that use plug type 12.

Afghanistan, Anguilla, Antigua, Argentina, Aruba, Bahamas, Bangladesh, Barbados, Belize, Bermuda, Bolivia, Bonaire, Brunei, Caicos Islands, Canada, Cape Verde Islands, Cayman Islands, Chile, Colombia, Costa Rica, Curacao, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Hong Kong S.A.R. of the PRC, Indonesia, Jamaica, Japan, Mexico, Montserrat, Myanmar, Netherlands



Antilles, Nicaragua, Panama, Paraguay, People's Republic of China, Peru, Philippines, Puerto Rico, Sri Lanka, St. Kitts, St. Martin, Suriname, Taiwan, Thailand, Tobago, Tortola (BVI), Trinidad, Turks Island, United States, Uruguay, Venezuela, Virgin Islands

### Plug type 18 countries or regions

Listed are countries or regions that use plug type 18.

Afghanistan, Albania, Algeria, Andorra, Armenia, Austria, Azores, Belarus, Belgium, Benin, Bosnia, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canary Islands, Cape Verde Islands, Central African Republic, Chad, Congo, Croatia, Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Estonia, Faero Islands, Finland, France, French Polynesia, French Guyana, Gabon, Georgia, Germany, Greece, Greenland, Guadeloupe, Guinea, Guinea-Bissau, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Kazakhstan, Kirghizia, Laos, Latvia, Lebanon, Liberia, Lithuania, Luxembourg, Macau S.A.R. of the PRC, Macedonia, Malagasy Republic, Mali, Martinique, Mauritania, Moldavia, Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, North Korea, Norway, Peru, Poland, Portugal, Principe, Reunion, Romania, Russia, Rwanda, Sao Tome Island, Saudi Arabia, Senegal, Serbia, Slovenia, Slovakia, South Korea, Spain, Sudan, Suriname, Swaziland, Sweden, Syria, Tahiti, Togo, Tunisia, Turkey, Ukraine, Uzbekistan, Vietnam, Zaire, Zimbabwe

### Plug type 46 (P+N+E) [32A] countries or regions

Listed are countries or regions that use plug type 46.

Abu Dhabi, Albania, Algeria, Andorra, Angola, Armenia, Azores, Bahrain, Belarus, Belgium, Benin, Bosnia, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canary Islands, Central African Republic, Chad, Congo, Croatia, Cyprus, Dahomey, Djibouti, Dominica, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Faero Islands, France, French Guyana, French Polynesia, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Greenland, Grenada, Grenadines, Guadeloupe, Guinea, Guinea-Bissau, Guyana, Hungary, Iceland, India, Iran, Iraq, Ireland, Italy, Ivory Coast, Jordan, Kazakhstan, Kenya, Kirghizia, Kuwait, Laos, Lesotho, Lebanon, Liberia, Libya, Luxembourg, Macedonia, Malagasy Republic, Macau S.A.R. of the PRC, Malawi, Mali, Malta, Martinique, Mauritania, Moldavia, Mongolia, Monaco, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Caledonia, Niger, Nigeria, Norway, Oman, Pakistan, Poland, Principe, Qatar, Reunion, Romania, Rwanda, Sabah, Sao Tome Island, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Somalia, Spain, St. Lucia, St. Vincent, Sudan, Swaziland, Syria, Tahiti, Tanzania, Togo, Tunisia, Uganda, Ukraine, United Arab Emirates, United Kingdom, Uzbekistan, Vietnam, Western Samoa, Zaire, Zambia, Zimbabwe

### Plug type 46 (P+N+E) [16A] countries or regions

Listed are countries or regions that use plug type 46.

Denmark, Liechtenstein, Switzerland

(J) Only: Abu Dhabi, Bahrain, Botswana, Brazil, Brunei, , Cyprus, Dominica, Gambia, Ghana, Grenada, Grenadines, Guyana, Hong Kong S.A.R. of the PRC, India, Iraq, Ireland, Jordan, Kenya, Kuwait, Lesotho, Malawi, Malaysia, Malta, Namibia, Nepal, Nigeria, Oman, Qatar, Sabah, Seychelles, Sierra Leone, Singapore, St. Lucia, St. Vincent, Tanzania, Uganda, United Arab Emirates, United Kingdom, Zambia

### Plug and receptacle type 12 part numbers

Use the Plug type 12 part numbers table to determine the part number, countries or regions, and systems that use plug type 12.

Table 664. Plug type 12 part numbers

Part Number	Accommodating Countries or regions
11F0114 (6 ft) (C) (F) (G)	Anguilla, Antigua, Canada, Cape Verde Islands, Cayman Islands, Honduras, Montserrat, St. Kitts & Nevis, Tortola (BVI), United States
11F0113 (14 ft) (C) (F) (G) (H)	

Table 664. Plug type 12 part numbers (continued)

Part Number	Accommodating Countries or regions
11F0115 (14 ft) (C) (F) (H) 11F0113 (14 ft) (G) (H)	Afghanistan, Argentina, Aruba, Bahamas, Bangladesh, Barbados, Belize, Bermuda, Bolivia, Bonaire, Brunei, Caicos Islands, Chile, Colombia, Costa Rica, Curacao, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Hong Kong S.A.R. of the PRC, Indonesia, Japan, Jamaica, Mexico, Myanmar, Netherland Antilles, Nicaragua, Panama, Paraguay, People's Republic of China, Peru, Philippines, Sri Lanka, St. Martin, Suriname, Taiwan, Thailand, Trinidad/Tobago, Turks Island, Uruguay, Venezuela
<b>Systems and expansion units</b>	
(C) - Model 53x Processor Side	
(F) - Models 9406-730, 9406-740, SB1	
(G) - Models 9406-840 SB3	
(H) - 9309 rack	

## Plug and receptacle types: By model

Select your model to find its plug and receptacle type and power cord features.

### Plug and receptacle types: Model 7037-A50 and 7047-185

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 665. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
100-127 V, 10 A	Type 75
100-127 V, 15 A	Type 4, Type 70
100-127 V, 12 A	Type 59
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 26, Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57

To determine the plug and receptacle type your model will need, follow these steps:

1. In the preceding table, find the **Voltage and Amperage** of your power supply.  
The **Plug and receptacle type** that is listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug is displayed in your row:

1. Click one of the plug and receptacle types.

2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will be located) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your sales representative.

### Plug and receptacle types: Model 5886

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 666. Plug and receptacle types by voltage and amperage*

Voltage and amperage	Plug and receptacle type
100 - 127 V, 10 A	Type 70, Type 75
100 - 127 V, 12 A	Type 59
100 - 127 V, 15 A	Type 4
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57
100-240 V, 10 A	Type 26

To determine the plug and receptacle type your model will need, follow these steps:

1. In the preceding table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug is displayed in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will be located) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 6458

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 667. Plug and receptacle types by voltage and amperage*

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 26

To determine the plug and receptacle type your model will need, follow these steps:

1. In the preceding table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug is displayed in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will be located) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 7214-1U2

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 668. Plug and receptacle types by voltage and amperage*

Voltage and amperage	Plug and receptacle type
100 - 127 V, 10 A	Type 70, Type 75
100 - 127 V, 12 A	Type 59
100 - 127 V, 15 A	Type 4
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57
100-240 V, 10 A	Type 26

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 7311-D10, 7311-D11, 5790

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 669. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57
100-240 V, 10 A	Type 26

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.

The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.

2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.

The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 7311-D20

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 670. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57, Type 10
100-240 V, 10 A	Type 26
100-127 V, 10 A	Type 70, Type 75
100-127 V, 10 A	Type 4, Type 59

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 7314-G30, 5796

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 671. Plug and receptacle types by voltage and amperage*

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57, Type 10, Type 34 (5796 only)
100-240 V, 10 A	Type 26

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 8204-E8A and 9409-M50

Use the Plug and receptacle types by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 672. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
100 - 127 V, 10 A	Type 70, Type 75
100 - 127 V, 12 A	Type 59
100 - 127 V, 15 A	Type 4
100 - 240 V, 10 A	Type 2
100 - 240 V, 12 A	Type 57
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 32, Type 62
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 8234-EMA

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 673. Plug and receptacle type by voltage and amperage

Voltage and amperage	Plug and receptacle type
100 - 127 V, 15 A	<ul style="list-style-type: none"> <li>• 4</li> <li>• 70</li> <li>• 75</li> </ul>
200 - 240 V, 10 A	<ul style="list-style-type: none"> <li>• 2</li> <li>• 66</li> <li>• 68</li> <li>• 69</li> </ul>
200 - 240 V, 12 A	<ul style="list-style-type: none"> <li>• 57</li> <li>• 76</li> </ul>

Table 673. Plug and receptacle type by voltage and amperage (continued)

Voltage and amperage	Plug and receptacle type
250 V, 10 A	<ul style="list-style-type: none"> <li>• 6</li> <li>• 24</li> <li>• 25</li> <li>• 26</li> <li>• 32</li> <li>• 62</li> </ul>
250 V, 13 A	<ul style="list-style-type: none"> <li>• 23</li> </ul>
250 V, 15 A	<ul style="list-style-type: none"> <li>• 5</li> </ul>
250 V, 16 A	<ul style="list-style-type: none"> <li>• 22</li> <li>• 25</li> <li>• 46 (3P+N+E)</li> </ul>
250 V, 30 A	<ul style="list-style-type: none"> <li>• KP</li> </ul>
250 V, 32 A	<ul style="list-style-type: none"> <li>• 40</li> <li>• 46 (P+N+E) [32 A]</li> </ul>
	<ul style="list-style-type: none"> <li>• 12</li> <li>• 18</li> <li>• 19</li> </ul>

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Models 8203-E4A, 9407-M15, 9408-M25

Use the Plug and receptacle types by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 674. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
100 - 127 V, 10 A	Type 70, Type 75
100 - 127 V, 12 A	Type 59
100 - 127 V, 15 A	Type 4



Table 674. Plug and receptacle types by voltage and amperage (continued)

Voltage and amperage	Plug and receptacle type
100 - 240 V, 10 A	Type 2
100 - 240 V, 12 A	Type 57
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 32, Type 62
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9110-510 and OpenPower 710

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 675. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
100-127 V, 15 A	Type 4, Type 70
100-127 V, 12 A	Type 59
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73

To determine the plug and receptacle type your model will need, follow these steps:

1. In the preceding table, find the **Voltage and Amperage** of your power supply.  
The **Plug and receptacle type** that is listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.

The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your sales representative.

### Plug and receptacle types: Model 9115-505

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 676. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
100-127 V, 15 A	Type 4, Type 70
100-127 V, 10 A	Type 75
100-127 V, 12 A	Type 59
100-240 V, 10 A	Type 26
250 V, 15 A	Type 5
250 V, 16 A	Type 18, Type 22, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.

The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9119-FHA

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

For a detailed description of the plug and receptacles see 9119-FHA power cord features.

### Plug and receptacle types: Model 9125-F2A

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

For a detailed description of the plug and receptacles see *Power cord information* in Breaker rating and cord information.

### Plug and receptacle types: Model 9406-520, 9111-520, 9406-550, 9113-550, and OpenPower 720, 9111-285, 9131-52A, 9133-55A, 9406-525, 9407-515

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 677. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 34, Type 62
100-127 V, 15 A	Type 4, Type 70
250 V, 15 A	Type 5, Type 10, Type 34, Type 73
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and Amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9116-561

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 678. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
250 V, 15 A	Type 5, Type 10
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 26, Type 66, Type 69, Type 73, Type 76
200-240 V, 12 A	Type 57

To determine the plug and receptacle type your model will need, follow these steps:

1. In the preceding table, find the **Voltage and Amperage** of your power supply.  
The **Plug and receptacle type** that is listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your sales representative.

### Plug and receptacle types: Model 9406-570 and 9117-570

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 679. Plug and receptacle types by voltage and amperage*

Voltage and amperage	Plug and receptacle type
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 34, Type 62
250 V, 15 A	Type 5, Type 10, Type 34, Type 64
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9117-MMA and 9406-MMA

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 680. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
100 - 240 V, 10 A	Type 26
250 V, 10 A	Type 2, Type 6, Type 19, Type 24, Type 25, Type 32, Type 62
250 V, 15 A	Type 5, Type 10
250 V, 16 A	Type 18, Type 22, Type 25, Type 32
250 V, 13 A	Type 23
200-240 V, 10 A	Type 66, Type 69
200-240 V, 12 A	Type 57

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9118-575

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

For a detailed description of the plug and receptacles used with the Model 9118-575, see 9118-575 power cord features.

### Plug and receptacle types: Model 9119-590, 9119-595, and 9406-595

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

For a detailed description of the plug and receptacles used with Models 9119-590, 9119-595, 9406-595, and 9119-FHA, see 9119-590, 9119-595, and 9406-595 power cord features.

#### Related reference:

“Power cord features” on page 146

Use the Power cord features table to view the power cord specifications available for your server.

### Plug and receptacle types: 8079, 8093, and 9094

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 681. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
250 V, 15 A	Type 54, Type 72
250 V, 16 A	Type 25, Type 32, Type 18, Type 22, Type 46 (P+N+E)[16A]
250 V, 20 A	Type 11, Type 29, Type 35
250 V, 13 A	Type 23
250 V, 15 A	Type 5, Type 10, Type 34

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

- Click one of the plug and receptacle types.
- In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
- Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: 0550 and 0551 (1.8 m racks)

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 682. Plug and receptacle type by voltage and amperage

Voltage and amperage	Plug and receptacle type		
250 V, 16 A/phase	Type 46 3P+N+E		
250 V, 30 A	Type 12	Type KP	Type PDL
250 V, 32 A	Type 40	Type 46 P+N+E [32A]	

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

- Click one of the plug and receptacle types.
- In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
- Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: 0553 and 7014-T42 (1.8 m racks)

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 683. Plug and receptacle type by voltage and amperage

Voltage and amperage	Plug and receptacle type		
100 -240 V, 10 (HV), 12 (LV)	Type 26		
250 V, 16 A/phase	Type 46 3P+N+E		
250 V, 30 A	Type 12	Type KP	Type PDL
250 V, 32 A	Type 40	Type 46 P+N+E [32A]	

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

- Click one of the plug and receptacle types.
- In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
- Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: 0554, 0555, 7014-S11, 7014-S25 racks

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 684. Plug and receptacle type by voltage and amperage

Voltage and amperage	Plug and receptacle type
100 -240 V, 10 (HV), 12 (LV)	Type 26

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

- Click one of the plug and receptacle types.
- In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).

- Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9406-250

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 685. Plug and receptacle type by voltage and amperage*

Voltage and amperage	Plug and receptacle type
125 V, 15 A	Type 4
250 V, 10 A	Type 6, Type 19, Type 24
250 V, 10 A or 16 A	Type 25, Type 32
250 V, 13 A	Type 23
250 V, 15 A	Type 5, Type 10 (Colombia and Mexico only)
250 V, 16 A	Type 18, Type 22

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

- Click one of the plug and receptacle types.
- In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
- Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9406-270

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 686. Plug and receptacle type by voltage and amperage*

Voltage and amperage	Plug and receptacle type
100 V, 10 A	Type 70
125 V, 15 A	Type 4
200 V, 10 A	Type 2
250 V, 10 A	Type 6, Type 19, Type 24, Type 62
250 V, 10 A or 16 A	Type 25, Type 32
250 V, 13 A	Type 23
250 V, 15 A	Type 5, Type 34, Type 10



Table 686. Plug and receptacle type by voltage and amperage (continued)

Voltage and amperage	Plug and receptacle type
250 V, 16 A	Type 18, Type 22

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Models 9406-870 and 9406-890

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 687. Plug and receptacle type by voltage and amperage

Voltage and amperage	Plug and receptacle type
200-240 V, 60 A, three-phase	Type 460 R9W
480 V, 30 A, three-phase	Type 430 R7W
380-415 V, 30 A, three-phase	See 1304 power cord description.

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

## Plug and receptacle types: Models 9406-800, 9406-810, 9406-825, and 5075, 5095, 0595, 7116, 7316, and 9316

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 688. Plug and receptacle type by voltage and amperage

Voltage and amperage	Plug and receptacle type			
125 V, 15 A (model 800 and 810 only)	Type 4			
250 V, 10 A	Type 6	Type 19	Type 24	Type 62
250 V, 10 A or 16 A	Type 25	Type 32		
250 V, 13 A	Type 23			
250 V, 15 A	Type 5	Type 10	Type 34	
250 V, 16 A	Type 18	Type 22		

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

- Click one of the plug and receptacle types.
- In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
- Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

## Plug and receptacle types: 5094 and 5294

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Voltage and amperage	Plug and receptacle type
250 V, 15 A	Type 54
250 V, 16 A	Type 25, Type 32, Type 18, Type 22, Type 46 (P+N+E)[16A]
250 V, 20 A	Type 11, Type 29
250 V, 13 A	Type 23
250 V, 15 A	Type 5, Type 10, Type 34

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.

The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: 5096, 5296

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Voltage and amperage	Plug and receptacle type
250 V, 15 A	Type 5, Type 10, Type 34

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Model 9406-820 and expansion units 5074, 5075, 5077, 5078, and 5079

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 689. Plug and receptacle type by voltage and amperage*

Voltage and amperage	Plug and receptacle type
100 V, 10 A	Type 70
125 V, 15 A	Type 4 and Type 7 (Types 4 and 7 are valid only for: Model 9406-820, 5075 & 5077)
200 V, 10 A	Type 2
250 V, 10 A or 15 A	Type 5, Type 10, Type 34
250 V, 10 A or 16 A	Type 25
250 V, 13 A	Type 23
250 V, 16 A	Type 18, Type 22, Type 32
250 V, 10 A	Type 6, Type 19, Type 24, Type 62

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### **Plug and receptacle types: 0554, 0555, 7014-S11, 7014-S25 racks**

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 690. Plug and receptacle type by voltage and amperage*

<b>Voltage and amperage</b>	<b>Plug and receptacle type</b>
100 -240 V, 10 (HV), 12 (LV)	Type 26

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### **Plug and receptacle types: 5786, 5787, 7031-D24, 7031-T24 expansion units**

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 691. Plug and receptacle types by voltage and amperage*

<b>Voltage and amperage</b>	<b>Plug and receptacle type</b>
250 V, 10 A	Type 2, Type 6
100-127 V, 15 A	Type 4

Table 691. Plug and receptacle types by voltage and amperage (continued)

Voltage and amperage	Plug and receptacle type
100-240 V, 10 A(HV) 12 A (LV)	Type 4
250 V, 15 A	Type 5, Type 10

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
- Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

- Click one of the plug and receptacle types.
- In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
- Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: 5792 rack

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

For a detailed description of the plug and receptacles used with the 5792 rack, see 5792 power cord features.

#### Related reference:

“Power cord features” on page 331

Use the Power cord features table to view the power cord specifications available for your server.

### Plug and receptacle types: models 9406-830 and SB2; base I/O enclosure 9074; and expansion units 5065, 5066, 5074, and 5079

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

Table 692. Plug and receptacle types by voltage and amperage

Voltage and amperage	Plug and receptacle type
200 V, 16 A	Type 64
250 V, 15 A	Type 54, Type 72
250 V, 16 A	Type 25, Type 18, Type 32, Type 22, Type 46 (P+N+E)[16A]
250 V, 20 A	Type 11, Type 29, Type 35 (valid for 5065 & 5066 only)
250 V, 13 A	Type 23
250 V, 15 A	Type 5, Type 10, Type 34 (not valid for 5065 & 5066)

To determine the plug and receptacle type your model will need, follow these steps:

- In the previous table, find the **Voltage and Amperage** of your power supply.

The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.

2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.

The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: Models 9406-840 and SB3

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 693. Plug and receptacle types by voltage and amperage*

Voltage and amperage	Plug and Receptacle Type
250 V, 16 A/phase	Type 46 3P+N+E
250 V, 30 A	Type 12, Type KP, Type PDL
250 V, 32 A	Type 40, Type 46 P+N+E [32A]

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the Voltage and amperage of your power supply.  
The Plug and receptacle type listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the Plug and receptacles table, look for your country or region (the country or region where your model will reside) in the Countries or regions column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your Country or region in the Plug and receptacle table.

The plug and receptacle type that lists your Country or Region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

### Plug and receptacle types: 9079 base I/O expansion unit

Use the Plug and receptacle type by voltage and amperage table to determine the plugs and receptacles available for your system.

*Table 694. Plug and receptacle types by voltage and amperage*

Voltage and amperage	Plug and receptacle type
250 V, 15 A	Type 54, Type 72
250 V, 16 A	Type 25, Type 32, Type 18, Type 22, Type 46 (P+N+E)[16A]
250 V, 20 A	Type 11, Type 29, Type 35

To determine the plug and receptacle type your model will need, follow these steps:

1. In the previous table, find the **Voltage and amperage** of your power supply.  
The **Plug and receptacle type** listed in the same row as your voltage and amperage supports your model.
2. Click on the plug and receptacle **Type** to view information about that type.

If more than one plug appears in your row:

1. Click one of the plug and receptacle types.
2. In the **Plug and Receptacles** table, look for your country or region (the country or region where your model will reside) in the **Countries or regions** column (on the right side of the table).
3. Repeat steps 1 and 2 until you find your country or region in the **Plug and Receptacle** table.  
The plug and receptacle type that lists your country or region is the type for which you need to plan.

**Note:** If your country or region is not listed or, for some reason, you still cannot determine your plug and receptacle type, contact your seller.

## Plug and receptacle configurations

Use the Plug type and connectors table to see a graphical representation of your plug type and connector.

Table 695. Plug type and connectors










Plug Type	Connector
IEC320-C14/C13	
IEC320-C20/C19	
IEC 60309 (3 PIN)	
IEC 60309 (5 PIN)	

Table 695. Plug type and connectors (continued)

Plug Type	Connector
NEMA 5-15	
NEMA 6-15	
L6-30	

### Plug and receptacle type 2

Plug type 2 is a 200 - 240 V, 10 A, IEC 83-A5 plug.

<p>Plug</p>  <p>Type 2 200 - 240 V 10 A</p>	<p>Receptacle</p> 	<p><i>Countries/Regions International Electrotechnical Commission</i></p> <p><b>IEC 83-A5</b></p> <p>Argentina, Paraguay, Uruguay</p>
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Cord Feature	Part Number
2961 <b>(B)</b>	36L8879 and 39M5067 <sup>1</sup> - 1.8 m (6 ft)
(Default) <b>(H)</b>	13F9940 - 2.7 m (9 ft) <b>(G) (T)</b>
1397 <b>(K) (T)</b>	36L6881 and 39M5069 <sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (S) (T)</b>
1412 <b>(G) (T)</b>	86G7648 - 1.8 m (6 ft) <b>(T)</b>
5102 dual power cord (Model 9406-820 only)	36L8880 and 39M5068 <sup>1</sup> - 2.7 m (9 ft) <b>(T)</b>
6488 <b>(T)</b>	36L8877 and 39M5066 <sup>1</sup> - 4.3 m (14 ft) <b>(U)</b>
6453 <b>(U)</b>	
9831 <b>(N) (P) (Q) (R) (S)</b>	
9908 <b>(Q)</b>	
<b>Cord Rating 2.4 kVA cord (B) (G) (H) (K) (T)</b>	
<p>Systems and expansion units</p> <p><b>(B)</b> - Models 53x I/O Side, and expansion units 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251</p> <p><b>(G)</b> - Models 9406-250, 9910-080</p> <p><b>(H)</b> - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083</p> <p><b>(K)</b> - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251</p> <p><b>(N)</b> - pSeries 640 - B80</p> <p><b>(P)</b> - 7025 - pSeries 620 - 6F0, 6F1</p> <p><b>(Q)</b> - pSeries 620 (7028) - 6C1</p> <p><b>(R)</b> - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1</p> <p><b>(S)</b> - pSeries 620 (7028) - 6E1</p> <p><b>(T)</b> - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, and 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9407-M15, 9406-525, 9407-515, 9408-M25, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8203-E4A, 8204-E8A, 5886, 7214-1U2, 7042-C07, 8234-EMA, 8261-E4S</p> <p><b>(U)</b> - 7311-D11, 7311-D10, 5790</p>	
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>	

## Plug and receptacle type 4

Plug type 4 is a 100 - 127 V, 15 A, NEMA WD-1: 5-15P plug.

Table 696. Plug and receptacle type 4




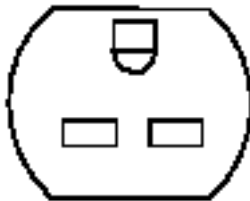
<p>Plug</p>  <p>Type 4 100 - 127 V 15 A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>National Electrical Manufacturers Association</i></p> <p><b>NEMA WD-1: 5-15P</b></p> <p>Anguilla, Antigua, Aruba, Bahamas, Barbados, Belize, Bermuda, Bonaire, Bolivia, Caicos Islands, Canada, Canary Islands, Cayman Islands, Colombia, Costa Rica, Curacao, Dominican Republic, El Salvador, Ecuador, Guam, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Montserrat, Netherland Antilles, Nevis, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, St. Kitts, St. Martin, Taiwan, Tobago, Tortola BVI, Trinidad, Turk Islands, United States, Venezuela, Virgin Islands, Yemen</p>
<p>Cord Feature</p> <p>2960 <b>(B)</b></p> <p>2960 + 9082 <b>(B)</b></p> <p>1412 <b>(I) (G)(K) (T)</b></p> <p>9800 <b>(P) (Q) (S)</b></p> <p>9900 <b>(Q)</b></p> <p>5102 dual power cord (Model 9406-820 only)</p> <p>6470 and 6460 <b>(T) (K) (B) (U)</b></p>	<p>Part Number</p> <p>75G2695 - 2.7 m (9 ft) <b>(G)</b></p> <p>86G7648 and 39M5080<sup>1</sup> - 1.8 m (6 ft) <b>(B) (K) (P) (Q) (S) (T)</b></p> <p>87G3880 and 39M5082<sup>1</sup> - 4.3 m (14 ft) <b>(B) (K) (P) (Q) (U)(T)</b></p> <p>12J5112 and 39M5258<sup>1</sup> - 2.7 m (9 ft) <b>(I)</b></p> <p>6952301 and 39M5080<sup>1</sup> - 1.8 m (6 ft) <b>(U)</b></p>	
<p>Cord Rating</p> <p>1.6 kVA Cord <b>(B) (G) (K)</b></p> <p>2.0 kVA cord <b>(I)</b></p>		

Table 696. Plug and receptacle type 4 (continued)

<p>Systems and expansion units</p> <p>(B) - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082, 8234-EMA, 8261-E4S</p> <p>(G) - Models 9406-250, 9910-080</p> <p>(I) - Models 9910-140</p> <p>(K) - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 9316, 7116, 7316 , 5786, 5787, 8234-EMA, 8261-E4S</p> <p>(P) - 7025 - pSeries 620 - 6F0, 6F1, pSeries 640 - B80</p> <p>(Q) - pSeries 620 (7028) - 6C1, 7316</p> <p>(S) - pSeries 620 (7028) - 6E1</p> <p>(T) - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, and 7310-C05, OpenPower 710, OpenPower 720, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A, 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S</p> <p>(U) - 7310-C04, 7310-C05 and 7310-CR2, 8234-EMA, 8261-E4S</p> <p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>
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### Plug and receptacle type 5

Plug type 5 is a 250 V, 15 A, NEMA WD-1: 6-15P plug.

<p>Plug</p>  <p>Type 5 250V 15A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>National Electrical Manufacturers Association</i></p> <p><b>NEMA WD-1: 6-15P</b></p> <p>Anguilla, Antigua, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Bonaire, Canada, Caicos Islands, Cayman Islands, Costa Rica, Curacao, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Montserrat, Netherland Antilles, Nicaragua, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, St. Marten, Taiwan, Thailand, Tobago, Tortola, Turks Island, United States, Venezuela, Virgin Islands</p>
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Cord Feature	Part Number
Migration <b>(J)</b>	1838576 and 39M5094 <sup>1</sup> - 1.8 m (6 ft) <b>(B) (H) (K) (P) (Q) (R) (S) (N) (U)(T)</b>
2961 <b>(A) (B)</b>	14F1547 and 39M5261 <sup>1</sup> - 1.8 m (6 ft) <b>(C) (J) (D) (L) (M)</b>
2961 + 9082 <b>(B)</b>	1838573 and 39M5096 <sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (T)</b>
(Default) <b>(D) (H)</b>	6952287 and 39M5093 <sup>1</sup> - 4.3 m (14 ft) <b>(T) (W)</b>
9082 <b>(D) (H)</b>	14F1548 and 39M5263 <sup>1</sup> - 4.3 m (14 ft) <b>(C) (D) (J) (L) (M)</b>
1412 <b>(G) (I)</b>	1838574 and 39M5095 <sup>1</sup> - 2.7 m (9 ft) <b>(G)</b>
1410 <b>(K)</b>	12J5120 and 39M5262 <sup>1</sup> - 2.7 m (9 ft) <b>(I) (M)</b>
1451 <b>(L) (M)</b>	25R2573 - 1.8 m (6 ft) <b>(V)</b>
1452 <b>(L)</b>	25R2575 - 4.3 m (14 ft) <b>(V)</b>
1457 <b>(M)</b>	
5102 dual power cord (Model 9406-820 only)	
5103 dual power cord <b>(C)</b>	
5105 dual power cord (5074 and top expansion unit in 8079)	
5106 dual power cord (single expansion unit in 5079)	
6469 <b>(T) (K)</b>	
6487 <b>(U) (T)</b>	
6687 <b>(V)</b>	
6669 <b>(V)</b>	
6455 <b>(W)</b>	
9800 <b>(P) (R) (N)</b>	
9833 <b>(Q) (S)</b>	
9909 <b>(Q)</b>	
Cord Rating	
2.4 kVA cord <b>(B) (G) (H) (K) (T)</b>	
3.6 kVA cord <b>(C) (I) (J) (D) (L) (M)</b>	

Systems and expansion units

**(B)** - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082

**(C)** - Model 9406-830 in a 0550 rack

**(D)** - Models 9406-720, 9406-830, SB2, and expansion units 5065, 5074

**(G)** - Models 9406-250, 9910-080

**(H)** - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083

**(I)** - Models 9910-140, 9910-180

**(J)** - Migration expansion units 5033, 5034, 5035

**(K)** - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251, 8204-E8A, 5886, 7214-1U2, 8203-E4A, 8261-E4S, 9407-M15, 9408-M25, 9409-M50, 8234-EMA

**(L)** - Model 9406-830, 9406-SB2, 5074, 5094, 9079, 9074, 5294, 8079, 8093, 8094, 9094, 5033, 5034, 5035, 9194, 5096, 5296

**(M)** - Model Feature 5079, 5294, 8079, 8094, 5296

**(N)** - pSeries 640 - B80

**(P)** - 7025 - pSeries 620 - 6F0, 6F1

**(Q)** - pSeries 620 (7028) - 6C1

**(R)** - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1

**(S)** - pSeries 620 (7028) - 6E1

**(T)** - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796 , 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S

**(U)** - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796 , 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S



**(V)** - OpenPower 720, 8234-EMA, **(T) (U)** - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796 , 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S

**(W)** - 7311-D11, 7311-D10, 5790

**Note:** This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

## Plug and receptacle type 6

Plug type 6 is a 250 V, 10 A, IEC 83-A5 plug.

<p>Plug</p>  <p><b>Type 6 250V 10A</b></p>	<p>Plug</p> 	<p>Countries/Regions <i>International Electrotechnical Commission</i></p> <p><i>IEC 83-A5</i></p> <p>Australia, Fiji, New Zealand, Papua New Guinea, Western Samoa, Kiribati, Nauru</p>
<p>Cord Feature</p> <p>2961 <b>(B)</b></p> <p>(Default) <b>(H)</b></p> <p>1438 <b>(K)</b></p> <p>5102 dual power cord (Model 9406-820 only)</p> <p>6479 <b>(T)</b></p> <p>6680 <b>(T)</b></p> <p>6468 and 6681<b>(U)</b></p> <p>9831 <b>(N) (P) (Q) (R) (S)</b></p> <p>9908 <b>(Q)</b></p>	<p>Part Number</p> <p>13F9939 and 39M5101<sup>1</sup> - 1.8 m (6 ft)</p> <p>13F9940 and 39M5102<sup>1</sup> - 2.7 m (9 ft) <b>(T)</b></p> <p>13F9938 and 39M5100<sup>1</sup> - 4.3 m (14 ft) <b>(T) (U)</b></p> <p>13F9941 and 39M5103<sup>1</sup> - 4.3 m (14 ft) <b>(B) (H)(K) (N) (P) (Q) (R) (S) (T)</b></p>	
<p>Cord Rating 2.4 kVA cord <b>(B) (G) (H) (K) (T)</b></p>		

Systems and expansion units

**(B)** - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082

**(G)** - Models 9406-250, 9910-080

**(H)** - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083

**(K)** - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251

**(N)** - pSeries 640 - B80

**(P)** - 7025 - pSeries 620 - 6F0, 6F1

**(Q)** - pSeries 620 (7028) - 6C1

**(R)** - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1

**(S)** - pSeries 620 (7028) - 6E1

**(T)** - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S



**(U)** - 7311-D11, 7311-D10, 5790

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

**Plug and receptacle type 7**

Plug type 7 is a 100 - 127 V, 15 A, NEMA WD-1: L5-15P plug.

<p>Plug</p> 	<p>Plug</p> 	<p>Countries/Regions <i>National Electrical Manufacturers Association</i></p> <p><i>NEMA WD-1: L5-15P</i></p> <p>Canada, United States</p>
<p><b>Type 7 100-127V 15A Locking</b></p>		
<p>Cord Feature</p> <p>2960 + 9083 (A)</p> <p>2960 + 9083 + 9082(A)</p>	<p>Part Number</p> <p>86G7874 and 39M5108<sup>1</sup> - 1.8 m (6 ft) (A)</p> <p>87G3881 and 39M5110<sup>1</sup> - 4.3 m (14 ft) (A)</p>	
<p>Cord Rating 1.6 kVA cord (A)</p>		

Systems and expansion units

(A) - Expansion units 5070, 5072, 5080, 5082

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

**Plug and receptacle type 10**

Plug type 10 is NEMA WD-5: L6-15P plug.

<p>Plug</p>  <p><b>Type 10 250V 15A Locking</b></p>	<p>Receptacle</p>  <p>NEMA L6-15R</p>	<p>Countries/Regions</p> <p><i>National Electrical Manufacturers Association NEMA WD-5: L6-15P</i></p> <p>Canada, Colombia, Japan, Mexico, United States, Uruguay</p> <p><b>Note:</b> Plug Type 10 supports models 9910-080 in Colombia and Mexico. Plug Type 10 is <b>not available in Canada and the United States for these models.</b></p>
<p>Cord Feature</p> <p>2961 + 9083 (B)</p> <p>2961 + 9083 + 9082 (B)</p> <p>9083 (D) (H)</p> <p>9083 + 9082 (D) (H)</p> <p>Migration (C)</p> <p>1414 (I) (J) (M)</p> <p>1453 (C) (F) (K) (L)</p> <p>1454 (F) (K) (L)</p> <p>1458 (C) (K) (L)</p> <p>5102 dual power cord (Model 9406-820 only)</p> <p>5103 dual power cord (F)</p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>6497(J) (M)</p>	<p>Part Number</p> <p>86G7878 and 39M5115<sup>1</sup> (10 A only) - 1.8 m (6 ft) (B) (H) (J) (M)</p> <p>14F1549 and 39M5273<sup>1</sup> - 1.8 m (6 ft) (C) (D) (F) (K) (L)</p> <p>12J5119 and 39M5274<sup>1</sup> - 2.7 m (9 ft) (L)</p> <p>86G7879 and 39M5117<sup>1</sup> (10 A only) - 4.3 m (14 ft) (B) (H) (J) [<i>outside Canada and United States - (G) (K)</i>]</p> <p>14F1550 and 39M5275<sup>1</sup> - 4.3 m (14 ft) (C) (D) (F) (I) (K) (L)</p>	



Cord Rating 2.4 kVA cord **(B) (H) (J)** [*outside United States - (G)*]

3.8 kVA cord **(C) (D) (F) (I) (K) (L)**

Systems and expansion units

**(B)** - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082

**(C)** - Expansion units 5033, 5034, 5035

**(D)** - Models 9406-720, 9406-830, SB2

**(F)** - Model 9406-830 in a 0550 rack

**(H)** - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083

**(I)** - Models 9910-140, 9910-180, 9406-270

**(J)** - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251

**(K)** - Models 9406-830, 940-SB2, 5074, 5094, 9079, 9074, 5065, 5066, 5074, 5079, 5094, 5294, 8094, 9194

**(L)** - Model Feature 5079, 5294, 8079, 8093, 8094



**(M)** - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7314-G30, 5796, 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 7042-C07

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

## Plug and receptacle type 11



Plug type 11 is NEMA WD-1: L6-20P plug.

Plug	Receptacle	Countries/Regions
		<p><i>National Electrical Manufacturers Association</i></p> <p><b>NEMA WD-1: L6-20P</b></p> <p>Argentina, Cape Verde Islands</p> <p><b>(K) (L) Only: US, Canada, Japan</b></p>
Type 11 250V 20A		

Cord Feature	Part Number
1414 (I)	14F1553 and 39M5279 <sup>1</sup> - 4.3 m (14 ft) (C) (I) (J) (M) (K) (L) (N)
1406 (C) (K) (L) (M) (N)	07H0095 and 39M5277 <sup>1</sup> - 1.8 m (6 ft)(C) (K) (L) (M) (N)
5103 dual power cord (C)	12J5118 and 39M5278 <sup>1</sup> - 2.7 m (9 ft) (N)
5105 dual power cord (5074 and top expansion unit in 8079)	
5106 dual power cord (single expansion unit in 5079)	
Migration (J)	
Cord Rating 4.5 kVA cord (C) (I) (J) (K) (L) (N)	
Systems and expansion units	
(C) - Model 9406-830 in a 0550 rack	
(I) - Models 9910-140, 9910-180	
(J) - Features 5033, 5034, 5035	
(K) - Feature 5065	
(L) - Feature 5066	
(M) - Models 9406-830, SB2, Features 5074, 5094, 9074, 9079	
(N) - Feature 5079, 5294, 8079, 8094	
<b>Note:</b>	
1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.	

## Plug and receptacle type 12

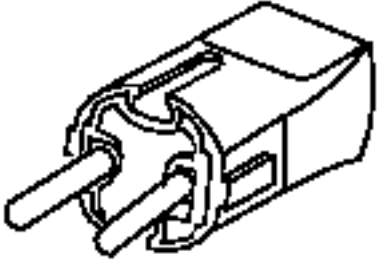

Plug type 12 is NEMA WD-5: L6-30P plug.

Plug	Receptacle	Countries/Regions <i>National Electrical Manufacturers Association</i>
		<b>NEMA WD-5: L6-30P</b>
Type 12 250V 30A Locking		Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Bonaire, Calicos Island, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Curacao, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Micronesia, Montserrat, Netherlands Antilles, Nicaragua, Panama, Peru, Phillipines, St Marten, Taiwan, Tortola (BVI), Thailand, United States, Venezuela

<p>Cord Feature</p> <p>4961 + 9183 <b>(C)</b></p> <p>1426 <b>(G) (J) (R)</b></p> <p>9183 <b>(F)</b></p> <p>4961 + 9183 + 9182 <b>(C)</b></p> <p>5104 dual power cord <b>(G)</b></p> <p>8622 dual power cord <b>(P)</b></p> <p>9183 + 9182 <b>(F)</b></p> <p>9081 <b>(H)</b></p> <p>9800 <b>(P)</b></p> <p>9986 <b>(P)</b></p> <p>6654, 6442, 6446, 6449 <b>(S)</b></p>	<p>Part Numbers</p> <p>11F0113 - 4.3 m (14 ft) <b>(P) (J) (Q) (G) (R) (S)</b></p> <p>11F0114 - 1.8 m (6 ft) <b>(P) (J) (R) (S)</b></p> <p>11F0115 - 4.3 m (14 ft) <b>(Q) (S)</b></p> <p>25R2555 - 4.3 m (14 ft) <b>(S)</b></p>
<p>Cord Rating 7.2 kVA cord <b>(C) (F) (G) (P) (J)</b></p>	
<p>Systems and expansion units</p> <p><b>(C)</b> - Model 53x Processor Side</p> <p><b>(F)</b> - Models 9406-730, 9406-740, SB1</p> <p><b>(G)</b> - Models 9406-840 SB3</p> <p><b>(H)</b> - 9309 rack</p> <p><b>(J)</b> - 0550 and 0551 racks</p> <p><b>(P)</b> - 7017 - S85</p> <p><b>(Q)</b> - 7014 racks</p> <p><b>(R)</b> - System i 5160 PDU for 0551 rack (System p 7014 racks when ordered with IBM eServer p5)</p> <p><b>(S)</b> - 7188 and 9188 power distribution units when used with 7014-S11, 7014-S25, 0554, 7014-T00, 7014-T42, 0550, 0551, 8234-EMA, 8261-E4S</p>	

## Plug and receptacle type 18

Plug type 12 is CEE 7 VII plug.

<p>Plug</p>  <p>Type 18 250V 16A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>International Rule for the Approval of Electrical Equipment</i></p> <p><b>CEE 7 VII</b></p> <p>Afghanistan, Albania, Algeria, Andorra, Armenia, Austria, Azores, Belarus, Belgium, Benin, Bosnia, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canary Islands, Cape Verde Islands, Central African Republic, Chad, Congo, Croatia, Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Estonia, Ethiopia, Faero Islands, Finland, France, French Polynesia, French Guyana, Gabon, Georgia, Germany, Greece, Greenland, Guadeloupe, Guinea, Guinea-Bissau, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Kazakhstan, Kirghizia, Laos, Latvia, Lebanon, Lithuania, Luxembourg, Macau S.A.R. of the PRC, Macedonia, Malagasy Republic, Mali, Martinique, Mauritania, Moldavia, Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Principe, Reunion, Romania, Russia, Rwanda, Sao Tome Island, Senegal, Serbia, Slovenia, Slovakia, Somalia, Spain, Suriname, Sweden, Syria, Tahiti, Togo, Tunisia, Turkey, Ukraine, Uzbekistan, Vietnam, Zaire, Zimbabwe</p>
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Cord Feature	Part Number
2961 <b>(B)</b>	13F9978 and 39M5122 <sup>1</sup> - 1.8 m (6 ft)
(Default) <b>(H)</b>	13F9979 and 39M5123 <sup>1</sup> - 2.7 m (9 ft) <b>(G) (T)</b>
1420 <b>(C) (L)</b>	13F9980 and 39M5124 <sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (S) (T)</b>
1439 <b>(K)</b>	14F1554 and 39M5283 <sup>1</sup> - 4.3 m (14 ft) <b>(C) (I) (J) (L)</b>
5102 dual power cord (Model 9406-820 only)	13F9977 and 39M5121 <sup>1</sup> - 4.3 m (14 ft) <b>(U)</b>
5103 dual power cord <b>(C)</b>	
5105 dual power cord (5074 and top expansion unit in 8079)	
5106 dual power cord (single expansion unit in 5079)	
6472 <b>(T)</b>	
6461 <b>(U)</b>	
9820 <b>(N) (P) (Q) (R) (S)</b>	
9901 <b>(Q)</b>	
Migration <b>(J)</b>	
Cord Rating 2.4 kVA cord <b>(B) (G) (H) (K)</b> 3.8 kVA <b>(C) (I) (J) (L)</b>	

Systems and expansion units

(B) - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082

(C) - Model 9406-830 in a 0550 rack

(G) - Models 9406-250, 9910-080

(H) - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083

(I) - Models 9910-140, 9910-180

(J) - Features 5033, 5034, 5035

(K) - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251

(L) - Model 9406-830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294, 9079 , 8079, 8094, 9094, 5033, 5034, 5035, 9194

(N) - pSeries 640 - B80

(P) - 7025 - pSeries 620 - 6F0, 6F1

(Q) - pSeries 620 (7028) - 6C1

(R) - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1

(S) - pSeries 620 (7028) - 6E1

(T) - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S



(U) - 7311-D11, 7311-D10, 5790

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

**Plug and receptacle type 19 (P+N+E) [10A]**


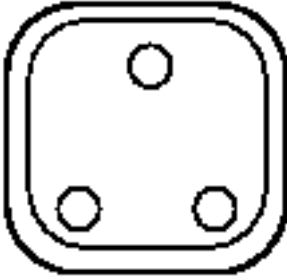
Plug type 19 (P+N+E) [10A] is CEE plug.

<p>Plug</p>  <p>Type 19 250V 10A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>International Rule for the Approval of Electrical Equipment</i></p> <p>CEE</p> <p>Denmark</p>
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Cord Feature	Part Number
2961 <b>(B)</b>	13F9996 and 39M5129 <sup>1</sup> - 1.8 m (6 ft)
(Default) <b>(H)</b>	13F9997 and 39M5130 <sup>1</sup> - 2.7 m (9 ft) <b>(G) (T)</b>
1412 <b>(G)</b>	13F9998 and 39M5131 <sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (S)</b>
1440 <b>(K)</b>	86G7648 - 1.8 m (6 ft) <b>(T)</b>
5102 dual power cord (Model 9406-820 only)	13F9995 and 39M5128 <sup>1</sup> - 4.3 m (14 ft) <b>(U)</b>
6473 <b>(T)</b>	
9821 <b>(N) (P) (Q) (R) (S)</b>	
9902 <b>(Q)</b>	
6462 <b>(U)</b>	
<b>Cord Rating 2.4 kVA cord (B) (G) (H) (K) (T)</b>	
<p>Systems and expansion units</p> <p><b>(B)</b> - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082</p> <p><b>(G)</b> - Models 9406-250, 9910-080</p> <p><b>(H)</b> - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083</p> <p><b>(I)</b> - Models 9910-140, 9910-180</p> <p><b>(K)</b> - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251</p> <p><b>(N)</b> - pSeries 640 - B80</p> <p><b>(P)</b> - 7025 - pSeries 620 - 6F0, 6F1</p> <p><b>(Q)</b> - pSeries 620 (7028) - 6C1</p> <p><b>(R)</b> - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1</p> <p><b>(S)</b> - pSeries 620 (7028) - 6E1</p> <p><b>(T)</b> - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 8204-E8A, 5886, 7214-1U2, 8203-E4A, 9407-M15, 9408-M25, 9409-M50, 8234-EMA, 8261-E4S</p> <p><b>(U)</b> - 7311-D11, 7311-D10, 5790</p>	
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>	

## Plug and receptacle type 22

Plug type 22 is a 250 V, 16 A, SABS 164 BS 546 plug.

<p>Plug</p>  <p>Type 22 250V 16A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>South African Bureau of Standards</i></p> <p><i>SABS 164 BS 546</i></p> <p>Bangladesh, Pakistan, South Africa, Sri Lanka, Lesotho, Maceo, Maldives, Namibia, Nepal, Samoa, Swaziland, Uganda</p>
<p>Cord Feature</p> <p>2961 <b>(B)</b></p> <p>(Default) <b>(H)</b></p> <p>1418 <b>(J) (K)</b></p> <p>1441 <b>(K)</b></p> <p>5102 dual power cord (Model 9406-820 only)</p> <p>5103 dual power cord <b>(C)</b></p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>6477 <b>(T)</b></p> <p>6466 <b>(U)</b></p> <p>9829 <b>(N) (P) (Q) (R) (S)</b></p> <p>9906 <b>(Q)</b></p> <p>Migration <b>(J) (K)</b></p>	<p>Part Number</p> <p>14F0015 and 39M5144<sup>1</sup> - 2.7 m (9 ft) <b>(T)</b></p> <p>14F0014 and 39M5143<sup>1</sup> - 1.8 m (6 ft)</p> <p>14F0016 and 39M5145<sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (S)</b></p> <p>14F1557 and 39M5291<sup>1</sup> - 4.3 m (14 ft) <b>(C) (I) (J) (L)</b></p> <p>14F0013 and 39M5142<sup>1</sup> - 4.3 m (14 ft)<b>(U)</b></p>	
<p>Cord Rating 2.4 kVA cord <b>(B) (G) (H) (K)</b></p> <p>3.8 kVA cord <b>(C) (I) (J) (L)</b></p>		



Systems and expansion units

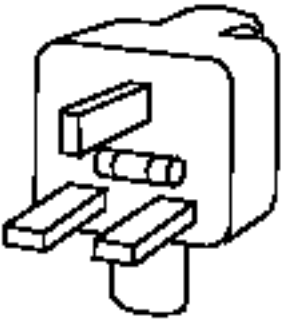

- (B) - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082
- (C) - Model 9406-830 in a 0550 rack
- (G) - Models 250, 9910-080
- (H) - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083
- (I) - Models 9910-140, 9910-180
- (J) - Features 5033, 5034, 5035
- (K) - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251
- (L) - Model 9406-830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294, 8079, 8094, 9074, 9079, 8093, 9094
- (N) - pSeries 640 - B80
- (P) - 7025 - pSeries 620 - 6F0, 6F1
- (Q) - pSeries 620 (7028) - 6C1
- (R) - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1
- (S) - pSeries 620 (7028) - 6E1
- (T) - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S
- (U) - 7311-D11, 7311-D10, 5790

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

### Plug and receptacle type 23

Plug type 23 is a 250 V, 13 A, BS 1363A plug.

<p>Plug</p>  <p style="text-align: center;">Type 23 250V 13A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>British Standards Institution</i></p> <p><b>BS 1363A</b></p> <p>Abu Dhabi, Bahrain, Botswana, Brunei, Channel Islands, Cyprus, Dominica, Gambia, Ghana, Grenada, Grenadines, Guyana, Iraq, Ireland, Hong Kong S.A.R. of the PRC, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar, Nevis, Nigeria, Oman, Qatar, Sabah, Seychelles, Sierra Leone, Singapore, St. Lucia, St. Kitts, St. Vincent, Sudan, Tanzania, Trinidad and Tobago, United Arab Emirates, United Kingdom, Yemen, Zambia</p>
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Cord Feature	Part Number
2961 <b>(B)</b>	14F0032 and 39M5150 <sup>1</sup> - 1.8 m (6 ft)
9082 <b>(H)</b>	14F0033 and 39M5151 <sup>1</sup> - 2.7 m (9 ft) <b>(G) (T)</b>
1476 <b>(C) (L)</b>	14F0034 and 39M5152 <sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (S)(T)</b>
1443 <b>(K)</b>	12J5988 and 39M5295 <sup>1</sup> - 4.3 m (14 ft) <b>(C) (I) (J) (L)</b>
5102 dual power cord (Model 9406-820 only)	14F0031 and 39M5149 <sup>1</sup> - 4.3 m (14 ft) <b>(U)</b>
5103 dual power cord <b>(C)</b>	
5105 dual power cord (5074 and top expansion unit in 8079)	
5106 dual power cord (single expansion unit in 5079)	
6474 <b>(T)</b>	
6463 <b>(U)</b>	
9825 <b>(N) (P) (Q) (R) (S)</b>	
9903 <b>(Q)</b>	
Migration <b>(J)</b>	
Cord Rating 2.5 kVA cord <b>(B) (G) (H) (K)</b> 3.2 kVA cord <b>(C) (I) (J) (L)</b>	

Systems and expansion units



- (B) - Models 53x I/O Side, and expansion units 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251
- (C) - Model 9406-830 in a 0550 rack
- (G) - Models 9406-250, 9910-080
- (H) - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083
- (I) - Models 9910-140, 9910-180
- (J) - expansion units 5033, 5034, and 5035
- (K) - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251
- (L) - Model 830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294, 8079, 8094, 9079, 9094, 5033, 5034, 5035, 9194
- (N) - pSeries 640 - B80
- (P) - 7025 - pSeries 620 - 6F0, 6F1
- (Q) - pSeries 620 (7028) - 6C1
- (R) - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1
- (S) - pSeries 620 (7028) - 6E1
- (T) - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S
- (U) - 7311-D11, 7311-D10, 5790

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

**Plug and receptacle type 24**



Plug type 24 is a 250 V, 10 A, SEV 24507 plug.

<p>Plug</p>  <p>Type 24 250V 10A</p>	<p>Receptacle</p> 	<p>Countries/Regions</p> <p><i>*Schweizerischer Elektrotechnischer Verein</i></p> <p><b>SEV 24507</b></p> <p>Liechtenstein, Switzerland</p>
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Cord Feature	Part Number	Cord Rating
2961 <b>(B)</b>	14F0050 - 1.8 m (6 ft)	2.4 kVA cord <b>(B) (G) (H) (K) (T)</b>
(Default) <b>(H)</b>	14F0051 and 39M5158 <sup>1</sup> - 2.7 m (9 ft) <b>(G) (T)</b>	
1412 <b>(G) (T)</b>	14F0049 and 39M5156 <sup>1</sup> - 4.3 m (14 ft) <b>(U)</b>	
1442 <b>(K)</b>	14F0052 and 39M5159 <sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (S)</b>	
5102 dual power cord (Model 9406-820 only)		
6476 <b>(T)</b>		
6465 <b>(U)</b>		
9828 <b>(N) (P) (Q) (R) (S)</b>		
9905 <b>(Q)</b>		
<b>Systems and expansion units</b>		
<b>(B)</b> - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082		
<b>(G)</b> - Models 9406-250, 9910-080		
<b>(H)</b> - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083		
<b>(K)</b> - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251		
<b>(N)</b> - pSeries 640 - B80		
<b>(P)</b> - 7025 - pSeries 620 - 6F0, 6F1		
<b>(Q)</b> - pSeries 620 (7028) - 6C1		
<b>(R)</b> - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1		
<b>(S)</b> - pSeries 620 (7028) - 6E1		
<b>(T)</b> - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A, 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S		
<b>(U)</b> - 7311-D11, 7311-D10, 5790		
<b>Note:</b> 1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.		

## Plug and receptacle type 25

Plug type 25 is a 250 V, 10 A or 16 A, CEI 23-16 plug.

<p>Plug</p>  <p>Type 25 250V 10A/16A</p>	<p>Receptacle</p> 	<p>Countries/Regions</p> <p><i>Comitato Elettrotecnico Italiano</i></p> <p>CEI 23-16</p> <p>Chile, Italy, Libya</p>
<p>Cord Feature</p> <p>2961 (B)</p> <p>(Default) (H)</p> <p>1408 (C) (J) (L)</p> <p>1444 (K)</p> <p>5102 dual power cord (Model 9406-820 only)</p> <p>5103 dual power cord (C)</p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>6478 (T)</p> <p>6467(U)</p> <p>9830 (N) (P) (Q) (R) (S)</p> <p>9907 (Q)</p> <p>Migration (J)</p>	<p>Part Number</p> <p>14F0068 - 1.8 m (6 ft)</p> <p>14F0069 and 39M5165<sup>1</sup> - 2.7 m (9 ft) (T)</p> <p>14F0070 and 39M5166<sup>1</sup> - 4.3 m (14 ft) (B) (H) (K) (N) (P) (Q) (R) (S)(T)</p> <p>14F1560 and 39M5299<sup>1</sup> - 4.3 m (14 ft) (L)</p> <p>14F0067 and 39M5163<sup>1</sup> - 4.3 m (14 ft)(U)</p>	<p>Cord Rating</p> <p>2.4 kVA cord (B) (G) (H) (K) (T)</p> <p>3.8 kVA cord (C) (I) (J) (L)</p>

Systems and expansion units

(B) - 53x I/O Side, and expansion units 5070, 5072, 5080, 5082

(C) - 9406-830 in a 0550 rack, 8261-E4S

(G) - Models 9406-250, 9910-080

(H) - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083

(I) - Models 9910-140, 9910-180

(J) - Features 5033, 5034, 5035, 8261-E4S

(K) - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251

(L) -9406-830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294, 8079, 8093, 8094, 9074, 9079, 9094, 8261-E4S

(N) - pSeries 640 - B80

(P) - 7025 - pSeries 620 - 6F0, 6F1

(Q) - pSeries 620 (7028) - 6C1

(R) - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1

(S) - pSeries 620 (7028) - 6E1

(T) - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S

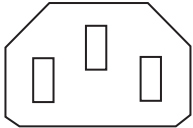
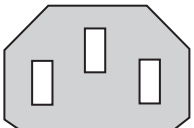
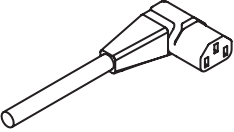
(U) - 7311-D11, 7311-D10, 5790

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

**Plug and receptacle type 26**


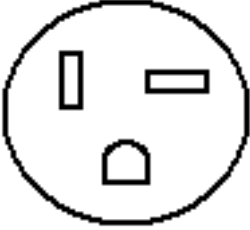
Plug type 26 is a 250 V, 10 A, IEC 320 - C14 plug.

Plug	Receptacle	Countries/Regions
 <p>IPHAD941-0</p> <p>250 V ac 10A</p>	 <p>IPHAD989-0</p>  <p>(F)</p>	<p>Countries/Regions</p> <p><i>Worldwide</i></p> <p>IEC 320 - C14 (Plug)</p> <p>IEC 320 - C13 (Receptacle)</p>

Cord Feature	Part Number	Cord Rating
1422 (A)	36L8860 or 36L8913 - 1.8 m (6 ft)	
6458 (A) (B) (F)	36L8861 or 39M5378 <sup>1</sup> - 4.3 m (14 ft)(B)	
6459 (E)	39M5377 - 2.7 m (9 ft)(C)	
6671 (C)	36L8861 or 39M5375 <sup>1</sup> - 1.5 m (5 ft)(D)	
6672 (D)	36L8859, 39M5374, or 041U0114 <sup>1</sup> - 3.2 m (10.5 ft)(E)	
5802 (F)	39M5510 (F)	
<b>Systems and expansion units</b>		
<p>(A) - 0551 (0121, 0122, 0127 only), 9316, 7116, 7316, 9131-52A, 9133-55A, 9117-MMA , 8204-E8A, 5886, 7214-1U2, 8203-E4A, 8261-E4S, 9407-M15, 9408-M25, 9409-M50, 8234-EMA</p>		
<p>(B) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786, 5787, 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 8204-E8A, 5886, 7214-1U2, 8203-E4A, 8261-E4S, 9407-M15, 9408-M25, 9409-M50, 8234-EMA</p>		
<p>(C) - 7014-S25 racks, 9131-52A, 9133-55A, 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 9110-510, 7314-G30, 5796, 9117-MMA, 9406-MMA, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 9409-M50, 8234-EMA, (T) (U) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796 , 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S</p>		
<p>(D) - 0554, 7014-S11, 7014-S25 racks, 9131-52A, 9133-55A, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 9110-510, 7310-CR3, 7310-C04, 7310-C05, 9117-MMA, 9406-MMA, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 9409-M50, 8234-EMA, (T) (U) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796 , 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S</p>		
<p>(E) - 7311-D11, 7311-D10, 5790, 8234-EMA, 9117-MMA, 9119-FHA, 9406-MMA</p>		
<p>(F) - 5802, 8261-E4S</p>		
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>		

## Plug and receptacle type 29



Plug type 29 is a 250 V, 20 A, NEMA WD-1; 6-20P plug.

<p>Plug</p>  <p>Type 29 250V 20A</p>	<p>Receptacle</p> 	<p>Countries/Regions</p> <p><i>National Electrical Manufacturers Association NEMA WD-1: 6-20P</i></p> <p>Anguilla, Antigua, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Bonaire, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Curacao, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Japan, Mexico, Netherlands Antilles, Nevis, Nicaragua, Panama, Philippines, Puerto Rico, St. Kitts, St. Martin, Taiwan, Tortola (BVI), Trinidad, Tobago, Turk Islands, United States, Venezuela, Virgin Islands, Yemen</p>
<p>Cord Feature</p> <p>1401 (J)</p>	<p>Part Number</p> <p>36L8851 and 39M5301<sup>1</sup> - 1.8 m (6 ft) (J)</p> <p>36L8852 and 39M5302<sup>1</sup> - 2.7 m (9 ft) (J)</p> <p>36L8853 and 39M5303<sup>1</sup> - 4.3 m (14 ft) (J)</p>	<p>Cord Rating</p> <p>3.8 kVA cord (J)</p>
<p>Systems and expansion units</p> <p>(J) - Features 5065, 5066</p>		
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>		



## Plug and receptacle type 32

Plug type 32 is a 250 V, 10 A or 16 A, SII 32-1971 plug.

<p>Plug</p>  <p>Type 32 250V 10A/16A</p>	<p>Receptacle</p> 	<p>Countries/Regions</p> <p><i>Standards Institution of Israel</i></p> <p><i>SII 32-1971</i></p> <p>Israel</p>
<p>Cord Feature</p> <p>2961 (B)</p> <p>(Default) (H)</p> <p>1419 (C) (L)</p> <p>1445 (K)</p> <p>5102 dual power cord (Model 9406-820 only)</p> <p>5103 dual power cord (C)</p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>6475 (T)</p> <p>6464(U)</p> <p>9827 (N) (P) (Q) (R) (S)</p> <p>9904 (Q)</p> <p>Migration (J)</p>	<p>Part Number</p> <p>14F0086 - 1.8 m (6 ft)</p> <p>14F0087 and 39M5172<sup>1</sup> - 2.7 m (9 ft) (G) (T)</p> <p>14F0088 and 39M5173<sup>1</sup> - 4.3 m (14 ft) (B) (H) (K) (N) (P) (Q) (R) (S)(T)</p> <p>14F1561 and 39M5311<sup>1</sup> - 4.3 m (14 ft) (C) (I) (J) (L)</p> <p>14F0085 and 39M5170<sup>1</sup> - 4.3 m (14 ft)(U)</p>	<p>Cord Rating</p> <p>2.4 kVA cord (B) (G) (H) (K) (T)</p> <p>3.8 kVA cord (C) (I) (J) (L)</p>

Systems and expansion units

(B) - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082

(C) - Model 9406-830 in a 0550 rack

(G) - Models 250, 9910-080

(H) - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083

(I) - Models 9910-140, 9910-180

(J) - Features 5033, 5034, 5035

(K) - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251

(L) - Model 830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294, 8079, 8094, 9079, 9094, 5033, 5034, 5035, 9194

(N) - pSeries 640 - B80

(P) - 7025 - pSeries 620 - 6F0, 6F1

(Q) - pSeries 620 (7028) - 6C1

(R) - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1

(S) - pSeries 620 (7028) - 6E1

(T) - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S

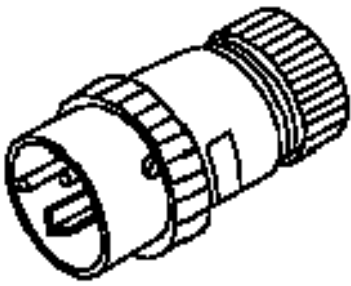

(U) - 7311-D11, 7311-D10, 5790

**Note:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

### Plug and receptacle type 34

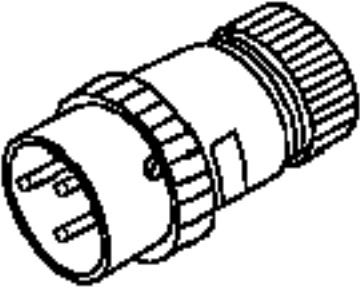
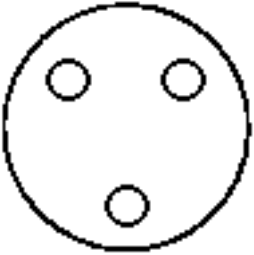
Plug type 34 is a 250 V, 10 A or 15 A, 3720U-2 plug with a 3743U-2 receptacle.

<p>Plug</p> 	<p>Receptacle</p> 	<p>Countries/Regions</p> <p><i>Manufacturer's Number Russel/Stoll</i></p> <p><b>Plug</b> 3720U-2</p> <p><b>Connector</b> 3913U-2 (DuraGard 9C23U2)</p> <p><b>Receptacle</b> 3743U-2 (DuraGard 9R23U2W)</p> <p>Canada, Japan, United States</p>
<p><b>Type 34</b> 250V 10A/15A Water Resistant</p>		

Cord Feature	Part Number	Cord Rating
1415 <b>(J) (M)</b>	73F4931 - 1.8 m (6 ft) <b>(B) (H) (J) (M)</b>	2.4 kVA cord <b>(B) (H) (J) (M)</b>
1455 <b>(F) (K) (L)</b>	14F1551 and 39M5313 <sup>1</sup> - 1.8 m (6 ft) <b>(D) (F) (K)</b>	3.8 kVA cord <b>(C) (D) (F) (K) (L)</b>
1456 <b>(F) (K) (L)</b>	55H6644 and 39M5314 <sup>1</sup> - 2.7 m (9 ft) <b>(L)</b>	
1459 <b>(L) (C)</b>		
2961 + 9080 <b>(B)</b>	73F4932 - 4.3 m (14 ft) <b>(B) (H) (J)</b>	
2961 + 9080 + 9082 <b>(B)</b>	14F1552 and 39M5315 <sup>1</sup> - 4.3 m (14 ft) <b>(C) (D) (F) (K)</b>	
5102 dual power cord (Model 9406-820 only)		
5103 dual power cord <b>(F)</b>		
5105 dual power cord (5074 and top expansion unit in 8079)		
5106 dual power cord (single expansion unit in 5079)		
6498 <b>(M) (J)</b>		
9080 <b>(D) (H)</b>		
9080 + 9082 <b>(D) (H)</b>		
Migration <b>(C)</b>		
<b>Systems and expansion units</b>		
<b>(B)</b> - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082		
<b>(C)</b> - Expansion units 5033, 5034, 5035		
<b>(D)</b> - Models 9406-720, 830, SB2		
<b>(F)</b> - Model 9406-830 in a 0550 rack		
<b>(H)</b> - 9251 base I/O and expansion units 5071, 5073, 5081, 5083		
<b>(J)</b> - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 7316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251		
<b>(K)</b> - Models 9406-830, 9406-SB2, 5074, 5094, 9079, 5079, 5294, 8079, 8093, 8094, 9094, 9194, 5096		
<b>(L)</b> - Model Feature 5079, 5294, 8079, 8094, 5296		
<b>(M)</b> - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570 and expansion units used with IBM System i5 and System p5 , 5786, 5787, 7031-D24, 7031-T24, 9131-52A, 9133-55A, 9405-520, 5796, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 7042-C07		
<b>Note:</b>		
1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.		

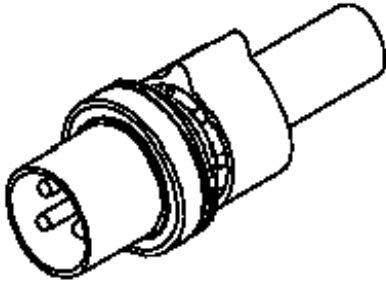

### Plug and receptacle type 35

Plug type 35 is a 250 V, 20 A, water resistant, 3720DP plug with a 3743 receptacle.

<p>Plug</p>  <p>Figure 254. Artwork for t35p</p> <p><b>Type 35 250V 20A Water Resistant</b></p>	<p>Receptacle</p>  <p>Figure 255. Artwork for t35r</p>	<p>Countries/Regions <i>Manufacturer's Number Russel/Stoll</i></p> <p><b>Plug</b> 3720DP</p> <p><b>Connector</b> 3913 (DuraGard 9C23U0)</p> <p><b>Receptacle</b> 3743 (DuraGard 9R23U0W)</p> <p>US, Canada, Japan</p>
<p>Cord Feature</p> <p>1407 (J)</p>	<p>Part Number</p> <p>36L8857 and 39M5319<sup>1</sup> - 4.3 m (14 ft) (J)</p>	<p>Cord Rating</p> <p>3.8 kVA cord (J)</p>
<p>Systems and expansion units</p> <p>(J) - Features 5065, 5066</p>		
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>		

### Plug and Receptacle type 40

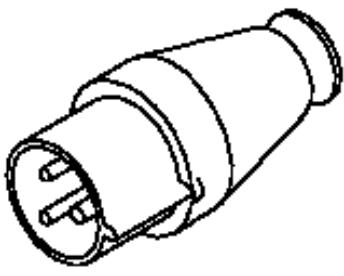

Plug type 40 is a 250 V, 32 A, 3750 plug with a 3753 receptacle.

<p>Plug</p>  <p><b>Type 40 250V 32A</b></p>	<p>Receptacle</p> 	<p>Countries/Regions <i>Manufacturer's Number Russel / Stoll</i></p> <p><b>Plug</b> 3750</p> <p><b>Connector</b> 3933 (DuraGard 9C33U0)</p> <p><b>Receptacle</b> 3753 (DuraGard 9R33U0W)</p> <p>Canada, United States</p>
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<p>Cord Feature</p> <p>4961 + 9180 (C)</p> <p>4961 + 9180 + 9182 (C)</p> <p>1427(G) (J)</p> <p>5104 dual power cord (G)</p> <p>8622 dual power cord (P)</p> <p>9180 (F)</p> <p>9180 + 9182 (F)</p> <p>9080 (H)</p> <p>9801 (P)</p> <p>9987 (P)</p> <p>6655 (Q)</p>	<p>Part Number</p> <p>46F4593 - 1.8 m (6 ft) (C) (F) (G) (J) (P)</p> <p>46F4594 - 4.3 m (14 ft) (C) (F) (G) (H) (J) (P)</p> <p>25R2557 - 4.3 m (14 ft)(Q)</p>
<p>Cord Rating</p> <p>7.2 kVA cord (C) (F) (G) (J) (P)</p>	
<p>Systems and expansion units</p> <p>(C) - Model 53x Processor Side</p> <p>(F) - Models 9406-730, 9406-740, SB1</p> <p>(G) - Models 9406-840, 9406-SB3</p> <p>(H) - 9309 rack</p> <p>(J) - 0550, 0551, 5160, and 7014 racks</p> <p>(P) - 7017 - S85</p> <p>(Q) - 7188 and 9188 power distribution units, model 8234-EMA, 8261-E4S</p>	

### Plug and receptacle type 46 (P+N+E) [32A]

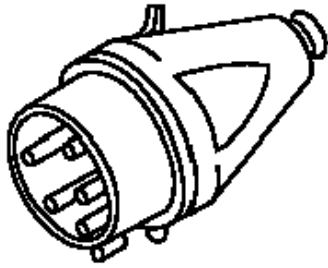
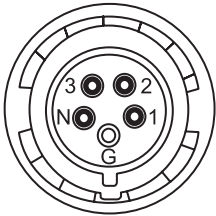
Plug type 46 (P+N+E) is a 250 V, 32 A, IEC 60309 plug.

<p>Plug</p>  <p>Type 46 (P+N+E) 250V 32A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>International Electrotechnical Commission</i></p> <p><b>IEC 309 (32A)</b></p> <p><b>(C) and (F)</b> - Portugal</p> <p><b>(C) only</b> - Austria, Brazil, Czech Republic, Denmark, Estonia, Ethiopia, Finland, Israel, Latvia, Liberia, Liechtenstein, Lithuania, Malaysia, Russia, Saudi Arabia, Somalia, South Africa, Swaziland, Sudan, Sweden, Switzerland, Turkey, Uganda</p>
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Cord Feature	Part Number
Country Code (F)	76X3559 - 4.3 m (14 ft) (C)
1449 (J) (G)	21H7693 - 4.3 m (14 ft) (F) (G) (J) (P)
4961 (C)	
5104 dual power cord (G)	
8622 dual power cord (P)	
9823 (P)	
4961 <sup>1</sup>	
Cord Rating 7.4 kVA cord (C) (F) (G) (J) (P)	
Systems and expansion units	
(C) - Model 53x Processor Side	
(F) - Models 9406-730, 9406-740, SB1	
(G) - Models 9406-840 SB3	
(J) - 0550 and 0551 racks	
(P) - 7017 - S85	
8234-EMA <sup>1</sup>	

### Plug and receptacle type 46 (3P+N+E)

Plug type 46 (3P+N+E) is a 250 V, 16 A, dual phase, IEC 60309 plug.

Plug	Plug Pinout	Countries/Regions <i>International Electrotechnical Commission</i>
		<b>IEC 309</b>  Austria, Czech Republic, Denmark, Estonia, Finland, Israel, Latvia, Liechtenstein, Lithuania, Russia, Sweden, Switzerland, Turkey
Type 46 (3P+N+E) 250 V 16 A, dual phase		
Cord Feature	Part Number	
Country Code (F)	21H7691 - 4.3 m (14 ft) (F) (G) (J)	
1450, (G) (J)	39M5413s <sup>1</sup>	
6489 (Z)		
Cord Rating 3.8 kVA cord (F) (G) (J)		

Systems and expansion units

(F) - Models 9406-730, 9406-740, SB1

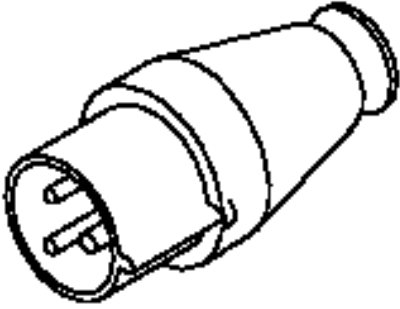

(G) - Models 9406-840 SB3

(J) - 0550 and 0551 racks

(Z) - Model 8234-EMA, 8261-E4S

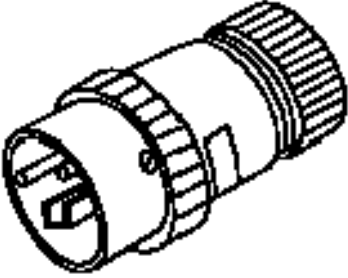

### Plug and receptacle type 46 (P+N+E) [16A]

Plug type 46 (P+N+E) is a 250 V, 16 A, IEC 60309 plug.

<p>Plug</p>  <p>Type 46 (P+N+E) 250V 16A</p>	<p>Receptacle</p> 	<p>Countries/Regions <i>International Electrotechnical Commission</i></p> <p>IEC 60309 (16A)</p>
<p>Cord Feature</p> <p>2961 + 9180 + 9182</p> <p>1414 (I)</p> <p>1421 (C) (K)</p> <p>5103 dual power cord (C)</p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>Migration (J)</p>	<p>Part Number</p> <p>14F1555 - 4.3 m (14 ft) (C) (I) (J) (K)</p>	
<p>Cord Rating 3.8 kVA cord (C) (I) (J) (K)</p>		
<p>Systems and expansion units</p> <p>(C) - Model 9406-830 in a 0550 rack</p> <p>(I) - Models 9910-140, 9910-180</p> <p>(J) - Features 5033, 5034, 5035</p> <p>(K) - Model 9406-830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5079, 8079, 8094, 9074, 9079</p>		



### Plug and receptacle type 51

Plug type 51 is a 125 V, 13 A or 15 A, 3720U-1 plug with a 3743U-1 receptacle.

<p>Plug</p> 	<p>Receptacle</p>  <p><b>Type 51</b> 125V 13A/15A Water Resistant</p>	<p>Countries/Regions <i>Manufacturer's Number Russel/Stoll</i></p> <p><b>Plug</b> 3720U-1 <b>Connector</b> (DuraGard 9C23UI) <b>Receptacle</b> 3743U-1 (DuraGard 9R23U1W)</p> <p>Canada, United States</p>
<p>Cord Feature</p> <p>2960 + 9080 <b>(B)</b> 2960 + 9080 + 9082 <b>(B)</b></p>	<p>Part Number</p> <p>46F5893 - 1.8 m (6 ft) <b>(B)</b> 46F5894 - 4.3 m (14 ft) <b>(B)</b></p>	
<p>Cord Rating 1.6 kVA cord <b>(B)</b> <b>(A)</b></p>		
<p>Systems and expansion units</p> <p><b>(B)</b> - Expansion units 5070, 5072, 5080, 5082</p>		

### Plug and receptacle type 54

Plug type 54 is a 250 V, 15 A, SAA-AS 3112 plug.


<p>Plug</p> 	<p>Receptacle</p>  <p><b>Type 54</b> 250V 15A</p>	<p>Countries/Regions <i>International Electrotechnical Commission</i></p> <p><b>SAA-AS 3112</b></p> <p>Australia, Fiji, New Zealand, Papua New Guinea, Western Samoa</p>
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<p>Cord Feature</p> <p>2961 + 9082</p> <p>1414 <b>(I)</b></p> <p>1409 <b>(C) (J) (K)</b></p> <p>5103 dual power cord <b>(C)</b></p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>Migration <b>(J)</b></p>	<p>Part Number</p> <p>14F1559 and 39M5331<sup>1</sup> - 4.3 m (14 ft) <b>(C) (I) (J) (K)</b></p>
<p>Cord Rating 3.8 kVA cord <b>(C) (I) (J) (K)</b></p>	
<p>Systems and expansion units</p> <p><b>(C)</b> - Model 9406-830 in a 0550 rack</p> <p><b>(I)</b> - Models 9910-140, 9910-180</p> <p><b>(J)</b> - Features 5033, 5034, 5035</p> <p><b>(K)</b> - Model 9406-830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294(x2), 8079, 8093, 8094(x2), 9074, 9079, 9094, 9194</p>	
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>	

### Plug and receptacle type 57


Plug type 57 is a 200 - 240 V, 12 A, NEMA 6-15 plug.

<p>Plug</p>  <p>Type 57 200 - 240 V 12 A</p>	<p>Receptacle <b>Type 57</b> 200 - 240 V 12 A</p>	<p>Countries/Regions <b>NEMA 6-15</b></p> <p>Japan</p>
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Cord Feature	Part Number
6687 (A) (B)	25R2576 and 39M5185 <sup>1</sup> - 1.8 m (6 ft) (A) (B)
6669 (A) (B)	25R2578 and 39M5187 <sup>1</sup> - 4.3 m (14 ft) (A) (B)
6456 (A) (B)	25R2575 and 39M5184 <sup>1</sup> - 4.3 m (14 ft) (A) (B)
6691 (C)	25R2573 and 39M5173 <sup>1</sup> - 1.8 m (6 ft) (A) (B)
	25R2582 and 39M5335 <sup>1</sup> - 4.3 m (14 ft) (A) (B)
	25R2580 and 39M5333 <sup>1</sup> - 1.8 m (6 ft) (A) (B)
	25R2581 and 39M5334 <sup>1</sup> - 2.7 m (9 ft) (A) (B)
	25R2577 and 39M5186 <sup>1</sup> - 2.7 m (9 ft) (A) (B)
	25R2582 and 39M5335 <sup>1</sup> - 4.3 m (14 ft) (C)
Systems and expansion units	
<p>(A) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 9409-M50, 8234-EMA, (T) (U) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796 , 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S</p> <p>(B) - 7311-D11, 7311-D10, 5790, 7314-G30, 5796, 9117-MMA, 9117-MMA, 8204-E8A, 5886, 7214-1U2, 8203-E4A, 9407-M15, 9408-M25, 9409-M50, 8234-EMA, (T) (U) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796 , 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S</p> <p>(C) - Model 9406-830, 9406-SB2, 5074, 5079, 5094, 5294, 8079, 8093, 8094, 9079, 9094, 5033, 5034, 5035, 9194</p>	
<b>Note:</b>	
1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.	

## Plug and receptacle type 59



Plug type 59 is a 125 V, 20 A, JIS C-8303-1983 plug.

<p>Plug</p>  <p>JIS C-8303-1983 Type 59 nonlocking</p> <p style="text-align: right;">IPHAD939-0</p> <p>Type 59 125V 20A</p>	Receptacle <b>Type 59</b> 250V 15A	Countries/Regions <i>JIS C-8303-1983</i>
		Japan

Cord Feature	Part Number
2960 (A) (B)	34G0222 and 39M5198 <sup>1</sup> - 1.8 m (6 ft) (B) (C)
2960 + 9082 (B)	34G0223 and 39M5199 <sup>1</sup> - 2.7 m (9 ft) (A)
6670 (C)	34G0224 and 39M5200 <sup>1</sup> - 4.3 m (14 ft) (B) (C)
6660 (C)	
Cord Rating 1.2 kVA cord (A) (B)	
Systems and expansion units	
(A) - Model 9406-270 [ <i>plug not available for these models in United States</i> ]	
(B) - Expansion units 5070, 5072, 5080, 5082	
(C) - OpenPower 710, 9110-510, and OpenPower 720, 5786, 5787, 7031-D24, 7031-T24, 9115-505, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 7310-C04, 7310-C05, 8204-E8A, 5886, 7214-1U2, 8203-E4A, (T) (U) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786, 5787, 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796, 9117-MMA, 9406-MMA, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S, 9407-M15, 9408-M25, 9409-M50	
<b>Note:</b>	
1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.	

### Plug and receptacle type 62



Plug type 62 is a 250 V, 10 A, CCC certified GB 1053 plug.

Plug	Plug	Countries/Regions <i>International Electrotechnical Commission 320 C13</i>
		<i>CCC certified GB 1053</i>
Type 62 250V 10A		People's Republic of China

<p>Cord Feature</p> <p>1395 <b>(K)</b></p> <p>2961 <b>(B)</b></p> <p>(Default) <b>(H)</b></p> <p>1438 <b>(K) (T)</b></p> <p>1412 <b>(G) (T)</b></p> <p>5102dual power cord (Model 9406-820 only)</p> <p>6452<b>(U)</b></p> <p>6493 <b>(T)</b></p> <p>9831 <b>(N) (P) (Q) (R) (S)</b></p> <p>9908 <b>(Q)</b></p>	<p>Part Number</p> <p>02K0547 and 39M5207<sup>1</sup> - 4.3 m (14 ft) <b>(B) (H) (K) (N) (P) (Q) (R) (S)</b></p> <p>02K0546 and 39M5206<sup>1</sup> - 2.7 m (9 ft) <b>(T)</b></p> <p>02K0544 and 39M5204<sup>1</sup> - 4.3 m (14 ft)<b>(U)</b></p>
<p>Cord Rating 2.4 kVA cord <b>(B) (G) (H) (K) (K) (T)</b></p>	
<p>Systems and expansion units</p> <p><b>(B)</b> - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082</p> <p><b>(G)</b> - Models 9406-250, 9910-080</p> <p><b>(H)</b> - 9251 base I/O, and expansion units 5071, 5073, 5081, 5083</p> <p><b>(K)</b> - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251, 7311-D20</p> <p><b>(N)</b> - pSeries 640 - B80</p> <p><b>(P)</b> - 7025 - pSeries 620 - 6F0, 6F1</p> <p><b>(Q)</b> - pSeries 620 (7028) - 6C1</p> <p><b>(R)</b> - 7026 - M80, pSeries 660 (7026) - 6H0, 6H1, 6M1</p> <p><b>(S)</b> - pSeries 620 (7028) - 6E1</p> <p><b>(T)</b> - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S</p> <p><b>(U)</b> - 7311-D11, 7311-D10, 5790</p>	
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>	

## Plug and receptacle type 64

Plug type 64 is a 250 V, 15 A, iNMETRO plug.

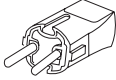

<p>Plug</p> 	<p>Receptacle</p>  <p>Type 64 250V 15A</p>	<p>Countries/Regions <i>International Electrotechnical Commission</i></p> <p><i>iNMETRO</i></p>
<p>Cord Feature</p> <p>2961 + 9082</p> <p>1414 (I) (A)</p> <p>1399 (C) (K) (J)</p> <p>1394 (A)</p> <p>5103 dual power cord (C)</p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>6495 (L)</p> <p>Migration (J)</p>	<p>Part Number</p> <p>36L8885 and 39M5343<sup>1</sup> - 4.3 m (14 ft) (C) (K) (J)</p> <p>36L8884 and 39M5342<sup>1</sup> - 2.7 m (9 ft) (C) (K)</p> <p>39M5341<sup>1,2</sup> - 1.8 m (5.9 ft)</p>	
<p>Cord Rating</p> <p>2.5 kVA cord (A)</p> <p>3.8 kVA cord (C) (I) (J) (K) (L)</p>		
<p>Systems and expansion units</p> <p>(A) - Models 9406-270, 9406-800, 9406-810, 9406-820, 9406-825</p> <p>(C) - Model 9406-830 in a 0550 rack</p> <p>(I) - Models 9910-140, 9910-180</p> <p>(J) - Features 5033, 5034, 5035</p> <p>(K) - Model 9406-830, 9406-SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294(x2), 8079, 8093, 8094(x2), 9074, 9079, 9094, 5033, 5034, 5035, 9194</p> <p>(L) - Models 9406-520, 9111-520, , 9406-525, 9407-515,9406-550, 9113-550, 9406-570, and 9117-570IBM System i5 and System p5 , 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 7042-C07</p>		

**Notes:**

1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.
2. This part uses an IEC 320 C19 receptacle.



**Plug and receptacle type 66**

Plug type 66 is a 200 - 240 V, 10 A, KETI plug.

<b>Plug</b> 	<b>Receptacle</b>  <b>Type 66</b> 200-240 V 10 A	Countries/Regions <i>International Electrotechnical Commission</i>  <b>KETI</b>  North Korea, South Korea
<b>Cord Feature</b>  6496 <b>(A)</b> (when ordered with IBM System i5 and System p5 )  6454 <b>(B)</b>	<b>Part Number</b>  24P6873 and 39M5219 <sup>1</sup> - 2.7 m (9 ft) <b>(A)</b>  24P6877 and 39M5217 <sup>1</sup> - 4.3 m (14 ft) <b>(B)</b>	
<b>Cord Rating</b>  2.5 kVA cord <b>(A)</b>		
<b>Systems and expansion units</b>  <b>(A)</b> - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S  <b>(B)</b> - 7311-D11, 7311-D10, 5790		
<b>Note:</b> 1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.		

**Plug and receptacle type 68**

Plug type 68 is a 200 - 240 V, 10 A, IS6538 plug.

<b>Plug</b> 	<b>Receptacle</b>  <b>Type 68</b> 200-240 V 10 A	Countries/Regions <i>International Electrotechnical Commission</i>  <b>IS6538</b>  India
<b>Cord Rating</b>  2.5 kVA cord <b>(A)</b>		



Systems and expansion units

(A) - Models 9110-510, 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570, OpenPower 710, OpenPower 720, 8234-EMA, 8261-E4S

(B) - 5786, 5787, 7031-D24, 7031-T24, 7311-D10, 7311-D11

### Plug and receptacle type 69

Plug type 69 is a 200 - 240 V, 10 A, IS6538 plug.

<p>Plug</p> 	<p>Receptacle</p>  <p><b>Type 69</b> 200-240 V 10 A</p>	<p>Countries/Regions <i>International Electrotechnical Commission</i></p> <p><b>IS6538</b></p> <p>India</p>
<p>Cord Feature</p> <p>6494 (A) (when ordered with IBM System i5 and System p5)</p> <p>6451 (B)</p>	<p>Part Number</p> <p>74P4424 and 39M5226<sup>1</sup> - 2.7 m (9 ft) (A)</p> <p>74P4422 and 39M5224<sup>1</sup> - 4.3 m (14 ft)(B)</p>	
<p>Systems and expansion units</p> <p>(A) - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S</p> <p>(B) - 7311-D11, 7311-D10, 5790</p>		
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>		

### Plug and receptacle type 70

Plug type 70 is a 100 - 127 V, 15 A, iNMETRO NBR 6147 plug.

Table 697. Plug and receptacle Type 70



<p>Plug</p>  <p><i>Figure 256. Artwork for t4p Type 70 100 - 127 V ac 15 A</i></p>	<p>Receptacle</p>  <p><i>Figure 257. Artwork for t4r</i></p>	<p>Countries/Regions <i>National Electrical Manufacturers Association</i></p> <p><b>iNMETRO NBR 6147</b></p> <p>Brazil</p>
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Table 697. Plug and receptacle Type 70 (continued)

Cord Feature	Part Number
2960 <b>(B)</b>	75G2695 - 2.7 m (9 ft) <b>(G)</b>
2960 + 9082 <b>(B)</b>	49P2109 - 1.8 m (6 ft) <b>(B) (K) (P) (Q) (S)</b>
1398 <b>(B) (K) (U)</b>	49P2111 and 39M5234 <sup>1</sup> - 4.3 m (14 ft) <b>(B) (K) (P) (Q) (U)</b>
6471 <b>(T)</b>	12J5112 - 2.7 m (9 ft) <b>(I)</b>
9800 <b>(P) (Q) (S)</b>	86G7648 - 1.8 m (6 ft) <b>(T)</b>
9900 <b>(Q)</b>	49P2110 and 39M5233 <sup>1</sup> - 2.7 m (9 ft) <b>(T)</b>
5102 dual power cord (Model 9406-820 only)	
Cord Rating	
1.6 kVA Cord <b>(B) (G) (K) (T)</b>	
2.0 kVA cord <b>(I)</b>	
Systems and expansion units	
<b>(B)</b> - Models 53x I/O Side, and expansion units 5070, 5072, 5080, 5082	
<b>(G)</b> - Models 9406-250, 9910-080	
<b>(I)</b> - Models 9910-140	
<b>(K)</b> - Model 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116	
<b>(P)</b> - 7025 - pSeries 620 - 6F0, 6F1, pSeries 640 - B80	
<b>(Q)</b> - pSeries 620 (7028) - 6C1	
<b>(S)</b> - pSeries 620 (7028) - 6E1	
<b>(T)</b> - Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A, 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S	
<b>(U)</b> - 7311-D20	
<b>Note:</b>	
1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.	




## Plug and receptacle type 72

Plug type 72 is a 250 V, 15 A, CCC certified GB 1053 plug.

<p>Plug</p> 	<p>Receptacle</p>  <p>Type 72 250V 15A</p>	<p>Countries/Regions <i>International Electrotechnical Commission 320 C19</i></p> <p><i>CCC certified GB 1053</i></p> <p>People's Republic of China</p>
<p>Cord Feature</p> <p>1396 <b>(J)</b> <b>(K)</b></p> <p>2961 + 9082</p> <p>1414 <b>(I)</b></p> <p>1409 <b>(C)</b> <b>(K)</b></p> <p>5103 dual power cord <b>(C)</b></p> <p>5105 dual power cord (5074 and top expansion unit in 8079)</p> <p>5106 dual power cord (single expansion unit in 5079)</p> <p>Migration <b>(J)</b></p>	<p>Part Number</p> <p>01K9852 and 39M5355<sup>1</sup> - 4.3 m (14 ft) <b>(C)</b> <b>(I)</b> <b>(J)</b> <b>(K)</b></p>	
<p>Cord Rating 3.8 kVA cord <b>(C)</b> <b>(I)</b> <b>(J)</b> <b>(K)</b></p>		
<p>Systems and expansion units</p> <p><b>(C)</b> - Model 9406-830 in a 0550 rack</p> <p><b>(I)</b> - Models 9910-140, 9910-180</p> <p><b>(J)</b> - Features 5033, 5034, 5035</p> <p><b>(K)</b> - Model 9406-830, SB2, 5065, 5066(x2), 5074, 5079(x2), 5094, 5294(x2), 8079, 8093, 8094(x2), 9079, 9094, 9194</p>		
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>		


## Plug and receptacle type 73

Plug type 73 is a 250 V, 15 A plug.

<p>Plug</p>  <p>UNIAO CERTIFICADORA Type 73 nonlocking</p> <p>IPHAD940-0</p>	<p>Receptacle <b>Type 73</b> 250V 15A</p>	<p>Countries/Regions</p> <p>Brazil</p>
<p>Cord Feature</p> <p>1394 (D)</p> <p>6495 (A) (C)</p> <p>6499 (D) (B)</p>	<p>Part Number</p> <p>74P4393 and 39M5240<sup>1</sup> - 2.7 m (9 ft) (A)</p> <p>25R2584 and 39M5240<sup>1</sup> - 2.7 m (9 ft) (A) (C)</p> <p>25R2585 and 39M5241<sup>1</sup> - 4.3 m (14 ft) (B) (D)</p>	
<p>Systems and expansion units</p> <p>(A) - Model 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786, 5787, 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 7314-G30, 5796, 9117-MMA, 9406-MMA, 8204-E8A, 5886, 8203-E4A 9407-M15, 9408-M25, 9409-M50</p> <p>(B) - 7311-D10, 7311-D11 expansion units, 5786, 5787, 7031-D24, 7031-T24</p> <p>(C) - 7310-CR3, 7310-C04, 7310-C05, 7314-G30, 5796, 9117-MMA conref="iphwsym.dita#iphwsym/eclhwpMLxmtm"&gt;, 9406-MMA, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 9409-M50</p> <p>(D) - Model 7311-D20, 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251</p>		
<p><b>Note:</b></p> <p>1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.</p>		

## Plug and receptacle type 74


Plug type 74 is a 250 V, 15 A plug.

<p>Plug</p>  <p>UNIAO CERTIFICADORA Type 73 nonlocking</p> <p>IPHAD940-0</p>	<p>Receptacle <b>Type 74</b> 250V 15A</p>	<p>Countries/Regions</p> <p>Brazil</p>
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Cord Feature	Part Number
6690(A)	25R2585 and 39M5241 <sup>1</sup> - 4.3 m (14 ft) (A)
Systems and expansion units	
(A) - 7311-D10, 7311-D11 expansion units	


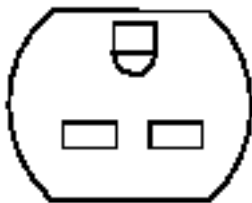
### Plug and receptacle type 75

Plug type 75 is a 100 - 127 V, 10 A, NEMA 5-15P plug.

Plug  UNIAO CERTIFICADORA Type 73 nonlocking IPHAD940-0	Receptacle <b>Type 75</b> 100 - 127 V 10A	Countries/Regions NEMA 5-15P Taiwan
Cord Feature 6651 (A)	Part Number 39M5247 - 2.7 m (9 ft) (A) 39M5246 - 1.8 m (6 ft) (A)	
Systems and expansion units (A) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, OpenPower 710, OpenPower 720, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251, 8203-E4A 9407-M15, 9408-M25, 7042-C07, 9409-M50, 8234-EMA, 8261-E4S		
<b>Note:</b> 1. This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.		

### Plug and receptacle type 76

Plug type 76 is a 200 - 240 V, 15 A plug.

Plug  <b>Type 76</b> 200 - 240 V 15A	Receptacle  <b>Type 76</b> 200-240 V 15A	Countries/Regions Taiwan
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Cord Feature	Part Number
6659 (A)	39M5254 <sup>1</sup> - 2.7 m (9 ft) (A)
6663 (B)	39M5252 <sup>1</sup> - 4.3 m (14 ft) (B)
Systems and expansion units	
(A) - 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, 9117-570, 9115-505, 5786 , 5787 , 7031-D24, 7031-T24, 9111-285, 9131-52A, 9133-55A, 7037-A50, 7047-185, 9116-561, 9110-51A, 9110-510, 9405-520, 7310-CR3, 7310-C04, 7310-C05, 9406-270, 9406-800, 9406-810, 9406-820, 9406-825, 5075, 5077, 5095, 7104, 7116, 9316, 5070, 5071, 5072, 5073, 5080, 5081, 5082, 5083, 9251, 7314-G30, 5796, 9117-MMA, 9406-MMA, 9406-525, 9407-515, 7310-C06, 7310-CR4, 7042-C06, 7042-CR4, 8204-E8A, 5886, 7214-1U2, 8203-E4A 9407-M15, 9408-M25, 9409-M50, 8234-EMA, 8261-E4S	
(B) - 7311-D11, 7311-D10, 5790, 7042-C07	
<b>Note:</b> This part meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.	

## Power cords: Plugs and receptacles

Select the appropriate plug and receptacle type for your system.

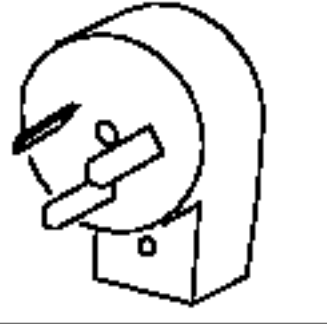
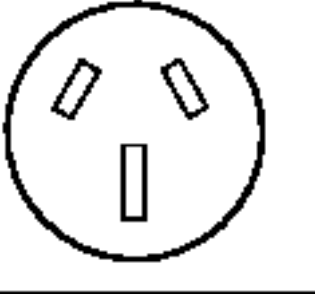
**Note:** When you select a plug and receptacle type, you will see a *Plug and receptacle type* table. Look for your country or region (where your system or server will reside) in the *Countries or regions* section (right side of table) and your model type in the *Systems and expansion units* section (bottom of table). You will find the plug type that supports your system or server in the table that lists both your model and your country or region.

Voltage and amperage	Plug and receptacle type
100 - 127 V 10 A	Type 75
100 - 127 V 10A/15A	Type 70
100 - 127 V 12A/16A	Type 51
100 - 127V 15A	Type 4 , Type 7
100 - 127 V 12A	Type 59
100 - 240 V (maximum 12A @ 100 - 127 V ac, maximum 10A @ 200 - 240 V ac)	Type 26
200 - 240 V 10A	Type 2, Type 66, Type 68, Type 69
200 - 240 V 15A	Type 64
200 - 240V 10A	Type 6, Type 19, Type 24, Type 62, Type 76
200 - 240 V 12 A	Type 57
200 - 240 V 10A/15A	Type 34, Type 73
200 - 240 V 10A/16A	Type 25, Type 32
200 - 240 V 10A/13A	Type 23
200 - 240 V 15A	Type 5, Type 54, Type 10, Type 72, Type 74, Type 76
200 - 240 10A/16A	Type 18, Type 22, Type 46 P+N+E, Type 46 3P+N+E
200 - 240 V 20A	Type 11, Type 29, Type 35
200 - 208, 240 V 30A	Type 12 Type 40
250V 32A	Type 46 P+N+E

Voltage and amperage	Plug and receptacle type
220V 30 A	Type KP
230 - 240 V 30 A	Type PDL

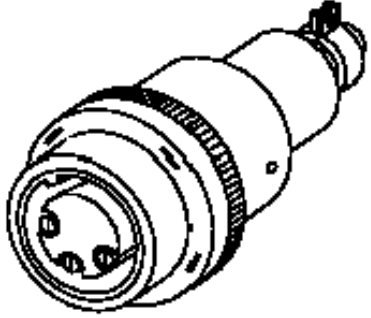

### Plug and receptacle type KP

Plug type KP is a 250 V, 30 A plug.

<p>Plug</p>  <p>Type KP 250V 30A</p>	<p>Receptacle</p> 	<p>Countries/Regions</p> <p>North Korea, South Korea</p>
<p>Cord Feature</p> <p>4961 + 9180 + 9182 (C)</p> <p>1446 (G) (J)</p> <p>5104 dual power cord (G)</p> <p>6658 (R)</p> <p>8622 dual power cord (P)</p> <p>9835 (P)</p> <p>Country Code (F)</p>	<p>Part Number</p> <p>87G6067 - 4.3 m (14 ft) (C) (F) (G) (J) (P)</p> <p>25R2559 - 4.3 m (14 ft)(R)</p>	<p>Cord Rating</p> <p>7.5 kVA cord (C) (F) (G) (J) (P)</p>
<p>Systems and expansion units</p> <p>(C) - Model 53x Processor Side</p> <p>(F) - Models 9406-730, 9406-740, SB1</p> <p>(G) - Models 9406-840 SB3</p> <p>(J) - 0550 and 0551 racks</p> <p>(P) - 7017 - S85</p> <p>(R) - 7188 and 9188 power distribution units, model 8234-EMA, 8261-E4S</p>		



## Plug and receptacle type PDL

Type PDL is a 250 V, 30 A plug.

<p>Plug</p>  <p>Type PDL 250V 30A</p>	<p>Receptacle</p> 	<p>Countries/Regions Australia, Fiji, New Zealand, Papua New Guinea</p>
<p>Cord Feature</p> <p>4961 + 9180 + 9182 (C)</p> <p>1447 (G) (J)</p> <p>1448 (G) (J)</p> <p>5104 dual power cord (G)</p> <p>6657(Q)</p> <p>6444 (R)</p> <p>8622 dual power cord (P)</p> <p>9822 (P)</p> <p>9826 (P)</p> <p>Country Code (F)</p>	<p>Part Number</p> <p>11F0106 - 4.3 m (14 ft) (C) (F) (G) (J) (R)</p> <ul style="list-style-type: none"> <li>(Australia)</li> </ul> <p>11F0107 - 4.3 m (14 ft) (C) (F) (G) (J)</p> <ul style="list-style-type: none"> <li>(New Zealand)</li> </ul>	
<p>Cord Rating 6.0 kVA cord (C) (F) (G) (J) (P)</p>		
<p>Systems and expansion units</p> <p>(C) - Model 53x Processor Side</p> <p>(F) - Models 9406-730, 9406-740, SB1</p> <p>(G) - Models 9406-840 SB3</p> <p>(J) - 0550 and 0551 racks</p> <p>(P) - 7017 - S85</p> <p>(Q) - 7188 and 9188 power distribution units, 8261-E4S</p> <p>(R) - System i 5160 PDU for 0551 rack (System p 7014 racks when ordered with System p server.</p>		


### Plug type 430 P7W and receptacle type 430 R7W

Plug type 430 P7W is a 480 V, 30 A, three-phase plug with a 430 R7W receptacle.

Plug	Receptacle	Countries or regions
		Canada, Japan, United States of America
480V, 30A, three-phase		
Cord Feature	Part Number	
1302 (H)	11P0914 - 1.8 m (6 ft) (H)	
1303 (H)	11P0916 - 4.3 m (14 ft) (H)	
Cord Rating		
<b>Systems and expansion units</b>		
(H) - Models 9406-870 and 9406-890		

### Plug type 460 P9W and receptacle type 460 R9W

Plug type 460 P9W is a 200 - 240 V, 60 A, three-phase plug with a 460 R9W receptacle.

Plug	Receptacle	Countries or regions
		Canada, Japan, United States of America
200-240V, 60A, three-phase		
Cord Feature	Part Number	
1300 (H)	11P0365 - 1.8 m (6 ft) (H)	
1301 (H)	11P0367 - 4.3 m (14 ft) (H)	
Cord Rating		
<b>Systems and expansion units</b>		

Plug	Receptacle	Countries or regions
(H) - Model 9406-890		

## Power cord features

Use the Power cord features table to find the specifications for your power cords.

When ordering power cords (also known as power cables), use power cord options to specify features like length and general plug type.

You can use some of the option numbers in conjunction with each other. For example, 9182 specifies a 4.3 m (14 ft) cord, and 9183 specifies a locking power cord.

The following lists the power cords and a *general* description of the power cord. Select the option number for a full description, including requirements.

**Note:** Some features are not available in all Countries or Regions, for all systems, or with all other options. Select the option number and check the full descriptions of the power cord for these prohibitions.

Table 698. Power cord features

Feature or option code	Voltage	Amperage	Length	System connector	Plug	Comments
1300	200-240 V ac	60 A, 3-phase	1.8 m (6 ft)	04N1868	460P9W wall plug	(9406-870 and 9406-890 only)
1301	200-240 V ac	60 A, 3-phase	4.3 m (14 ft)	04N1868	460P9W wall plug	(9406-870 and 9406-890 only)
1302	480 V ac	30 A, 3-phase	1.8 m (6 ft)	11P0767	430P5W wall plug	(9406-870 and 9406-890 only)
1303	480 V ac	30 A, 3-phase	4.3 m (14 ft)	11P0767,	430P5W wall plug	(9406-870 and 9406-890 only)
1304	380-415 V ac	30 A, 3-phase	4.3 m (14 ft)	11P0918	no wall plug	(9406-870 and 9406-890 only)
1394	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C13	IEC60083 non-locking wall plug	
1395	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	CCC certified GB 1053 non-locking plug	
1396	200-240 V ac	15 A	4.3 m (14 ft)	IEC320-C19	CCC certified GB 1053 plug	
1397	200 V ac	10 A	4.3 m (14 ft)	IEC320-C13	IRAM 2073 non-locking wall plug	
1398	100 V ac	10 A	4.3 m (14 ft)	IEC320-C13	INMETRO NBR 6147 non-locking wall plug	
1399	200 V ac	16 A	4.3 m (14 ft)	IEC320-C19	IEC60083 wall plug	
1401	200-240 V ac		4.3 m (14 ft)	IEC320-C19	NEMA 6-20P wall plug	
1406	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19	NEMA L6-20P locking plug	



Table 698. Power cord features (continued)

1407	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19	water-resistant plug	
1408	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19	CEI-16 non-locking wall plug	
1409	200-240 V ac	15 A	4.3 m (14 ft)	IEC320-C19	AS3112 non-locking plug	
1410	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-C13	NEMA 6-15P non-locking wall plug	
1411	200-240 V ac	12 A	4.3 m (14 ft)	IEC320-C13	NEMA 6-15P non-locking wall plug	
1412	100-127 V ac	12 A	1.8 m (6 ft)	IEC320-C13	NEMA 5-15P non-locking wall plug	
1414	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-C13	NEMA L6-15P locking wall plug	
1415	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-C13	water-resistant plug	
1418	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19	SABS 164 non-locking wall plug	
1419	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19	SII-32 wall plug	
1420	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19	Schuko non-locking wall plug	
1421	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19	IEC 60309 non-locking wall plug	
1422	1. 100-127 V ac 2. 200-240 V ac	1. 12 A 2. 10 A	4.3 m (14 ft)	IEC320-C13	IEC320-C14	Inside the rack, this cord goes from the 516x PDU to the rack drawer
1426	200-240 V ac	24 A	4.3 m (14 ft)	L6-30R	NEMA L6-30P locking plug	This connects the 5160 PDU to the wall power source
1427	200-240 V ac	24 A	4.3 m (14 ft)	L6-30R	Water-resistant plug	This connects the 5160 PDU to the wall power source
1438	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	AS3112 non-locking wall plug	This connects the 5160 PDU to the wall power source
1439	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	Schuko non-locking wall plug	
1440	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	Denmark non-locking wall plug	
1441	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	SABS 164 non-locking wall plug	
1442	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	SEV 24507 non-locking wall plug	

Table 698. Power cord features (continued)

1443	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	BS1363A non-locking wall plug	
1444	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	CEI 23-16 non-locking wall plug	
1445	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	SII-32 non-locking wall plug	
1446	200-240 V ac	30 A	4.3 m (14 ft)	L6-30R	Korean 32 A non-locking wall plug	This cord connects PDU to wall power source
1447	200-240 V ac	30 A	4.3 m (14 ft)	L6-30R	Australian 32 A non-locking wall plug	This cord connects PDU to wall power source
1448	200-240 V ac	30 A	4.3 m (14 ft)	L6-30R	New Zealand 32 A non-locking wall plug	This cord connects PDU to wall power source
1449	200-240 V ac	32 A	4.3 m (14 ft)	IEC 60309	IEC 60309 3-pin non-locking wall plug	This cord connects PDU to wall power source
1450	200-240 V ac	16 A per phase	4.3 m (14 ft)	IEC 60309	IEC 60309 5-pin non-locking wall plug	This cord connects PDU to wall power source (2 of 3 phases)
1451	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-C19	NEMA 6-15P non-locking wall plug	
1452	200-240 V ac	12 A	4.3 m (14 ft)	IEC320-C19	NEMA 6-15P non-locking wall plug	
1453	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-C19	NEMA L6-15P locking wall plug	
1454	200-240 V ac	12 A	4.3 m (14 ft)	IEC320-C19	L6-15P locking wall plug	
1455	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-C19	Water-resistant wall plug	
1456	200-240 V ac	12 A	4.3 m (14 ft)	IEC320-C19	Water-resistant wall plug	
1457	200-240 V ac	12 A	2.7 m (9 ft)	IEC320-C19	NEMA 6-15P non-locking wall plug	
1458	200-240 V ac	12 A	2.7 m (9 ft)	IEC320-C19	NEMA L6-15P locking wall plug	
1459	200-240 V ac	12 A	2.7 m (9 ft)	IEC320-C19	Water-resistant wall plug	
1476	200-240 V ac	13 A	4.3 m (14 ft)	IEC320-C19	BS 1363A non-locking wall plug	
1477	200-240 V ac	16 A per phase	4.3 m (14 ft)	IEC 60309R	IEC 60309 5-pin wall plug	This cord connects the 5163 PDU to wall power source (3 of three-phases)
2960	100-127 V ac	12 A				Low voltage cord feature
2961	200-240 V ac	10 A				High voltage cord feature
4961	200-240 V ac	30 A				Cord feature

Table 698. Power cord features (continued)

6451	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	IS 6538	
6452	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	GB 1053 (CCC Cert)	
6453	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	IRAM 2073	
6454	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C13	KSC 8305	
6455	200-240 V ac	15 A	4.3 m (14 ft)	IEC320-C13		
6456	200-240 V ac	12 A	4.3 m (14 ft)	IEC320-C13	NEMA 6-15	
6458	100-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	IEC320-14	Inside the rack, this cord connects a drawer to the PDU for power
6459	200-240 V ac	10 A	3.66 m (12 ft)	IEC320-C13	IEC320-C14	Inside the rack, this cord connects a drawer to the PDU for power
6460	120-127 V ac	12 A	4.3 m (14 ft)	IEC320-C13	NEMA 5-15 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6461	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	CEE 7 VII	
6462	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	DK2-5e	
6463	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	BS1364A	
6464	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	SII 32-1971	
6465	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	SEV 24507	
6466	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	SABS 1661	
6467	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	CEI 23-16	
6468	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	AS3112-1964, NZS 198	
6469	200-240 V ac	12 A (15 A derated)	4.3 m (14 ft)	IEC320-C13		
6470	100-127 V ac	12 A	1.8 m (6 ft)	IEC320-C13	NEMA 5-15 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6471	100-127 V ac	15 A	2.7 m (9 ft)	IEC320-C13	INMETRO NBR 6147 (NEMA 5-15) non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6472	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	Schucko non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6473	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	CEE Danish non-locking plug	This cord connects a stand-alone or rack drawer to its power source
6474	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	BS1364A non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6475	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	SII 32 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source

Table 698. Power cord features (continued)

6476	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	SEV 24507 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6477	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	SABS 164 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6478	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	CEI 23-16 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6479	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	AS3112	This cord connects a stand-alone or rack drawer to its power source
6487	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-13	NEMA 6-15 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6488	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-13	IRAM 2073 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6489	380-415 V ac	24 A, 3-phase	4.3 m (14 ft)	Souriau UTG (32A)	IEC 60309 (32 A, 3P+N+E) non-locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6491	200-240 V ac	63 A, 1-phase	4.3 m (14 ft)	Souriau UTG	IEC 60309 (63 A, P+N+E) non-locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6492	200-240 V ac	48 A, 1-phase	4.3 m (14 ft)	Souriau UTG	IEC 60309 (60 A, 2P+E) non-locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6493	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	GB53 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6494	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	IS6538 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6495	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	IEC60083-A5 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6496	200-240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	KETI non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6497	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-13	NEMA L6-15 locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6498	200-240 V ac	12 A	1.8 m (6 ft)	IEC320-C13	RS37204-2 water-resistant	This cord connects a stand-alone or rack drawer to its power source

Table 698. Power cord features (continued)

6499	200-240 V ac	15 A	4.3 m (14 ft)	IEC320-C19		
6651	100 - 127 V ac	10 A	2.7 m (9 ft)	IEC320-C13	NEMA 5-15P non-locking wall plug	
6653	380-415 V ac	16 A, 3-phase	4.3 m (14 ft)	Souriau UTG	IEC 60309 (16 A, 3P+N+E) non-locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6654	200-240 V ac	24 A, 1-phase	4.3 m (14 ft)	Souriau UTG	NEMA L6-30P locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6655	200-240 V ac	24 A	4.3 m (14 ft)	Souriau UTG	Water-resistant	This cord connect the 7188 or 9188 PDU to the wall for power
6656	200-240 V ac	32 A	4.3 m (14 ft)	Souriau UTG	IEC 60309 (32 A, P+N+E) non-locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6657	200-240 V ac	24 A	4.3 m (14 ft)	Souriau UTG	Plug type PDL non-locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6658	200-240 V ac	24 A	4.3 m (14 ft)	Souriau UTG	Plug type KP non-locking wall plug	This cord connect the 7188 or 9188 PDU to the wall for power
6659	200 - 240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	NEMA 6-15P	
6660	120-127 V ac	15 A	4.3 m (14 ft)	IEC320-C13	NEMA 5-15 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6663	200-240 V ac	10 A	4.3 m (14 ft)	IEC320-C13 right angle	NEMA 6-15P	
6669	200-240 V ac	12 A (15 A derated)	4.3 m (14 ft)	IEC320-C13		
6670	100-127 V ac	15 A	1.8 m (6 ft)	IEC320-C13	NEMA 5-15 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6671	100-240 V ac	10 A (HV), 12 A (LV)	2.7 m (9 ft)	IEC320-C13	IEC320-C14 wall plug	
6672	100-240 V ac	10 A (HV), 12 A (LV)	1.5 m (5 ft)	IEC320-C13	IEC320-C14 wall plug	
6673	100-240 V ac	10 A	1 m (3.2 ft)	IEC320-C13	IEC320-C14 wall plug	
6680	200 - 240 V ac	10 A	2.7 m (9 ft)	IEC320-C13	AS3112-1964, NZS 198	
6681	200 - 240 V ac	10 A	4.3 m (14 ft)	IEC320-C13	AS3112-1964, NZS 198	
6687	200-240 V ac	15 A	1.8 m (6 ft)	IEC320-13	NEMA 6-15 non-locking wall plug	This cord connects a stand-alone or rack drawer to its power source
6690	200-240 V ac	16 A	4.3 m (14 ft)	IEC320-C19		

Table 698. Power cord features (continued)

6691	200-240 V ac	15 A	4.3 m (14 ft)	IEC320-C19	NEMA 6-15P Denan	
6692	250 V ac	15 A	4.3 m (14 ft)	C19	SAA-AS 3112	
8677	380-415 V ac	30 A	4.3 m (14 ft)		No wall plug provided	
8686	200-240 V ac		4.3 m (14 ft)		IEC 60309 wall plug	
8687	200-240 V ac		1.8 m (6 ft)		IEC 60309 wall plug	
8688	200-240 V ac		4.3 m (14 ft)		IEC 60309 wall plug	
8689	200-240 V ac		1.8 m (6 ft)		IEC 60309 wall plug	
8694	380-415 V ac		4.3 m (14 ft)		No wall plug provided	
8697	480 V ac		4.3 m (14 ft)		IEC 60309 wall plug	
8698	480 V ac		1.8 m (6 ft)		IEC 60309 wall plug	
9080	200-240 V ac					Water-resistant power cord
9081	200-240 V ac	30 A			NEMA L6-30R	Locking power cord
9180	200-240 V ac					Water-resistant power cord
9182	200-240 V ac		4.3 m (14 ft) power cord			
9183	200-240 V ac					Locking power cord

## Power load calculating for 7188 or 9188 power distribution units

Learn how to calculate the power load for power distribution units.

### Rack-mounted 7188 or 9188 power distribution unit

This topic provides the power loading requirements and proper loading sequence for the 7188 or 9188 power distribution unit.

The IBM 7188 or 9188 rack-mounted power distribution unit (PDU) contains 12 IEC 320-C13 outlets connected to six 20 A circuit breakers (two outlets per circuit breaker). The PDU employs an inlet current that allows a variety of power cord options that are listed in the following chart. Based on the power cord that is used, the PDU can supply from 4.8 kVa to 19.2 kVa.

Table 699. Power cord options

Feature code	Power cord description	KVa available
6489	Power cord, PDU to wall, 4.3 m (14 ft), 3-phase, Souriau UTG, IEC 60309 32 A 3P+N+E plug	21.0
6491	Power cord, PDU to wall, 4.3 m (14 ft), 200 - 240 V ac, Souriau UTG, IEC 60309 63 A P+N+E plug	9.6
6492	Power cord, PDU to wall, 4.3 m (14 ft), 200 - 240 V ac, Souriau UTG, IEC 60309 60 A 2P+E plug	9.6

Table 699. Power cord options (continued)

Feature code	Power cord description	KVa available
6653	Power cord, PDU to wall, 4.3 m (14 ft), 3-phase, Souriau UTG, IEC 60309 16A 3P+N+E plug	9.6
6654	Power cord, PDU to wall, 4.3 m (14 ft), 200 - 240 V ac, Souriau UTG, Plug type 12 plug	4.8
6655	Power cord, PDU to wall, 4.3 m (14 ft), 200 - 240 V ac, Souriau UTG, Plug type 40 plug	4.8
6656	Power cord, PDU to wall, 4.3 m (14 ft), 200 - 240 V ac, Souriau UTG, IEC 60309 32 A P+N+E plug	4.8
6657	Power cord, PDU to wall, 4.3 m (14 ft), 200 - 240 V ac, Souriau UTG, Plug type PDL plug	4.8
6658	Power cord, PDU to wall, 4.3 m (14 ft), 200 - 240 V ac, Souriau UTG, Plug type KP plug	4.8

## Loading requirements

The power loading of the 7188 or 9188 PDU must follow these rules:

1. Total power load connected to the PDU must be limited to below the kVa listed in the table.
2. Total power load connected to any one circuit breaker must be limited to 16 A (derating of circuit breaker).
3. Total power load connected to any one IEC320-C13 outlet must be limited to 10 A.

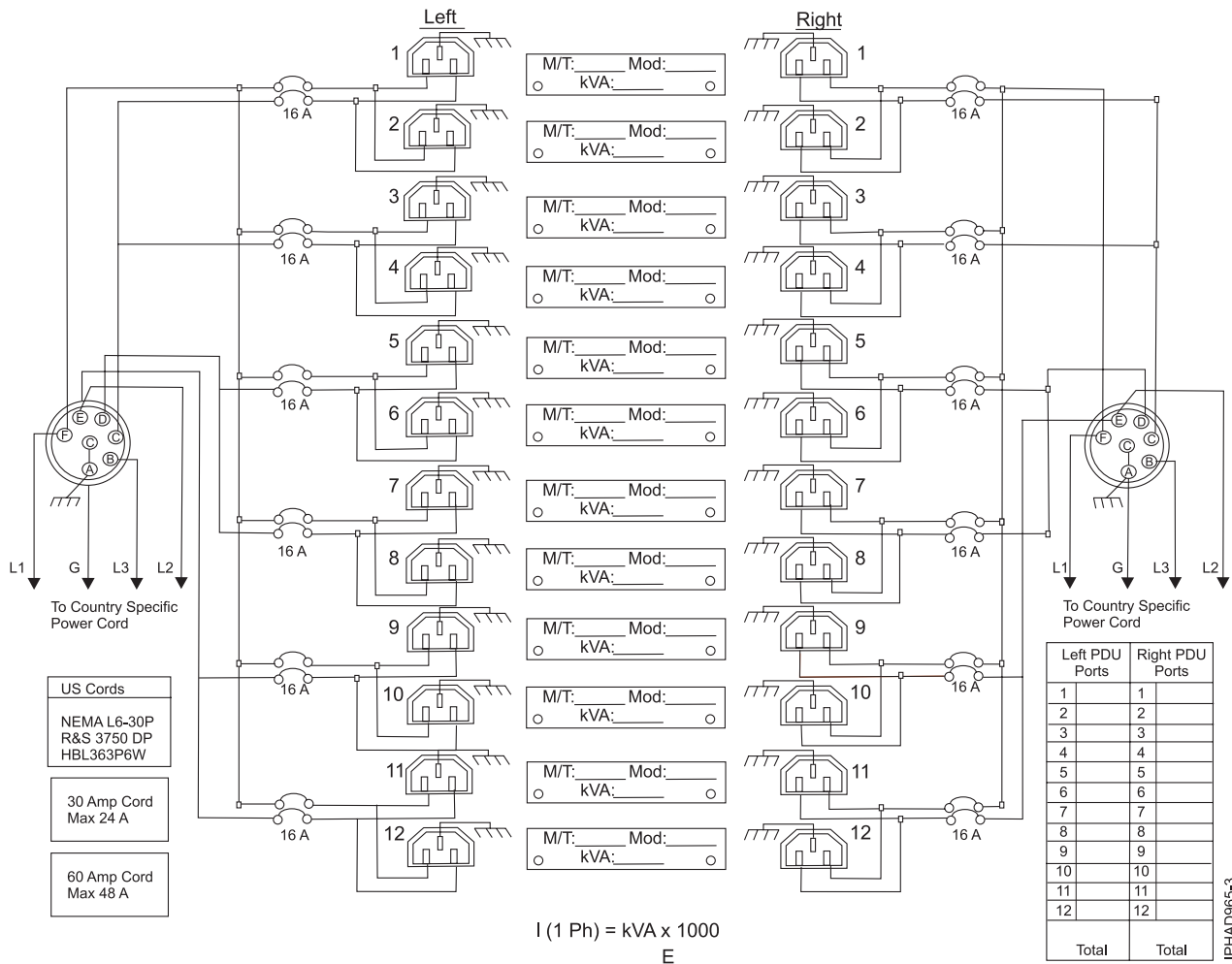
**Note:** The load on the PDU when a dual line configuration is used will only be half the total load of the system. When calculating the power load on the PDU, you must include the total power load of each drawer even if the load is distributed over two PDUs.

## Loading sequence

Follow these loading sequence steps:

1. Collect power requirements for all units that will be connected to the 7188 or 9188 PDU. See your server specifications for specific power requirements.
2. Sort list by total power required from highest power draw to lowest power draw.
3. Connect highest power drawer to outlet 1 on circuit breaker 1.
4. Connect next highest power drawer to outlet 3 on circuit breaker 2.
5. Connect next highest power drawer to outlet 5 on circuit breaker 3.
6. Connect next highest power drawer to outlet 7 on circuit breaker 4.
7. Connect next highest power drawer to outlet 9 on circuit breaker 5.
8. Connect next highest power drawer to outlet 11 on circuit breaker 6.
9. Connect next highest power drawer to outlet 12 on circuit breaker 6.
10. Connect next highest power drawer to outlet 10 on circuit breaker 5.
11. Connect next highest power drawer to outlet 8 on circuit breaker 4.
12. Connect next highest power drawer to outlet 6 on circuit breaker 3.
13. Connect next highest power drawer to outlet 4 on circuit breaker 2.
14. Connect next highest power drawer to outlet 2 on circuit breaker 1.

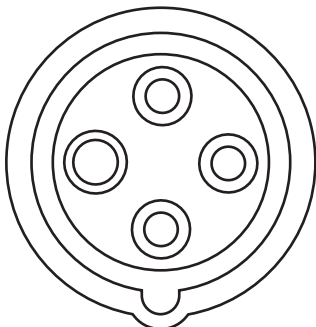
Following these rules will allow the load to be distributed more evenly across the six PDU circuit breakers. Ensure that your total power load is below the maximum listed in the table and that each circuit breaker is not loaded above 15 A.



### Power cord 1300 for models 9406-870 and 9406-890

This option is the 3-phase, 200-240 V ac, 60 A, 1.8 m (6 ft) power cord with part number 04N1868 machine input connector, and a 460R9W plug on the wall side.

Install the IEC 60309 receptacle in a metal-backed box with the green wire ground-connected to the grounding lug within the box. Ensure continuity between the box and the metallic shielding of the conduit.

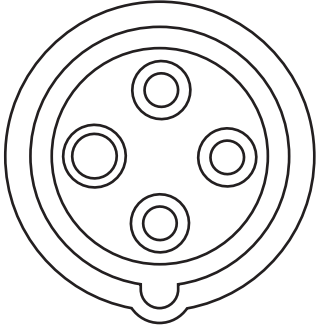




### **Power cord 1301 for models 9406-870 and 9406-890**

This option is the 3-phase, 200-240 V ac, 60 A, 4.3 m (14 ft) power cord with part number 04N1868 machine input connector, and a 460R9W plug on the wall side.

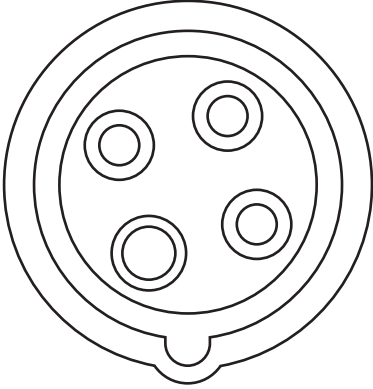
Install the IEC 60309 receptacle in a metal-backed box with the green wire ground-connected to the grounding lug within the box. Ensure continuity between the box and the metallic shielding of the conduit.



### **Power cord 1302 for models 9406-870 and 9406-890**

This option is the 3-phase, 480 V ac, 30 A, 1.8 m (6 ft) power cord with part number 11P0767 machine input connector, and a 430R5W plug on the wall side.

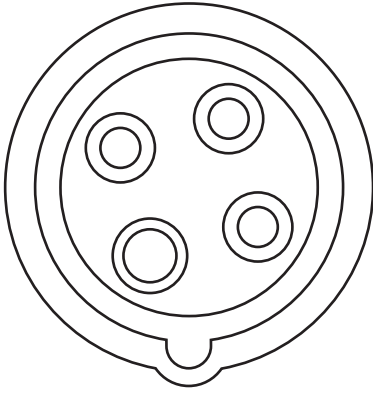
Install the IEC 60309 receptacle in a metal-backed box with the green wire ground-connected to the grounding lug within the box. Ensure continuity between the box and the metallic shielding of the conduit.



### **Power cord 1303 for models 9406-870 and 9406-890**

This option is the 3-phase, 480 V ac, 30 A, 4.3 m (14 ft) power cord with part number 11P0767 machine input connector, and a 430R5W plug on the wall side.

Install the IEC 60309 receptacle in a metal-backed box with the green wire ground-connected to the grounding lug within the box. Ensure continuity between the box and the metallic shielding of the conduit.



### **Power cord 1304 description**

This option is the 3-phase, 380-415 V ac, 30 A, 4.3 m (14 ft) power cord with part number 11P0918 machine input connector, and no plug on the wall side.

### **Power cord 1394 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and an IEC60083 plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, and 9117-570, 570, 9406-270, and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1395 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and a CCC certified GB 1053 plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, and 9117-570, models 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-820
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1396 description**

This option is the 200-240 V ac, 15 A, 4.3 m (14 ft) power cord with an IEC 320-C19 machine input connector and a CCC certified GB 1053 plug

This option is used on the following:

- Models 9406-830 and SB2
- 9079 I/O unit and 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 5094 PCI-X expansion unit

- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### **Power cord 1397 description**

This option is the 200 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC320-C13 system connector and an IRAM 2073 wall plug

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270, 9406-800, 9406-810, and 9406-820
- 5075, 5077, 5095, 7104, and 7116 expansion units

### **Power cord 1398 description**

This option is the 100 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC320-C13 system connector and iNMETRO NBR 6147 wall plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270, 9406-800, 9406-810, and 9406-820
- 5075, 5095, 7104, and 7116 expansion units

### **Power cord 1399 description**

This option is the 200 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC320-C19 system connector and IEC60083 wall plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 and 5094 expansion units

### **Power cord 1401 description**

This option is the 200-240 V ac, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and a NEMA 6-20P plug on the wall side for the 5065 and 5066 (two cords needed).

### **Power cord 1406 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) twist lock/locking power cord with an IEC320-C1 machine input connector and L6-15 wall plug

This option is used on the following:

- Models 9406-830 and SB2
- The 5065, 5066 (two cords needed), 5074 PCI expansion unit, and 5079 (two cords needed) the 1.8M I/O rack
- The 9079 Base I/O Tower in Argentina and Cape Verde Islands only, but worldwide for just the 5065, 5066 (two cords needed).
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### **Power cord 1407 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) water-resistant power cord with an IEC320-C19 machine input connector and water-resistant wall plug for just the 5065 and 5066 (two cords needed).

### **Power cord 1408 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC 320-C19 machine input connector and a CEI16 plug.

This option is used on the following:

- 5079 1.8M I/O rack
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack
- 9079 I/O unit and 5074 PCI expansion unit
- Model 8234-EMA
- 8261-E4S
- Models 9406-830 and SB2

### **Power cord 1409 description**

This option is the 200-240 V ac, 15 A, 4.3 m (14 ft) power cord with an IEC 320-C19 machine input connector and an AS3112 plug.

This option is used on the following:

- Models 9406-830 and SB2
- 9079 I/O unit and 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### **Power cord 1410 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) power cord with an IEC 320-C13 machine input connector and NEMA 6-15P wall plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1411 description**

This option is the 200-240 V ac, 12 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and NEMA 6-15P wall plug.

This option is used on the following:

- Models 9406-270, 9406-810, 9406-820, and 9406-825
- 5075 PCI expansion unit, 5077 migration tower, and 5095 PCI-X expansion unit
- 7104 system unit expansion sidecar

### **Power cord 1412 description**

This option is the 100-127 V ac, 12 A, 1.8 m (6 ft) power cord with an IEC 320-C13 machine input connector and NEMA 5-15P wall plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit

- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1414 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) power cord with a twist-lock and an IEC 320-C13 machine input connector.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1415 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) water-resistant power cord with an IEC320-C13 machine input connector.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1418 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and SABS164 wall plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### **Power cord 1419 description**

This option is the 200 - 240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and SII-32 plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack

- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### **Power cord 1420 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and Schuko plug.

This option is used on the following:

- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### **Power cord 1421 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and IEC 60309 plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### **Power cord 1422 description**

This option is the 100-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC320-C13 that connects to IEC320-C14, and requires 5160, 5161, or 5162.

### **Power cord 1426 description**

This option is the 200-240 V ac, 24 A, 4.3 m (14 ft) locking power cord with a NEMA L6-30P wall plug and L6-30R machine input connector for the models 9406-840, SB3, and 0550 and 0551.

### **Power cord 1427 description**

This option is the 200-240 V ac, 4.3 m (14 ft) water-resistant power cord with a RS 3570 wall plug and a L6-30R machine input connector for models 9406-840, SB3, and 0550 and 0551.

### **Power cord 1438 description**

This option is the 200-240 V ac, 30 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and an AS3112 plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810

- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1439 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and Schuko plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1440 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and a Denmark wall plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1441 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and an SABS164 plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1442 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord.

This option is used on the following:

- Model 9406-520
- Model 9111-520
- Model 9406-570
- Model 9117-570
- 9406-270
- 9406-820
- 7104 expansion unit

- 5077 migrated rack

### **Power cord 1443 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and a BS 1363 A plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1444 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and a CEI23-16 plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1445 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and an SII-32 plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-570, 9117-570, 9406-270 and 9406-820
- 5075 PCI expansion unit
- 7104 attached expansion unit
- Model 9406-800 or 9406-810
- Model 9406-825
- 5095 PCI-X expansion unit

### **Power cord 1446 description**

This option is the 200-240 V ac, 30 A, 4.3 m (14 ft) power cord with an IEC 60309 machine input connector and 32 A Korean plug.

This option is used on the following:

- Model 9406-840
- Model SB3

### **Power cord 1447 description**

This option is the 200-240 V ac, 30 A, 4.3 m (14 ft) power cord with an IEC 60309 machine input connector and 32 A Australian plug.

This option is used on the following:



- Model 9406-840
- Model SB3

### **Power cord 1448 description**

This option is the 200-240 V ac, 30 A, 4.3 m (14 ft) power cord with an IEC 60309 machine input connector and 32 A New Zealand plug.

This option is used on the following:

- Model 9406-840
- Model SB3

### **Power cord 1449 description**

This option is the 200-240 V ac, 32 A, 4.3 m (14 ft) power cord with an IEC 60309 machine input connector and 3-pin, IEC 60309 plug.

This option is used on the following:

- Model 9406-840
- Model SB3

### **Power cord 1450 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC 60309 machine input connector and 5-pin, IEC 60309 plug.

This option is used on the following:

- Model 9406-840
- Model SB3

### **Power cord 1451 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) power cord with an IEC320-C19 machine input connector and NEMA 6-15P plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1452 description**

This option is the 200-240 V ac, 12 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and NEMA 6-15P plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit

- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 5096
- 5296

### **Power cord 1453 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) power cord with an IEC320-C19 machine input connector and a NEMA L6-15P twist-lock plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1454 description**

This option is the 200-240 V ac, 12 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and NEMA L6-15P twist-lock plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1455 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) power cord with an IEC320-C19 machine input connector and water-resistant plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1456 description**

This option is the 200-240 V ac, 12 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and water-resistant plug.

This option is used on the following:

- Models 9406-830 and SB2
- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1457 description**

This option is the 200-240 V ac, 12 A, 2.7 m (9 ft) upper power cord with an IEC320-C19 machine input connector and NEMA 6-15P plug.

This option is used on the following:

- 5079 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1458 description**

This option is the 200-240 V ac, 12 A, 2.7 m (9 ft) upper power cord with an IEC320-C19 machine input connector and NEMA 6-15P twist-lock plug.

This option is used on the following:

- 5079 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1459 description**

This option is the 200-240 V ac, 12 A, 2.7 m (9 ft) upper power cord with an IEC320-C19 machine input connector and a water-resistant plug.

This option is used on the following:

- 5079 1.8M I/O rack
- 8094 1.8M I/O rack
- 5096
- 5296

### **Power cord 1476 description**

This option is the 200-240 V ac, 13 A, 4.3 m (14 ft) power cord with an IEC320-C19 machine input connector and BS 1363 A non-locking plug.

This option is used on the following:

- Models 9406-830 and SB2

- 5074 PCI expansion unit
- 5079 1.8M I/O rack
- 9079 I/O unit
- 5094 PCI-X expansion unit
- 5294 1.8M I/O rack
- 8094 1.8M I/O rack

### Power cord 1477 description

This option is the 200-240 V ac, 16 A per phase, 4.3 m (14 ft) power cord with an IEC 60309R machine input connector that connects the 5163 PDU to the wall power source.

### Power cord 2960 description

This option specifies all power cords for the ordered system unit to be low voltage (100-127 V ac).

The following conditions apply to the use of this option.

- The 2960 option affects the power cord for models 200, 20S, and 4xx System Units; the 3xx, 5xx, 600, and S10 System Towers; and the 5060, 5061, 5062, 5063, 5070, 5072, 5080, and 5082 expansion units.
- This voltage feature is not used by models 620, 640, 650, 7xx, and 9406-8xx; models S20, S30, S40, SB1, SB2, and SB3; the 5071, 5073, 5074, 5079, 5065, 5066, 5075, 5081, 5083, and Expansion Units; and the 5033, 5034, 5035, and 5077 Migration Units.
- You can add the specification codes 9080, 9082, and 9083 in addition to 2960 to specify other attributes of the line-cord such as length and plug type.
- You must specify the I/O side of 530 and 53S system towers separately, using either 2960 or 2961.
- 2961 is not allowed on the same power cord as 2960.

### Power cord 2961 description

This option specifies all power cords for the ordered system unit to be high voltage (200-240 V ac).

The following conditions apply to the use of this option.

- The 2961 option affects the power cord for models 200, 20S, and 4xx System Units; models 3xx, 5xx, 600, and S10 System Towers; and the 5060, 5061, 5062, 5063, 5070, 5072, 5080, and 5082 expansion units.
- This voltage feature is **not used by** models 620, 640, 650, 7xx, and 9406-8xx; models S20, S30, S40, SB1, SB2, and SB3; the 5071, 5073, 5074, 5079, 5065, 5066, 5075, 5081, 5083, and Expansion Units; and the 5033, 5034, 5035, and 5077 Migration Units.
- **You can add the specification codes** 9080, 9082, and 9083 in addition to 2961 to specify other attributes of the line-cord such as length and plug type.
- **You must specify** the I/O side of 530 and 53S system towers separately, using 2960 or 2961.
- 2960 is **not allowed** on the same power cord as 2961.

### Power cord 4961 description

This option specifies that the power cord for the processor side of model 53x System Tower is 30 A and 200-240 V ac.

The following conditions apply to the use of this option.

- Models 640, 650, 9406-730, 9406-740, and 9406-840 and models S30, S40, SB1, and SB3 **do not use this power cord**.
- 4961 does not affect other power cords of the system.
- There is **no 120 Volt option** on the processor side of the 53x System Tower; models 640, 650, 9406-730, 9406-740, and 9406-840; or models S30, S40, SB1, and SB3.
- **You can add the specification codes** 9180, 9182, and 9183 in addition to 4961 to specify other attributes of the power cord such as length and plug type for the processor side.

### **Power cord 5102 description**

This option is for a dual power cord.

This option is for a model 9406-820. Two 14xx power cords must be ordered for each 5102 on a model 9406-820 initial order.

### **Power cord 5103 description**

This option is for a dual power cord.

This option is for a model 9406-830 or SB2. Two 14xx power cords must be ordered for each 5103 on a model 9406-830 or SB2 initial order.

### **Power cord 5104 description**

This option is the dual power cord.

This option is for a model 9406-840 or SB3. Two 14xx power cords must be ordered for each 5104 on a model 9406-840 or SB3 initial order.

### **Power cord 5105 description**

This option is the dual power cord.

This option is for a 5074 expansion unit and for the top unit in a 8079 expansion unit.

- Two 14xx power cords must be ordered for each 0574 expansion unit with a 5101 when a 5101 is ordered on a 5074 initial order. Batteries are not included and two 840 W power supplies are included.
- When ordering a 5105 for an existing 5074 expansion unit, one additional 14xx power cord must be ordered. The batteries are removed and the 765 W power supplies are replaced with two 840 W power supplies. A 5074 expansion unit installed in a 0551 rack is supported with this feature.

Note: If the 5074 expansion unit has 5101 installed, 5105 must be converted to 5111 (no parts included).

### **Power cord 5106 description**

This option is for a dual power cord.

This option provides dual power cord capability for a single unit in a 5079 expansion unit.

- Two 14xx power cords must be ordered for each 5106 when a 5106 is ordered on a 5079 initial order. Batteries are not included and two 840 W power supplies are included.
- When ordering a 5106 for an existing 5079 expansion unit, one additional 14xx power cord must be ordered. The batteries are removed and the 765 W power supplies are replaced with two 840 W power supplies.

The configurator will default a quantity of two 5106s for each 5079 expansion unit on a server that has dual power cords.

### **Power cord 6451 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and IS 6538 wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6452 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and GB 1053 (CCC Cert) wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6453 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and IRAM 2073 wall plug.

This option is used on the following:

- 7311-D10
- 7311-D11

### **Power cord 6454 description**

This option is the 200 - 240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and KSC 8305 wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6455 description**

This option is the 200-240 V ac, 15 A, 4.3 m (14 ft) power cord with an IEC320-C13 machine input connector.

This option is used on the following:

- 7311-D11
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6456 description**

This option is the 200-240 V ac, 12 A, 4.3 m (14 ft) power cord with an IEC320-C13 machine input connector.

This option is used on the following:

- 7311-D11

### **Power cord 6458 description**

This option is the 100-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and an IEC 320-C14 plug.

This option is used on the following:

- 5095 PCI-X expansion unit

- 5802
- 5886
- 7037-A50
- 7047-185
- 7214-1U2
- 8203-E4A
- 8204-E8A
- 8234-EMA
- 8261-E4S
- 9111-285
- 9111-520
- 9115-505
- 9116-561
- 9113-550
- 9117-MMA
- 9117-570
- 9131-52A
- 9133-55A
- 9406-MMA
- 9406-520
- 9406-550
- 9406-570
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6459 description**

This option is the 200-240 V ac, 10 A, 3.66 m (12 ft) power cord with an IEC 320-C13 machine input connector and an IEC 320-14 plug.

This option is used on the following:

- 5790,
- 7311-D10, 7311-D11
- 8234-EMA
- 8261-E4S

### **Power cord 6460 description**

This option is the 120-127 V ac, 12 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and an NEMA 5-15 plug.

This option is used on the following:

- 5786
- 5787
- 5886
- 7031-D24
- 7031-T24
- 7037-A50

- 7047-185
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 8204-E8A
- 8261-E4S
- 9111-285
- 9115-505
- 9111-520
- 9113-550
- 9131-52A
- 9133-55A
- 9406-520
- 9406-525
- 9406-550
- 9407-515
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6461 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and CEE 7 VII wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6462 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and DK2-5e wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6463 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and BS1364A wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit



### **Power cord 6464 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and SII 32-1971 wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6465 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and SEV 24507 wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6466 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and SABS 1661 wall plug.

This option is used on the following:

- 7311-D10
- 7311-D11
- 5790

### **Power cord 6467 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and CEI23-16 wall plug.

This option is used on the following:

- 7311-D10
- 7311-D11
- 5790

### **Power cord 6468 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and AS3112-1964, NZS 198 wall plug.

This option is used on the following:

- 7311-D10, 7311-D11

### **Power cord 6469 description**

This option is the 200 - 240 V ac, 12 A (15 A derated), 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit

- 5796
- 5886
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 7037-A50
- 7047-185
- 7214-1U2
- 7314-G30
- 8203-E4A
- 8204-E8A
- 8234-EMA
- 8261-E4S
- 9111-285
- 9111-520
- 9113-550
- 9115-505
- 9116-561
- 9117-MMA
- 9117-570
- 9131-52A
- 9133-55A
- 9406-MMA
- 9406-525
- 9407-M15
- 9407-515
- 9408-M25
- 9409-M50

### **Power cord 6470 description**

This option is the 100-127 V ac, 12 A, 1.8 m (6 ft) power cord with an IEC 320-C13 machine input connector and NEMA 5-15 wall plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-550, and 9113-550
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 8203-E4A
- 8204-E8A
- 8261-E4S
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A

- 7037-A50
- 7047-185
- 9406-525
- 9407-515
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6471 description**

This option is the 100-127 V ac, 15 A, 2.7 m (9 ft) power cord with an IEC320-C13 system connector and an iNMETRO NBR 6147 non-locking wall plug.

This option is used on the following:

- 5786 expansion unit
- 5787 expansion unit
- 5886
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 7037-A50
- 7047-185
- 7214-1U2
- 8203-E4A
- 8204-E8A
- 8234-EMA
- 8261-E4S
- 9111-285
- 9111-520
- 9113-550
- 9115-505
- 9117-570
- 9131-52A
- 9133-55A
- 9406-520
- 9406-550
- 9406-570
- 9406-525
- 9407-M15
- 9407-515
- 9408-M25
- 9409-M50

### **Power cord 6472 description**

This option is the 200-240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and Schuko plug.

This option is used on the following:

- 9406-5209117-570

- 9113-550
- 9111-520
- 9406-550
- 9406-570
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 8261-E4S
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6473 description**

This option is the 200-240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and a CEE wall plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 8261-E4S

- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6474 description**

This option is the 200-240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and a BS 1364 A plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 8261-E4S
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA

- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6475 description**

This option is the 200-240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and an SII-32 plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 8261-E4S
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15

- 9408-M25
- 9409-M50

### **Power cord 6476 description**

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and an SEV24507 wall plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550,
- 9113-550
- 9406-570,
- 9117-570
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 8261-E4S
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6477 description**

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and an SABS164 plug.

This option is used on the following:

- Models 9406-520
- 9111-520

- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 8261-E4S
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6478 description**

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and a CEI23-16 plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit



- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6479 description**

This option is the 200-240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and an AS3112 plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570
- 5095 PCI-X expansion unit when ordered with IBM System i5 and System p5
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9406-525
- 9407-515

### **Power cord 6487 description**

This option is the 200 - 240 V ac, 12 A, 1.8 m (6 ft) power cord with an IEC 320-C13 machine input connector and NEMA 6-15 wall plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 8203-E4A
- 8234-EMA
- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6488 description**

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC320-C13 system connector and an IRAM 2079 wall plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5095 PCI-X expansion unit when ordered with IBM System i5 and System p5
- 5786 expansion unit
- 5787 expansion unit

- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 8261-E4S
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### Power cord 6489 description

This option is the 380 - 415 V ac, 24 A, 3-phase, 24 A, 4.3 m (14 ft) power cord with a Souriau UTG (32A) system connector and an IEC 60309 (32 A, 3P+N+E) non-locking wall plug.

This option is used on the following:

- FC 7188
- 8234-EMA
- 8261-E4S
- FC 9188



### Power cord 6491 description

This option is the 200 - 240 V ac, 63 A, 1-phase, 4.3 m (14 ft) power cord with a Souriau UTG system connector and an IEC 60309 (63 A, P+N+E) non-locking wall plug.

This option is used on the following:

- FC 7188
- Model 8234-EMA
- 8261-E4S

- FC 9188



### Power cord 6492 description

This option is the 200 - 240 V ac, 48 A, 1-phase, 4.3 m (14 ft) power cord with a Souriau UTG system connector and an IEC309 (63A, 2P+G) locking wall plug. The wall plug is a 363P6W and is compatible with a 360R6W receptacle or a 360C6W connector.

This option is used on the following:

- FC 7188
- Model 8234-EMA
- 8261-E4S
- FC 9188



### Power cord 6493 description

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and a GB 53 plug.

This option is used on the following:

- Models 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796

- 8261-E4S
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6494 description**

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and a IS 6538 plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570
- 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 8261-E4S
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2

- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6495 description**

This option is the 200-240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and an IEC 60083-AS plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6496 description**

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector with a KETI wall plug.

This option is used on the following:

- 9406-520
- 9111-520
- 9406-550
- 9113-550
- 9406-570

- 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 8261-E4S
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6497 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) power cord with a twist-lock and an IEC 320-C13 machine input connector and a NEMA L6-15 locking wall plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9111-285
- 9131-52A
- 9133-55A
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA

- 9406-525
- 9407-515

### **Power cord 6498 description**

This option is the 200-240 V ac, 12 A, 1.8 m (6 ft) water-resistant power cord with an IEC320-C13 machine input connector and RS37204-2 water-resistant plug.

This option is used on the following:

- Models 9406-520, 9111-520, 9406-550, 9113-550, 9406-570, and 9117-570
- 5095 PCI-X expansion unit
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9406-525
- 9407-515

### **Power cord 6499 description**

This option is the 200-240 V ac, 15 A, 4.3 m (14 ft) non-locking power cord with an IEC320-C19 machine input connector.

This option is used on the following:

- 7311-D10, 7311-D11
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit

### **Power cord 6651 description**

This option is the 100 - 127 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and NEMA 5-15P wall plug.

This option is used on the following:

- 9113-550
- 9406-520
- 9406-550
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA



- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6653 description**

This option is the 380 - 415 V ac, 16 A, 3-phase, 4.3 m (14 ft) power cord with a Souriau UTG system connector and an IEC 60309 (16 A, 3P+N+E) non-locking wall plug.

This option is used on the following:

- 8234-EMA
- 8261-E4S

### **Power cord 6654 description**

This option is the 200 - 240 V ac, 24 A, 1-phase, 4.3 m (14 ft) power cord with a Souriau UTG system connector and a NEMA L6-30P locking wall plug.

This option is used on the following:

- 8234-EMA
- 8261-E4S

### **Power cord 6655 description**

This option is the 200 - 240 V ac, 24 A, 4.3 m (14 ft) power cord with a Souriau UTG system connector and a water-resistant wall plug.

This option is used on the following:

- 8234-EMA
- 8261-E4S

### **Power cord 6656 description**

This option is the 200 - 240 V ac, 32 A, 4.3 m (14 ft) power cord with a Souriau UTG system connector and an IEC 60309 (32 A, P+N+E) non-locking wall plug.

This option is used on the following:

- 8234-EMA
- 8261-E4S

### **Power cord 6657 description**

This option is the 200 - 240 V ac, 24 A, 4.3 m (14 ft) power cord with a Souriau UTG system connector and a plug type PDL non-locking wall plug.

This option is used on the following:

- 8234-EMA
- 8261-E4S

### **Power cord 6658 description**

This option is the 200 - 240 V ac, 24 A, 4.3 m (14 ft) power cord with a Souriau UTG system connector and a plug type KP non-locking wall plug.

This option is used on the following:

- 8234-EMA
- 8261-E4S

## Power cord 6659 description

This option is the 200 - 240 V ac, 10 A, 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and NEMA 6-15P wall plug.

This option is used on the following:

- 8261-E4S
- 9110-510
- 9111-520
- 9113-550
- 9115-505
- 9117-570
- 9406-520
- 9406-550
- 9406-570
- 9406-270
- 9406-800
- 9406-810
- 9406-820
- 9406-825
- OpenPower 705
- OpenPower 710
- OpenPower 720
- 7031-D24
- 7031-T24
- 7311-D20
- 5095
- 5786
- 5787
- 7310-CR3
- 9114-275
- 9114-285
- 7028-6C1/6E1
- 9112-265
- 7029-6C3/6E3
- 7025-6F0/6F1
- 7028-6C4
- 7028-6E4
- 7026-B80
- 7038-6M2
- 5075
- 5077
- 5095
- 7104
- 7116
- 9115-505
- 9111-285

- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6660 description**

This option is the 120-127 V ac, 15 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and an NEMA 5-15 plug.

This option is used on the following:

- OpenPower 720
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6663 description**

This option is the 200-240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 right-angle machine input connector.

This option is use on the following:

- 7311-D11, 7311-D10, 5790 expansion units

### **Power cord 6665 description**

This option is the 200 - 240 V ac, 10 A single phase cord with an IEC320/C13 and an IEC320/C20 plug type.

This option is used on the following:

- 8234-EMA
- 8261-E4S

### **Power cord 6669 description**

This option is the 200 - 240 V ac, 12 A (15 A derated), 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector.

This option is used on the following:

- OpenPower 720
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6670 description**

This option is the 100-127 V ac, 15 A, 1.8 m (6 ft) power cord with an IEC 320-C13 machine input connector and NEMA 5-15 wall plug.

This option is used on the following:

- OpenPower 720
- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9115-505
- 9111-285

- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 8204-E8A
- 8203-E4A
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6671 description**

This option is the 100 - 240 V ac, 10 A (HV), 12 A (LV), 2.7 m (9 ft) power cord with an IEC 320-C13 machine input connector and IEC 320-C14 wall plug.

This option is used on the following:

- 7014-S25 rack
- 0555 rack
- 9131-52A
- 9133-55A
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6672 description**

This option is the 100 - 240 V ac, 10 A (HV), 12 A (LV), 1.5 m (5 ft) power cord with an IEC 320-C13 machine input connector and IEC 320-C14 wall plug.

This option is used on the following:

- 7014-S11 rack
- 7014-S25 rack
- 0554 rack
- 0555 rack
- 9131-52A
- 9133-55A
- 9117-MMA
- 9406-MMA
- 8204-E8A
- 5886

- 7214-1U2
- 8203-E4A
- 8234-EMA
- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6673 description**

This option is the 100 - 240 V ac, 10 A 1 m (3.2 ft) power cord with an IEC 320-C13 machine input connector and IEC 320-C14 wall plug.

This option is used on the following:

- 9110-51A
- 9111-520
- 9113-550
- 9115-505
- 9110-510
- 9117-570
- 9117-MMA
- 9406-MMA
- 9131-52A
- 9133-55A
- 9405-520
- 9406-520
- 9406-550
- 9406-570
- 0555 rack

### **Power cord 6680 description**

This option is the 200 - 240 V ac, 10 A, 2.7m (9 ft) power cord with an IEC 320-C13 machine input connector and AS3112-1964 and NZS 198 wall plug.

This option is used on the following:

- 9110-510
- 9111-520
- 9113-550
- 9115-505
- 9117-570
- 9406-520
- 9406-550
- 9406-570
- 5786
- 5787
- 0595
- 7310-CR3
- 7310-C04

- 5786 expansion unit
- 5787 expansion unit
- 7031-D24 expansion unit
- 7031-T24 expansion unit
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796
- 9117-MMA
- 9406-MMA
- 9406-525
- 9407-515
- 8204-E8A
- 5886
- 7214-1U2
- 8203-E4A
- 8234-EMA
- 8261-E4S
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6681 description**

This option is the 200 - 240 V ac, 10 A, 4.3 m (14 ft) power cord with an IEC 320-C13 machine input connector and AS3112-1964 and NZS 198 wall plug.

This option is used on the following:

- 7311-D10
- 7311-D11

### **Power cord 6687 description**

This option is the 200-240 V ac, 15 A, 1.8 m (6 ft) power cord with an IEC 320-C13 machine input connector and NEMA 6-15 wall plug.

This option is used on the following:

- OpenPower 720
- 9115-505
- 9111-285
- 9131-52A
- 9133-55A
- 7037-A50
- 7047-185
- 9116-561
- 7314-G30, 5796

- 9117-MMA
- 9406-MMA
- 8204-E8A
- 8203-E4A
- 9407-M15
- 9408-M25
- 9409-M50

### **Power cord 6690 description**

This option is the 200-240 V ac, 16 A, 4.3 m (14 ft) power cord with an IEC 320-C19 machine input connector.

This option is used on the following:

- 7311-D10, 7311-D11 expansion units

### **Power cord 6691 description**

This option is the 200-240 V ac, 15 A, 4.3 m (14 ft) power cord with an IEC 320-C19 machine input connector and NEMA 6-15P wall plug.

This option is used on the following:

- Expansion units 5074, 5079, 5094, 5294, 8079, 8093, 8094, 9079, 9094, 9194

### **Power cord 6692 description**

This option is the 250 V ac, 15 A, 4.3 m (14 ft) power cord with an SAA-AS 3112 wall plug with a C19 system connector.

This option is used on the following:

- 9910-P30 uninterruptible power supply
- 9910-P33 uninterruptible power supply

### **Power cord 8677 description**

This option is for the 380-415 V ac, 30 A, 4.3 m (14 ft) power cord.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA

No wall plug is shipped with this power cord.

### **Power cord 8686 description**

This option is the 200-240 V ac, 100 A, 4.3 m (14 ft) power cord with a IEC 60309 wall plug.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA



### **Power cord 8687 description**

This option is the 200-240 V ac, 100 A, 1.8 m (6 ft) power cord with a IEC 60309 wall plug.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA

### **Power cord 8688 description**

This option is the 200-240 V ac, 60 A, 4.3 m (14 ft) power cord with a IEC 60309 wall plug.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA

### **Power cord 8689 description**

This option is the 200-240 V ac, 24 A, 1.8 m (6 ft) power cord with a IEC 60309 wall plug.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA

### **Power cord 8694 description**

This option is the 380-415 V ac, 60 A, 4.3 m (14 ft) power cord.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA

No wall plug is shipped with this power cord.

### **Power cord 8697 description**

This option is the 480 V ac, 30 A, 4.3 m (14 ft) power cord with an IEC 60309 wall plug.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA

### **Power cord 8698 description**

This option is the 480 V ac, 30 A, 1.8 m (6 ft) power cord with an IEC 60309 wall plug.

This option is used on the following:

- Model 9119-590
- Model 9406-595
- Model 9119-595
- Model 9119-FHA

### **Power cord 9002 description**

This option is specified when a dual power cord is required.

The following conditions apply to this option.

- This specific code is used to determine that the 9406-820 power subsystem is enabled to support dual power cords.
- The 9002 specific code is added to all model 9406-820 servers regardless of the operating system level ordered.

### **Power cord 9080 description**

This option is specified when a water resistant power cord is required.

The following conditions apply to this option.

- **You can add the specification code 9082**, which specifies the length of the power cord.
- 9083 is **not allowed** on the same power cord as 9080.
- Option 9080 is **only available** in Canada, Japan, and the United States.

### **Power cord 9081 description**

This option is specified when a locking power cord is required on the processor side of your rack.

This option is specified when a locking power cord is required on the processor side of the 9309 rack.

- The voltage and amperage rating is: 250V 30A.
- The receptacle number is NEMA L6-30R.

### **Power cord 9082 description**

This option is specified when a 14 ft (4.3 m) power cord is required.

The following conditions apply to this option.

- The **prerequisite** is either 2960 or 2061.
- Option 9082 is **only available** in Canada, Japan, and the United States.

### **Power cord 9083 description**

This option is specified when a locking power cord is required.

The following conditions apply to this option.

- The prerequisite is either 2960 or 2961.
- You can add specification code 9082 in addition to 9083 to specify length of the power cord.
- 9080 is not allowed on the same power cord as 9083.
- Option 9083 is only available in Canada, Japan, and the United States.

### **Power cord 9180 description**

This option is specified when a water-resistant power cord is required.

This option is specified when a water-resistant power cord is required on the processor side of models 53x, 640, 650, S30, S40, and SB1. The following conditions apply to this option.

- The **prerequisite** for the processor side of the 53x System is 4961.
- **You can add specification code 9182** in addition to 9180 to specify length of the power cord.

- 9183 is **not allowed** on the same power cord as 9180.
- Option 9180 is **only available** in Canada, Japan, and the United States.

### Power cord 9182 description

This option is specified when a 14 ft (4.3 m) power cord is required.

This option is specified when a 14 ft (4.3 m) power cord is required on the processor side of models 53x, 640, 650, S30, S40, and SB1. The following conditions apply to this option.

- The **prerequisite** for the processor side of the 53x System is 4961.
- **You can add specification codes** 9180 or 9183 in addition to 9182 to specify other attributes of the power cord such as length and plug type.

### Power cord 9183 description

This option is specified when a locking power cord is required.

This option is specified when a locking power cord is required on the processor side of models 53x, 640, 650, S30, S40, and SB1. The following conditions apply to this option.

- The **prerequisite** for the processor side of the **53x System** is 4961.
- **You can add the specification code** 9182 in addition to **9183** to specify length of the power cord.
- 9180 is **not allowed** on the same power cord as 9183.

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## Modification of IBM-provided power cords

Modification of IBM-provided power cords should only be done in rare circumstances, because the power cords provided with IBM systems meet stringent design and manufacturing specifications.

IBM encourages the use of an IBM released power cord because of the specifications that must be met for both the design and manufacture of our IBM power cords. The specifications, the components used in the design, and the manufacturing process is an external safety agency approved process that is audited by safety agencies on a periodic and ongoing basis to ensure quality and compliance with design requirements.

When a server leaves the manufacturing site, it is safety agency listed, therefore, **IBM does not recommend modifying IBM-provided power cords**. In the rare circumstance where modification of an IBM provided power cord is deemed essential, you should:

- Discuss the modification with their insurance provider to assess the effect, if any, on insurance coverage
- Consult with a professional electrician regarding compliance with local codes

The following excerpts from the Services Reference Manual (SRM) explains IBM policy on power cord alteration and the liabilities involved.

### SRM excerpts

A cable group associated with a purchased IBM machine, and bearing an IBM label, is the property of the IBM machine owner. All other IBM furnished cable groups (except those for which specific purchase invoices have been paid) are the property of IBM.

Customers assume all risks associated with turning a machine over to others for the performance of technical work such as, but not limited to, the installation or removal of features, alterations or attachments.

IBM will advise the customer of any limitation, resulting from the alteration, affecting IBM's ability to provide Warranty Service or Maintenance after review by the appropriate Service Delivery and Field Marketing Practices personnel.

### **Definition of an alteration**

An alteration is any change to an IBM machine that deviates from IBM physical, mechanical, electrical, or electronic design (including microcode) whether or not additional devices or parts are used. An alteration is also an interconnection at some place other than an IBM defined interface. See the Multiple Supplier Systems Bulletin for more detail.

For an altered machine, service will be confined to the unaltered portions of the IBM machine.

After inspection, IBM will continue to make Warranty Service or Maintenance available, as appropriate, for the unaltered portion of an IBM machine.

IBM will not maintain the altered portion of an IBM machine under either an IBM Agreement or on an Hourly Service basis.

If you have more questions about power cord modification, contact an IBM service representative.

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## Chapter 11. Planning for cables

Learn how to develop plans for cabling your server and devices.

This topic helps you plan your layout by presenting planning information on some cables used to interconnect the system units and devices. This topic includes information on cable length and measuring techniques and some sample cable planning charts.

You must plan the type of cable, cable path, and cable length, considering not only your current needs, but also your anticipated growth and the relocation of personnel.

To assist with the installation of your system, you should note cable paths on your office layout.

You are responsible for planning for the installation of interconnecting cables, including the proper lightning and surge protection as necessary and should contact the appropriate contractor for guidance and assistance, as required. If the cables specified herein do not meet your needs, talk to your IBM representative or cabling vendor about custom cabling alternatives.

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### General cabling considerations

Cabling your server can be fairly complex. Use these guidelines to ensure proper cable installation.

You have to purchase, install, label, and test all your own workstation cables. These are cables to your server, PCs, display stations, and printers. Without cables, however, a server cannot exist. What you really have is a system of cables, connecting everything together. And, if your cables cause problems, your server goes down. Because cables are critical to your business, you should purchase pre-assembled cables rather than assemble the cables yourself.

If you ordered a Total System Package with one or more display stations, a 6 m (20 ft) cable will be included with your server. If you ordered one or more printers, one 6 m (20 ft) cable is included.

Consider the following when routing your cables:

- Do not create a safety hazard. Do not route cables where they can harm personnel and equipment. For instance, make sure people cannot trip over cables.
- Do not expose a cable to damage. Do not route cables near a heat source or where they can be pinched (like under a door).
- Avoid sources of electrical interference. Do not route cables near electric motors or transformers.
- Be careful not to exceed the bend radius of the cable. This is especially true for the high-speed link cables.
- Do not lay cables over sharp edges, the weight of the cable along with vibrations will eventually wear through the cable.

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### Measuring cables

Accurate measuring of cables is critical to a successful and efficient installation. Do not guess or estimate your cable lengths.

To determine the cable lengths that you need, be sure to consider the following:

- Length allowed for service access, on both server and device ends
- Length from server to floor
  - Tabletop to floor for desktop models

- 460 mm (1.5 ft) for stand-alone models
- Horizontal and vertical cable runs. Be sure to route cables around furniture to avoid tripping hazards.
- Distance from floor to device. (This can include distance between floors, between buildings, and so on, depending on the complexity of the installation.)

For model 595, the length of the RIO-G cable is a limiting factor in determining the distance between the server and a separately powered I/O frame.

## Special requirements for model 595 cabling

The distance between the server frame and the I/O frame is limited by the RIO-G cable length.

The 8 m (26 ft) RIO-G cable is a limiting factor in determining the distance between the server frame and a separately powered I/O frame. The RIO-G cables are the communication cables that connect the server to the I/O drawers. Up to 2 m (6.5 ft) of the cable length is needed to exit the server frame. An additional 2 m (6.5 ft) might be required to connect the I/O drawer in the I/O frame, depending on the position of the drawer in the frame. The additional cable length to go horizontally between the two frames is approximately 1 m (3.2 ft) even with the frames touching. This leaves approximately 3 m (9.8 ft) to use under a raised floor or to space the server frame and I/O frame further apart.

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## Determining cable requirements and ordering cables

Follow these guidelines to select and order the correct cables for your server.

You must order, install, label, and test all your own workstation cables. These are cables to your servers, towers, PCs, display stations, and printers. Because assembling cables can be complex, purchase preassembled cables.

For information on high-speed link cabling, see *High speed link information*.

Packages with one or more display stations, receive one 6 m (20 ft) cable with your server. If you ordered one or more printers, you get one 6 m (20 ft) cable. You must order any additional cables separately.

Follow this procedure to order your cables:

1. From the site plan that you drew, determine how much cable you need. See *Measuring cables* to determine the length of cables that you need.
2. Select the types of cables to view specifications and part numbers:
  - High speed link cables
  - Operations Console cables
  - Twinaxial cables (workstations, remote workstation controllers, host servers)
3. Write down the type and quantity of cables you need in the Workstation Information Form 3B.
4. Using the information you entered in the form, order your cables. Make sure you specify:
  - Type of cable (for instance, twinaxial)
  - Lengths and quantity of cable (such as, ten 6-foot cables, and so on)
  - Type of covering if applicable (such as vinyl covered twinaxial cables)

Remember to order any necessary cable accessories, such as adapters and T-connectors.

**Note:** If you are ordering cables from IBM, you must specify part numbers and, in some cases, length or feature number. Verify the cable part tables (twinaxial cables).

For more details on cables, contact an authorized service provider.

**Related reference:**

“High-speed link information”

High-speed link (HSL) cables connect systems to I/O enclosures, IXA cards in System x expansion units and other systems.

“Measuring cables” on page 669

Accurate measuring of cables is critical to a successful and efficient installation. Do not guess or estimate your cable lengths.

“HSL, SPCN, RIO, and InfiniBand cable planning” on page 678

Use these tables to select your HSL, SPCN, RIO and InfiniBand cables.

“Operations Console and remote control panel cables” on page 711

Use the Operations Console cables and Remote control panel cables tables to determine the cable specifications for your server.

“Workstation Information Form 3B” on page 501

Use this form to record the type and quantity of cables you need for your server.

“Twinaxial cables from IBM” on page 711

Use the Twinaxial cables table to choose a cable for your server.

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## High-speed link information

High-speed link (HSL) cables connect systems to I/O enclosures, IXA cards in System x expansion units and other systems.

High-speed link OptiConnect Loop is the designation for an HSL loop which connects multiple systems. It provides system-to-system connectivity and switch disk environments.

### Planning for HSL cabling

**High-speed link cable options and loop maximums** contains HSL cables and lists the maximum loops for each server.

**High-speed link terminology** provides definitions for some of the common terms used in HSL cabling information.

**HSL and SPCN cable planning topic collection** lists cables and also contains cable planning diagrams.

#### Related reference:

“High-speed link cable options and loop maximums” on page 672

Use the Cable options tables to determine the high-speed link (HSL) cables available for your servers, expansion units, and the maximum number of expansion units on an HSL loop.

“High-speed link terminology” on page 677

Use this information to familiarize yourself with basic high-speed link cable terminology.

“HSL, SPCN, RIO, and InfiniBand cable planning” on page 678

Use these tables to select your HSL, SPCN, RIO and InfiniBand cables.

## High-speed link cable options and loop maximums

Use the Cable options tables to determine the high-speed link (HSL) cables available for your servers, expansion units, and the maximum number of expansion units on an HSL loop.

Use the following table to identify the cables for model numbers and machine types identified.

Table 700. Cable options for model 270, 800, 810, 820, 825, 830, 840, 870, and 890

Cable feature	Cable name	270	800 and 810	820	825	830 and 840	870 and 890
<b>Copper</b>							
1307	1.75 m (5.7 ft) HSL-2 cable				X		X
1460	3 m (9.8 ft) HSL copper cable	X	X	X		X	
1461	6 m (19.7 ft) HSL copper cable	X	X	X		X	
1462	15 m (49.2 ft) HSL copper cable			note 2		X	
1474	6 m (19.7 ft) HSL to HSL-2 cable	X	X	X	X	X	X
1475	10 m (32.8 ft) HSL to HSL-2 cable			note 2	X	X	X
1481	1.2 m (3.9 ft) HSL-2 cable				X		X
1482	4 m (13.1 ft) HSL-2 cable				X		X
1483	10 m (32.8 ft) HSL-2 cable				X		X
1485	15 m (49.2 ft) HSL-2 cable				X		X
<b>Fiber Optic</b>							
	see note 1						
1470	6 m (19.7 ft) HSL fiber optic cable				X	X	X
1471	30 m (98.4 ft) HSL fiber optic cable				X	X	X
1472	100 m (328 ft) HSL fiber optic cable				X	X	X
1473	250 m (820.2 ft) HSL fiber optic cable				X	X	X
<b>SPCN</b>							
0369	250 m (820.2 ft) Fiber Optic SPCN cable				X	X	X
1463	2 m (6.6 ft) SPCN cable	X	X	X	X	X	X
1464	6 m (19.7 ft) SPCN cable	X	X	X	X	X	X
1465	15 m (49.2 ft) SPCN cable	X	X	X	X	X	X
1466	30 m (98.4 ft) SPCN cable	X	X	X	X	X	X
1468	100 m (328 ft) Fiber Optic SPCN cable				X	X	X
<b>Note:</b>							
1. Fiber optic cable requires a base or feature optical HSL port card in the system.							
2. 15 m (49.2 ft) HSL copper cables are not supported on the A1 port of model 820. They can be used on the A0 port of model 820.							

Use the following table to identify the RIO/HSL cables for model numbers and machine types identified.

Table 701. System unit RIO/HSL cable options

Cable feature	9117-MMA or 9406-MMA
1307 (copper)	
1308 (copper)	
1460 (copper)	



Table 701. System unit RIO/HSL cable options (continued)

Cable feature	9117-MMA or 9406-MMA
1461 (copper)	
1462 (copper)	
1470 (fiber optic)	
1471 (fiber optic)	
1472 (fiber optic)	
1473 (fiber optic)	
1474 (copper)	
1475 (copper)	
1481 (copper)	
1482 (copper)	X
1483 (copper)	
1485 (copper)	
1487 (copper)	
3146 (copper)	X
3147 (copper)	X
3148 (copper)	X
3168 (copper)	X
3170 (copper)	
7924 (copper)	

Table 702. Cable options for the expansion units available with iSeries servers

Cable feature	Cable name	5074	5075	5078 0578	5079 8079	IXA card	0694 5094 9094	5095 0595	5088 0588	5294 8094
<b>Copper</b>										
1460	3 m (9.8 ft) HSL copper cable	X	X	X	X	X				
1461	6 m (19.7 ft) HSL copper cable	X	X	X	X	X				
1462	15 m (49.2 ft) HSL copper cable	X	X	X	X	X				
1474	6 m (19.7 ft) HSL to HSL-2 cable	X	X	X	X	X	X	X	X	X
1475	10 m (32.8 ft) HSL to HSL-2 cable	X	X	X	X	X	X	X	X	X
1482	4 m (13.1 ft) HSL-2 cable						X	X	X	X
1483	10 m (32.8 ft) HSL-2 cable						X	X	X	X
1485	15 m (49.2 ft) HSL-2 cable						X	X	X	X
<b>Optical</b>	see notes									
1470	6 m (19.7 ft) HSL fiber optic cable	X		X	X		X	X	X	X
1471	30 m (98.4) HSL fiber optic cable	X		X	X		X	X	X	X
1472	100 m (328 ft) HSL fiber optic cable	X		X	X		X	X	X	X
1473	250 m (820.2 ft) HSL fiber optic cable	X		X	X		X	X	X	X
<b>SPCN</b>										

Table 702. Cable options for the expansion units available with iSeries servers (continued)

Cable feature	Cable name	5074	5075	5078 0578	5079 8079	IXA card	0694 5094 9094	5095 0595	5088 0588	5294 8094
0369	250 m (820.2 ft) Fiber Optic SPCN cable	X		X	X	X	X	X	X	X
1463	2 m (6.6 ft) SPCN cable	X	X	X	X	X	X	X	X	X
1464	6 m (19.7 ft) SPCN cable	X	X	X	X	X	X	X	X	X
1465	15 m (49.2 ft) SPCN cable	X	X	X	X	X	X	X	X	X
1466	30 m (98.4 ft) SPCN cable	X	X	X	X	X	X	X	X	X
1468	100 m (328 ft) Fiber Optic SPCN cable	X		X	X	X	X	X	X	X
<b>Note:</b>										
<ul style="list-style-type: none"> <li>Optical cable requires a base or feature optical HSL port card in the expansion unit.</li> <li>Fiber optic cable requires a base or feature optical HSL port card in the system.</li> <li>15 m (49.2 ft) HSL copper cables are not supported on the A1 port of model 820. They can be used on the A0 port of model 820.</li> </ul>										

Table 703. Cable options for the expansion units available with IBM eServer hardware

Cable feature	Cable name	5078 0578	5079 8079	5095 0595	5088 0588	5294 8094
<b>Copper</b>						
1460	3 m (9.8 ft) HSL copper cable	X	X			
1461	6 m (19.7 ft) HSL copper cable	X	X			
1462	15 m (49.2 ft) HSL copper cable	X	X			
1474	6 m (19.7 ft) HSL to HSL-2 cable	X	X	X	X	X
1475	10 m (32.8 ft) HSL to HSL-2 cable	X	X	X	X	X
1482	4 m (13.1 ft) HSL-2 cable			X	X	X
1483	10 m (32.8 ft) HSL-2 cable			X	X	X
1485	15 m (49.2 ft) HSL-2 cable			X	X	X
<b>Optical</b>	see notes					
1470	6 m (19.7 ft) HSL fiber optic cable	X	X	X	X	X
1471	30 m (98.4 ft) HSL fiber optic cable	X	X	X	X	X
1472	100 m (328 ft) HSL fiber optic cable	X	X	X	X	X
1473	250 m (820.2 ft) HSL fiber optic cable	X	X	X	X	X
<b>SPCN</b>						
0369	250 m (820.2 ft) Fiber Optic SPCN cable	X	X	X	X	X
1463	2 m (6.6 ft) SPCN cable	X	X	X	X	X
1464	6 m (19.7 ft) SPCN cable	X	X	X	X	X
1465	15 m (49.2 ft) SPCN cable	X	X	X	X	X
1466	30 m (98.4 ft) SPCN cable	X	X	X	X	X
1468	100 m (328 ft) Fiber Optic SPCN cable	X	X	X	X	X
<b>Note:</b>						
<ul style="list-style-type: none"> <li>Optical cable requires a base or feature optical HSL port card in the expansion unit.</li> <li>Fiber optic cable requires a base or feature optical HSL port card in the system.</li> </ul>						

Table 704. Maximum expansion units on an HSL for iSeries servers

<b>System maximums</b>	270	800	810	820	825	830	840	870	870	890	890	520	570
								2489	2486	2487	2488		
HSL loops	1	1	1	1	3	4	8	4	8	12	14	1	2
HSL loops supporting fiber optic cables	0	0	0	0	2	1	2	2	6	10	12	0	1
I/O expansion units	1	1	4	5	18	13	23	23	47	47	47	6	12
IXA cards in xSeries expansion units	2	3	7	8	18	16	60	48	60	60	60	8	16
I/O expansion units and IXA cards	3	4	8	9	27	21	60	48	60	60	60	9	18
HSL OptiConnect loops	1	1	1	1	2	2	4	3	7	11	13	1	2
Fiber optic HSL OptiConnect loops	0	0	0	0	1	1	2	2	6	10	12	0	1
HSL migration expansion unit	0	0	0	1	0	1	1	0	0	0	0	0	0
<b>HSL Loop Maximums</b>													
I/O expansion units	1	1	4	5	6	6	6	6	6	6	6	6	6
IXA cards in xSeries expansion units	2	3	7	8	5*	8	8	8	8	8	8	8	8
I/O expansion units and IXA cards	3	4	8	9	9	9	9	9	9	9	9	9	9
<b>HSL OptiConnect Loop - 2 systems</b>													
I/O expansion units and IXA cards	4	4	4	4	4	4	4	4	4	4	4	4	4
<b>HSL OptiConnect Loop - 3 systems</b>													
I/O expansion units and IXA cards					0	0	0	0	0	0	0	0	0
<b>Note:</b>													
<ul style="list-style-type: none"> <li>Optical cable requires a base or feature optical HSL port card in the expansion unit.</li> <li>Fiber optic cable requires a base or feature optical HSL port card in the system.</li> <li>15 m (49.2) HSL copper cables are not supported on the A1 port of model 9406-820. They can be used on the A0 port of model 9406-820.</li> </ul>													

Table 705. RIO/HSL configuration rules for expansion units

Configuration	Maximum number of ports	Maximum number of loops	Maximum number of expansion units per loop	Maximum number of supported expansion units
9111-520 or 9111-285	2	1	4	4
9405-520 or 9406-520	2	1	6	6
9113-550	4	2	4	8
p5 550Q, or 720	4	2	6	12
9406-550	4	2	6	12
9117-570	16	8	4 (7 with a 9411-100 attachment <sup>1</sup> )	14 (20 with a 9411-100 attachment)
9406-570	16	8	6	48
9118-575 or 9125-F2A	2 per node	1 per node	1	1
9119-590 or 9119-FHA	24	12	1 (7 with a 9411-100 attachment <sup>2</sup> )	8 (14 with a 9411-100 attachment)

Table 705. RIO/HSL configuration rules for expansion units (continued)

Configuration	Maximum number of ports	Maximum number of loops	Maximum number of expansion units per loop	Maximum number of supported expansion units
9119-595	48	24	1 (7 with a 9411-100 attachment <sup>2</sup> )	12 (18 with a 9411-100 attachment)
9406-595	62	31	6	96
<b>Notes:</b>				
1. A model 9117-570 with a 9411-100 attachment cannot be mixed on the same loop as a 7040-61D, 7311-D10, 7311-D11, or 7311-D20 expansion unit.				
2. A model 9119-590, 9119-595, or 9119-FHA with a 9411-100 attachment cannot be mixed on the same loop as a 5791, 5794, or 7040-61D expansion unit.				

Table 706. RIO/HSL and InfiniBand configuration rules for expansion units for System i

Configuration	Maximum number of ports	Maximum number of loops	Maximum number of expansion units per loop	Maximum number of supported expansion units
9406-MMA (RIO/HSL) 5790 5095 0595	16	8	6	48
9406-MMA12X adapter 5796	16	8	4	32

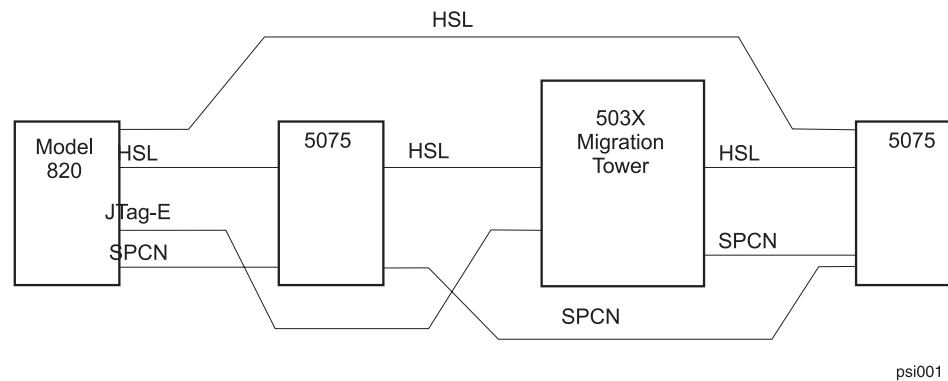
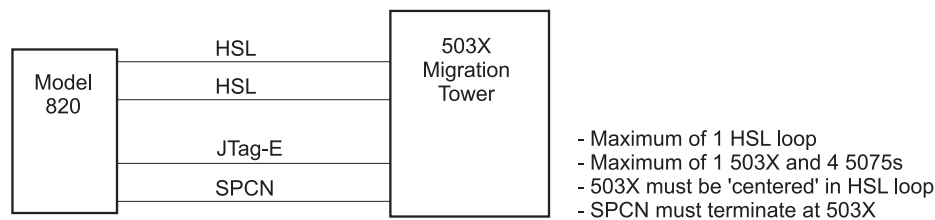
Table 707. RIO/HSL and InfiniBand configuration rules for expansion units for System p

Configuration	Maximum number of ports	Maximum number of loops	Maximum number of expansion units per loop	Maximum number of supported expansion units
9117-MMA(RIO/HSL) 7311-D11 7311-D20	16	8	4	20
9117-MMA (12x adapter) 7314-G30	16	8	4	32

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## Model 820 HSL loop configuration

Use this figure to set up an HSL loop for your Model 820.



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## High-speed link terminology

Use this information to familiarize yourself with basic high-speed link cable terminology.

The following list provides the terminology used for high-speed link cabling.

- **Alternate server:** For a given tower, the server to which a tower can be switched.
- **Base tower:** Same as power-controlled tower.
- **System unit node:** A node that is the hub for a server.
- **External tower:** An I/O tower that is contained within a physical package separate from a system unit. Note that more than one external tower might be contained within a single physical package (for example, a 5079 tower is actually two external towers).
- **Home server:** Same as power-controlling server.
- **HSL:** High-speed link technology. A high-speed connection mechanism that takes advantage of the I/O bus structure or the memory to connect multiple systems or partitions.
- **HSL loop segment:** A portion of an HSL loop whose endpoints are defined by two system unit nodes (servers) and which contains only I/O nodes.
- **HSL OptiConnect:** The System i system area network that provides high-speed interconnectivity between multiple System i systems in a local environment. Along with WAN and LAN technologies, OptiConnect provides the high-speed connectivity between cluster nodes in System i cluster environments.
- **Internal tower:** An I/O tower that is contained within the same physical package as a server.
- **I/O node:** A node that is the bridge to an I/O tower (internal or external) or IXS tower.
- **IXS tower:** Integrated xSeries Server tower (cannot be switchable, such as, an IXS tower is always a private tower).
- **Managing server:** Same as owning server.
- **Node:** An addressable entity on an HSL loop.

- **Owning server:** The server that is currently responsible for accessing and controlling a tower.
- **Power-controlling server:** For a given tower, the server that has system power control network (SPCN) control over that tower.
- **Power-controlled tower:** For a given system, a tower over which that system has SPCN control.
- **Private tower:** A tower that is not switchable.
- **Switchable tower:** A tower that has been configured to allow it to be owned by an alternate system.
- **Switched tower:** A tower that is currently owned by the alternate system.

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## HSL, SPCN, RIO, and InfiniBand cable planning

Use these tables to select your HSL, SPCN, RIO and InfiniBand cables.

The following table shows the high speed link (HSL) cable descriptions and feature code numbers available for your servers and expansion units.

*Table 708. HSL cables*

Cable	Number
HSL - 3 m (9.8 ft)	1460
HSL - 6 m (19.7 ft)	1462
HSL - 15 m (49.2 ft)	1462
HSL - 6 m (19.7 ft)	1470
HSL - 30 m (98.4 ft)	1471
HSL - 100 m (328 ft)	1472
HSL - 250 m (820.2 ft)	1473
HSL to HSL2 - 6 m (19.7 ft)	1474
HSL to HSL2 - 10 m (32.8 ft)	1475
HSL2 - 1 m (3.28 ft)	1481
HSL2 - 3.5 m (11.5 ft)	1482
HSL2 - 10 m (32.8 ft)	1483
HSL2 - 15 m (49.2 ft)	1485

The following table shows the InfiniBand cable descriptions and feature code numbers available for your servers and expansion units.

*Table 709. InfiniBand cables*

Cable feature	Cable type	Length	Part number
1829	12x InfiniBand cable	0.6 m (2 ft)	41V0226
1830	12x InfiniBand cable	1.5 m (5 ft)	41V0227
1834	12x InfiniBand cable	8 m (26 ft)	39J5642
1840	12x InfiniBand cable	3 m (9.8 ft)	42V2132

The following table shows the SPCN cable descriptions and feature code numbers available for your servers and expansion units.

*Table 710. SPCN cables*

Cable	Number
SPCN - 2 m (6.6 ft)	1463

Table 710. SPCN cables (continued)

SPCN - 6 m (19.7 ft)	1464
SPCN - 15 m (49.2 ft)	1465
SPCN - 30 m (98.4 ft)	1466
SPCN - 2 m (6.6 ft)	6001
SPCN - 3 m (9.8 ft)	6006
SPCN - 6 m (19.7 ft)	6008
SPCN - 15 m (49.2 ft)	6007
SPCN - 30 m (98.4 ft)	6029

The following table shows the RIO cable descriptions and feature code numbers available for your servers and expansion units.

Table 711. RIO cables

Cable	Number
RIO - 1.2 m (3.9 ft)	3146
RIO - 3.5 m (11.5 ft)	3147
RIO - 1.75 m (5.7 ft)	3156
RIO - 10 m (32.8 ft)	3148
RIO - 2.5 m (8.2 ft)	3168

### HSL handling requirements

The cables are included with protective coverings (end caps) over the connectors. The purpose of these end caps is to protect the cable ends from mechanical damage and contact contamination. Keep the end caps on while routing cables, etc. until it is time to plug the connectors into the equipment.

Excess cable might be coiled. The recommended bend radius is 152.4 mm (6 in.); however, the minimum bend radius is 76.2 mm (3 in.). If cable ties or other restraining devices are used to hold the coiled cable in place, make sure these fit loosely on the cable jacket.

**Attention:** Do not compress or crush the cables. This might result in mechanical damage to the wires and insulation.

#### Notes:

1. The 15 m (49.2 ft) HSL cable (1462) is not supported on the 9406-270.
2. A 15 m (49.2 ft) HSL cable should not be used to directly connect the system unit port A1 on model 9406-820 to a 5075, 5074, or 5079. It can be used for all other connections on model 9406-820. For the 9406-830 and 9406-840, 1462 can be used for all connections.

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## Serial-attached SCSI cable planning

Serial-attached SCSI (SAS) cables provide serial communication for transfer of data for directly attached devices, such as hard disk drives, solid-state drives, and CD-ROM drives.

### SAS cable overview

Serial-attached SCSI (SAS) is an evolution of the parallel SCSI device interface into a serial point-to-point interface. SAS physical links are a set of four wires used as two differential signal pairs. One differential

signal transmits in one direction while the other differential signal transmits in the opposite direction. Data might be transmitted in both directions simultaneously. SAS physical links are contained in ports. A port contains one or more SAS physical links. A port is a wide port if there are more than one SAS physical link in the port. Wide ports are designed to enhance performance and provide redundancy in case an individual SAS physical link fail.

Each SAS cable contains four SAS physical links that are typically organized into either a single 4x SAS port or two 2x SAS ports. Each end of the cable uses a mini SAS 4x connector. Review the following design and installation criteria before installing your SAS cables:

- Only specific cabling configurations are supported. Many configurations could be constructed that are not supported and will either not function correctly or will generate errors. Refer to “SAS cabling configurations” on page 685 for diagrams of the supported cabling configurations.
- Each mini-SAS 4x connector is keyed to help prevent cabling an unsupported configuration.
- Each cable end has a label that graphically describes the correct component port to which it is connected, such as:
  - SAS adapter
  - Expansion drawer
  - System external SAS port
  - Internal SAS disk slots connection.
- Cable routing is important. For example, YO, YI, and X cables must be routed along the right side of the rack frame (as viewed from the rear) when connecting to a disk expansion drawer. Additionally, X cables must be attached to the same numbered port on both SAS adapters to which it connects.
- When a choice of cable lengths is available, select the shortest cable that will provide the needed connectivity.
- Always use care when inserting or removing a cable. The cable should slide easily into the connector. Forcing a cable into a connector can cause damage to the cable or connector.
- The X cables are only supported on all SAS PCI (RAID) adapters and only when RAID is enabled.
- Not all cabling configurations are supported when using solid-state drives (SSD). Refer to *Installing and configuring Solid State Drives* for more information.

## Supported SAS cable information

The following table contains a list of the supported SAS cable types and their designed usage.

Table 712. Functions for supported SAS cables

Cable type	Function
AA cable	This cable is used to connect between the top ports on two tri-port SAS adapters in a RAID configuration.
AI cable	This cable is used to connect from a SAS adapter to internal SAS disk slots using an FC3650 or FC3651 cable card or to the System External SAS port on models 8204-E8A (FC3669) or 8203-E4A (FC3670). This cable is also used between the adapter connector and cable card connector on an FC5909 or FC5911 combination adapter and cable card.
AE cable	These cables are used to connect a SAS adapter to a media expansion drawer. These cables can also be used to connect two SAS adapters to a disk expansion drawer in a unique JBOD configuration.
AT cable	This cable is used with a PCIe 12X I/O drawer to connect from a PCIe SAS adapter to the internal SAS disk slots.



Table 712. Functions for supported SAS cables (continued)

Cable type	Function
EE cable	This cable is used to connect one disk expansion drawer to another in a cascaded configuration. Disk expansion drawers can only be cascaded one level deep, and only in certain configurations.
YO cable	This cable is used to connect a SAS adapter to a disk expansion drawer. It is also used to connect a 9125-F2A system I/O unit to a disk expansion drawer. The cable must be routed along the right side of the rack frame (as viewed from the rear) when connecting to a disk expansion drawer.
YI cable	This cable is used to connect a system external SAS port to a disk expansion drawer. The cable must be routed along the right side of the rack frame (as viewed from the rear) when connecting to a disk expansion drawer.
X cable	This cable is used to connect two SAS adapters to a disk expansion drawer in a RAID configuration. The cable must be routed along the right side of the rack frame (as viewed from the rear) when connecting to a disk expansion drawer.
YR cable	This cable is used to connect two SAS adapters to internal SAS disk slots using an FC3651 cable card.

The following table contains specific information about each supported SAS cable.

Table 713. Supported SAS cables

Name	Length	IBM part number	Feature code
SAS AA cable	3 m (9.8 ft)	44V8231	3681
	6 m (19.6 ft)	44V8230	3682
SAS 4x AI cable	1 m (3.2 ft)	44V4041	3679
SAS 4x AE cable	3 m (9.8 ft)	44V4163	3684
	6 m (19.6 ft)	44V4164	3685
SAS 4x AT cable	0.6 m (1.9 ft)	44V5132	3688
SAS 4x EE cable	1 m (3.2 ft)	44V4147	3652
	3 m (9.8 ft)	44V4148	3653
	6 m (19.6 ft)	44V4149	3654
SAS YO cable	1.5 m (4.9 ft)	44V4157	3691
	3 m (9.8 ft)	44V4158	3692
	6 m (19.6 ft)	44V4159	3693
	15 m (49.2 ft)	44V4160	3694
SAS YI cable	1.5 m (4.9 ft)	44V4161	3686
	3 m (9.8 ft)	44V4162	3687
SAS X cable	3 m (9.8 ft)	44V4154	3661
	6 m (19.6 ft)	44V4155	3662
	15 m (49.2 ft)	44V4156	3663
SAS YR cable	1 m (3.2 ft)	44V4818	3667

Table 713. Supported SAS cables (continued)

Name	Length	IBM part number	Feature code
Split disk backplane cable card for a 3/3 split 9117-MMA		44V3557	3650
Split disk backplane cable card for a 6/0 split 9117-MMA		44V3435	3651
Disk backplane to rear bulkhead, cascading. (internal cable) 8204-E8A, 9409-M50		42R5751	3668
Split disk backplane to rear bulkhead (internal cable) 8204-E8A		44V5252	3669
Split disk backplane to rear bulkhead (internal cable) 8203-E4A		44V5253	3670
Disk backplane to rear bulkhead, cascading. (internal cable) 8203-E4A, 9408-M25		44V3382	3674

The following table contains cable label information. The graphic labels are designed to match the correct component port to which the cable end is to be attached.

Table 714. SAS cable labeling



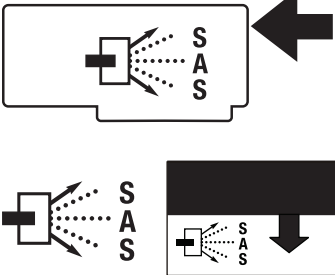
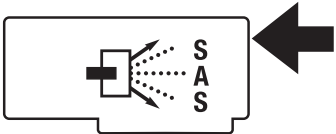
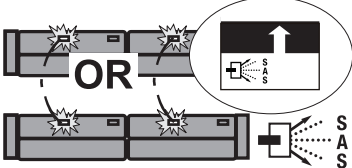
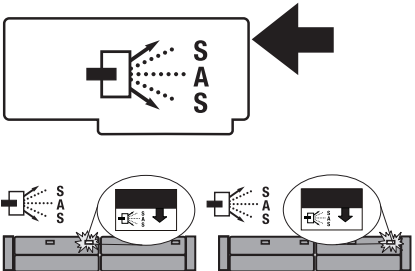
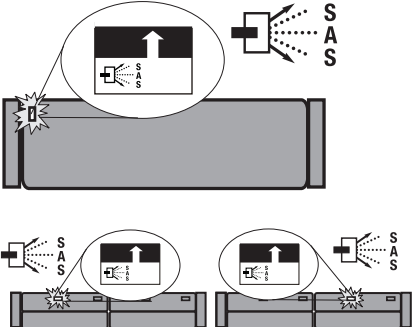
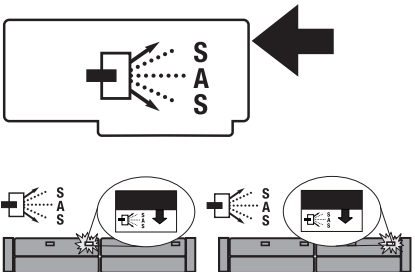
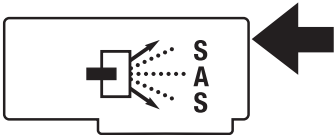
Name	Connects	Label
SAS AA cable	Top connectors on tri-port SAS adapter to tri-port SAS adapter.	
SAS 4x AI cable	SAS adapter to internal SAS disk slots through an FC3650 or FC3651 cable card or an FC5909 or FC5911 combination adapter and cable card or to the System External SAS port on models 8204-E8A (with FC3669 installed) or 8203-E4A (with FC3670 installed)	
SAS 4x AE cable	SAS adapter to a media expansion drawer or two SAS adapters to a disk expansion drawer in a unique JBOD configuration	

Table 714. SAS cable labeling (continued)

Name	Connects	Label
SAS 4x AT cable	PCIe SAS adapter in PCIe 12X I/O drawer to the internal SAS disk slots	
SAS 4x EE cable	One disk expansion drawer to another disk expansion drawer in a cascaded configuration	
SAS YO cable	SAS adapter or 9125-F2A system I/O unit to a disk expansion drawer	
SAS YI cable	System external SAS port to a disk expansion drawer	
SAS X cable	Two SAS adapters to a disk expansion drawer in a RAID configuration	
SAS YR cable	Two SAS adapters to internal SAS disk slots through an FC3651 cable card	

## Cable section lengths

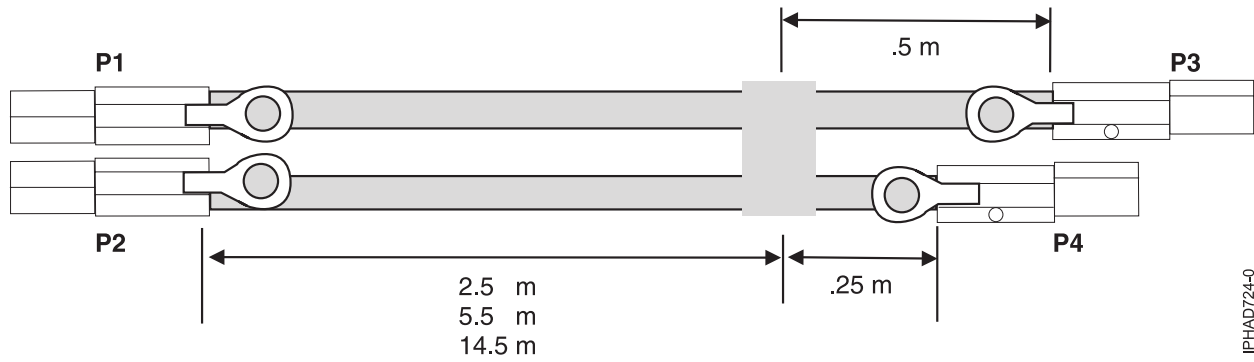


Figure 258. SAS external X cable assembly cable lengths

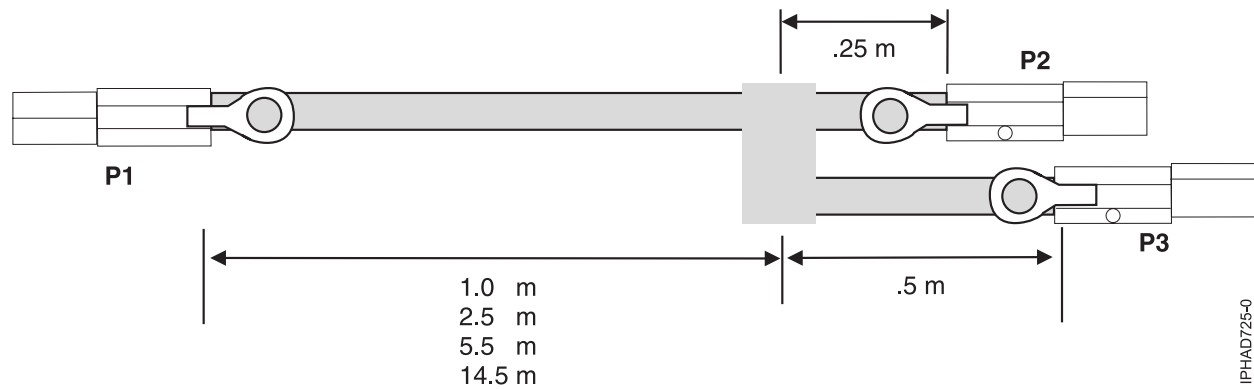


Figure 259. SAS external YO-cable assembly cable lengths

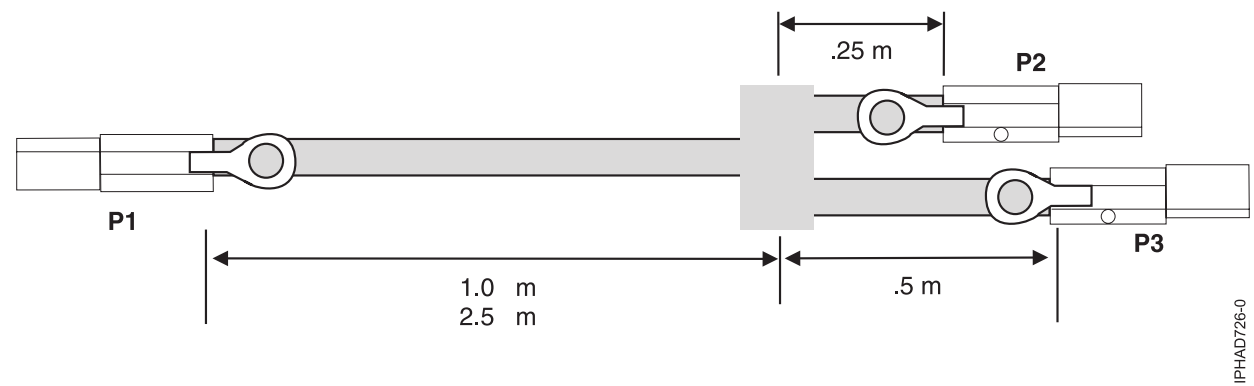


Figure 260. SAS external YI-cable assembly cable lengths

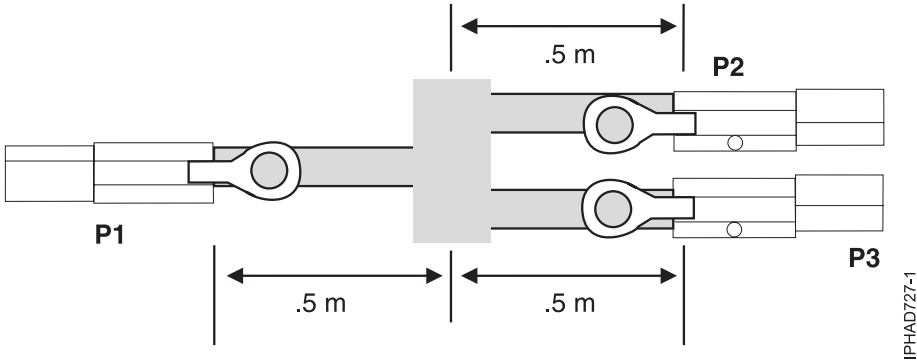


Figure 261. SAS external YR-cable assembly cable lengths

## SAS cabling configurations

The following sections provide the typical supported SAS cabling configurations. Many configurations could be constructed that are not supported and will either not function correctly or will generate errors. To avoid problems, restrict cabling to only the general types of configurations shown in the following sections.

- “SAS adapter to disk expansion drawers”
- “SAS adapter to media expansion drawer” on page 688
- “SAS adapter to expansion drawer combinations” on page 689
- “System external SAS port to disk expansion drawer- models 8204-E8A, 8203-E4A, 9408-M25, and 9409-M50” on page 690
- System I/O unit external SAS port to disk expansion drawer- model 9125-F2A
- “SAS adapter to internal SAS disk slots in models 9117-MMA” on page 693
- “Two SAS adapters to internal SAS disk slots in models 9117-MMA and 9406-MMA” on page 698
- “SAS adapter to internal SAS disk slots in models 8204-E8A and 8203-E4A” on page 699
- “Two SAS adapters to disk expansion drawer multi-initiator high availability (HA) RAID configuration” on page 701
- “Two SAS adapters to disk expansion drawer - multi-initiator HA JBOD configuration” on page 705
- PCIe SAS adapter in PCIe 12X I/O drawer to the internal SAS disk slots

## SAS adapter to disk expansion drawers

Figure 262 on page 686, Figure 263 on page 686, Figure 264 on page 687, and Figure 265 on page 688 illustrate connecting a SAS adapter to one, two, three, or four disk expansion drawers. It is also possible to connect three disk expansion drawers by omitting one of the cascaded drawers shown in Figure 264 on page 687. Disk expansion drawers can be cascaded only one level deep.

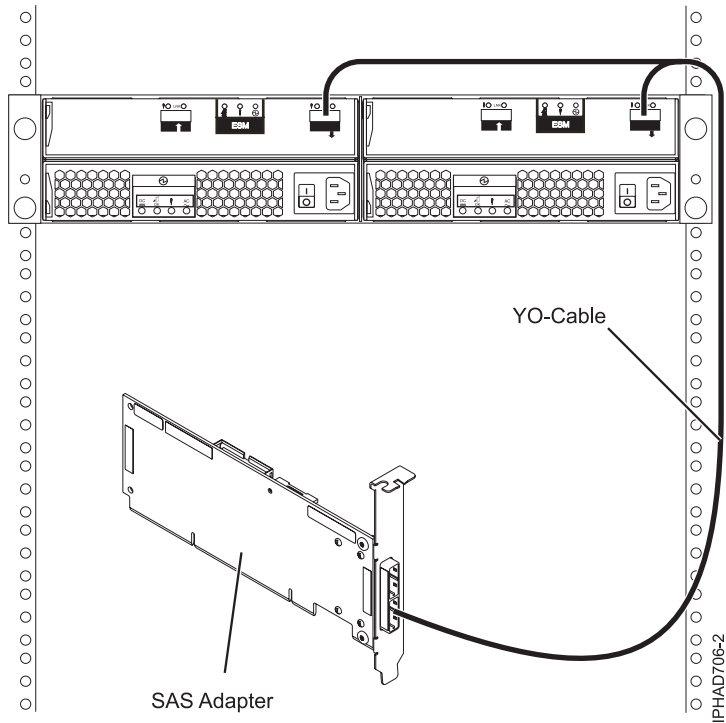


Figure 262. SAS adapter to a disk expansion drawer

**Note:** The YO cable must be routed along the right side of the rack frame.

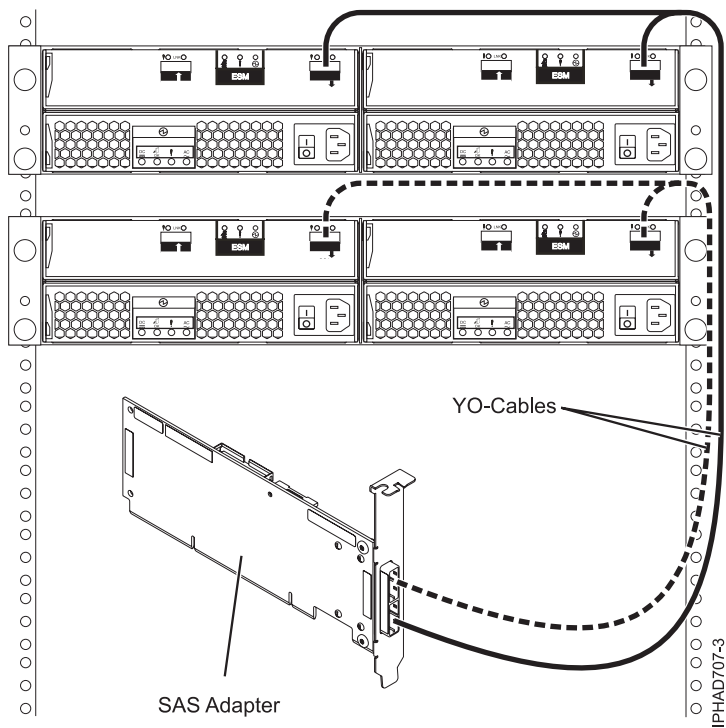


Figure 263. SAS adapter to two disk expansion drawers

**Note:** The YO cable must be routed along the right side of the rack frame.

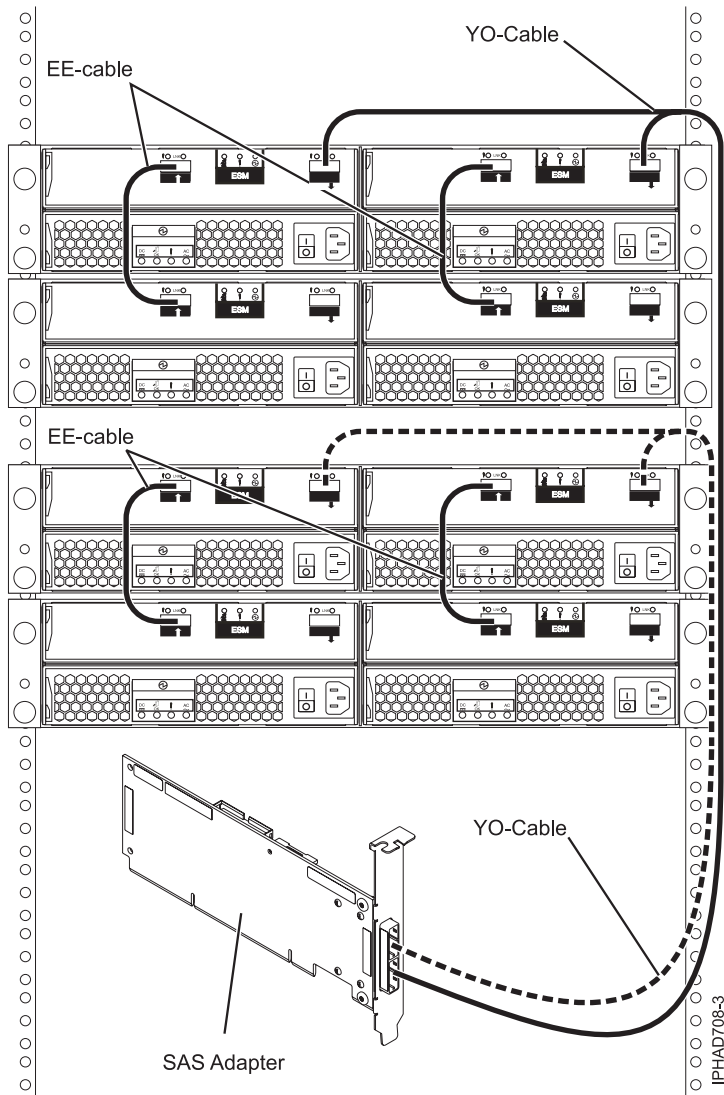


Figure 264. SAS adapter to four disk expansion drawers

**Note:** The YO cable must be routed along the right side of the rack frame.

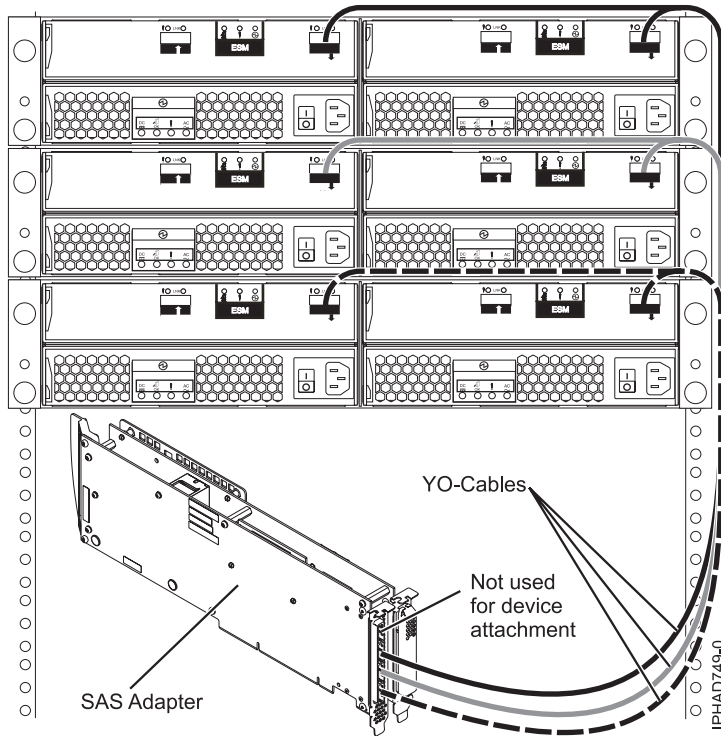


Figure 265. Tri-port SAS adapter to disk expansion drawers

When attaching only hard disk drives, it is also possible to cascade a second disk expansion drawer off of two out of the three drawers for a maximum of five disk expansion drawers per adapter. Refer to Figure 264 on page 687. Disk expansion drawers can be cascaded only one level deep.

**Note:** The YO cable must be routed along the right side of the rack frame.

### SAS adapter to media expansion drawer

Figure 266 on page 689 illustrates connecting a SAS adapter to a media expansion drawer. It is also possible to connect a second media expansion drawer to the second port of the SAS adapter.



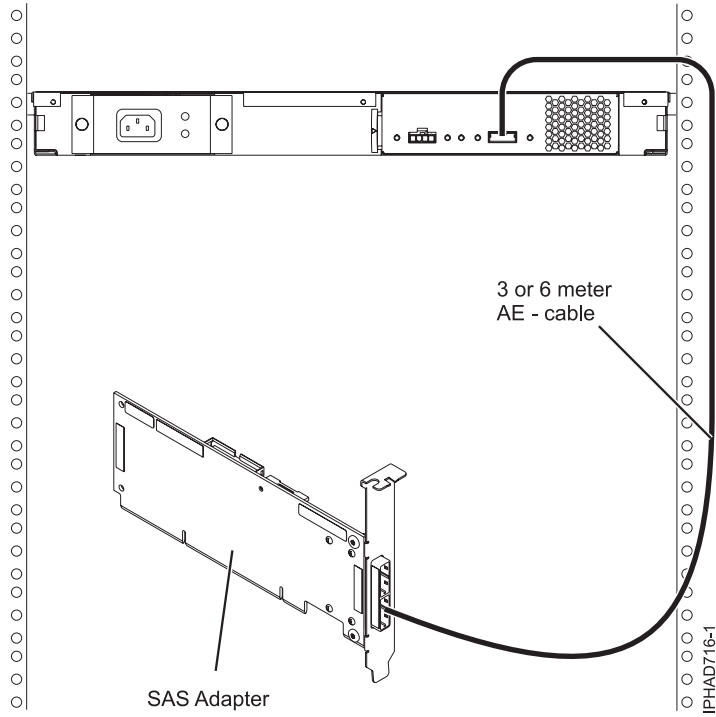


Figure 266. SAS adapter to a media expansion drawer

### SAS adapter to expansion drawer combinations

Figure 267 on page 690 illustrates connecting a SAS adapter to both a disk expansion drawer and a media expansion drawer on separate adapter ports. It is also possible to cascade a second disk expansion drawer (refer to Figure 264 on page 687).

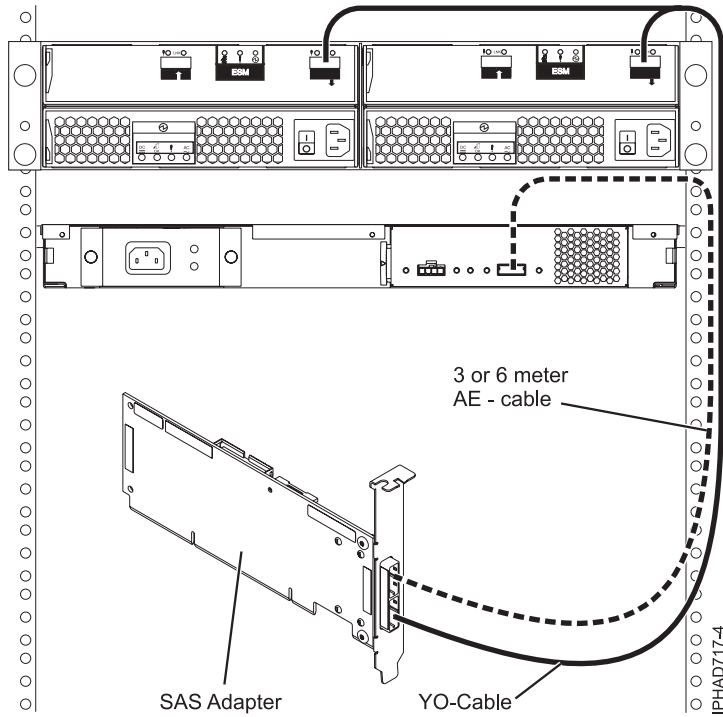


Figure 267. SAS adapter to both a disk expansion drawer and a media expansion drawer

**Note:** The YO cable must be routed along the right side of the rack frame.

**System external SAS port to disk expansion drawer- models 8204-E8A, 8203-E4A, 9408-M25, and 9409-M50**

Figure 268 on page 691 illustrates connecting a system external SAS port to a disk expansion drawer. Disk expansion drawers cannot be cascaded.

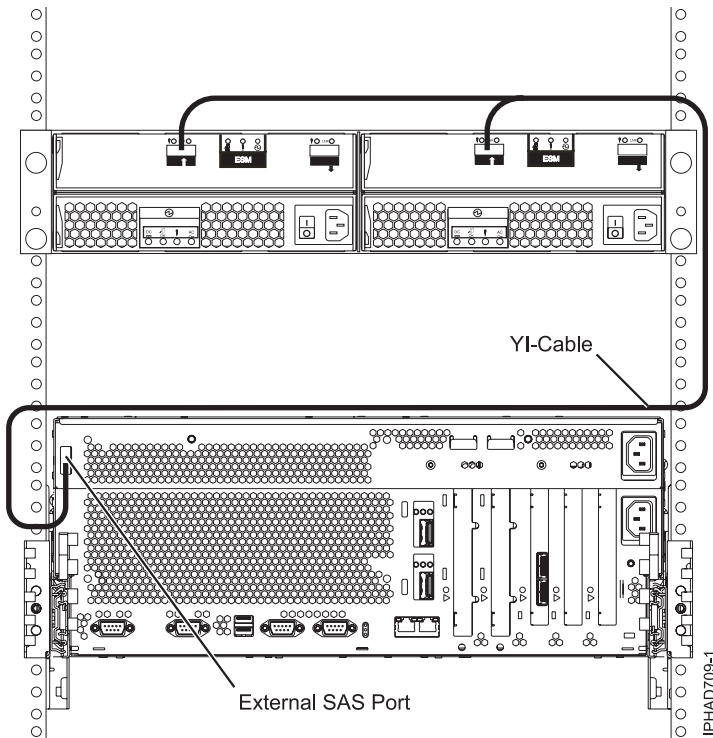


Figure 268. System external SAS adapter port to a disk expansion drawer

**Note:** The YI cable must be routed along the right side of the rack frame.

### System I/O unit external SAS port to disk expansion drawer- model 9125-F2A

Figure 269 on page 692 and Figure 270 on page 692 illustrate connecting a 9125-F2A system I/O unit external SAS port to one or two disk expansion drawers.

**Note:** The disk expansion drawers can be cascaded only one level deep.

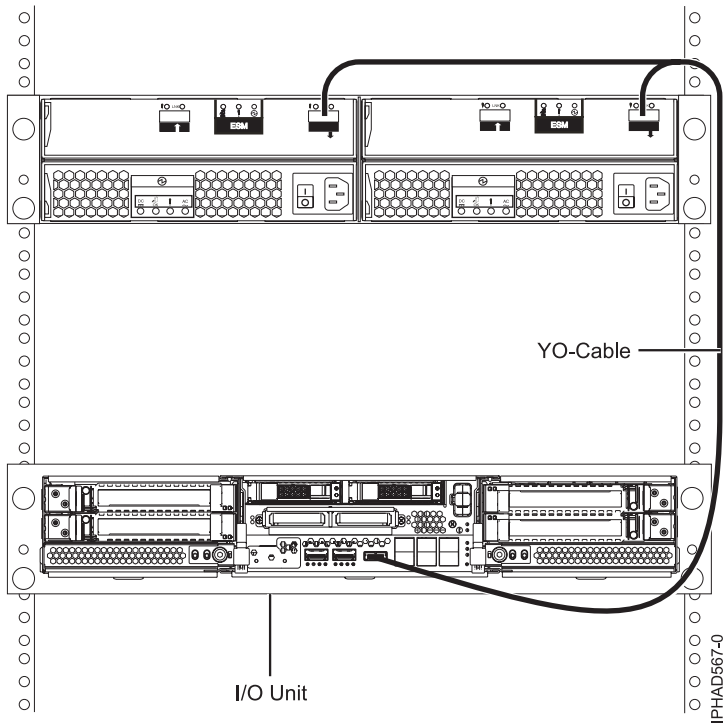


Figure 269. SAS adapter to a disk expansion drawer

**Note:** The YO cable must be routed along the right side of the rack frame.

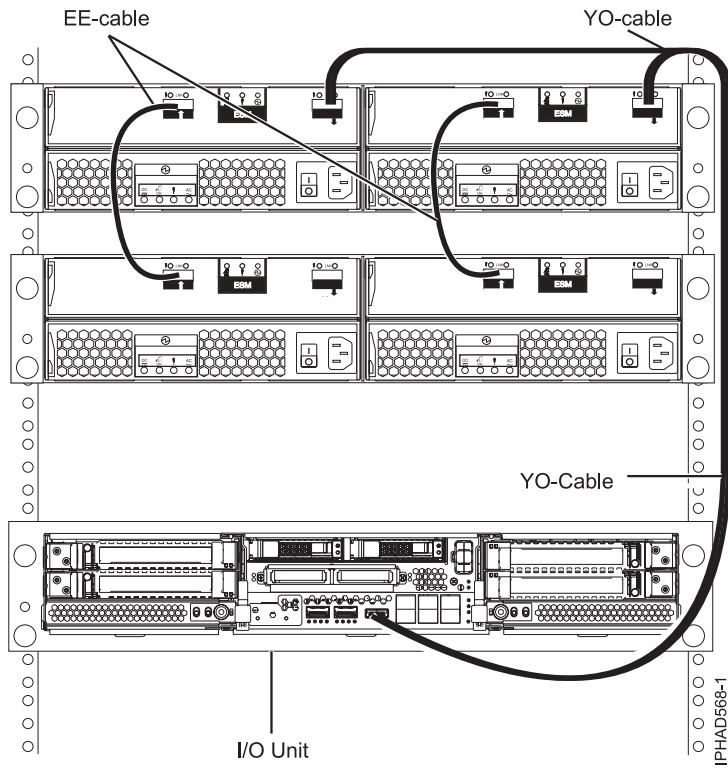


Figure 270. SAS adapter to two disk expansion drawers

**Note:** The YO cable must be routed along the right side of the rack frame.

## SAS adapter to internal SAS disk slots in models 9117-MMA

Figure 271 and Figure 272 on page 694 illustrate connecting a SAS adapter to internal SAS disk slots through one or two FC3650 or FC3651 cable cards. Figure 274 on page 696 and Figure 276 on page 697 illustrate connecting a disk expansion or media expansion drawer in addition to the internal SAS disk slots. Figure 277 on page 697 illustrates connecting a SAS adapter to internal SAS disk slots through an FC5909 or FC5911 combination adapter and cable card.

**Note:** When installing Feature Code 3650 or 3651, you might have difficulties inserting and plugging the card assembly. This is caused by an interference of a bracket installed within the enclosure. When this problem is encountered contact IBM for removal of the bracket and installation of the feature at no charge. Removal of this bracket does not affect the functionality of the system.

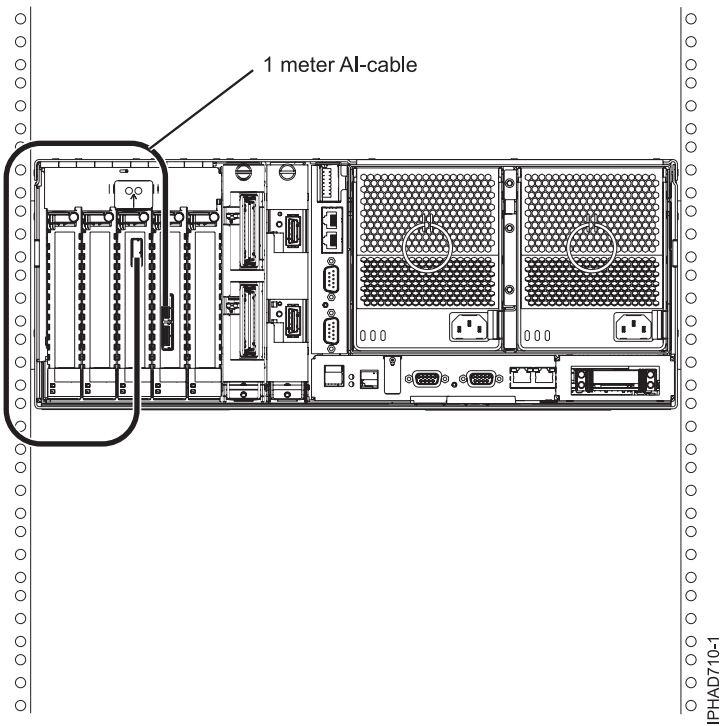


Figure 271. SAS adapter to internal SAS disk slots through an FC3650 or FC3651 cable card

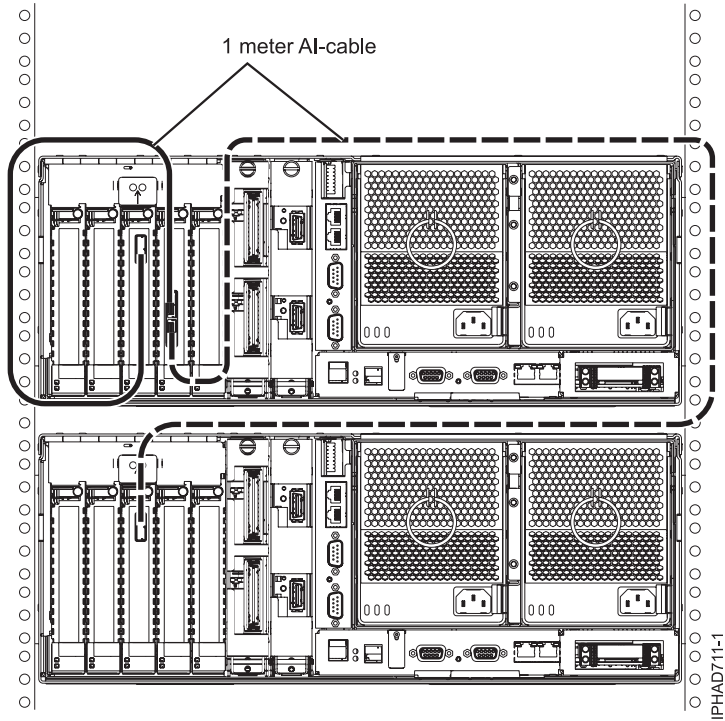


Figure 272. SAS adapter to internal SAS disk slots through two FC3650 or FC3651 cards

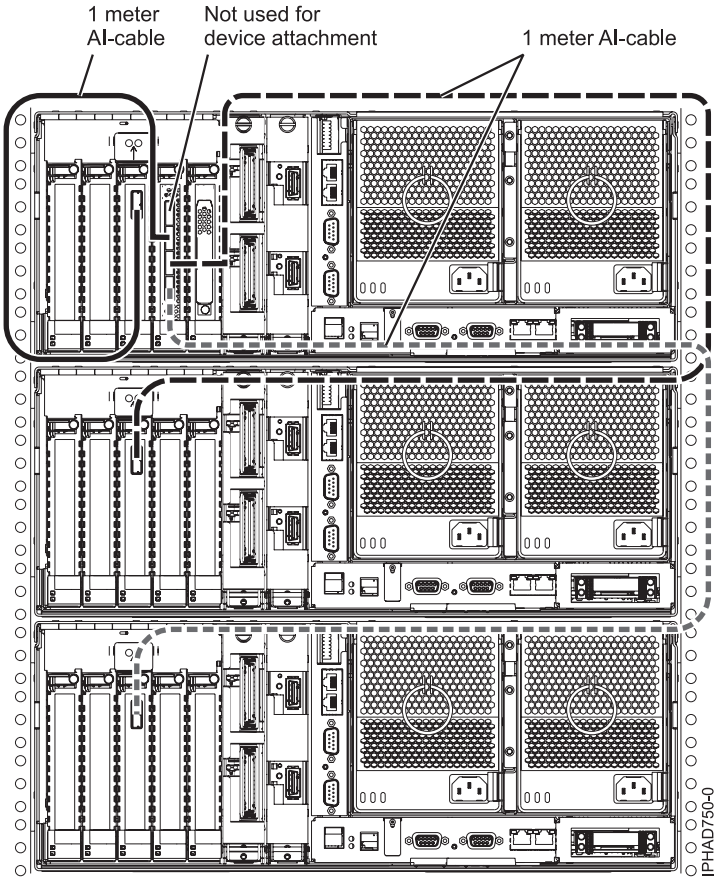


Figure 273. FC5904 or FC5908 adapter connecting to three system units through an FC3650 or FC3651 cable card

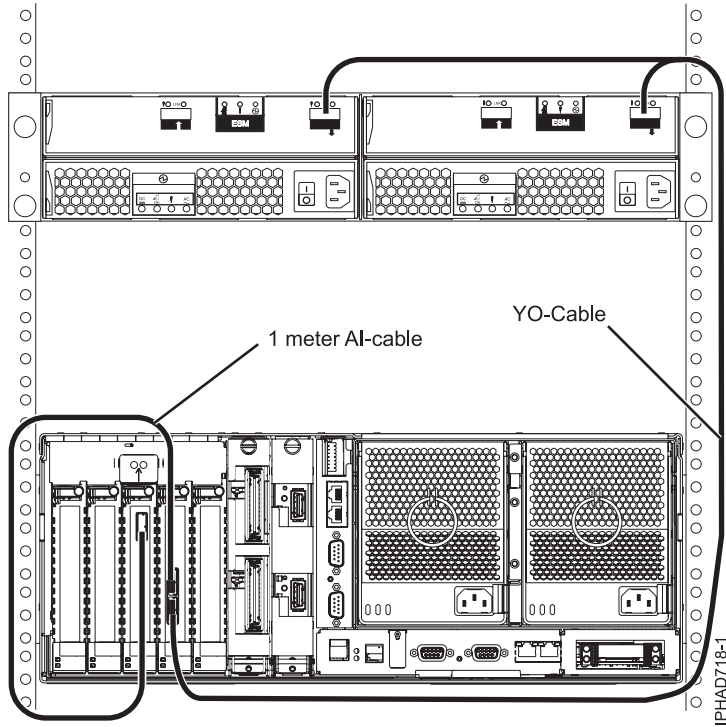


Figure 274. SAS adapter to disk expansion drawer and internal SAS disk slots through an FC3650 or FC3651 cable card

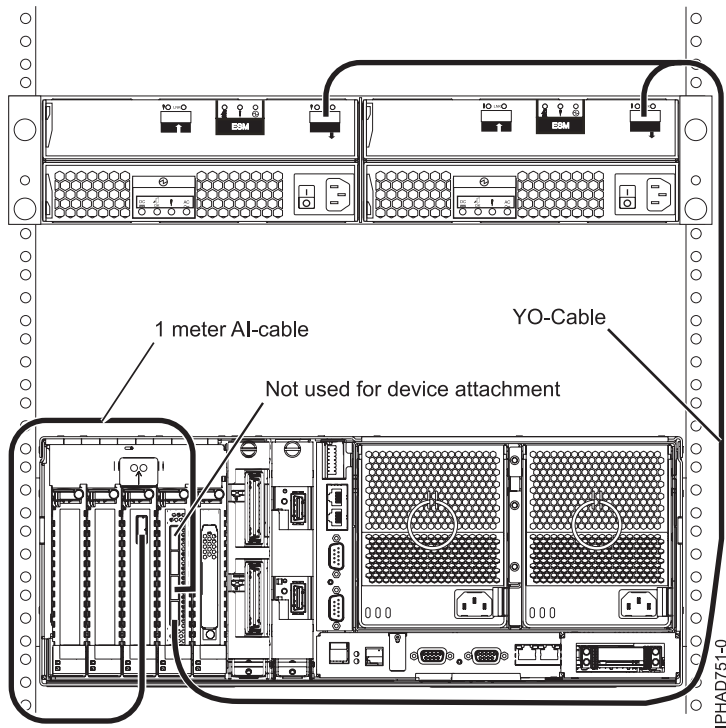


Figure 275. FC5904 or FC5908 adapter connecting to the FC3650 or FC3651 in a system unit and connecting to a disk expansion drawer



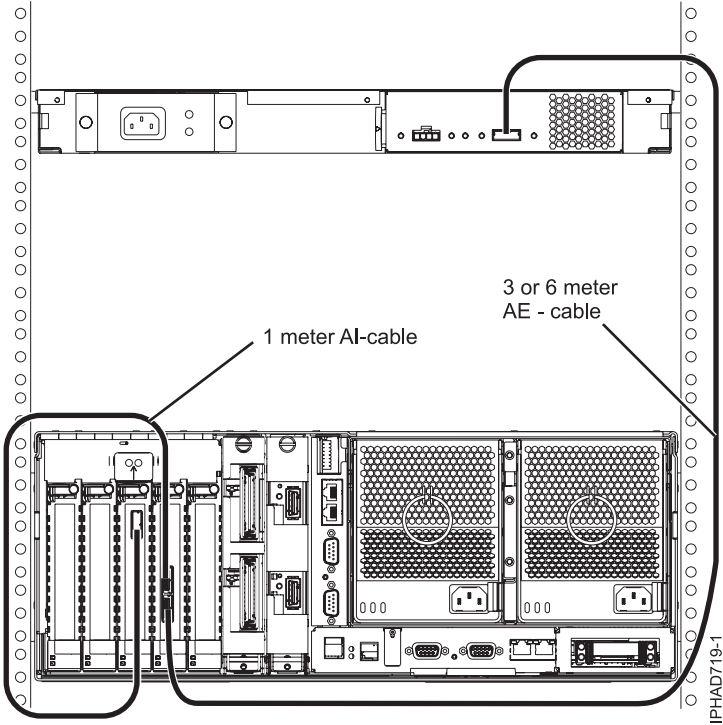
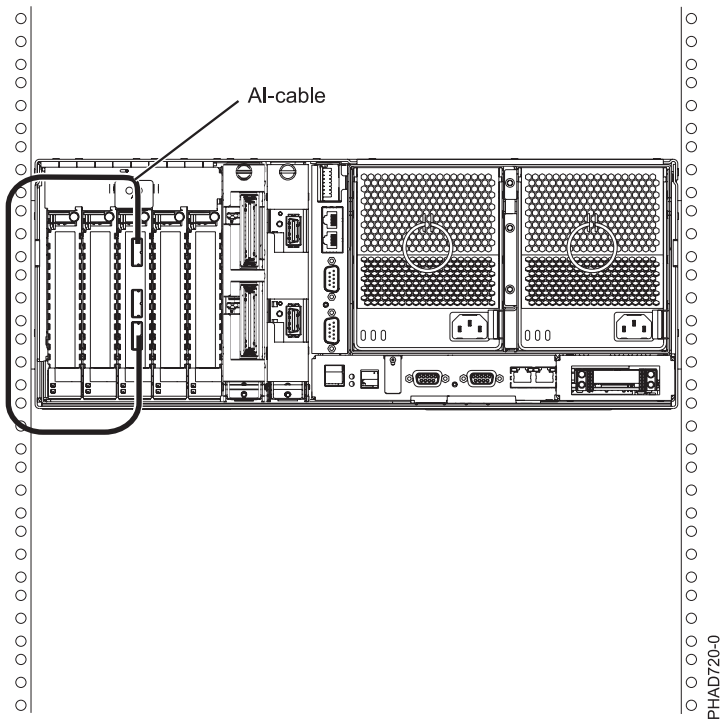


Figure 276. SAS adapter to media expansion drawer and internal SAS disk slots through an FC3650 or FC3651 cable card

Figure 277. SAS adapter to internal SAS disk slots through an FC5909 or FC5911 combination adapter and cable card.



**Note:** The middle connector on the FC5909 is not used for any connection. The middle connector on the FC5911 can be used to connect an additional disk expansion or media expansion drawer. Refer to the expansion drawer connection in Figure 274 on page 696 and Figure 276 on page 697.

## Two SAS adapters to internal SAS disk slots in models 9117-MMA and 9406-MMA

Figure 278 and Figure 279 illustrate connecting two SAS adapters to internal SAS disk slots through one or two FC3651 cable cards.

Figure 278. Two SAS adapters to internal SAS disk slots through an FC3651 cable card

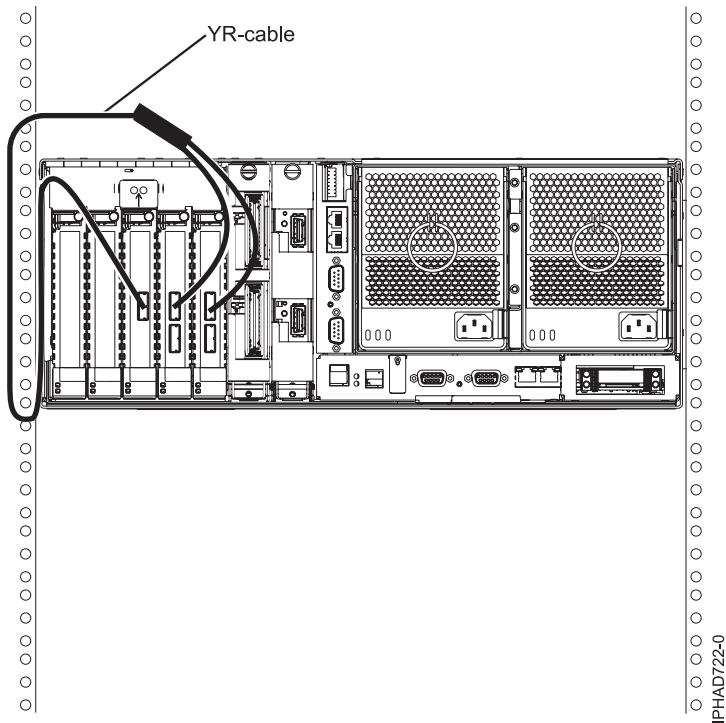
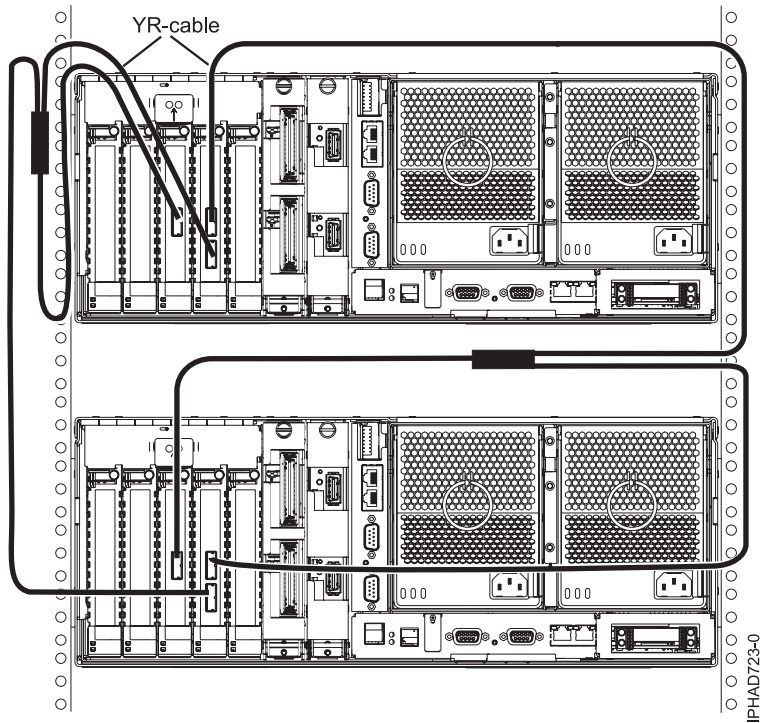


Figure 279. Two SAS adapters to internal SAS disk slots through two FC3651 cable cards



### SAS adapter to internal SAS disk slots in models 8204-E8A and 8203-E4A

Figure 280 on page 700 illustrates connecting a SAS adapter to internal SAS disk slots through the system external SAS port.

**Note:** Internal cable FC3670 for model 8203-E4A or FC3669 for model 8204-E8A must be installed to enable this configuration. For more information, see *Installing the external SAS port on a model 8203-E4A, 9407-M15, or 9408-M25* or *Installing the external SAS port on a model 8204-E8A or 9409-M50*.

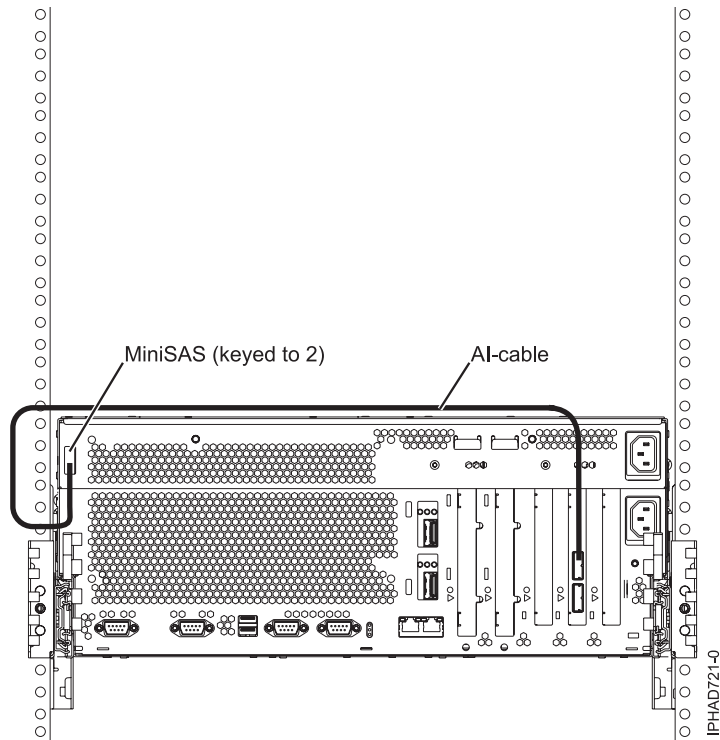


Figure 280. SAS adapter to internal SAS disk slots through the system external SAS port

**Notes:**

- Internal cable FC3670 for model 8203-E4A or FC3669 for model 8204-E8A must be installed to enable this configuration. For more information, see *Installing the external SAS port on a model 8203-E4A, 9407-M15, or 9408-M25* or *Installing the external SAS port on a model 8204-E8A or 9409-M50*.
- The second connector on the adapter can be used to attach a disk expansion or media expansion drawer as shown in Figure 262 on page 686 or Figure 266 on page 689.

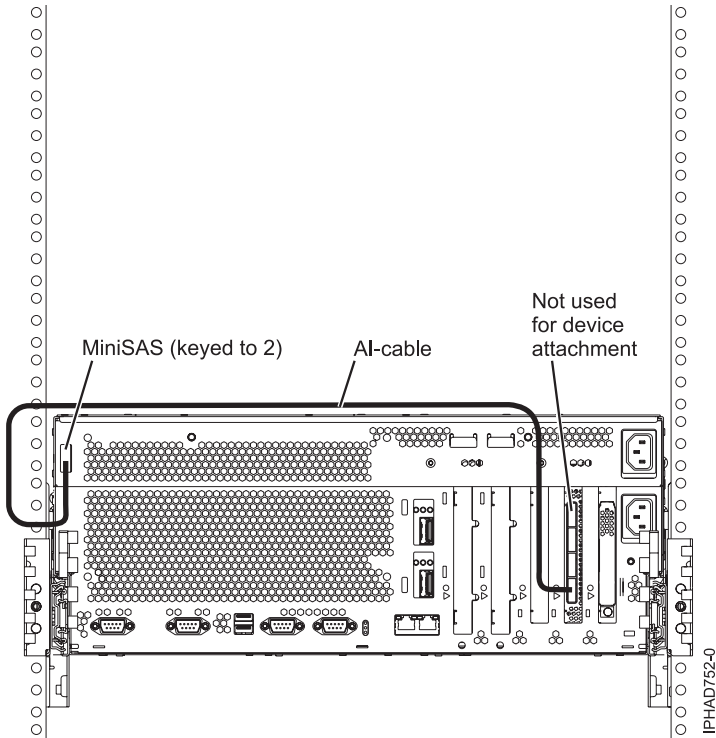


Figure 281. FC5904 or FC5908 adapter attached to disk expansion drawers

**Note:**

- The remaining two connectors on the adapter can be used to attach disk expansion drawers as shown in Figure 265 on page 688.

**Two SAS adapters to disk expansion drawer multi-initiator high availability (HA) RAID configuration**

Figure 282 on page 702, Figure 283 on page 703, Figure 284 on page 704, and Figure 285 on page 705 illustrate connecting two SAS adapters to one, two, or four disk expansion drawers in a RAID configuration. It is also possible to connect three disk expansion drawers by omitting one of the cascaded drawers shown in Figure 284 on page 704. Disk expansion drawers can be cascaded only one level deep.

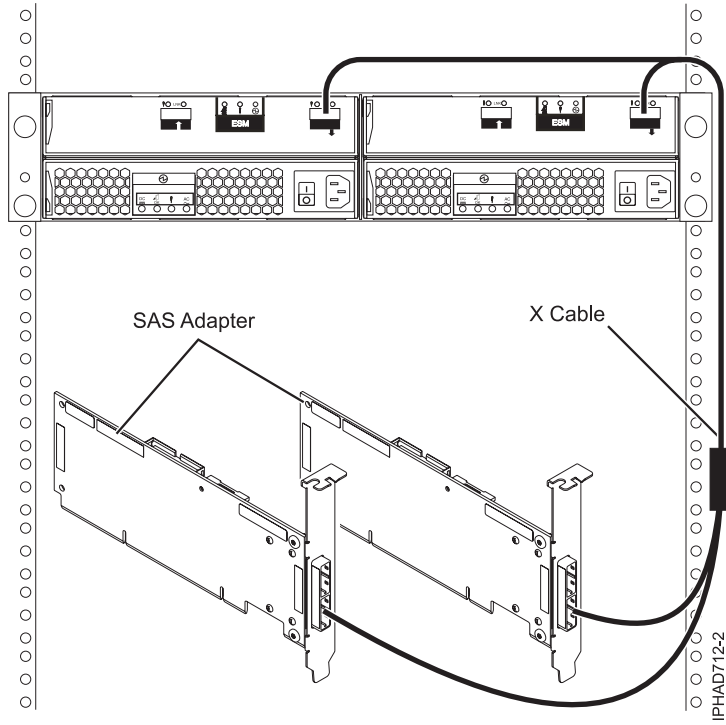


Figure 282. Two SAS RAID adapters to a disk expansion drawer in a multi-initiator HA RAID configuration

**Note:**

1. The X cable must be routed along the right side of the rack frame.
2. The X cable must be attached to the same numbered port on all adapters.

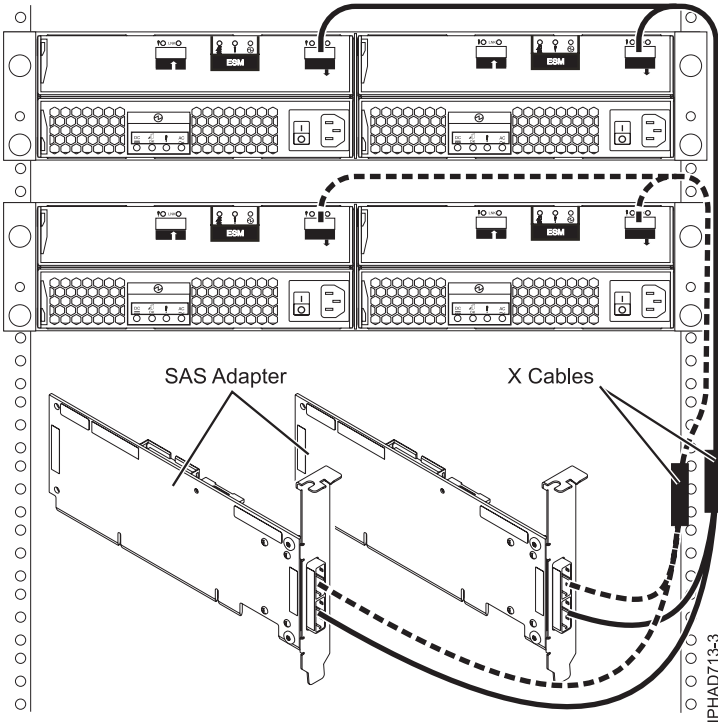


Figure 283. Two SAS RAID adapters to two disk expansion drawers in a multi-initiator HA RAID configuration

**Note:**

1. The X cable must be routed along the right side of the rack frame.
2. The X cable must be attached to the same numbered port on all adapters.

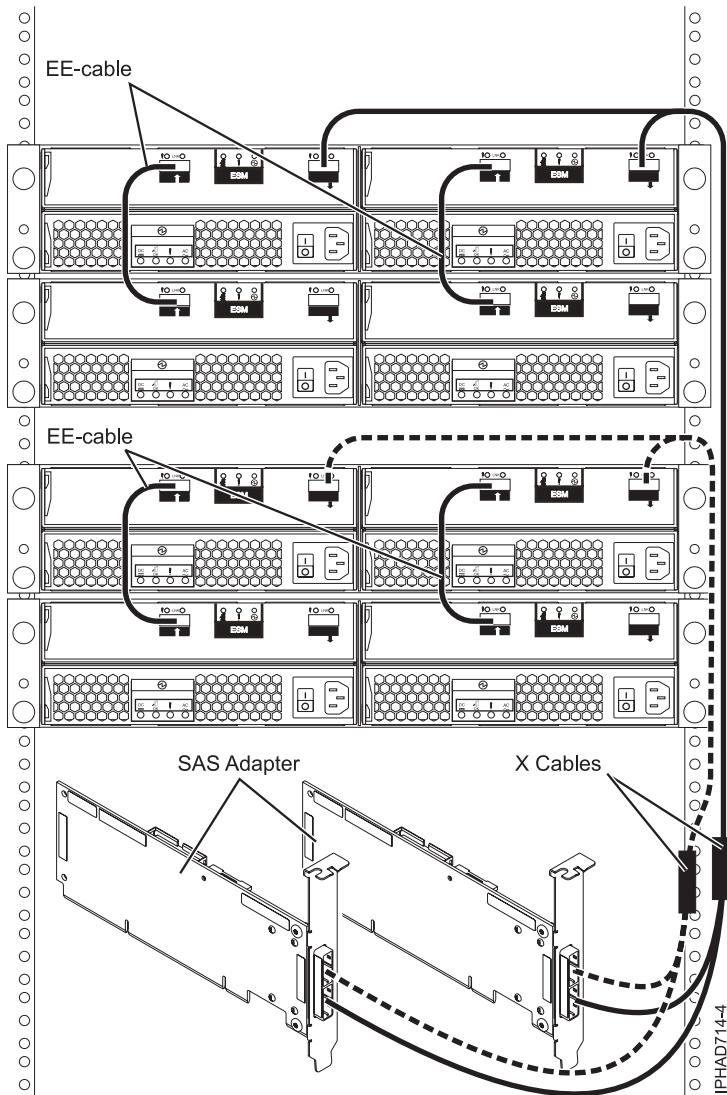
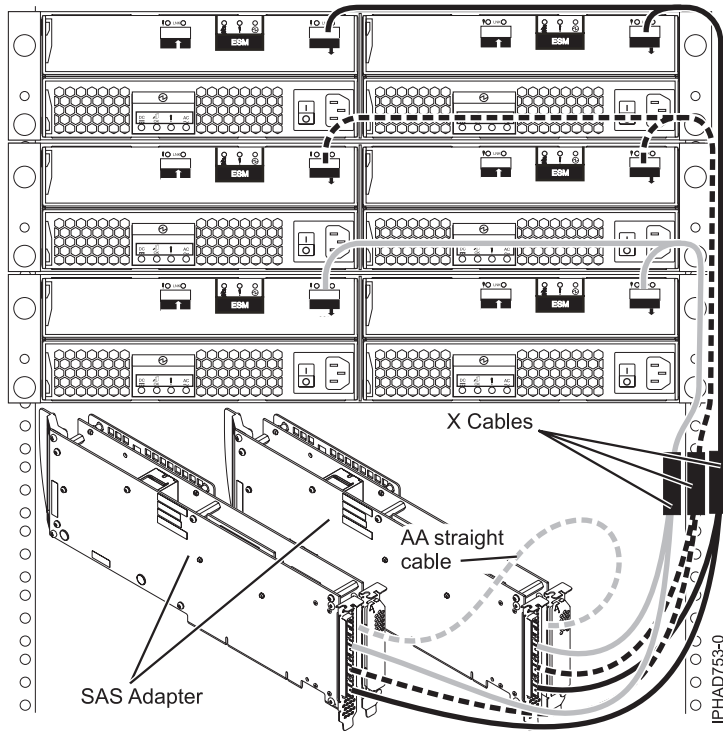


Figure 284. Two SAS RAID adapters to four disk expansion drawers in a multi-initiator HA RAID configuration

**Note:**

1. The X cable must be routed along the right side of the rack frame.
2. The X cable must be attached to the same numbered port on all adapters.





When attaching only hard disk drives, it is also possible to cascade a second disk expansion drawer off of two out of the three drawers for a maximum of five disk expansion drawers per adapter. Refer to Figure 264 on page 687.

**Notes:**

- Disk expansion drawers can be cascaded only one level deep.
- The X cable must be routed along the right side of the rack frame.
- The X cable must be attached to the same numbered port on all adapters.

*Figure 285. Two Tri-port SAS adapters to disk expansion drawers in a multi-initiator HA raid configuration*

**Two SAS adapters to disk expansion drawer - multi-initiator HA JBOD configuration**

Figure 286 on page 706 illustrates connecting two SAS adapters to a disk expansion drawer in a unique JBOD configuration.

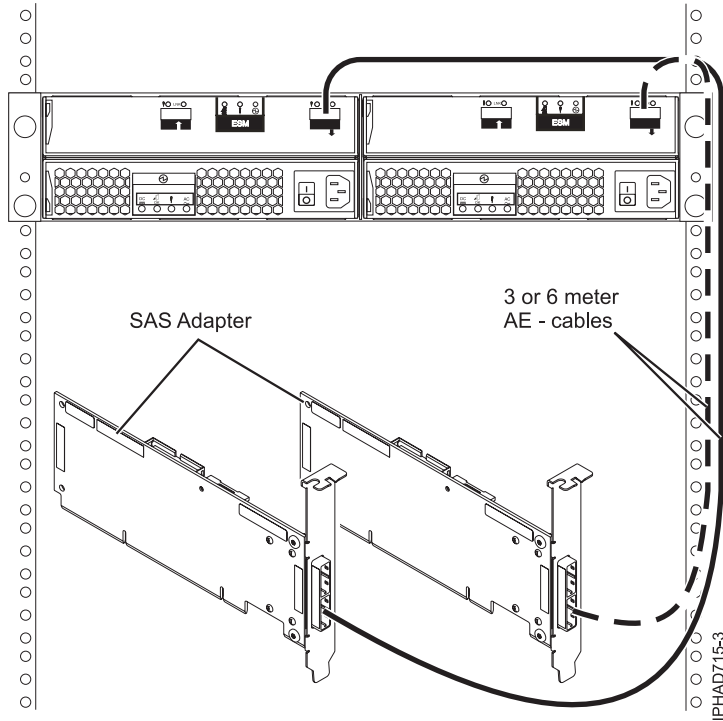


Figure 286. Two RAID SAS adapters to a disk expansion drawer in a multi-initiator HA JBOD configuration

**Note:** This configuration is only supported by the AIX and Linux operating systems with specific SAS adapters and requires special user configuration setup. Refer to the SAS RAID controllers for AIX or the SAS RAID controllers for Linux for additional information.

### PCIe SAS adapter in PCIe 12x I/O drawer to the internal SAS disk slots

There are several possible configurations for attaching PCIe SAS adapters to the internal SAS disk slots in the PCIe 12X I/O drawer, and multiple ways of setting up the disk layout within the drawer. The disk unit partitions switch setting on the rear of the PCIe 12X I/O drawer controls the grouping of the disk units within the drawer. This will also affect the way the adapter or adapters are cabled to specific ports on the PCIe 12X I/O drawer. The desired switch position should be selected before attaching the AT cables. If the disk unit partitions switch is changed, the PCIe 12X I/O drawer must be powered off and on for the new position to be detected.

All internal disk units are attached using AT cables. There are also options where other external expansion drawers might be connected to these same SAS adapters. External disk expansion drawers are attached using YO cables for single adapter configurations or X cables for two adapter configurations. External media expansion drawers are attached using AE cables for single adapter configurations. External media expansion drawers are not supported for two adapter configurations.

For complete details and examples of these configurations within the PCIe 12X I/O drawer, see Configuring the 5802 disk-drive subsystem. Figure Figure 287 on page 707 illustrates the rear view of a typical connection from two PCIe SAS adapters to the PCIe 12X I/O drawer. Use the AT cable to attach from an adapter port to a SAS port on the PCIe 12X I/O drawer.

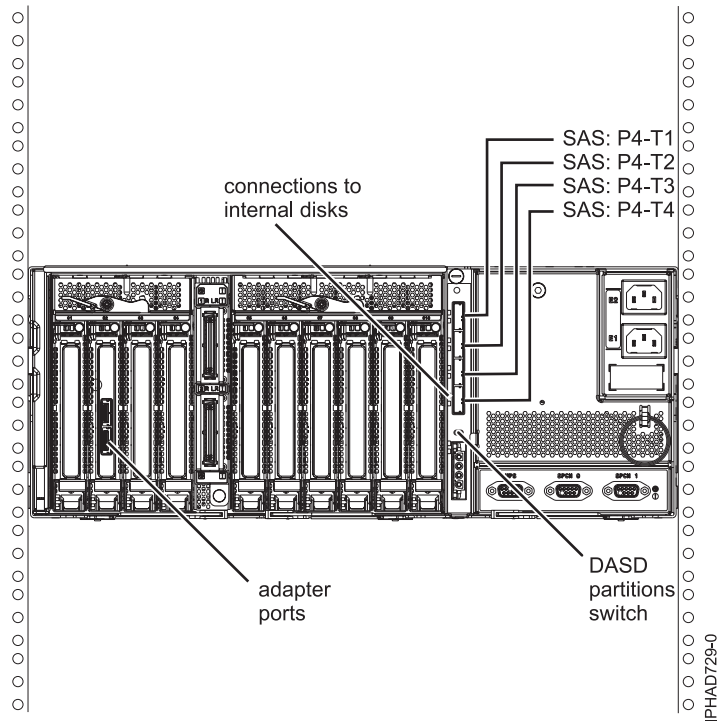


Figure 287. Two RAID SAS adapters to a disk expansion drawer in a multi-initiator HA JBOD configuration

**Related information:**

➡ Installing and configuring Solid State Drives

## Cable connectors

Use the Cable connectors table to select a cable connector for your server.

Table 715. Cable connectors

Number	Description	iSeries connector
2811	25 Mbps (UTP-3) I/O adapter	RJ-45
2812	45 Mbps (DS-3) I/O adapter	BNC
2815	155 Mbps (UTP-5) I/O adapter	RJ-45
2816	155 Mbps (MMF) I/O adapter	SC
2818	155 Mbps (SMF) I/O adapter	SC
2819	34 Mbps (E-3) I/O adapter	BNC

## Twinaxial console requirements

A twinaxial console allows you to use a basic command line interface and does not require you to use a personal computer as a system console.

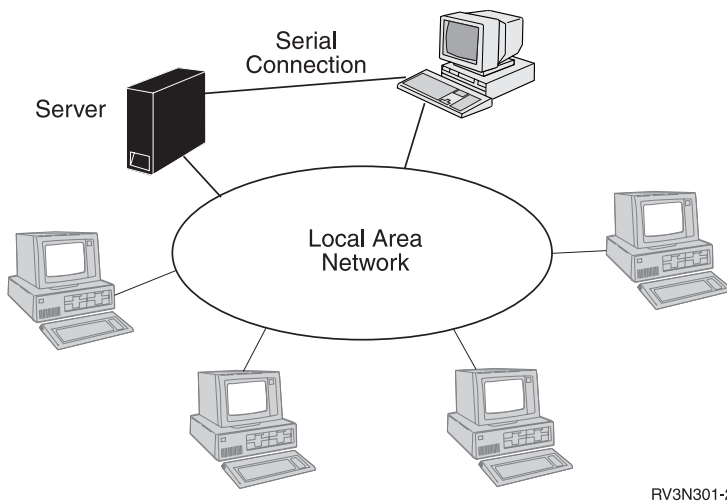
A twinaxial console requires:

- A console monitor and keyboard.
- A twinaxial console cable (supplied by the customer). The twinaxial console cable must be ordered separately. See **Twinaxial cables** to verify the correct part number required for the console.

---

## Local console directly attached to the server

Use this diagram to directly attach your server to a local console.



---

## Ordering server cables

Follow these steps to order cables for your server.

To order your server cables, follow these steps:

1. Check out General Cabling Considerations.
2. Figure out how much cable you need by consulting the site plan you drew.
3. Click types of cable to view specifications and part numbers.
  - Twinaxial cables (workstations, remote workstation controllers, host servers)
  - Operations Console Cables
4. Write down the type and quantity of cables you need in the Workstation Information Form 3B.
5. Using the information you entered in the form, order your cables. Make sure you specify:
  - Type of cable (for instance, twinaxial)
  - Lengths and quantity of cable (as in, ten 1.8 m (6 ft) cables, and so on)
  - Type of covering if applicable (like vinyl- or Teflon-covered twinaxial cables)

Remember to order any necessary cable accessories, such as **adapters** and **T connectors**.

**Note:** If you are ordering cables from IBM, you must specify part numbers and, in some cases, length or feature number. Verify the cable part tables (twinaxial cables and iSeries Access Console cables).

For more details on cables, contact an IBM service representative.

### Related reference:

"Workstation Information Form 3B" on page 501

Use this form to record the type and quantity of cables you need for your server.

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## Twinaxial cables

Use this information to plan for devices that require twinaxial cables.

### Related reference:

"General twinaxial cabling considerations" on page 709

Use these guidelines when planning your twinaxial cables.

“Twinaxial workstations cabling configurations for model 9406-7xx and 9406-8xx 8-port attachment”  
Use the cabling twinaxial workstations to the twinaxial 8-port workstation attachment figure to cable your server.

“Distance guidelines for workstation cabling” on page 710

Use these distance guidelines to cable your workstation with various equipment.

“Twinaxial cables from IBM” on page 711

Use the Twinaxial cables table to choose a cable for your server.

---

## General twinaxial cabling considerations

Use these guidelines when planning your twinaxial cables.

- **Cable types:** To connect twinaxial devices (that is, workstations) to your server, you can use vinyl-covered cables, Teflon-covered cables, or both. The only major difference between vinyl- and Teflon-covered cables is that Teflon-covered cables should be used for installation in an air plenum.
- **Adapters:** If you plan to connect two or more lengths of cable, order cable-to-cable adapters for the type of cable you are using. *Do not splice cables.*
- **Maximum workstation distance:** The last workstation in your series can be no more than 1525 m (5000 ft) in cable distance away from your host server or remote workstation controller.
- **Cable junctions:** A cable junction occurs when a cable attaches to a workstation or when an adapter which joins two cables. (Each pair of connections to a device is considered one junction.) *Do not make more than 11 cable junctions per line.*
- **Outdoor cables:** If you plan to install cables outside a building, consult a qualified service representative.
- **Cabling configurations:** See diagrams of how to arrange *twinaxial workstations*.
- **Cable placement and electrical equipment:** Do not install workstation cables near any power lines (transmitting more than 440 volts) or electrical equipment (using more than 440 volts). You can install cables near equipment of less than 440 volts if you follow *distance guidelines*.
- **Workstation connections:** Workstations have two sockets each for cable connections. Workstations are connected in a series. Your server can have up to seven workstation addresses on each twinaxial port. The last workstation in each of your series must have a cable terminator. Most workstations have this feature built in. Older workstations might need an external terminating plug. Review your workstation documentation.

### Related reference:

“Twinaxial workstations cabling configurations for model 9406-7xx and 9406-8xx 8-port attachment”  
Use the cabling twinaxial workstations to the twinaxial 8-port workstation attachment figure to cable your server.

“Distance guidelines for workstation cabling” on page 710

Use these distance guidelines to cable your workstation with various equipment.

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## Twinaxial workstations cabling configurations for model 9406-7xx and 9406-8xx 8-port attachment

Use the cabling twinaxial workstations to the twinaxial 8-port workstation attachment figure to cable your server.

This figure shows the cabling for twinaxial workstations to the twinaxial 8-port workstation attachment. Your unit might look different, but the same cabling concepts still apply.

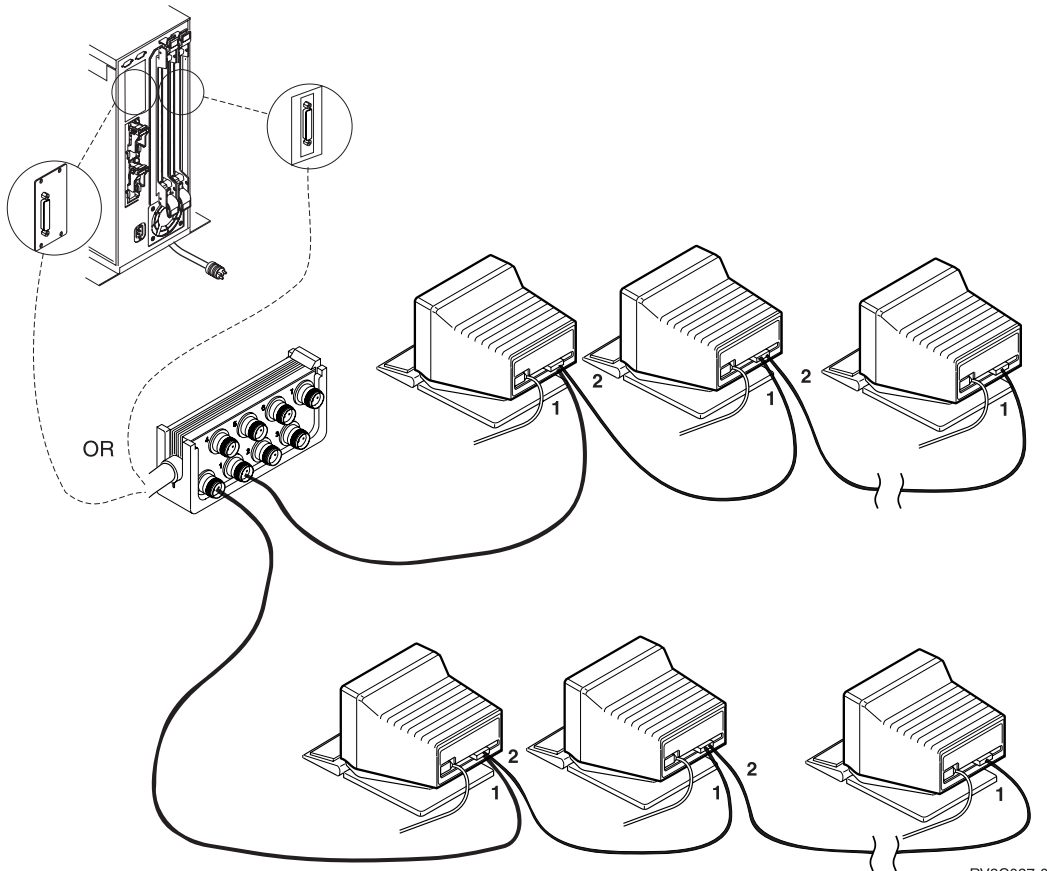


Figure 288. Cabling twinaxial workstations to the twinaxial 8-port workstation attachment

RV3C027-0

## Distance guidelines for workstation cabling

Use these distance guidelines to cable your workstation with various equipment.

When using the following equipment, it must be the minimum distance listed from workstation cables.

Fluorescent, Neon, or Incandescent lighting fixtures	Minimum distance from workstation cables 127 mm (5 in.)
Unshielded Power Lines or Electrical Equipment 0 - 2 kVA 2 - 5 kVA 5+ kVA	Minimum distance from workstation cables 127 mm (5 in.) 305 mm (12 in.) 610 mm (24 in.)

### With Workstation Cable Enclosed in Metallic Conduit

Unshielded Power Lines or Electrical Equipment 0 - 2 kVA 2 - 5 kVA 5+ kVA	Minimum distance from workstation cables 63.5 mm (2.5 in.) 152 mm (6 in.) 305 mm (12 in.)
---	---

### With Workstation Cable Enclosed in Grounded Metallic Conduit

Power Lines Enclosed in Grounded Metallic Conduit 0 - 2 kVA 2 - 5 kVA 5+ kVA	Minimum distance from workstation cables 30.5 mm (1.2 in.) 76 mm (3 in.) 152 mm (6 in.)
--	---

## Twinaxial cables from IBM

Use the Twinaxial cables table to choose a cable for your server.

When ordering cables from IBM, remember to specify the total length of each cable.

Table 716. Twinaxial cables

Part name	Part number
Cable Assembly (cable in specified length with connectors at both ends)	IBM part <b>4236482</b> (with vinyl covering)
	IBM part <b>7362062</b> (with Teflon covering)
Adapter (cable-to-cable)	IBM part <b>7362230</b> Amphenol 82-5588
Bulk Cable (cable in specified length, without connectors)	IBM part <b>7362211</b> (with vinyl covering) AWM
	IBM part <b>7362061</b> (with Teflon covering) CL2P
	IBM part <b>483699</b> (tubing used with Teflon-covered cables) CL2P
Connector (single plug connector)	IBM part <b>7362229</b> 82-5589 Amphenol AMP 22724-1
Terminator Plug	IBM part <b>7362188</b> AMP 227504-1, 110 Ohms (twinaxial cabling)
	IBM part <b>6091068</b> AMP 227504-2, 150 Ohms (IBM cabling server)
T Connector	IBM part <b>94X3678</b> or <b>81X5387</b>
Station Protector	IBM part <b>7362426</b> (single station protector)
	IBM part <b>7361807</b> (pair of station protectors)
Twinaxial Connector Shield	Twinaxial Connector Shield Kits: IBM part <b>94X3698</b>
Connector Kit (two plug connectors)	IBM part <b>7362268</b> (for vinyl-covered cables)
	IBM part <b>7362063</b> (for Teflon-covered cables)

## Operations Console and remote control panel cables

Use the Operations Console cables and Remote control panel cables tables to determine the cable specifications for your server.

You can connect a personal computer to your server as an operations console. The PC is attached through a serial connection to a communications input/output adapter (IOA) installed on the server. You can then use the PC as your Operations Console. Use a special Operations Console cable to do this.

Table 717. Operations Console cables

Model	Part number	Cable length	Number
Models 9406-730 and 9406-740 (#36-pin, square)	97H7556	6 m (19.7 ft)	2699
Models 9406-170, 9406-250, and 9406-720	97H7557 or 39J5835	6 m (19.7 ft)	2721, 2742, 2745, 2771, 2793
Models 9406-270, 9406-8xx, SSBx, 9406-520, 9111-520, 9406-550, 9406-570, and 9117-570, 9406-595	97H7557 or 39J5835	6 m (19.7 ft)	2742, 2745, 2771, 2793
9406-MMA, 8204-E8A, 8203-E4A 9407-M15, 9408-M25, 9409-M50	97H7557 or 39J5835	6 m (19.7 ft)	2742, 2793, 576C

Table 718. Remote control panel cables

Remote control panel cables	
Model	Part number
Models 9406-270, 9406-8xx, and SB3	53P5704 (substitute for 04N5592)
All other servers, except POWER5 systems (and later)	97H7591

**Notes:**

1. All POWER5 systems (and later) models do not support a directly attached remote control panel. To get remote control panel functions on the PC, you must use either the LAN-connected configuration or the virtual control panel function in the console's serial cable.
2. For a local console directly attached to the server the console and the remote control panel functions each need a special cable.
3. If you are currently using electronic customer support (ECS), you must move the electronic customer support cabling to another communications port before trying to install Operations Console directly attached. Note: You might need to reassign your ECS resources.
4. Any supported adapter might be used in a logical partition. There are cases where the Multi-function Input/Output Processor (MFIOP) might not support certain Input/Output Adapter (IOA) types in a logical partition. When in doubt, contact your sales representative. For more information, see Install the operations console cable.
5. Part number 39J5835 meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

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## Optical cable fiber specifications

Learn about the optical fiber cable specifications for your server.

The preferred optical fiber for the server is 50/125 multimode fiber. This is because its bandwidth is a factor of three higher than 62.5/125 at the 780 nm wavelength at which the system operates. The 62.5/125 multimode fiber is also supported but at reduced distances. For 3xx systems at 220 Mbps and 5xx, 6x0, Sx0, and SB1 servers at 266 Mbps, a 50/125 fiber will support a distance of 2000 meters. A 62.5/125 fiber will support a distance of 700 meters.

For 5xx, 6x0, Sx0, and SB1 systems that use the higher speed 1063 Mbps link, optical technology with 50/125 fiber will support a distance of 500 meters. A 62.5/125 fiber will support a distance of 175 meters.

Care should be taken so that optical fiber cables are not coiled to a diameter less than 16 cm (6.3 in) and not bent to a radius less than 3 cm (1.2 in). Do not grip optical cables with mechanical tools.

More information about optical cable installation can be found in *940x Installation and Upgrade*, SY44-5950.

**Note:** Although optical technology will support these distances, not all functions can operate at those distances in all cases. Review disk unit and tape unit operation functions before supporting distances beyond 100 meters.

### Cable specifications for 50/125

- Bandwidth:  
400 MHz-km at 780 nm. This is equivalent to 500 MHz-km at 850 nm.
- Attenuation:  
4.0 dB/km at 780 nm. This is equivalent to 3.0 dB/km at 850 nm.



- Cable specification for 62.5/125:
- Bandwidth:  
160 MHz-km at 850 nm.
- Attenuation:  
4.0 dB/km at 850 nm wavelength.

Depending on the data rate, the allowable link loss available to the user varies from 6 to 12 dB. Typical optical fiber connectors have a loss of 0.2 dB with a 0.5 dB maximum loss, and splices run 0.1 to 0.3 dB loss.

- Connectors for 3xx systems:

The connections to the optical ports of I/O Bus Expansion are SC duplex connectors. The jumper cables available with the server when shipped are duplex cables. These cables terminate with SC duplex connectors with a PC polish. Use the simplex ST connectors for the system power control network (SPCN).

- Connectors for 5xx, 6x0, Sx0, and SB1 systems:

The connector used for the 266 and 1063 data rate is slightly different than that used on the 220 Mbps links. For 3xx, a duplex SC connector is used. The 5xx, 6x0, Sx0, and SB1 machines have been changed to conform to industry standard Fiber Channel Support (FCS) duplex SC connector. The FCS SC connector is similar in appearance to the 3xx duplex SC connector but the keying orientation is different. The FCS duplex connector used for 5xx, 6x0, Sx0, and SB1 also employs two SC connectors joined together but the two SC connectors are rotated 90 - from the connectors used on 3xx systems.

- 2618/8664 Fiber Distributed Data Interface (FDDI) Adapter
- 2665/8665 Shielded Twisted-Pair Distributed Data Interface (SDDI) Adapter
- 2666 High Speed Communications Adapter
- Wireless LAN Communications
- Integrated FAX Adapter

**Related information:**

 [940x Installation and Upgrade](#)

## Labeling cables

Labeling the cables you install helps you keep track the location of all your cables.

You can use label templates to label your cables. Print them, complete the information, and tape a label to each end of each cable. The label contains all the information you need to know about the cable and where it should be connected. For an example of the information on a label, see *Label templates*.

## Label templates

Use the label template to clearly identify the cables used on your server.

<b>Connect this end to:</b>	<b>Other end connects to:</b>
Device type/name	
Location	
Device address	
Socket/port	

	SX21-9920
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<b>Connect this end to:</b>	<b>Other end connects to:</b>
Device type/name	
Location	
Device address	
Socket/port	
	SX21-9920

<b>Connect this end to:</b>	<b>Other end connects to:</b>
Device type/name	
Location	
Device address	
Socket/port	
	SX21-9920

## Cables available from IBM

Use the *Cables available from IBM* table to find cables available from IBM.

**Note:** Some parts might be labeled with part numbers that are different from the ones specified in your order. Check to make sure your parts match the parts in this table.

Table 719. Cables available from IBM

Description	Length	Part number	CIN	Fire-resistance characteristics
<i>For racks attached to model B</i>				
Bus Cable	4.0 m (13.1 ft)	62X3427	9984	–
Bus Cable	8.0 m (26.2 ft)	62X3428	9985	–
Power Sequence Cable	3.0 m (10.0 ft)	89X2926	–	–
Power Sequence Cable	6.0 m (19.7 ft)	89X2925	–	–
Power Sequence Cable	12.0 m (39.3 ft)	93X2000	9120	CL2, FT4
Power Sequence Cable	30.0 m (98.4 ft)	93X2147	9117	CL2, FT4
Power Sequence Cable ( <b>plenum</b> )	30.0 m (98.4 ft)	21F5135	9117	CL2P, FT6

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
Power Sequence Cable	60.0 m (196.8 ft)	93X2148	9118	CL2, FT4
Power Sequence Cable (plenum)	60.0 m (196.8 ft)	21F5136	9117	CL2P, FT6
<b>SPD Communications Cable Non-Enhanced</b>				
RS232 Cable Germany	15.2 m (50 ft)	21F9353	9836	CL2, FT4
RS232 Cable Japan	15.5 m (50 ft)	21F9349	9836	CL2, FT4
RS232 Cable	6.1 m (20 ft)	22F0149	9022	CL2, FT4
RS232 Cable	15.2 m (50 ft)	22F9348	9836	CL2, FT4
RS232 Cable Germany	6.1 m (20 ft)	22F0150	9022	CL2, FT4
RS232 Cable Japan	6.1 m (20 ft)	22F0151	9022	CL2, FT4
RS366 Cable	6.1 m (20 ft)	72X5643	9840	CL2, FT4
RS366 Cable Japan	6.1 m (20 ft)	21F4415	9840	CL2, FT4
<b>SPD Communications Cable Enhanced</b>				
V.24 Cable	6.1 m (20 ft)	22F0152	9203	CL2, FT4
V.24 Cable Germany	6.1 m (20 ft)	22F0153	9023	CL2, FT4
V.24 Cable Japan	6.1 m (20 ft)	22F0154	9023	CL2, FT4
V.24 Cable	15.2 m (50 ft)	21F9350	9835	CL2, FT4
V.24 Cable Japan	15.2 m (50 ft)	21F9351	9835	CL2, FT4
V.24 Cable Germany	15.2 m (50 ft)	21F9352	9835	CL2, FT4
V.24 Cable	24.2 m (80 ft)	74F1837	9869	CL2, FT4
<b>Other SPD Communications Cables</b>				
X.21 Cable	6.1 m (20 ft)	72X5640	9021	CL2, FT4
X.21 Cable	15.2 m (50 ft)	21F9356	9839	CL2, FT4
V.35 Cable	6.1 m (20 ft)	72X5641	9020	CL2, FT4
V.35 Cable	15.2 m (50 ft)	21F9357	9838	CL2, FT4
V.35 Cable	24.4 m (80 ft)	74F1839	9870	CL2, FT4
2 Port Comm Cable	3 m (9.8 ft)	21F9345	9843	CL2, FT4
<b>SPD and PCI Twinaxial Workstation Attachment Cables</b>				
Twinaxial 8 Port Cable	6.1 m (20 ft)	21F5093	9842	CL2, FT4
<b>Removable Media Device Attachment (2621)</b>				
SCSI 1 Cable	2.6 m (8.5 ft)	17G4142	9826	CL2, FT4
SCSI 1 Cable	4 m (13.1 ft)	6495268	9826	CL2, FT4
SCSI 1 Cable	12 m (39.3 ft)	6495269	9827	CL2, FT4
SCSI 1 Cable	20 m (65.6 ft)	21F4980	9846	CL2, FT4
<b>Direct Access Storage Device Controller (6500)</b>				
SCSI 2 Cable	2 m (6.6 ft)	21F9043	9870	CL2, FT4
SCSI 2 Cable	4 m (13.1 ft)	21F9044	9871	CL2, FT4

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
SCSI 2 Cable	64 m (19.7 ft)	56F0382	9872	CL2, FT4
SCSI 2 Cable	24 m (78.7 ft)	21F9045	9873	CL2, FT4
<b>Tape and Disk Device Controller (6501)</b>				
SCSI P Cable	2 m (6.6 ft)	17G2007	9875	CL2, FT4
SCSI P Cable	4 m (13.1 ft)	21F9047	9876	CL2, FT4
SCSI P Cable	6 m (19.7 ft)	56F0381	9877	CL2, FT4
SCSI P Cable	24 m (78.7 ft)	21F9048	9878	CL2, FT4
<b>Tape Device Controller (6534, 2729)</b>				
3490 model Fxx and 3570 Cables				
SCSI 2 Cable	0.5 m (2 ft)	49G6456	5205	CL2, FT4
SCSI 2 Cable	4.5 m (15 ft)	49G6457	5245	CL2, FT4
SCSI 2 Cable	12 m (39 ft)	49G6458	5212	CL2, FT4
SCSI 2 Cable	18 m (59 ft)	49G6459	5218	CL2, FT4
3590 Cables				
SCSI 2 Cable	4.5 m (15 ft)	05H4648	5145	CL2, FT4
SCSI 2 Cable	12 m (39 ft)	05H4649	5112	CL2, FT4
SCSI 2 Cable	18 m (59 ft)	05H4650	5118	CL2, FT4
SCSI 2 Cable	25 m (82 ft)	05H4651	5125	CL2, FT4
<b>Tape and Disk Feature Device Controller (6112)</b>				
DFCI Cable	.6 m (2 ft)	6495253	9801	CL2, FT4
DFCI Cable	1.5 m (5 ft)	6495254	9802	CL2, FT4
DFCI Cable	2.5 m (8.2 ft)	6495250	9803	CL2, FT4
DFCI Cable	4 m (13.1 ft)	6495252	9804	CL2, FT4
DFCI Cable	6 m (19.7 ft)	6495251	9805	CL2, FT4
DFCI Cable	10 m (32.8 ft)	6495255	9806	CL2, FT4
DFCI Cable	20 m (65.6 ft)	6495256	9807	CL2, FT4
DFCI Cable	30 m (98.4 ft)	6495257	9808	CL2, FT4
DFCI Cable (plenum)	30 m (98.4 ft)	6495275	9811	CL2P, FT6
DFCI Cable	40 m (131.2 ft)	6495258	9809	CL2, FT4
DFCI Cable (plenum)	40 m (131.2 ft)	6495276	9812	CL2P, FT6
DFCI Cable	60 m (196.8 ft)	6495264	9810	CL2, FT4
DFCI Cable (plenum)	60 m (196.8 ft)	6495277	9813	CL2P, FT6
<b>SPD High-Speed Communications Adapter (2666)</b>				
X.21 Cable	6.1 m (20 ft)	17G3987	9885	CL2, FT4
V.35 Cable	6.1 m (20 ft)	17G3991	9879	CL2, FT4
V.35 Cable	24.4 m (80 ft)	17G3992	9880	CL2, FT4

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
RS449 Cable	6.1 m (20 ft)	17G4000	9882	CL2, FT4
RS449 Cable	24.4 m (80 ft)	17G4001	9883	CL2, FT4
RS449 Cable	45.7 m (150 ft)	17G4002	9884	CL2, FT4
<i>PCI and SPD Miscellaneous server cables</i>				
Diskette Cable	2.4 m (7.9 ft)	46G3658	9886	CL2, FT4
Diskette/Twinaxial Cable	2.4 m (7.9 ft)	46G3585	9887	CL2, FT4
BBU cable	2.4 m (7.9 ft)	86G7712	5144	AWM, FT1
Ethernet	3.0 m (9.8 ft)	86G7691	9025	CL2, FT4
Token Ring	2.44 m (8 ft)	6339098	9024	CL2
<i>For model 9406 and Expansion Units</i>				
SPCN Cable (plenum)	0.6 m (1.96 ft)	21F9362	9216	CL2P, FT6
SPCN Cable (plenum)	1.2 m (3.9 ft)	17G2017	9220	CL2P, FT6
SPCN Cable (plenum)	2.0 m (6.6 ft)	87G6235	9206	CL2P, FT6
SPCN Cable (plenum)	6.0 m (19.7 ft)	21F9469	9219	CL2P, FT6
SPCN Cable (plenum)	15.0 m (49.2 ft)	21F9358	9213	CL2P, FT6
SPCN Cable (plenum)	30.0 m (98.4 ft)	21F9359	9214	CL2P, FT6
SPCN Cable (plenum)	60.0 m (196.8 ft)	21F9360	9215	CL2P, FT6
SPCN Cable (plenum)	60.0 m (196.8 ft)	21F9414	9211	OFNP, OFN FT6
SPCN Cable (plenum)	100 m (328 ft)	21F9415	9212	OFNP, OFN FT6
BUS Cable	4.0 m (13.1 ft)	62X3427	9984	AWM(VW-1)
BUS Cable	8.0 m (26.2 ft)	62X3428	9985	AWM(VW-1)
BUS Cable (plenum)	6.0 m (19.7 ft)	46F2440	9851	OFNP, OFN FT6
BUS Cable (plenum)	10.0 m (32.8 ft)	46F2441	9852	OFNP, OFN FT6
BUS Cable (plenum)	20.0 m (65.6 ft)	46F2442	9853	OFNP, OFN FT6
BUS Cable (plenum)	6.0 m (19.7 ft)	54G3385		Copper
BUS Cable (plenum)	10.0 m (32.8 ft)	54G3386		Copper
BUS Cable (plenum)	20.0 m (65.6 ft)	54G3387		Copper
BUS Cable	2.4 m (8 ft)	72X5638	–	–
BUS Cable	3 m (9.8 ft)	72X5638	–	–
ISDN Cable	7.0 m (22.9 ft)	72X6348	9844	AWM(VW-1)
ISDN Cable (France)	7.0 m (22.9 ft)	17G2528	9844	AWM(VW-1)

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
ISDN Cable (Switzerland)	7.0 m (22.9 ft)	8191781	9844	AWM(VW-1)
ISDN Cable (Europe NIA)	7.0 m (22.9 ft)	8191822	9844	AWM(VW-1)
Data Encryption Cable	6.1 m (20.0 ft)	85F8109	9848	CL2, FT4
<b>Operations Console Cables</b>				
Operations Console serial remote control panel cable for models 9406-170, 9406-250, 9406-720, 9406-730, and 9406-740	6.1 m (20.0 ft)	97H7591	0381	CL, FT4
Operations Console (P for 2721 and 2745) for models 9406-170, 9406-250 and 9406-720	6.1 m (20.0 ft)	97H7557	0367	CL2, FT4, or CMG
Operations Console (D for 2699) for models 9406-730 and 9406-740	6.1 m (20.0 ft)	97H7556	0328	CL2, FT4
Operations Console for models 9406-8xx, SBx, 9406-270, 9406-520, 9111-520, 9406-550, 9406-570, 9117-570, 9406-595, 9406-MMA, 8204-E8A, 8203-E4A, 9407-M15, 9408-M25	6.0 m (20.0 ft)	97H7557 or 39J5835	0367	CL2, FT4, or CMG
Operations Console parallel remote control panel cable for models 9406-270, 9406-8xx, and SBx <b>Note:</b> Not supported in V5R4 and later.		53P5704		
<b>PCI Communications Cables for models 15X, 170, 600, 620, S10, and S20</b>				
RS232	6.1 m (20.0 ft)	44H7480	0348	CL2, CMG
RS232, Germany	6.1 m (20.0 ft)	44H7482	0348	CL2, CMG
RS232, Japan	6.1 m (20.0 ft)	44H7484	0348	CL2, CMG
V.24	6.1 m (20.0 ft)	44H7486	0350	CL2, CMG
V.24, Germany	6.1 m (20.0 ft)	44H7489	0350	CL2, CMG
V.24, Japan	6.1 m (20.0 ft)	44H7492	0350	CL2, CMG
V.35	6.1 m (20.0 ft)	44H7495	0353	CL2, CMG
V.36	6.1 m (20.0 ft)	44H7498	0356	CL2, CMG
X.21	6.1 m (20.0 ft)	44H7501	0359	CL2, CMG

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
<b>PCI Communications Cables for models 600, S10, 620, and S20</b>				
RS232 Cable	15.2 m (50 ft)	44H7481	0349	CL2, FT4
RS232 Cable	15.2 m (50 ft) Germany	44H7483	0349	CL2, FT4
RS232 Cable	15.5 m (50 ft)	44H7485	0349	CL2, FT4
V.24 Cable	15.2 m (50 ft)	44H7487	0351	CL2, FT4
V.24 Cable	15.2 m (50 ft) Germany	44H7490	0351	CL2, FT4
V.24 Cable	15.5 m (50 ft)-Japan	44H7493	0351	CL2, FT4
V.24 Cable	24.4 m (80 ft)	44H7488	0352	CL2, FT4
V.24 Cable	24.4 m (80 ft)-Germany	44H7491	0352	CL2, FT4
V.24 Cable	24.4 m (80 ft)-Japan	44H7494	0352	CL2, FT4
V.35 Cable	15.2 m (50 ft)	44H7496	0354	CL2, FT4
V.35 Cable	24.4 m (80 ft)	44H7497	0355	CL2, FT4
V.36 Cable	15.2 m (50 ft)	44H7499	0357	CL2, FT4
V.36 Cable	45.7 m (150 ft)	44H7500	0358	CL2, FT4
X.21 Cable	15.2 m (50 ft)	44H7502	0360	CL2, FT4
<b>SPD Book Type Communications Cables for models 6x0, Sx0, and SB1</b>				
RS232 Cable	24.4 m (80 ft)	97H7389	0329	
RS232 Cable Germany	24.4 m (80 ft)	97H7390	0329	
RS232 Cable Japan	24.4 m (80 ft)	97H7391	0329	
RS232 Cable	6.1 m (20 ft)	21H3764	0330	CL2, FT4
RS232 Cable Germany	6.1 m (20 ft)	21H3765	0330	CL2, FT4
RS232 Cable Japan	6.1 m (20 ft)	21H3766	0330	CL2, FT4
RS232 Cable	15.2 m (50 ft)	21H3767	0331	CL2, FT4
RS232 Cable Germany	15.2 m (50 ft)	21H3768	0331	CL2, FT4
RS232 Cable Japan	15.2 m (50 ft)	21H3769	0331	CL2, FT4
V.24 Cable	6.1 m (20 ft)	21H3770	0332	CL2, FT4
V.24 Cable	6.1 m (20 ft)-Germany	21H3771	0332	CL2, FT4
V.24 Cable	6.1 m (20 ft)-Japan	21H3772	0332	CL2, FT4
V.24 Cable	15.2 m (50 ft)	21H3773	0333	CL2, FT4
V.24 Cable	15.2 m (50 ft)-Germany	21H3774	0333	CL2, FT4
V.24 Cable	15.5 m (50 ft)-Japan	21H3775	0333	CL2, FT4
V.24 Cable	24.4 m (80 ft)	21H3776	0334	CL2, FT4
V.24 Cable	24.4 m (80 ft)-Germany	21H3777	0334	CL2, FT4

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
V.24 Cable	24.4 m (80 ft)-Japan	21H3778	0334	CL2, FT4
V.36 Cable	6.1 m (20 ft)	21H3787	0335	CL2, FT4
V.36 Cable	15.2 m (50 ft)	21H3788	0336	CL2, FT4
V.36 Cable	45.7 m (150 ft)	21H3789	0337	CL2, FT4
V.35 Cable	6.1 m (20 ft)	21H3792	0338	CL2, FT4
V.35 Cable	15.2 m (50 ft)	21H3785	0339	CL2, FT4
V.35 Cable	24.4 m (80 ft)	21H3786	0340	CL2, FT4
X.21 Cable	6.1 m (20 ft)	21H3782	0341	CL2, FT4
X.21 Cable	15.2 m (50 ft)	21H3783	0342	CL2, FT4
<b>Fax Coupler Cables</b>				
Fax Coupler Cable Belgium		21H4903		
Fax Coupler Cable Israel		21H4905		
Fax Coupler Cable South Africa		21H4904		
Fax Coupler Cable Italy		75G3802		
Fax Coupler Cable France		75G3803		
Fax Coupler Cable Germany		75G3804		
Fax Coupler Cable United Kingdom		75G3805		
Fax Coupler Cable Sweden		75G3806		
Fax Coupler Cable Australia		75G3807		
Fax Coupler Cable China (Hong Kong S.A.R.)		75G3808		
Fax Coupler Cable Finland		75G3809		
Fax Coupler Cable Netherlands		75G3810		
Fax Coupler Cable Switzerland		75G3811		
Fax Coupler Cable Denmark		75G3812		
Fax Coupler Cable US/Canada		87G6236		
<b>Miscellaneous Cables for models 9406-640, S30, 9406-730, 9406-650, S40, 9406-740, and SB1</b>				
HSL Cable	15 m (32.8 ft)	21H7377	0346	CL2, CMG, or FT4
<b>Cables for servers 9406-270, 9406-820, 9406-830, 9406-840, SB2, and SB3</b>				



Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
VS COM Cable	6 m (19.8 ft)	44L0007	031A	
HSL Cable 250/500	3 m (10 ft)	44L0005	0343	
HSL Cable 250/500	6 m (19.8 ft)	97H7490	0361	
HSL Cable 250/500	15 m (32.8 ft)	04N7014	0368	
ISDN PRI Cable WT	10 m (32.8 ft)	97H7698	984B	
ISDN PRI Cable BRI	10 m (32.8 ft)	97H7699	984C	
ISDN PRI Cable US	10 m (32.8 ft)	97H7697	984A	
JTAG A Cable	6 m (19.8 ft)	97H7468	033A	
JTAG E Cable	6 m (19.8 ft)	97H7604	033C	
JTAG C Cable	6 m (19.8 ft)	97H7487	033B	
SPCN 2 Port Cable	3 m (9.8 ft)	04N2652	036A	
RS232 Cable	24.4 m (80 ft)	97H7386	0365	
RS232 Cable Germany	24.4 m (80 ft)	97H7387	0365	
V.24 Cable Japan	24.4 m (80 ft)	97H7388	0365	
<b>High-Speed Link Cables for models 9406-650, 9406-740, S40, SB1, 9406-820, 9406-830, and 9406-840</b>				
HSL Cable	6 m (19.7 ft)	21H7643	0347	CL2, CMG or FT4
<b>System Interconnect Cables for models 65X</b>				
OP Panel	5 m (16.4 ft)	21H7374	9819	CL2, CMG
JTAG Cable	3 m (9.8 ft)	21H7375	9817	CL2, CMG
<b>Cables for models 9406-870 and 9406-890</b>				
HSL (copper)	3.0 m	44L0005	1460	
HSL (copper)	6.0 m	97H7490	1461	
HSL (copper)	15.0 m	97H7491	1462	
HSL (optical)	6.0 m	21P5014	1470	
HSL (optical)	30.0 m	21P5015	1471	
HSL (optical)	100.0 m	21P5016	1472	
HSL (optical)	250.0 m	21P6326	1473	
HSL to HSL2 (copper)	6.0 m	21P5477	1474	
HSL to HSL2 (copper)	10.0 m	21P5458	1475	
HSL2 (copper)	1.0 m	21P5454	1481	
HSL2 (copper)	3.5 m	53P2676	1482	
HSL2 (copper)	10.0 m	21P5456	1483	
HSL2 (copper)	15.0 m	21P5457	1485	
IPCS video extension cables for NT	4.5 m (15.0 ft)	44H8676	0325	CL2, CL2, CMG or FT4
IPCS mouse or keyboard extension cables for NT	5.0 m (16.0 ft)	44H8677	0325	AWM (VW-1)
RS232	6.0 m (20.0 ft)	44H7480	0348	CL2, CMG or FT4

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
RS232, Germany	6.0 m (20.0 ft)	44H7482	0348	CL2, CMG or FT4
RS232, Japan	6.0 m (20.0 ft)	44H7484	0348	CL2, CMG or FT4
RS232	15.0 m (50.0 ft)	44H7481	0349	CL2, CMG or FT4
RS232, Germany	15.0 m (50.0 ft)	44H7483	0349	CL2, CMG or FT4
RS232, Japan	15.0 m (50.0 ft)	44H7485	0349	CL2, CMG or FT4
V.35	6.0 m (20.0 ft)	44H7495	0353	CL2, CMG or FT4
V.36	6.0 m (20.0 ft)	44H7498	0356	CL2, CMG or FT4
X.21	6.0 m (20.0 ft)	44H7501	0359	CL2, CMG or FT4
X.21	15.0 m (50.0 ft)	44H7502	0360	CL2, CMG or FT4
RS232	24.5 m (80.0 ft)	97H7386	0365	CL2, CMG or FT4
RS232, Germany	24.5 m (80.0 ft)	97H7387	0365	CL2, CMG or FT4
RS232, Japan	24.5 m (80.0 ft)	97H7388	0365	CL2, CMG or FT4
LC-SC adapter kit (50um)	0.2 m (0.7 ft)	11P1373	0371	OFNR, FT4
LC-SC adapter kit (62.5um)	0.2 m (0.7 ft)	11P1374	0372	OFNR, FT4
Remote control panel cable	6.0 m (20.0 ft)	53P5704	0382	CL2, CMH
Modem cable - Austria	10.0 m (33.0 ft)	21H4902	1010	AWM (VW-1)
Modem cable - Belgium	10.0 m (33.0 ft)	21H4903	1011	AWM (VW-1)
Modem cable - Africa	10.0 m (33.0 ft)	21H4904	1012	AWM (VW-1)
Modem cable - Israel	10.0 m (33.0 ft)	21H4905	1013	AWM (VW-1)
Modem cable - Italy	10.0 m (33.0 ft)	75G3802	1014	AWM (VW-1)
Modem cable - France	10.0 m (33.0 ft)	75G3803	1015	AWM (VW-1)
Modem cable - Germany	10.0 m (33.0 ft)	75G3804	1016	AWM (VW-1)
Modem cable - UK	10.0 m (33.0 ft)	75G3805	1017	AWM (VW-1)
Modem cable - Iceland/Sweden	10.0 m (33.0 ft)	75G3806	1018	AWM (VW-1)
Modem cable - Australia	10.0 m (33.0 ft)	75G3807	1019	IEC 60950 (V2)
Modem cable - China (Hong Kong S.A.R.) and New Zealand	10.0 m (33.0 ft)	75G3808	1020	AWM (VW-1)
Modem cable - Finland and Norway	10.0 m (33.0 ft)	75G3809	1021	AWM (VW-1)
Modem cable - Netherlands	10.0 m (33.0 ft)	75G3810	1022	AWM (VW-1)
Modem cable - Switzerland	10.0 m (33.0 ft)	75G3811	1023	AWM (VW-1)

Table 719. Cables available from IBM (continued)

Description	Length	Part number	CIN	Fire-resistance characteristics
Modem cable - Denmark	10.0 m (33.0 ft)	75G3812	1024	AWM (VW-1)
Modem cable - US/Canada	10.0 m (33.0 ft)	87G6236	1025	AWM (VW-1)
<b>SAS cables</b>				
SAS 4x AI cable	1 m (3.2 ft)	44V4041		FT4, CMG
SAS 4x AE cable	3 m (9.8 ft)	44V4163		FT4, CMG
SAS 4x AE cable	6 m (19.6 ft)	44V4164		FT4, CMG
SAS 4x EE cable	1 m (3.2 ft)	44V4147		FT4, CMG
SAS 4x EE cable	3 m (9.8 ft)	44V4148		FT4, CMG
SAS 4x EE cable	6 m (19.6 ft)	44V4149		FT4, CMG
SAS YO cable	1.5 m (4.9 ft)	44V4157		FT4, CMG
SAS YO cable	3 m (9.8 ft)	44V4158		FT4, CMG
SAS YO cable	6 m (19.6 ft)	44V4159		FT4, CMG
SAS YO cable	15 m (49.2 ft)	44V4160		FT4, CMG
SAS YI cable	1.5 m (4.9 ft)	44V4161		FT4, CMG
SAS YI cable	3 m (9.8 ft)	44V4162		FT4, CMG
SAS X cable	3 m (9.8 ft)	44V4154		FT4, CMG
SAS X cable	6 m (19.6 ft)	44V4155		FT4, CMG
SAS X cable	15 m (49.2 ft)	44V4156		FT4, CMG
SAS YR cable	1 m (3.2 ft)	44V4818		FT4, CMG
Split disk backplane cable card for a 3/3 split		44V3557		
Split disk backplane cable card for a 6/0 split		44V3435		
Disk backplane to rear bulkhead		42R5751		
Split disk backplane to rear bulkhead		44V5252		
Split disk backplane to rear bulkhead		44V5253		
Disk backplane to rear bulkhead		44V3382		
<b>Note:</b> Fire-resistance characteristics are defined in <i>National Electrical Code</i> , UL 1950/IEC 950/CSA 22.2-950.				



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## Chapter 12. Rack installation procedures for racks not purchased at IBM

Learn the requirements and specifications for installing IBM systems into racks that were not purchased at IBM.

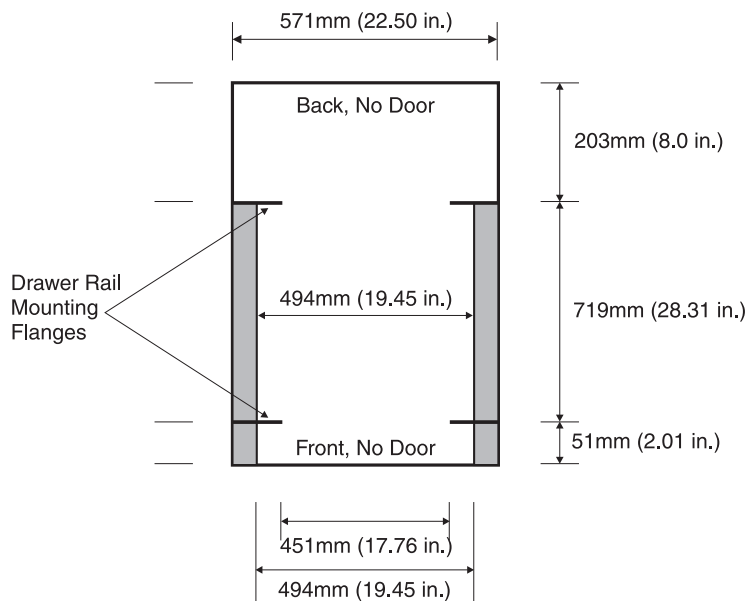
This topic provides requirements and specifications for 19-inch racks used by certain systems. These requirements and specifications are provided as an aid to help you understand the requirements to install certain IBM systems into racks. It is your responsibility, working with your rack manufacturer, to ensure that the rack chosen meets the requirements and specifications listed here.

### Rack specifications

The general rack specifications are:

- The rack or cabinet must meet the EIA Standard EIA-310-D for 19-inch racks published August 24, 1992. The EIA-310-D standard specifies internal dimensions, for example, the width of the rack opening (width of the chassis), the width of the module mounting flanges, the mounting hole spacing, and the depth of the mounting flanges. The EIA-310-D standard does not control the overall external width of the rack. There are no restrictions on the location of side walls and corner posts relative to the internal mounting space.

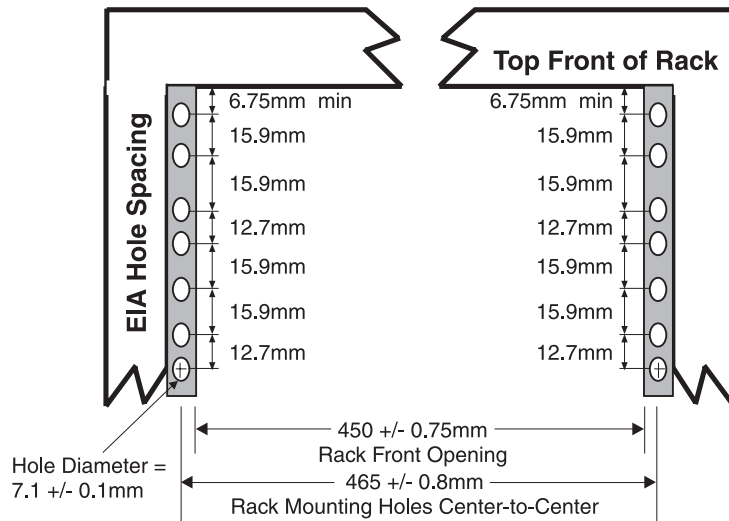
The front rack opening must be 451 mm wide + 0.75 mm (17.75 in. + 0.03 in.), and the rail-mounting holes must be 465 mm + 0.8 mm (18.3 in. + 0.03 in.) apart on center (horizontal width between vertical columns of holes on the two front-mounting flanges and on the two rear-mounting flanges).



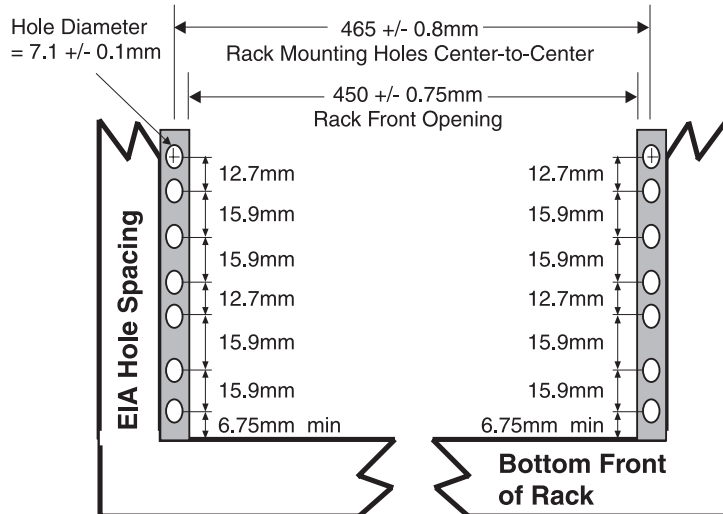
### Top view of rack specifications dimensions

Figure 289. Top view of rack specifications dimensions

The vertical distance between mounting holes must consist of sets of three holes spaced (from bottom to top) 15.9 mm (0.625 in.), 15.9 mm (0.625 in.), and 12.67 mm (0.5 in.) on center (making each three hole set of vertical hole spacing 44.45 mm (1.75 in.) apart on center). The front and rear mounting flanges in the rack or cabinet must be 719 mm (28.3 in.) apart and the internal width bounded by the mounting flanges at least 494 mm (19.45 in.), for the IBM rails to fit in your rack or cabinet (see the following figure).



**Rack specifications dimensions, top front view**



**Rack specifications dimensions, bottom front view**

- The rack or cabinet must be capable of supporting an average load of 15.9 kg (35 lb) of product weight per EIA unit.

For example, a four EIA drawer has a maximum drawer weight of 63.6 kg (140 lb).

The following rack hole sizes are supported for racks where IBM hardware is mounted:

- 7.1 mm plus or minus 0.1 mm
- 9.2 mm plus or minus 0.1 mm
- 12 mm plus or minus 0.1 mm
- Only ac power drawers are supported in the rack or cabinet. It is strongly recommended to use a power distribution unit that meets the same specifications as IBM power distribution units to supply rack power (for example, feature code 7188). Each power distribution unit installed in a rack requires a dedicated power line of 200 to 240 V ac and 30 A. Rack or cabinet power distribution devices must meet the drawer power requirements, as well as that of any additional products that will be connected to the same power distribution device.

The rack or cabinet power receptacle (power distribution unit, uninterruptible power supply, or multi-outlet strip) must have a compatible plug type for your drawer or device.

**Note:** If you want to use power distribution units that are designed for 7014 racks, refer to the sales manual for 0551, 0553, 0555 7014 or racks. The customer is responsible for ensuring that the power distribution unit is compatible with the rack or cabinet and assumes responsibility for any and all agency certifications required.

- The rack or cabinet must be compatible with the drawer-mounting rails. The rail-mounting pins and screws should fit securely and snugly into the rack or cabinet rail-mounting holes. It is strongly recommended that the IBM mounting rails and mounting hardware that are included with the product be used to install it in the rack. The mounting rails and mounting hardware that are provided with IBM products have been designed and tested to safely support the product during operation and service activities as well as to safely support the weight of your drawer or device. The rails must facilitate service access by allowing the drawer to be safely extended, if necessary, forward, backward, or both. Some rails, with IBM features for non-IBM racks, provide drawer specific anti-tip brackets, rear lock-down brackets, and cable management guides that require clearance on the rear side of the rails.

**Note:** If the rack or cabinet has square holes on the mounting flanges, a plug-in hole adapter might be required.

If non-IBM rails are used, the rails must be product-safety certified for use with the IBM products. At a minimum, mounting rails must be able to support four times the maximum rated product weight in its worst-case position (fully-extended front and rear positions) for one full minute without catastrophic failure.

- The rack or cabinet must have stabilization feet or brackets installed both in the front and rear of the rack, or have another means of preventing the rack/cabinet from tipping while the drawer or device is pulled into its extreme front or rear service positions.

Examples of some acceptable alternatives: The rack or cabinet might be securely bolted to the floor, ceiling or walls, or to adjacent racks or cabinets in a long and heavy row of racks or cabinets.

- There must be adequate front and rear service clearances (in and around the rack or cabinet).

The rack or cabinet must have sufficient horizontal width clearance in the front and rear to allow the drawer to be fully slid into the front and, if applicable, the rear service access positions (typically this requires 914.4 mm (36 in.) clearance in both the front and rear).

- If present, front and rear doors must be able to open far enough to provide unrestrained access for service or be easily removable. If doors must be removed for service, it is the customer's responsibility to remove them prior to service.
- The rack or cabinet must provide adequate clearance around the rack drawer.

There must be adequate clearance around the drawer bezel so that it can be opened and closed, according to the product specifications.

Front or rear doors must also maintain a minimum of 51 mm (2 in.) front, 203 mm (8 in.) rear, door to mounting flange clearance, and 494 mm (19.4 in.) front, 571 mm (22.5 in.) rear, side-to-side clearance for drawer bezels and cables (see Figure 289 on page 725).

- The rack or cabinet must provide adequate front-to-back ventilation.

For optimum ventilation, it is recommended the rack or cabinet not have a front door. If the rack or cabinet has doors, the doors must be fully perforated so that there is proper front-to-back airflow to maintain the required drawer ambient inlet temperature as specified in the server specifications. The perforations should yield at least 34 % minimum open area per square inch.

## IBM features

IBM features adjustable rails for non-IBM racks are available in the product configurators as follows:

- System i servers
  - 7883 - model 9406-520 non-IBM rack-mount drawer rail kit and hardware
  - 7798 - model 9406-550 non-IBM rack-mount drawer rail kit and hardware
- System p servers
  - 7161 - model 9111-520 non-IBM rack-mount drawer rail kit

- 7162 - model 9113-550 IBM or non-IBM rack-mount drawer rail kit
- 7163 - model 9113-550 non-IBM rack-mount drawer rail kit
- 7165 - model 9117-570 and 9117-MMA non-IBM rack-mount drawer rail kit
- 7166 - model 9110-510 IBM or non-IBM rack-mount drawer rail kit
- OpenPower server
  - 7162 - OpenPower 720 IBM or non-IBM rack-mount drawer rail kit
  - 7163- OpenPower 720 non-IBM rack-mount drawer rail kit
  - 7166 - OpenPower 710 IBM or non-IBM rack-mount drawer rail kit

Power Systems servers

- 7114 - model 8203-E4A, 9407-M15 or 9408-M25, IBM or non-IBM rack mount drawer rail kit
- 7146 - model 8204-E8A, or 9409-M50, IBM or non-IBM rack mount drawer rail kit
- 7164 - model 9117-MMA, IBM or non-IBM rack mount drawer rail kit

Additional features for non-IBM racks are as follows:

- System p servers
  - 7969 - model 9117-570 and 9117-MMA non-IBM chassis/bezel
  - 7873 - model 9111-520 non-IBM rack-mount drawer bezel and hardware
  - 7874 - model 9113-550 non-IBM rack-mount drawer bezel and hardware
  - 7999 model 9110-510 non-IBM rack-mount drawer bezel and hardware
- OpenPower server
  - 7999 - OpenPower 710 non-IBM rack-mount drawer bezel and hardware
  - 7915 - OpenPower 720 OEM rack-mount drawer bezel and hardware

**Special considerations for mounting an IBM Power 560 Express or an IBM Power 570 into a non-IBM rack**

For both the models 560 Express and the 570, the EIA rack specification regarding rack depth is critical to successful installation of these models. The following graphics show the routing path of the 560 or 570 flex assembly in an IBM Enterprise rack when multiple system units are involved. The 570 front flex assembly extends outside of the rail mounting flanges by 70 mm (2.75 in). The 560 or 570 rear flex assembly extends outside of the rail mounting flanges by 25 mm (1.0 in.). A non-IBM rack must have this additional space to properly install the flex assembly and to adequately protect the assembly from physical damage.

**Note:** The 560 is limited to two drawers. The 570 can have up to four drawers.



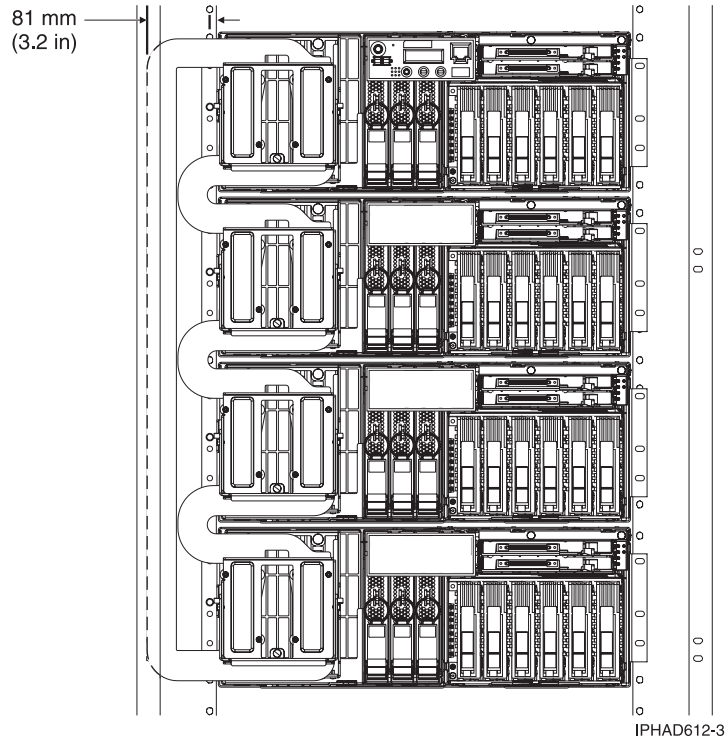


Figure 290. Routing path for POWER5 model 570 flex assembly (front view)

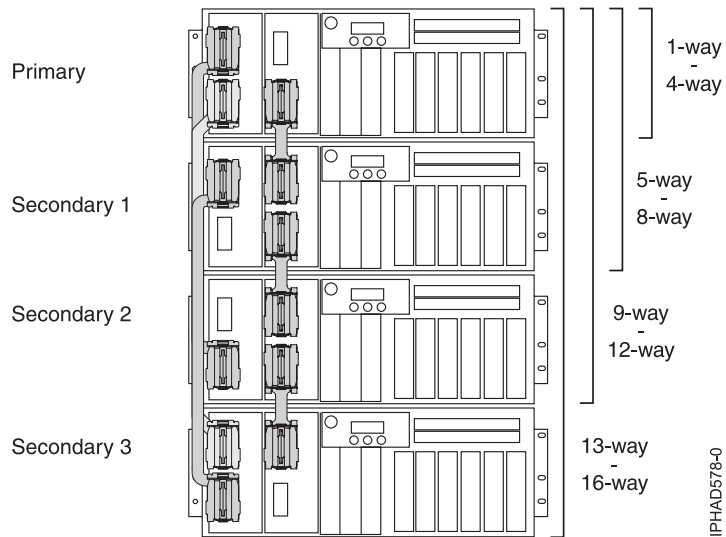


Figure 291. Routing path for POWER6 560 (8234-EMA) and POWER6 570 (9117-MMA)

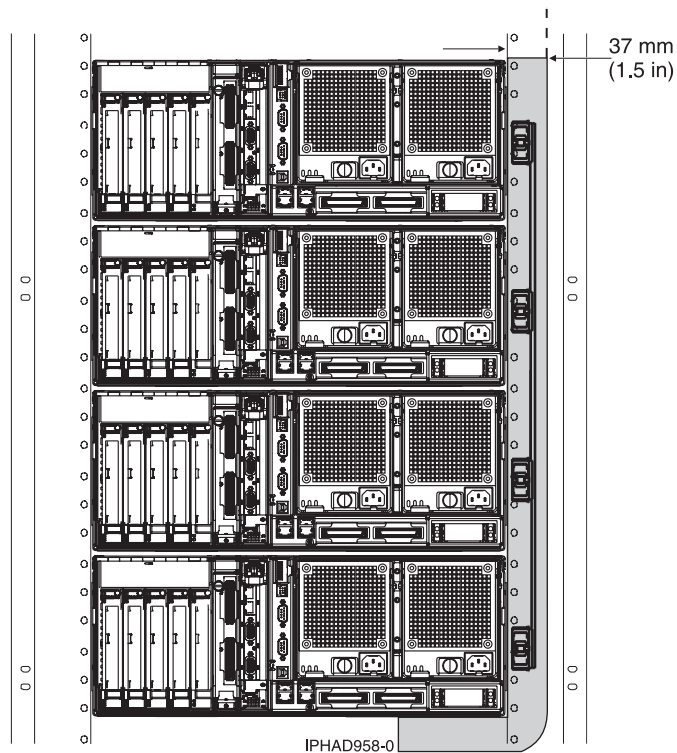


Figure 292. Routing path for model 570 flex assembly (rear view)

**Note:** The model 9117-MMA does not extend past the rail mounting flanges.

### General safety requirements for IBM products installed in a non-IBM rack or cabinet

The general safety requirements for IBM products installed in non-IBM racks are:

- Any product or component that plugs into either an IBM power distribution unit or mains power (via a power cord), or uses any voltage over 42 V ac or 60 V dc (considered to be hazardous voltage) must be Safety Certified by a Nationally Recognized Test Laboratory (NRTL) for the country in which it will be installed.

Some of the items that require safety certification might include: the rack or cabinet (if it contains electrical components integral to the rack or cabinet), fan trays, power distribution unit, uninterruptible power supplies, multi-outlet strips, or any other products installed in the rack or cabinet that connect to hazardous voltage.

Examples of OSHA-approved NRTLs for the U.S.:

- UL
- ETL
- CSA (with CSA NRTL or CSA US mark)

Examples of approved NRTLs for Canada:

- UL (ULc mark)
- ETL (ETLc mark)
- CSA

The European Union requires a CE mark and a Manufacturer's Declaration of Conformity (DOC).

Certified products should have the NRTL logos or marks somewhere on the product or product label. However, proof of certification must be made available to IBM upon request. Proof consists of such items as copies of the NRTL license or certificate, a CB Certificate, a Letter of Authorization to apply

the NRTL mark, the first few pages of the NRTL certification report, Listing in an NRTL publication, or a copy of the UL Yellow Card. Proof should contain the manufacturer's name, product type and model, standard to which it was certified, the NRTL name or logo, the NRTL file number or license number, and a list of any Conditions of Acceptance or Deviations. A Manufacturer's Declaration is not proof of certification by an NRTL.

- The rack or cabinet must meet all electrical and mechanical safety legal requirements for the country in which it is installed.

The rack or cabinet must be free of exposed hazards (such as voltages over 60 V dc or 42 V ac, energy over 240 VA, sharp edges, mechanical pinch points, or hot surfaces).

- There must be an accessible and unambiguous disconnect device for each product in the rack, including any power distribution unit.

A disconnect device might consist of either the plug on the power cord (if the power cord is no longer than 1.8 m (6 ft)), the appliance inlet receptacle (if the power cord is of a detachable type), or a power on/off switch, or an Emergency Power Off switch on the rack, provided all power is removed from the rack or product by the disconnect device.

If the rack or cabinet has electrical components (such as fan trays or lights), the rack must have an accessible and unambiguous disconnect device.

- The rack or cabinet, power distribution unit and multi-outlet strips, and products installed in the rack or cabinet must all be properly grounded to the customer facility ground.

There must be no more than 0.1 Ohms between the ground pin of the power distribution unit or rack plug and any touchable metal or conductive surface on the rack and on the products installed in the rack. Grounding method must comply with applicable country's electric code (such as NEC or CEC). Ground continuity can be verified by your IBM service personnel, after the installation is completed, and should be verified prior to the first service activity.

- The voltage rating of the power distribution unit and multi-outlet strips must be compatible with the products plugged into them.

The power distribution unit or multi-outlet strips current and power ratings are rated at 80% of the building supply circuit (as required by the National Electrical Code and the Canadian Electrical Code). The total load connected to the power distribution unit must be less than the rating of the power distribution unit. For example, a power distribution unit with a 30 A connection will be rated for a total load of 24 A (30 A x 80 %). Therefore, the sum of all equipment connected to the power distribution unit in this example must be lower than the 24 A rating.

If an uninterruptible power supply is installed, it must meet all the electrical safety requirements as described for a power distribution unit (including certification by an NRTL).

- The rack or cabinet, power distribution unit, uninterruptible power supply, multi-outlet strips and all products in the rack or cabinet must be installed according to the manufacturer's instructions, and in accordance with all national, state or province, and local codes and laws.

The rack or cabinet, power distribution unit, uninterruptible power supply, multi-outlet strips and all products in the rack or cabinet must be used as intended by the manufacturer (per manufacturer's product documentation and marketing literature).

- All documentation for use and installation of the rack or cabinet, power distribution unit, uninterruptible power supply, and all products in the rack or cabinet, including safety information, must be available on-site.
- If there is more than one source of power in the rack cabinet, there must be clearly visible safety labels for "Multiple Power Source" (in the languages required for the country in which the product is installed).
- If the rack or cabinet or any products installed in the cabinet had safety or weight labels applied by the manufacturer, they must be intact and translated into the languages required for the country in which the product is installed.
- If the rack or cabinet has doors, the rack becomes a fire enclosure by definition and must meet the applicable flammability ratings (V-0 or better). Totally metal enclosures at least 1 mm (0.04 in.) thick are considered to comply.

Nonenclosure (decorative) materials must have a flammability rating of V-1 or better. If glass is used (such as in rack doors) it must be safety glass. If wood shelves are used in the rack/cabinet, they must be treated with a UL Listed flame-retardant coating.

- The rack or cabinet configuration must comply with all IBM requirements for "safe to service" (contact your IBM Installation Planning Representative for assistance in determining if the environment is safe). There must be no unique maintenance procedures or tools required for service.

Elevated service installations, where the products to be serviced are installed between 1.5 m and 3.7 m (5 ft and 12 ft) above the floor, require the availability of an OSHA- and CSA-approved nonconductive step ladder. If a ladder is required for service, the customer must supply the OSHA- and CSA-approved nonconductive step ladder (unless other arrangements have been made with the local IBM Service Branch Office). Products installed over 2.9 m (9 ft) above the floor require a Special Bid to be completed before they can be serviced by IBM service personnel.

For products not intended for rack-mounting to be serviced by IBM, the products and parts that will be replaced as part of that service must not weigh over 11.4 kg (25 lb) Contact your Installation Planning Representative if in doubt.

There must not be any special education or training required for safe servicing of any of the products installed in the racks. Contact your Installation Planning Representative if you are in doubt.

**Related reference:**

Chapter 6, "Rack specifications," on page 443

Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

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## Appendix. Notices

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### 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 respecte 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 Technical Regulations  
Pascalstr. 100, Stuttgart, Germany 70569  
Tele: 0049 (0)711 785 1176  
Fax: 0049 (0)711 785 1283  
E-mail: tjahn@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.

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**Japanese Electronics and Information Technology Industries Association (JEITA)  
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**声 明**

此为 A 级产品,在生活环境中,  
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干扰采取切实可行的措施。

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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

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Verantwortlich für die Konformitätserklärung nach des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

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