ESCALA Power7

Site and Hardware Planning for the E1-700, E1-705, E3-700 or E3-705

BULL

ESCALA Power7

Site and Hardware Planning for the E1-700, E1-705, E3-700 or E3-705

The ESCALA Power7 publications concern the following models:

 - Bull Escala E5-700 (Power 750 / 8233-E8B)
 - Bull Escala M6-700 (Power 770 / 9117-MMB)
 - Bull Escala M6-705 (Power 770 / 9117-MMC)
 - Bull Escala M7-700 (Power 780 / 9179-MHB)
 - Bull Escala M7-705 (Power 780 / 9179-MHC)
 - Bull Escala E1-700 (Power 710 / 8231-E2B)
 - Bull Escala E1-705 (Power 710 / 8231-E1C)
 - Bull Escala E2-700 / E2-700T (Power 720 / 8202-E4B)
 - Bull Escala E2-705 / E2-705T (Power 720 / 8202-E4C)
 - Bull Escala E3-700 (Power 730 / 8231-E2B)
 - Bull Escala E3-705 (Power 730 / 8231-E2C)
 - Bull Escala E4-700 / E4-700T (Power 740 / 8205-E6B)
 - Bull Escala E4-705 (Power 740 / 8205-E6C)

References to Power 755 / 8236-E8C models are irrelevant.

Hardware

May 2012

Trademarks and Acknowledgements

We acknowledge the right of proprietors of trademarks mentioned in this book.

Contents

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.

Laser safety information

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

Laser compliance

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

DANGER

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

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:
- Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

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

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

  (D005a)

DANGER

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

- Heavy equipment–personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

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

CAUTION

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

(R001)

CAUTION:

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

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:

  – Remove all devices in the 32U position and above.

  – Ensure that the heaviest devices are installed in the bottom of the rack cabinet.

  – Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.

- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.

- Inspect the route that you plan to take to eliminate potential hazards.

- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.

- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).

- Ensure that all devices, shelves, drawers, doors, and cables are secure.

- Ensure that the four leveling pads are raised to their highest position.

- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.

- Do not use a ramp inclined at more than 10 degrees.

- When the rack cabinet is in the new location, complete the following steps:

  – Lower the four leveling pads.

  – Install stabilizer brackets on the rack cabinet.

  – If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.

- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

(L001)

(L002)

(L003)
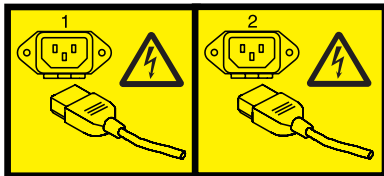
or

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)

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

Do Not:
- **___ Throw or immerse into water**
- **___ Heat to more than 100°C (212°F)**
- **___ Repair or disassemble**

Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. (C003a)

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

The following comments apply to the 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.

Site and hardware physical planning overview

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

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

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

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

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

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

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

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

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

Planning activities

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

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

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

Planning task checklist

Use this checklist to document your planning progress.

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

Table 1. Planning task checklist

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

General considerations

Planning your system requires attention to the numerous details.

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

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

  Note: The system and devices are designed to operate in normal office environments. Dirty or other poor environments might damage the system or the devices. You are responsible for providing the proper operating environment.
- Altitude limitations of the devices.
- Noise emission levels of the devices.
- Any vibration of equipment near where the devices will be placed.
- Paths of power cords.

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

Site preparation and physical planning guidelines

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

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

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

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

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

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

- Dual power installations

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

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

Communications
- Planning for communications

Hardware specification sheets

Hardware specification sheets provide detailed information for your hardware, including dimensions, electrical, power, temperature, environment, and service clearances.

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 31E/2B, 31E/1C, and 31E/2C server specifications

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

Limited configurations of the 7/30 (31E/2B and 31E/2C) two processor socket servers are qualified to the EPA ENERGY STAR® Computer Server requirements. The qualified configurations require a minimum of 64 GB of memory. The ENERGY STAR Power and Performance Data Sheet is provided as follows:

- 31E/2B
- 31E/2C

Use the following specifications to plan for your server.

Table 2. Dimensions for rack-mounted drawer

Width	Depth	Height	EIA units[1]	Weight
447 mm (17.6 in.)	728 mm (28.7 in.)	86 mm (3.4 in.)	2	29.5 kg (65 lb)

Table 3. Shipping dimensions for rack-mounted drawer

Width	Depth	Height	Weight[1]
610 mm (24 in.)	965 mm (38 in.)	241 mm (9.5 in.)	32 kg (71 lb)
[1]This is an estimated value.			

Table 4. Shipping dimensions for rack-mounted drawer (China)

Width	Depth	Height	Weight[1]
610 mm (24 in.)	965 mm (38 in.)	508 mm (20 in.)	43 - 54 kg (95 - 120 lb)
[1]This is an estimated value.			

Table 5. Electrical

Electrical characteristics	Properties
Rated voltage and frequency[1]	100 - 127 V ac[3] or 200 - 240 V ac at 47 - 63 Hz
Thermal output (maximum)[2]	2048 Btu/hr (31E/2B - 7/10)
	2560 Btu/hr (31E/1C - 7/10)
	3754 Btu/hr (31E/2B - 7/30)
	4300 Btu/hr (31E/2C - 7/30)
Maximum power consumption[2]	650 W (31E/2B - 7/10)
	750 W (31E/1C - 7/10)
	1100 W (31E/2B - 7/30)
	1260 W (31E/2C - 7/30)
Maximium kVA[4]	0.663 (31E/2B - 7/10)
	0.765 (31E/1C - 7/10)
	1.122 (31E/2B - 7/30)
	1.286 (31E/2C - 7/30)
Power factor	0.98
Inrush current (maximum)	75 A
Leakage current (maximum)	0.68 mA
Phase	Single
Branch circuit breaker	20 A maximum
Drawer mounted in 14T/00 and 14T/42 racks, and power distribution unit (PDU)	0370

Notes:

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 (electrical supply) 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 website for more information.

3. Feature code 7317 (one processor chassis) for 7/10 servers are rated 100 - 127 V ac and 200 - 240 V ac. Feature code 7318 (two processor chassis) for 7/30 servers are rated at 200 - 240 V ac.

4. To calculate the amperage, multiply the kVA by 1000 and divide that number by the operating voltage.

Table 6. Environment requirements for the 31E/2B, 31E/1C, and 31E/2C

Environment	Properties
Recommended operating temperature	18°C - 27°C (64°F - 80°F)
Allowable operating temperature	5°C - 35°C (41°F - 95°F)
Nonoperating temperature	5°C - 45°C (41°F - 113°F)
Recommended relative humidity (RH) range	5.5°C (42°F) dew point to 60% RH and 15°C (59°F) dew point
Allowable relative humidity range	20% - 80%
Nonoperating relative humidity range	8% - 80%
Shipping temperature	-40°C - 60°C (-40°F - 140°F)

Table 6. Environment requirements for the 31E/2B, 31E/1C, and 31E/2C (continued)

Environment	Properties
Shipping humidity range	5% - 100%
Operating dew point	28°C (84°F)
Altitude range	0 - 3050 m[1]
[1]Derate maximum dry-bulb temperature 1°C/300 m above 900 m.	

Table 7. Noise emissions for the 31E/2B, 31E/1C, and 31E/2C

Product description	Declared A-weighted sound power level, L_{Wad} (B)		Declared A-weighted sound pressure level, L_{pAm} (dB)	
	Operating	Idle	Operating	Idle
7/10 31E/2B1 socket, 4 GB DIMMs, 2 power supplies, 6 hard drives. typical workload [5]	6.6	6.6	50	50
7/30 31E/2B 2 socket, 4 GB DIMMs, 2 power supplies, 6 hard drives. typical workload [5]	6.6	6.6	50	50

Notes:

1. L_{Wad} is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1 B).

2. L_{pAm} is the mean A-weighted emission sound pressure level measured at the 1-meter bystander position (rounded to the nearest dB).

3. 10 dB (decibel) equals 1 B (bel).

4. All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296. 25° Celsius, 500 meter altitude.

5. Preliminary data is subject to change.

Table 8. 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: CISPR 22; CISPR 24; FCC, CFR 47, Part 15 (US); VCCI (Japan); Directive 2004/108/EC (EEA); ICES-003, Issue 4 (Canada); ACMA radio communications standard (Australia, New Zealand); CNS 13438 (Taiwan); Radio Waves Act, MIC Rule No. 210 (Korea) ; Commodity Inspection Law (China); TCVN 7189 (Vietnam); MoCI (Saudi Arabia); SI 961 (Israel); GOST R 51318.22, 51318.24 (Russia).

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 HMC installation and configuration.

Note: As an alternative to the local HMC requirement, you can 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. It must provide functional capabilities equivalent to the HMC that it replaces, and is needed by the service representative to service the system.

Plan view for model 31E/2B, 31E/1C, and 31E/2C

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

The following figure shows dimensional planning information for models 31E/2B, 31E/1C, and 31E/2C .

447 mm
(17.6 in.)

Server

728 mm
(28.7 in.)

Front

Top-down view

P7HAD507-0
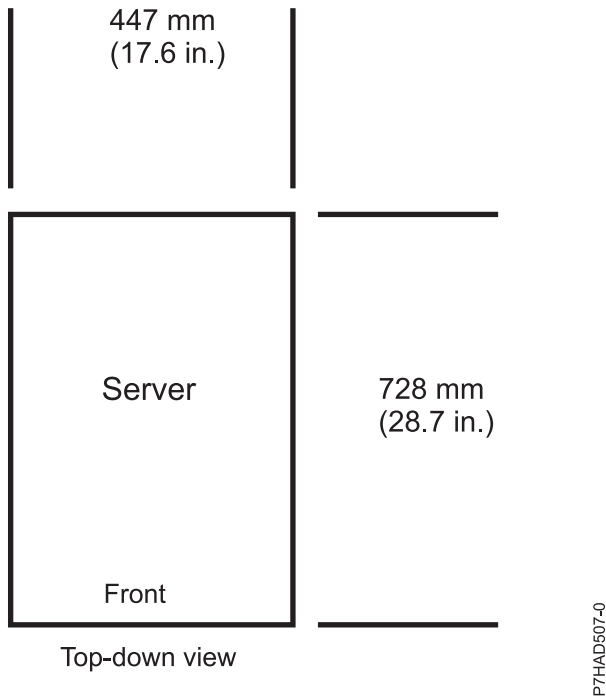
Figure 1. Model 31E/2B, 31E/1C, and 31E/2C plan view (rack-mount)

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.

expansion unit

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

Table 9. Dimensions for rack-mounted expansion unit

Width	Depth	Height	Maximum configuration weight
447 mm (17.5 in.)	660 mm (26 in.)	171 mm (6.75 in.)	54 kg (120 lb)

Table 10. Dimensions for stand-alone expansion unit with stabilizer foot and decorative covers

Width	Depth	Height	Maximum configuration weight
305 mm (12.0 in.)	655 mm (26.0 in.)	508 mm (20.0 in.)	66 kg (145 lb)

Table 11. 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
Maximum thermal output	2382 Btu/hr
Maximum power requirements[1]	700 W
Power factor	0.95
Inrush current	55 A per power cord
Maximum leakage current	3.10 mA
Phase	1
[1]All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.	

Table 12. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)[1]	-40 - 60°C (-40 - 140°F)
[1]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).	

Table 13. Environment requirements

Properties	Operating	Nonoperating	Maximum altitude
Noncondensing Humidity	20 - 80% (allowable) 40 - 55% (recommended)	8 - 80% (including condensing)	2134 m (7000 ft) above sea level
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)	

Table 14. Noise emissions

Models	Properties	Operating	Idle
57/86	L_{WAd}	6.6 bels	6.5 bels
Single 57/86 drawer in standard 19-inch rack with 24 hard drives, nominal environmental conditions, and no front or rear doors on rack.	L_{pAm} (1-meter bystander)	49 dB	49 dB
[1]For a description of noise emission values, see Acoustics.			
[2]All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.			

Table 15. Service clearances for rack-mounted expansion unit

Front	Back	Sides[1]
914 mm (36 in.)	914 mm (36 in.)	914 mm (36 in.)
[1]Side and top clearances are optional during operation.		

Table 16. Service clearances for stand-alone expansion unit

Front	Back
368.3 mm (14.5 in.)	381 mm (15 in.)

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

expansion unit

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

Table 17. Dimensions I/O drawer only

Height	Width	Depth
172 mm (6.8 in.)	224 mm (8.8 in.)	800 mm (31.5 in.)

Table 18. Dimensions - with required I/O drawer mounting enclosure

Height	Width	Depth
176 mm (6.9 in.)	473 mm (18.6 in.)	800 mm (31.5 in.)

Table 19. 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 20. 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

Table 21. Temperature requirements

Operating	Nonoperating	Storage
10 - 38°C (50 - 100°F)	1 - 60°C (33.8 - 140°F)	1 - 60°C (33.8 - 140°F)
The upper limit of the dry bulb temperature must be derated 1°C per 137 m (450 ft) above 915 m (3000 ft).		

Table 22. Environment requirements

Environment	Operating	Nonoperating	Storage	Maximum altitude
Noncondensing humidity	8 - 80%	8 - 80%	5 - 80%	3048 m (10 000 ft)
Wet bulb temperature[4]	23°C (73.4°F)	27°C (80.6°F)	29°C (84.2°F)	
The upper limit of the wet bulb temperature must be derated 1°C per 274 m (900 ft) above 305 m (1000 ft).				

Table 23. Noise emissions

Properties	Operating	Idle
L_{WAd}	6.2 bels	6.1 bels
$<L_{pA}>_m$	44 dB	43 dB
For a description of noise emission values, see Acoustics.		

Table 24. Service clearances

Front	Back	Sides
915 mm (36 in.)	915 mm (36 in.)	915 mm (36 in.)

Related information:

➥ Acoustics

58/02 expansion unit

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

Table 25. 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 26. 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 27. 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 28. Environment requirements

Properties	Operating	Nonoperating	Storage	Shipping	Maximum altitude
Noncondensing humidity	Recommended: 34 - 54% Allowable: 20 - 80%	5 - 80%	5 - 80%	5 - 100%	3048 m (10 000 ft)

Table 29. Noise emissions

Models	Properties	Operating	Idle
Feature Code 58/02 - 4U I/O drawer consists of 18 SSF disk drives, 10 PCI-Express 8x slots, and 2 DCAs	L^{WAd} (B)	7.0	7.0
	L^{pAm} (dB)	52	52

Notes:

1. L^{WAd} is the statistical upper-limit A-weighted sound power level (rounded to the nearest 0.1 B).
2. L^{pAm} 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 30. Service clearances

Front	Back	Sides
915 mm (36 in.)	915 mm (36 in.)	914 mm (36 in.)

5877 expansion unit

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

Table 31. 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 32. 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 33. 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 34. Environment requirements

Properties	Operating	Nonoperating	Storage	Shipping	Maximum altitude
Noncondensing humidity	Recommended: 34 - 54% Allowable: 20 - 80%	5 - 80%	5 - 80%	5 - 100%	3048 m (10 000 ft)

Table 35. Service clearances

Front	Back	Sides
915 mm (36 in.)	915 mm (36 in.)	914 mm (36 in.)

58/86 expansion unit

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

Table 36. Dimensions for rack-mounted expansion unit

Weight (with no drives installed)	Width	Depth (including front bezel)	Height
17.7 kg (39 lb)	445 mm (17.5 in.)	521 mm (20.5 in.)	89 mm (3.5 in.)

Table 37. Electrical

Electrical characteristics	Properties
kVA[1]	0.358
Rated voltage and frequency	100 - 240 V ac at 50 - 60 Hz
Thermal Output[1]	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
[1]All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.	

Table 38. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)[1]	-40 - 60°C (-40 - 140°F)
[1]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).	

Table 39. Environmental requirements

Environment	Operating	Nonoperating	Maximum altitude
Noncondensing humidity	20 - 80% (allowable) 40 - 55% (recommended)	8 - 80% (including condensing)	2134 m (7000 ft) above sea level
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)	

Table 40. Noise emissions. Single drawer in standard 19-inch rack with 24 hard drives, nominal environmental conditions, and no front or rear doors on rack.

Properties	Operating	Idle
L_{WAd}	6.6 bels	6.5 bels
L_{pAm} (1-meter bystander)	49 dB	49 dB
For a description of noise emission values, see *Acoustics*. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.		

Table 41. Service clearances for rack-mounted expansion unit

Front	Back	Sides
914 mm (36 in.)	914 mm (36 in.)	914 mm (36 in.)
Side and top clearances are optional during operation.		

Table 42. Service clearances for stand-alone expansion unit

Front	Back
368.3 mm (14.5 in.)	381 mm (15 in.)

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

58/87 expansion unit

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

Table 43. Dimensions for rack-mounted expansion unit

Weight (with drives installed)	Width	Depth (including front bezel)	Height (with support rails)
25.4 kg (56.0 lb)	448.6 mm (17.7 in.)	530 mm (20.9 in.)	87.4 mm (3.4 in.)

Table 44. Electrical

Electrical characteristics	Properties
kVA (maximum)[1]	0.32
Rated voltage and frequency	100 - 127 V ac or 200 - 240 V ac at 50 - 60 Hz
Thermal output (maximum)[1]	1024 Btu/hr
Power requirements (maximum)	300 W
Power factor	0.94

Table 44. Electrical (continued)

Electrical characteristics	Properties
Leakage current (maximum)	1.2 mA
Phase	1
[1]All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.	

Table 45. Temperature requirements

Operating	Nonoperating
10°C - 38°C (50°F - 100.4°F)[1]	-40°C - 60°C (-40°F - 140°F)
[1]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).	

Table 46. Environmental requirements

Environment	Operating	Nonoperating	Maximum altitude
Noncondensing humidity	20% - 80% (allowable) 40% - 55% (recommended)	8% - 80% (including condensing)	2134 m (7000 ft) above sea level
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)	

Table 47. Noise emissions. Single drawer in standard 19-inch rack with 24 hard drives, nominal environmental conditions, and no front or rear doors on rack.

Properties	Operating	Idle
L_{WAd}	6.0 bels	6.0 bels
L_{pAm} (1-meter bystander)	43 dB	43 dB
For a description of noise emission values, see *Acoustics*.		
All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.		

Table 48. Service clearances for rack-mounted expansion unit

Front	Back	Sides
914 mm (36 in.)	914 mm (36 in.)	914 mm (36 in.)
Side and top clearances are optional during operation.		

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

58/88 expansion unit

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

Table 49. Dimensions for rack-mounted expansion unit

Weight (with drives installed)	Width	Depth (including front bezel)	Height (with support rails)
21.8 kg (48.0 lb)	444.5 mm (17.5 in.)	762 mm (30 in.)	44.5 mm (1.75 in.)

Table 50. Electrical

Electrical characteristics	Properties
kVA (maximum)[1]	0.46
Rated voltage and frequency	100 - 127 V ac or 200 - 240 V ac at 50 - 60 hz
Thermal output (maximum)[1]	1501 Btu/hr
Power requirements (maximum)	440 W
Phase	1
[1]All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.	

Table 51. Temperature requirements

Operating	Nonoperating
10°C - 38°C (50°F - 100.4°F)[1]	-40°C - 60°C (-40°F - 140°F)
[1]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).	

Table 52. Environmental requirements

Environment	Operating	Nonoperating	Maximum altitude
Noncondensing humidity	20% - 80% (allowable) 40% - 55% (recommended)	8% - 80% (including condensing)	2134 m (7000 ft) above sea level
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)	

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

➡ 5888 PCIe storage enclosure

Rack specifications

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

Select your rack model to view its specifications.

Related reference:

"Rack installation procedures for racks" on page 48
Learn the requirements and specifications for installing systems into racks .

0551 rack

The 0551 rack specifications provide detailed information for your rack.

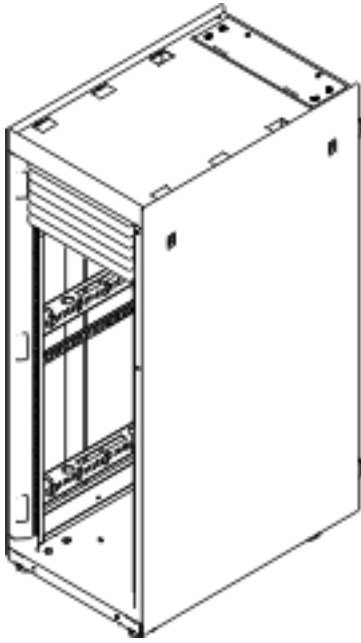The 0551 provides an empty 1.8 m rack (36 EIA units of total space).

Figure 2. 0551 rack

Table 53. Dimensions

Maximum configuration weight	Width	Depth	Height
The weight of the empty rack is 244 kg (535 lb).	650 mm (25.5 in.)	1020 mm (40.0 in.)	1800 mm (71.0 in.)

Table 54. Temperature requirements

Operating	Nonoperating
10 - 38°C (50 - 100.4°F)	1 - 60°C (33.8 - 140°F)

Table 55. Environment requirements

Environment	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%
Wet bulb temperature	22.8°C (73°F)	22.8°C (73°F)
Maximum altitude	3048 m (10000 ft)	3048 m (10000 ft)
Noise emissions	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 56. Service clearances

Front	Back	Sides	Top
762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)	762 mm (30 in.)
Side and top clearances are optional during operation			

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 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.

2. Acoustic doors are available for the racks. Feature code 6248 is available for the 0551 and 14T/00 racks. Feature code 6249 is available for the 0553 and 14T/42 racks. The overall sound reduction is approximately 6 dB. The doors add 381 mm (15 in.) to the depth of the racks.

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

Caster and leveler locations

The following diagram provides the caster and leveler locations for the 14T/00, 14T/42, 0551, 0553 racks.
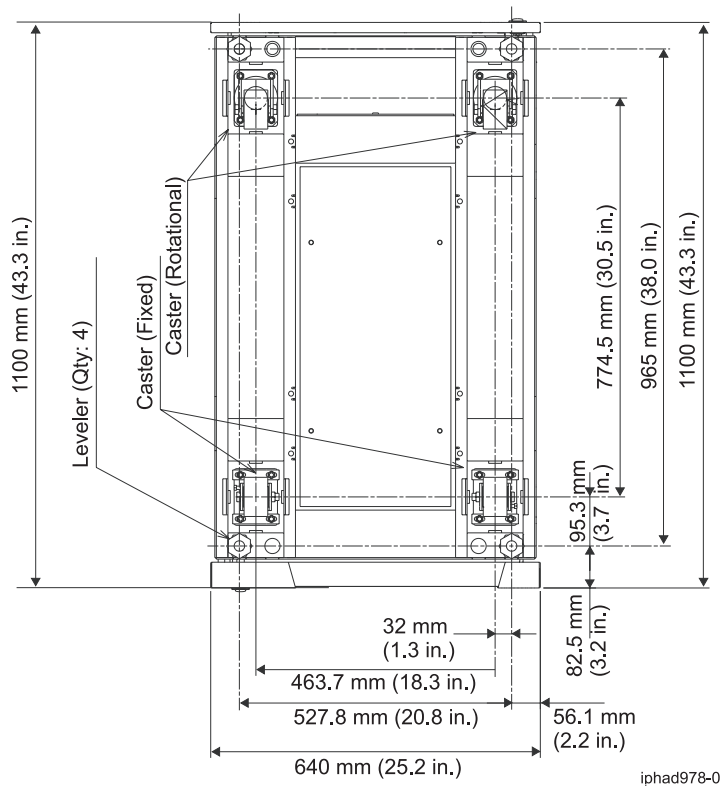

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Figure 3. Caster and leveler locations

Related information:

Acoustics

, and 7014 rack configurations

The 14T/00 provide a 1.8 meter rack (36 EIA units of total space). The 14T/42 or 0553 provides a 2.0 meter rack (42 EIA units of total space).

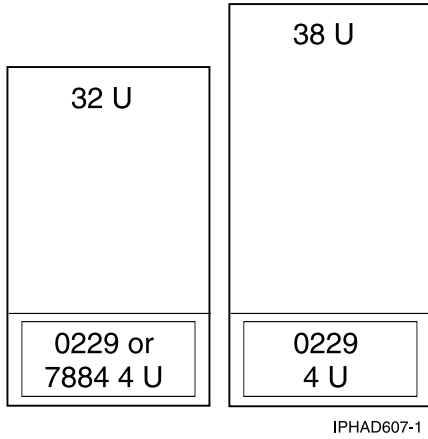## 9406 feature code 7884, 9111 rack content specify code 0229 - 9406-520 and 115/20 in rack

Figure 4. Feature code 7884 - 9406-520 and 115/20 in rack

rack	Rack, specify code	PDU support	Power cords
0551[1] 0553[1] 7014[4]	7884, 0229	0 to 4[2]	7884, PDU[3]

[1]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.

[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.

[3]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.

[4]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.

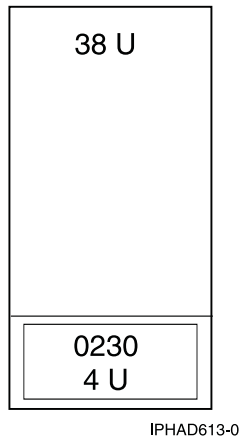## 9113 rack content, specify code 0230; 9406 rack content, specify code 7886

Figure 5. 550 in rack

rack	Rack, specify code	PDU support	Power cords
7014[1]	0230 (135/50), 7886 (9406-550)	0 to 4[2]	PDU[3]

[1]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.[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.

[3]If unit plugs into a PDU, two feature code 6458, 6459, 6095, or 9911 power jumper cords are required.

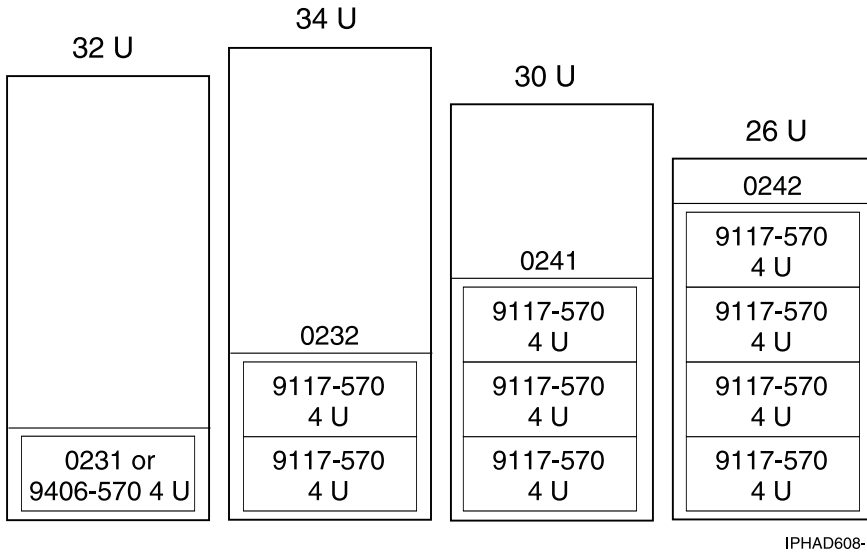## 9406-570 in rack, 175/70 rack content, specify codes 0231, 0232, 0241, 0242

Figure 6. 5/70 in rack

rack	Rack, specify code	PDU support	Power cords
0551[1]	0231, 0232, 0241, 0242	0 to 4[2]	PDU[4]
0553[1]			
7014[3]			

[1]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.

[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.

[3]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.

[4]If unit plugs into a PDU, two feature code 6458, 6459, 6095, or 9911 power jumper cords are required.

## Feature code 0123 - 5074 lower expansion unit in rack; Feature code 0574 - 5074 equivalent
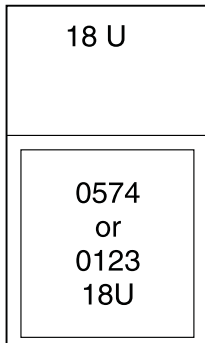
Figure 7. Feature code 0123

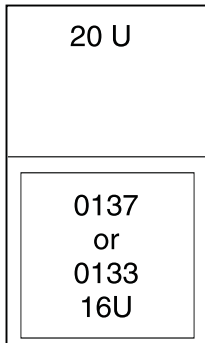| rack	Bottom rack, specify code	Rack, specify code	PDU support	Power cords
0551[1] 0553[1]	0123	0574	0 to 4[2]	0123, 0574, PDU[3]
[1]0551 is an empty 1.8 meter rack with 36 EIA units of total space. 0553 is a 2.0 meter rack with 42 EIA units of total space. [2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188. [3]Feature code 0123 or 0574 do not plug into a PDU.				

Feature code 0694 - 5094 equivalent
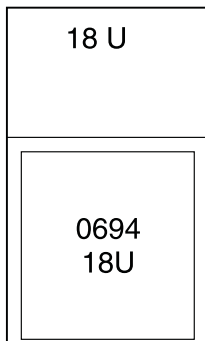
Figure 8. Feature code 0694 - 5094 equivalent

rack	Rack, specify code	PDU support	Power cords
0551[1] 0553[1]	0694	0 to 4[2]	0694, PDU[3]

rack	Rack, specify code	PDU support	Power cords
[1]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.			
[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.			
[3]Feature code 0125 does not plug into a PDU.			

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)
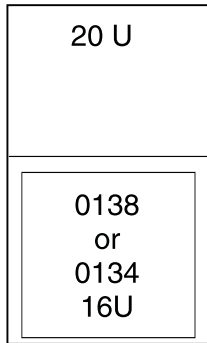

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Figure 9. Feature code 0133

rack	Rack, specify code	PDU support	Power cords
0551[1] 0553[1]	0133[3], 0137[3]	0 to 4[2]	0133, 0137, PDU[4]
[1]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.			
[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.			
[3]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.			
[4]If unit plugs into a PDU, two feature code 6458, 6459, 6095, or 9911 power jumper cords are required.			

Feature code 0134 - Field install in rack (model 9406-825); Feature code 0138 - Field install in rack (model 9406-825)
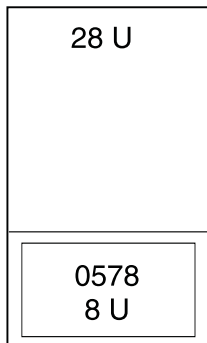

IPHAD603-0

Figure 10. Feature code 0134

rack	Rack, specify code	PDU support	Power cords
0551[1] 0553[1]	0134[3], 0138[3]	0 to 4[2]	0134, 0138, PDU[4]
[1]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.			
[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.			
[3]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.			
[4]If unit plugs into a PDU, two feature code 6458, 6459, 6095, or 9911 power jumper cords are required.			

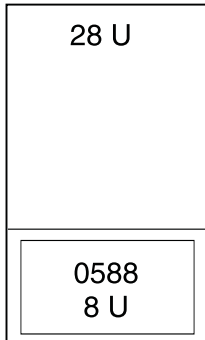## Feature code 0578 - PCI-X expansion unit in rack

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Figure 11. Feature code 0578 - PCI-X expansion unit in rack

rack	Rack, specify code	PDU support	Power cords
0551[1] 0553[1]	0578	0 to 4[2]	PDU[3]

rack	Rack, specify code	PDU support	Power cords
[1]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.			
[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.			
[3]0578 includes two rack power cords that plug into a PDU.			

Feature code 0588 - PCI-X expansion unit in rack

Figure 12. Feature code 0588 - PCI-X expansion unit in rack

rack	Rack, specify code	PDU support	Power cords
0551[1] 0553[1]	0588	0 to 4[2]	PDU[3]
[1]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.			
[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.			
[3]0588 comes with two rack power cords that plug into a PDU.			

Feature code 0595 - PCI-X expansion unit in rack

rack	Rack, specify code	PDU support	Power cords
0551[1] 0553[1]	0595	0 to 4[2]	0595, PDU[3]
[1]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.			
[2]0551, 0553, feature codes 5160, 5161, 5163, and 7188. 7014 feature codes 7176, 7177, 7178, and 7188.			
[3]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.			

Note: Supported only on MES orders and includes a rack shelf with rail assembly, adapter plate, and cable-management-arm assembly.

Model 14S/11 rack

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

Table 57. Dimensions

Dimension	Properties
Height	611 mm (24 in.)
Capacity	11 usable EIA units
Height with PDP - DC only	Not applicable
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[1]	218 kg (481 lb)

Table 58. Electrical

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
The 7188 power distribution unit used with this rack is mounted horizontally and requires one EIA unit of space.	

Front	Back	Sides
915 mm (36 in.)	254 mm (10 in.)	71 mm (2.8 in.)
Recommended minimum vertical service clearance from floor is 2439 mm (8 ft).		

See your server or hardware specifications for specific temperature requirements and 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.

Note: 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.

Model 14S/11 rack operational clearances

35 mm
(1.4 in.)

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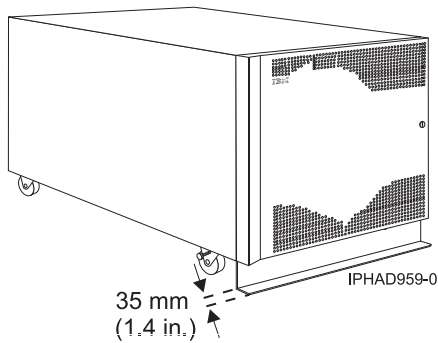
Model 05/54 and 14S/11 with stabilizer bar

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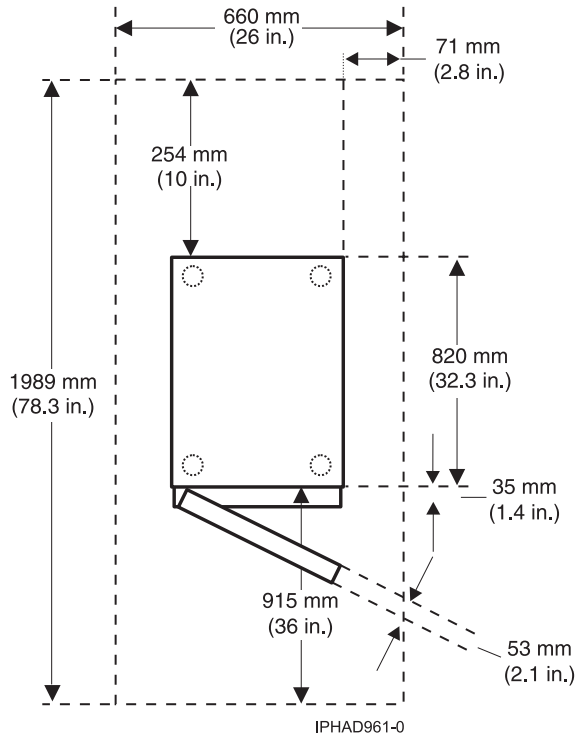
Model 05/54 and 14S/11 plan view

ⓐ 22 mm (0.9 in.)

ⓑ 13 mm (0.5 in.)

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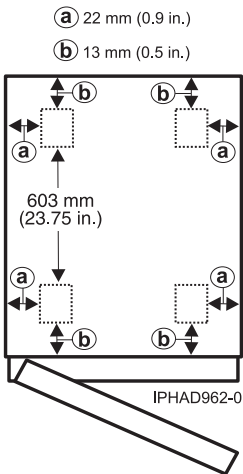
Model 05/54 and 14S/11 caster locations

Model 14S/25 rack

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

Table 60. 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.)

Table 60. Dimensions (continued)

Dimensions	Properties
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
Base rack (empty)	98 kg (217 lb)
Full rack[1]	665 kg (1467 lb)

Table 61. Electrical

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
The 7188 power distribution unit used with this rack is mounted horizontally and requires one EIA unit of space.	

Table 62. 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 and 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.

Notes:
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).

Model 14S/25 rack operational clearances

215 mm
(8.5 in.)

IPHAD960-0
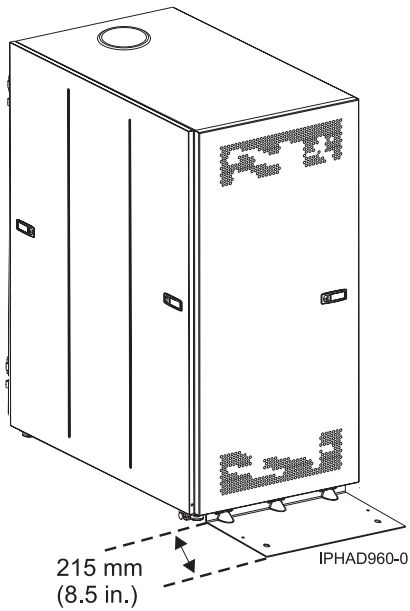
Model 05/55 and 14S/25 with stabilizer foot

915 mm
(36 in.)

600 mm
(23.6 in.)

915 mm
(36 in.)

19 mm (0.75 in.)

760 mm (30 in.)

318 mm (12.5 in.)

950 mm (37.4 in.)

915 mm (36 in.)

19 mm (0.75 in.)

1520 cm (60 in.)

IPHAD963-0
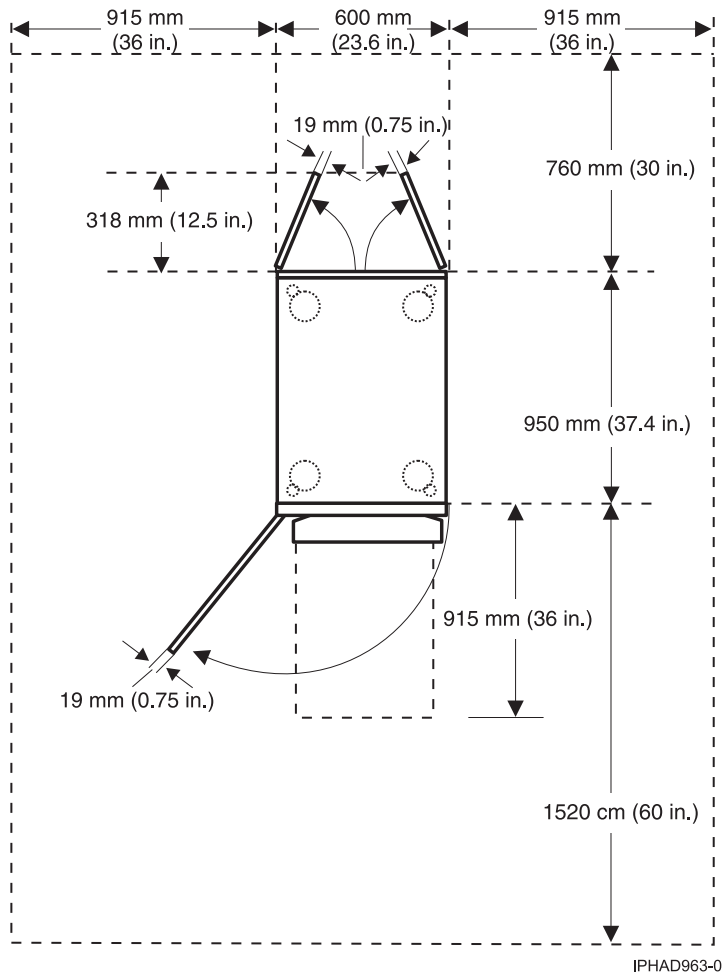
Model 05/55 and 14S/25 plan view

ⓒ 85 mm (3.3 in.)
ⓓ 65 mm (2.6 in.)
ⓔ 50 mm (2.0 in.)
ⓕ 80 mm (3.1 in.)

670 mm
(26.4 in.)

IPHAD964-0
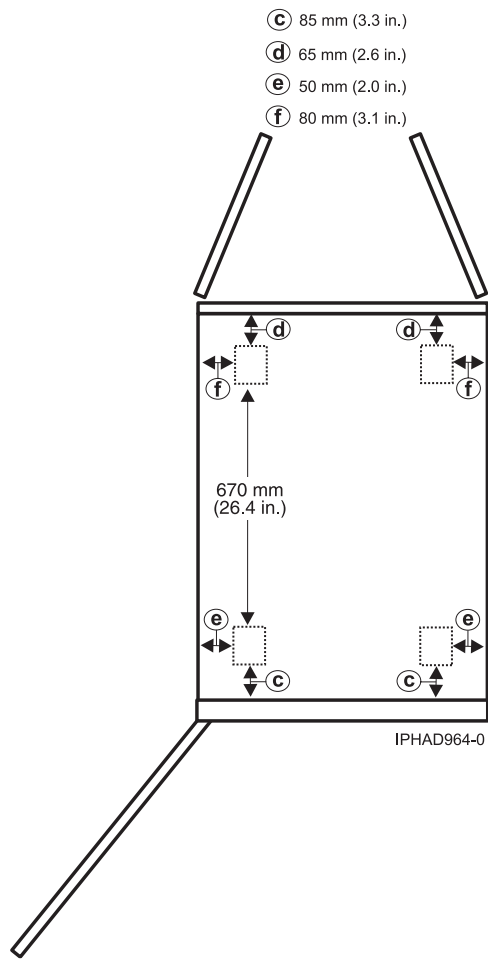
Model 05/55 and 14S/25 caster locations

Planning for the 14T/00 and 14T/42 racks

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

The following provide specifications for the 14T/00, and 14T/42 or 0553 racks.

Model 14T/00 rack

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

Table 63. 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.)

Table 63. Dimensions (continued)

Dimensions	Properties
Depth with sculptured style front door	1147 mm (45.2 in.)

Table 64. Weight

Base rack (empty)	Full rack
244 kg (535 lb)	816 kg (1795 lb) See 14T/00, 14T/42 and 0553 rack weight distribution and floor loading

Table 65. Electrical[1]

Electrical characteristics	Properties
DC rack voltage (nominal)	-48 V dc
Power source loading maximum in kVa[2]	See Power distribution unit and power cord options for 7014, 0551, 0553, rack for details
Voltage range (V dc)	-40 - -60
AC rack	683 Btu/hr
Power source loading maximum in kVa (per PDB)[3]	135 W
Voltage range (V ac)	200 - 240
Frequency (Hz)	50 or 60

[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.

Table 66. 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 and 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.

Note: 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.

Rack airflow requirements are a function of the number and type of drawers installed.

Note: Acoustic doors are available for the racks. Feature code 6248 is available for the 0551 and 14T/00 racks. Feature code 6249 is available for the 0553 and 14T/42 racks. The overall sound reduction is approximately 6 dB. The doors add 381 mm (15 in.) to the depth of the racks.
Refer to the individual drawer specifications.

Related reference:

"14T/00, 14T/42, and 0553 rack weight distribution and floor loading" on page 38
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.

Model 14T/42, 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 14T/42 rack, see *Planning for the installation of rear door heat exchangers*.

Table 67. 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)
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 14T/00, 14T/42 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 68. Electrical[1]

Electrical characteristics	Properties
DC rack voltage (nominal)	-48 V dc
Power source loading maximum in kVa[2]	See Power distribution unit and power cord options for 7014, 0551, 0553, and 0555 rack for details
Voltage range (V dc)	-40 - -60
AC rack	683 Btu/hr
Power source loading maximum in kVa (per PDB)[3]	135 W
Voltage range (V ac)	200 - 240 V ac
Frequency (Hz)	50 or 60

Table 68. Electrical[1] (continued)

Electrical characteristics	Properties
[1]Recommended minimum vertical service clearance from floor is 2439 mm (8 ft). [2]When installing a model 17M/MB or 9179-MHB in a 14T/42 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 racks. Feature code 6248 is available for the 0551 and 14T/00 racks. Feature code 6249 is available for the 0553 and 14T/42 racks. The overall sound reduction is approximately 6 dB. The doors add 381 mm (15 in.) to the depth of the racks.	

Table 69. Service clearances

Front	Back	Sides
915 mm (36 in.)	915 mm (36 in.)	915 mm (36 in.)
Recommended minimum vertical service clearance from floor is 2439 mm (8 ft).		

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.

Note: Acoustic doors are available for the racks. Feature code 6248 is available for the 0551 and 14T/00 racks. Feature code 6249 is available for the 0553 and 14T/42 racks. The overall sound reduction is approximately 6 dB. The doors add 381 mm (15 in.) to the depth of the racks.

Rack airflow requirements are a function of the number and type of drawers installed.

Note: 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.
Refer to the individual drawer specifications.

Caster and leveler locations

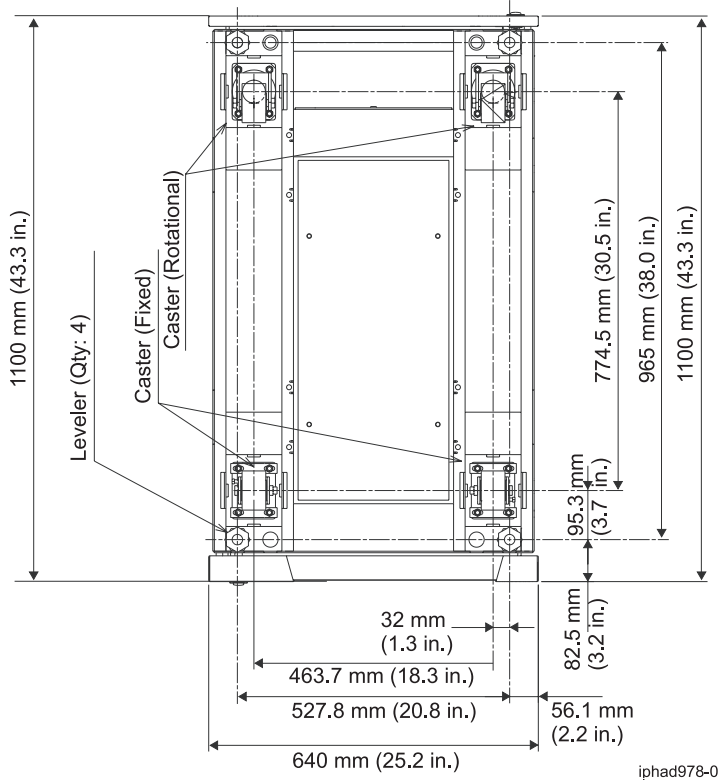The following diagram provides the caster and leveler locations for the 14T/00, 14T/42, 0551, 0553, racks.

Figure 13. Caster and leveler locations

Related reference:
"14T/00, 14T/42, and 0553 rack weight distribution and floor loading" on page 38
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.

Related information:

➡ Planning for the installation of rear door heat exchangers

14T/00, 14T/42, and 0553 service clearances and caster location
Use the service clearances and caster location for 14T/00, 14T/42 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:
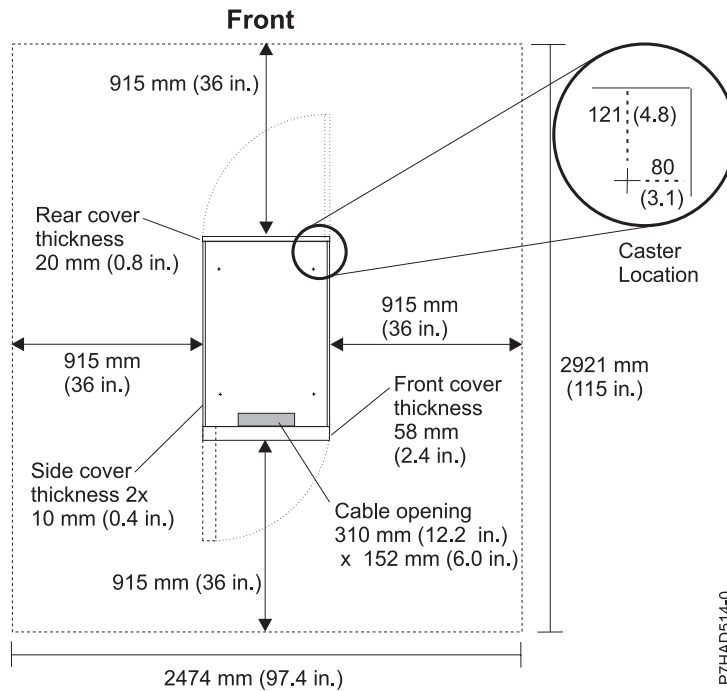
Front

915 mm (36 in.)

121 (4.8)

80 (3.1)

Rear cover thickness 20 mm (0.8 in.)

Caster Location

915 mm (36 in.)

915 mm (36 in.)

2921 mm (115 in.)

Front cover thickness 58 mm (2.4 in.)

Side cover thickness 2x 10 mm (0.4 in.)

Cable opening 310 mm (12.2 in.) x 152 mm (6.0 in.)

915 mm (36 in.)

2474 mm (97.4 in.)

P7HAD514-0

Figure 14. Service clearances and caster location for 14T/00, 14T/42, 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.

14T/00, 14T/00, and 0553 racks multiple attachment

14T/00, 14T/42 or 0553 racks can be bolted together in a multiple rack arrangement. This figure shows that arrangement.

T00 or T42 Rack

T00 or T42 Rack

Separation 25.4 mm (1 in.)
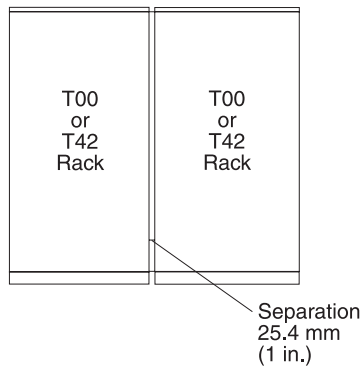
A kit is available including the bolts, spacers, and decorative trim pieces to cover the 25.4 mm (1 in.) space. For service clearances, see the service clearances as shown in the table for the model 14T/00 rack.

Related reference:

"Model 14T/00 rack" on page 32

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

14T/00, 14T/42, 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 14T/00, 14T/42, and 0553 racks can be extremely heavy when several drawers are present. The following table shows the necessary weight distribution distances for the 14T/00, 14T/42, and 0553 racks when loaded.

Table 70. Weight distribution distances for racks when loaded

Rack	System weight [1]	Width[2]	Depth[2]	Weight distribution distance[3]	
				Front and back	Left and right
14T/00[4]	816 kg (1795 lb)	623 mm (24.5 in)	1021 mm (40.2 in)	515.6 mm (20.3 in), 477.5 mm (18.8 in)	467.4 mm (18.4 in)
14T/00[5]	816 kg (1795 lb)	623 mm (24.5 in)	1021 mm (40.2 in)	515.6 mm (20.3 in), 477.5 mm (18.8 in)	0
14T/00[6]	816 kg (1795 lb)	623 mm (24.5 in)	1021 mm (40.2 in)	515.6 mm (20.3 in), 477.5 mm (18.8 in)	559 mm (22 in)
14T/42 and 0553 [4]	930 kg (2045 lb)	623 mm (24.5 in)	1021 mm (40.2 in)	515.6 mm (20.3 in), 477.5 mm (18.8 in)	467.4 mm (18.4 in)
14T/42 and 0553 [5]	930 kg (2045 lb)	623 mm (24.5 in)	1021 mm (40.2 in)	515.6 mm (20.3 in), 477.5 mm (18.8 in)	0
14T/42 and 0553[6]	930 kg (2045 lb)	623 mm (24.5 in)	1021 mm (40.2 in)	515.6 mm (20.3 in), 477.5 mm (18.8 in)	686 mm (27 in)

Notes:

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^2 raised floor loading objective.

The following table shows the necessary floor loading for the 14T/00, 14T/42 and 0553 racks when loaded.

Table 71. Floor loading for racks when loaded

Rack	Floor loading			
	Raised kg/m[1]	Non-raised kg/m[1]	Raised lb/ft[1]	Non-raised lb/ft[1]
14T/00[2]	366.7	322.7	75	66
14T/00[3]	734.5	690.6	150.4	141.4
14T/00[4]	341	297	70	61
14T/42 and 0553[2]	403	359	82.5	73.5
14T/42 and 0553[3]	825	781	169	160

Table 71. Floor loading for racks when loaded (continued)

Rack	Floor loading			
	Raised kg/m[1]	Non-raised kg/m[1]	Raised lb/ft[1]	Non-raised lb/ft[1]
14T/42 and 0553[4]	341.4	297.5	70	61
Notes:				
1. Dimensions without covers, units are inches with mm in parentheses.				
2. Weight distribution distance is 1/2 the service clearance values shown in the figure plus cover thickness.				
3. No left and right weight distribution distance.				
4. Left and right weight distribution distance required for a 70 lb/ft^2 raised floor loading objective.				

Related reference:

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

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

Planning for the 7953-94X rack

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

The following provide specifications for the 7953-94X rack.

Model 7953-94X rack

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

Table 72. Dimensions for rack

Width (without outriggers)	Width (with outriggers)	Depth	Height	Weight (empty with outriggers)	EIA unit capacity
600 mm (23.6 in.)	780 mm (30.7 in.)	1095 mm (43.1 in.)	2002 mm (78.8 in.)	261 kg (575 lb)	42 EIA units

Table 73. Dimensions for doors

Width	Height	Weight
599 mm (23.6 in.)	1932 mm (76.1 in.)	7.7 kg (17 lb)

Table 74. Dimensions for side covers

Width	Height	Weight
885 mm (34.9 in.)	1870 mm (73.6 in.)	17.7 kg (39 lb)

Table 75. Temperature requirements

Operating	Nonoperating
10°C - 38°C (50°F - 100.4°F)[1]	-40°C - 60°C (-40°F - 140°F)
[1]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).	

Table 76. Environmental requirements

Environment	Operating	Nonoperating	Maximum altitude
Noncondensing humidity	20% - 80% (allowable) 40% - 55% (recommended)	8% - 80% (including condensing)	2134 m (7000 ft) above sea level
Wet bulb temperature	21°C (69.8°F)	27°C (80.6°F)	

Electrical

For electrical requirements, see Power distribution unit and power cord options.

Features

The 7953-94X rack has the following features available for use:
- Recirculation prevention plate installed at the bottom, front of the rack.
- Stabilizer bracket installed at the front of the rack.

Caster locations

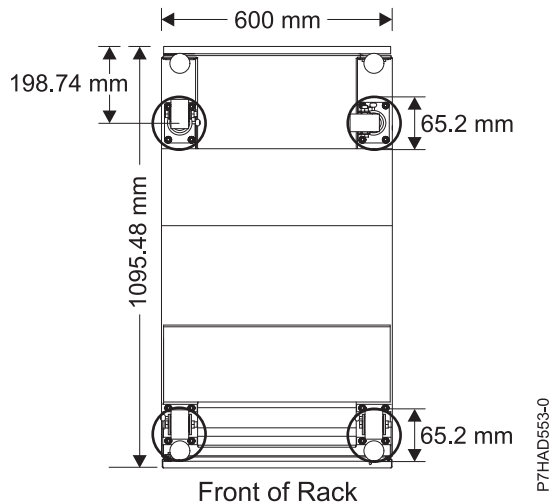The following diagram provides the caster locations for the 7953-94X rack.

Figure 15. Caster locations

Cabling the 7953-94X rack
Learn about the different cable routing options available for the 7953-94X rack.

Cabling within the rack

Side cable channels are available in the rack to route cables. There are two cable channels on each side of the rack as shown in Figure 16 on page 41.

Front to rear cable channels

Cable channels caps

Front to rear cable channels

Cable channels caps
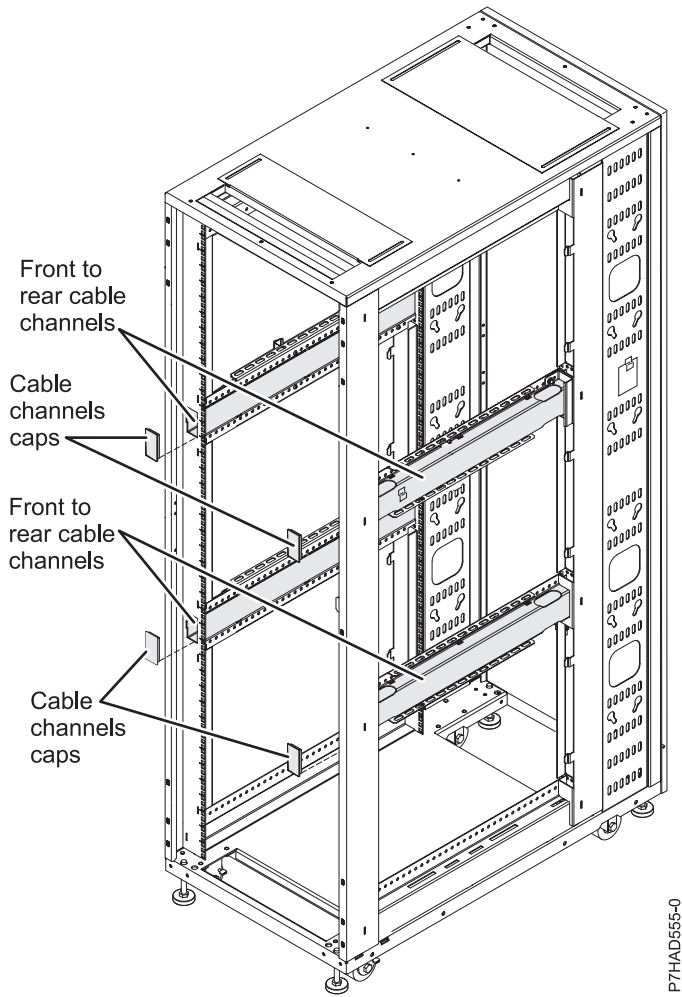
P7HAD555-0

Figure 16. Cabling within the rack

Cabling under the floor

A cable access bar located on the bottom rear of the rack helps to route the cables, leaving the rack in place. This bar can be removed for installation and then reattached after the rack is installed and cabled.

Cable-access bar

M6 screws
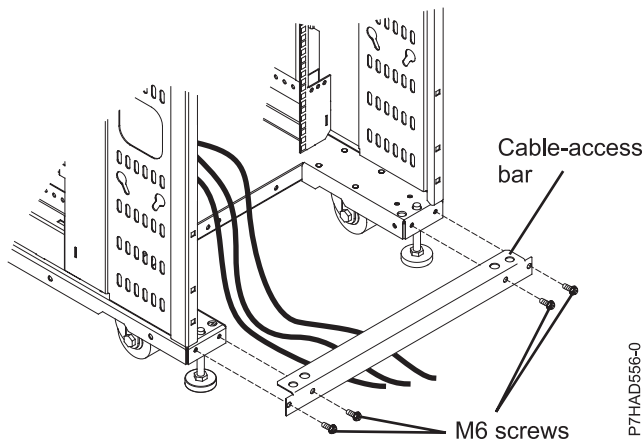
P7HAD556-0

Figure 17. Cable access bar

Cabling overhead

Front and rear rectangular cable access openings located on the top of the rack cabinet allow cables to be routed up and out of the rack. Cable access covers are adjustable by loosing the side screws and sliding the covers forward or backward.
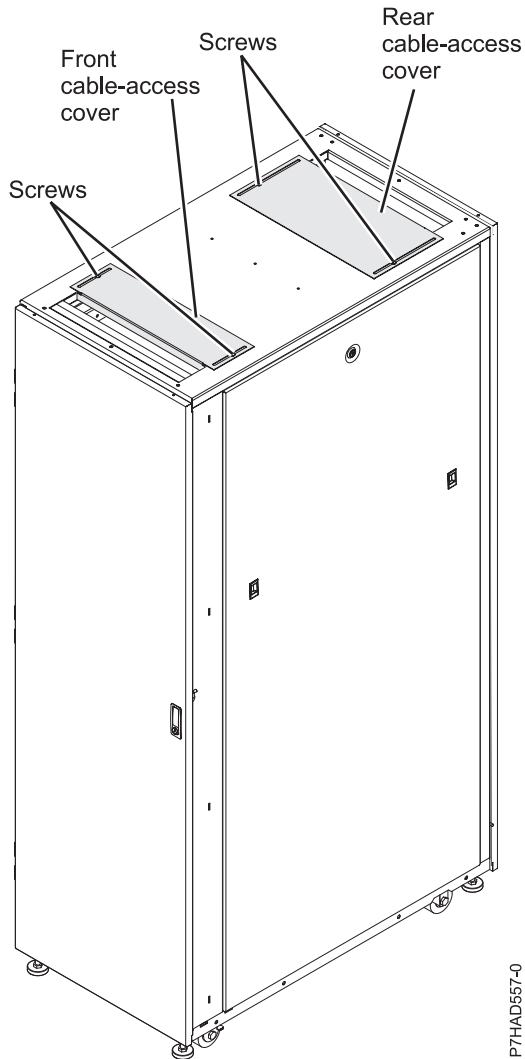

Figure 18. Cable access covers

Side stabilizing outriggers
Learn about the side stabilizing outriggers available for the 7953-94X rack.

The outriggers are stabilizers with wheels installed on the sides of the rack cabinet. The outriggers can be removed only after the rack is in its final location and will not be moved more than 2 meters (6 ft) away in any direction.

To remove the outriggers, use a 6 mm hex wrench to remove the four bolts that attach each outrigger to the rack cabinet.

Keep each of the outriggers and bolts in a safe place for future use when moving the rack. Reinstall the outriggers if you need to move the rack cabinet to another location greater than 2 meters (6 ft) away from its current location.
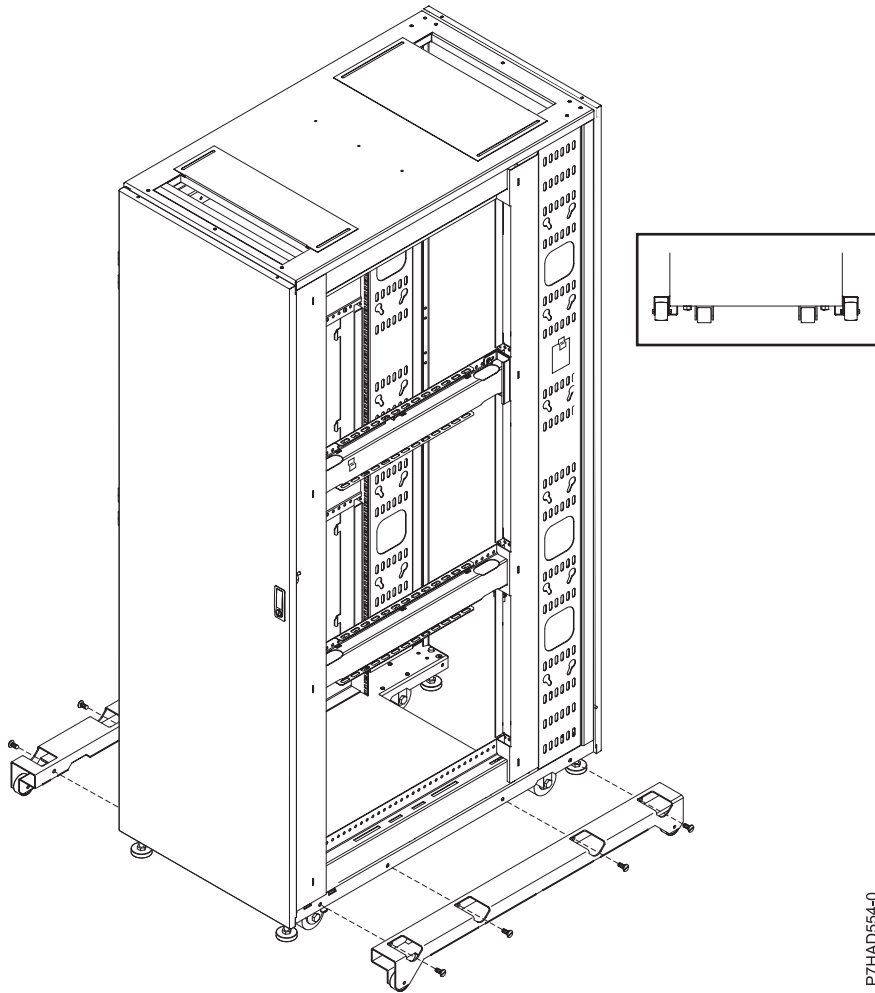
Figure 19. Outrigger locations

Multiple racks
Learn how to attach multiple 7953-94X racks together.

Multiple 7953-94X racks can be attached together via attachment brackets connecting the units at the front of the rack. See Figure 20 on page 44.
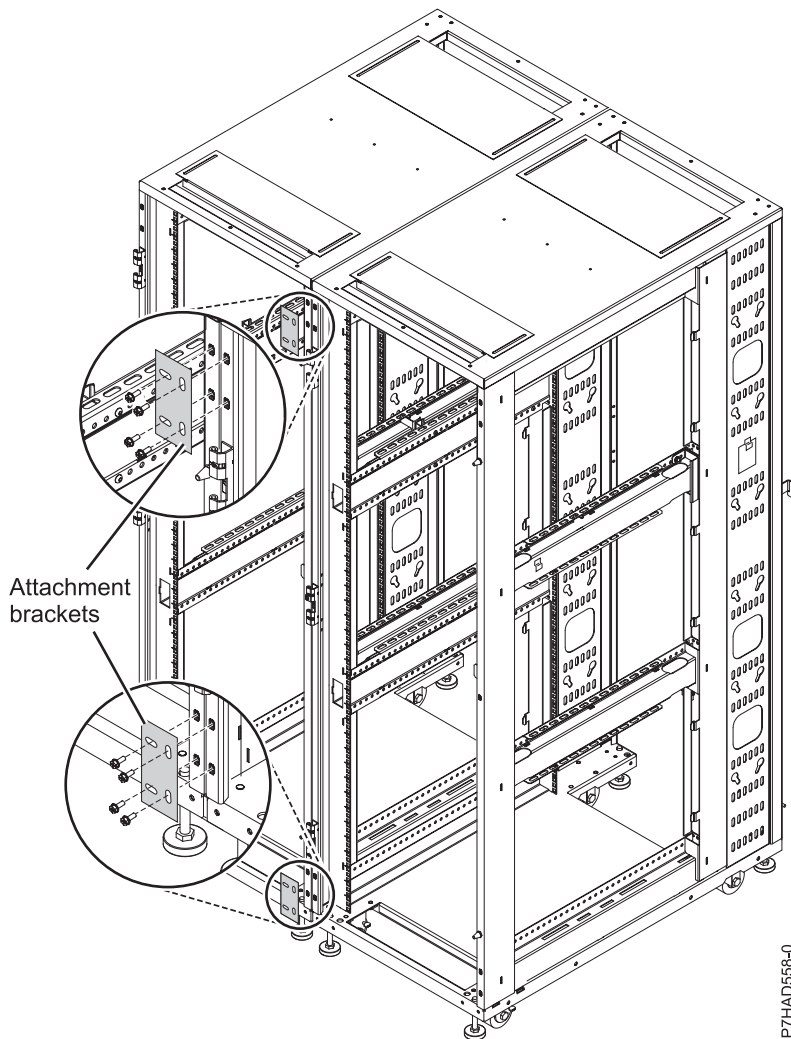
Figure 20. Attachment brackets

P7HAD558-0

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-C08 Hardware Management Console specifications

Hardware specifications for model 7042-C08 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 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 77. Dimensions

Width	Depth	Height	Weight
216 mm (8.5 in.)	540 mm (21.25 in.)	438 mm (17.25 in)	19.6 - 21.4 kg (43 - 47 lb)

Table 78. Electrical

Electrical characteristics	Properties
Maximum measured power	523 W
Maximum kVA	.55
Frequency	50 or 60 Hz
Maximum thermal output	1784 BTU/hr
Input voltage low range	100 - 127 V ac
Input voltage high range	200 - 240 V ac

Table 79. Environment requirements

Environment	System requirements	Altitude
Recommended operating temperature	10 - 35°C (50 - 95°F)	0 - 914.4 m (0 - 3000 ft)
	10 - 32°C (50 - 89.6°F)	914.4 - 2133.6 m (3000 - 7000 ft)
Nonoperating temperature	10 - 43°C (50 - 109.4°F)	2133.6 m (7000 ft)
Maximum altitude	NA	2133.6 m (7000 ft)
Shipping temperature	-40 - 60°C (-40 - 140°F)	
Operating humidity	8 - 80%	
Nonoperating humidity	8 - 80%	

42C/07 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 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 80. 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
Electrical[1]					
Power source loading			0.106 kVa to 0.352 kVa		
Input voltage			100 - 127 V ac (low range)		
			200 - 240 V ac (high range)		

Table 80. Hardware Management Console specifications (continued)

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)

Air temperature requirements

Operating	Shipping
10 to 32°C (50 to 89.6°F)	-40 to 60°C (-40 - 140°F)

Humidity requirements

	Operating	Nonoperating
Noncondensing humidity	8 - 80%	8 - 80%

Noise emissions[2]

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

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.

Systems Director Management Console specifications

Systems Director Management Console (SDMC) specifications provide detailed information for your SDMC, including dimensions, electrical, power, temperature, environment, and service clearances.

7042-CR6 rack-mounted Systems Director Management Console specifications

Hardware specifications provide detailed information for your Systems Director Management Console (SDMC), including dimensions, electrical, environmental requirements, and noise emissions.

The SDMC controls managed systems, including the management of logical partitions and the use of capacity on demand. Using service applications, the SDMC communicates with managed systems to detect, consolidate, and send information for analysis. The SDMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your SDMC.

Table 81. 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 82. 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 Hz - 63 Hz

Table 83. Environmental requirements

Environment	Temperature
Recommended operating temperature	10°C - 35°C (50°F - 95°F)
Nonoperating temperature	5°C - 45°C (41°F - 113°F)
Maximum altitude	3048 m (10000 ft)
Operating humidity	8% - 80%
Nonoperating humidity	20% - 80%

Table 84. Noise emissions (maximum configuration)[1]

	Idling	Operating
L_{WAd}	6.1 bels	6.1 bels
[1] 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-CR7 rack-mounted Systems Director Management Console specifications

Hardware specifications provide detailed information for your Systems Director Management Console (SDMC), including dimensions, electrical, environmental requirements, and noise emissions.

The SDMC controls managed systems, including the management of logical partitions and the use of capacity on demand. Using service applications, the SDMC communicates with managed systems to detect, consolidate, and send information for analysis. The SDMC provides service technicians with diagnostic information for systems that can operate in a multiple-partitioned environment.

Use the following specifications to plan for your SDMC.

Table 85. Dimensions

Width	Depth	Height	Weight (maximum configuration)
429 mm (16.9 in.)	734 mm (28.9 in.)	43 mm (1.7 in.)	16.4 kg (36.16 lb)

Table 86. Electrical requirements

Electrical characteristics	Properties
Maximum measured power	351 W
Maximum thermal output	1198 BTU/hr
Input voltage low range	100 V ac - 127 V ac
Input voltage high range	200 V ac - 240 V ac
Frequency (Hertz)	50 or 60 Hz (+/- 3 Hz)

Table 87. Environmental requirements

Environment	System Requirements	Altitude
Recommended operating temperature	10°C - 35°C (50°F - 95°F)	0 - 915 m (0 - 3000 ft)
	10°C - 32°C (50°F - 90°F)	915 m - 2134 m (3000 ft - 7000 ft)
	10°C - 28°C (50°F - 83°F)	2134 m - 3050 m (7000 ft - 10000 ft)
Nonoperating temperature	5°C - 45°C (41°F - 113°F)	
Shipping temperature	-40°C - 60°C (-40°F - 140°F)	
Maximum altitude	3048 m (10000 ft)	
Operating humidity	20% - 80%	
Operating dew point (maximum)	21°C (70°F)	
Nonoperating humidity	8% - 80%	
Nonoperating dew point (maximum)	27°C (81°F)	

Table 88. Noise emissions (Maximum configuration)[1]

	Idling	Operating
L_{WAd}	6.2 bels	6.5 bels
[1] 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.		

Rack installation procedures for racks

Learn the requirements and specifications for installing systems into racks .
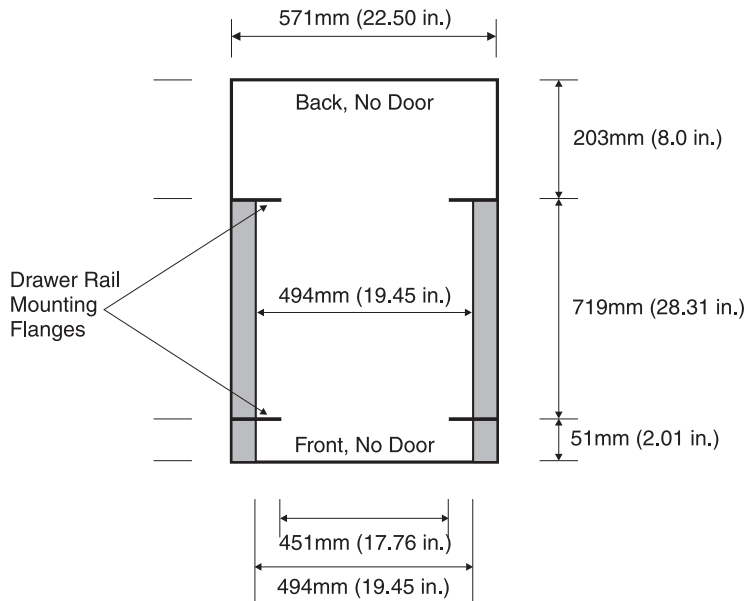
This topic provides requirements and specifications for 19-inch racks. These requirements and specifications are provided as an aid to help you understand the requirements to install systems into racks. It is your responsibility, working with your rack manufacturer, to ensure that the rack chosen meets the requirements and specifications listed here. Mechanical drawings of the rack, if available from the manufacturer, are recommended for comparison against the requirements and specifications.

Note: The IBM 7014-T00, 7014-T42, 7014-B42, 0551, and 0553 racks meet all the requirements and specifications.
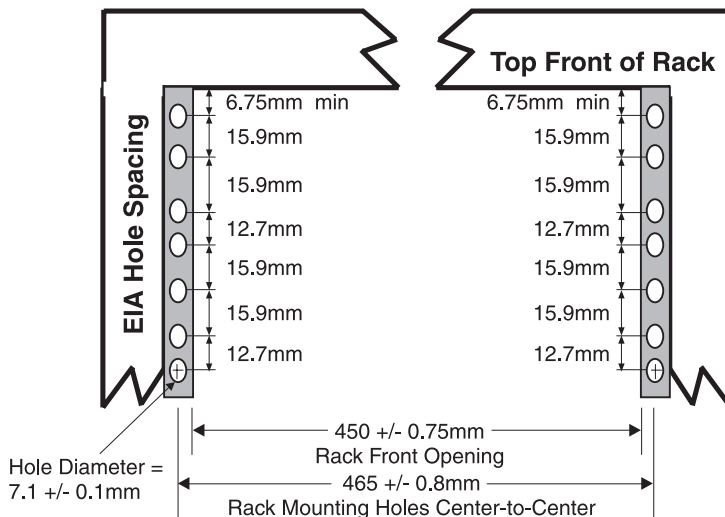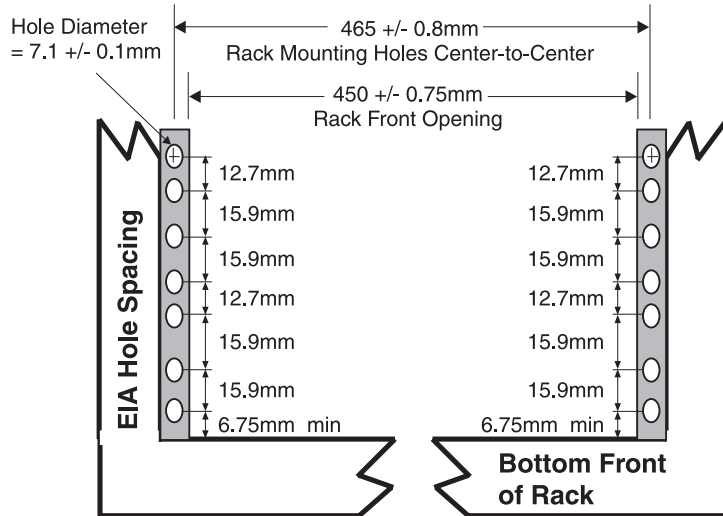
Rack specifications

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).

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 rails to fit in your rack or cabinet (see the following figure).

Hole Diameter = 7.1 +/- 0.1mm

465 +/- 0.8mm
Rack Mounting Holes Center-to-Center

450 +/- 0.75mm
Rack Front Opening

EIA Hole Spacing

12.7mm	12.7mm
15.9mm	15.9mm
15.9mm	15.9mm
12.7mm	12.7mm
15.9mm	15.9mm
15.9mm	15.9mm
6.75mm min	6.75mm min

Bottom Front of Rack

- Models 9117-MMB and 9179-MHB use SMP and FSP flex assemblies that extend beyond the rack mount post width. The front rack opening must be 535 mm (21.06 in.) wide for dimension C (the width between the outsides of the standard mounting flanges, see Figure 21). The back rack opening must be 500 mm (19.69 in.) wide for dimension C (the width between the outsides of the standard mounting flanges).

Critical Mounting Flange Dimensions

C
B
A

Mounting Flange

Installed System

Installed System

System Width

Notable Dimensions:

Dimension A = 450 mm (17.717") min.
Dimension B = 465 mm (18.307") normal
Dimension C = 535 mm (21.06") min.

P7HAD501-1
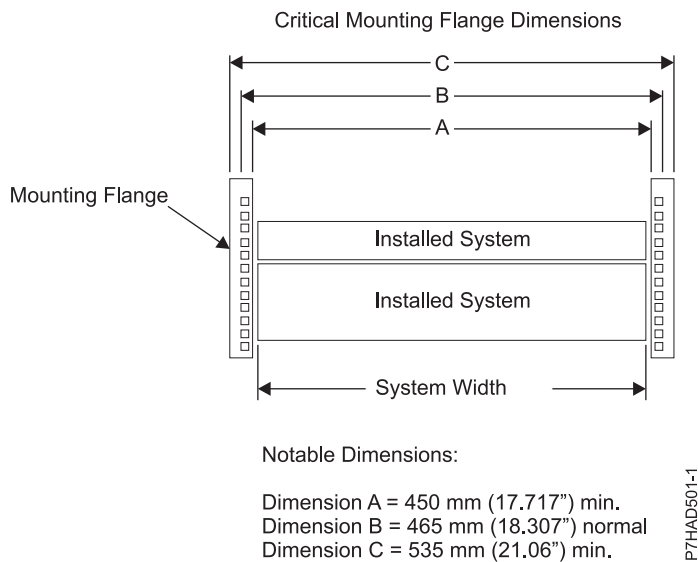
Figure 21. Critical mounting flange dimensions

- A minimum rack opening width of 500 mm (19.69 in.) for a depth of 330 mm (12.99 in.) is needed behind the installed system for maintenance and service. The depth can extend beyond the rack rear door.

Rack

Installed System

500mm opening width needed for a 330mm depth. The depth can extend beyond the frame line.

Top Down View

Front

P7HAD505-0

- 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).

  – 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

- All parts shipped with the Power Systems products must be installed.

- 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 power distribution units to supply rack power (for example, feature code 7188). Rack or cabinet power distribution devices must meet the drawer voltage, amperage, and 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.

- 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 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 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 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.

  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.

  Note: 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.
- The rack or cabinet must provide adequate front-to-back ventilation.

  Note: 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.

General safety requirements for products installed in a rack or cabinet

The general safety requirements for products installed in racks are:
- Any product or component that plugs into either an 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 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 manufacturers 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 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 requirements for "safe to service" (contact your 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 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 service personnel.

  For products not intended for rack-mounting to be serviced, 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:

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

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.

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). Your seller 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.
- Contact an electrician. Contact a qualified electrician to take care of your server power requirements and install needed power outlets. Give the electrician a copy of your power information. You can print the recommended power distribution wiring diagram as a reference for your electrician.

Server Information Form 3A

Use this form to record the type and quantity of power cords that you need for your server.

Frame	Device type	Device description feature code	Plug type/input voltage

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

Part number	Device type	Device description	Device location	Cable length	Plug type/input voltage	Telephone contact

Plugs and receptacles

Select the country or region link to see plugs and receptacles available by country. Or, if you use a PDU select Connecting your sever to a PDU.

Connecting your server to a country specific receptacle

Choose the country or region in which your system will be installed to assist in determining the feature cord of your system.

Supported feature cords

Find out which feature cords are supported for each system and country.

Use the following tables to determine the appropriate feature cord to use with your system in your country.

Table 89. Supported feature cords for POWER7 systems

Feature cord (FC)	02E/4B and 02E/4C (7/20)	05F/6B and 05E/6C (7/40)	31E/2B, 31E/1C, and 31E/2C (7/10 and 7/30)	33E/8B (7/50)	36E/8C (7/55)	17M/MB and 17M/MC (7/70)	19F/HB (7/95)	79M/HB and 79M/HC (7/80)
6460	X	X	X	X	X	X	X	X
6469	X	X	X	X	X	X	X	X
6470	X	X	X	X	X	S	X	S
6471	X	X	X	X	X	X	X	X
6472	X	X	X	X	X	X	X	X
6473	X	X	X	X	X	X	X	X
6474	X	X	X	X	X	X	X	X
6475	X	X	X	X	X	X	X	X
6476	X	X	X	X	X	X	X	X
6477	X	X	X	X	X	X	X	X
6478	X	X	X	X	X	X	X	X

Table 89. Supported feature cords for POWER7 systems (continued)

Feature cord (FC)	02E/4B and 02E/4C (7/20)	05F/6B and 05E/6C (7/40)	31E/2B, 31E/1C, and 31E/2C (7/10 and 7/30)	33E/8B (7/50)	36E/8C (7/55)	17M/MB and 17M/MC (7/70)	19F/HB (7/95)	79M/HB and 79M/HC (7/80)
6479	S	S	S	S	N/S	S	S	S
6488	X	X	X	X	X	X	X	X
6489	X	X	X	X	X	X	X	X
6491	X	X	X	X	X	X	X	X
6492	X	X	X	X	X	X	X	X
6493	X	X	X	X	X	X	X	X
6494	X	X	X	X	X	X	X	X
6495	S	S	S	S	N/S	S	S	S
6496	X	X	X	X	X	X	X	X
6497	S	S	S	S	N/S	X	X	X
6498	S	S	S	S	N/S	S	S	S
6651	X	X	X	X	X	X	X	X
6653	X	X	X	X	X	X	X	X
6654	X	X	X	X	X	X	X	X
6655	X	X	X	X	X	X	X	X
6656	X	X	X	X	X	X	X	X
6657	X	X	X	X	X	X	X	X
6658	X	X	X	X	X	X	X	X
6659	X	X	X	X	X	X	X	X
6660	X	X	X	X	X	X	X	X
6662	S	S	S	S	N/S	S	S	S
6670	S	S	S	S	N/S	S	S	S
6680	X	X	X	X	X	X	X	X
6687	S	S	S	S	N/S	S	S	S
6690	S	S	S	S	N/S	S	S	S
6691	S	S	S	S	N/S	S	S	S
6692	S	S	S	S	N/S	S	S	S
RPQ 8A1871	N/S	N/S	N/S	N/S	N/S	N/S	X	N/S

X = Feature cord is supported and can be purchased.

S = Feature cord is supported, but is no longer available for purchase.

N/S = Feature cord is not supported.

Table 90. Supported feature cords by countries

Feature Cord (FC)	Supported countries
6470	United States, Canada

Table 90. Supported feature cords by countries (continued)

Feature Cord (FC)	Supported countries
6471	Brazil
6472	Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Gabon, Georgia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (Peoples Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire
6473	Denmark
6474	Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, Cyprus, Dominica, Gambia, Ghana, Grenada, Guyana, Hong Kong, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Qatar, Saint Kitts & Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad & Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe, Uganda
6475	Israel
6476	Liechtenstein, Switzerland
6477	Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda
6478	Italy
6479	Australia, New Zealand
6488	Argentina
6489	Internationally available
6491	Europe
6492	United States, Canada
6493	China
6494	India
6495	Brazil
6496	Korea
6497	United States, Canada
6498	Japan
6651	Taiwan
6653	Internationally available
6654	United States, Canada
6655	United States, Canada
6656	Internationally available
6657	Australia, New Zealand
6658	Korea

Table 90. Supported feature cords by countries (continued)

Feature Cord (FC)	Supported countries
6659	Taiwan
6660	Japan
6662	Taiwan
6670	Japan
6680	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
6687	Japan
6690	Brazil
6691	Japan
6692	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea
RPQ 8A1871	Internationally available

Internationally available

The plug and receptacles for this system are available internationally.

Select your system's feature code for more information.

Cord feature code 6489:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is IEC 60309 3P+N+E.

**Note:** This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
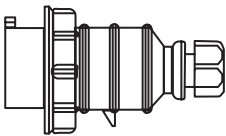
Figure 22. Plug type IEC 60309 3P+N+E
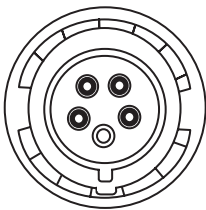
Figure 23. Receptacle type IEC 60309 3P+N+E

Voltage and amperage

The voltage is 240 - 415 V ac, and the amperage is 32 A.

Part number

The part number is:

*   39M5413

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Cord feature code 6491:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

**Plug and receptacle**

The plug and receptacle type is IEC 60309 P+N+E.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
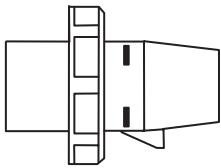
Figure 24. Plug type IEC 60309 P+N+E
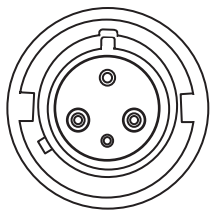
Figure 25. Receptacle type IEC 60309 P+N+E

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 48 A.

Part number

The part number is:

*   39M5415

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Cord feature code 6653:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is IEC 60309 3P+N+E.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
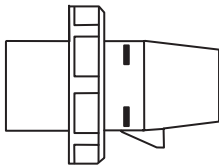

Figure 26. Plug type IEC 60309 3P+N+E
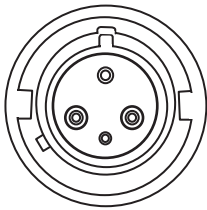
Figure 27. Receptacle type IEC 60309 3P+N+E

Voltage and amperage

The voltage is 415 V ac and the amperage is 16 A.

Part number

The part number is:
• 39M5412

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Cord feature code 6656:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is IEC 60309 P+N+E.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
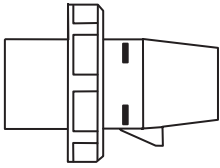
Figure 28. Plug type 60309 P+N+E
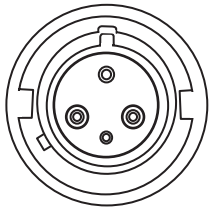
Figure 29. Receptacle type 60309 P+N+E

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 32 A.

Part number

The part number is:
- 39M5414

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Anguilla

The plug and receptacles for this system are available in Anguilla.

Select your system's feature code for more information.

Cord feature code 6460:

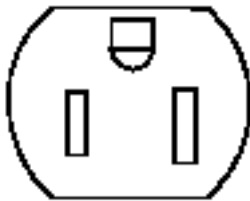Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 4.

Figure 30. Plug type 4
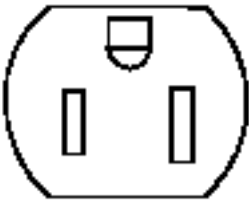
Figure 31. Receptacle type 4

Voltage and amperage

The voltage is 100 - 127 V ac, and the amperage is 15 A.

Part number

The part number is:
• 39M5513

> **Note:** This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Antigua and Barbuda
The plug and receptacles for this system are available in Antigua and Barbuda.

Select your system's feature code for more information.

Cord feature code 6469:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

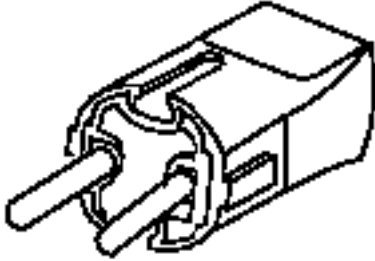**Plug and receptacle**

The plug and receptacle type is 5.

Figure 32. Plug type 5
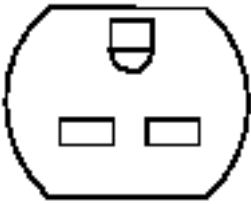
Figure 33. Receptacle type 5

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 15 A.

Part number

The part numbers are:
- 1838573
- 39M5096

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 4.3 m (14 ft).

Australia

The plug and receptacles for this system are available in Australia.

Select your system's feature code for more information.

Cord feature code 6657:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is PDL.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
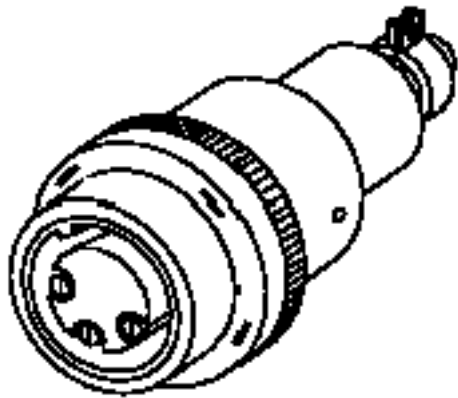
Figure 34. Plug type PDL
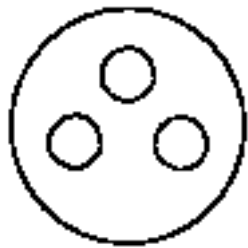
Figure 35. Receptacle type PDL

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 32 A.

Part number

The part number is:
- 39M5419

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Brazil

The plug and receptacles for this system are available in Brazil.

Select your system's feature code for more information.

Cord feature code 6471:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Note: Line cord FC 6471 is for use in Brazil and cannot be used in the United States.

Plug and receptacle

The plug and receptacle type is 70.

Figure 36. Plug type 70

Figure 37. Receptacle type 70

Voltage and amperage

The voltage is 100 - 127 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 49P2110
- 39M5233

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

Bulgaria
The plug and receptacles for this system are available in Bulgaria.

Select your system's feature code for more information.

Cord feature code 6472:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 18.

Figure 38. Plug type 18

Figure 39. Receptacle type 18

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
* 13F9979
* 39M5123

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 2.7 m (9 ft).

Canada

The plug and receptacles for this system are available in Canada.

Select your system's feature code for more information.

Cord feature code 6497:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle
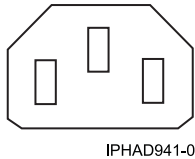
The plug and receptacle type is 10.
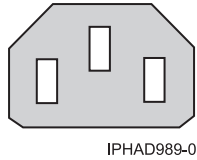

Figure 40. Plug type 10

Figure 41. Receptacle type 10

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part number is:
- 41V1961

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 1.8 m (6 ft).

Cord feature code 6654:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 12.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.

Figure 42. Plug type 12

Figure 43. Receptacle type 12

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 24 A.

Part number

The part number is:
- 39M5416

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Cord feature code 6655:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 40.

**Note:** This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
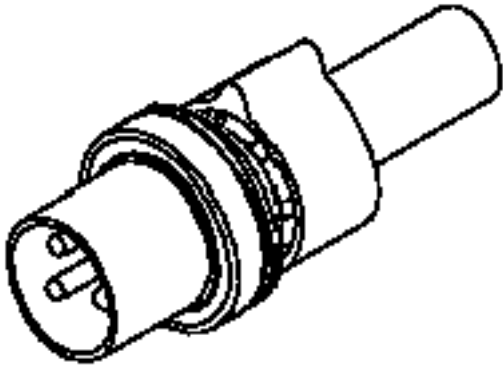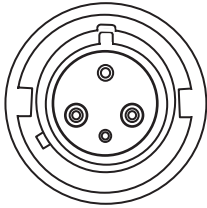

Figure 44. Plug type 40

Figure 45. Receptacle type 40

Voltage and amperage

The voltage is 200 - 240 V and the amperage is ac 24 A.

Part number

The part number is:
- 39M5418

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Chile
The plug and receptacles for this system are available in Chile.

Select your system's feature code for more information.

Cord feature code 6478:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 25.

Figure 46. Plug type 25

Figure 47. Receptacle type 25

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 14F0069
- 39M5165

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 2.7 m (9 ft).

Cord feature code 6672:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 26.

Figure 48. Plug type 26

Figure 49. Receptacle type 26

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 36L8860
- 39M5375

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 1.5 m (5 ft).

China
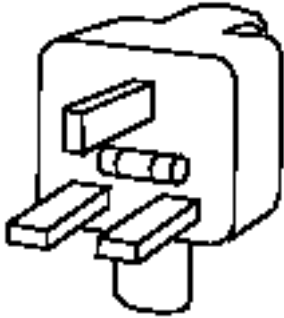The plug and receptacles for this system are available in China.

Select your system's feature code for more information.

Cord feature code 6492:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is IEC 60309 2P+E.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
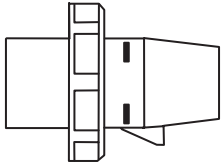
Figure 50. Plug type IEC 60309 2P+E

Figure 51. Receptacle type IEC 60309 2P+E

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 63 A.

Part number

The part number is:
- 39M5417

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Cord feature code 6493:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle
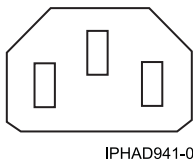
The plug and receptacle type is 62.
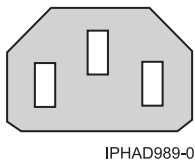
Figure 52. Plug type 62

Figure 53. Receptacle type 62

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
* 02K0546
* 39M5206

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 2.7 m (9 ft).

Denmark
The plug and receptacles for this system are available in Denmark.

Select your system's feature code for more information.

Cord feature code 6473:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 19.
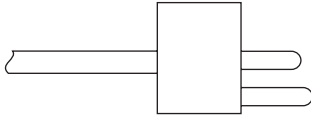
Figure 54. Plug type 19

Figure 55. Receptacle type 19

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 13F9997
- 39M5130

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 2.7 m (9 ft).

Dominica
The plug and receptacles for this system are available in Dominica.

Select your system's feature code for more information.

Cord feature code 6474:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 23

Figure 56. Plug type 23

Figure 57. Receptacle type 23

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 14F0034
- 39M5151

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

Italy

The plug and receptacles for this system are available in Italy.

Select your system's feature code for more information.

Cord feature code 6672:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

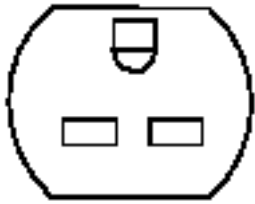The plug and receptacle type is 26.

Figure 58. Plug type 26

Figure 59. Receptacle type 26

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 36L8860
- 39M5375

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 1.5 m (5 ft).

Israel

The plug and receptacles for this system are available in Israel.

Select your system's feature code for more information.

Cord feature code 6475:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 59.

Figure 60. Plug type 59

Figure 61. Receptacle type 59

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 14F0087
- 39M5172

> **Note:** This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 2.7 m (9 ft).

Japan

The plug and receptacles for this system are available in Japan.

Select your system's feature code for more information.

Cord feature code 6487:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

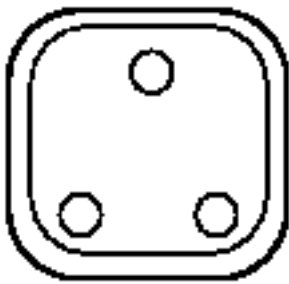The plug and receptacle type is 5.

Figure 62. Plug type 5

Figure 63. Receptacle type 5

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 15 A.

Part number

The part numbers are:
- 1838576
- 39M5094

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 1.8 m (6 ft).

Cord feature code 6660:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 59.

JIS C-8303-1983
Type 59
nonlocking

IPHAD939-0

Figure 64. Plug type 59

Voltage and amperage

The voltage is 100 - 127 V ac, and the amperage is 15 A.

Part number

The part number is:
• 39M5200

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Liechtenstein

The plug and receptacles for this system are available in Liechtenstein.

Select your system's feature code for more information.

Cord feature code 6476:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 24.

Figure 65. Plug type 24

Figure 66. Receptacle type 24

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 14F0051
- 39M5158

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 2.7 m (9 ft).

Macao

The plug and receptacles for this system are available in Macao.

Select your system's feature code for more information.

Cord feature code 6477:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 22.

Figure 67. Plug type 22

Figure 68. Receptacle type 22

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 16 A.

Part number

The part numbers are:
- 14F0015
- 39M5144

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

Paraguay

The plug and receptacles for this system are available in Paraguay.

Select your system's feature code for more information.

Cord feature code 6488:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 2.

Figure 69. Plug type 2

Figure 70. Receptacle type 2

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 36L8880
- 39M5068

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord rating

The cord rating is 2.4 kVA.

Cord length

The cord length is 2.7 m (9 ft).

India

The plug and receptacles for this system are available in India.

Select your system's feature code for more information.

Cord feature code 6494:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.
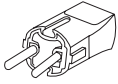
Plug and receptacle

The plug and receptacle type is 69.

Figure 71. Plug type 69

Figure 72. Receptacle type 69

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part number is:
- 39M5226

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

Kiribati

The plug and receptacles for this system are available in Kiribati.

Select your system's feature code for more information.

Cord feature code 6680:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 6.

Figure 73. Plug type 6

Figure 74. Receptacle type 6

Voltage and amperage

The voltage is 250 V ac and the amperage is 10 A.

Part number

The part number is:
* 39M5102

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

Korea
The plug and receptacles for this system are available in Korea.

Select your system's feature code for more information.

Cord feature code 6496:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

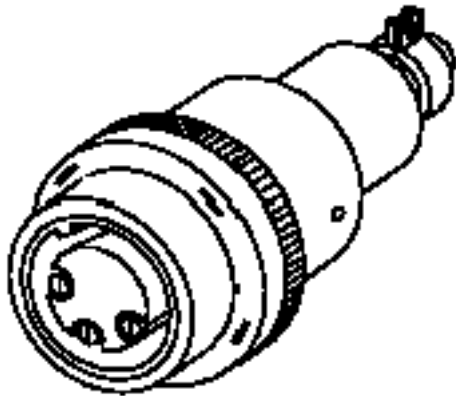**Plug and receptacle**

The plug and receptacle type is 66.

Figure 75. Plug type 66

Figure 76. Receptacle type 66

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 24P6873
- 39M5219

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

Cord feature code 6658:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is KP.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.

Figure 77. Plug type KP

Figure 78. Receptacle type KP

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 24 A.

Part number

The part number is:
• 39M5420

   Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

New Zealand
The plug and receptacles for this system are available in New Zealand.

Select your system's feature code for more information.

Cord feature code 6657:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is PDL.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.
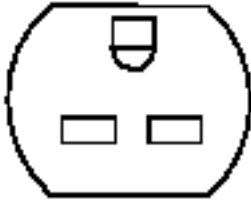

Figure 79. Plug type PDL

Figure 80. Receptacle type PDL

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 32 A.

Part number

The part number is:
- 39M5419

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Taiwan

The plug and receptacles for this system are available in Taiwan.

Select your system's feature code for more information.

Cord feature code 6651:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 75.
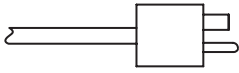
Figure 81. Plug type 75

Figure 82. Receptacle type 75

Voltage and amperage

The voltage is 100 -127 V ac, and the amperage is 15 A.

Part number

The part number is:
* 39M5463

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

Cord feature code 6659:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 76.

Figure 83. Plug type 76

Figure 84. Receptacle type 76

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 15 A.

Part number

The part number is:
* 39M5254

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.7 m (9 ft).

United States, Territories, and Possessions

The plug and receptacles for this system are available in the United States, Territories, and Possessions.

Select your system's feature code for more information.

Cord feature code 6497:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 10.

Figure 85. Plug type 10

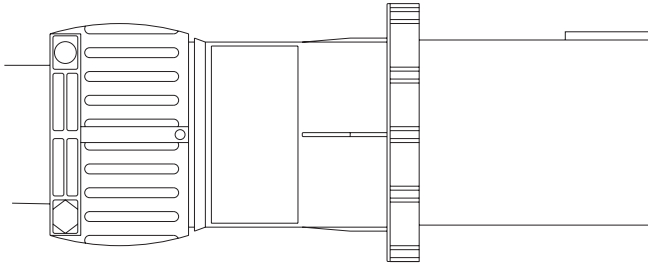*Figure 86. Receptacle type 10*

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part number is:
- 41V1961

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 1.8 m (6 ft).

Cord feature code 6654:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

**Plug and receptacle**

The plug and receptacle type is 12.

Note: This feature code connects the power distribution unit (PDU) in a rack to the wall receptacle.

Figure 87. Plug type 12

Figure 88. Receptacle type 12

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 24 A.

Part number

The part number is:
- 39M5416

  Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Cord feature code RPQ 8A1871:

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug type is RS 7328DP and the receptacle type is RS 7324-78.
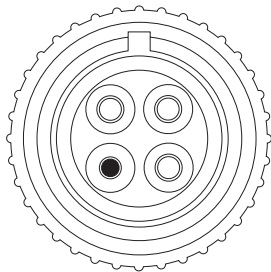
Figure 89. Plug type RS 7328DP

Figure 90. Receptacle type RS 7324-78

Voltage and amperage

The voltage is 380 - 415 V ac, and the amperage is 60 A.

Part number

The part number is:
- 45D9456

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Connecting your server to a PDU

Select this option if you system uses a power distribution unit (PDU). These cords are available worldwide as they connect the system to a PDU (instead of a wall plug outlet where the receptacle is country specific).

Select your system's feature code for more information.

Cord feature code 6458

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

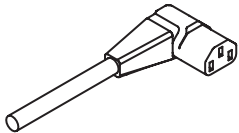### Plug and receptacle

The plug and receptacle type is 26.

IPHAD941-0
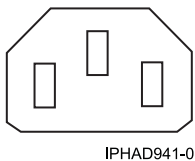
Figure 91. Plug type 26
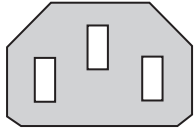
Figure 92. Receptacle type 26

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 36L8861
- 39M5378

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 4.3 m (14 ft).

Cord feature code 6459

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

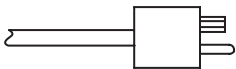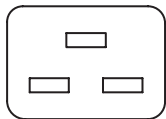**Plug and receptacle**

The plug and receptacle type is a 26 Right angle.

Figure 93. Plug and receptacle type 26

Voltage and amperage

The voltage is 250 V ac and the amperage is 10 A.

Part number

The part numbers are:
- 00P2401
- 41U0114

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

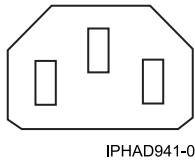The cord length is 3.7 m (12 ft).

Cord feature code 6577
Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type 15.

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Cord length

There are three different cord lengths[1]:
- 1.5 m (5 ft)
- 2.7 m (9 ft)
- 4.2 m (13.8 ft)

[1] For this feature, IBM Manufacturing chooses the optimum cord length when assembling systems into a rack.
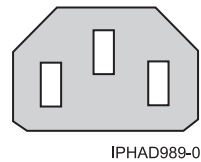
Cord feature code 6665
Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

The plug and receptacle type is 61.

Figure 94. Plug type 61

Figure 95. Receptacle type 61

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 74P4430
- 39M5392

Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 3.0 m (10 ft).

Cord feature code 6671

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

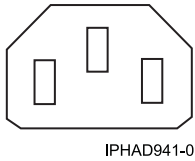### Plug and receptacle

The plug and receptacle type is 26.

Figure 96. Plug type 26

Figure 97. Receptacle type 26

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 36L8886
- 39M5377

Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 2.8 m (9 ft).

Cord feature code 6672

Find your plug and receptacle information, voltage and amperage, part number, and cord length.

Plug and receptacle

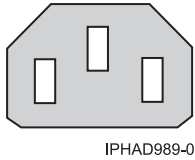The plug and receptacle type is 26.

Figure 98. Plug type 26

Figure 99. Receptacle type 26

Voltage and amperage

The voltage is 200 - 240 V ac, and the amperage is 10 A.

Part number

The part numbers are:
- 36L8860
- 39M5375

    Note: This part number meets the European Union Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Cord length

The cord length is 1.5 m (5 ft).

Uninterruptible power supply

Uninterruptible power supplies are available to meet the power protection needs of servers. The uninterruptible power supply is the type 9910.

The 9910 uninterruptible power supply solutions are compatible with the power requirements for these servers and have passed testing procedures. The uninterruptible power supplies are intended to provide a single source for purchase and protection of 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*.

Feature Code 1827 service processor communications port to uninterruptible power supply cable

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. 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's
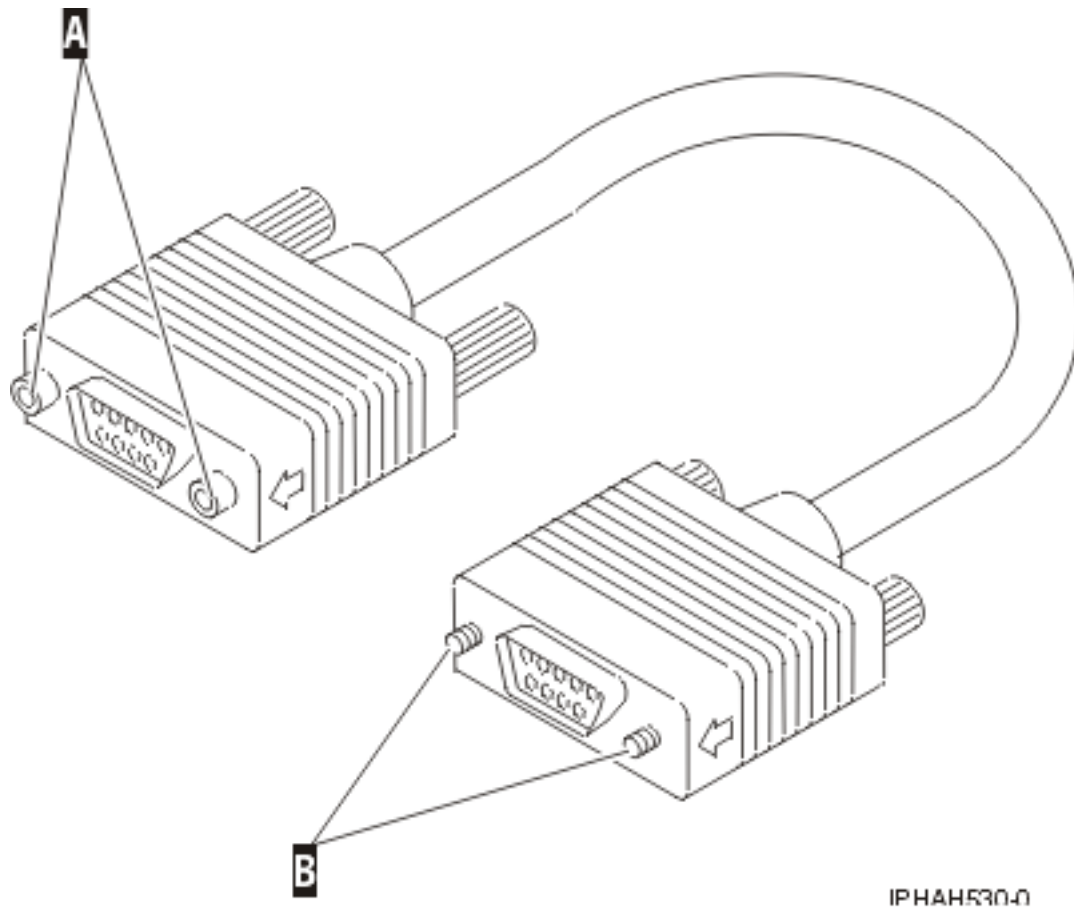
external threads on the uninterruptible power supply.

Figure 100. Uninterruptible power supply connector for the uninterruptible power supply communications cable

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 when the 1827 cable is attached and the server is started. The service processor will 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.

Feature Code 3930 RJ45 service processor communications port to uninterruptible power supply cable

The 3930 is a 290 mm (11.4 in.) RJ45 service processor communications power to uninterruptible power supply cable for certain POWER® system models.

Figure 3 shows the 3930 cable. One end of the cable, letter A, has an RJ45 connector that plugs into the service processor communications port. The other end of the cable, letter B, has a male 9-pin D-shell connector that 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.

Connecting POWER product uninterruptible power supply communications for IBM i operating system

Use the following information to connect communications for a POWER system operating IBM i operating system.

Note: Serial ports are rendered useless for AIX® use when a 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.

33E/8B and 36E/8C uninterruptible power supply communications

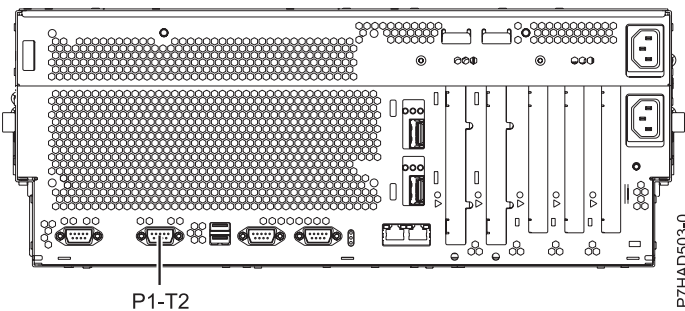Attach the 1827 cable to the POWER server at the P1-T2 location.

Figure 101. 33E/8B and 36E/8C rear view with cable installation location

17M/MB, 17M/MC, 79M/HB, 79M/HC, and 5208 or 5877 uninterruptible power supply communications

Uninterruptible power supply support via the Serial to SPCN feature code (1827) is not supported on the 17M/MB, 17M/MC, 79M/HB, and 79M/HC. UPS support may be added by using a 5802 or 5877 expansion unit. SPCN cables are used to attach the 17M/MB, 17M/MC, 79M/HB, 79M/HC, and 5802 or 5877 SPCN ports, as shown in Figure 102 on page 101. The connection from the UPS to the 5802 or 5877 is made directly from the UPS to the port labelled P2-T1. The 1827 is not needed.
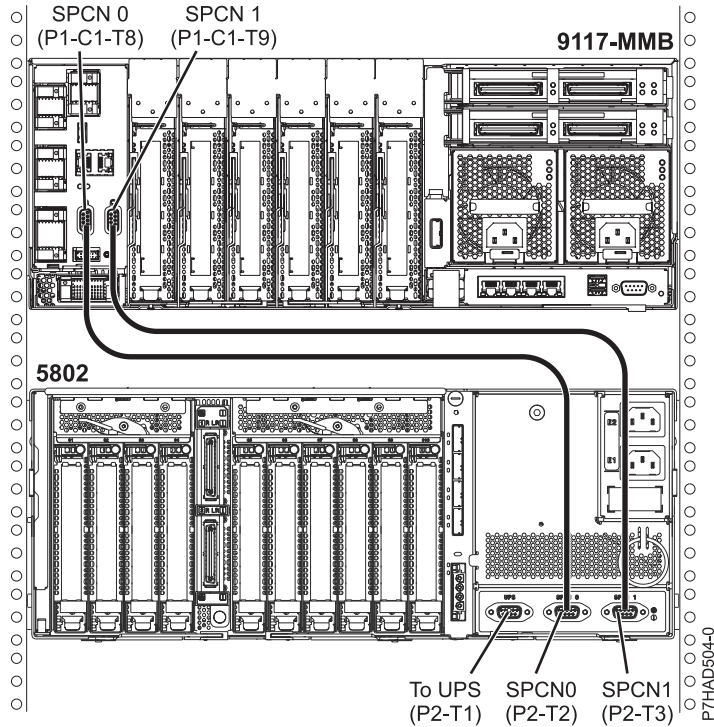
Figure 102. 17M/MB, 17M/MC, 79M/HB, and 79M/HC and 5208 or 5877 rear view cable installation location

02E/4B, 02E/4C, 05F/6B, 05E/6C, 31E/2B, 31E/1C, and 31E/2C Uninterruptible power supply communications

For POWER 710 Express and POWER 730 Express (31E/2B, 31E/1C, and 31E/2C), POWER 720 Express (02E/4B and 02E/4C), and POWER 740 Express (05F/6B and 05E/6C), feature code 3930 is used in addition to feature code 1827. Uninterruptible power supply communications are supported through a designated RJ45 port via the 3930 cable. See Figure 103 and Figure 104 on page 102. The 9 pin, male end of the 3930 cable then attaches to the end of the 9 pin, female end of the 1827 cable. See Figure 105 on page 102.
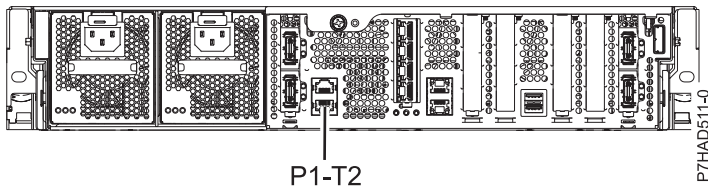

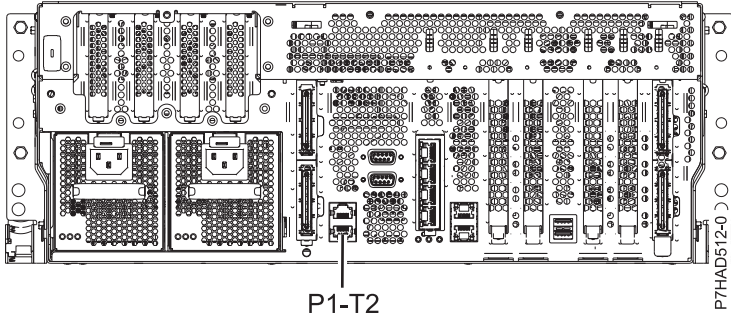*Figure 103. 31E/2B, 31E/1C, and 31E/2C rear view with cable installation location*

Figure 104. 02E/4B, 02E/4C, 05F/6B, and 05E/6C rear view with cable installation location
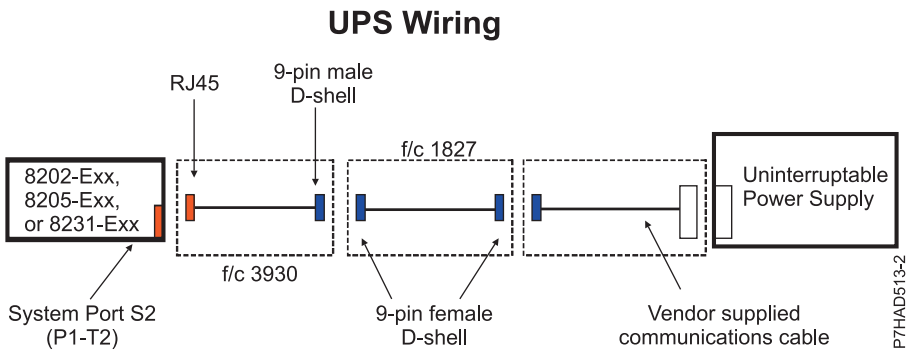

Figure 105. UPS wiring for the 02E/4B, 02E/4C, 05F/6B, 05E/6C, 31E/2B, 31E/1C, and 31E/2C

Power distribution unit and power cord options for 7014,, rack

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

Power distribution unit

The following figure shows the four vertical PDU locations in a rack.

Rack Rear View

IPHAD803-0
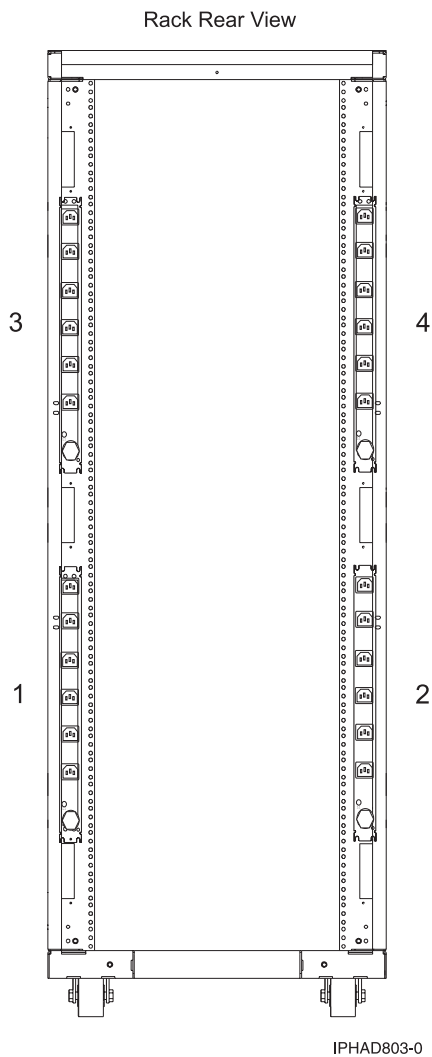
Power distribution units (PDUs) are required with 14T/00, 14T/42 racks. If a PDU is not defaulted or ordered, a power cord is provided with each individual rack-mounted drawer for connection to a country-specific utility mains receptacle or uninterruptible power supply. See the individual rack-mounted drawer specifications for the appropriate power cords.

9188 or 7188 universal PDU

Table 91. 9188 universal PDU features

PDU Number	Racks usage	Supported power cords PDU to wall
9188 universal PDU	14T/00 and 14T/42 racks	• 6489 • 6491 • 6492 • 6653 • 6654 • 6655 • 6656 • 6657 • 6658

Table 92. 7188 universal PDU features

PDU Number	Racks usage	Supported power cords PDU to wall
7188 universal PDU	14T/00, 14T/42, racks.	• 6489 • 6491 • 6492 • 6653 • 6654 • 6655 • 6656 • 6657 • 6658

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 hook-and-loop fastener 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, but each group of two outlets is fed from one 20 A circuit breaker derated to 16 A.

Circuit breaker reset

Status LED

Souriau UTG Connector

IPHAD804-2
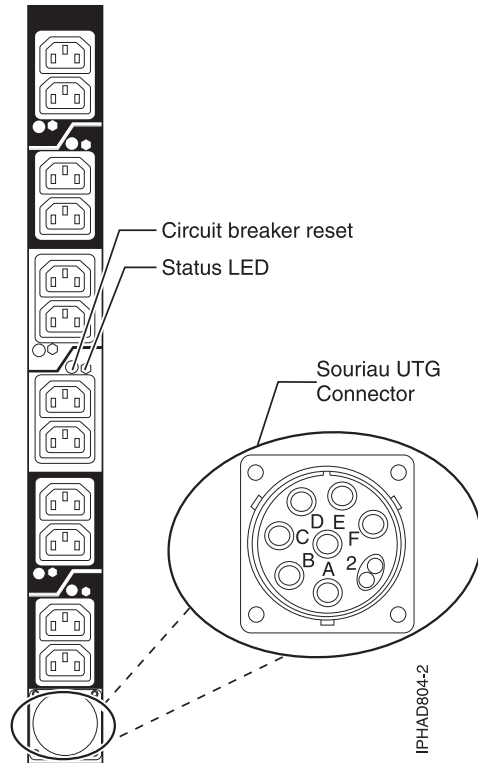
5160 single phase PDU

Table 93. 5160 single phase PDU features

PDU Number	Racks usage	Supported power cords PDU to wall
5160 single phase PDU	0551, 0553, racks	This is a hard wired power cord with a NEMA L6-30P (30A, 250VAC).

Typical rack and PDU configurations

See *7014, and 05/55 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 94. 5889 PDU+ features

PDU Number	Racks usage	Supported power cords PDU to wall
5889 PDU+	7014 racks	• 6489 • 6491 • 6492 • 6653 • 6654 • 6655 • 6656 • 6657 • 6658

Table 95. 5889 PDU+ specifications

Characteristics	Properties
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 96. 7189 PDU+ features

PDU number	Racks usage	Supported power cords PDU to wall
7189 PDU+	7014-B42 rack	• 6489 • 6491 • 6492 • 6653

Table 97. 7189 PDU+ specifications

Characteristics	Properties
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 rated at 20 A
Power outlet	Six IEC 320-C19 outlets rated at 16 A (VDE) or 20 A (UL/CSA)

7196 PDU+

Table 98. 7196 PDU+ features

PDU Number	Racks usage	Supported power cords PDU to wall
7196 PDU+	7014-B42	Fixed power cord with IEC 60309, 3P+E, 60 A plug

Table 99. 7196 PDU+ specifications

Characteristics	Properties
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
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

Table 99. 7196 PDU+ specifications (continued)

Characteristics	Properties
Power outlet	Six IEC 320-C19 outlets rated at 16 A (VDE) or 20 A (UL/CSA)

7109 PDU+

Table 100. 7109 PDU+ features

PDU Number	Racks usage	Supported power cords PDU to wall
7109 PDU+	0551, 0553, racks	• 6489 • 6491 • 6492 • 6653 • 6654 • 6655 • 6656 • 6657 • 6658

Table 101. 7109 PDU+ specifications

Characteristics	Properties
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)
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)

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 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 102. 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
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.
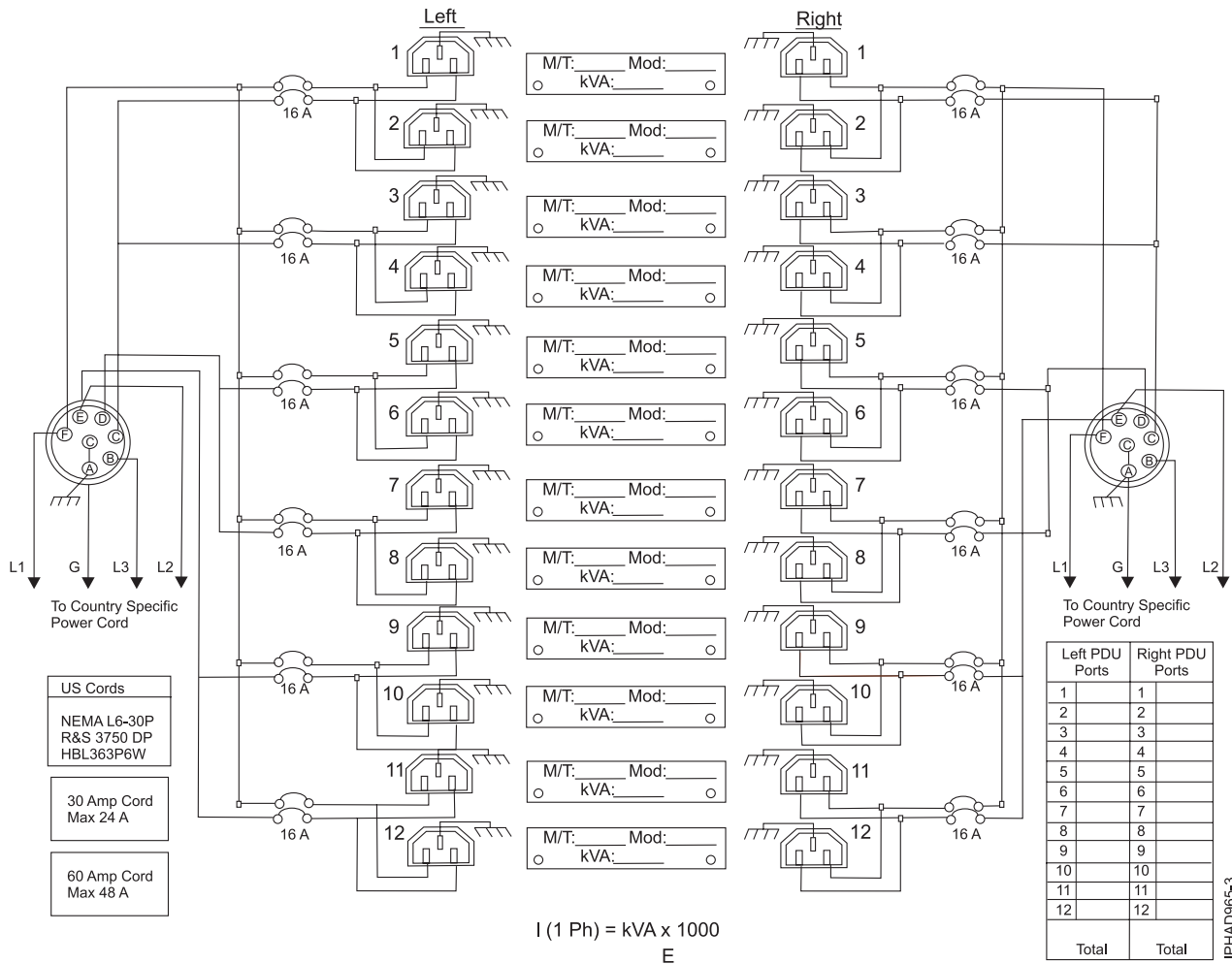
Loading sequence

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.

Left   Right

M/T:_____ Mod:_____ kVA:_____

To Country Specific Power Cord

L1   G   L3   L2

US Cords

NEMA L6-30P
R&S 3750 DP
HBL363P6W

30 Amp Cord
Max 24 A

60 Amp Cord
Max 48 A

16 A

$$I\ (1\ Ph) = \frac{kVA \times 1000}{E}$$

Left PDU Ports		Right PDU Ports	
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
Total		Total	

IPHAD965-3

Planning for cables

Learn how to develop plans for cabling your server and devices.

Cable management

These guidelines ensure that your system and its cables have optimal clearance for maintenance and other operations. The guidelines also provide guidance in correctly cabling your system and using the appropriate cables.

The following guidelines provide cabling information for installing, migrating, relocating, or upgrading your system:

- Position drawers in racks to allow enough space, where possible, for cable routing on the bottom and top of the rack, and between drawers.
- Shorter drawers should not be placed between longer drawers in the rack (for example, placing a 19-inch drawer between two 24-inch drawers).
- When a specific cable plugging sequence is required, for example, for concurrent maintenance (symmetric multiprocessing cables), label the cables appropriately and note the sequence order.
- To facilitate cable routing, install cables in the following order:
  1. System power control network (SPCN) cables
  2. Power cables
  3. Communications (serial attached SCSI, InfiniBand, remote input/output, and peripheral component interconnect express) cables

  Note: Install and route the communications cables, starting with the smallest diameter first and then progressing to the largest diameter. This applies to installing them into the cable management arm and retaining them to the rack, brackets, and other features that may be provided for cable management.
- Install and route the communications cables, starting with smallest diameter first and then progressing to the largest diameter.
- Use the innermost cable-management bridge lances for SPCN cables.
- Use the middle cable-management bridge lances for power and communications cables.
- The outermost row of cable-management bridge lances are available for use when routing cables.
- Use the cable raceways on the sides of the rack to manage excess SPCN and power cables.
- There are four cable-management bridge lances on the top of the rack. Use these bridge lances to route the cables from one side of the rack to the other, by routing to the top of the rack, where possible. This routing helps to avoid having a cable bundle that blocks the cable exit opening at the bottom of the rack.
- Use the cable management brackets provided with the system to maintain concurrent maintenance routing.
- Maintain a minimum bend diameter of 101.6 mm (4 in.) for communications (SAS, IB, RIO, and PCIe) cables.
- Maintain a minimum bend diameter of 50.8 mm (2 in.) for power cables.
- Maintain a minimum bend diameter of 25.4 mm (1 in.) for SPCN cables.
- Use the shortest-length cable available for each point-to-point connection.
- If cables have to be routed across the rear of a drawer, leave enough slack to reduce the tension on the cables for maintenance of the drawer.

- When routing cables, leave enough slack around the power connection on the power distribution unit (PDU) so that the wall-to-PDU line cord can be attached to the PDU.
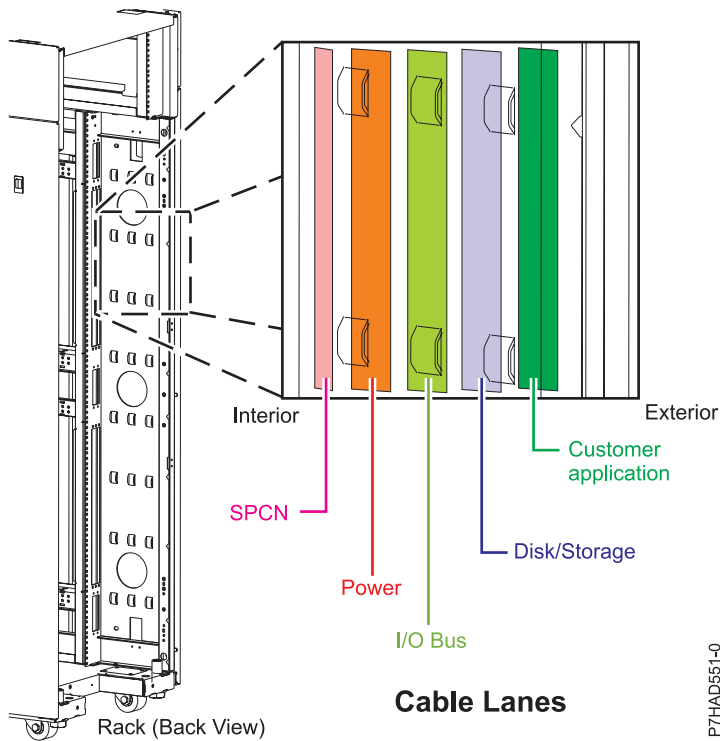- Use hook-and-loop fasteners where necessary.

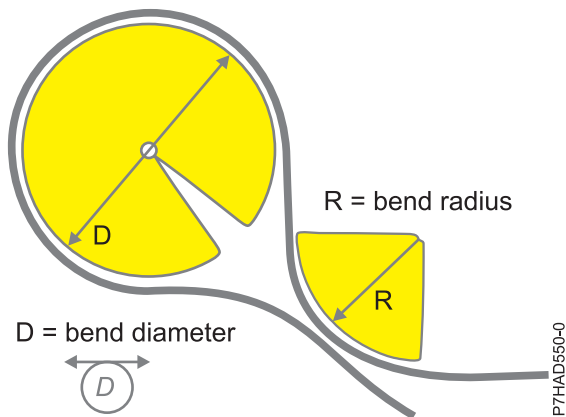*Figure 106. Cable management bridge lances*

Cable bend radius

Figure 107. Cable bend radius

Power cord routing and retention

Proper power cord routing and retention ensures your system remains connected to a power supply.

The primary purpose of power cord retention is to prevent unexpected power loss to your system that could potentially cause system operations to stop functioning.

Different types of power cord retention are available. Some of the most commonly used types of retention include:

- Cable management arms
- Rings
- Clamps
- Plastic straps
- Hook-and-loop fasteners

Power cord retainers are typically found at the rear of the unit and on the chassis or pedestal near the alternating current (AC) power cord input.

Systems that are rack mounted and are on rails should use the provided cable management arm.

Systems that are rack mounted, but are not on rails should use the provided rings, clamps, or straps.
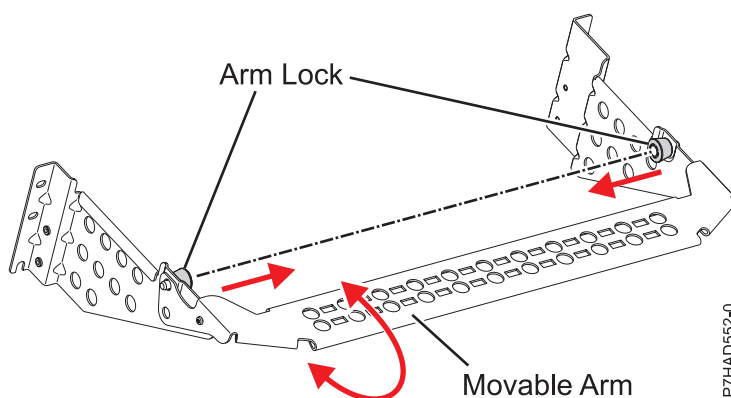
Figure 108. Cable management bracket

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 incase an individual SAS physical link fail.

There are two types of SAS connectors, mini SAS and mini SAS high density (HD). High density cables are typically needed to support 6 Gb/s SAS.

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 or mini SAS HD 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. See "SAS cabling configurations" on page 116 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). See *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 103. 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 FC 3650 or FC 3651 cable card or FC 3669 to the system external SAS port on your system.
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.
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. 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.

Table 103. Functions for supported SAS cables (continued)

Cable type	Function
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.

The following table contains specific information about each supported SAS cable.

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.

Cable section lengths
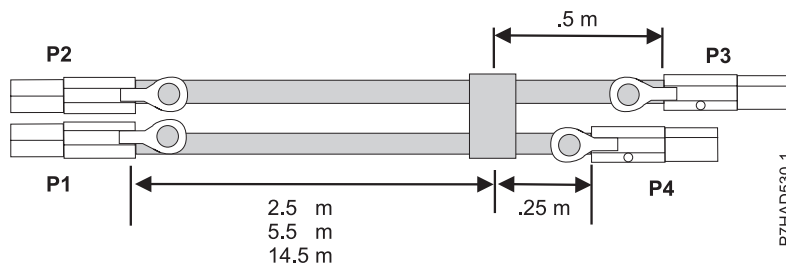
Figure 109. SAS external X cable assembly cable lengths
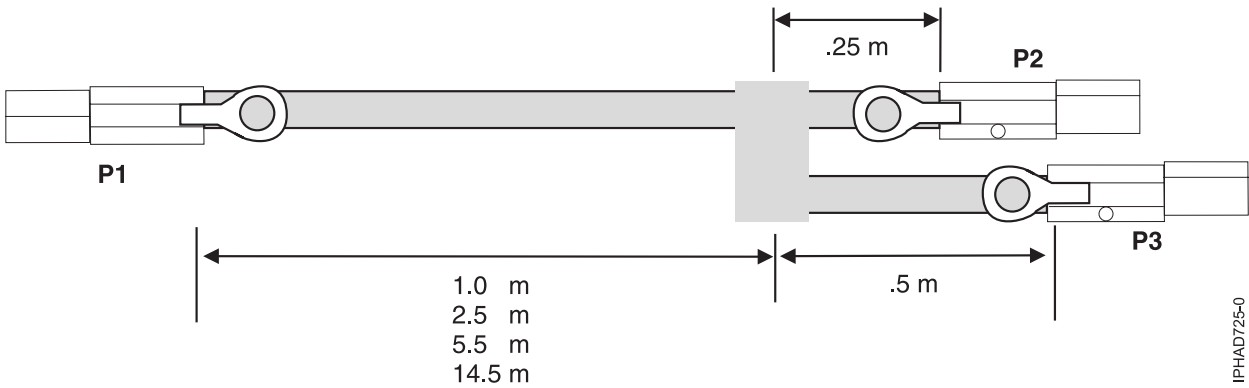
Figure 110. SAS external YO-cable assembly cable lengths
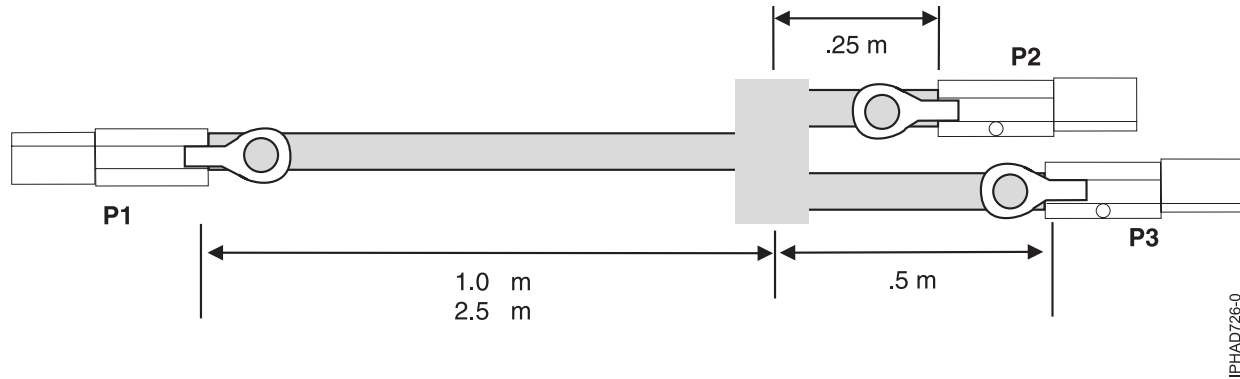
Figure 111. SAS external YI-cable assembly cable lengths

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 119
- "SAS adapter to expansion drawer combinations" on page 120
- "System external SAS port to disk expansion drawer" on page 121
- "SAS adapter to internal SAS disk slots " on page 122
- "Two SAS adapters to disk expansion drawer multi-initiator high availability (HA) RAID configuration" on page 124
- "Two RAID SAS adapters with HD connectors to disk expansion drawer in a multi-initiator high availability (HA) mode" on page 128
- "Two SAS adapters to disk expansion drawer - multi-initiator HA JBOD configuration" on page 132
- PCIe SAS adapter in PCIe 12X I/O drawer to the internal SAS disk slots
- SAS cabling to the 5887 drawer

SAS adapter to disk expansion drawers

Figure 112 on page 117, Figure 113 on page 117, Figure 114 on page 118, and Figure 115 on page 119 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 114 on page 118. Disk expansion drawers can be cascaded only one level deep.
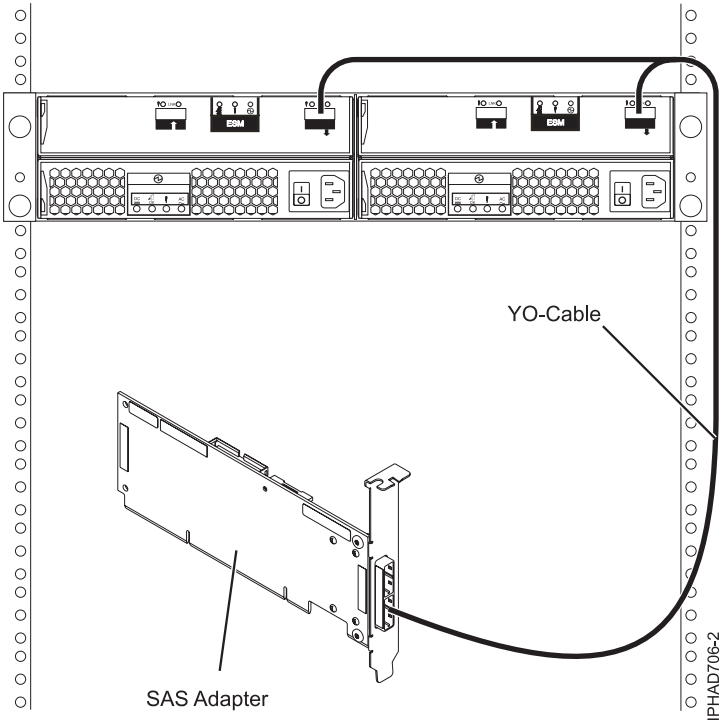
Figure 112. SAS adapter to a disk expansion drawer

Note: The YO cable must be routed along the right side of the rack frame.
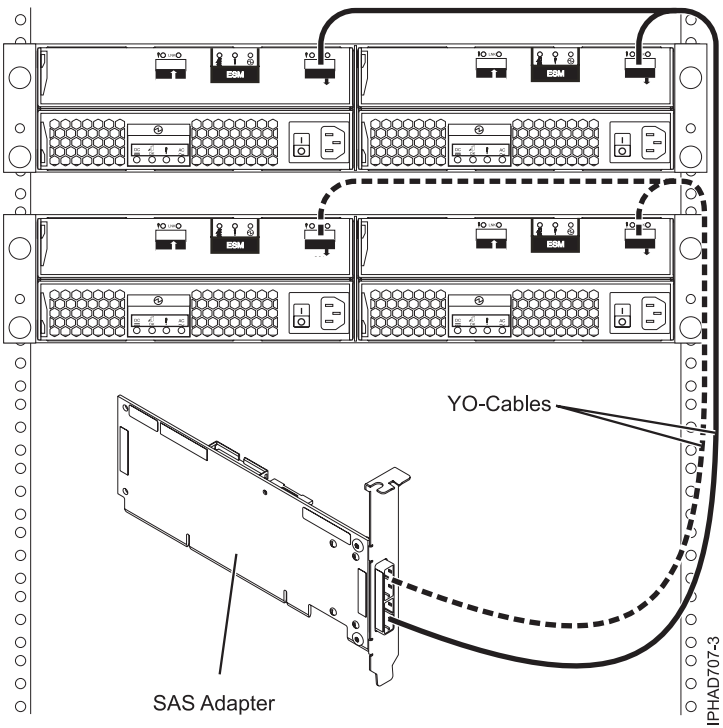

Figure 113. SAS adapter to two disk expansion drawers

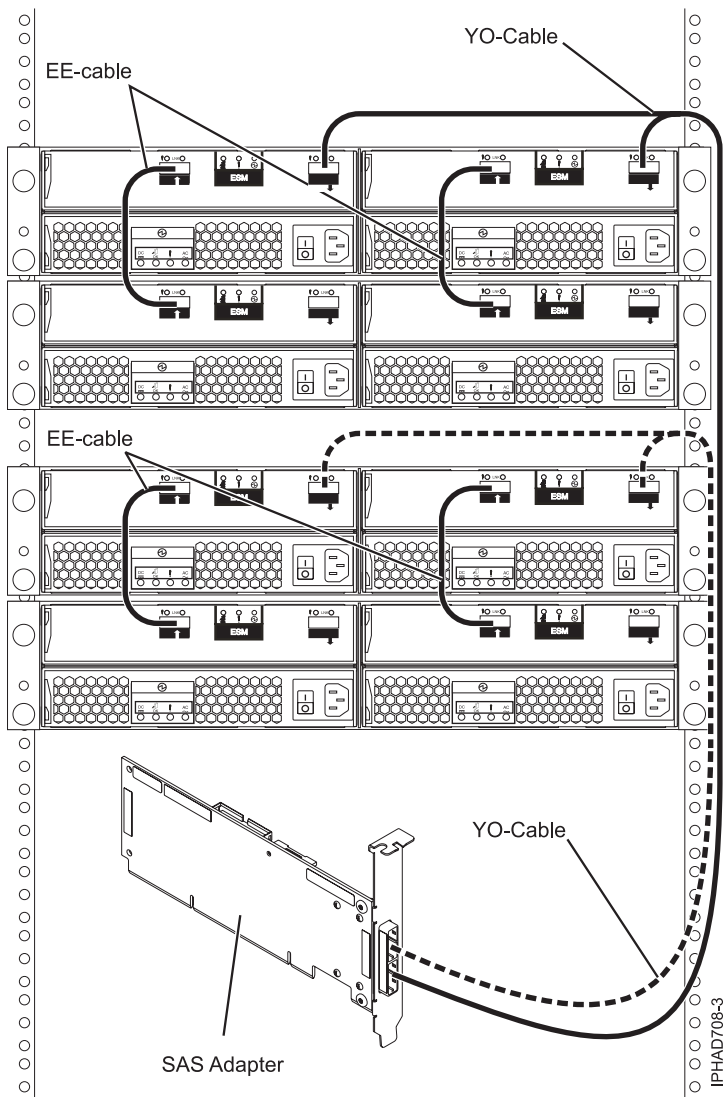**Note:** The YO cable must be routed along the right side of the rack frame.

Figure 114. SAS adapter to four disk expansion drawers

Note: The YO cable must be routed along the right side of the rack frame.
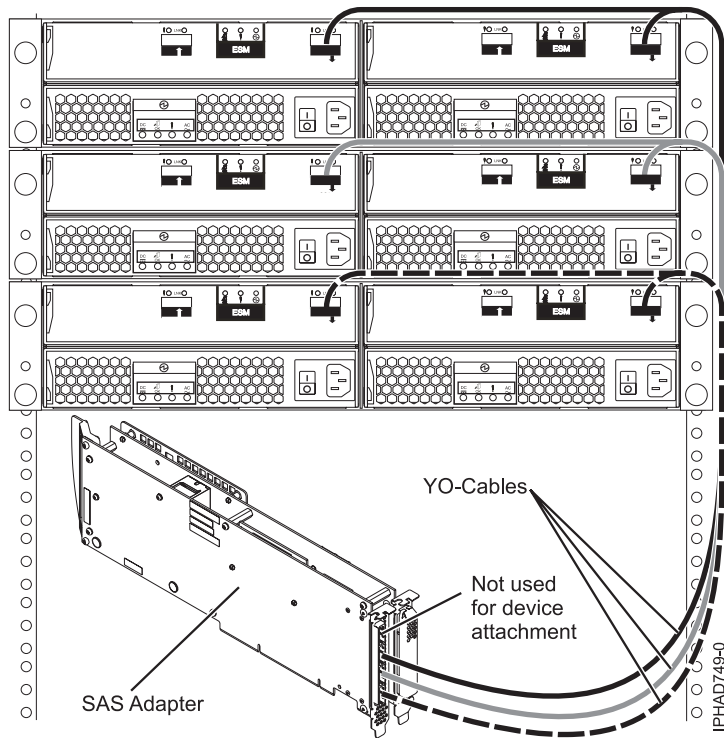
Figure 115. Tri-port SAS adapter to disk expansion drawers

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. See Figure 114 on page 118. 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 116 on page 120 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.
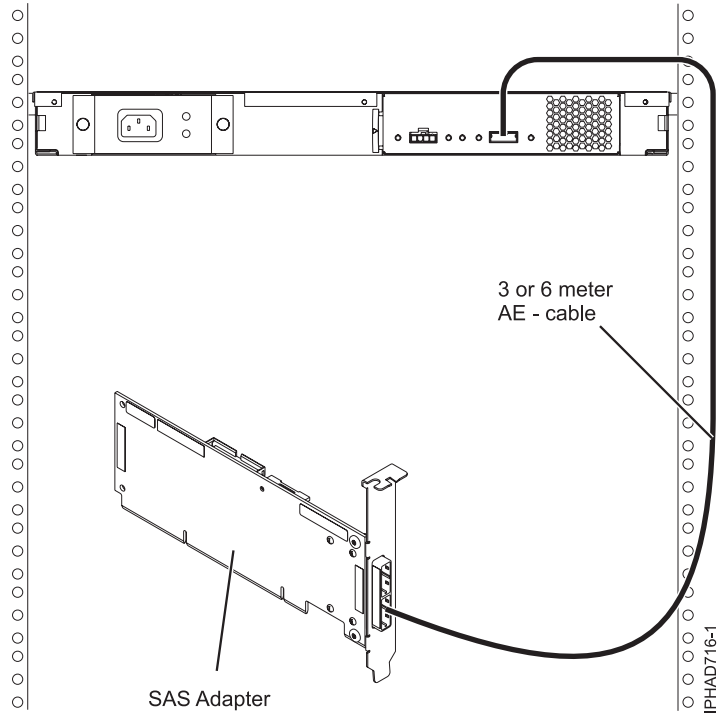
Figure 116. SAS adapter to a media expansion drawer

SAS adapter to expansion drawer combinations

Figure 117 on page 121 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 (see Figure 114 on page 118).
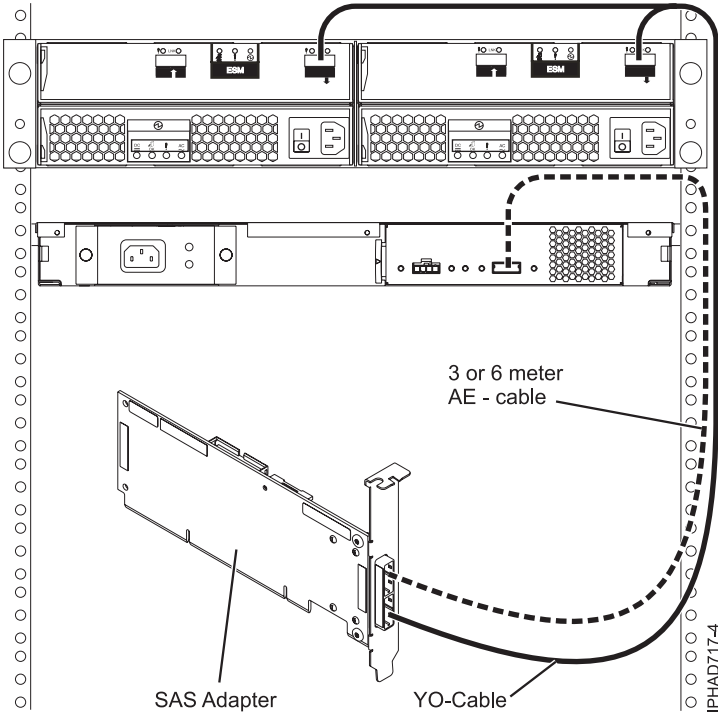
Figure 117. SAS adapter to both a disk expansion drawer and a media expansion drawer

Note: The YO cable must be routed along the right side of the rack frame.

System external SAS port to disk expansion drawer

Figure 118 on page 122 illustrates connecting a system external SAS port to a disk expansion drawer. Disk expansion drawers cannot be cascaded.
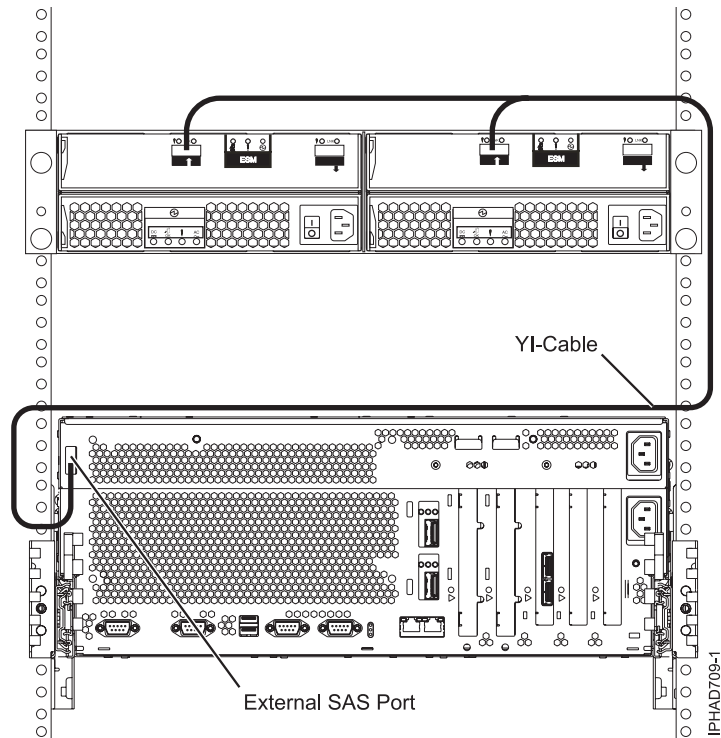
Figure 118. System external SAS adapter port to a disk expansion drawer

Note: The YI cable must be routed along the right side of the rack frame.

SAS adapter to internal SAS disk slots

Figure 119 on page 123 illustrates connecting a SAS adapter to internal SAS disk slots through the system external SAS port.

Note: Internal cable FC 3669 must be installed to enable this configuration. For more information, see Installing the external SAS port.
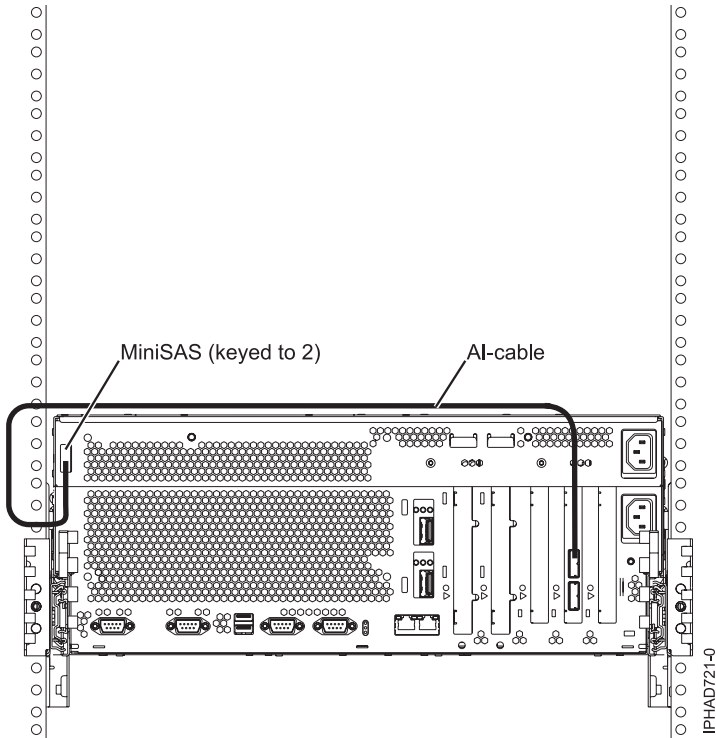
Figure 119. SAS adapter to internal SAS disk slots through the system external SAS port

Notes:

- Internal cable FC 3669 must be installed to enable this configuration (Models 33E/8B and 36E/8C). For more information, see Installing the external SAS port.
- The second connector on the adapter can be used to attach a disk expansion or media expansion drawer as shown in Figure 112 on page 117 or Figure 116 on page 120.
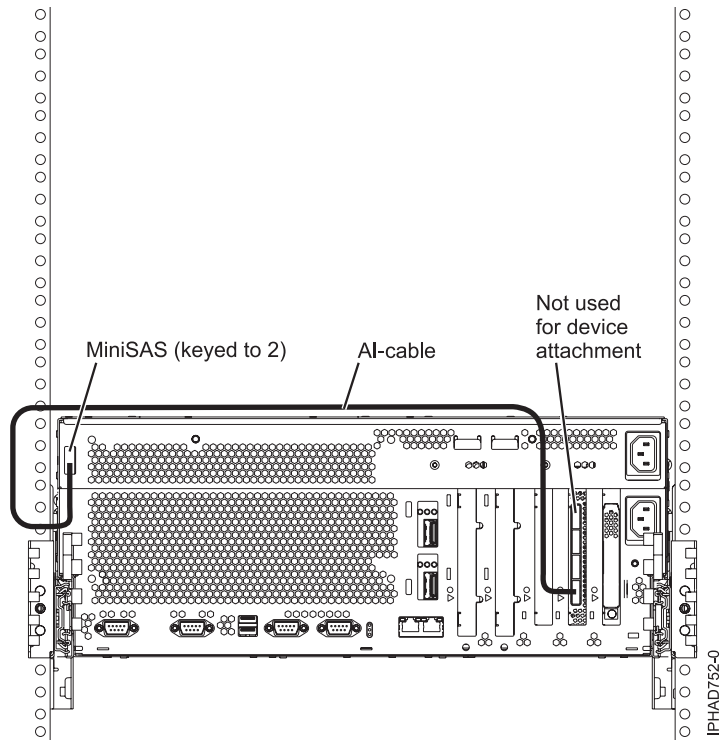
Figure 120. FC5904 or FC5908 adapter attached to disk expansion drawers

Note:

*   The remaining two connectors on the adapter can be used to attach disk expansion drawers as shown in Figure 115 on page 119.

Two SAS adapters to disk expansion drawer multi-initiator high availability (HA) RAID configuration

Figure 121 on page 125, Figure 122 on page 126, Figure 123 on page 127, and Figure 124 on page 128 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 123 on page 127. Disk expansion drawers can be cascaded only one level deep.

Figure 121. Two SAS RAID adapters to a disk expansion drawer in a multi-initiator HA RAID configuration

Notes:

- The X cable must be routed along the right side of the rack frame.
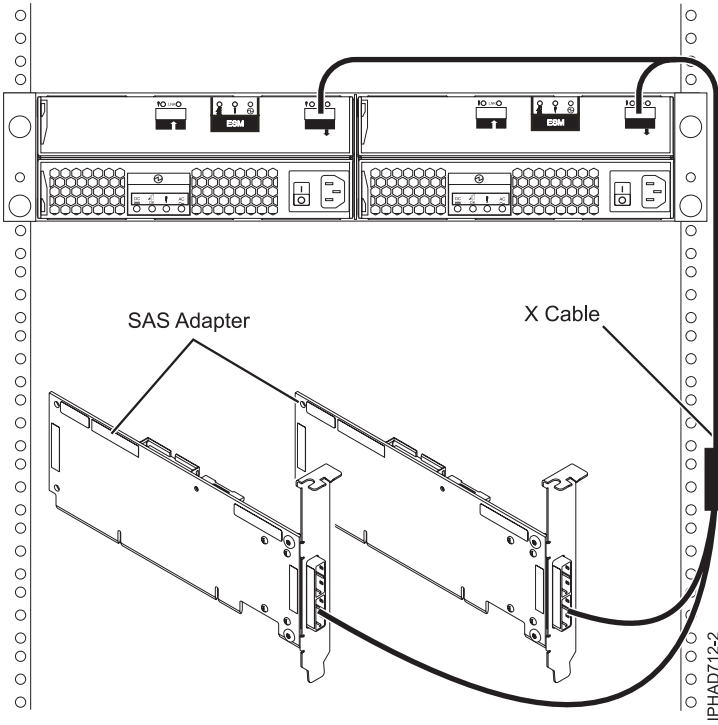- The X cable must be attached to the same numbered port on all adapters.

Figure 122. Two SAS RAID adapters to two disk expansion drawers in a multi-initiator HA RAID configuration

Notes:

- 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 123. Two SAS RAID adapters to four disk expansion drawers in a multi-initiator HA RAID configuration

Notes:

- 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.
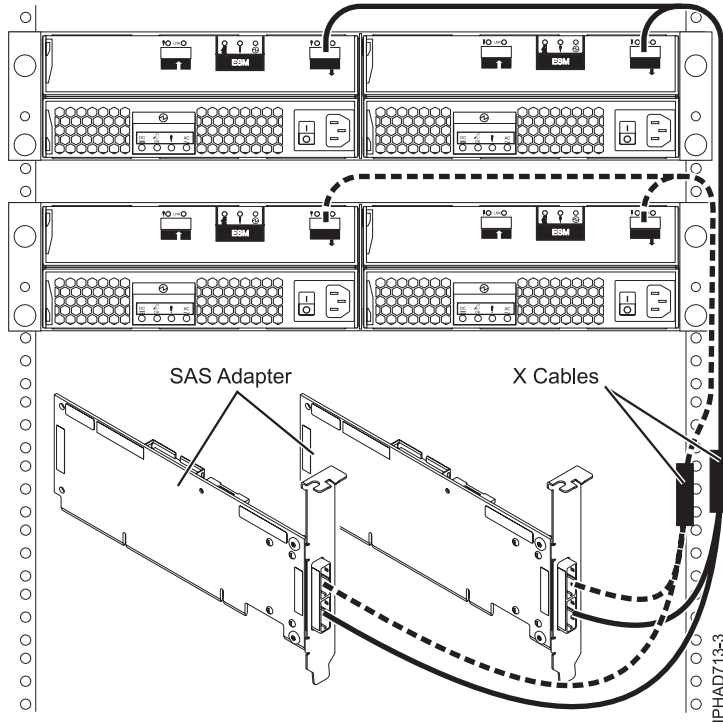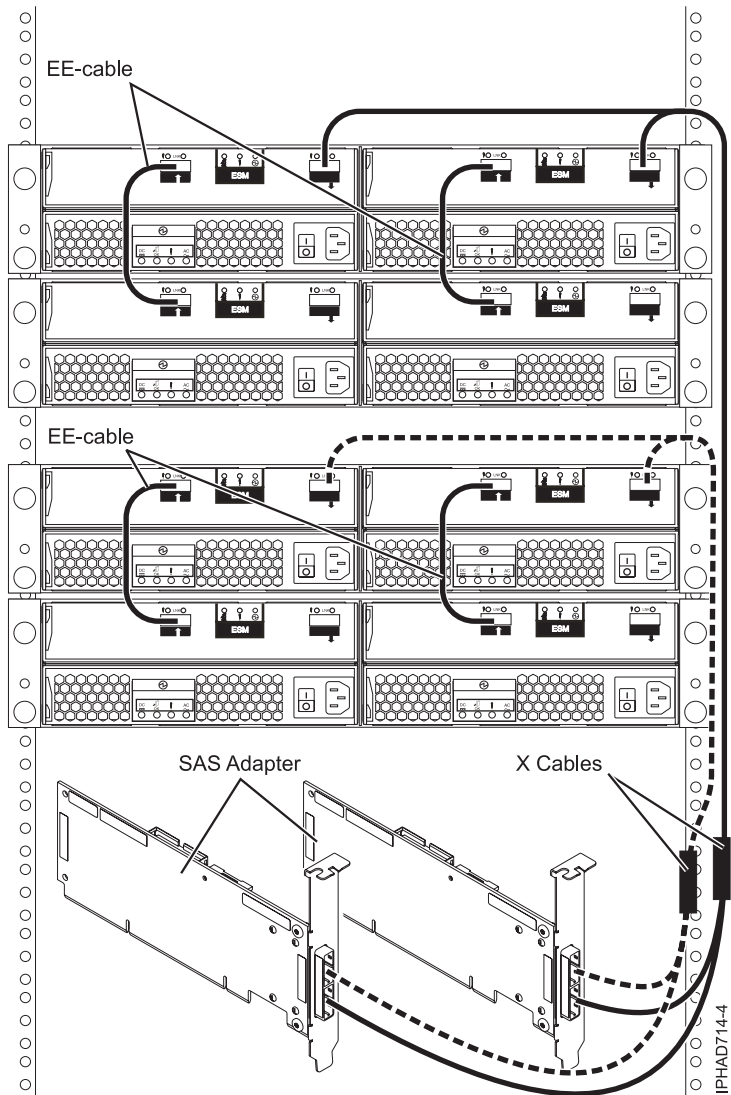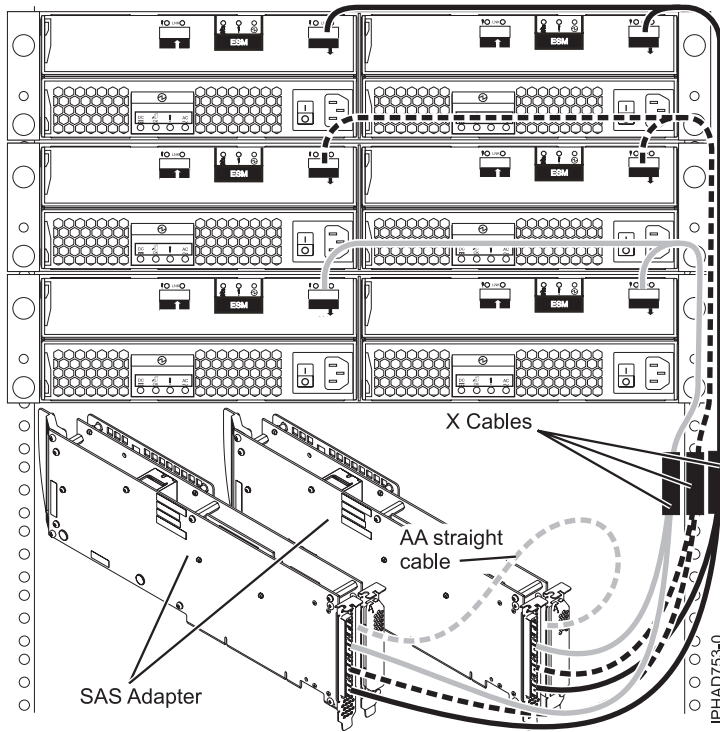
X Cables

AA straight cable

SAS Adapter

IPHAD753-0

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. See Figure 114 on page 118.
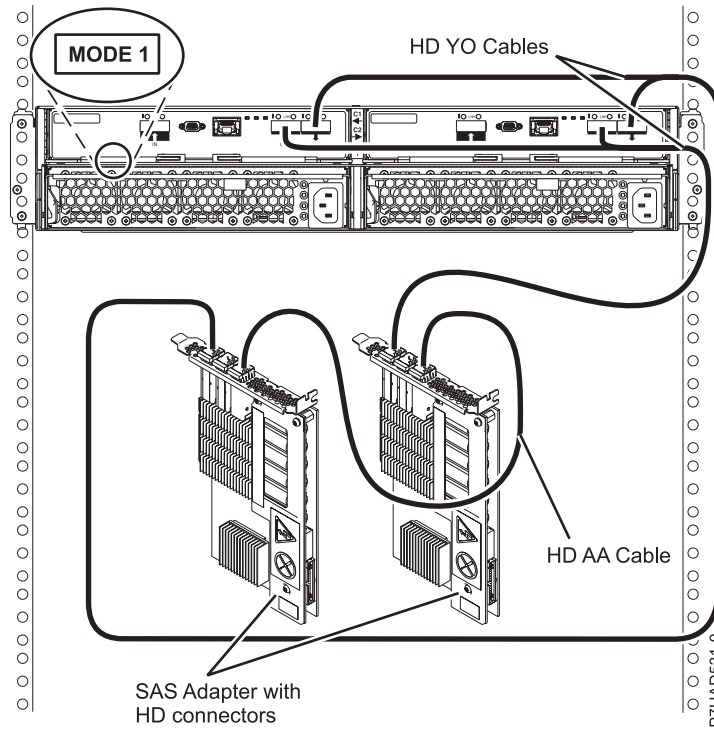
Notes:

- 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 124. Two Tri-port SAS adapters to disk expansion drawers in a multi-initiator HA raid configuration

Two RAID SAS adapters with HD connectors to disk expansion drawer in a multi-initiator high availability (HA) mode

Figure 125 on page 129, Figure 126 on page 130, and Figure 127 on page 131 illustrate connecting two SAS RAID adapters with HD connectors to one, two, or three disk expansion drawers in a multi-initiator HA mode.
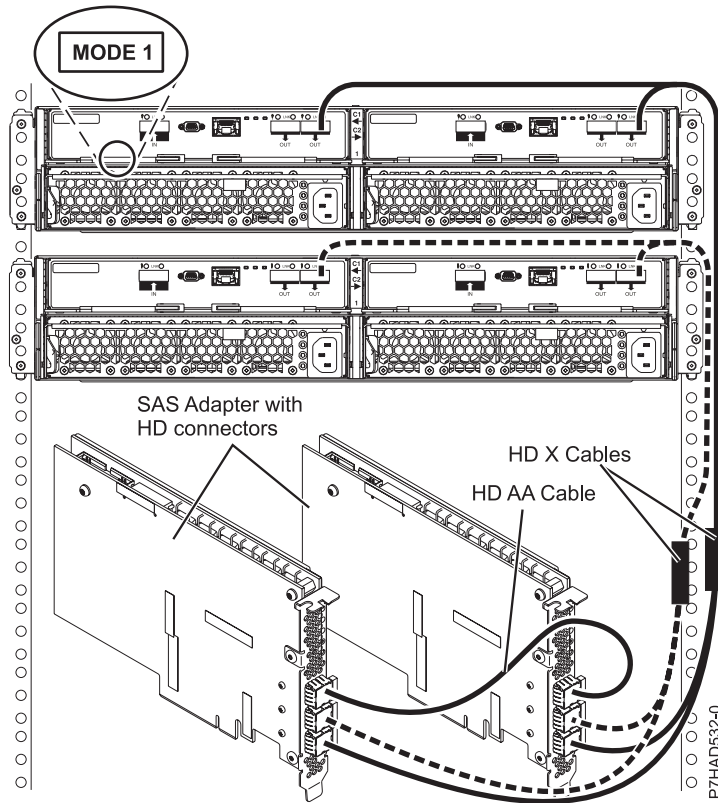
Figure 128 on page 132 illustrate connecting two pair of SAS RAID adapters with HD connectors to one disk expansion drawer in a multi-initiator HA mode.

MODE 1

HD YO Cables

HD AA Cable

SAS Adapter with
HD connectors

P7HAD531-0

Notes:

- No cascading allowed for the 5887 storage drawer.
- HD AA cable is required.

Figure 125. Two RAID SAS adapters with HD connectors to a disk expansion drawer in a multi-initiator HA mode

Note:

- No cascading allowed for the 5887 storage drawer.

Figure 126. Two RAID SAS adapters with HD connectors to two disk expansion drawer in a multi-initiator HA mode

Notes:

- No cascading allowed for the 5887 storage drawer.
- HD AA cable is required.

Figure 127. Two RAID SAS adapters with HD connectors to three disk expansion drawers in a multi-initiator HA mode

MODE 2

HD X Cables

HD AA Cable

SAS Adapter with HD connectors

HD AA Cable

SAS Adapter with HD connectors

P7HAD534-0
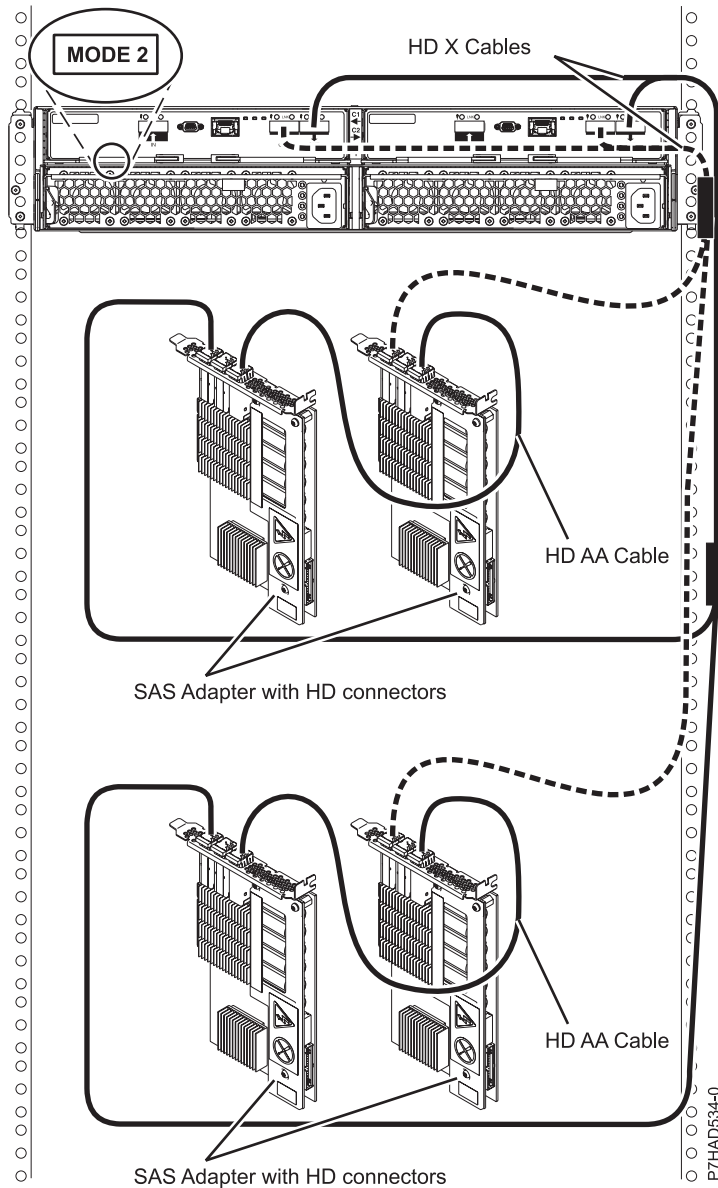
Notes:

- No cascading allowed for the 5887 storage drawer.
- HD AA cable is required.

Figure 128. Two pairs of RAID SAS adapters with HD connectors to a disk expansion drawer – Mode 2 in a multi-initiator HA mode
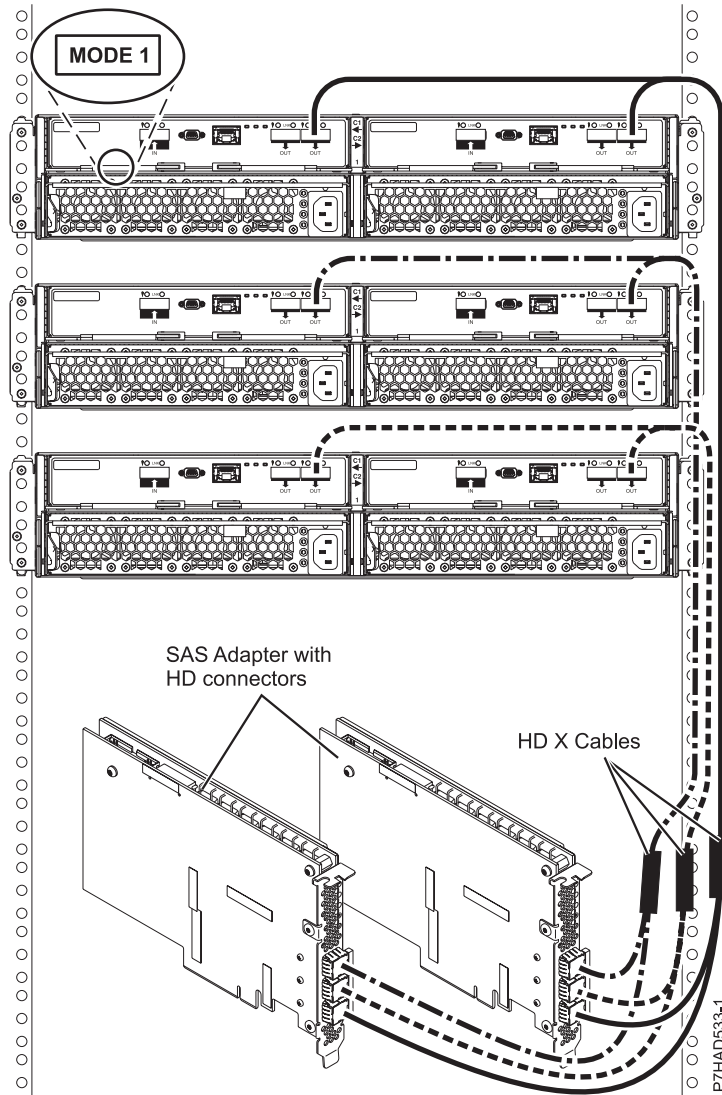
Two SAS adapters to disk expansion drawer - multi-initiator HA JBOD configuration

Figure 129 on page 133 illustrates connecting two SAS adapters to a disk expansion drawer in a unique JBOD configuration.
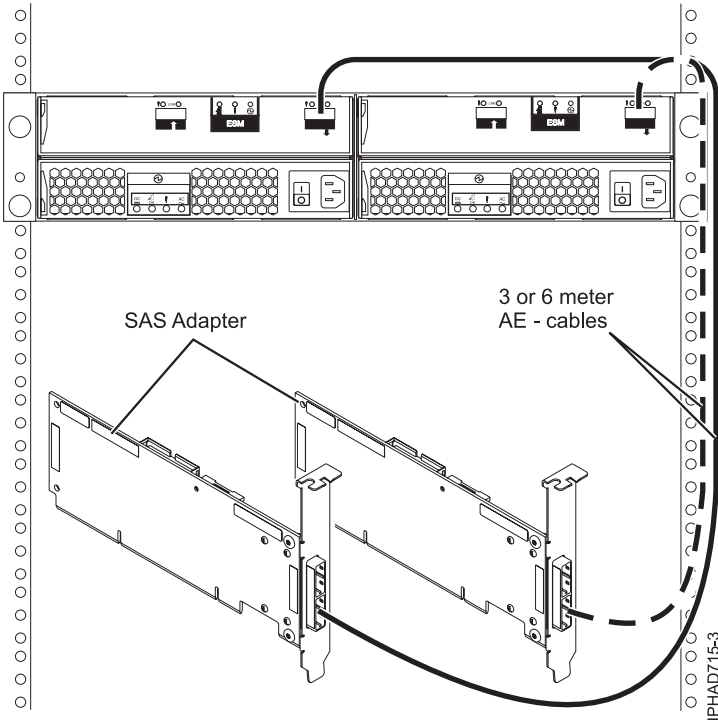
Figure 129. Two RAID SAS adapters to a disk expansion drawer in a multi-initiator HA JBOD configuration

Note: This configuration is only supported by the AIX and Linux operating systems with specific SAS adapters and requires special user configuration setup. See SAS RAID controllers for AIX or 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 130 on page 134 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.
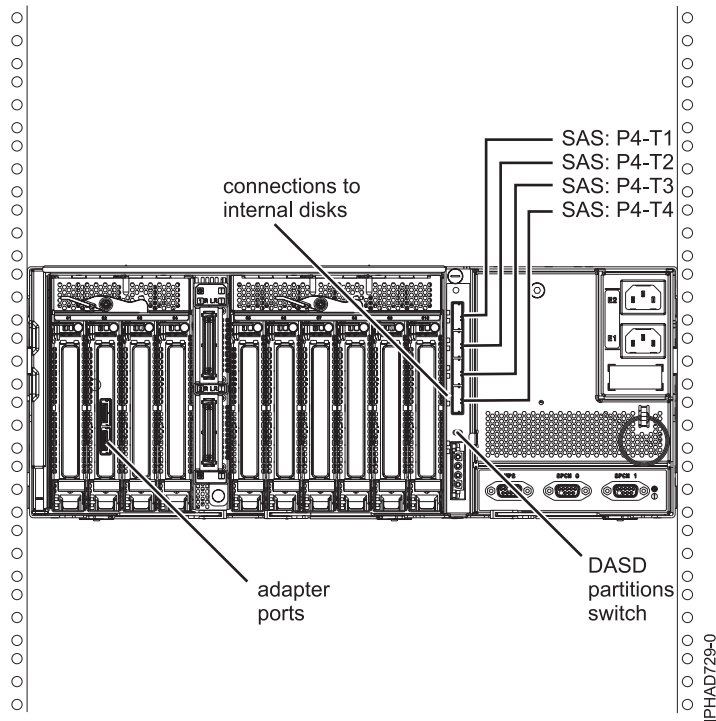
Figure 130. Two RAID SAS adapters to a disk expansion drawer in a multi-initiator HA JBOD configuration

Internal disk drive sharing

The following information is for use after the FC 5901 SAS Storage adapter is installed. Install the adapter and then return here. For more information on the PCI adapters topic, see PCI adapters for the 8233-E8B or 8236-E8C .

Please review the tasks in the Before you begin section before proceeding with the below procedure.

This feature allows you to split the internal disks in the system unit enclosure into groups which you can manage separately.

1. Stop and power off the system. For more information, see Stopping a system or logical partition
2. Cable a single system unit enclosure by doing the following:
   a. Attach the cable to the SAS port on the rear bulkhead of the system unit enclosure to the top port in the SAS Storage Controller as shown in the following figure.

      Restriction: Internal disk drive sharing is only available when internal cable feature FC 1815 is installed from the DASD backplane to the read bulkhead of the system unit enclosure. Also FC 5662 175 MB cache RAID - dual IOA enablement card must not be installed. The SAS Storage Controller may be in any of the other slots that support it.

1 meter AI-cable

P7HAL603-0
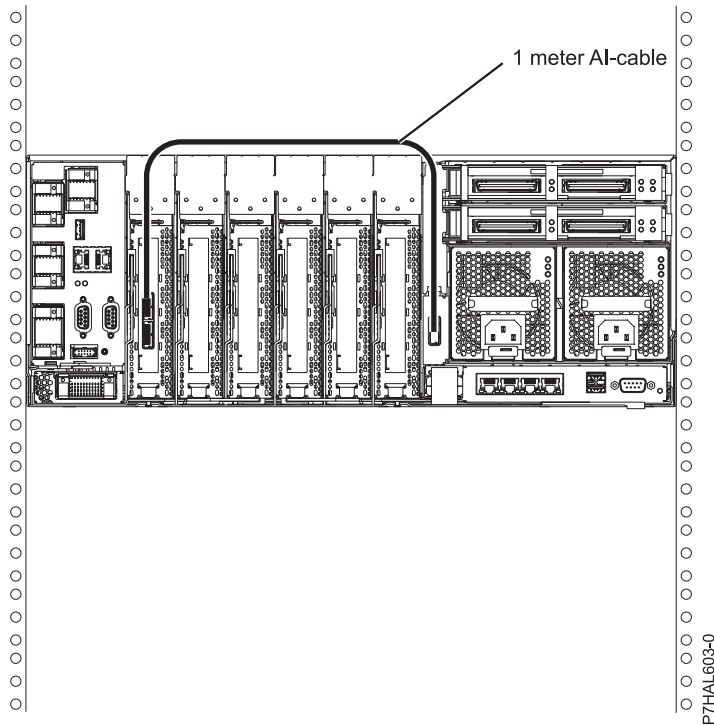
    b. Secure any extra cable.

3. Start the system. For more information, see Starting the system or logical partition .

4. Verify that the feature is installed and is working. For more information, see Verifying the installed part .

With this function installed, 2 of the 6 disks (D3, D6) in the system enclosure will be managed by the SAS Storage Controller adapter.

Note: The Removable Media device is always controlled by the separate embedded SAS controller on the system planar. For more information on installing and removing SAS media devices, see Removing and replacing media devices .

Related information:

▶ Installing and configuring Solid State Drives

▶ Connecting the SAS adapter to the 5887 disk drive enclosure

SAS cabling for the 5887 drawer

Learn about the different serial-attached SCSI (SAS) cabling configurations available for the 5887 drawer and mixed configurations of the 5886 and 5887 drawers.

SAS adaptor (FC 5901) to the 5887

There are seven supported configurations to connect the FC 5901 adapter to a 5887.

Notes:

1. No solid-state drives (SSDs) supported with the FC 5901 adaptor.
2. No cascading of 5887 drawers.
3. No mixed configurations of 5886 and 5887 drawers supported.
4. No support for IBM i5.
5. The long end (0.5 m) of the YO cable must be connected to the left side of the drawer (as viewed from the rear) and the short end (0.25 m) must be connected to the right side of drawer (as viewed from the rear).

The following list describes the seven supported configurations for connecting the FC 5901 adaptor to a 5887:

1. Single FC 5901 adapter to one 5887 via a mode 1 connection.
   - 5887 drawer with one set of 24 hard disk drives (HDDs).
   - Connection using SAS YO cables to connect to the 5887 drawer.
   - Supported only on AIX and Linux systems.
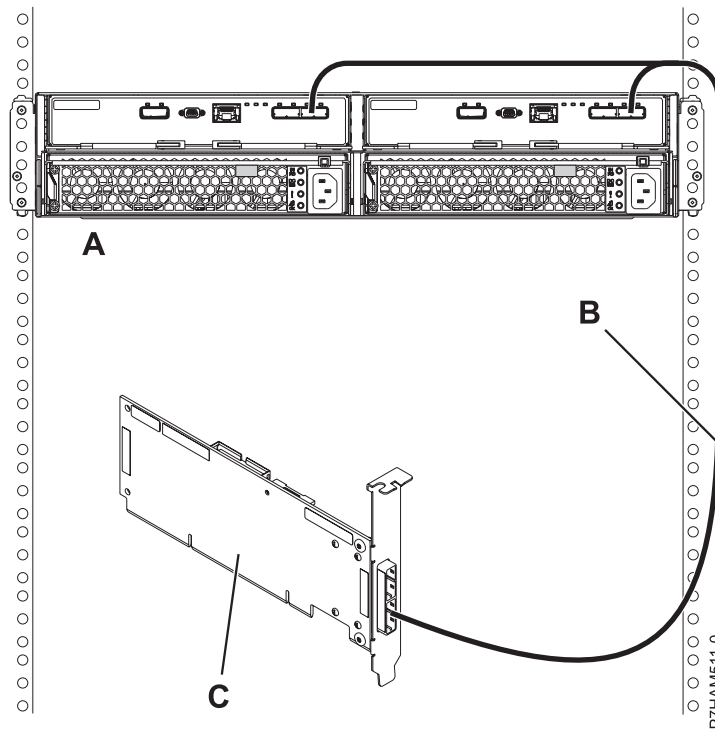
Figure 131. Mode 1 connection of a 58/87 drawer using a YO cable to a single SAS adapter

2. Single FC 5901 adapter to two 5887s via a mode 1 connection.
   - 5887 drawers with two sets of 24 hard disk drives (HDDs).
   - Connection using SAS YO cables to connect to the 5887 drawers.
   - Supported only on AIX and Linux systems.
3. Dual FC 5901 adapters to one 5887 via a mode 1 connection.
   - 5887 drawer with one set of 24 hard disk drives (HDDs).

- Connection using Dual SAS YO cables to connect to the 5887 drawer.
- Supported only on AIX and Linux systems.
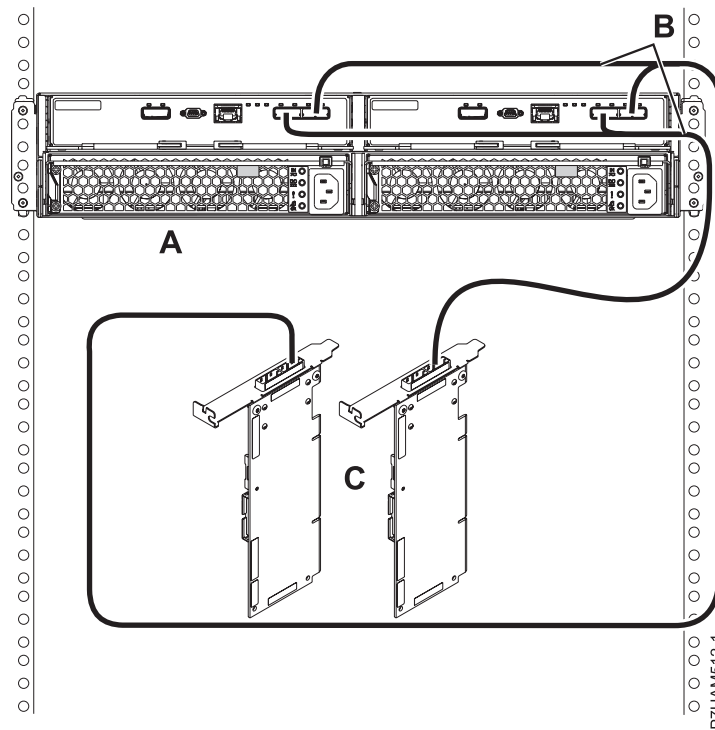
Figure 132. Mode 1 connection of a 58/87 drawer using YO cables to dual SAS adapters

4. Dual FC 5901 adapters to two 5887s via a mode 1 connection.
   - 5887 drawers with two sets of 24 hard disk drives (HDDs).
   - Connection using Dual SAS YO cables to connect to the 5887 drawer.
   - Supported only on AIX and Linux systems.
5. Dual FC 5901 adapters to one 5887 via a mode 2 connection.
   - 5887 drawer with two sets of 12 hard disk drives (HDDs).
   - Connection using Dual SAS YO cables to connect to the 5887 drawer.
   - Supported only on AIX and Linux systems.
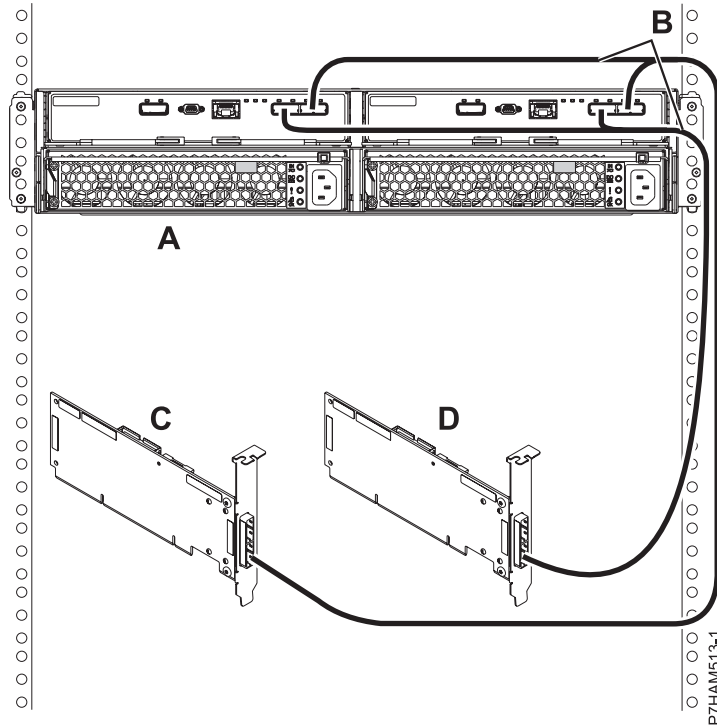
Figure 133. Mode 2 connection of a 58/87 drawer using YO cables to dual SAS adapters

6. Quad FC 5901 (two pair) adapters to one 5887 via a mode 2 connection
   - 5887 drawer with two sets of 12 hard disk drives (HDDs).
   - Connection using Dual SAS X cables to connect to the 5887 drawer.
   - Supported only on AIX and Linux systems.

Figure 134. Mode 2 connection of a 58/87 drawer using X cables to quad SAS adapters (two pairs)

7. Quad FC 5901 adapters to one 5887 via a mode 4 connection
   - 5887 drawer with four sets of 6 hard disk drives (HDDs).
   - Connection using Dual SAS X cables to connect to the 5887 drawer.
   - Supported only on AIX and Linux systems.

Figure 135. Mode 4 connection of a 58/87 drawer using X cables to quad SAS adapters

SAS adaptor (FC 5805 and FC 5903) to the 5887

There are three supported configurations to connect FC 5805 or FC 5903 adapter to a 5887 and one supported mixed configuration to a 5886 and 5887.

Notes:
1. Maximum of eight SSDs in single drawer configurations.
2. No cascading of 5887 drawers.
3. No cascading of 5886 drawers in mixed configurations.
4. IBM i5 only supports mode 1 connections.
5. The long end (0.5 m) of the YO cable must be connected to the left side of the drawer (as viewed from the rear) and the short end (0.25 m) must be connected to the right side of drawer (as viewed from the rear).

The following list describes the supported configurations:
1. Dual FC 5805 or FC 5903 adapters to one 5887 via a mode 1 connection.
   - 5887 drawer with 1 - 24 HDDs or 1 - 8 SSDs.
   - Connection using Dual SAS YO cables to connect to the 5887 drawer.

Figure 136. Mode 1 connection of a 58/87 drawer using YO cables to dual SAS adapters

2. Dual FC 5805 or FC 5903 adapters to two 5887s via a mode 1 connection.
   - 5887 drawers with HDDs only.
   - Connection using Dual SAS YO cables to connect to the 5887 drawers.
3. Dual FC 5805 or FC 5903 adapters to one 5886 and one 5887 via a mode 1 connection.
   - 5886 and 5887 drawer with HDDs only.
   - Connection using one SAS X cable to connect to the 5886 drawer and two SAS YO cables to the 5887 drawers.
4. Quad FC 5805 or FC 5903 adapters to one 5887 via a mode 2 connection.
   - 5887 drawer with 1 - 12 HDDs or 1 - 8 SSDs.
   - Connection using Dual SAS X cables to connect to the 5887 drawer.
   - Supported only on AIX and Linux systems. No support for IBM i5.
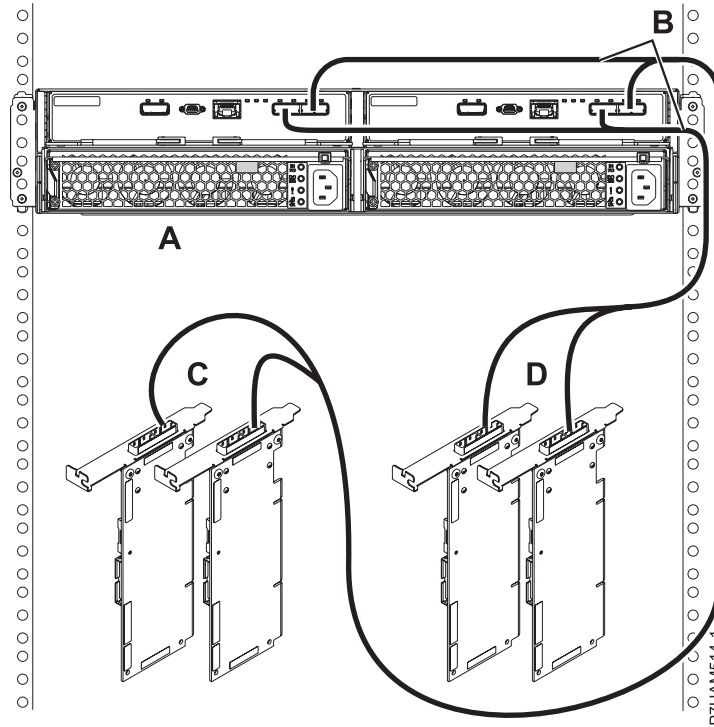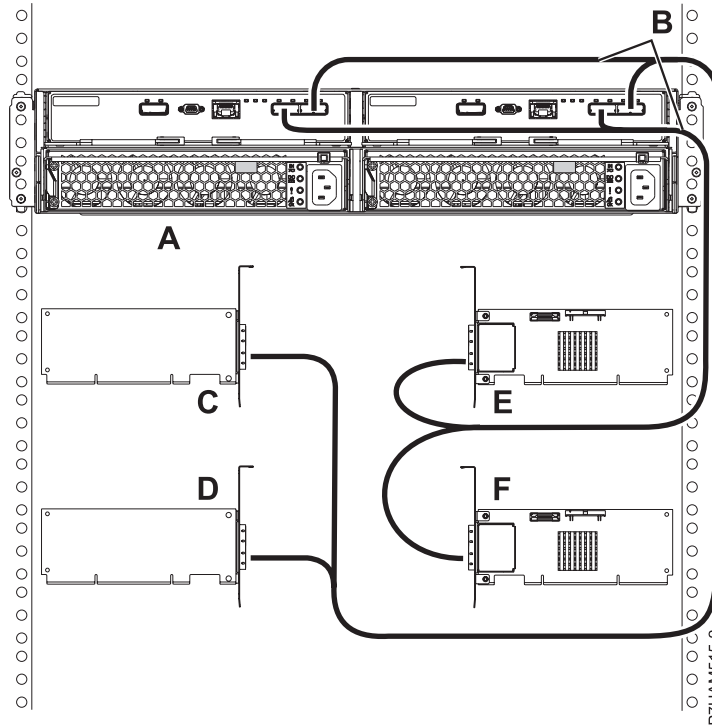
SAS adaptor (FC 5904, FC 5906, and FC 5908) to the 5887

There are four supported configurations to connect FC 5904, FC 5906, or FC 5908 adapters to a 5887 and six supported mixed configurations to a 5886 and 5887.

Notes:
1. Mode 1 connections only.
2. Maximum of two 5887 drawers on a FC 5904, FC 5906, or FC 5908 adapter or a pair of FC 5904, FC 5906, or FC 5908 adapters.
3. No cascading of 5887 drawers.
4. No cascading of 5886 drawers in mixed configurations.
5. Maximum of eight SSDs in single drawer configurations.

6. The long end (0.5 m) of the YO cable must be connected to the left side of the drawer (as viewed from the rear) and the short end (0.25 m) must be connected to the right side of drawer (as viewed from the rear).

The following list describes the supported configurations:
1. Single FC 5904, FC 5906, or FC 5908 adapter to one 5887 via a mode 1 connection.
   - 5887 drawers with 1 - 24 HDDs or 1 - 8 SSDs.
   - Connection using Dual SAS YO cables to connect to the 5887 drawer.

Figure 137. Mode 1 connection of a 58/87 drawer using a YO cable to a single SAS adapter

2. Single FC 5904, FC 5906, or FC 5908 adapter to two 5887s via a mode 1 connection.
   - 5887 drawers with HDDs only.
   - Connection using SAS YO cables to connect to the 5887 drawers.
3. Dual FC 5904, FC 5906, or FC 5908 adapters to one 5887 via a mode 1 connection.
   - 5887 drawers with 1 - 24 HDDs or 1 - 8 SSDs.
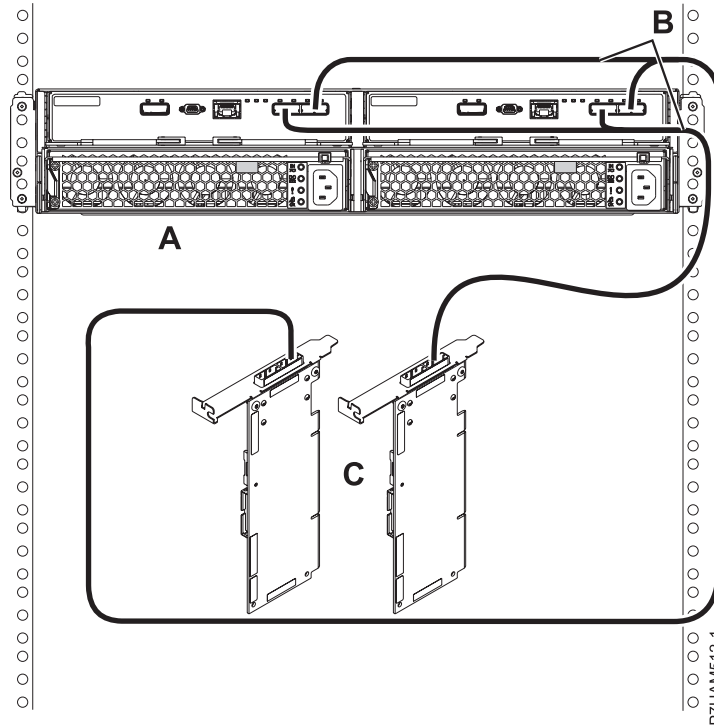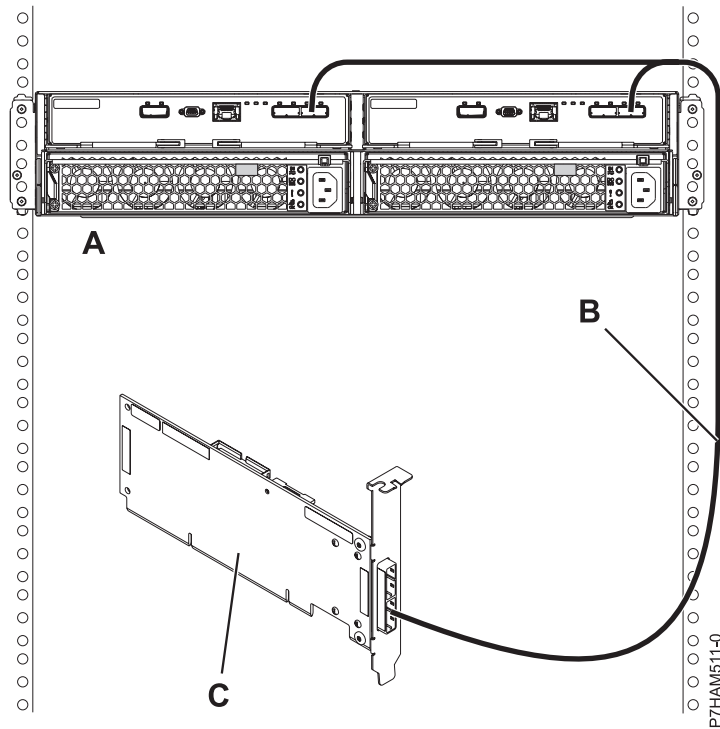   - Connection using Dual SAS YO cables to connect to the 5887 drawer.
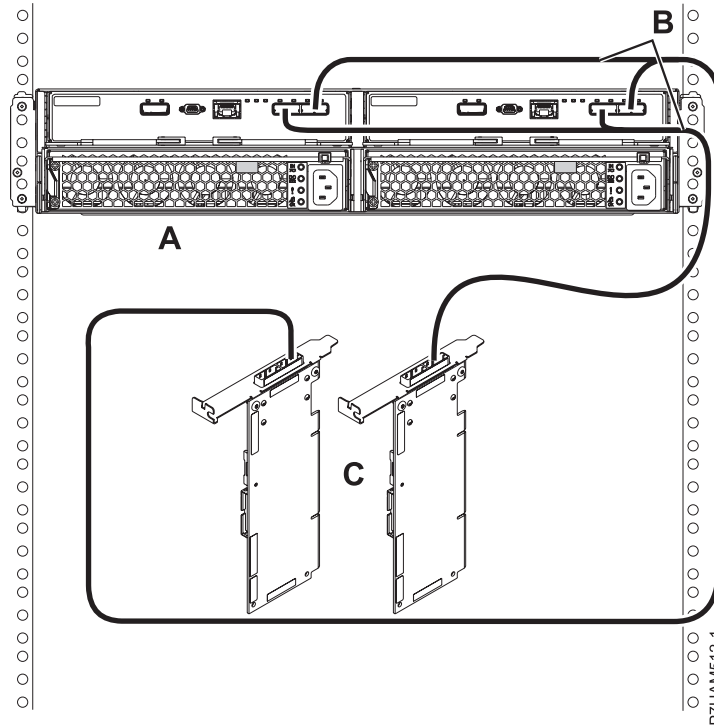
Figure 138. Mode 1 connection of a 58/87 drawer using YO cables to dual SAS adapters

4. Dual FC 5904, FC 5906, or FC 5908 adapters to two 5887s via a mode 1 connection.
   - 5887 drawers with HDDs only.
   - Connection using SAS YO cables to connect to the 5887 drawers.
5. Single FC 5904, FC 5906, or FC 5908 adapter to one 5886 and one 5887 via a mode 1 connection.
   - 5886 and 5887 drawers with HDDs only.
   - Connection using SAS YO cables to connect to both the 5886 drawer and the 5887 drawer.
6. Single FC 5904, FC 5906, or FC 5908 adapter to one 5886 and two 5887s via a mode 1 connection.
   - 5886 and 5887 drawers with HDDs only.
   - Connection using SAS YO cables to connect to both the 5886 drawer and the 5887 drawers.
7. Single FC 5904, FC 5906, or FC 5908 adapter to two 5886s and one 5887 via a mode 1 connection.
   - 5886 and 5887 drawers with HDDs only.
   - Connection using SAS YO cables to connect to both the 5886 drawers and the 5887 drawer.
8. Dual FC 5904, FC 5906, or FC 5908 adapters to one 5886 and one 5887 via a mode 1 connection.
   - 5886 and 5887 drawers with HDDs only.
   - Connection using SAS X cables to connect to the 5886 drawer and SAS YO cables to the 5887 drawer.
9. Dual FC 5904, FC 5906, or FC 5908 adapters to one 5886 and two 5887s via a mode 1 connection.
   - 5886 and 5887 drawers with HDDs only.
   - Connection using SAS X cables to connect to the 5886 drawer and SAS YO cables to the 5887 drawers.
10. Dual FC 5904, FC 5906, or FC 5908 adapters to two 5886s and one 5887 via a mode 1 connection.
    - 5886 and 5887 drawers with HDDs only.
    - Connection using SAS X cables to connect to the 5886 drawers and SAS YO cables to the 5887 drawer.

SAS adapter (FC 5913) to the 5887

There are four supported configurations to connect the FC 5913 adapter to a 5887 and three supported mixed configurations to a 5886 and 5887.

Notes:

1. Maximum of 24 SSDs for a pair of FC 5913s.
2. Allowed to have 24 SSDs in a single drawer or split between two drawers.
3. No cascading of 5887 drawers.
4. No cascading of 5886 drawers in mixed configurations.
5. In mode 2, the 5887 appears as two logical drawers.
6. The long end (0.5 m) of the YO cable must be connected to the left side of the drawer (as viewed from the rear) and the short end (0.25 m) must be connected to the right side of drawer (as viewed from the rear).

The following list describes the supported configurations:

1. Dual FC 5913 adapters to one 5887 via a mode 1 connection.
   - 5887 drawers with 1 - 24 HDDs or SSDs.
   - Connection using SAS 6x YO cables to connect to the 5887 drawer (both cables must be to attached to the same port on each adapter).
   - SAS 6x AA cable is required for connecting the pair of FC 5913 adapters.
2. Dual FC 5913 adapters to two 5887s via a mode 1 connection.
   - 5887 drawers with either a maximum of 48 HDDs or 24 SSDs only (cannot have a mix of HDDs and SSDs in the same drawer).
   - Connection using SAS 6x YO cables to connect to the 5887 drawers.
   - SAS 6x AA cable is required for connecting the pair of FC 5913 adapters.
3. Dual FC 5913 adapters to three 5887s via a mode 1 connection.
   - 5887 drawers with either a maximum of 72 HDDs or 24 SSDs only (cannot have a mix of HDDs and SSDs in the same drawer).
   - Connection using SAS 6x YO cables to connect to the 5887 drawers.
4. Quad FC 5913 adapters to one 5887 via a split connection.
   - 1 - 12 SSDs or 1 - 12 HDDs per FC 5913 pair.
   - Connection using SAS 6x X cables to connect to the 5887 drawer (both cables must be to attached to the same port on each adapter).
   - SAS 6x AA cable is required for connecting each pair of FC 5913 adapters.
   - Supported only on AIX and Linux systems.
   - No IBM i support.
   - POWER7 only support.
5. Dual FC 5913 adapters to one 5886 and one 5887 via a mode 1 connection.
   - 5886 drawer with 1 - 8 SSDs or 1 - 12 HDDs.
   - 5887 drawer with 1 - 24 SSDs or HDDs.
   - Maximum of 24 SSDs.
   - Connection using SAS 6x X cables to connect to the 5886 drawer.
   - Connection using SAS 6x YO cables to connect to the 5887 drawer.
   - SAS 6x AA cable is required for connecting the pair of FC 5913 adapters.
6. Dual FC 5913 adapters to one 5886 and two 5887s via a mode 1 connection.
   - 5886 drawer with 1 - 8 SSDs or 1 - 12 HDDs.

- 5887 drawers with 1 - 24 SSDs or HDDs.
- Maximum of 24 SSDs.
- Connection using SAS 6x X cables to connect to the 5886 drawer.
- Connection using SAS 6x YO cables to connect to the 5887 drawers.
7. Dual FC 5913 adapters to two 5886s and one 5887 via a mode 1 connection.
    - 5886 drawers with 1 - 8 SSDs or 1 - 12 HDDs.
    - 5887 drawer with 1 - 24 SSDs or HDDs.
    - Maximum of 24 SSDs.
    - Connection using SAS 6x X cables to connect to the 5886 drawers.
    - Connection using SAS 6x YO cables to connect to the 5887 drawer.

SAS adapters with high density (HD) connectors

Learn about the various configurations available using HD connectors.

1. Two SAS adapters with HD connectors to one 5887 via a mode 1 connection.
    - No cascading allowed.
    - HD AA cable is required.
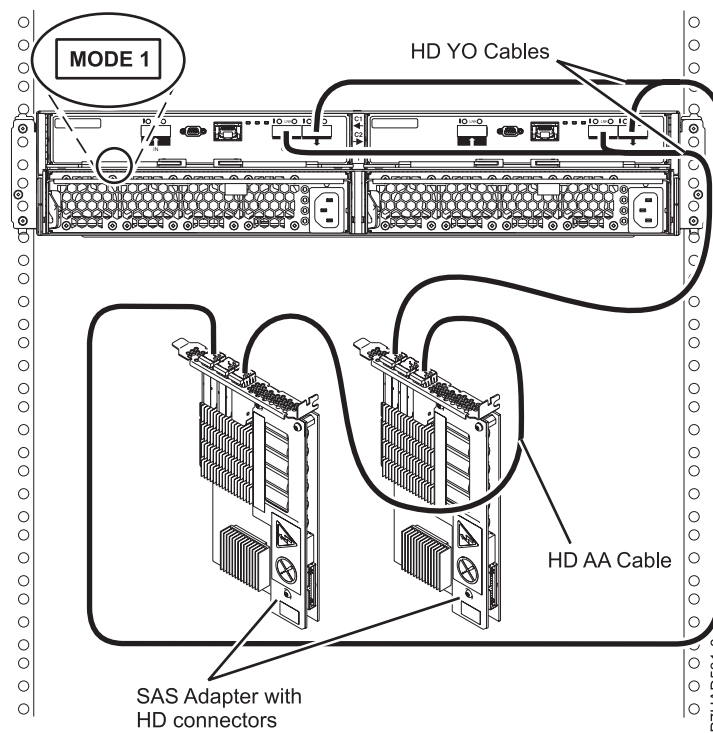
Figure 139. Mode 1 connection of a 58/87 drawer using HD connectors to two SAS adapters

2. Two SAS adapters with HD connectors to two 5887s via a mode 1 connection.
    - No cascading allowed.
    - HD AA cable is required.

Figure 140. Mode 1 connection of two 58/87 drawers using HD connectors to two SAS adapters

3. Two SAS adapters with HD connectors to three 5887s via a mode 1 connection.
   - No cascading allowed.
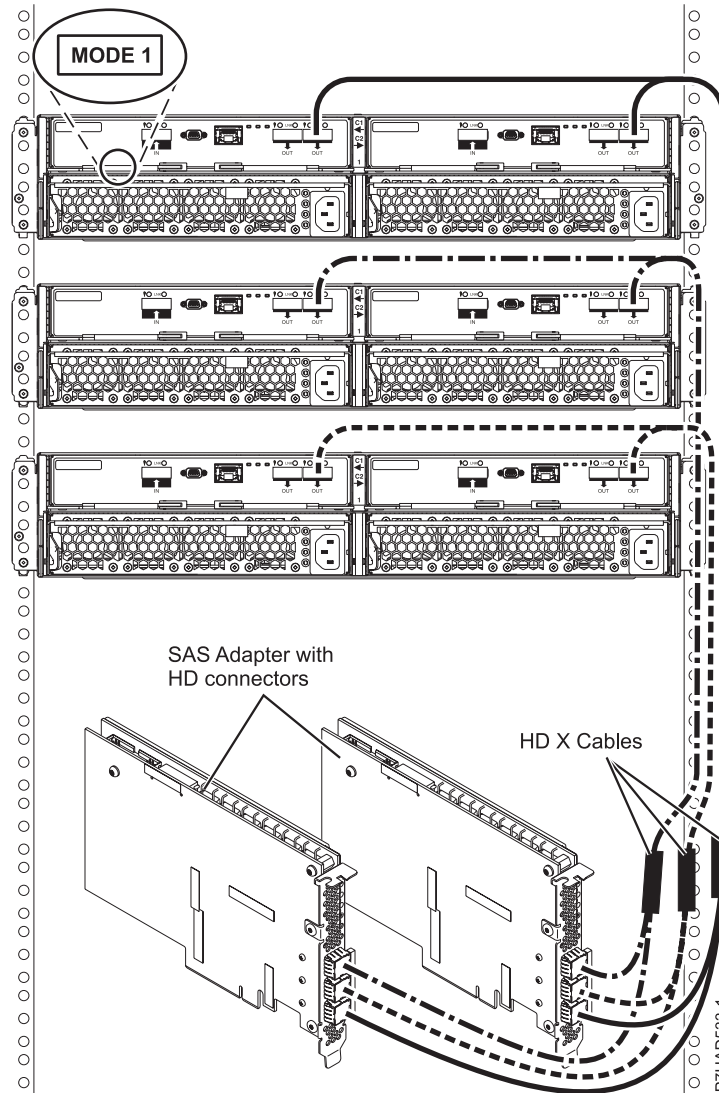
Figure 141. Mode 1 connection of three 58/87 drawers using HD connectors to two SAS adapters

4. Two pairs of SAS adapters with HD connectors to one 5887 via a mode 2 connection
   - No cascading allowed.
   - HD AA cable is required.
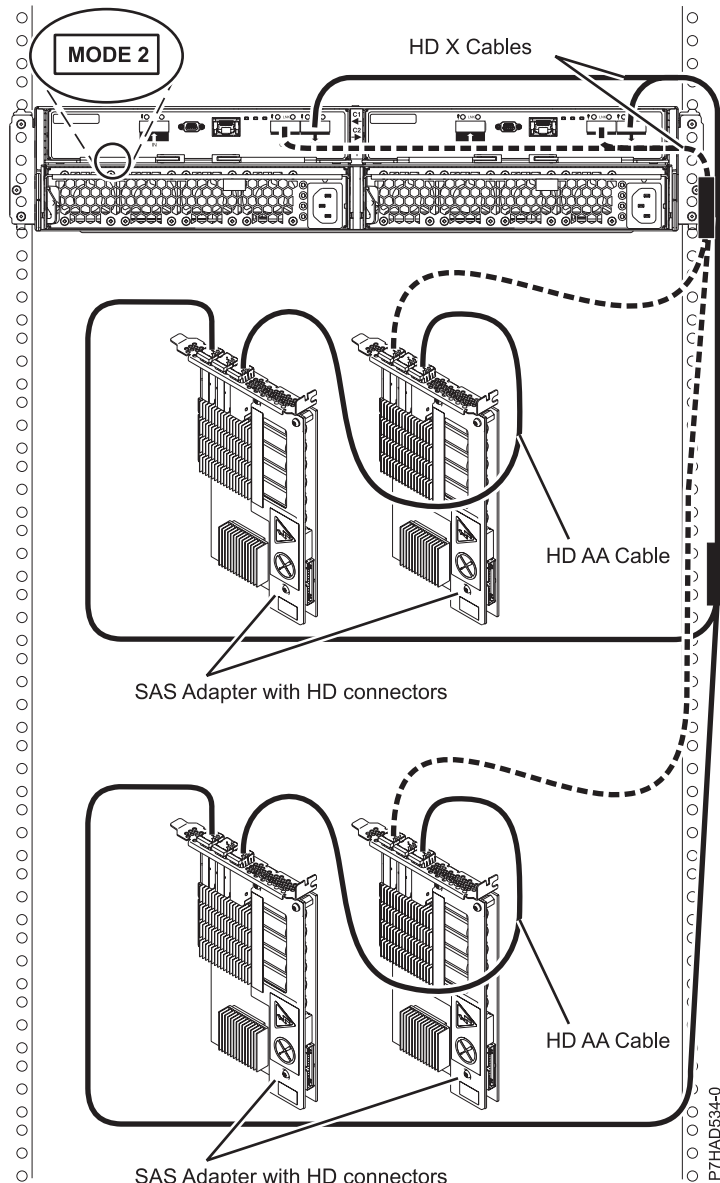
Figure 142. Mode 2 connection of a 58/87 drawer using HD connectors to two pairs of SAS adapters

Rack installation procedures for racks

Learn the requirements and specifications for installing systems into racks .

This topic provides requirements and specifications for 19-inch racks. These requirements and specifications are provided as an aid to help you understand the requirements to install 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. Mechanical drawings of the rack, if available from the manufacturer, are recommended for comparison against the requirements and specifications.

Note: The IBM 7014-T00, 7014-T42, 7014-B42, 0551, and 0553 racks meet all the requirements and specifications.

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).

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 rails to fit in your rack or cabinet (see the following figure).

Hole Diameter
= 7.1 +/- 0.1mm

465 +/- 0.8mm
Rack Mounting Holes Center-to-Center

450 +/- 0.75mm
Rack Front Opening

EIA Hole Spacing

12.7mm   12.7mm

15.9mm   15.9mm

15.9mm   15.9mm

12.7mm   12.7mm

15.9mm   15.9mm

15.9mm   15.9mm

6.75mm min   6.75mm min

**Bottom Front
of Rack**

- Models 9117-MMB and 9179-MHB use SMP and FSP flex assemblies that extend beyond the rack mount post width. The front rack opening must be 535 mm (21.06 in.) wide for dimension C (the width between the outsides of the standard mounting flanges, see Figure 21 on page 50). The back rack opening must be 500 mm (19.69 in.) wide for dimension C (the width between the outsides of the standard mounting flanges).

Critical Mounting Flange Dimensions

C

B

A

Mounting Flange

Installed System

Installed System

System Width

Notable Dimensions:

Dimension A = 450 mm (17.717") min.
Dimension B = 465 mm (18.307") normal
Dimension C = 535 mm (21.06") min.

P7HAD501-1

Figure 143. Critical mounting flange dimensions

- A minimum rack opening width of 500 mm (19.69 in.) for a depth of 330 mm (12.99 in.) is needed behind the installed system for maintenance and service. The depth can extend beyond the rack rear door.

Rack

Installed System

500mm opening width needed for a 330mm depth. The depth can extend beyond the frame line.

Top Down View

Front

P7HAD505-0

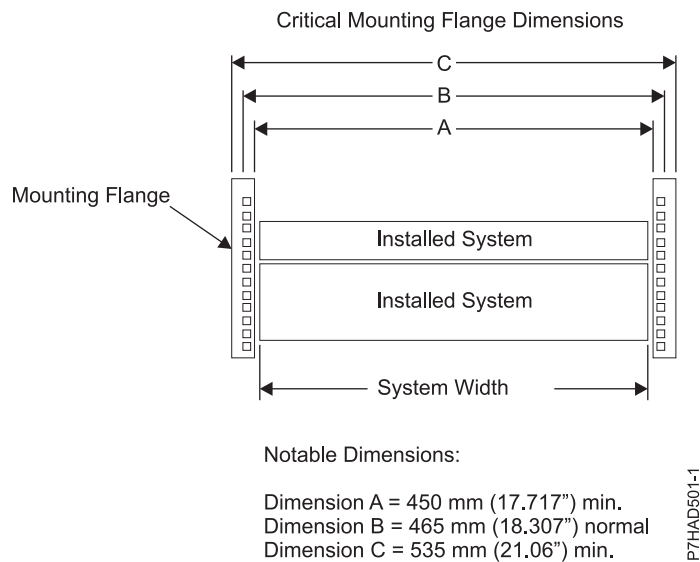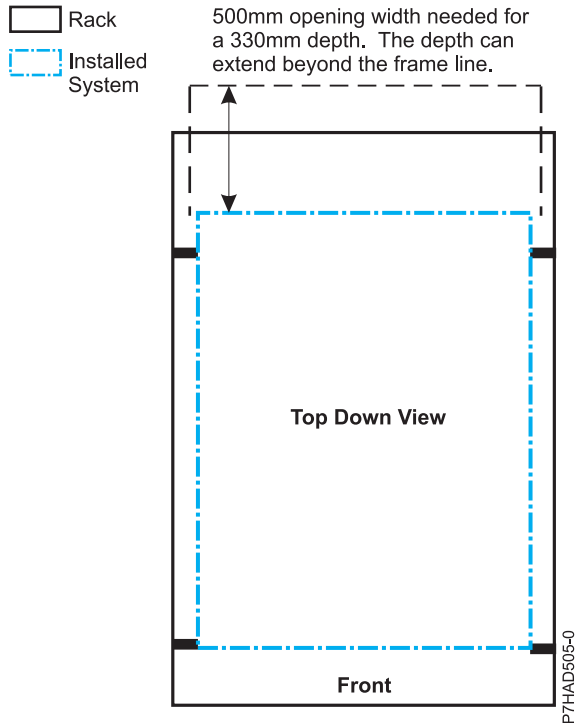- The rack or cabinet must be capable of supporting an average load of 15.9 kg (35 lb) of product weight per EIA unit.

  For example, a four EIA drawer has a maximum drawer weight of 63.6 kg (140 lb).

  – 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

- All parts shipped with the Power Systems products must be installed.

- 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 power distribution units to supply rack power (for example, feature code 7188). Rack or cabinet power distribution devices must meet the drawer voltage, amperage, and 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.

- 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 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 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 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.

  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.

   Note: 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.

- The rack or cabinet must provide adequate front-to-back ventilation.

   Note: 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.

General safety requirements for products installed in a rack or cabinet

The general safety requirements for products installed in racks are:

- Any product or component that plugs into either an 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 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 manufacturers 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 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 requirements for "safe to service" (contact your 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 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 service personnel.

  For products not intended for rack-mounting to be serviced, 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:

"Rack specifications" on page 18
Rack specifications provide detailed information for your rack, including dimensions, electrical, power, temperature, environment, and service clearances.

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Ethernet connection usage restriction

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks.

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Electronic emission notices

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

Class A Notices
The following Class A statements apply to the servers.

Federal Communications Commission (FCC) statement

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

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

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M456
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15-2937
email: 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.

VCCI Statement - Japan

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

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

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

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline with Modifications (products greater than 20 A per phase)

高調波ガイドライン準用品

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

声　明

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

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

Electromagnetic Interference (EMI) Statement - Taiwan

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

Electromagnetic Interference (EMI) Statement - Korea

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

Germany Compliance Statement

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

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

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

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:
"Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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

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

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15-2937
email: tjahn@de.ibm.com

Generelle Informationen:

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

Electromagnetic Interference (EMI) Statement - Russia

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

Class B Notices

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

Federal Communications Commission (FCC) statement

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

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

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM-authorized dealer or service representative for help.

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

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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

European Community contact:
IBM Deutschland GmbH
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Tele: +49 7032 15-2937
email: tjahn@de.ibm.com

VCCI Statement - Japan

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　　取扱説明書に従って正しい取り扱いをして下さい。　　　　ＶＣＣＩ－Ｂ

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

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高調波ガイドライン準用品

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Germany Compliance Statement

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse B EU-Richtlinie zur Elektromagnetischen Verträglichkeit

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

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

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

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

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456

IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15-2937
email: tjahn@de.ibm.com

Generelle Informationen:

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

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