

# **Stratus ftServer 29x0, 49x0, and 69x0 Systems: Site Planning and Installation Guide**

Stratus Technologies  
R786-03

---

# Notice

The information contained in this document is subject to change without notice.

UNLESS EXPRESSLY SET FORTH IN A WRITTEN AGREEMENT SIGNED BY AN AUTHORIZED REPRESENTATIVE OF STRATUS TECHNOLOGIES, STRATUS MAKES NO WARRANTY OR REPRESENTATION OF ANY KIND WITH RESPECT TO THE INFORMATION CONTAINED HEREIN, INCLUDING WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PURPOSE. Stratus Technologies assumes no responsibility or obligation of any kind for any errors contained herein or in connection with the furnishing, performance, or use of this document.

Software described in Stratus documents (a) is the property of Stratus Technologies Bermuda, Ltd. or the third party, (b) is furnished only under license, and (c) may be copied or used only as expressly permitted under the terms of the license.

Stratus documentation describes all supported features of the user interfaces and the application programming interfaces (API) developed by Stratus. Any undocumented features of these interfaces are intended solely for use by Stratus personnel and are subject to change without warning.

This document is protected by copyright. All rights are reserved. Stratus Technologies grants you limited permission to download and print a reasonable number of copies of this document (or any portions thereof), without change, for your internal use only, provided you retain all copyright notices and other restrictive legends and/or notices appearing in the copied document.

Stratus, the Stratus logo, ftServer, and the ftServer logo are registered trademarks of Stratus Technologies Bermuda, Ltd. The Stratus Technologies logo, the Stratus 24 x 7 logo, ActiveService, ftScalable, Automated Uptime, and Active Upgrade are trademarks of Stratus Technologies Bermuda, Ltd.

VMware, vSphere, ESX, ESXi, vCenter Server, and vMotion are registered trademarks or trademarks of VMware, Inc. in the United States and/or other jurisdictions.

The registered trademark Linux is used pursuant to a sublicense from the Linux Mark Institute, the exclusive licensee of Linus Torvalds, owner of the mark on a world-wide basis. FLEXIm is a registered trademark of Macrovision Corporation.

All other trademarks are the property of their respective owners.

Manual Name: *Stratus ftServer 29x0, 49x0, and 69x0 Systems: Site Planning and Installation Guide*

Part Number: R786

Revision Number: 03

Software Release Number: Automated Uptime Layer for Windows-based ftServer Systems, Release 12.0.0.0

Automated Uptime Layer for Linux-based ftServer Systems, Release 11.1.6.0

Automated Uptime Layer for VMware vSphere-based ftServer Systems, Release 6.7.3.1

Publication Date: September 2019

Stratus Technologies, Inc.

5 Mill and Main Place, Suite 500

Maynard, Massachusetts 01754-2660

© 2019 Stratus Technologies Bermuda, Ltd. All rights reserved.

---

# Contents

---

<b>Preface</b>	xi
----------------	----

---

<b>1. Site Planning for ftServer 2900, 4900, and 6900 Systems</b>	1-1
Site Planning Overview	1-1
The Stratus ActiveService Network	1-3
Site Planning Checklist	1-3
System Documentation	1-7

---

<b>2. Electrical Power Planning</b>	2-1
Redundant Power Sources	2-1
AC Power and HVAC Service Requirements	2-2
AC Power Outlet Requirements	2-4
Connecting a System Directly to Separate AC Sources	2-5
Selecting a UPS Unit for ftServer Systems	2-6
Communicating with a UPS over a Network	2-6
Connecting a System Directly to a UPS	2-7
Power Cord Summary	2-7
Power Cords for ftServer Systems and Peripheral	
Components	2-7
PDU Power Cords	2-9
Grounding Requirements	2-10

---

<b>3. Space Planning</b>	3-1
Room Requirements	3-1
Planning for Cables	3-3

---

<b>4. Communications Line Planning</b>	4-1
Supported Host Bus Adapters	4-2
Supported Storage Systems	4-2

Connections from Storage Systems to ftServer Systems	4-3
Fibre Channel Connections	4-3
iSCSI Connections	4-4
Ethernet Cables	4-5
Category-6/Category-6A Cables	4-8
Telephone Line Connections	4-9

---

<b>5. Rack Configuration Planning</b>	5-1
Using PDUs	5-1
Determining PDU Requirements	5-2
Example of PDU Usage Calculation	5-4

---

<b>6. Cabinet and Monitor Requirements</b>	6-1
Cabinet Requirements	6-1
Monitor Requirements	6-5

---

<b>7. Site Planning for Peripheral Components</b>	7-1
ftScalable Storage System Requirements	7-1
Keyboard Requirements	7-2
Peripheral Components for Windows-based Systems	7-3
Peripheral Components for Linux-based Systems	7-4
Peripheral Components for VMware vSphere-based Systems	7-5

---

<b>8. Before You Install the System</b>	8-1
Safety Considerations	8-1
Safety Notices	8-1
Consignes de sécurité	8-4

---

<b>9. Installing the System in a Cabinet</b>	9-1
Required Tools	9-3
Numbering the Vertical Rails	9-3
Installing PDUs (Optional)	9-6
Installing a System Chassis	9-11
Installing the System Enclosures	9-21
Next Steps	9-24

---

<b>10. Connecting the System Components and Peripherals</b>	10-1
PCI Adapters	10-1
System Ports and Backplane	10-3
Managing Cables	10-4
Connecting a Monitor, Mouse, and Keyboard	10-4
Connecting the ftServer System to External Storage Systems	10-4
Connecting ftServer Systems to the Network for iSCSI Access	10-5
Connecting the VTM Ports to a Network	10-7
Connecting the External Modem	10-7
Connecting Tape Drives (Windows- and Linux-based Systems)	10-9
Next Steps	10-10

---

<b>11. Connecting the System to Electrical Power</b>	11-1
System Power Overview	11-1
Connecting the System to AC Power (Mains)	11-2
Connecting the System Directly to a UPS	11-3
Connecting Systems to Power Through PDUs	11-6
Next Steps	11-8

---

<b>Appendix A. System Specifications</b>	A-1
System Specifications	A-1
PCIe Adapter Specifications	A-6
AAP87600 PDU Specifications	A-7

---

<b>Appendix B. Electrical Circuit and Wiring Information</b>	B-1
Fault Protection Requirements	B-1
Grounding Considerations	B-1
Circuit Wiring Diagrams	B-2
Electrical Power Connectors	B-9
PDU Safety Considerations	B-10

---

<b>Appendix C. Hardware Replacement and System Support</b>	C-1
--	-----

---

<b>Index</b>	Index-1
--------------	---------

---

# Figures

Figure 6-1.	Rail Clearance	6-4
Figure 9-1.	System Components	9-2
Figure 9-2.	EIA Vertical Rail Hole Pattern	9-4
Figure 9-3.	Numbering the Middle Hole of 6U	9-5
Figure 9-4.	PDU Components	9-7
Figure 9-5.	Cage Nut Locations: PDU	9-8
Figure 9-6.	Inserting Cage Nuts	9-9
Figure 9-7.	Installing the Lower PDU (at U Number 1)	9-10
Figure 9-8.	Installing the Upper PDU (at U Number 2)	9-11
Figure 9-9.	Screw Locations on the Rear Vertical Rails	9-12
Figure 9-10.	Attaching the Mounting Brackets and Inserting Guide Screws (Rear View)	9-13
Figure 9-11.	Removing the Front Panel from the Shelf Unit	9-14
Figure 9-12.	Removing the System Backplane	9-15
Figure 9-13.	Cage Nut Locations on Front Vertical Rails	9-16
Figure 9-14.	Mounting the Shelf Unit on the Mounting Brackets	9-17
Figure 9-15.	Securing the Shelf Unit to the Front Rails	9-18
Figure 9-16.	Securing the Shelf Unit to the Mounting Brackets	9-19
Figure 9-17.	Replacing the Front Panel in the Shelf Unit	9-20
Figure 9-18.	Installing the CPU-I/O Enclosures in a Cabinet	9-22
Figure 9-19.	Installing the Bezel	9-24
Figure 10-1.	System Ports	10-3
Figure 10-2.	Connecting Cables to the Modem	10-8
Figure 10-3.	Mini-SAS (SFF-8088) Connector	10-9
Figure 10-4.	Connecting a Tape Drive to an ftServer System	10-10
Figure 11-1.	Connecting a System Directly to AC Power	11-3
Figure 11-2.	Connecting a System to a UPS	11-5
Figure 11-3.	Connecting the Systems Directly to PDUs	11-7
Figure A-1.	ftServer 2900, 4900, or 6900 System: CPU-I/O Enclosures: Front View	A-2
Figure A-2.	AAP87600PDU	A-8
Figure B-1.	Star Ground Example	B-2
Figure B-2.	PDU Power Input Labeling	B-3
Figure B-3.	ftServer Enclosure Power Input Labeling	B-3
Figure B-4.	Single-Phase 120V AC Circuit Connection	B-4
Figure B-5.	Single-Phase 240V AC Circuit Connection	B-5
Figure B-6.	Split-Phase 120/240 Volts AC Circuit Connection	B-6

Figure B-7.	Three-Phase 208V AC, Y-, or D-Source Circuit Connection, Phase-to-Phase	B-7
Figure B-8.	Three-Phase 380V AC, Y-, or D-Source Circuit Connection, Phase-to-Neutral	B-8

## Tables

Table 1-1.	Ethernet PCIe Adapters	1-4
Table 1-2.	ftServer 2900, 4900, and 6900 System Documentation	1-7
Table 1-3.	Additional System Documentation for Windows-based Systems	1-8
Table 1-4.	Additional System Documentation for Linux-based Systems	1-9
Table 1-5.	Additional System Documentation for VMware vSphere-based Systems	1-9
Table 2-1.	Worksheet: Determining A-Side Power Requirements	2-3
Table 2-2.	Worksheet: Determining B-Side Power Requirements	2-3
Table 2-3.	Worksheet: Determining External Power Requirements	2-3
Table 2-4.	HVAC Requirements	2-4
Table 2-5.	Worksheet: A-Side External Power Outlet Requirements: PDUs Used	2-4
Table 2-6.	Worksheet: B-Side External Power Outlet Requirements: PDUs Used	2-4
Table 2-7.	Worksheet: A-Side External Power Outlet Requirements: No PDUs	2-5
Table 2-8.	Worksheet: B-Side External Power Outlet Requirements: No PDUs	2-5
Table 2-9.	Power Cords - ftServer Systems and Peripheral Components to AC Power	2-7
Table 2-10.	Power Cords Between ftServer Systems or Storage Systems and a UPS	2-8
Table 2-11.	Power Cords to Connect PDUs Directly to AC Power Mains	2-9
Table 2-12.	Power Cords to Connect PDUs to a UPS	2-9
Table 2-13.	System Power ( <i>Jumper</i> ) Cables to Connect ftServer Systems to PDUs	2-10
Table 4-1.	HBAs Supported by ftServer 2900, 4900, and 6900 Systems	4-2
Table 4-2.	Storage Systems Supported by ftServer 2900, 4900, and 6900 Systems	4-2
Table 4-3.	Optical FC Cables	4-3
Table 4-4.	Customer-Supplied Ethernet Cables	4-6
Table 5-1.	Current and Rack-Space Requirements	5-3
Table 5-2.	Calculating A-Side PDU and Rack-Space Requirements	5-4
Table 5-3.	Example: Current and Rack-Space Requirements (208 volts)	5-4



---

Table 5-4.	Example: Calculating A-Side PDU and Rack-Space Requirements	5-5
Table 7-1.	Site Planning for ftScalable Storage G3 Systems	7-1
Table 7-2.	V115 Keyboard: Specifications	7-2
Table 7-3.	PCI Adapters and Peripheral Components: Windows-based Systems	7-3
Table 7-4.	PCI Adapters and Peripheral Components: Linux-based Systems	7-4
Table 7-5.	PCI Adapters and Peripheral Components: VMware vSphere-based Systems	7-5
Table A-1.	Cabinet Dimensions	A-3
Table A-2.	ftServer 2900, 4900, 6900 System Unit Specifications	A-4
Table A-3.	PCIe Adapter Specifications	A-6
Table A-4.	AAP87600 PDU: Specifications	A-9
Table B-1.	Connectors for AC Power Outlets	B-9



---

# Preface

The *Stratus ftServer 29x0, 49x0, and 69x0 Systems: Site Planning and Installation Guide* (R786) documents the site requirements and customer responsibilities related to preparing a site for the installation of ftServer 2900, 4900, and 6900 systems. This manual also documents how to install the system and its peripheral components.

This document is intended for personnel who are responsible for preparing a site for the installation of an ftServer 2900, 4900, or 6900 system. It is also intended for system administrators who are responsible for installing the system.

## Revision Information

This document is a revision. This revision adds support for ftScalable Storage G4 systems connected to ftServer 2900, 4900, or 6900 systems running Automated Uptime Layer for VMware vSphere-based ftServer Systems, Release 6.7.3.1 or higher.

## Manual Organization

This manual is organized as follows:

- Chapters 1 through 7 provide site-planning information:
  - [Chapter 1](#) provides an overview of how to prepare a site for an ftServer system.
  - [Chapter 2](#) describes how to plan appropriate AC electrical power for an ftServer system and its peripheral components.
  - [Chapter 3](#) describes how to plan sufficient space for an ftServer system.
  - [Chapter 4](#) describes how to plan the locations of an ftServer system and its external components so that all communications and data cables will reach their connection points.
  - [Chapter 5](#) describes how to plan a rack configuration for an ftServer system.
  - [Chapter 6](#) describes cabinet and monitor requirements.
  - [Chapter 7](#) describes how to prepare a site for an ftServer system's peripheral components.

- Chapters 8 through 11 provide hardware-installation information:
  - [Chapter 8](#) describes safety-related steps to take before you begin to install an ftServer system.
  - [Chapter 9](#) describes how to install an ftServer system in a cabinet.
  - [Chapter 10](#) describes how to connect ftServer system components and peripheral components.
  - [Chapter 11](#) describes how to connect an ftServer system to electrical power.
- [Appendix A](#) provides system specifications.
- [Appendix B](#) provides electrical circuit and wiring information.
- [Appendix C](#) provides information about hardware replacement and system support.

## ftScalable Storage G4 System Documentation

For detailed information about ftScalable Storage G4 systems, see the following manual and web site:

- *Using ftScalable Storage G4 Systems* (R789)
- <https://www.seagate.com/support/raid-systems/>

## Notation Conventions

This document uses the notation conventions described in this section.

### Warnings, Cautions, Notices, and Notes

Warnings, cautions, notices, and notes provide special information and have the following meanings:



#### **WARNING** \_\_\_\_\_

A warning indicates a hazardous situation that, if not avoided, could result in death or serious injury.



#### **AVERTISSEMENT** \_\_\_\_\_

Un avertissement indique une situation dangereuse qui, si pas évitée, pourrait entraîner la mort ou des blessures graves.

**CAUTION** \_\_\_\_\_

A caution indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

**MISE EN GARDE** \_\_\_\_\_

Une mise en garde indique une situation dangereuse qui, si pas évitée, pourrait entraîner des blessures mineures ou modérées.

**NOTICE** \_\_\_\_\_

A notice indicates information that, if not acted on, could result in damage to a system, hardware device, program, or data, but does not present a health or safety hazard.

**NOTE** \_\_\_\_\_

A note provides important information about the operation of an ftServer system or related equipment or software.

## Typographical Conventions

The following typographical conventions are used in this document:

- The bold font emphasizes words in text or indicates text that you type, the name of a screen object, or the name of a programming element. For example:

**Before** handling or replacing system components, make sure that you are properly grounded by using a grounded wrist strap.

In the **System Properties** dialog box, click the **Hardware** tab.

Call the **RegisterDeviceNotification** function.

- The italic font introduces new terms and indicates programming and command-line arguments that the user supplies. For example:

Many hardware components are *customer-replaceable units* (CRUs), which can be replaced on-site by system administrators with minimal training or tools.

**copy** *filename1 filename2*

Pass a pointer for the *NotificationFilter* parameter

- The monospace font indicates sample program code and output, including message text. For example:

```
#include <iostream.h>
```

```
The operation completed successfully.
```

The monospace font also represents text that would appear on your display screen when working in a text-based console on a Linux- or VMware vSphere-based system. The monospace bold font represents text you must type in examples that contain both user input and system output. The monospace italic font represents terms in command lines that are to be replaced by literal values. For example:

To display the state of a CPU enclosure, type a command in the following format:

```
/opt/ft/bin/ftsmaint ls n
```

If you type **/opt/ft/bin/ftsmaint ls 0** at the prompt, the following output appears:

```
H/W Path : 0
Description : Combined CPU/IO
.
.
.
```

- The percent sign (%), dollar sign (\$), and number sign (#) are default prompt signs that have a specific meaning at the command prompt of a Linux- or VMware vSphere-based system. Although a prompt is sometimes shown at the beginning of a command line as it would appear on the screen, you do not type it.
  - % or \$ indicates you are logged in to a standard user account and are subject to certain access limitations. The prompt displayed on the screen depends on your shell environment, for example, csh (%) or bash (\$).
  - # indicates you are logged in to the system administrator account and have *superuser* access. Users of this account are referred to as *root*. The # prompt sign used in an example indicates the command can be issued only by *root*.

## Getting Help

If you have a technical question about ftServer system hardware or software, try these online resources first:

- **Online documentation at the StrataDOC web site.** Stratus provides complimentary access to StrataDOC, an online-documentation service that enables you to view, search, download, and print customer documentation. You can access StrataDOC at the following web site:

<http://stratadoc.stratus.com>

- **Online support from Stratus Customer Service.** You can find the latest technical information about an ftServer system in the Stratus Customer Service Portal at the following web site:

<http://www.stratus.com/go/support>

The Service Portal provides access to Knowledge Base articles for all Stratus product lines. You can locate articles by performing a simple or advanced keyword search, viewing recent articles or top FAQs, or browsing a product and category.

To log in to the Service Portal, enter your employee user name and password or, if you have not been provided with a login account, click **Register Account**. When registering a new account, ensure that you specify an email address from a company that has a service agreement with Stratus.

- **Online product support for Microsoft® products.** Your primary source for support is the computer manufacturer who provided your software, or an authorized Microsoft Support Provider. You can also find the latest technical information about Microsoft Windows® and other Microsoft products through online product support at the Microsoft Help and Support web site:

<http://support.microsoft.com/>

- **Online product support for Red Hat® Linux® products.** Your primary source for support is the manufacturer who provided your software, or Red Hat Global Support Services. You can also find the latest technical information about Red Hat Enterprise and Standard Linux through online product support at the Red Hat Support Web site:

<http://www.redhat.com/apps/support/>

- **Online product support for VMware vSphere® products.** You can find the latest technical information about VMware vSphere through online product support at the VMware Support web site:

<http://www.vmware.com/support/>

If you cannot resolve your questions with these online self-help resources, and the ftServer system is covered by a service agreement, contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative. To contact the CAC, use the Service Portal to log a support request. Click **Customer Support** and **Add Issue**, and then complete the **Create Issue** form. A member of our Customer Service team will be glad to assist you.

## Commenting on This Manual

You can comment on this manual using one of the following methods. When you submit a comment, be sure to provide the manual's name and part number, a description of the problem, and the location in the manual where the affected text appears.

- From StrataDOC, click the **site feedback** link at the bottom of any page. In the pop-up window, answer the questions and click **Submit**.
- From any email client, send email to `comments@stratus.com`.
- From the Stratus Customer Service Portal, log on to your account and create a new issue.

Stratus welcomes any corrections and suggestions for improving this manual.

## Regulatory Notice

All regulatory notices are provided in *Compliance Information for Stratus Products* (R002G), which is available on StrataDOC:

[https://stratadoc.stratus.com/compliance\\_info/Compliance\\_Information\\_for\\_Stratus\\_Products.htm](https://stratadoc.stratus.com/compliance_info/Compliance_Information_for_Stratus_Products.htm)



---

# Chapter 1

## Site Planning for ftServer 2900, 4900, and 6900 Systems

For an overview of required information and tasks you need to perform to prepare a site for ftServer 2900, 4900, and 6900 systems, see:

- [“Site Planning Overview” on page 1-1](#)
- [“Site Planning Checklist” on page 1-3](#)
- [“System Documentation” on page 1-7](#)

### NOTICES

---

1. See [“Safety Notices” on page 8-1](#) for a list of important safety notices that you should review as part of your site planning.
2. See [“Regulatory Notice”](#) for information about standards compliance.

## Site Planning Overview

Site planning for fault-tolerant systems includes:

- [Purchasing an appropriate cabinet and monitor](#)

Provide a monitor that meets the system’s requirements.

### NOTE

---

A monitor, keyboard, and mouse are required to install Automated Uptime Layer.

If you do not purchase a cabinet from Stratus, provide a cabinet that meets the system’s requirements.

- **Electrical power planning**

Provide electrical power sources that meet the requirements of the system and optional components, optionally including the purchase of a qualified uninterruptible power supply (UPS).

- **Space planning**

Provide adequate space for the system or cabinet and for a desk or table to accommodate components outside a cabinet. Also provide enough space for servicing the systems and components.

Provide an environment that meets the system's requirements for ambient temperature and air quality.

- **Communications line planning**

Provide sufficient network and analog telephone lines and plan the location of the system and external components to accommodate the lengths of the connecting cables.

- **Rack space planning**

Ensure that the power distribution units (PDUs) supply sufficient power to the components you have purchased and that you have sufficient space available in an appropriate cabinet.

- **Planning for peripheral components**

Provide for the electrical, cooling, power, and space needs of any peripheral components.

For information about obtaining documents related to your ftServer system, see [“System Documentation” on page 1-7](#).

During the site planning and preparation processes, work closely with your facilities group or contractor to determine space, power, and environmental requirements. Enlist their help to provide a suitable location with sufficient alternating current (AC) power, heating, ventilation and air conditioning (HVAC) capabilities, and network and telephone connections.

If your system is covered by a service agreement and you need help with site planning, contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative. If you have a contract with the CAC or your authorized Stratus service representative to install the system, contact them after you have prepared the installation site and moved the system to the site. For more information about the CAC, see [“Getting Help”](#) in the Preface or the <http://www.stratus.com/go/support> web site.

See [Appendix A](#) for the specifications of the base ftServer systems and of PDUs. See [Chapter 7](#) for specifications of other components.

## The Stratus ActiveService Network

The Stratus ActiveService Network (ASN) is a network that allows your ftServer system to automatically report problems to the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative, and that can allow the CAC or your authorized Stratus service representative to remotely diagnose, troubleshoot, and resolve problems online.

To enable connectivity to the ASN, you connect a pair of partnered Ethernet ports, one from each CPU-I/O enclosure in your system, to a network that has Internet access. For additional protection, if you connect the Ethernet port of the VTM in each enclosure to a network with Internet access, the VTMs can communicate with the ASN even when the host operating system is not running or is unresponsive.

If Internet access is not available, or if you wish to have a backup method of connecting to the ASN, you can also connect the optional ASN modem to your system, which allows either the host operating system or a VTM to communicate with the ASN through a telephone dialup connection.

## Site Planning Checklist

Referring to the information in this document, answer the following questions:

### Planning for ASN Connectivity

- ☐ Will your system connect to the ASN? If so, will it connect over an ASN modem or the Internet?
- ☐ If your system will use the Internet to connect to the ASN, do you have an Internet connection available?
- ☐ If your system will use an ASN modem, do you have an external analog telephone line available for the ASN modem?

#### NOTE

A dedicated phone line provides the most reliable service. ASN calls routed through a PBX may be slow due to load on the PBX, or may not complete successfully due to disconnections. If you must use a PBX, do not route the telephone extension through a switchboard; instead, provide a direct-dial analog number.

- ☐ Do you have an additional telephone connection and telephone near the operator's station for voice communications when calling for support?

Planning for Network Connectivity

- ❑ All ftServer 2900, 4900, and 6900 systems contain four embedded 1-gigabit Ethernet (GbE) ports that operate at 10 or 100 Megabits-per-second (Mbps) or at 1 gigabit-per-second (Gbps). In addition, four embedded 10GbE ports that operate at 100 Mbps or at 1 or 10 Gbps are standard on ftServer 4900 and ftServer 6900 systems. Also, you can add optional Ethernet PCI adapters to provide additional Ethernet bandwidth.

In [Table 1-1](#), indicate the number of Ethernet ports you will use, and plan network connections accordingly.

Table 1-1. Ethernet PCIe Adapters

Adapter	Number of Ports
Embedded Dual-Port 1 Gigabit Ethernet (1GbE) PCI-Express Adapters (2)	4
Embedded Dual-Port 10 Gigabit Ethernet (10GbE) PCI-Express Adapters (2) <sup>†</sup>	
U113 Dual-Port 10/100/1000 Base-T Ethernet PCI-Express Adapter	
U117A Dual-Port Fiber 10-Gbps Ethernet PCI-Express Adapter <sup>‡</sup> (Windows- and VMware vSphere-based systems)	
U584 Dual-Port Fiber 10-Gigabit Ethernet PCI-Express Adapter (Linux-based ftServer 4900 with riser and 6900 systems)	
U118 Dual-Port RJ-45 10-Gigabit Ethernet PCI-Express Adapter	
Total Number of Ports	

<sup>†</sup> Standard on ftServer 4900 and ftServer 6900 systems, but not available on ftServer 2900 systems. See [“Category-6/Category-6A Cables” on page 4-8](#) for additional site-planning requirements for embedded 10GbE ports.

<sup>‡</sup> Available only on ftServer 4900 and 6900 systems.

Planning for External Storage Options

- ❑ Will your system connect to external Fibre Channel storage enclosures? If so, the system requires a pair of Fibre Channel HBAs, which are provided when you order the storage enclosure. If you order the enclosure at the same time you order the system, the required Fibre Channel HBAs are installed at the factory. See [Chapter 7](#) for descriptions of the storage enclosures provided by Stratus and the names of the PCI adapters required for supported storage enclosures.

- ☐ Will your system connect to external Fibre Channel storage enclosures in a storage area network (SAN) configuration? If so, do you have a minimum of two switches that can accommodate the cables from the pair of Fibre Channel HBAs in each ftServer system?
- ☐ Will your system have an iSCSI connection to ftScalable Storage systems? If so, ensure that you supply two Ethernet switches that can accommodate the cables from the network adapters in each ftServer system.
- ☐ Set up your system to communicate with a UPS.

### **Planning for Optional Components**

- ☐ Will you be using an external modem?
- ☐ Will you connect a SAS tape drive (customer-supplied) to your system?

#### **NOTE** \_\_\_\_\_

VMware vSphere-based systems do not support tape drives.

### **Planning AC Power**

- ☐ Will you provide power to both sides of the system through a pair of PDUs?
- ☐ Will you protect the system power with a UPS?
- ☐ What optional components will you use?
- ☐ What are the AC power requirements of your system, including all optional components?
- ☐ What are the lengths and types of the power cords that are provided for the PDUs or system, and optional components?
- ☐ What type of AC receptacles do you need to provide?
- ☐ Is the AC power service wired properly?

### **Planning Space for Your System**

- ☐ Provide a table or desk for the monitor, keyboard, and mouse.
- ☐ Will your system and its external components fit where you plan to place them?
- ☐ What is the height of the cabinet you will use, and what is the total height of the systems and components that will be installed in the cabinet? Will the items fit into the cabinet? What components will be located outside the cabinet?
- ☐ What are the lengths and types of the interface and communications cables that will connect to your system?

- ☐ Have you created a sketch of how you plan to arrange the system at the installation site? Consider the available cable lengths, the placement of external devices, and the location of network and voice communication connections.

On the sketch, show the following:

- Location of the system and its external components
- Power cords, and telephone and interface cables
- Locations of AC power receptacles, phone jacks, Ethernet jacks, switches, and hubs

**NOTE** \_\_\_\_\_

Make sure that all cords and cables are long enough to reach between their respective components and connectors. Route all cables out of the way of foot traffic.

### **Working with Other Groups**

- ☐ Have you provided your facilities group and contractors with the sketch of how you plan to arrange the system and copies of the following?
  - [“AC Power and HVAC Service Requirements” on page 2-2](#)
  - [“Redundant Power Sources” on page 2-1](#)
  - Tables [2-1](#), [2-2](#), and [2-3](#), worksheets for determining AC power requirements
  - Tables [2-5](#) and [2-6](#) (if you are using PDUs) or Tables [2-7](#) and [2-8](#) (if you are not using PDUs), worksheets for determining the number of external power outlets required
  - [Appendix B, “Electrical Circuit and Wiring Information”](#)
  - Any notes you have about site planning
- ☐ Have you reviewed and discussed the requirements with the facilities personnel and contractors to ensure that all site modifications are understood and implemented?

If you have any questions about the number and types of components, contact your Stratus account representative or distributor.

## System Documentation

[Table 1-2](#) lists the hardware documents for ftServer 2900, 4900, and 6900 systems, and the tasks described in each document. Also see [Table 1-3](#) (for Windows-based systems) [Table 1-4](#) (for Linux-based systems), or [Table 1-5](#) (for VMware vSphere-based systems).

**Table 1-2. ftServer 2900, 4900, and 6900 System Documentation**

Document	Task
<i>Stratus ActiveService Network Configuration Guide</i> (R072)	Configure your system for support by the ASN
<i>Stratus ftServer Systems: PCI Adapter Guide</i> (R461)	Install, configure, replace, or troubleshoot PCI adapters
<i>Stratus ftServer Systems: Technical Reference Guide</i> (R550)	Consult technical reference information for ftServer systems  View or change BIOS settings in the system BIOS setup utility  Use the Unified Extensible Firmware Interface (UEFI) to configure the BMC and configure user accounts
<i>Stratus ftServer Virtual Technician Module User's Guide</i> (R642)	Use the VTM console to remotely control, monitor, and troubleshoot your system
<i>Read Me First: Unpacking ftServer Systems</i> (R784)	Inspect and unpack ftServer system hardware that you install in your cabinet
<i>Stratus ftServer 29x0, 49x0, and 69x0 Systems: Operation and Maintenance Guide</i> (R785)	Start up, shut down, and operate your system  Troubleshoot system hardware  Remove and replace CRUs, including PCI adapters
<i>ftScalable Storage G3: Getting Started Guide</i> (R687)	Install and initially configure an ftScalable Storage G3 system  Perform site-planning tasks for an ftScalable Storage G3 system
<i>Using ftScalable Storage G4 Systems</i> (R789)	Install and initially configure an ftScalable Storage G4 system

[Table 1-3](#) lists additional documentation for Windows-based systems.

**Table 1-3. Additional System Documentation for Windows-based Systems**

Document	Task
<i>Release Notes: Stratus Automated Uptime Layer for Windows-based ftServer Systems</i> (R004W)	<p>Learn the contents of the latest Automated Uptime Layer release</p> <p>Learn the latest information about the product</p> <p>Learn about significant known problems and how to work around or avoid the problems</p>
<i>Stratus Automated Uptime Layer for Windows-based ftServer Systems: Installation and Configuration</i> (R002W)	<p>Respond to Mini-Setup questions</p> <p>Install or reinstall Automated Uptime Layer and Windows Server software</p> <p>Install the operating system on your new system</p> <p>Upgrade software and BIOS and BMC firmware</p> <p>Configure Automated Uptime Layer</p> <p>Set up your system to communicate with a UPS</p> <p>Configure VTMs</p>
<i>Stratus ftServer System Administrator's Guide for the Windows Operating System</i> (R014W)	<p>Use tools that are provided by the operating system software, Automated Uptime Layer, and other vendors to manage and troubleshoot the system</p> <p>Manage data-storage devices</p>



[Table 1-4](#) lists additional documentation for Linux-based systems.

**Table 1-4. Additional System Documentation for Linux-based Systems**

Document	Task
<i>Release Notes: Stratus Automated Uptime Layer for Linux-based ftServer Systems</i> (R005L)	<p>Learn the contents of the latest Automated Uptime Layer release</p> <p>Learn the latest information about the product</p> <p>Learn about significant known problems and how to work around or avoid the problems</p>
<i>Stratus Automated Uptime Layer for Linux-based ftServer Systems: Installation and Configuration</i> (R013L)	<p>Install and update the Linux operating system, Automated Uptime Layer, and BIOS and BMC firmware</p> <p>Configure VTMs</p> <p>Set up your system to communicate with a UPS</p>
<i>Stratus ftServer System Administrator's Guide for the Linux Operating System</i> (R003L)	<p>Use tools that are provided by the operating system software, Automated Uptime Layer, and other vendors to manage and troubleshoot the system</p> <p>Manage network connections and data storage devices</p> <p>Install and configure the Simple Network Management Protocol</p>

[Table 1-5](#) lists additional documentation for VMware vSphere-based systems.

**Table 1-5. Additional System Documentation for VMware vSphere-based Systems**

Document	Task
<i>Release Notes: Stratus Automated Uptime Layer for VMware vSphere-based ftServer Systems</i> (R001E)	<p>Learn the contents of the latest Automated Uptime Layer release</p> <p>Learn the latest information about the product</p> <p>Learn about significant known problems and how to work around or avoid the problems</p>
<i>Stratus Automated Uptime Layer for VMware vSphere-based ftServer Systems: Installation and Configuration</i> (R004E)	<p>Install, update, and configure VMware ESXi,<sup>™</sup> Automated Uptime Layer, and BIOS and BMC firmware</p> <p>Configure VTMs</p> <p>Set up your system to communicate with a UPS</p>

**Table 1-5. Additional System Documentation for VMware vSphere-based Systems** *(Continued)*

Document	Task
<i>Stratus ftServer System Administrator's Guide for VMware vSphere</i> (R002E)	Use tools that are provided by VMware vSphere, Automated Uptime Layer, and other vendors to manage and troubleshoot the system  Manage data storage devices
VMware vSphere Storage <sup>†</sup>	Learn how to set up and manage a system using VMware vSphere with Fibre Channel storage area networks (SANs) or iSCSI storage systems

<sup>†</sup> Available from VMware at <http://www.vmware.com/support/pubs/>.

---

## Chapter 2

# Electrical Power Planning

For information about planning appropriate AC electrical power for your system and its peripheral components, see:

- [“Redundant Power Sources” on page 2-1](#)
- [“AC Power and HVAC Service Requirements” on page 2-2](#)
- [“Selecting a UPS Unit for ftServer Systems” on page 2-6](#)
- [“Power Cord Summary” on page 2-7](#)
- [“Grounding Requirements” on page 2-10](#)

### Related Topic

- [Chapter 5, “Rack Configuration Planning”](#)

## Redundant Power Sources

ftServer systems require at least two separate and independent AC power sources—an *A-side* power source and a *B-side* power source—that provide power to the system’s power receptacles, labeled A and B, respectively. Either source must be capable of continuing to provide power if power to the other source is lost.

The A-side power source provides power to the top CPU-I/O enclosure, to one-half of a storage enclosure, and to components that do not require two sources of power, such as tape-drive enclosures and a monitor. If you use an uninterruptible power supply (UPS), the UPS is, in these standard, documented configurations, the A-side power source.

The B-side power source provides power to the bottom CPU-I/O enclosure and to the second half of a storage enclosure.

Optionally, a pair of PDUs supplies power to multiple systems and components in a cabinet. The top PDU in the cabinet provides A-side power; that is, it powers one CPU-I/O enclosure and one side of an external storage enclosure, and it is the only source of power to tape drives. The bottom PDU provides B-side power; that is, it provides power to the other CPU-I/O enclosure and to the other side of an external storage enclosure.

The wattage required from the A-side power source will always be equal to or greater than the wattage required from the B-side power source.

## AC Power and HVAC Service Requirements

From [Table 7-1](#), obtain the nominal input line voltage (volts AC) and frequency (Hz) required for optional storage systems. In general, provide 100–127 VAC or 200–240 VAC at 50 or 60 Hz for optional components. PDUs require 200–240 VAC at 50 or 60 Hz. Operating the system at the higher end of the voltage range, when possible, results in higher power system efficiency and consequently less generated heat and lower utility costs.

For detailed information about the plug types and lengths of the power cords provided with the system, see [“Power Cord Summary” on page 2-7](#).

The power service must be properly wired and grounded according to local standards and regulations. See [Appendix B, “Electrical Circuit and Wiring Information”](#), for more information.

### NOTE

A branch circuit breaker with ground fault protection must allow a minimum of 3.5 milliamperes (mA) leakage current for each power cord.

Use the following worksheets to determine AC power requirements for the site.

- In [Table 2-1](#), determine the power requirements at the A-side power source.
- In [Table 2-2](#), determine the power requirements at the B-side power source.
- In [Table 2-3](#), determine the power requirements for components outside of the cabinet (for example, monitor, tape drives, ASN modem, and so on). These components can share a power source with the A-side or B-side components.
- In [Table 2-4](#), determine the related HVAC requirements.

### To determine AC power requirements

Provide information in [Tables 2-1](#), [2-2](#), and [2-3](#) as follows:

1. In the **Quantity** column, write the number of each type of component.
2. Multiply the entry in the **Quantity** column by the number in the **Watts** column, and enter the result in the **Watts Subtotal** column.
3. Add the values in the **Watts Subtotal** column, and enter the sum on the bottom line. This value indicates the maximum power requirement for each power source.

**Table 2-1. Worksheet: Determining A-Side Power Requirements**

System Component	Quantity	Watts	Watts Subtotal
ftServer 2900 and 4900 systems		x 800	
ftServer 6900 systems		x 1000	
Storage enclosure <sup>†</sup>		x	
Fibre Channel switch <sup>‡</sup>		x	
User-supplied components			
TOTAL A-SIDE POWER REQUIREMENTS			

<sup>†</sup> See [Table 7-1](#) for the wattage of optional storage enclosures you purchase from Stratus.

<sup>‡</sup> If you are using Fibre Channel switches to connect the systems to storage enclosures, include on this line the power requirements for a Fibre Channel switch. Two switches are required for fault-tolerant operation. Connect one switch to A-side power and the other switch to B-side power.

**Table 2-2. Worksheet: Determining B-Side Power Requirements**

System Component	Quantity	Watts	Watts Subtotal
ftServer 2900 and 4900 systems		x 800	
ftServer 6900 systems		x 1000	
Storage enclosure <sup>†</sup>		x	
Fibre Channel switch <sup>‡</sup>		x	
User-supplied components			
TOTAL B-SIDE POWER REQUIREMENTS			

<sup>†</sup> See [Table 7-1](#) for the wattage of optional storage enclosures you purchase from Stratus.

<sup>‡</sup> If you are using Fibre Channel switches to connect the systems to storage enclosures, include on this line the power requirements for a Fibre Channel switch. Two switches are required for fault-tolerant operation. Connect one switch to A-side power and the other switch to B-side power.

**Table 2-3. Worksheet: Determining External Power Requirements**

System Component	Watts
Other peripheral components	
<b>TOTAL EXTERNAL POWER REQUIREMENTS</b>	

**To determine HVAC requirements**

1. Add together the values from the bottom lines of Tables 2-1, 2-2, and 2-3, subtract the storage enclosure total from Table 2-2, and enter the value in the **Total Watts** column of Table 2-4.
2. Multiply the value in the **Total Watts** column by 3.41, and enter the number of BTUs in the **BTUs/hr. Subtotal** column.

**Table 2-4. HVAC Requirements**

<b>Total Watts</b> (From Tables 2-1, 2-2, and 2-3)	<b>Convert to BTUs</b>	<b>BTUs/hr. Subtotal</b>
	x 3.41 =	

**AC Power Outlet Requirements**

If you **do** use a pair of PDUs in the cabinet, use Tables 2-5 and 2-6 to determine the total number of power outlets required **outside the cabinet**.

1. In the **Quantity** column, write the number of each type of component.
2. Multiply the value in the **Quantity** column by the value in the **Outlets** column, and enter the total in the **Subtotal** column.
3. Add the values in the **Subtotal** column and enter the sum on the bottom line.

**Table 2-5. Worksheet: A-Side External Power Outlet Requirements: PDUs Used**

Component	Quantity		Outlets	Subtotal
PDUs		x	1	
Other external components				
TOTAL NUMBER OF A-SIDE POWER OUTLETS				

**Table 2-6. Worksheet: B-Side External Power Outlet Requirements: PDUs Used**

Component	Quantity		Outlets	Subtotal
PDUs		x	1	
Other external components				
TOTAL NUMBER OF B-SIDE POWER OUTLETS				

If you do **not** use PDUs in the cabinet, use Tables 2-7 and 2-8 to determine the number of AC power outlets required **outside the cabinet**.

1. In the **Quantity** column, write the number of each type of component.
2. Multiply the value in the **Quantity** column by the value in the **Outlets** column, and enter the total in the **Subtotal** column.
3. Add the values in the **Subtotal** column and enter the sum on the bottom line.

**Table 2-7. Worksheet: A-Side External Power Outlet Requirements: No PDUs**

Component	Quantity		Outlets	Subtotal
ftServer systems		x	1	
Storage enclosures		x	1	
External monitor		x	1	
Tape-drive enclosure		x	1	
Other peripheral components				
<b>TOTAL NUMBER OF A-SIDE POWER OUTLETS</b>				

**Table 2-8. Worksheet: B-Side External Power Outlet Requirements: No PDUs**

Component	Quantity		Outlets	Subtotal
ftServer systems		x	1	
Storage enclosures		x	1	
Other peripheral components				
<b>TOTAL NUMBER OF B-SIDE POWER OUTLETS</b>				

## Connecting a System Directly to Separate AC Sources

If you do not connect your ftServer system or PDUs to a UPS, provide two AC power sources that are as electrically independent of each other as the installation site allows.

At a minimum, the two power sources must be powered by separate circuit breakers (maximum of 20A) to AC power and, if possible, be independent of each other beyond that level. The more electrical separation between the two power sources, the less likely they will both fail at the same time. Due to redundancy in ftServer systems, power to either side of the system keeps the system in operation, although the system is no longer fault-tolerant.

The following figures in [Chapter 11, “Connecting the System to Electrical Power”](#), show how to connect a system directly to separate AC sources:

- [Figure 11-1](#) shows how to connect rack-mounted ftServer 2900, 4900, and 6900 systems directly to two separate AC power sources.
- [Figure 11-3](#) shows how to connect PDUs directly to two separate power sources.

## Selecting a UPS Unit for ftServer Systems

Stratus does not sell or service UPS units. However, Stratus has qualified UPS models for use with ftServer 2900, 4900, and 6900 systems.

Use [Table 2-1](#) to determine the number of watts the A-side of your system requires, and then see [http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html) to select an appropriate UPS model.

### NOTE

Site planning information for the UPS in this document is of a general nature only. Do not rely exclusively on the UPS information in this document. Contact APC at <http://www.apc.com> for detailed UPS specifications, documentation, sizing, and ordering information.

## Communicating with a UPS over a Network

Use the following additional tools to enable a UPS and an ftServer system to communicate over the network:

- APC UPS Network Management Card 2 (APC part number AP9630)
- APC PowerChute® Network Shutdown for the ftServer system. (See [http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html) for the PowerChute Network Shutdown (PCNS) release number.)

When you install your ftServer system, download PCNS from APC, and install and configure the tool on the system, as described in one of the following manuals:

- *Stratus Automated Uptime Layer for Windows-based ftServer Systems: Installation and Configuration* (R002W)
- *Stratus Automated Uptime Layer for Linux-based ftServer Systems: Installation and Configuration* (R013L)
- *Stratus Automated Uptime Layer for VMware vSphere-based ftServer Systems: Installation and Configuration* (R004E)



PCNS monitors the UPS for an imminent power loss, and initiates an orderly shutdown of the system before power is lost.

## Connecting a System Directly to a UPS

Figure 11-2 shows how to connect the A-side power connectors of your system directly to a UPS.

## Power Cord Summary

Stratus supplies tested and approved AC power cords for the following components:

- [ftServer systems and peripheral components](#)
- [PDUs](#)



### CAUTION

Place all power cords out of the way of foot traffic.



### MISE EN GARDE

Éloigner tous les cordons d'alimentation du passage.

Power cords described as Domestic are made with American Wire Gauge (AWG) cordage and are intended for use in North America. Refer to UL 62 and CSA C22.2, No. 49. All other power cords are made with International cordage and are intended for use in the specified countries, and other countries that use that standard.

## Power Cords for ftServer Systems and Peripheral Components

Table 2-9 lists the available power cords that connect ftServer systems and peripheral components directly to an AC power source (not to a PDU or to a UPS).

**Table 2-9. Power Cords - ftServer Systems and Peripheral Components to AC Power**

Marketing ID/	Plug Type	Rating	Length	Locale
B50101F	NEMA 5-15, UL/CSA approved, to IEC 60320 C13	15A/127V	7 ft (2.1m)	North America (Domestic)
B50104F	NEMA 5-15, UL/CSA approved, to IEC 60320 C13	15A/127V	14.8 ft (4.5m)	North America (Domestic)
B50112F	CEE 7 VII to IEC 60320 C13	16A/250V	14.8 ft (4.5m)	Europe (Continental)

**Table 2-9. Power Cords - ftServer Systems and Peripheral Components to AC Power** *(Continued)*

Marketing ID/	Plug Type	Rating	Length	Locale
B50116F	BS 1363/A to IEC 60320 C13	13A/250V	14.8 ft (4.5m)	United Kingdom
B50124F	AS/NZS 3112:1993 to IEC 60320 C13	10A/250V	14.8 ft (4.5m)	Australia
B50140F	SEV 1011-S24507 to IEC 60320 C13	10A/250V	14.8 ft (4.5m)	Switzerland
B50152F	SABS164-1:1992 ZA/3 to IEC 60320 C13	13A/250V	14.8 ft (4.5m)	South Africa/India
B50153F	IEC 60309, TUV approved, to IEC 60320 C13	16A/250V	14.8 ft (4.5m)	International, locking power cord
B50157F	CEE 7 VII to IEC 60320 C13	10A/250V	15 ft (4.6m)	Korea
B50160F	NEMA 5-15, PSE approved, to IEC 60320 C13	15A/127V	15 ft (4.6m)	Japan (100V applications)
B50161F	NEMA L6-20, UL approved, to IEC 60320 C13	20A/250V	14.8 ft (4.5m)	North America, locking power cord
B50162F	GB1002-1996, CCC approved, to IEC 60320 C13	10A/250V	8 ft (2.4m)	China
B50173F	NEMA 5-15, BSMI approved, to IEC 60320 C13	10A/125V	14.8 ft (4.5m)	Taiwan
B50174	L6-20, PSE approved, to IEC 60320 C13	15A/250V	15 ft (4.6m)	Japan, locking power cord (200V applications)
B50176	IEC 60227, INMETRO approved, to IEC 60320 C13	10A/250V	14.8 ft (4.5m)	Brazil

Table 2-10 lists the available power cords that connect ftServer systems to [qualified UPS models](#) from APC.

**Table 2-10. Power Cords Between ftServer Systems or Storage Systems and a UPS**

Marketing ID	Plug Types	Rating	Length	Locale
B50104F-P	NEMA 5-15 to IEC 60320 C13	15A/127V	14.8 ft (4.5m)	North America
B50160F-P	NEMA 5-15 to IEC 60320 C13	15A/127V	15 ft (4.6m)	Japan

**Table 2-10. Power Cords Between ftServer Systems or Storage Systems and a UPS** (Continued)

Marketing ID	Plug Types	Rating	Length	Locale
B50161F-P	NEMA L6-20 to IEC 60320 C13	20A/250V	14.8 ft (4.5m)	North America, locking power cord
B50301F-P	IEC 60320 C14 to IEC 60320 C13	10A/250V	14.8 ft (4.5m)	International
B50174-P	L6-20, PSE approved, to IEC 60320 C13	15A/250V	15 ft (4.6m)	Japan, locking power cord (200V applications)

## PDU Power Cords

The PDU supplies power to ftServer systems. [Table 2-11](#) lists the available power cords that connect PDUs directly to an AC power source. [Table 2-12](#) describes the power cords used to connect PDUs to a UPS. [Table 2-13](#) describes the gray and black power (*jumper*) cables that are provided to connect ftServer systems to PDUs.

**Table 2-11. Power Cords to Connect PDUs Directly to AC Power Mains**

Marketing ID	Plug Type	Rating	Length	Locale
B50154F	IEC 60320 C19 to IEC 60309	20A/250V	15 ft (4.6m)	International
B50171F	IEC 60320 C19 to NEMA L6-20, UL approved	16A/250V	14.8 ft (4.5m)	North America
B50175	IEC 60320 C19 to NEMA L6-20, PSE approved	20A/250V	15 ft (4.6m)	Japan, locking power cord

**Table 2-12. Power Cords to Connect PDUs to a UPS**

Marketing ID	Plug Type	Rating	Length	Locale
B50171F	IEC 60320 C19 to NEMA L6-20, UL approved	16A/250V	14.8 ft (4.5m)	North America
B50175	IEC 60320 C19 to NEMA L6-20, PSE approved	20A/250V	15 ft (4.6m)	Japan
B52700F-45M	IEC 60320 C19 to IEC 60320 C20	20A/250V	14.8 ft (4.5m)	International

**Table 2-13. System Power (*Jumper*) Cables to Connect ftServer Systems to PDUs**

Marketing ID	Plug Type to System	Rating	Length	Locale
B50502F	IEC 60320 C13 to IEC 60320 C14	10A/250V	6.6 ft (2m)	All

## Grounding Requirements



**WARNING** \_\_\_\_\_

Incorrect grounding can cause severe personal injury and extensive equipment damage.



**AVERTISSEMENT** \_\_\_\_\_

Une mise à la terre incorrecte peut provoquer des blessures graves et endommager sérieusement l'équipement.

The ftServer system obtains its protective earth (PE) ground through the power cord.

See [“Grounding Considerations” on page B-1](#) for a more complete discussion of ftServer system grounding.

---

## Chapter 3

# Space Planning

For information about planning sufficient space for your ftServer system, see:

- [“Room Requirements” on page 3-1](#)
- [“Planning for Cables” on page 3-3](#)

### Room Requirements

To ensure that the installation site provides a properly equipped, cooled, and sized environment, make sure that the site:

- Provides clearances for air circulation, opening cabinet doors, removing cabinet panels, and servicing the system from the front and rear.

Locate the front and rear of the system at least 2.5 feet (ft) (0.76 meters (m)) away from walls and other obstructions.

- Maintains reasonable temperature and humidity levels and has a thermometer and humidistat to monitor room temperature and humidity.

See [Chapter 2](#) for detailed information about HVAC planning and [Appendix A](#) for detailed information about temperature and humidity requirements.

- Is as free as possible of airborne contamination (particulate and gaseous).

#### NOTICE

---

Due to the mission-critical nature of Stratus servers, data centers housing the equipment should follow the guidelines of airborne contamination (particulate and gaseous) as outlined in the ASHRAE (TC) 9.9 documentation. Particulate matter to adhere to ISO 14644-1 Class 8. Gaseous contamination, such as sulfur or chlorine-bearing gases to adhere to ANSI/ISA-71.04-1985 Severity level G1.

Dust buildup in the system can impede air circulation and heat transfer, causing components to become less reliable as the ambient temperature rises.

Fans clogged by dust fail to expel hot air, causing circuit boards to overheat and fail.

Dust on circuit boards raises the temperature, thus reducing the component's mean time between failure (MTBF).

Dust circulating in the room increases the risk of fire within the room by providing potential combustible material within the environment.

Dust contamination on tape devices causes mis-reads and -writes, leading to failure of attempts to back up and restore data.

- Has sufficient floor space for external components.
- Provides a table or desktop for external devices such as a telephone, external monitor, keyboard, and mouse.

Each of these devices requires table or rack space.

#### NOTICE \_\_\_\_\_

Do not place a peripheral component on top of a system cabinet.

- Allows the system and peripheral devices to be placed within the room so that power cords and communications cables will reach their respective power receptacles, telephone jacks, and other connection points.
- Provides communications cable connectors or patch panels as needed.
- Provides two electrically separate grounded AC wall outlets, within reach of the power cords from the system or PDUs, and, if used, UPS units. The lengths of detachable power cords are listed in [“Power Cords for ftServer Systems and Peripheral Components” on page 2-7](#) and [“PDU Power Cords” on page 2-9](#). If the power cord must be hard-wired, consult an electrician to plan the length of the power cord.
- Provides grounded AC wall outlets for external components that do not connect to a PDU.
- Provides cutouts in the floor for routing cables, if the site has an elevated floor.
- Contains space for future expansion.

#### NOTICE \_\_\_\_\_

Do not place the system in an area of high electrostatic discharge. Static electricity may damage components. Do

not locate components near transformers or other electromagnetic devices.

See [Appendix A](#) for the dimensions of system components.

## Planning for Cables

To accommodate cables from your system, make sure to provide:

- One or two telephone lines:
  - One telephone line for use when calling for service
  - One telephone line for the ASN modem, if used
- Ethernet jacks, switches, or hubs, as needed
- Two electrically separate grounded AC wall outlets, or a UPS and a wall outlet, within reach of the power cords from the system or PDUs, and additional outlets for any components that do not connect to a PDU
- For optional components, AC wall outlets within reach of the power cords from the components, or use PDUs

Make sure that cables you plan to connect to the system are long enough to reach between the system and external components or connections. For information about specific cables and power cords, see the following:

- [“Power Cord Summary” on page 2-7](#)
- [Chapter 4, “Communications Line Planning”](#)
- [“Monitor Requirements” on page 6-5](#)

For information about cable lengths for ftScalable Storage systems see:

- *ftScalable Storage G3: Getting Started Guide* (R687)
- *Using ftScalable Storage G4 Systems* (R789) and the link in the [ftScalable Storage G4 System Documentation](#) section in the Preface.





---

## Chapter 4

# Communications Line Planning

Make sure that you plan the locations of your ftServer system and its external components so that all communications and data cables will reach their connection points.

This chapter contains the following sections:

- “Supported Host Bus Adapters” on page 4-2
- “Supported Storage Systems” on page 4-2
- “Connections from Storage Systems to ftServer Systems” on page 4-3
- “Ethernet Cables” on page 4-5
- “Telephone Line Connections” on page 4-9

### NOTES

---

1. If you have a unique network requirement, contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative. For more information about the CAC, see “Getting Help” in the Preface or the <http://www.stratus.com/go/support> web site.
2. See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) for more information about the adapters Stratus supplies for your ftServer system.

## Supported Host Bus Adapters

[Table 4-1](#) summarizes the host bus adapters (HBAs) supported by ftServer 2900, 4900, and 6900 systems.

**Table 4-1. HBAs Supported by ftServer 2900, 4900, and 6900 Systems**

HBA	For Connections to	Supported on
U112A Single-Port 16-Gbps Fibre Channel PCI-Express Adapter	External storage systems	Windows- Linux- and VMware vSphere-based systems
U114 Eight-Port SAS PCI-Express Adapter	Tape drives	Windows- and Linux-based systems

You must provide your own cables, with one exception: two 2-meter 50/125  $\mu\text{m}$  (micrometer) OM3 multi-mode fiber (MMF) dual-fiber cables with LC-type connectors (part number AW-B91000-020) are included with each ftScalable Storage system.

See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) for information about PCI-Express adapters.

## Supported Storage Systems

[Table 4-2](#) summarizes the external storage systems supported by ftServer 2900, 4900, and 6900 systems.

**Table 4-2. Storage Systems Supported by ftServer 2900, 4900, and 6900 Systems**

Storage System	Supported Operating System of Host ftServer System
ftScalable Storage G4	Automated Uptime Layer for Linux-based ftServer Systems, Release 11.1.6.0 and later  Automated Uptime Layer for VMware vSphere-based ftServer Systems, Release 6.7.3.1 and later
ftScalable Storage G3	Automated Uptime Layer for Windows-based ftServer Systems, Release 12.0.0.0 and later  Automated Uptime Layer for VMware vSphere-based ftServer Systems, Release 6.7.1.0 and later

For a summary of connection options, see [“Connections from Storage Systems to ftServer Systems” on page 4-3](#).

## Connections from Storage Systems to ftServer Systems

ftServer systems support both Fibre Channel (FC) connections and Internet SCSI (iSCSI) connections to storage systems. For more information, see the following sections:

- [“Fibre Channel Connections” on page 4-3](#)
- [“iSCSI Connections” on page 4-4](#)

### Fibre Channel Connections

ftServer systems support FC connections to the ftScalable Storage systems listed in [Table 4-2](#) through the optical FC HBAs listed in [Table 4-1](#).

ftServer systems support the following FC connection options:

- Directly attach the FC cables between one or two ftServer systems and the RAID controller trays of an ftScalable Storage system.
- Connect multiple ftServer systems to ftScalable Storage systems through a storage area network (SAN).

A pair of optical FC HBAs provides fault tolerance through the multipath I/O capability of the operating system. The adapters are single-ported, and each member of the pair is installed in a different CPU-I/O enclosure: one in the top enclosure and the other in the bottom enclosure.

[Table 4-3](#) lists the optical FC cables available for connecting the supported FC PCI adapter. The cable sets come in blue and yellow, to make it easy to distinguish between members of cable pairs.

**Table 4-3. Optical FC Cables**

Length	Part number Blue Cables	Part number Yellow Cables
6.5 ft (2m)	AW-B91000-020	AW-B91001-020

For detailed information about making the FC connections to supported ftScalable Storage systems, see one of the following:

- *ftScalable Storage G3: Getting Started Guide* (R687)
- *Using ftScalable Storage G4 Systems* (R789)

Specifically, see the following figures for supported FC connections between ftServer systems to ftScalable Storage Systems:

- Single-Host DAS Connections
- Multi-Host DAS Connections
- Dual-Host SAN Connections

For information about supported FC PCI adapters, see the *Stratus ftServer Systems: PCI Adapter Guide* (R461).

## iSCSI Connections

ftServer systems support iSCSI connections to the storage systems listed in [Table 4-2](#).

### NOTES

1. Ensure that your ftServer system provides adequate bandwidth for your iSCSI storage requirements.
2. ftServer systems support only software iSCSI initiators in conjunction with standard network adapters. Hardware iSCSI HBAs are not supported. Contact your account representative for information about third-party iSCSI storage systems qualified for use with ftServer systems.

Each ftServer system must contain two available Ethernet adapters (one in each CPU-I/O enclosure). You can use embedded Ethernet adapters or U113 Dual-Port 10/100/1000 Base-T Ethernet PCI-Express Adapters. For better performance you can use one of the following:

- On VMware vSphere- and Windows-based systems, U117A Dual-Port Fiber 10-Gbps Ethernet PCI-Express Adapters or U118 Dual-Port RJ-45 10-Gigabit Ethernet PCI-Express Adapters, where applicable.
- On Linux-based systems, U584 Dual-Port Fiber 10-Gigabit Ethernet PCI-Express Adapter, where applicable.

See the *Stratus ftServer Systems: PCI Adapter Guide* (R461) for additional information about supported Ethernet adapters.

For cabling diagrams and detailed information about making the iSCSI connections to supported ftScalable Storage systems, see one of the following:

- *ftScalable Storage G3: Getting Started Guide* (R687)
- *Using ftScalable Storage G4 Systems* (R789)

## Ethernet Cables

In addition to the Ethernet cables listed in this section, you must also plan to provide network connection points. Consider providing a network connection with Internet access for each of the VTMs to allow you and, if authorized, the CAC or your authorized Stratus service representative to access the VTMs' web interface to operate the system and diagnose problems remotely. If available, this mode of accessing the VTMs is faster and more reliable than dialup through the ASN modem.



### CAUTION

Make sure network cables can be routed out of the way of foot traffic.



### MISE EN GARDE

Vérifier que les câbles réseau peuvent être acheminés en dehors du passage.

You will need Ethernet cables for the following connections:

- From embedded Ethernet ports on the system and Ethernet ports on optional Ethernet PCIe adapters to network connection points. See [“Planning for Network Connectivity” on page 1-4](#) for information about the number and types of embedded Ethernet ports available on each system.

### NOTES

1. Two Ethernet ports are typically paired and teamed in software for fault tolerance. Each member of the pair requires an Ethernet cable.
  2. If you will use the embedded 10GbE ports on an ftServer 4900 or 6900 system, see [“Category-6/Category-6A Cables” on page 4-8](#) for additional site-planning information.
- From each supported ftScalable Storage RAID controller tray, if present, to a network connection point, for web management and monitoring of ftScalable Storage systems

- From a management PC to a network connection point, for web management of ftScalable Storage systems

The same network must provide access to the RAID controllers on the ftScalable controller tray from the PC.

[Table 4-4](#) describes the cables you must supply for network connectivity. Be sure to provide cables of sufficient length for the distance between the system and a wall jack or hub.

**Table 4-4. Customer-Supplied Ethernet Cables**

Component	Quantity	Cable Length	Cable Type
VTM Ethernet Port	2	N/A. You must supply these cables.  The maximum allowable distance from these ports to a switch or a hub is 328 ft (100m).	24 AWG Unshielded Twisted Pair (UTP) EIA/TIA-Verified, Category-3 or Category-5 wire, with RJ-45 modular connectors terminated with pair-wiring adhering to the EIA/TIA 568-A or EIA/TIA 568-B standard.  For connections to an Ethernet hub or switch, provide a straight-through cable.  For 100- or 1000-Mbps (fast Ethernet) operation, provide full-duplex, or Category-5 Ethernet cables.
1GbE Embedded Ethernet Port	4		
U113 Dual-Port 10/100/1000 Base-T Ethernet PCI-Express Adapter (RJ-45 copper)	Ordered in pairs. Typically teamed for fault tolerance.	The maximum distance between the adapter and a hub or a switch is 328 ft (100m).	The customer must supply a standard Ethernet cable to the following specifications:  1000 Mbps requires a Category-5E cable  100 Mbps (fast Ethernet connection) requires either a Category-5E (recommended) or Category-5 cable  10 Mbps requires either a Category-5, Category-4, or Category-3 cable

**Table 4-4. Customer-Supplied Ethernet Cables** *(Continued)*

<b>Component</b>	<b>Quantity</b>	<b>Cable Length</b>	<b>Cable Type</b>
U117A Dual-Port Fiber 10-Gbps Ethernet PCI-Express Adapter	Ordered in pairs. Typically teamed for fault tolerance.	The maximum distance between the adapter and a hub or a switch is 984 ft (300m).	The customer must supply a multi-mode fiber (MMF), 50/125 mm dual-fiber cable rated with the OM3 performance code, with LC-type connectors to the PCIe adapter, and connectors on the other end that are compatible with your site network switch.
U584 Dual-Port Fiber 10-Gigabit Ethernet PCI-Express Adapter	Ordered in pairs. Typically teamed for fault tolerance.	The maximum distance between the adapter and a hub or a switch is 984 ft (300m).	The customer must supply a multi-mode fiber (MMF), 50/125 mm dual-fiber cable rated with the OM3 performance code, with LC-type connectors to the PCIe adapter, and connectors on the other end that are compatible with your site network switch.
U118 Dual-Port RJ-45 10-Gigabit Ethernet PCI-Express Adapter (RJ-45 copper)	Ordered in pairs. Typically teamed for fault tolerance.	The maximum distance between the adapter and a hub or a switch is 328 ft (100m).	The customer must supply a Category-6A Ethernet cable.
10GbE Embedded Ethernet Port	4	N/A. You must supply these cables.  The maximum allowable distance from these ports to a switch or a hub is 328 ft (100m) for Category-6A wire, and 180 ft (55m) for Category-6 wire.	22 AWG Unshielded Twisted Pair (UTP) EIA/TIA-Verified, Category-6 or Category-6A wire, with RJ-45 modular connectors terminated with pair-wiring adhering to the TIA/EIA-568-B.2-10 standard

**Table 4-4. Customer-Supplied Ethernet Cables** (Continued)

Component	Quantity	Cable Length	Cable Type
ftScalable Storage RAID controller tray (note that ftScalable Storage systems are optional)	3: two for each controller tray and one to a management PC	N/A. You must supply these cables.	<p>24 AWG Unshielded Twisted Pair (UTP) EIA/TIA-Verified, Category-3 or Category-5 wire, with RJ-45 modular connectors terminated with pair-wiring adhering to the EIA/TIA 568-A or EIA/TIA 568-B standard.</p> <p>For connections to an Ethernet hub or switch, provide a straight-through cable.</p> <p>For 100-Mbps (fast Ethernet) operation, provide full-duplex, or Category-5 Ethernet cables.</p>

## Category-6/Category-6A Cables

If your system contains embedded 10GbE ports using Category-6/Category-6A cables, additional site planning is needed to prevent disruptions from electromagnetic interference (EMI).

- Between devices, try to have as close as possible to zero (0) volt potential relative to earth reference ground. See [“Grounding Considerations” on page B-1](#) for detailed information.
- Separate all power cords from the cables.
- Do not route the cables near fluorescent lights.
- Ground the cable trays.
- Avoid using two-way radios and cell phones near the cables.
- If your site is located near high electric fields, transmission towers, high-voltage transmission lines, or electrical switching relays, consider using shielded Category-6A cable.

See the following standards for more information about Category-6A cables and how to qualify a test site:

- The ANSI/TIA-568 family of Telecommunications Standards (C.0, C.1, C.2, C.3)
- TIA/EIA-607: Grounding and Bonding Requirements for Telecommunications in Commercial Buildings



## Telephone Line Connections

The system requires up to two telephone cables, and related connection points:

- One telephone line for use when calling for service
- One analog telephone line to connect a modem dedicated to ASN connectivity, if used, to a telephone connection point

A 7 ft (2.13m) telephone cable (minimum 26 AWG phone cord) is shipped with the modem, except with orders destined for the Republic of Korea.

### NOTE

A dedicated phone line provides the most reliable service for ASN connections. ASN calls routed through a PBX might be slow due to the load on the PBX, or might not complete successfully because the calls can become disconnected. If you must use a PBX, do not route the telephone extension through a switchboard; instead, provide a direct-dial analog number.

- Always use telephone cable that is 26 AWG or greater and is UL approved.



---

## Chapter 5

# Rack Configuration Planning

For information about planning a rack configuration, see:

- [“Using PDUs” on page 5-1](#)
- [“Determining PDU Requirements” on page 5-2](#)
- [“Example of PDU Usage Calculation” on page 5-4](#)

## Using PDUs

ftServer systems have two power receptacles. Correspondingly, two power distribution units (PDUs) provide power to the receptacles.

Use of PDUs is optional unless you have a support agreement with Stratus. If you do have a support agreement with Stratus, use pairs of PDUs to provide AC power to systems and components in a cabinet **if six or more power cords would otherwise exit from the cabinet.**

The A-side (top) PDU provides power to:

- The A-side of each system
- The A-side of a storage enclosure
- Any rack-mounted tape drives

The B-side (bottom) PDU provides power to the other side of each system and to the B-side of a storage enclosure.

Because the A-side PDU always uses at least as many power cords and consumes at least as much power as the B-side PDU, plan the cabinet configuration so that the A-side PDU can support the configuration.

### NOTES \_\_\_\_\_

1. Connect each PDU to a separate AC power source.
2. Install a maximum of two pairs of PDUs in a rack.

Use the information in [“Determining PDU Requirements” on page 5-2](#) to plan the rack configuration for your ftServer system. [“Example of PDU Usage Calculation” on page 5-4](#) shows how to use the information you gather for planning the rack configuration.



#### **WARNING**

For important safety information about your PDUs, see [“PDU Safety Considerations” on page B-10](#).



#### **AVERTISSEMENT**

Pour obtenir des informations importantes sur la sécurité de vos unités de distribution de l'alimentation, consultez la section [“PDU Safety Considerations” on page B-10](#).

## **Determining PDU Requirements**

Using the nominal voltage rating of the power receptacle at your site and the total wattage of the components that will draw power from the A-side PDU, complete the information in Tables [5-1](#) and [5-2](#). This information will help you determine the current that the ftServer systems and rack-mounted components will draw and whether you need a second pair of PDUs.

### **To complete [Table 5-1](#)**

1. Obtain the voltage available at your location. Consult a facilities manager at your site to make sure you know the correct voltage.
2. For each type of component you plan to place in the rack, calculate the required current, as follows: Divide the wattage of the element, listed in the Watts column of [Table 5-1](#), by the voltage available at your site. Multiply the result by 1.25 and enter the value in the **Current** column.

**Table 5-1. Current and Rack-Space Requirements**

Component	Watts	÷	Site Voltage <sup>†</sup>	x 1.25 =	Current (A)	Rack Space
Single CPU-I/O enclosure of ftServer 2900 or 4900 system	800	÷	200	x 1.25 =	5A	4U (full system)
Single CPU-I/O enclosure of ftServer 6900 system	1000	÷	200	x 1.25 =	5A	4U (full system)
Tape-drive enclosure <sup>‡</sup>						
Disk-storage enclosure <sup>§</sup>		÷		x 1.25 =		

<sup>†</sup> PDU input voltage is 200-240 VAC.

<sup>‡</sup> See your tape-drive documentation for the wattage and rack requirements of your tape drive.

<sup>§</sup> See [Table 7-1](#) for the wattage and rack requirements of your disk-storage solutions.

### To complete [Table 5-2](#)

1. In column 1, write the names of each system or component in the rack. If you have more than one system, use a row for each system.
2. In column 2, write the cumulative number of rack units (Us): Add the number of Us (see [Table 5-1](#)) for the component to the value in the space above and write the result.
3. In column 3, write the cumulative number of outlets required. For each component, add 1 to the value in the space above and write the result.
4. In column 4, write the cumulative current required. For each component, add the current for the component, which you entered in [Table 5-1](#), to the value in the space above and write the result.

You need another pair of PDUs if the cumulative number of outlets exceeds 8 or if the cumulative current exceeds 15A. Use the information in column 2 to plan the size and number of racks required.

Table 5-2. Calculating A-Side PDU and Rack-Space Requirements

1. Component	2. Cumulative Space Used	3. Cumulative Number of Outlets	4. Cumulative Current (A)
PDU Pair	2U	0	0.00

Example of PDU Usage Calculation

Table 5-3 shows how to use the information from Table 5-1 to calculate the required rack space and the current when the PDU is connected to a NEMA L6-20R receptacle in the United States, with a voltage of 208V.

Table 5-3. Example: Current and Rack-Space Requirements (208 volts)

Component	Watts	÷	Site Voltage	x 1.25 =	Current (A)	Rack Space
Single CPU-I/O enclosure of ftServer 2900 system	800	÷	208	x 1.25 =	4.80	4U
Tape drive (typical)	80	÷	208	x 1.25 =	0.48	2U
ftScalable Storage G3 system	400	÷	208	x 1.25 =	2.40	2U

Table 5-4 and the explanation that follows show how to use the information from Table 5-3 to determine when you need to buy an additional pair of PDUs or calculate the size and number of cabinets you need.

**Table 5-4. Example: Calculating A-Side PDU and Rack-Space Requirements**

1. Component	2. Cumulative Space Used (U)	3. Cumulative Number of A-Side Outlets	4. Cumulative Current (A)
PDU pair	2	0	0.00
Single CPU-I/O enclosure of ftServer 2900 system	6	1	4.8 <sup>†</sup>
Tape drive (typical)	8	2	5.28
ftScalable Storage G3 system	10	3	7.68
ftServer system	14	4	12.48
PDU pair	2	0	0
Single CPU-I/O enclosure of ftServer 2900 system	6	1	4.8 <sup>†</sup>
Single CPU-I/O enclosure of ftServer 2900 system	10	2	9.6

† For a single CPU-I/O enclosure.

In the calculations in [Table 5-4](#), components were added one by one, calculating:

- The total current demanded by the components
- The total space used in the rack
- The total number of outlets required

In this example, two PDUs can provide enough current for two ftServer 2900 systems, one tape drive (typical), and one ftScalable Storage G3 system. This set of components consumes 12.48 amperes; adding another CPU-I/O enclosure would increase the consumption to 17.28 amperes, which exceeds the 15 amperes limit for the PDUs. The configuration also utilizes four outlets in the A-side PDU and 14U of rack space.

To add any more components, you require another pair of PDUs.

For information about planning a rack configuration, see:

- [“Using PDUs” on page 5-1](#)
- [“Determining PDU Requirements” on page 5-2](#)
- [“Example of PDU Usage Calculation” on page 5-4](#)





---

## Chapter 6

# Cabinet and Monitor Requirements

For requirements related to providing your own cabinet and monitor, see:

- [“Cabinet Requirements” on page 6-1](#)
- [“Monitor Requirements” on page 6-5](#)

## Cabinet Requirements

If you are providing your own cabinet for an ftServer system, make sure the cabinet contains a rack that is 19 inches (in.) wide and that meets the Electronic Industries Association (EIA) 310-D Section 1 standard.

In general, consider the following factors during your site planning for systems in cabinets:

- **Elevated Operating Ambient Temperature**—If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T<sub>ma</sub>) specified by the manufacturer.
- **Reduced Air Flow**—Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- **Mechanical Loading**—Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- **Circuit Overloading**—Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- **Reliable Earthing**—Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Make sure that the cabinet meets the following requirements:

- The cabinet can support the weight of all of the components you plan to install in it. [Appendix A](#) provides the weights of ftServer system components. [Table 7-1](#) provides the weights of ftScalable Storage G3 system components. For the weights of ftScalable Storage G4 system components see the link in the [ftScalable Storage G4 System Documentation](#) section in the Preface.
- The cabinet contains two front and two rear vertical EIA rails, one in each corner of the cabinet, that have the **universal** square-hole pattern as defined in the EIA 310-D Section 1 specification.
- The front vertical rails extend at least 0.5 in. (1.27 centimeters (cm)) beyond the inside edge of the accessory leg, if present, to allow the mounting rails to be fitted. See [Figure 6-1](#).
- The distance between the front vertical rails and the inside of the front door is at least 3.0 in. (7.62 cm).
- The distance between the rear of the system chassis and the inside of the rear door is at least 6.0 in. (15.24 cm).
- The distance between the front and rear vertical rails is between 24.5 in. and 30 in. (62.23 cm and 76.20 cm, respectively).
- The vertical mounting rails have a 0.345" or 0.375" square pattern, with a thickness between 0.063" - 0.105", to accept 10-32 cage nuts and mounting hardware.
- The vertical mounting rails are plated, or some other method is used to ensure continuity for grounding between installed equipment.
- Cable-management brackets are provided to support and constrain data and power cords so that the cables do not interfere with air flow out of the rear of the enclosures, and so that the connectors do not disconnect or break.
- To prevent stray voltages, all components are grounded together through the vertical mounting rails to the cabinet frame, and then to local building ground. To ensure signal quality, use a grounding cable for local building ground.
- There is a plan for maintaining cables and wires to the cabinet by either running them under the floor or placing them overhead in an overhead cable tray.
- Air flows through the cabinet from front to back.
- Air does not recirculate within the cabinet.
- Filler panels cover any unused rack space to prevent air recirculation.

- Blockers are installed between the vertical mounting rails and the side panels at the rear of the cabinet.
- Vents are evenly distributed on the front and rear doors and make up at least 69% of the surface area.

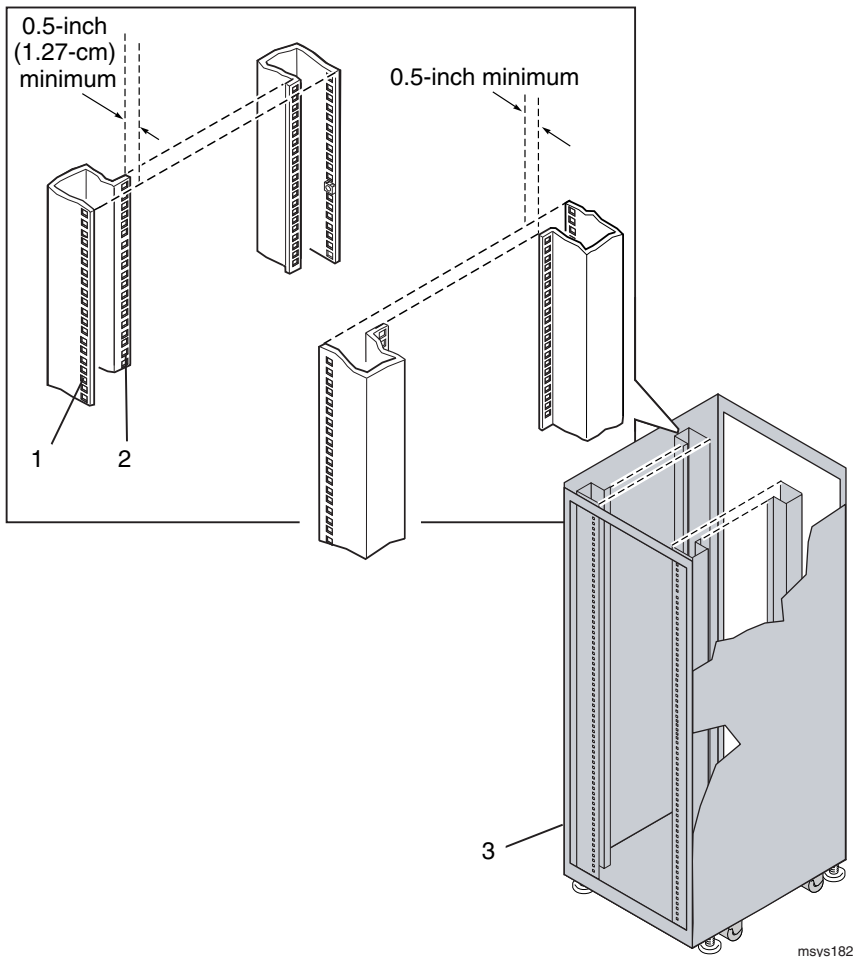
**NOTE** \_\_\_\_\_

If your cabinet does not have vented front and rear doors, you can remove the doors from the cabinet while your ftServer system is operating.

- The final installation conforms to all emission, immunity, safety, and other applicable regulations.

[Figure 6-1](#) shows the required rail clearance between the front vertical rails and the inside edge of an accessory leg.

**Figure 6-1. Rail Clearance**



- 1 Front vertical EIA rail
- 2 Accessory leg
- 3 Front of cabinet

## Monitor Requirements

For your monitor, make sure that:

- The monitor accepts universal 100–240 volts AC (VAC), 50/60 Hertz (Hz) power.
- The VGA cable has a 15-pin D-sub connector.
- The power cord for the monitor is long enough to reach the power source.
- The plug type on the power cord is compatible with the external power source at the site.

For information about connecting a monitor, see [“Connecting a Monitor, Mouse, and Keyboard” on page 10-4](#).



---

## Chapter 7

# Site Planning for Peripheral Components

When planning a site for your ftServer system, consider the electrical, cooling, power, and space needs of your peripheral components. Also consider which PCI adapters are being installed, and the lengths of cables for the PCI adapters and peripheral components.

This chapter contains the following information:

- [“ftScalable Storage System Requirements” on page 7-1](#)
- [“Keyboard Requirements” on page 7-2](#)
- [“Peripheral Components for Windows-based Systems” on page 7-3](#)
- [“Peripheral Components for Linux-based Systems” on page 7-4](#)
- [“Peripheral Components for VMware vSphere-based Systems” on page 7-5](#)

### NOTE

The system temperature and humidity requirements defined in [Table A-2](#) are the **minimum** requirements the site must provide. This chapter specifies the temperature and humidity requirements for other components.

## ftScalable Storage System Requirements

[Table 7-1](#) provides basic site-planning information for ftScalable Storage G3 systems. You need some of this information to complete the worksheets in [Chapter 2](#).

**Table 7-1. Site Planning for ftScalable Storage G3 Systems**

Specification	Value
AC power (watts)	400
Nominal input voltage	100-240 VAC

**Table 7-1. Site Planning for ftScalable Storage G3 Systems** (Continued)

Nominal frequency range	50/60 Hz
Number of AC outlets	2
Height, in rack units	2U
Weight of controller or expansion enclosure with 24 drives (typical) <sup>†</sup>	51.8 lb (23.5 kg)

<sup>†</sup> Weights shown are nominal and subject to variances. Weights may vary due to different power supplies, IOMs, and differing calibrations between scales. Weights may vary due to actual number and type of disk drives installed.

For detailed site-planning information for ftScalable Storage G3 systems, see *ftScalable Storage G3: Getting Started Guide* (R687).

For all site-planning information for ftScalable Storage G4 systems, see the links in the [ftScalable Storage G4 System Documentation](#) section in the Preface.

## Keyboard Requirements

ftServer 2900, 4900, and 6900 systems support the V115 keyboard.

[Table 7-2](#) lists the specifications for the V115 keyboard.

**Table 7-2. V115 Keyboard: Specifications**

Dimension	Value
Height	2.5 in. (6.4 cm; 2U)
Width	19 in. (48.3 cm)
Depth	8 in. (20.3 cm)

A 6-ft (1.83-m) USB cable is attached to the keyboard, and you connect it to a USB port in the system's I/O panel. Another 6-ft (1.83-m) USB cable is attached to the mouse, and you connect it to a second USB port in the system's I/O panel.

For information about connecting a keyboard and mouse, see [“Connecting a Monitor, Mouse, and Keyboard” on page 10-4](#).



## Peripheral Components for Windows-based Systems

Table 7-3 lists the PCI adapters required for each peripheral component on ftServer systems running Automated Uptime Layer for Windows-based ftServer Systems.

**Table 7-3. PCI Adapters and Peripheral Components: Windows-based Systems**

Components	PCI Adapters
External SAS tape drive (customer supplied) and ftServer 2900, 4900, or 6900 system	U114 Eight-Port SAS PCI-Express Adapter
Fibre Channel ftScalable Storage G3 systems and ftServer 2900, 4900, or 6900 systems	U112A Single-Port 16-Gbps Fibre Channel PCI-Express Adapters
iSCSI ftScalable Storage G3 systems and ftServer 2900, 4900, or 6900 systems	Embedded Ethernet adapters  U113 Dual-Port 10/100/1000 Base-T Ethernet PCI-Express Adapters  U117A Dual-Port Fiber 10-Gbps Ethernet PCI-Express Adapter <sup>†</sup>  U118 Dual-Port RJ-45 10-Gigabit Ethernet PCI-Express Adapter

<sup>†</sup> Supported only in ftServer systems with the PCI-Express (PCIe) riser assembly, which is optional in ftServer 4900 systems and standard in ftServer 6900 systems.

To plan a site for a system on which Automated Uptime Layer and the Windows operating system are installed, see the previous chapters in this manual. Also, see the following manuals:

- The *ftScalable Storage G3: Getting Started Guide* (R687) for information about connecting ftScalable Storage G3 systems to ftServer systems
- The *Stratus ftServer Systems: PCI Adapter Guide* (R461) for detailed information about the PCI adapters

For additional information about third-party peripheral equipment that has been tested with ftServer systems, see the following web site:

[http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html)

## Peripheral Components for Linux-based Systems

Table 7-4 lists the PCI adapters required for each peripheral component on ftServer systems running Automated Uptime Layer for Linux-based ftServer Systems.

**Table 7-4. PCI Adapters and Peripheral Components: Linux-based Systems**

Components	PCI Adapter
External SAS tape drive (customer supplied) and ftServer 2900, 4900, or 6900 systems	U114 Eight-Port SAS PCI-Express Adapter
Fibre Channel ftScalable Storage G4 systems and ftServer 2900, 4900, or 6900 systems	U112A Single-Port 16-Gbps Fibre Channel PCI-Express Adapters
iSCSI ftScalable Storage G4 systems and ftServer 2900, 4900, or 6900 systems	Embedded Ethernet adapters  U113 Dual-Port 10/100/1000 Base-T Ethernet PCI-Express Adapters  U118 Dual-Port RJ-45 10-Gigabit Ethernet PCI-Express Adapter  U584 Dual-Port Fiber 10-Gigabit Ethernet PCI-Express Adapters

To plan a site for a system on which Automated Uptime Layer and the Linux operating system are installed, see the previous chapters in this manual. Also, see the following manuals:

- *Using ftScalable Storage G4 Systems* (R789) for information about connecting ftScalable Storage G4 systems to ftServer systems
- The *Stratus ftServer Systems: PCI Adapter Guide* (R461) for detailed information about the PCI adapters

For additional information about third-party peripheral equipment that has been tested with ftServer systems, see the following web site:

[http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html)

## Peripheral Components for VMware vSphere-based Systems

Table 7-5 lists the PCI adapters required for each peripheral component on ftServer systems running Automated Uptime Layer for VMware vSphere-based ftServer Systems.

**Table 7-5. PCI Adapters and Peripheral Components: VMware vSphere-based Systems**

Components	PCI Adapter
Fibre Channel ftScalable Storage G3 or ftScalable Storage G4 systems, and ftServer 2900, 4900, or 6900 systems	U112A Single-Port 16-Gbps Fibre Channel PCI-Express Adapters
iSCSI ftScalable Storage G3 or ftScalable Storage G4 systems, and ftServer 2900, 4900, or 6900 systems	Embedded Ethernet adapters  U113 Dual-Port 10/100/1000 Base-T Ethernet PCI-Express Adapters  U117A Dual-Port Fiber 10-Gbps Ethernet PCI-Express Adapter†  U118 Dual-Port RJ-45 10-Gigabit Ethernet PCI-Express Adapter

† Supported only in ftServer 4900 and 6900 systems with the PCI-Express (PCIe) riser assembly.

To plan a site for a system on which Automated Uptime Layer for VMware vSphere-based ftServer Systems is installed, see the previous chapters in this manual. Also, see the following manuals:

- The *ftScalable Storage G3: Getting Started Guide* (R687) for information about connecting ftScalable Storage G3 systems to ftServer systems
- *Using ftScalable Storage G4 Systems* (R789) for information about connecting ftScalable Storage G4 systems to ftServer systems
- The *Stratus ftServer Systems: PCI Adapter Guide* (R461) for detailed information about the PCI adapters

For additional information about third-party peripheral equipment that has been tested with ftServer systems, see the following web site:

[http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html)



---

## Chapter 8

# Before You Install the System

When you receive your ftServer system, unpack and inspect it as described in the *Read Me First: Unpacking ftServer Systems* (R784) booklet that is attached to the system's outer shipping box.

After you perform the tasks described in that booklet, make sure you read and understand the following important safety information before you begin installing the system:

- [“Safety Considerations” on page 8-1](#)
- [“Safety Notices” on page 8-1](#)

## Safety Considerations

Before installing the system, take the following important precautions:

- Observe all applicable industry safety standards. See the [“Safety Notices” on page 8-1](#).
- Provide the necessary space and light to safely perform the installation.
- Do not wear conducting objects, such as rings, bracelets, and keys.

## Safety Notices



### WARNING

Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions provided with the battery.



### WARNING

The system uses two power cords to provide redundant sources of power. To fully remove power from a system, disconnect both power cords. To reduce the risk that electrical shock could injure a person or damage the

system, exercise caution when working in the unit even when only one power cord is connected.



**WARNING** \_\_\_\_\_

To prevent a cabinet from tipping over and injuring a person or damaging the system, start installing systems from the bottom of the cabinet upward.



**WARNING** \_\_\_\_\_

If you replace the modem cable supplied by Stratus, use a cable with a gauge of at least 26 AWG to prevent fire.



**WARNING** \_\_\_\_\_

To avoid fire, electric shock, and equipment breakdown, prevent water or foreign objects from getting into the equipment. Do not let water or foreign objects, such as pins or paper clips, enter the equipment.



**WARNING** \_\_\_\_\_

To prevent fire or current leakage, do not plug the power cord into a nonconforming outlet. Use a power outlet with appropriate voltage and power type, as specified in this guide.



**WARNING** \_\_\_\_\_

Do not install the equipment where you may need an extension cord. Use of an extension cord that does not meet the power specifications introduces a risk of overheating that could lead to a fire.



**WARNING** \_\_\_\_\_

Disconnect the power cords from the server or power source before you install or relocate the equipment. All voltage is removed only when the power cords are disconnected.

**WARNING**

Do not install or store the equipment in an unsuitable place. Install or store the equipment in a place that meets the requirements specified in this guide. Avoid the following conditions to avoid the risk of fire:

- Dust
- High humidity, such as a place near a boiler
- Direct sunlight
- Instability, such as places not stabilized against earthquakes

**WARNING**

Do not use or store this product in a corrosive environment.

Avoid using or storing this product in an environment which may contain corrosive gases. Such gases include, but are not limited to, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, chlorine, ammonia or ozone.

Avoid installing this product in a dusty environment or one that may contain corrosive materials such as sodium chloride or sulfur.

Avoid installing this product in an environment having excessive metal flakes or conductive particles in the air.

Such environments may cause corrosion or short circuits within this product, resulting in not only damage to this product, but also fire.

If there are any concerns regarding the environment at the planned site of installation or storage, please contact your CAC or your authorized Stratus service representative.

**WARNING**

When installing a system or CRU, always connect the power cord first, before adding communications cables. The power cord contains the protective earth connection; it should be connected first and disconnected last, to maintain a grounded chassis.

Before attempting to remove a CRU from the system chassis, make sure to power off the CRU, disconnect communications cables, and then disconnect the power cord.

Never connect a power cord to a CRU when it is not located within the system chassis.



#### **WARNING**

---

Do not disassemble, repair, or alter the server, except as described in the operation and maintenance guide for your system. There is a risk of an electric shock or fire as well as equipment malfunction if you do not observe the instructions in the operation and maintenance guide for your system.



#### **WARNING**

---

Do not place any object on top of the server. The object may fall off and cause injuries, damage to hardware, or a fire.



#### **CAUTION**

---

Do not leave the DVD tray ejected. Dust may enter the equipment and cause it to malfunction. The ejected tray may also become a cause of injuries.

## **Consignes de sécurité**



#### **AVERTISSEMENT**

---

Risque d'explosion si la batterie est remplacée par une autre de type incorrect. Jeter les batteries usagées conformément aux instructions fournies avec la batterie.



#### **AVERTISSEMENT**

---

Le système utilise deux cordons d'alimentation pour fournir des sources d'alimentation redondantes. Pour mettre un système entièrement hors tension, débrancher les deux cordons d'alimentation. Pour réduire le risque qu'un choc électrique puisse blesser une personne ou



endommager le système, utiliser l'unité avec prudence même lorsqu'un seul cordon d'alimentation est branché.



#### **AVERTISSEMENT**

Pour éviter qu'une armoire ne bascule et blesse une personne ou endommage le système, commencer par installer les systèmes de bas en haut de l'armoire.



#### **AVERTISSEMENT**

En cas de remplacement du câble de modem fourni par Stratus, utiliser un câble homologué UL dont le calibre est d'au moins 26 AWG afin de prévenir les incendies.



#### **AVERTISSEMENT**

Pour éviter tout risque d'incendie, de choc électrique et de panne de matériel, empêcher l'eau ou les objets étrangers d'entrer dans l'équipement. Ne pas laisser d'eau ou d'objets étrangers, tels que des agrafes ou des trombones, entrer dans l'équipement.



#### **AVERTISSEMENT**

Pour éviter tout risque d'incendie ou de fuite de courant, ne pas brancher le cordon d'alimentation dans une prise non conforme. Utiliser une prise de courant avec une tension et un type d'alimentation appropriés, tel qu'indiqué dans ce guide.



#### **AVERTISSEMENT**

Ne pas installer l'équipement dans un lieu où une rallonge pourrait être nécessaire. L'utilisation d'une rallonge ne respectant pas les spécifications électriques présente un risque de surchauffe pouvant provoquer un incendie.



#### **AVERTISSEMENT**

Débrancher les cordons d'alimentation du serveur ou de la source d'alimentation avant d'installer ou de déplacer

l'équipement. Toute la tension n'est coupée que lorsque les cordons d'alimentation sont débranchés.



#### **AVERTISSEMENT**

---

Ne pas installer ou entreposer l'équipement dans un lieu inadapté. Installer ou entreposer l'équipement dans un lieu qui satisfait aux exigences spécifiées dans ce guide. Éviter les situations suivantes pour empêcher le risque d'incendie:

- Poussière
- Forte humidité, comme à proximité d'une chaudière
- Exposition directe au soleil
- Instabilité, comme des endroits non stabilisés contre les tremblements de terre



#### **AVERTISSEMENT**

---

Ne pas utiliser ou entreposer ce produit dans un environnement corrosif.

Éviter d'utiliser ou d'entreposer ce produit dans un environnement qui pourrait contenir des gaz corrosifs. Ces gaz incluent, mais sans s'y limiter, du dioxyde de soufre, du sulfure d'hydrogène, du dioxyde d'azote, du chlore, de l'ammoniac ou de l'ozone.

Éviter d'installer ce produit dans un environnement poussiéreux ou qui pourrait contenir des matériaux corrosifs, tels que du chlorure de sodium ou du soufre.

Éviter d'installer ce produit dans un environnement qui pourrait contenir des éclats de métal excessifs ou des particules conductrices dans l'air.

Ces environnements peuvent causer une corrosion ou des courts-circuits dans ce produit, ce qui endommage non seulement le produit, mais peut aussi provoquer un incendie.

Pour toute question concernant l'environnement sur le site planifié de l'installation ou de l'entreposage, veuillez

communiquer avec votre centre d'assistance à la clientèle (CAC).



### **AVERTISSEMENT**

Lors de l'installation d'un système ou d'une unité remplaçable par le client (CRU), commencez toujours par brancher le cordon d'alimentation, avant d'ajouter les câbles de communications. Le cordon d'alimentation est équipé d'une connexion de terre de protection; il doit être branché en premier et débranché en dernier afin de conserver un châssis relié à la terre.

Avant d'essayer d'enlever une CRU du châssis du système, veillez à bien mettre la CRU hors tension, à débrancher les câbles de communications, puis à débrancher le cordon d'alimentation.

Ne jamais brancher un cordon d'alimentation à une CRU lorsqu'elle n'est pas à l'intérieur du châssis du système.



### **AVERTISSEMENT**

Ne pas démonter, réparer ni modifier le serveur, sauf comme décrit dans le manuel d'utilisation et d'entretien de votre système. Il existe un du manuel risque d'électrocution ou d'incendie ainsi qu'un risque de dysfonctionnement de l'équipement si vous ne respectez pas les instructions d'utilisation et d'entretien de votre système.



### **AVERTISSEMENT**

Ne placer aucun objet au-dessus du serveur. L'objet pourrait tomber et causer des blessures, endommager le matériel ou provoquer un incendie.



### **MISE EN GARDE**

Ne pas laisser le plateau du DVD ouvert. De la poussière pourrait entrer dans l'équipement et causer une défaillance. Le plateau d'éjection pourrait également causer des blessures en position ouverte.

## 安全注意事項



### WARNING

若錯誤更換電池類型，將產生爆炸風險。請按電池包裝說明，妥善丟棄已耗廢電池。



### WARNING

系統採用兩條電源線，以提供冗餘電源。欲徹底清除系統電源，先拔下兩條電源線。為降低觸電所導致的人體傷害或系統損害，請小心操作機體，即使系統僅插入一條電源線。



### WARNING

欲預防儲櫃翻倒，進而導致人體傷害或系統損害，請從儲櫃下方開始往上安裝系統。



### WARNING

若您更換由Stratus供應的數據機纜線，請使用至少有26 AWG壓力的纜線，避免發生火災。



### WARNING

避免火災、觸電、設備故障、液體或其他異物進入設備。不得讓液體或類似圖釘或迴紋針等異物進入設備。



### WARNING

為避免火災或漏電，不得將電源線插入規格不符的插座中。請使用本指南指定之電壓及電源類別的插座。

**WARNING**

不得使用延長線安裝設備。使用與指定電源規格不符的延長線會產生設備過熱風險，進而可能導致火災。

**WARNING**

安裝或移動設備前，請從伺服器或電源拔下電源插頭。

只有在拔下電源線後，設備的所有電壓才會消除。

**WARNING**

不得在不適合場所安裝或存放設備。請按本指南指定且符合規格要求的場所安裝或存放設備。避免下列可能產生火災風險的地方：

灰塵較多

熱水器旁濕氣較重的地方

陽光直照的地方

不平穩位置，例如易受地震影響的地方

**WARNING**

不得在腐蝕性環境中使用或存放產品。避免在含腐蝕性氣體的環境使用或存放本產品，其中包括但不限於：二硫化硫、氫化硫、氮、氫、氨或臭氧。

不得將本產品安裝在灰塵較多或含類似氯化鈉或硫磺等腐蝕性物質的地方。

不得將本產品安裝在空氣中含過量金屬碎片或傳導粒子的地方。

上述環境可能導致本產品腐蝕或短路，因而損壞產品，甚至引起火災。若對產品安裝或存放的場地環境規劃有任何疑問，請與CAC或授權Stratus服務代表聯絡。



#### **WARNING**

---

不得在伺服器已連接電源的狀態下連接界面電纜。安裝或移除任何內建裝置，或從伺服器拔下或連接任何界面電纜前，確認已關閉伺服器的電源，並從伺服器或電插座拔下電纜線。即使伺服器電源已切斷，在仍連接電源的狀態下，碰觸內建裝置、電纜或連接器也可能產生觸電、或因短路而引起火災。



#### **WARNING**

---

除非按照系統操作和維護指南的說明，不能拆卸、修理或者改裝伺服器。如果您不遵守系統操作和維護指南的說明，會有觸電或者火災以及設備故障的風險。



#### **WARNING**

---

不得在伺服器上放置任何物件。物件可能會掉落而導致人體傷害、硬體損壞或火災。



#### **CAUTION**

---

**DVD**光碟機不得靜置於彈出位置。灰塵進入設備將導致功能異常。彈出的光盤也可能是導致設備損壞的來源。

---

## Chapter 9

# Installing the System in a Cabinet

Before installing the system in a cabinet, make sure that:

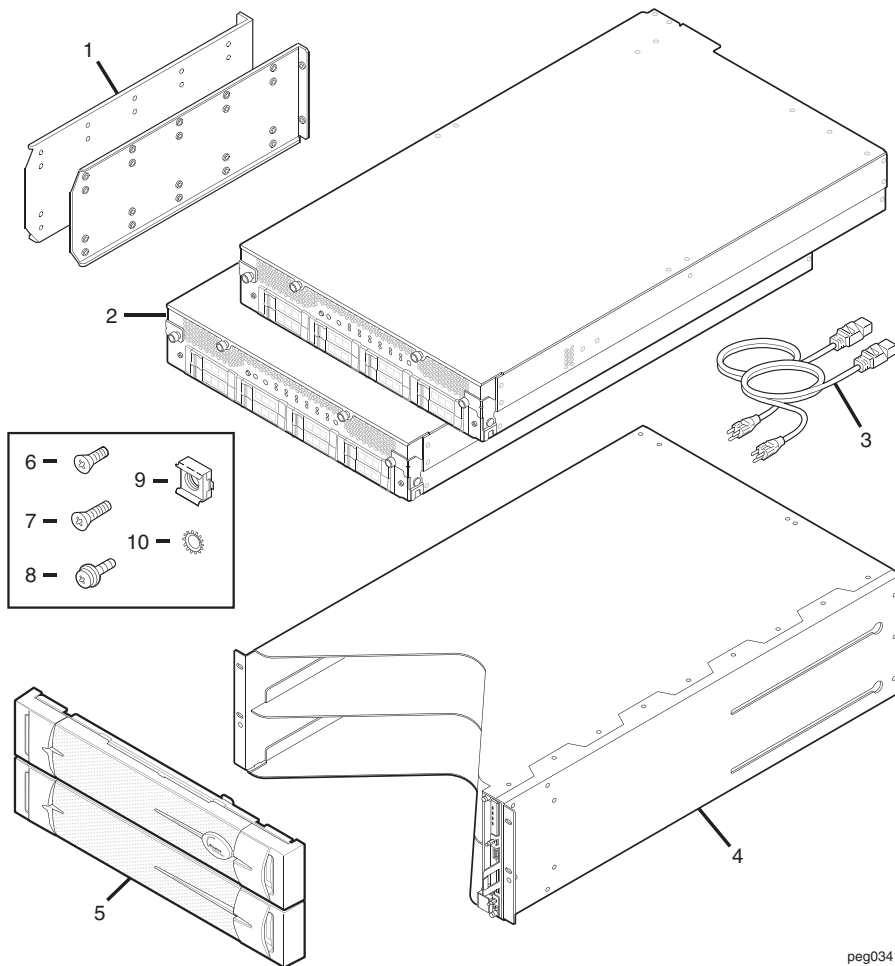
- You read the entire chapter and understand the entire installation procedure.
- Your cabinet meets the system requirements.
- The site has been properly prepared.

The requirements for the cabinet and for site planning are described in [“Cabinet Requirements” on page 6-1](#).

To install the system components in a cabinet, see the following topics and refer to [Figure 9-1](#), which identifies the system components:

- [“Required Tools” on page 9-3](#)
- [“Numbering the Vertical Rails” on page 9-3](#)
- [“Installing PDUs \(Optional\)” on page 9-6](#)
- [“Installing a System Chassis” on page 9-11](#)
- [“Installing the System Enclosures” on page 9-21](#)
- [“Next Steps” on page 9-24](#)

**Figure 9-1. System Components**



peg034

- |   |                            |    |  |
|---|----------------------------|----|--|
| 1 | Rear mounting brackets (2) | 6  | 10-32 x 1/2 in. flat-head Phillips-head screws (8) |
| 2 | CPU-I/O enclosures (2)     | 7  | 10-32 x 5/8 in. flat-head Phillips-head screws (4) |
| 3 | Power cords (2)            | 8  | 10-32 x 1/2 pan-head screws with cup washer (4)    |
| 4 | Shelf unit                 | 9  | 10-32 cage nuts (4)                                |
| 5 | Bezel                      | 10 | 10/32 countersunk lock washers (12)                |



## Required Tools

Tools required for installing a cabinet system:

- A #2 Phillips-head screwdriver
- A flat-head screwdriver and a cage-nut insertion/extraction tool



### CAUTION

To avoid personal injury or damage to the system, two persons are required to install the system in a cabinet.



### MISE EN GARDE

Pour éviter toute blessure ou dommage au système, deux personnes sont nécessaires pour installer une armoire.

## Numbering the Vertical Rails

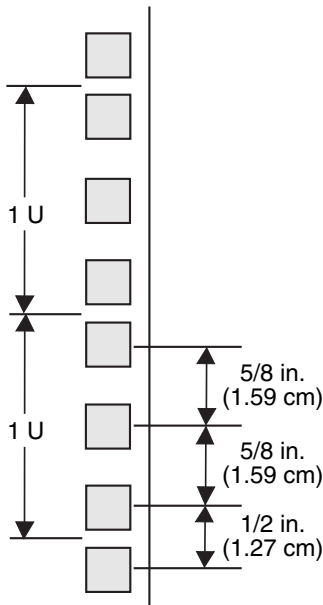
If the holes in the vertical rails of your cabinet are not already numbered, use a marker or pencil to number the middle hole of at least the following:

- The 4U in which to install each shelf unit
- The 2U in which to install each pair of PDUs, if ordered
- The 2U in which to install each storage enclosure, if ordered

### NOTE

The cabinet rails, system, and various components are measured in Electronic Industries Alliance (EIA) rack units (U). Every three holes on the EIA square-hole pattern on the vertical rail equals one U (1.75 in., 4.45 cm). The holes on EIA rails are located in a repeating pattern of 1/2 in. (1.27 cm), 5/8 in. (1.59 cm), 5/8 in. (1.59 cm), as shown in [Figure 9-2](#). The middle hole of each U has equal spacing between it and the holes adjacent to it. In some cabinets, numbers on the vertical rails identify the middle hole of each U.

**Figure 9-2. EIA Vertical Rail Hole Pattern**



cnut005

The following example shows how to number the rails for a configuration that includes the optional PDUs and optional ftScalable Storage systems.

1. On each of the front and rear rails, number the two U where you will install the PDUs. Each PDU requires a 1U space. Mark the number 1 next to the middle hole of the first U and the number 2 next to the middle hole of the second U, as shown in [Figure 9-3](#).

#### NOTE

Install the first pair of PDUs in the bottom two contiguous one-U locations of the cabinet. If you are installing a second pair, install it in two convenient, contiguous one-U locations in the middle of the cabinet.

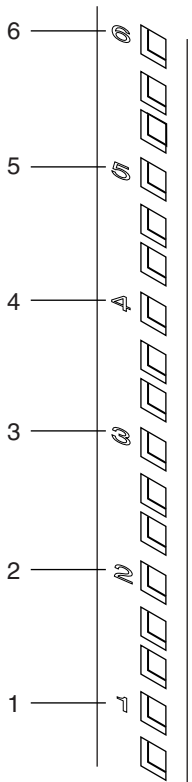
2. On each of the front and rear rails, number the middle holes of the 4U spaces where you will install the system shelf unit. Mark the number 3 next to the middle hole of the third U, the number 4 next to the middle hole of the fourth U, the number 5 next to the middle hole of the fifth U, and the number 6 next to the middle hole of the sixth U, as shown in [Figure 9-3](#).
3. If you are installing additional systems in the same cabinet, continue numbering the middle hole of another 4U for each shelf unit.

4. If you are installing ftScalable Storage systems, number 2U for each storage system.

**NOTICE**

To ensure that the components will be level when you install them, mark the same holes on the rear rails that you marked on the front vertical rails.

**Figure 9-3. Numbering the Middle Hole of 6U**



cnut006

## Installing PDUs (Optional)

Power distribution units (PDUs) are an optional component.

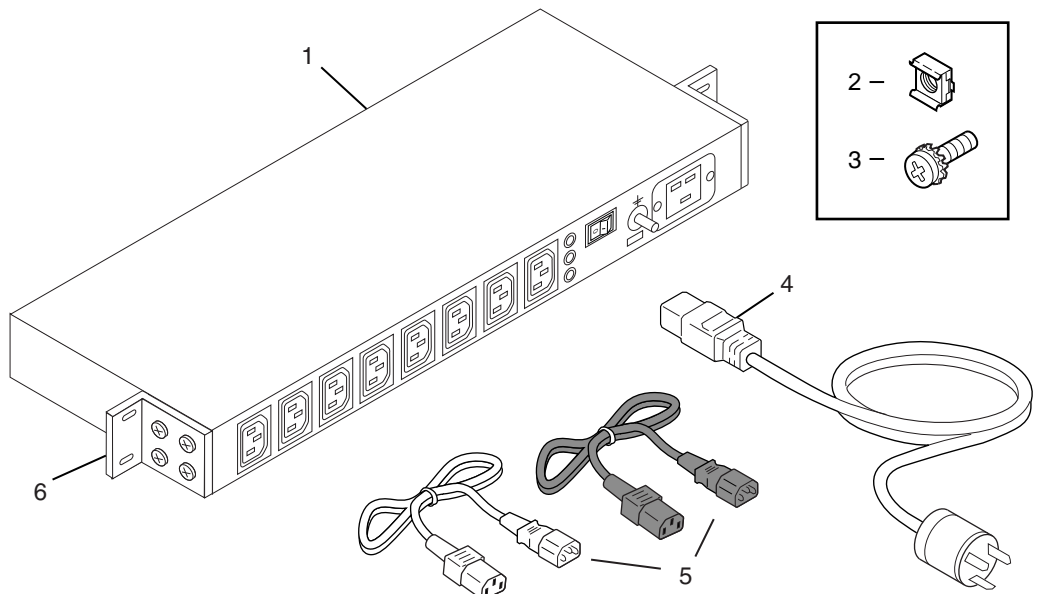
- If you have **not** ordered PDUs from Stratus, skip this section and continue to [“Installing a System Chassis” on page 9-11](#).
- If you **have** ordered PDUs from Stratus and want to install them at this time, see:
  - [“PDU Components”](#)
  - [“Installing PDUs in a Cabinet”](#)

To connect the PDUs to AC power, see [“Connecting Systems to Power Through PDUs” on page 11-6](#).

### PDU Components

The PDUs are ordered and shipped in pairs. Each PDU is shipped with mounting brackets attached.

Verify that you have the components shown in [Figure 9-4](#) for your PDU, and inspect the components to ensure that they are not damaged. If you notice damage, contact the [Stratus Customer Assistance Center \(CAC\)](#) or your [authorized Stratus service representative](#).

**Figure 9-4. PDU Components**

pdu001a

- 1 PDU
- 2 10-32 cage nuts (4)
- 3 10-32 pan-head screws with captive external tooth washers (4)
- 4 Power cord
- 5 Power (*jumper*) cables (one black and one gray) from the system's accessories box
- 6 Mounting brackets<sup>†</sup>

<sup>†</sup> To ensure a proper ground connection from the PDU to the cabinet, the mounting brackets must remain on the non-painted surface of the PDU.

### Installing PDUs in a Cabinet

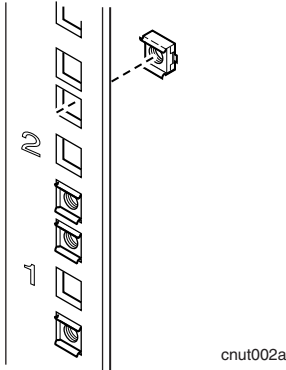
For each pair of PDUs, the top PDU provides A-side power and the bottom PDU provides B-side power. For more information, see [“Redundant Power Sources” on page 2-1](#).

Removable fasteners attach two reversible mounting brackets to the body of the PDU.

## To install a PDU

1. For each PDU, insert four cage nuts in the rear vertical cabinet rails. Insert two cage nuts in each rear rail, in the top and bottom holes of U positions 1 and 2. The locations in which to install the cage nuts for two PDUs are indicated in [Figure 9-5](#).

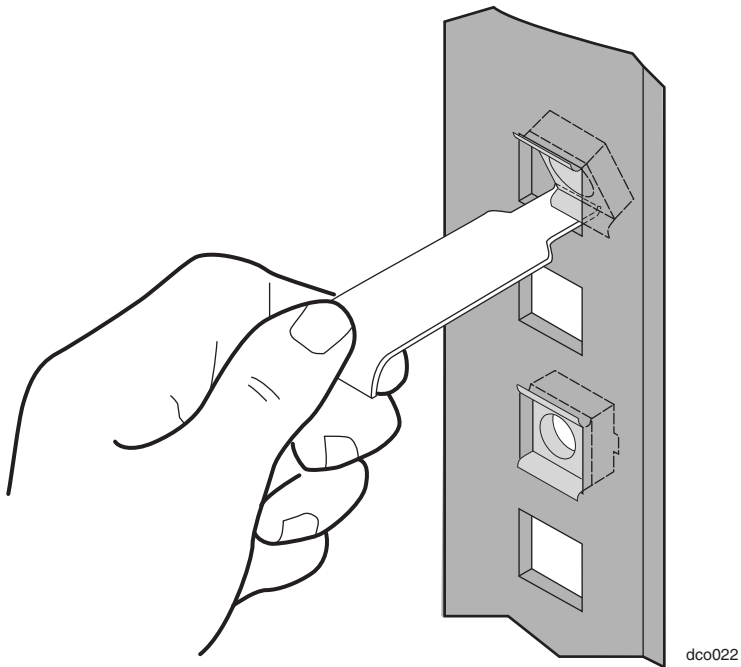
**Figure 9-5. Cage Nut Locations: PDU**



### NOTE

To insert cage nuts, position them so that the tabs are on the top and bottom ([Figure 9-6](#)). Then insert the cage nut so that its top overlaps the vertical rails, and use a cage-nut insertion tool or your fingers to pull the rest of the cage nut through so that the bottom tab overlaps the vertical rail.

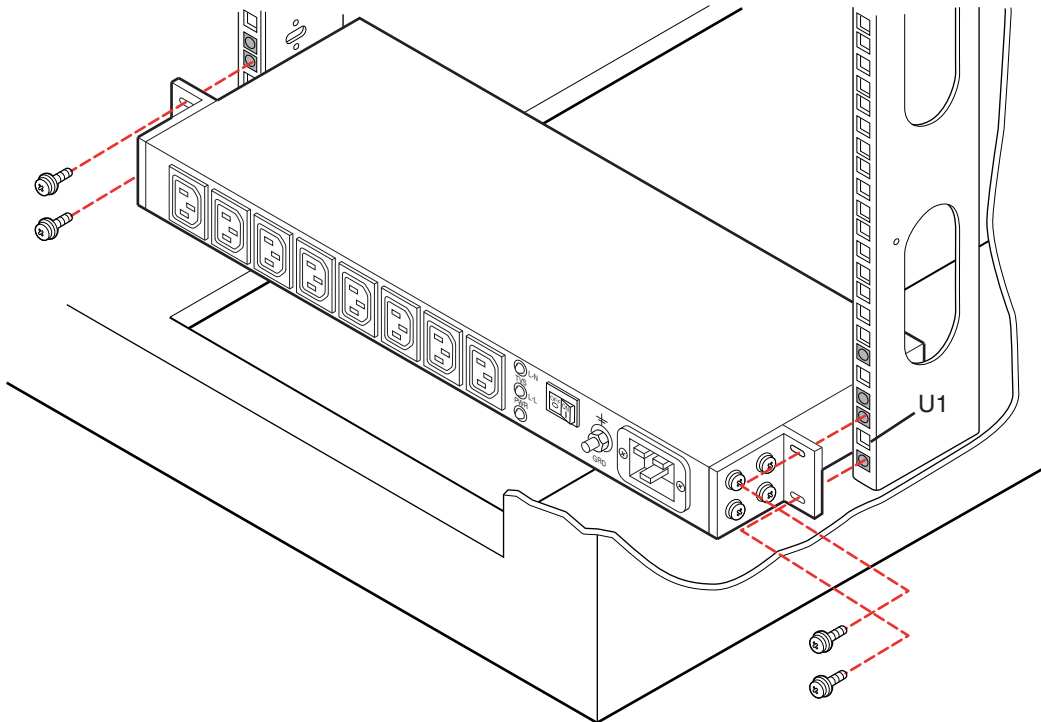
**Figure 9-6. Inserting Cage Nuts**



2. Install the PDU with the receptacles facing toward the back of the cabinet, as shown in [Figure 9-7](#).

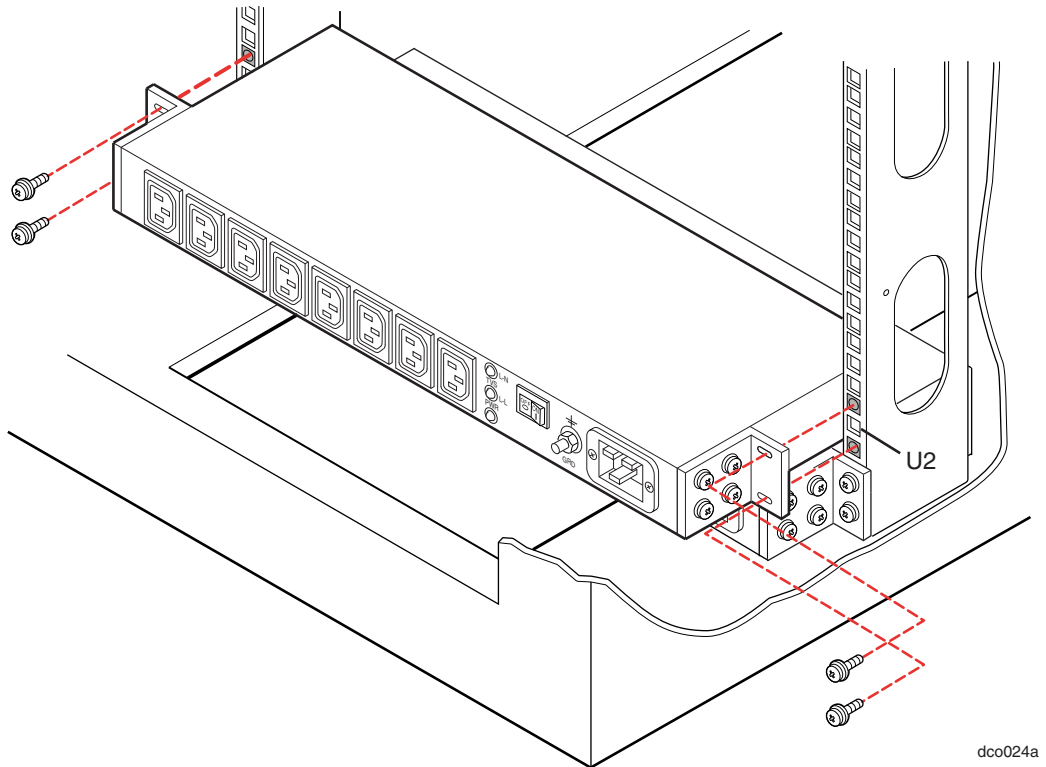
3. Align the screw holes on the mounting brackets with the top and bottom holes of the U with cage nuts, as follows:
  - Align the first PDU with the U numbered 1 (as shown in [Figure 9-7](#)).
  - Align the second PDU with the U numbered 2 (as shown in [Figure 9-8](#)).

**Figure 9-7. Installing the Lower PDU (at U Number 1)**



dco024



**Figure 9-8. Installing the Upper PDU (at U Number 2)**

4. Attach the PDU with four 10-32 screws with one hand while supporting the PDU with the other.
5. Tighten the screws.

## Installing a System Chassis

To install your system chassis in a cabinet, see the following sections:

- [“Attaching Rear Mounting Brackets to the Cabinet Vertical Rails”](#)
- [“Installing the Shelf Unit”](#)

Before you start assembling the system chassis, add a lock washer to each flat-head screw. The toothed side of the washer faces the head of the screw.

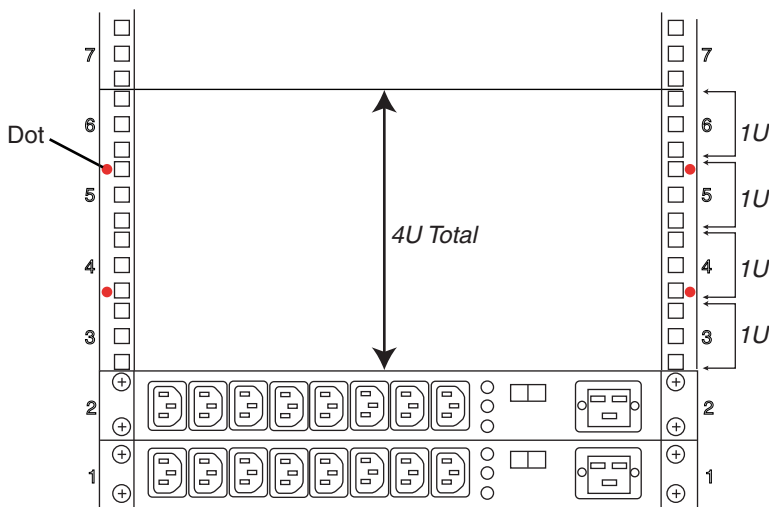
## Attaching Rear Mounting Brackets to the Cabinet Vertical Rails

The shelf unit is affixed to the front vertical rails by a flange that is built into the shelf unit. Two rear mounting brackets must be affixed to the back vertical rails. These are mounted to the shelf unit through long guide slots in the shelf unit that can adjust to accommodate varying cabinet depths.

### To attach the rear mounting brackets

1. On the rear vertical rails, use a pen to mark the hole above the number 5 and below the number 4, as indicated by dots in [Figure 9-9](#).

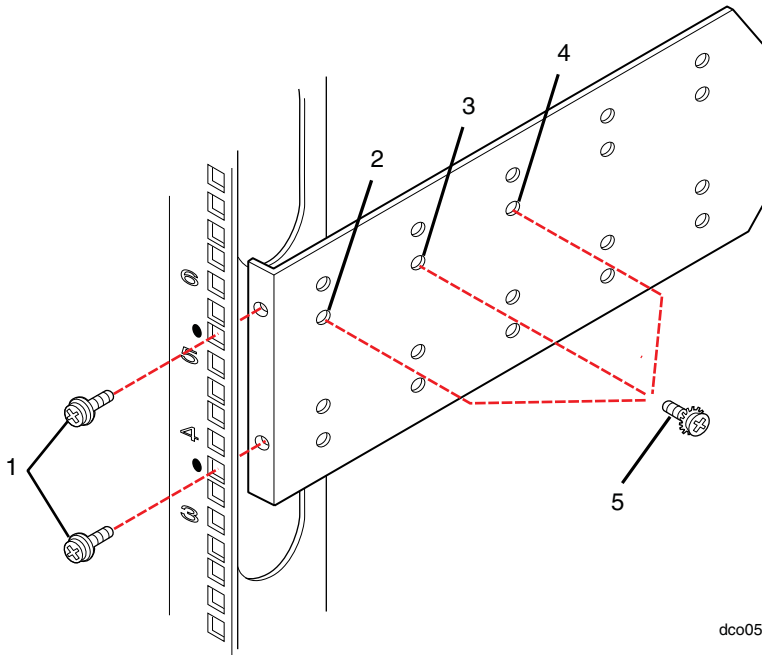
**Figure 9-9. Screw Locations on the Rear Vertical Rails**



Cabinet Rear View

dco057

2. Position a mounting bracket **inside** a rear vertical rail, lining up the holes in the mounting bracket with the two holes you marked on the rear vertical rail. See [Figure 9-10](#).
3. Insert and tighten two 10-32 x 1/2-in. pan-head crest-cup screws (number 1 in [Figure 9-10](#)) through the marked holes in the rear vertical rails and into the holes in the mounting bracket.
4. Repeat steps 2 and 3 for the second mounting bracket.

**Figure 9-10. Attaching the Mounting Brackets and Inserting Guide Screws (Rear View)**

dco056

- |   |                                      |   |   |
|---|--------------------------------------|---|---|
| 1 | 10-32 x 1/2 pan-head crest-cup screw | 4 | Third hole from rear  |
| 2 | First hole from rear                 | 5 | Guide screw and washer (to be inserted in one of three indicated holes) |
| 3 | Second hole from rear                |   |   |

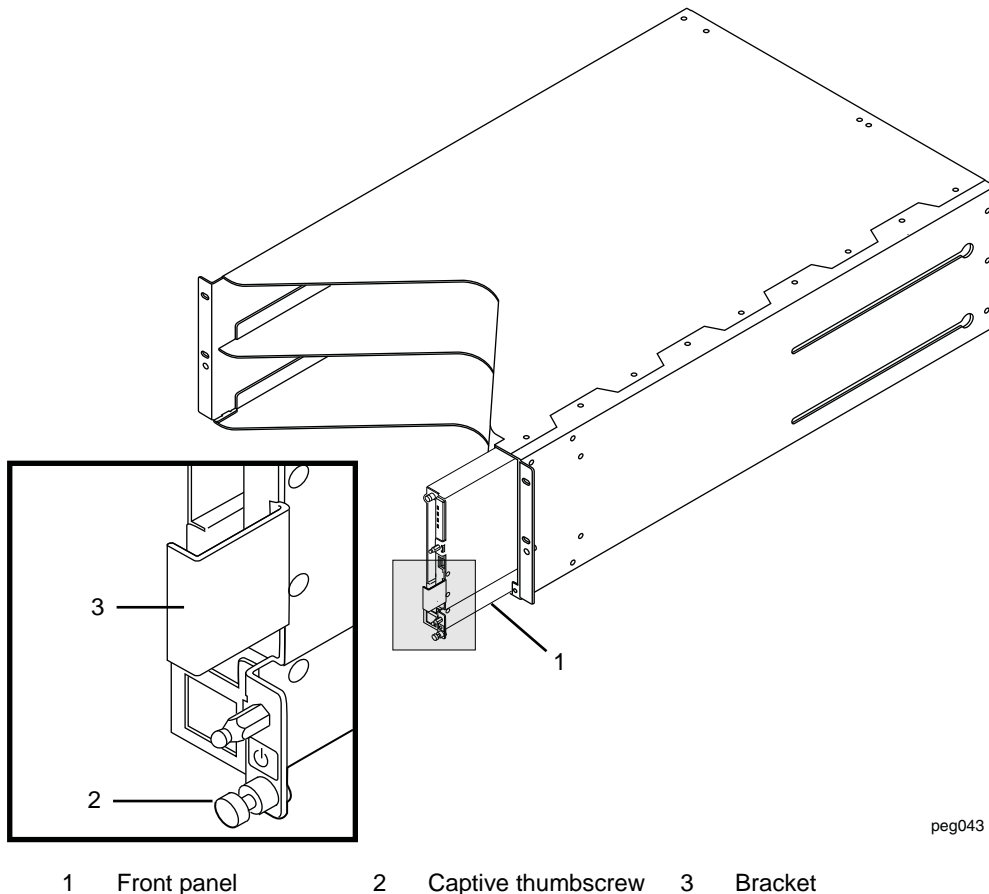
5. Measure the distance between the front and rear vertical rails in the cabinet and install one guide screw and washer (number 5) as described below and as shown in [Figure 9-10](#):
  - If the rail depth is less than 27 in. (68.58 cm), install a flat-head screw with countersunk lock washer in the hole closest to the rear of the cabinet (number 2 in [Figure 9-10](#)).
  - If the rail depth is 27 in. (68.58 cm), install a flat-head screw with countersunk lock washer in the second hole from the rear (number 3).
  - If the rail depth is greater than 27 in. (68.58 cm), install a flat-head screw with countersunk lock washer in the third hole from the cabinet rear (number 4).

## Installing the Shelf Unit

The shelf unit comes with a front panel and the system backplane installed. Before installing the shelf unit in the cabinet, you must remove the front panel and system backplane from the shelf unit in order to access the screw holes at the rear of the shelf unit.

1. To remove the front panel (number 1 in [Figure 9-11](#)):
  - a. Loosen the captive thumbscrew (number 2) at the bottom of the front panel.
  - b. Gripping the bracket (number 3) on the right side of the panel, pull the front panel straight out of its slot and out of the shelf unit.

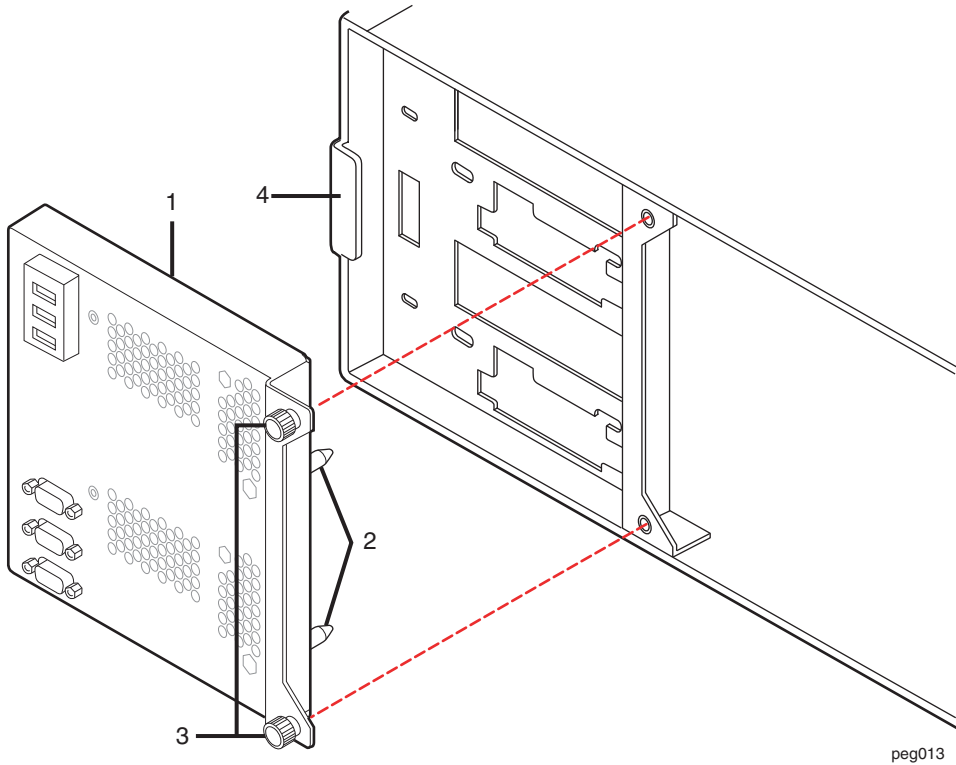
**Figure 9-11. Removing the Front Panel from the Shelf Unit**



peg043

2. To remove the system backplane (number 1 in [Figure 9-12](#)), loosen the two thumbscrews (number 3) on the right side of the system backplane assembly.

**Figure 9-12. Removing the System Backplane**

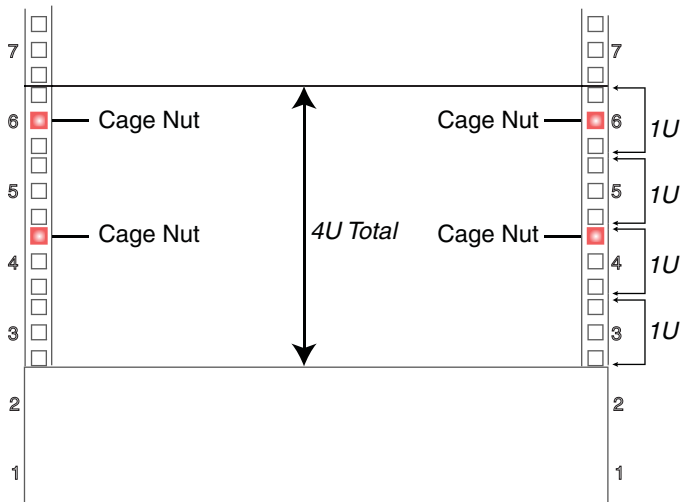


- |   |                           |   |                              |
|---|---------------------------|---|------------------------------|
| 1 | System backplane assembly | 3 | System backplane thumbscrews |
| 2 | Guide pins                | 4 | Retaining tab                |

3. Slide the system backplane assembly to the right, out from beneath the retaining tab (number 4), and pull the assembly out of the shelf unit.

- At the front of the cabinet, insert two cage nuts into each vertical rail in the locations shown in [Figure 9-13](#).

**Figure 9-13. Cage Nut Locations on Front Vertical Rails**



Cabinet Front View

dco057a

#### NOTE

To insert cage nuts, position the cage nuts so that the tabs are on the top and bottom ([Figure 9-6](#)). Then insert the cage nut so that the top tab on the cage nut overlaps the vertical rails. Use a cage-nut insertion tool or your fingers to pull the rest of the cage nut through so that the bottom tab overlaps the vertical rail.



#### CAUTION

To avoid personal injury or damage to the shelf unit, two persons are required to insert the shelf unit into the cabinet and onto the mounting brackets.

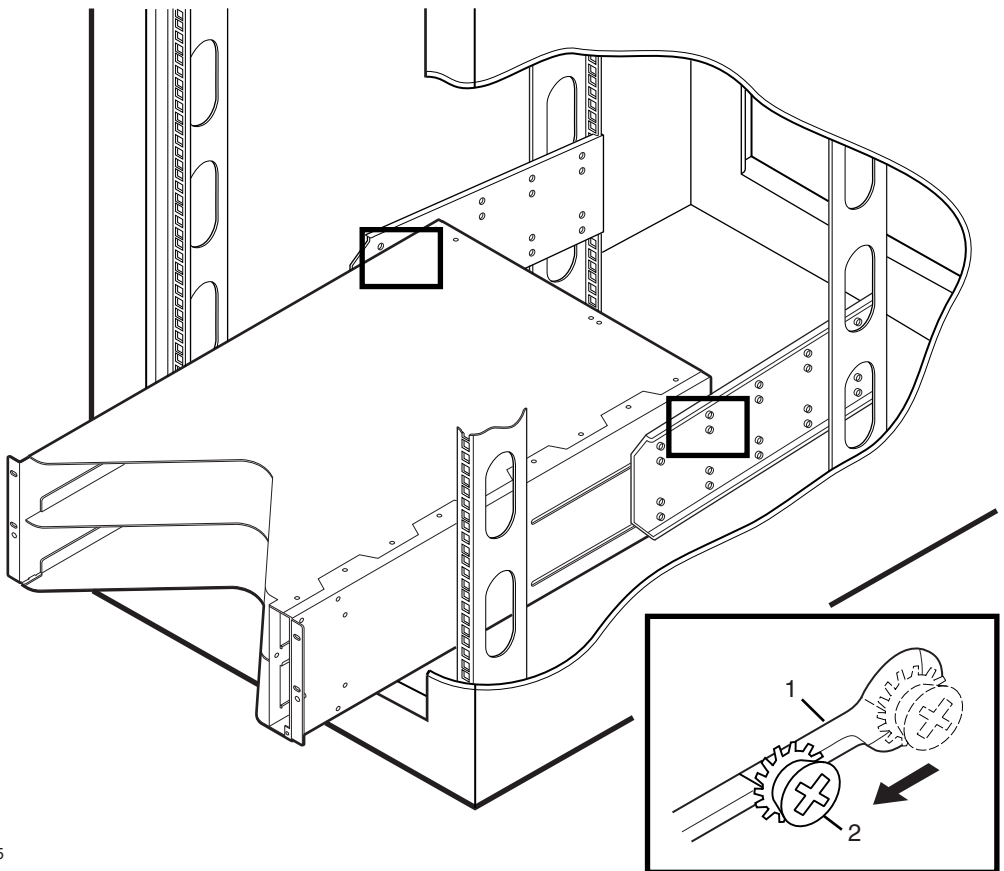


#### MISE EN GARDE

Pour éviter toute blessure corporelle ou tout dommage à l'étagère, deux personnes sont nécessaires pour insérer l'étagère dans l'armoire et sur les supports de montage.

5. With one person at the front of the cabinet and one person at the rear of the cabinet, insert the shelf unit into the cabinet and onto the mounting brackets.
  - a. At the front of the cabinet, slide the shelf unit into the cabinet.
  - b. At the rear of the cabinet, flex the right (from the rear) mounting bracket towards the side of the cabinet, and guide the shelf unit so that the guide slot (number 1 in [Figure 9-14](#)) at the top right of the shelf unit aligns with the guide screw (number 2) on your right.
  - c. Perform the same action on the other side of the cabinet.

**Figure 9-14. Mounting the Shelf Unit on the Mounting Brackets**



dco025

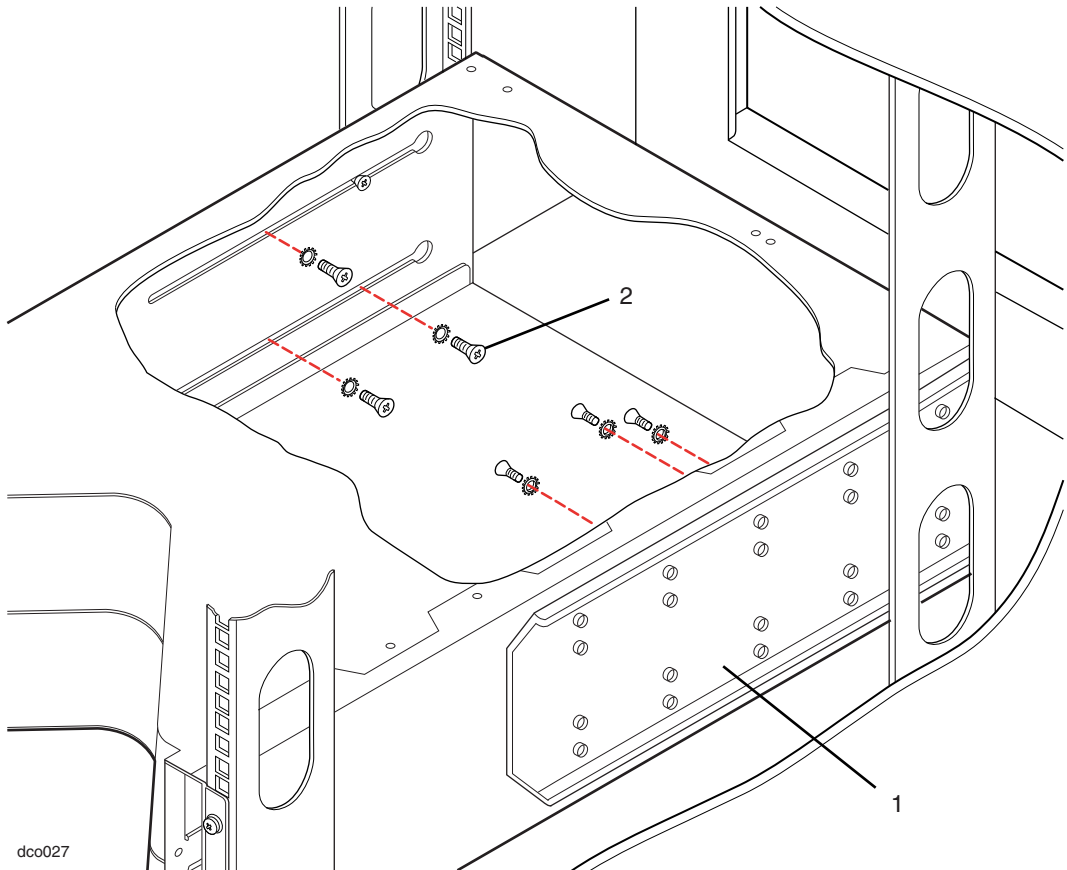
- 1 Guide slots (2)
- 2 Guide screws (2)

- ### Figure 9-15. Securing the Shelf Unit to the Front Rails



8. Tighten the two guide screws.
9. Secure each side of the shelf unit to a rear mounting bracket (number 1 in [Figure 9-16](#)) with three 10-32 x 1/2-in. flat-head screws (number 2) with countersunk lock washers on each side, as shown in [Figure 9-16](#).  
Tighten the six screws.



**Figure 9-16. Securing the Shelf Unit to the Mounting Brackets**

dco027

- 1 Mounting brackets (2)
- 2 10-32 x 1/2 in. flat-head screws with countersunk lock washers (6)

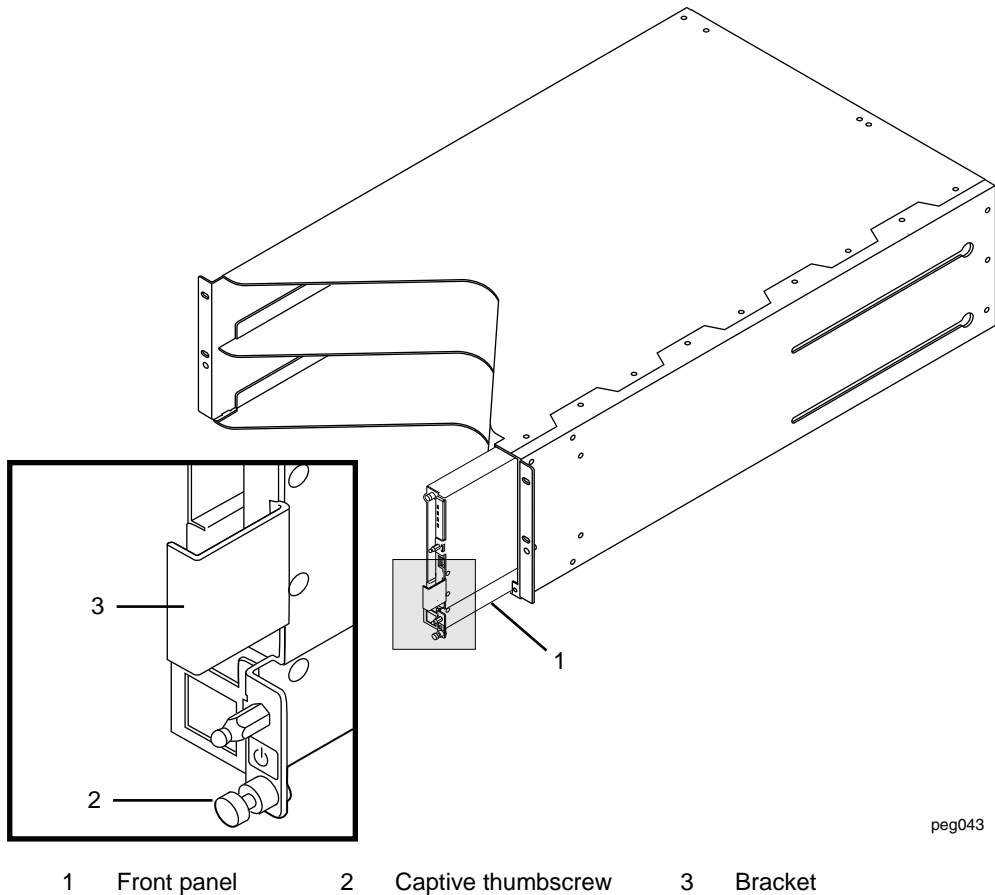
10. Reinstall the system backplane assembly as follows:

- a. Position the system backplane assembly as shown in [Figure 9-12](#). Note the position of the guide pins (number 2).
- b. Insert the system backplane assembly into the shelf unit, then slide the backplane to the left and beneath the retaining tab (number 4).
- c. The thumbscrews (number 3) on the assembly should line up with the screw holes on the rear of the shelf unit.
- d. Tighten the two thumbscrews on the system backplane assembly to fasten it to the shelf unit.

11. Reinstall the front panel into the shelf unit as follows:

- a. Align the front panel with the slot in the front right side of the shelf unit and push it straight into the slot, as shown in [Figure 9-17](#).
- b. Tighten the captive thumbscrew (number 2 in [Figure 9-11](#)) at the bottom of the panel.

**Figure 9-17. Replacing the Front Panel in the Shelf Unit**



peg043

## Installing the System Enclosures

After you have installed the shelf unit (and reinstalled the system backplane assembly and the front panel), you must install the CPU-I/O enclosures and the bezel.

1. Install the CPU-I/O enclosures.
  - a. Place each CPU-I/O enclosure on a flat surface and pull down the two ejector levers (number 1, shown in lower-left box in [Figure 9-18](#)).

### NOTE

If your shipment contains an operating system DVD, the operating system and system software were installed in one of the CPU-I/O enclosures at the factory. In this case, install the CPU-I/O enclosure that contains the boot disk (labeled “Boot”) in the top CPU-I/O slot.

- b. With the ejector levers in the open (down) position, slide each CPU-I/O enclosure into the shelf unit.



### CAUTION

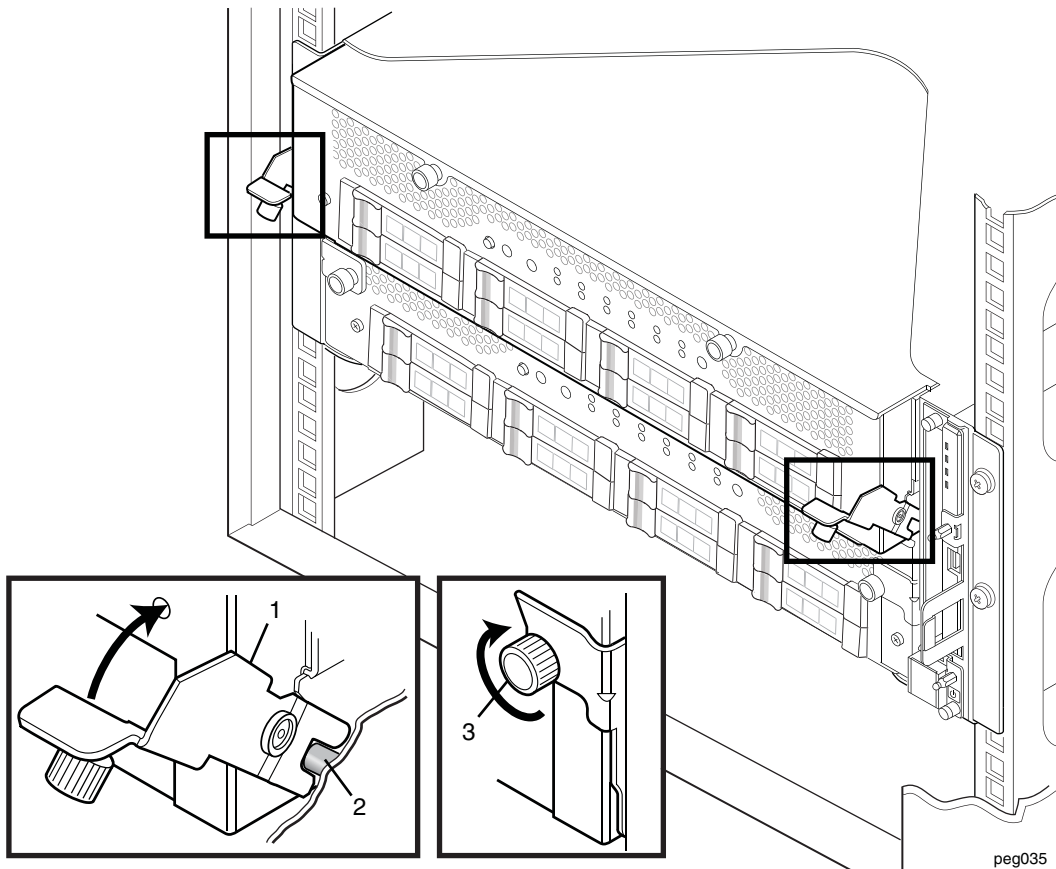
To avoid personal injury, lifting a CPU-I/O enclosure requires two persons.



### MISE EN GARDE

Pour éviter toute blessure, deux personnes sont requises pour soulever le boîtier CPU-I/O.

**Figure 9-18. Installing the CPU-I/O Enclosures in a Cabinet**



- |   |  |   |            |
|---|--|---|------------|
| 1 | Ejector lever in open position             | 3 | Thumbscrew |
| 2 | Ejector lever engaged with positioning pin |   |            |

- c. With the bottom of the ejector levers engaged with the positioning pin (number 2 in [Figure 9-18](#)), push the ejector levers up into the closed position and tighten the thumbscrews (number 3 in [Figure 9-18](#)) so that each CPU-I/O enclosure is installed securely in the rack.

#### NOTICE

Be sure to press the ejector levers flush against the front of the system before tightening the thumbscrews; otherwise, the thumbscrew threads will be stripped.

2. Attach the bezel.

- a. Facing the front of the system, hold the bezel so that the LED light pipes inside the bezel (number 1 in [Figure 9-19](#)) are on the right. Align the light pipes with the four front-panel system LEDs.

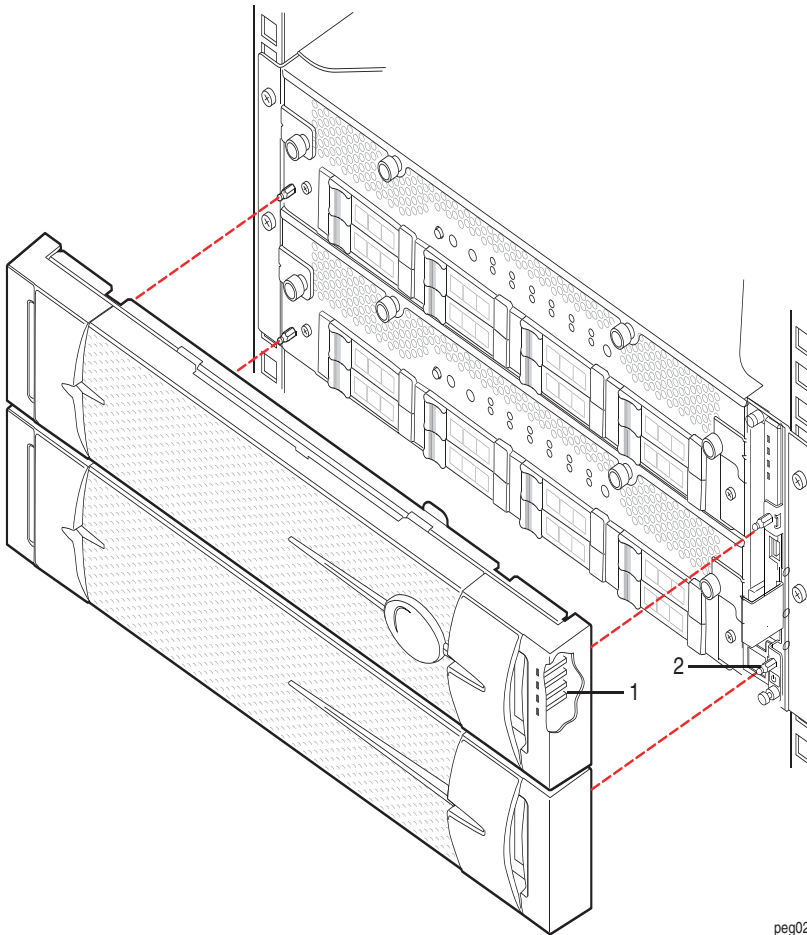
**NOTICE** \_\_\_\_\_

The bezel light pipes extend about 0.25 in. (0.635 cm) out from the inside of the bezel. Be careful not to bend or hit the light pipes when installing the bezel.

- b. Holding the bezel in front of the mounting rails, align its ball-stud holes with the ball studs (number 2 in [Figure 9-19](#)) on the sides of the system (two on the left side and two on the right).

[Figure 9-19](#) shows the front of the system, with the bezel aligned with the cabinet for installation.

**Figure 9-19. Installing the Bezel**



peg026

- 1 Light pipes (an array of 4)
- 2 Ball studs (4)

## Next Steps

Connect the system components and peripherals, as described in [Chapter 10](#).

---

## Chapter 10

# Connecting the System Components and Peripherals

To connect your system components and peripherals, see:

- [“PCI Adapters” on page 10-1](#)
- [“System Ports and Backplane” on page 10-3](#)
- [“Managing Cables” on page 10-4](#)
- [“Connecting a Monitor, Mouse, and Keyboard” on page 10-4](#)
- [“Connecting the ftServer System to External Storage Systems” on page 10-4](#)
- [“Connecting the VTM Ports to a Network” on page 10-7](#)
- [“Connecting the External Modem” on page 10-7](#)
- [“Connecting Tape Drives \(Windows- and Linux-based Systems\)” on page 10-9](#)
- [“Next Steps” on page 10-10](#)

No tools are required for these tasks.

## PCI Adapters

Each CPU-I/O enclosure in ftServer 2900, 4900, and 6900 systems contains two low-profile PCI adapter slots. In addition, a PCIe riser assembly with two full-height adapter slots is standard in the CPU-I/O enclosure of ftServer 6900 systems and optional in ftServer 4900 systems. The low-profile PCI adapter slots appear in software as slots 1 and 2 (numbers 4 and 5, respectively, in [Figure 10-1](#)). The riser assembly slots can accept full-height or low-profile adapters, PCI slots 3 and 4 in software (numbers 2 and 3, respectively, in [Figure 10-1](#)).

When you receive your system from the manufacturer, PCI adapters that were ordered at the same time the system was ordered are installed. To install additional PCI adapters, see the *Stratus ftServer Systems: PCI Adapter Guide* (R461) and the *Stratus ftServer 29x0, 49x0, and 69x0 Systems: Operation and Maintenance Guide* (R785).

Use only PCI adapters approved by Stratus. Before approving an adapter, Stratus thoroughly tests it to make sure that it interacts properly with Stratus systems, including failover to a duplexed partner if an active adapter or CPU-I/O enclosure fails or is removed from service. Customers who have attempted to use inadequately tested PCI adapters in their systems have frequently experienced problems that proved difficult to isolate and diagnose and resulted in delayed projects.

Stratus provides ftReady third-party PCI adapter testing and driver-hardening services. To find out more about these offerings, contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative (see “Getting Help” in the Preface or the <http://www.stratus.com/go/support> web site).

You should thoroughly test any new PCI adapter, including adapters sold or approved by Stratus, with your applications in a test environment before using it in a production environment.

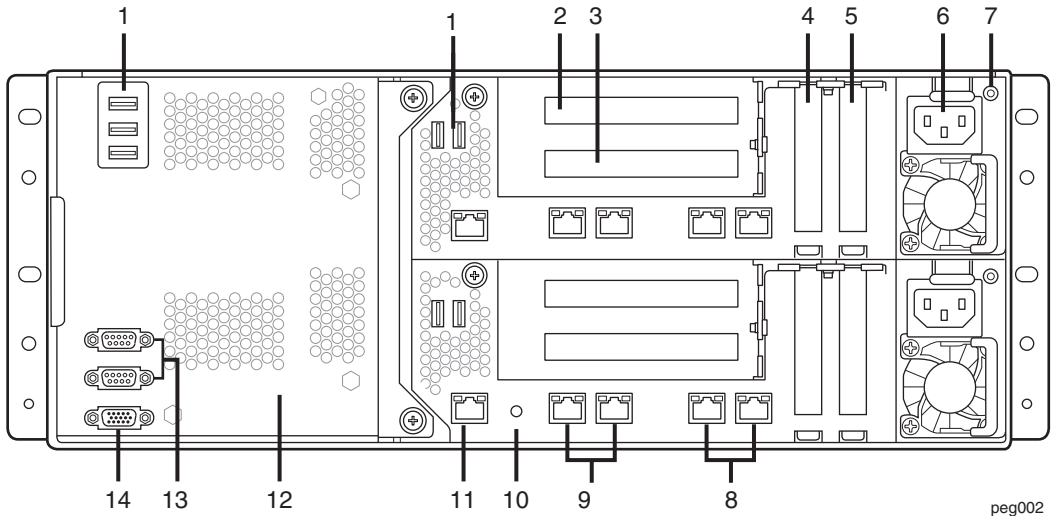
For information about supported PCI adapters, see [Table 4-1](#) and [Table 4-4](#).



## System Ports and Backplane

The ports are located at the rear of the system, as shown in [Figure 10-1](#).

**Figure 10-1. System Ports**



- |   |  |    |  |
|---|--|----|--|
| 1 | USB 2.0 ports (3)<br>USB 3.0 ports (2) †   | 8  | 1GbE ports (4)                                 |
| 2 | PCI adapter slot 3 (PCIe Gen 3, 2x8) (2) ‡ | 9  | 10GbE ports (4) ‡                              |
| 3 | PCI adapter slot 4 (PCIe Gen 3, 2x8) (2) ‡ | 10 | CPU-I/O enclosure system<br>identifier LED (2) |
| 4 | PCI adapter slot 1 (PCIe Gen 3, 2x8) (2)   | 11 | VTM Ethernet port (2)                          |
| 5 | PCI adapter slot 2 (PCIe Gen 3, 2x8) (2)   | 12 | System backplane                               |
| 6 | CPU-I/O enclosure power receptacle (2)     | 13 | Serial (COM) ports (2)                         |
| 7 | Power supply LED (2)                       | 14 | VGA (monitor) port                             |

† No failover capacity for USB 3.0 ports.

‡ Not present on ftServer 2900 systems.

## Managing Cables

When routing cables within the cabinet, keep all power cords as separate as possible from peripheral and communication cables. For example, route all power cords on one side of the cabinet and all peripheral and communications cables on the other side of the cabinet, using the cable management rings on your cabinet to constrain the cords and cables.

## Connecting a Monitor, Mouse, and Keyboard

You can connect a monitor that you supply and the V115 mouse and keyboard supplied by Stratus.

### NOTES

1. Other keyboards and mice have not been tested and may not work properly. See [http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html) for third-party peripheral equipment that has been tested with Stratus ftServer systems.
2. For information about monitor and keyboard requirements, see “[Monitor Requirements](#)” on [page 6-5](#) and “[Keyboard Requirements](#)” on [page 7-2](#), respectively.

### Connecting a Generic Monitor

1. Connect the USB cable from the mouse to a USB port located on the backplane at the rear of the system.
2. Connect the USB cable from the keyboard to another of the system’s USB ports. (number 1 in [Figure 10-1](#)).
3. Connect the 15-pin D-sub connector on the VGA cable from the monitor to the system’s VGA port (number 14 in [Figure 10-1](#)).
4. Connect the VGA cable to the monitor.

## Connecting the ftServer System to External Storage Systems

### NOTE

ftServer systems support connections to ftScalable Storage G3 or ftScalable Storage G4 systems, depending on the operating system and version of Automated Uptime Layer installed on the ftServer system.

For more information, see [“Supported Storage Systems” on page 4-2](#).

The following configurations are supported:

- Directly attach the Fibre Channel cables between one or two ftServer systems and the Fibre Channel RAID controllers of a supported ftScalable Storage system
- Connect multiple ftServer systems to a supported ftScalable Storage storage systems through a storage area network (SAN)
- Connect multiple ftServer systems to iSCSI RAID controllers in a supported ftScalable Storage system through a switch in a LAN

If you are connecting an external storage system for data storage only, make the connections **after** you install the operating system and verify that the operating system is operating properly.

For Linux- or VMware vSphere-based systems only, if you are installing Automated Uptime Layer on a volume or LUN (logical unit number) of a Fibre Channel storage system to create a boot volume, make the connections **before** you install the software.

For information about installing, connecting, and configuring your external storage system to an ftServer system, see one or more of the following:

- The *ftScalable Storage G3: Getting Started Guide* (R687).
- The links in the [ftScalable Storage G4 System Documentation](#) section in the Preface.
- For VMware vSphere-based systems, also see the VMware *vSphere Storage* guide, which explains the best practices for configuring storage systems in a VMware vSphere environment and provides information about managing VMware vSphere-based systems that use a SAN.
- For connecting to network switches to access iSCSI storage systems on the same subnet, see [“Connecting ftServer Systems to the Network for iSCSI Access” on page 10-5](#).

## Connecting ftServer Systems to the Network for iSCSI Access

You can use one of the following network ports to connect ftServer systems to supported ftScalable Storage system iSCSI storage devices:

- The embedded 1GbE or 10GbE LAN adapters
- The supported, optional Ethernet PCI adapters. See [Table 7-3](#), [Table 7-4](#), or [Table 7-5](#) for information about supported Ethernet PCI adapters.

## To connect the Ethernet ports to networks

1. Connect the ports for the embedded Ethernet controllers to networks. Obtain the appropriate cables and connectors (see [Table 4-4](#)) for each of the system Ethernet ports you plan to use. Connect one end of each cable to a network port on the system and the other end to an Ethernet wall jack or switch. Items 8 and 9 in [Figure 10-1](#) show the 1GbE and 10GbE network ports, respectively, on the systems.
2. If the system contains Ethernet adapters in PCI slots, connect them to a network. Connect the LAN adapter team to the same network subnet as the iSCSI storage array using two network switches for fault tolerance.

For ports on copper gigabit Ethernet adapters, use UTP cables with RJ-45 connectors.

## NOTES

1. If you are installing the adapters, install them in pairs, one in the same slot in each CPU-I/O enclosure.
2. Add cables in pairs, a cable connected to the same port in the same slot in each CPU-I/O enclosure. If you are using a single pair of ports, attach cables to the top port(s) of each card and attach both cables to the same network.

After you connect the cables and install the software, and when the system is running, configure the iSCSI software initiator and configure the Ethernet ports into *teams* (on Windows-based systems), *channel-bond interfaces* (on Linux-based systems), or *vSwitches* (on VMware vSphere-based systems).

For information about configuring the iSCSI software initiator, see the *ftScalable Storage G3: Getting Started Guide* (R687) or the links in the [ftScalable Storage G4 System Documentation](#) section in the Preface.

For instructions about configuring Ethernet ports, see one of the following manuals:

- *Stratus ftServer System Administrator's Guide for the Windows Operating System* (R014W)
- *The Stratus ftServer System Administrator's Guide for the Linux Operating System* (R003L)
- *Stratus ftServer System Administrator's Guide for VMware vSphere* (R002E)

## Connecting the VTM Ports to a Network

Each ftServer 2900, 4900, and 6900 system includes two integrated Virtual Technician Module (VTM) ports (see item 11 in [Figure 10-1](#)), which enable remote access to the VTM console. The VTM console enables system administrators, the CAC, or your authorized Stratus service representative to remotely control, monitor, and diagnose problems on your system, even when the operating system is not responsive.

To connect the VTMs to a network, you need two UTP cables with RJ-45 connectors. Connect one end of each cable to a VTM network port. Attach the other end of each cable to an Ethernet wall jack or a switch.

After installing and starting the operating system, configure and test the VTMs, as described in one of the following manuals:

- *Stratus Automated Uptime Layer for Windows-based ftServer Systems: Installation and Configuration* (R002W)
- *Stratus Automated Uptime Layer for Linux-based ftServer Systems: Installation and Configuration* (R013L)
- *Stratus Automated Uptime Layer for VMware vSphere-based ftServer Systems: Installation and Configuration* (R004E)

For complete information about using the VTM console, see the *Stratus ftServer Virtual Technician Module User's Guide* (R642).

## Connecting the External Modem

The phone line connection provides a way for you, the CAC, or your authorized Stratus service representative to remotely manage and troubleshoot your system if it does not have network access to the Internet.

### NOTICE

---

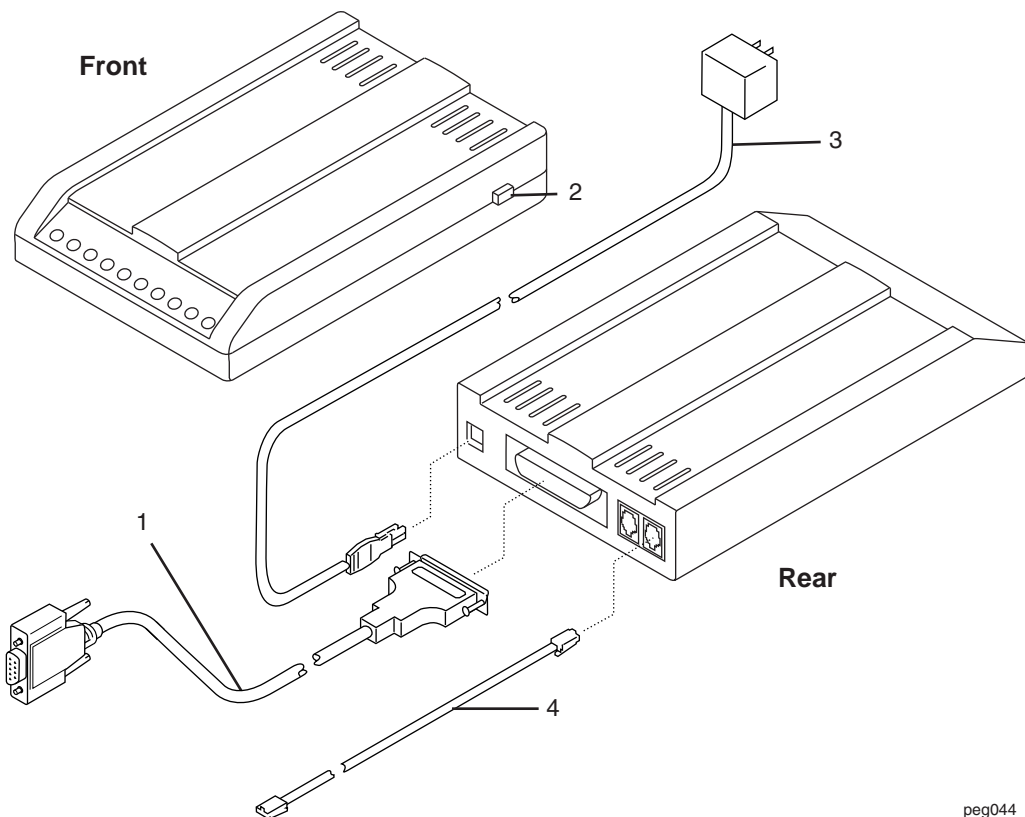
Use only the power supply supplied with the modem. Use of any other power supply voids the warranty and can damage the modem.

1. Connect the telephone cable ([Figure 10-2](#)) to the RJ-11 line jack on the modem.
2. If necessary, attach a Telco adapter to the telephone cable.
3. Connect the DB-25 end of the modem cable to the modem's DB-25 port, and the DB-9 end of the modem cable to the ftServer system's DB-9 COM2 port (the lower of the two serial COM ports shown in callout 13 in [Figure 10-1](#).)
4. Connect the power cord to the modem and to a power outlet.
5. Turn the modem power switch on.

For information about configuring the modem after installing and starting the operating system, see one of the following manuals:

- *Stratus Automated Uptime Layer for Windows-based ftServer Systems: Installation and Configuration* (R002W)
- *Stratus Automated Uptime Layer for Linux-based ftServer Systems: Installation and Configuration* (R013L)
- *Stratus Automated Uptime Layer for VMware vSphere-based ftServer Systems: Installation and Configuration* (R004E)

**Figure 10-2. Connecting Cables to the Modem**



peg044

1 DB-9 connector (to COM2 on the ftServer system)

2 Modem on/off switch

3 Power cord

4 Telephone cable

## Connecting Tape Drives (Windows- and Linux-based Systems)

Connect a tape drive to a Windows- or Linux-based ftServer system using a (customer-supplied) SCSI mini-SAS SFF-8088 storage cable.

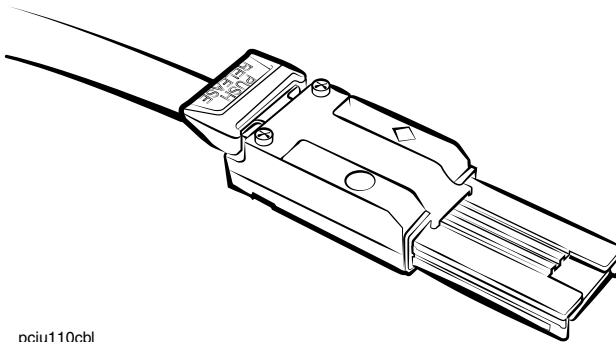
### NOTE

VMware vSphere-based systems do not support tape drives.

### To connect a tape drive to the system

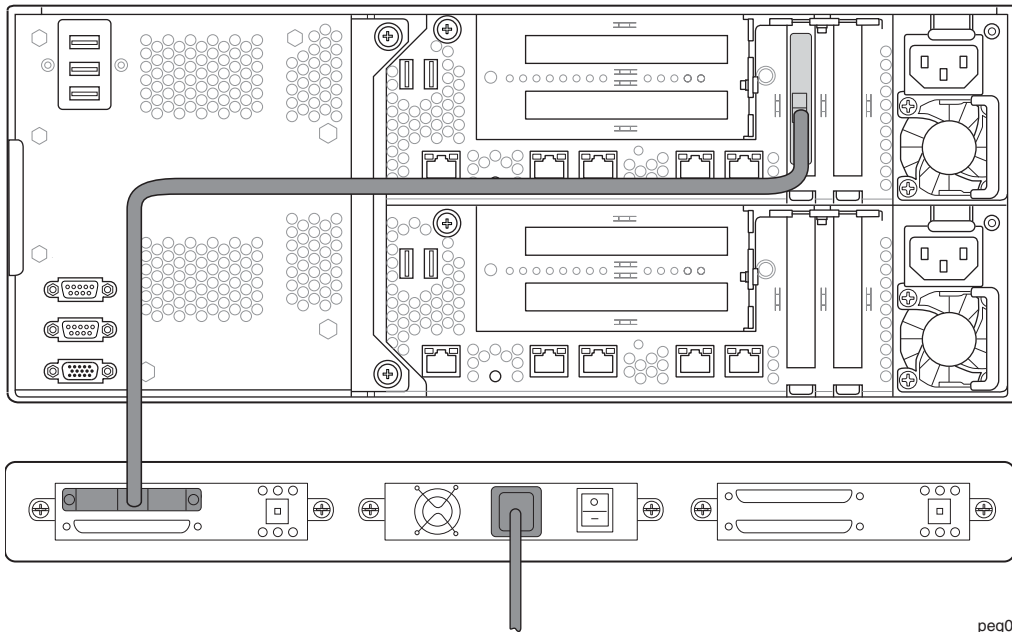
1. At the rear of the system, connect the mini-SAS (SFF-8088) connector (see [Figure 10-3](#)) to the port on the supported SAS PCI adapter. Ensure that the connector locks into place.

**Figure 10-3. Mini-SAS (SFF-8088) Connector**



pci110cbl

2. Support the cable by routing it through cable management rings or by tying it with tie wraps.
3. Connect the other end of the cable mini-SAS connector to the tape drive (the lower component in [Figure 10-4](#)). Ensure that the connector locks into place.

**Figure 10-4. Connecting a Tape Drive to an ftServer System**

For more information about installing and connecting the tape drive, see the tape drive manufacturer's documentation.

For information about the tape-drive models that have been tested with Stratus ftServer systems, see [http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html).

## Next Steps

Connect the system to electrical power as described in [Chapter 11](#).



---

# Chapter 11

## Connecting the System to Electrical Power

To connect your ftServer system to electrical power, see the following topics:

- [“System Power Overview” on page 11-1](#)
- [“Connecting the System to AC Power \(Mains\)” on page 11-2](#)
- [“Connecting the System Directly to a UPS” on page 11-3](#)
- [“Connecting Systems to Power Through PDUs” on page 11-6](#)
- [“Next Steps” on page 11-8](#)

No tools are required for these tasks.

### System Power Overview

For an overview of system power, see [“Redundant Power Sources” on page 2-1](#). In addition, be sure to read the following safety information.



#### **WARNING**

Use only the power cords or cables you receive from Stratus.

**DO NOT MODIFY THE POWER CORDS OR CABLES** you receive with your system.

Failure to comply with this warning will void agency certification.

Failure to comply with this warning can cause a fire hazard.



## AVERTISSEMENT

Utiliser uniquement les cordons d'alimentation ou les câbles reçus de Stratus.

NE PAS ALTÉRER LES CORDONS D'ALIMENTATION OU LES CÂBLES fournis avec votre système.

Le non-respect de cet avertissement annulera la certification de l'organisme.

Le non-respect de cet avertissement peut entraîner un risque d'incendie.

## NOTE

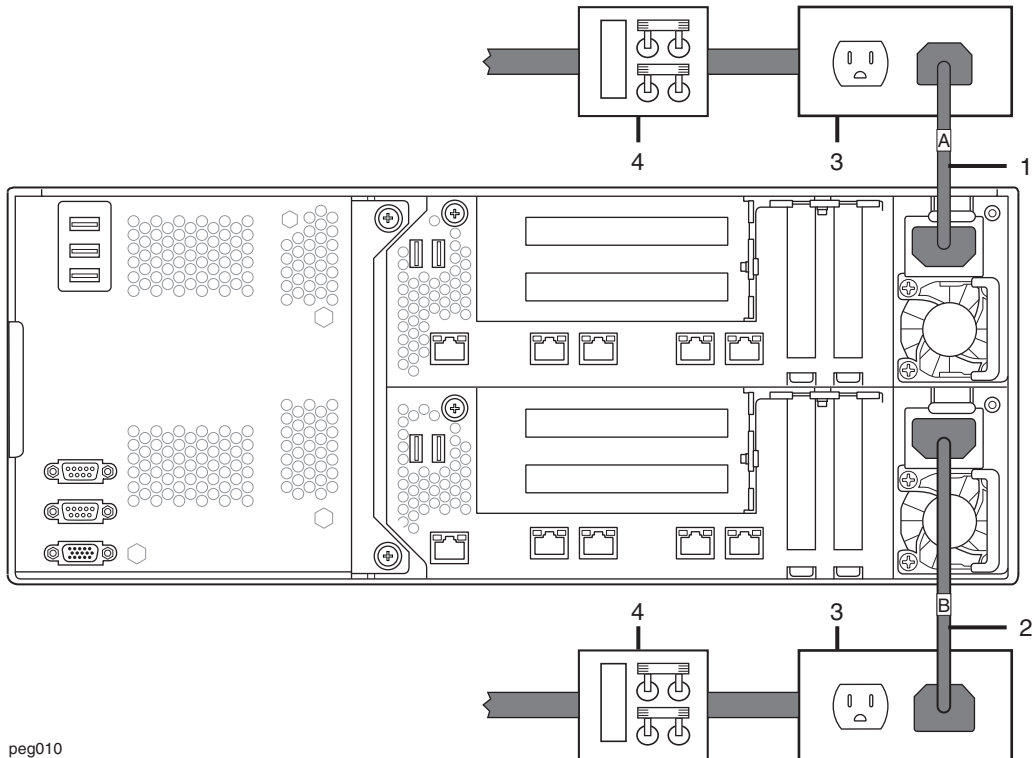
When routing cables within the cabinet, keep all power cords as separate as possible from peripheral and communication cables. For example, route all power cords on one side of the cabinet and all peripheral and communications cables on the other side of the cabinet, using the cable management rings on your cabinet to constrain the cords and cables.

## Connecting the System to AC Power (Mains)

1. From the front of the system, make sure that the CPU-I/O enclosures are fully inserted into the shelf unit by tightening the thumbscrews, if necessary.
2. Locate two black power cords and two labels, A and B.
3. Attach an A label to one power cord. Connect the female end to the receptacle on the **top** CPU-I/O enclosure. (Lift the small power-cord locking bar above the receptacle to insert the power cord into the enclosure.) Connect the other end to the A-side power source.
4. Attach a B label to the second power cord. Connect the female end to the receptacle on the **bottom** CPU-I/O enclosure. Connect the other end to a second, separate, B-side power source.

Figure 11-1 shows where the two power cords connect to the system.

**Figure 11-1. Connecting a System Directly to AC Power**



peg010

- |   |                   |   |   |
|---|-------------------|---|---|
| 1 | A-side power cord | 3 | AC power outlets  |
| 2 | B-side power cord | 4 | AC power (mains) distribution circuit breakers (maximum of 20A) |

## Connecting the System Directly to a UPS

### NOTES

1. Connect the ftServer system directly to a Stratus-qualified UPS, which is sized accordingly to support the A-side of the system.
2. If you need to provide battery backup for peripheral components, plan for additional UPS capacity to handle the load of these components, and test your configuration to ensure that it works properly when

power is removed. If you need assistance in planning and testing your UPS configuration, contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative.

3. For more information about qualified UPS units, see [http://stratadoc.stratus.com/genref/refsell/qualified\\_equipment.html](http://stratadoc.stratus.com/genref/refsell/qualified_equipment.html).

## NOTICE

---

The network switch that connects the UPS to the ftServer system must be connected to UPS power. Otherwise, the UPS cannot send an OS shutdown message to the ftServer system if the network is down.

1. From the front of the system, make sure that the CPU-I/O enclosures are fully inserted into the shelf unit by tightening the thumbscrews, if necessary.
2. Locate two black power cords and two labels, A and B.
3. Attach an A label to one power cord.

Connect the IEC-C13 end of the cable to the receptacle on the **top** CPU-I/O enclosure. (Lift the small power-cord locking bar above the receptacle to insert the power cord into the enclosure.) Connect the other country-specific end to the UPS. See [Table 2-10](#) to select the power cord that meets your configuration and country's power connection requirements.

4. Attach a B label to the second power cord.

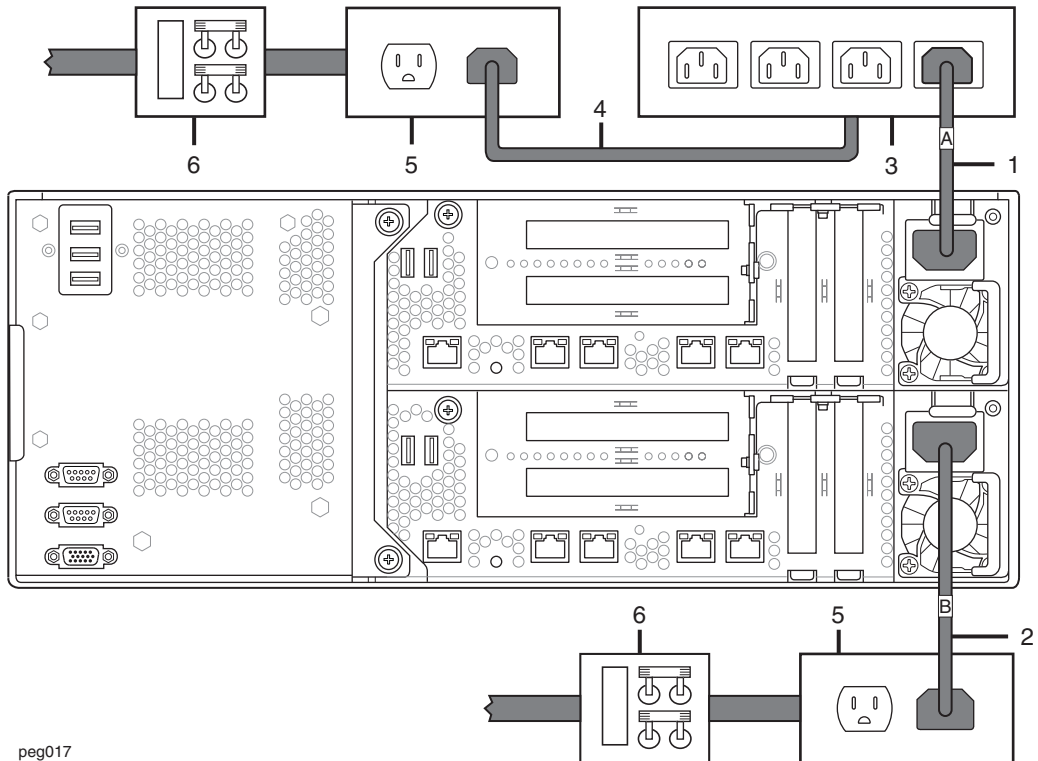
Connect the IEC-C13 end of the cable to the receptacle on the **bottom** CPU-I/O enclosure. Connect the other end to a second, separate power source.

To configure the system to communicate with a UPS in the case of a power outage, see one of the following manuals:

- *Stratus Automated Uptime Layer for Windows-based ftServer Systems: Installation and Configuration* (R002W)
- *Stratus Automated Uptime Layer for Linux-based ftServer Systems: Installation and Configuration* (R013L).
- *Stratus Automated Uptime Layer for VMware vSphere-based ftServer Systems: Installation and Configuration* (R004E)

Figure 11-2 shows how the rack-mounted system connects to power through a UPS.

**Figure 11-2. Connecting a System to a UPS**



peg017

- |   |                   |   |   |
|---|-------------------|---|---|
| 1 | A-side power cord | 4 | UPS power cord  |
| 2 | B-side power cord | 5 | AC power outlets  |
| 3 | UPS               | 6 | AC power (mains) distribution circuit breakers (maximum of 20A) |

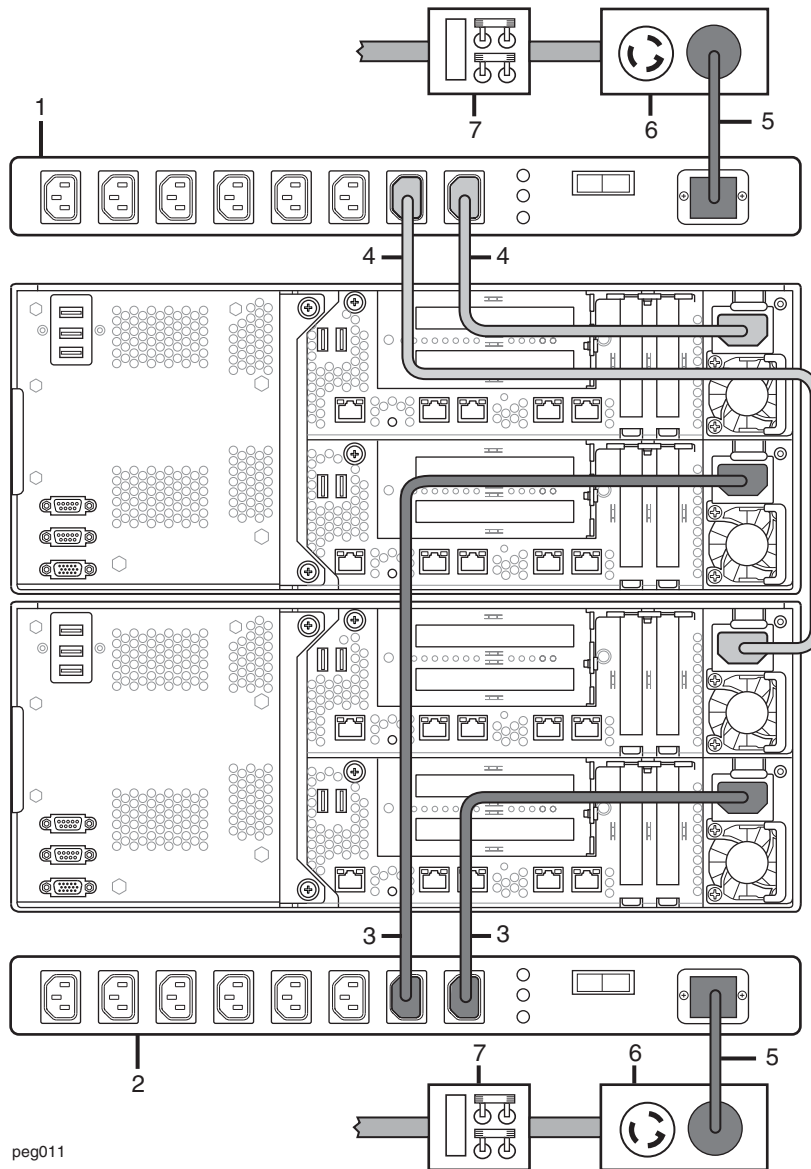
## Connecting Systems to Power Through PDUs

### NOTE

Do not connect a PDU or peripheral components to a Stratus-qualified UPS, which is sized only for the ftServer system.

1. From the front of the system, make sure that the CPU-I/O enclosures are fully inserted into the shelf unit by tightening the thumbscrews, if necessary.
  2. Locate two black power cables and two labels, A and B.
  3. Connect the A-side and B-side PDUs to **separate** AC power sources. For each PDU, do the following:
    - a. At the back of the cabinet, attach the IEC 320-C19 connector end of the country-specific external power cord (number 5 in [Figure 11-3](#)) to the single PDU inlet connector on the right side of the PDU.
    - b. Connect the country-specific connector end to a power source.
    - c. Attach the appropriate label to the power cable to indicate A- or B-side power.
- [Figure 11-3](#) shows how to connect PDUs to ftServer systems and directly to power sources.
4. Locate one black and one gray power cable (*jumper*).
  5. Connect the IEC-C13 end of the **gray** power cable (number 4) to the receptacle on the top CPU-I/O enclosure. (Lift the small power-cord locking bar above the receptacle to insert the power cord into the enclosure.) Connect the other end of the gray cable to the **top** PDU.
  6. Connect the IEC-C13 end of the **black** cable (number 3) to the receptacle on the bottom CPU-I/O enclosure. Connect the other end of the black cable to the **bottom** PDU.
  7. If applicable, repeat steps 4 through 6 for additional systems.

[Figure 11-3](#) shows the color-coded power cords connected to the systems and PDUs.

**Figure 11-3. Connecting the Systems Directly to PDUs**

- |   |                                   |   |  |
|---|-----------------------------------|---|--|
| 1 | A-side PDU                        | 5 | PDU power cords  |
| 2 | B-side PDU                        | 6 | AC power outlets   |
| 3 | B-side system power cords (black) | 7 | AC power (mains) distribution circuit breaker (maximum of 20A) |
| 4 | A-side system power cords (gray)  |   |  |

## Next Steps

For further information, see one of the following manuals:

- *Stratus Automated Uptime Layer for Windows-based ftServer Systems: Installation and Configuration* (R002W)
- *Stratus Automated Uptime Layer for Linux-based ftServer Systems: Installation and Configuration* (R013L)
- *Stratus Automated Uptime Layer for VMware vSphere-based ftServer Systems: Installation and Configuration* (R004E)

If the system software was already installed at the factory, follow the instructions in one of the preceding documents for starting your system for the first time. If the system software was not installed, follow the instructions for installing the operating system and associated system software.



---

# Appendix A

## System Specifications

For system specifications, see:

- [“System Specifications” on page A-1](#)
- [“PCIe Adapter Specifications” on page A-6](#)
- [“AAP87600 PDU Specifications” on page A-7](#)

### NOTES

---

1. The system temperature and humidity requirements defined in Table [A-2](#) are the **minimum** requirements the site must provide.
2. For ftScalable Storage G3 systems, the temperature and humidity requirements are provided in the *ftScalable Storage G3: Getting Started Guide* (R687).
3. For ftScalable Storage G4 systems, see the link in the [ftScalable Storage G4 System Documentation](#) section in the Preface for temperature and humidity requirements.

## System Specifications

The following figures show front and rear views of the systems.

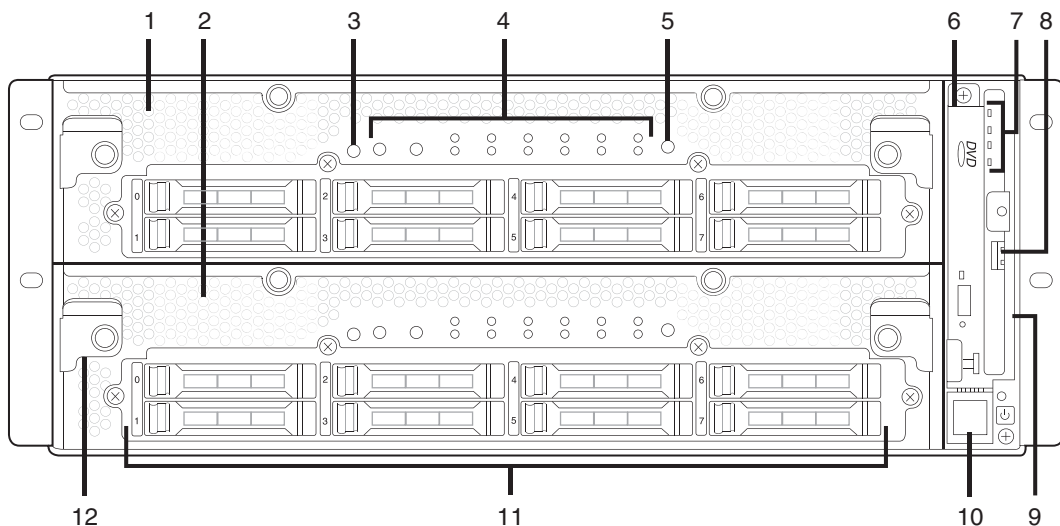
- [Figure A-1](#) shows the front of an ftServer 2900, 4900, or 6900 system, mounted in a rack with its bezel pulled forward.
- [Figure 10-1](#) shows the rear of a rack-mountable ftServer 2900, 4900, or 6900 system, specifying the locations of the connectors at the rear of the system.

[Table A-1](#) lists the dimensions of the system cabinets supplied by Stratus. [Table A-2](#) lists the specifications for each ftServer CPU-I/O enclosure, the front panel, and the backplane assembly. [Table A-4](#) lists the specifications of the PDU.

For the specifications of ftScalable Storage G3 systems, see the *ftScalable Storage G3: Getting Started Guide* (R687).

For specifications of ftScalable Storage G4 systems, see the link in the [ftScalable Storage G4 System Documentation](#) section in the Preface.

**Figure A-1. ftServer 2900, 4900, or 6900 System: CPU-I/O Enclosures: Front View**



peg022

- |   |                                       |    |  |
|---|---------------------------------------|----|--|
| 1 | CPU 0, I/O 10                         | 7  | Front panel LEDs                               |
| 2 | CPU 1, I/O 11                         | 8  | USB port                                       |
| 3 | CPU ID button (magnifying glass icon) | 9  | Front panel                                    |
| 4 | System LEDs                           | 10 | Power button                                   |
| 5 | NMI (dump) button                     | 11 | Internal disk drives (16) or disk drive blanks |
| 6 | DVD drive                             | 12 | Release levers (4)                             |

**Table A-1. Cabinet Dimensions**

<b>24U Shipping Container</b>	
Height (including pallet)	56 in. (1.42m)
Width	41 in. (1.04m)
Depth	53 in. (1.35m)
<b>38U Shipping Container</b>	
Height (including pallet)	80 in. (2.03m)
Width	41 in. (1.04m)
Depth	53 in. (1.35m)
<b>24U Cabinet</b>	
Height (including casters)	49.5 in. (1.26m)
Width	27.6 in. (70 cm)
Depth	41 in. (1.04m)
Weight, empty	280 lb (127 kg)
Weight, empty with pallet and shipping container	436 lb (197.8 kg)
Weight capacity (payload)	1500 lb (680.4 kg)
<b>38U Cabinet</b>	
Height (including casters)	74 in. (1.9m)
Width	27.5 in. (70 cm)
Depth	41 in. (1.04m)
Weight, empty (with front and rear doors)	350 lb (158.76 kg)
Weight, empty with pallet and shipping container	512 lb (232.2 kg)
Weight capacity (payload)	1500 lb (680.4 kg)

**Table A-2. ftServer 2900, 4900, 6900 System Unit Specifications**

<b>Power</b>	
Input power	An AC power connector 800W for each ftServer 2900 or 4900 enclosure (1600W total) 1000W for each ftServer 6900 enclosure (2000W total)
Nominal input voltage	100-127 or 200-240 volts; 50/60 Hz. Each CPU-I/O enclosure has a C14 (IEC 60320) input connector.
Power Factor	0.98
VA	ftServer 2900 and 4900: 960 (240V x 4) 800 (100V x 8)  ftServer 6900: 1200 (240V x 5) 1000 (100V x 10)
Protective earth ground current	3.5 mA maximum for each AC power cord
<b>Physical Dimensions</b>	
Height	7.0 in. (17.78 cm; 4U)
Width	17.5 in. (44.45 cm)
Depth	30.1 in. (76.5 cm), with bezel, excluding rail
Weight (fully-loaded, with 2 processors, 20 DIMMs, and 8 disks per CPU-I/O enclosure)	System (2 CPU-I/O enclosures, shelf unit, front panel, backplane, and bezel): 120 lb (54.4 kg)  Mounting brackets: 3 lb (1.4 kg)
<b>Environmental</b>	
Operating temperature	41° F to 104° F (5° C to 40° C) For every 800 ft (243.8 m) above 2000 ft (609.6 m), lower the maximum operating temperature by 0.56° F (1° C).
Storage temperature	-38° F to 140° F (-39° C to 60° C), vented
Operating altitude	0 ft to 10,000 ft (0m to 3,048m). In China markets, regulations may limit installations to a maximum altitude of 6562 ft (2000m).
Maximum rate of temperature change during operation	6.67° F (12° C) per hour

**Table A-2. ftServer 2900, 4900, 6900 System Unit Specifications** (Continued)

Relative humidity during operation	10% to 80% (noncondensing)
Relative humidity during storage	5% to 95% (noncondensing)
Heat dissipation, each system (both enclosures)	5464 Btu/hr. maximum
Air cleanliness	Meets ISO 14644-1 class 8 standards
<b>Features</b>	
Processors	<p>ftServer 2900: One Intel® Skylake-EP 10-Core 2.2 GHz processor in each CPU-I/O enclosure</p> <p>ftServer 4900: Two Intel Skylake-EP 10-Core 2.2 GHz processors in each CPU-I/O enclosure</p> <p>ftServer 6900: Two Intel Skylake-EP 16-Core 2.2 GHz processors in each CPU-I/O enclosure</p>
Memory	<p>ftServer 2900: 8 physical, fully buffered (FB) DDR4 inline memory module (DIMM) slots in each CPU-I/O enclosure.</p> <p>ftServer 4900 and 6900: 20 physical, fully buffered (FB) DDR4 inline memory module (DIMM) slots in each CPU-I/O enclosure. All 20 slots are usable in dual-processor systems.</p>
Ports	<p>Each CPU-I/O enclosure contains the following ports:</p> <p><i>System front</i></p> <ul style="list-style-type: none"> <li>• A USB 2.0 port</li> </ul> <p><i>System rear</i></p> <ul style="list-style-type: none"> <li>• Two embedded 1GbE</li> <li>• Two embedded 10GbE (None on ftServer 2900 systems)</li> <li>• Two USB 3.0</li> </ul> <p><i>System backplane</i></p> <ul style="list-style-type: none"> <li>• Three USB 2.0 ports</li> <li>• A VGA port</li> <li>• Two serial ports</li> </ul>
PCIe slots (standard)	<p>Two low-profile PCI-Express slots standard on each CPU-I/O enclosure</p> <p>See <a href="#">“PCIe Adapter Specifications”</a> for details.</p>

**Table A-2. ftServer 2900, 4900, 6900 System Unit Specifications (Continued)**

Additional PCI slots	<p>On ftServer 6900 systems, each CPU-I/O enclosure supports one PCIe riser with two full-height-capable PCIe slots.</p> <p>On ftServer 4900 systems, the PCIe riser is optional.</p> <p>The PCIe riser is not supported on ftServer 2900 systems.</p> <p>See <a href="#">“PCIe Adapter Specifications”</a> for details.</p>
BMC	One advanced system management module (Baseboard Management Controller, or BMC) embedded in each CPU-I/O enclosure with one 10/100-Mbps Ethernet port dedicated to the BMC in each CPU-I/O enclosure. BMCs include embedded Virtual Technician Module (VTM) functionality.
Internal disk drives	<p>Up to eight Serial Attached SCSI (SAS) disks per CPU-I/O enclosure.</p> <ul style="list-style-type: none"> <li>For internal hard disk drives, up to eight per CPU-I/O enclosure are supported.</li> <li>Up to eight enterprise flash drives (EFDs) per CPU-I/O enclosure are supported.</li> </ul>
DVD+/-R drive <sup>†</sup>	In the front panel, one drive that reads from CDs and DVDs.

<sup>†</sup> VMware vSphere-based ftServer systems support the DVD drive only during system software installation.

## PCIe Adapter Specifications

Two PCIe slots are standard on each CPU-I/O enclosure motherboard. In addition, a PCIe riser that adds two slots per enclosure is standard on ftServer 6900 systems and optional on ftServer 4900 systems. (The PCIe riser is not available on ftServer 2900 systems.) [Table A-3](#) lists the power and length specifications for PCI adapters.

**Table A-3. PCIe Adapter Specifications**

Power	
PCI slot rating	10W maximum per PCI slot
Physical Dimensions	
CPU-I/O enclosure motherboard	<p>Two low-profile PCIe slots</p> <p>6.6 in (167.64 mm) maximum adapter length</p>

**Table A-3. PCIe Adapter Specifications** *(Continued)*

<b>Power</b>	
PCIe riser (standard on ftServer 6900 systems; optional on ftServer 4900 systems)	Two full-height-capable PCIe slots
	Top riser slot (PCI 3): 6.6 in. (167.64 mm) maximum adapter length
	Lower riser slot (PCI 4): 6.6 in. (167.64 mm) maximum adapter length

Use only Stratus-approved PCI adapters in your Stratus system. Before approving an adapter, Stratus thoroughly tests it to make sure that it interacts properly with Stratus systems, including failover to a duplexed partner if an active adapter or CPU-I/O enclosure fails or is removed from service. Customers who have attempted to use inadequately tested PCI adapters in their systems have frequently experienced problems that proved difficult to isolate and diagnose and resulted in delayed projects.

Stratus provides ftReady third-party PCI adapter testing and driver hardening services. To find out more about these offerings, contact the Stratus Customer Assistance Center (CAC) or your authorized Stratus service representative (see “[Getting Help](#)” in the Preface or the <http://www.stratus.com/go/support> web site).

You should thoroughly test any new PCI adapter, including adapters sold or approved by Stratus, with your applications in a test environment before using it in a production environment.

All Stratus-approved PCI adapters are submitted for Electromagnetic Interference (EMI) and safety compliance. Other adapters will not have EMI and safety approvals for use in an ftServer system.

## AAP87600 PDU Specifications

A power distribution unit (PDU) optionally supplies power to rack-mounted ftServer systems and optional rack-mountable components.



### **WARNING**

For important safety information about your PDUs, see “[PDU Safety Considerations](#)” on page B-10.

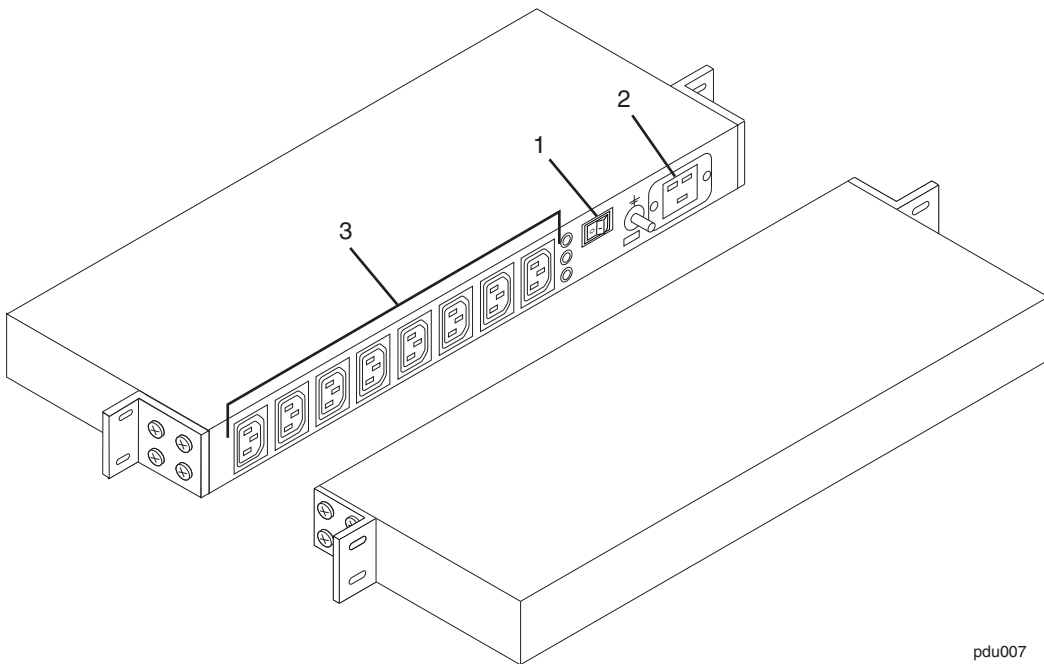


## AVERTISSEMENT

Pour obtenir des informations importantes sur la sécurité de vos unités de distribution de l'alimentation, consultez la section [“PDU Safety Considerations” on page B-10](#).

[Figure A-2](#) shows the AAP87600 PDU.

**Figure A-2. AAP87600PDU**



pdu007

- 1 Circuit breaker switch
- 2 AC input receptacle
- 3 AC outlet receptacles



Table A-4 lists the specifications for the AAP87600 PDU.

**Table A-4. AAP87600 PDU: Specifications**

<b>Input Specifications</b>	
Power input	Single phase, AC
Nominal input voltage; frequency	200–240 VAC; 50/60 Hz
Current <sup>†</sup>	16 amps
Input receptacle	IEC 320/C20
Input protection <sup>‡</sup>	16A, circuit breaker
Power dissipation <sup>§</sup>	10W nom. @ 240 VAC
Panel indicators <sup>¶</sup>	LED, main, and TVS
<b>Output Specifications</b>	
Power output <sup>††</sup>	3.84 KVA, maximum
Output receptacle	8x - IEC 320/C13
PE ground <sup>‡‡</sup>	1/4" - 20 threaded stud
<b>Physical and Environmental Specifications</b>	
Overall size <sup>§§</sup>	Height: 1.72 in. (4.36 cm) Width: 19.0 in. (48.26 cm) Depth: 6.5 in. (16.51 cm)
Weight	5.7 lb (2.6 kg)
Operating temperature during operation	32° F (0° C) to 131° F (55° C)  For every 800 ft (243.8m) above 2000 ft (609.6m), lower the maximum operating temperature (95° F (35° C)) by 1.8° F (1° C).
Maximum rate of temperature change during operation	54° F (12° C) per hour or 32.36° F (0.2° C) per minute
Relative humidity during operation	10% to 80% (noncondensing)
Storage temperature to 40,000 ft (12.2 km)	-38° F to 140° F (-40° C to 60° C)
Relative humidity during storage	5% to 95% (noncondensing)

† Denotes a maximum continuous input current of 16A at 240 VAC.

‡ The circuit breaker is UL 489-listed and features a flat rocker front surface with an “Accidental Off” feature. The circuit breaker has a delay curve similar to an AIRPAX™ LEG series, delay 62.

§ *Power dissipation* is the combination of heat loss due to wiring, input filter leakage, and LED indicators.

¶ LEDs are turned off when TVS networks are disconnected from the circuitry because of overheating caused by transient voltage conditions.

†† Output power is the combined power of the 8 outlets, which averages 2 amps/outlet at 240 VAC.

‡‡ Denotes Protective Earth Ground.

§§ Overall size includes the width of the mounting flanges. The PDU cabinet is sized for EIA 19 in. (48.26 cm) rack installation.

---

## Appendix B

# Electrical Circuit and Wiring Information

For electrical circuit and wiring information that you need to provide to the contractor and/or facilities personnel responsible for wiring the power at the system installation site, see:

- [“Fault Protection Requirements” on page B-1](#)
- [“Grounding Considerations” on page B-1](#)
- [“Circuit Wiring Diagrams” on page B-2](#)
- [“Electrical Power Connectors” on page B-9](#)
- [“PDU Safety Considerations” on page B-10](#)

### Fault Protection Requirements

Each enclosure in ftServer systems contains internal fault/overload current protection. However, the system relies on the power distribution system at your site for protection against potential faults in the power cords and the wiring in the system base.

System and PDU power cords must not be connected to a branch circuit greater than 20A.

### Grounding Considerations

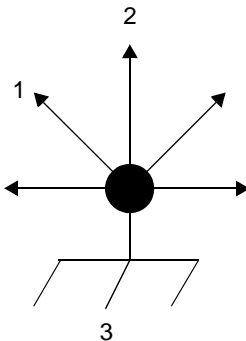
The system obtains an earth reference ground through the power cords attached to the system. Similarly, each peripheral device connected to the system obtains ground through its power cord. You **must** ensure that a high-integrity safety-ground conductor is installed as part of the wiring system (in accordance with U.S. national electric code NFPA 70 or the equivalent). The international safety standard (EN60950) for electronic data processing (EDP) equipment also requires a ground conductor, but calls it a protective earth (PE) ground.

Depending upon local conditions, ground potentials may differ between the system base and any peripheral devices connected to the system base. All grounds in the system **must** return to the same reference point in the power distribution system, as close as possible to **zero (0) volt potential** relative to earth reference ground. Earth

reference ground is typically a metal stake in the ground to which the ground conductors from one or more buildings are attached.

As shown in [Figure B-1](#), a *star ground* is often used to obtain the same earth reference ground. Each earth reference ground, such as the system base ground, is returned separately to a common point where a zero-volt (0V) earth ground exists. The star ground ensures that all equipment is at the same potential and that no noise or safety problems associated with an unpredictable or uncharacterized grounding system will occur.

**Figure B-1. Star Ground Example**



- 1 To monitor
- 2 To ftServer system
- 3 Earth reference ground (0V)

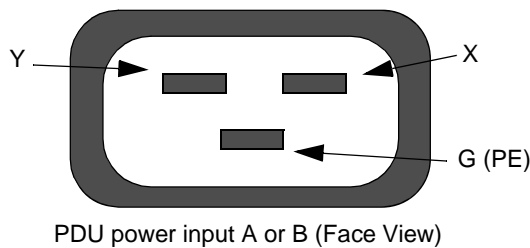
## Circuit Wiring Diagrams

The following circuit wiring diagrams show how the hot, ground, and/or neutral AC signals should be connected to the power input plugs of the system and optional components:

- [Figure B-4](#) illustrates a single-phase 120V AC circuit connection.
- [Figure B-5](#) illustrates a single-phase 240V AC circuit connection.
- [Figure B-6](#) illustrates a split-phase 120/240V AC circuit connection.
- [Figure B-7](#) illustrates a three-phase 208V AC, Y-, or  $\Delta$ -source circuit connection, phase-to-phase.
- [Figure B-8](#) illustrates a three-phase 380V AC, Y-, or  $\Delta$ -source circuit connection, phase-to-neutral.

In the following diagrams, the power inputs for ftServer 2900, 4900, and 6900 systems are labeled X and Y, as shown in [Figure B-2](#) and [Figure B-3](#), to eliminate any ambiguities in the nomenclature. For single-phase applications, the X input is connected to the L (Line) *hot* input, and the Y input is connected to the N (Neutral) input. However, for split-phase or three-phase applications, the X and Y inputs are connected to L1, L2, or L3 (separate lines). Therefore, for split-phase or three-phase applications, both X and Y can be electrically hot with respect to the system base (earth reference ground). [Figure B-2](#) shows the physical locations of the X and Y inputs on the PDU, and [Figure B-3](#) shows them on the system enclosure.

**Figure B-2. PDU Power Input Labeling**



**Figure B-3. ftServer Enclosure Power Input Labeling**

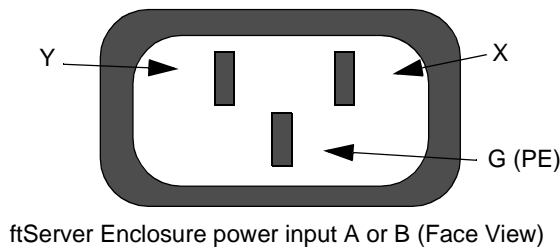


Figure B-4 shows a single-phase 120V AC circuit connection. Note that this application requires a single-pole circuit breaker.

Figure B-4. Single-Phase 120V AC Circuit Connection

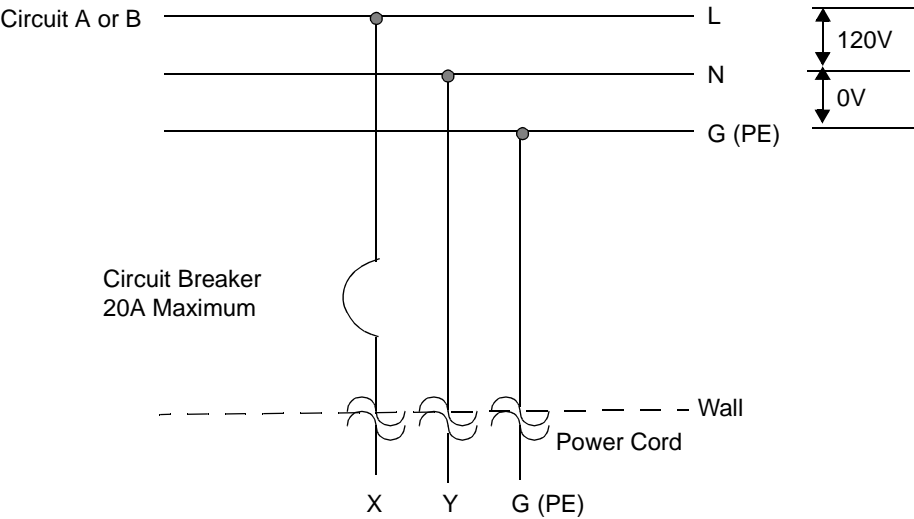


Figure B-5 shows a single-phase 240V AC circuit connection. Note that this application requires a single-pole circuit breaker.

**Figure B-5. Single-Phase 240V AC Circuit Connection**

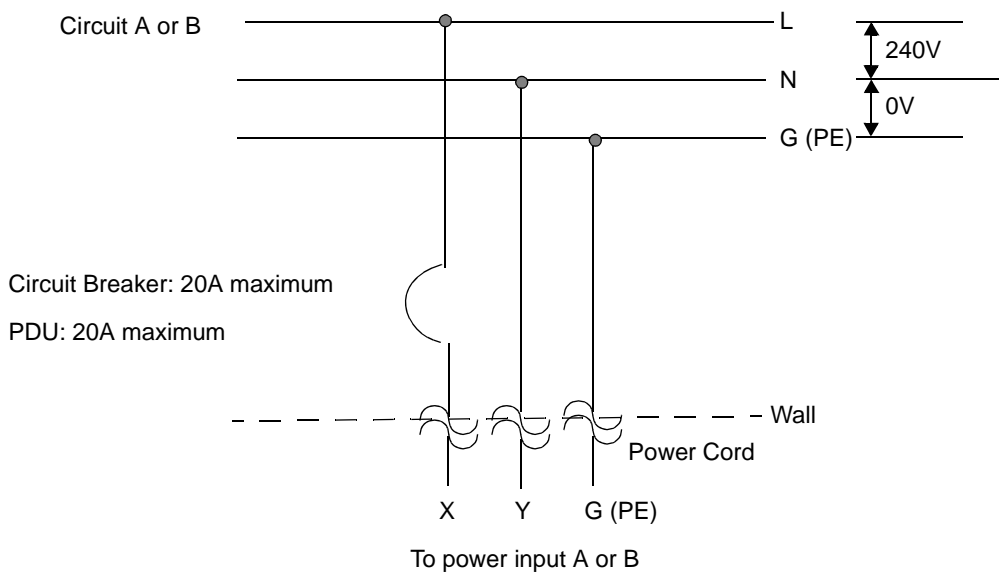


Figure B-6 shows a split-phase 120/240V AC circuit connection. Note that this application requires a double-pole circuit breaker.

Figure B-6. Split-Phase 120/240 Volts AC Circuit Connection

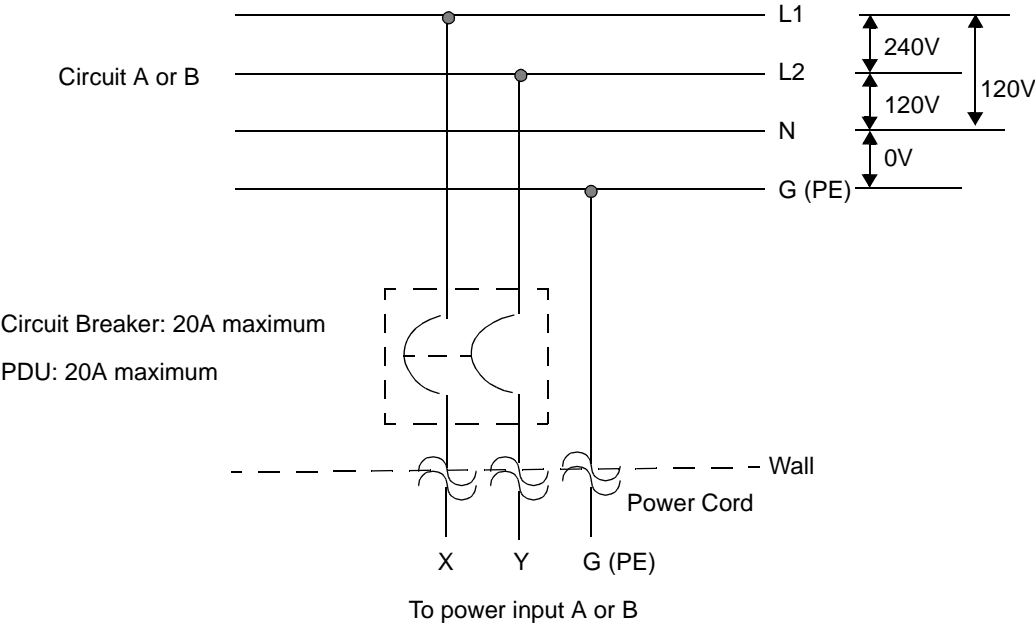




Figure B-7 shows a three-phase 208V AC, Y-, or  $\Delta$ -source circuit connection, which is a phase-to-phase source connection. Note that the X and Y inputs on the system can be connected from L1 and L2, L2 and L3, or L1 and L3. This application requires a double-pole circuit breaker.

**Figure B-7. Three-Phase 208V AC, Y-, or  $\Delta$ -Source Circuit Connection, Phase-to-Phase**

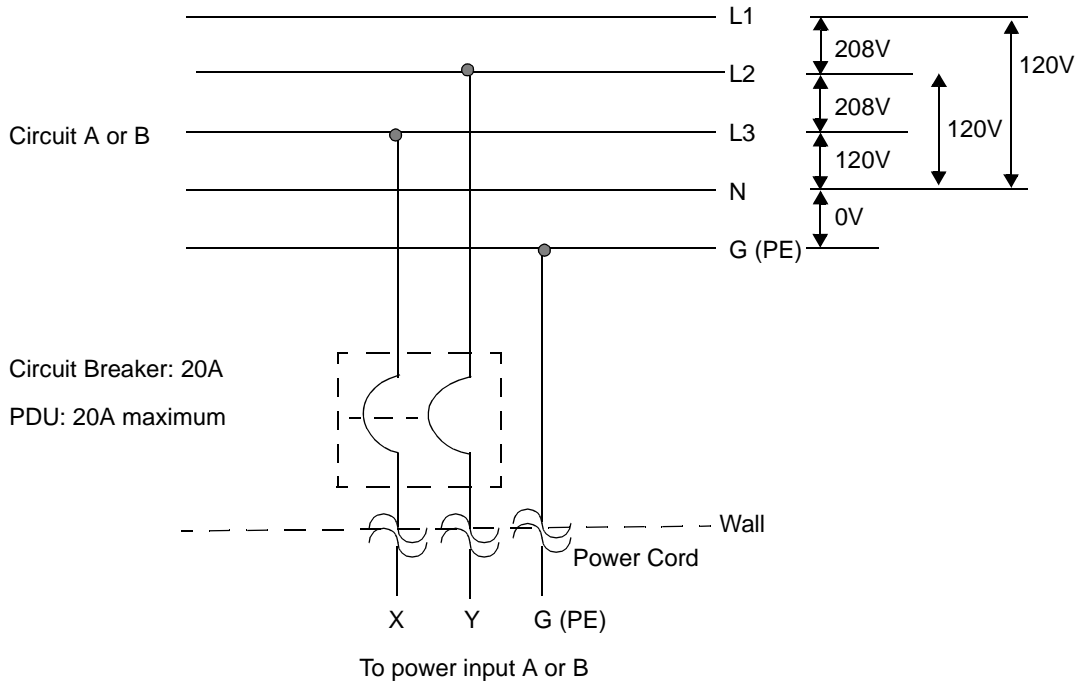
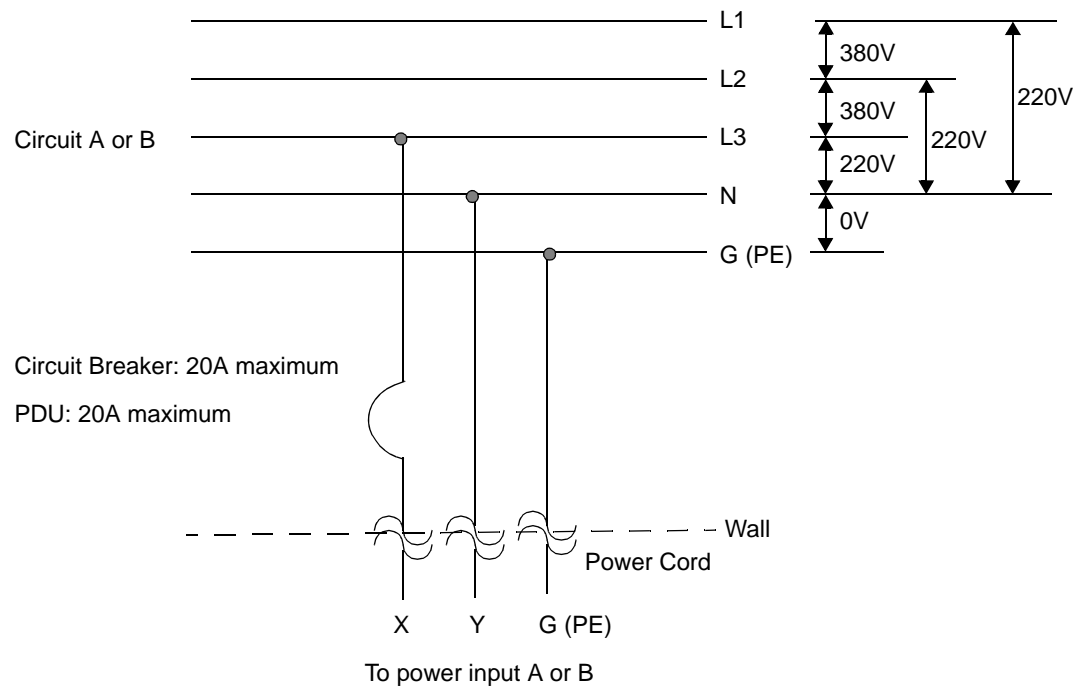


Figure B-8 shows a three-phase 380V AC, Y-, or Δ-source circuit connection, which is a phase-to-neutral source connection. Note that the system's X input can be connected to L1, L2, or L3. This application requires a single-pole circuit breaker.

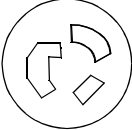
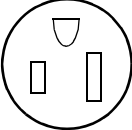
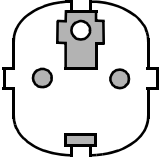
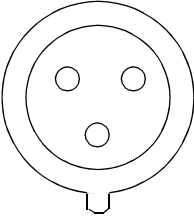
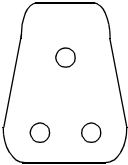
Figure B-8. Three-Phase 380V AC, Y-, or D-Source Circuit Connection, Phase-to-Neutral



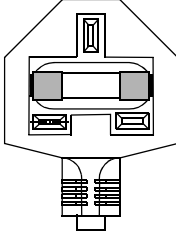
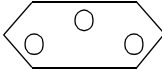
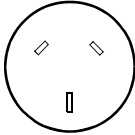
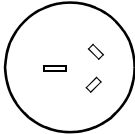
## Electrical Power Connectors

Table B-1 describes the connectors required by the AC power cords that Stratus supplies with ftServer systems and optional devices.

**Table B-1. Connectors for AC Power Outlets**

Connector	Configuration	Rating	Description
NEMA L6-20		20A, 250 volts AC	2-pole, 3-wire
NEMA 5-15		15A, 125 volts AC	2-pole, 3-wire
CEE (7) VII		20A, 250 volts AC	2-pole, 3-wire
IEC 60309 (formerly IEC 309)		16-20A, 250 volts AC	2-pole, 3-wire
SABS 164-1:1992		16A, 250 volts AC	2-pole, 3-wire

**Table B-1. Connectors for AC Power Outlets** *(Continued)*

Connector	Configuration	Rating	Description
BS 1363/A		13A, 250 volts AC	2-pole, 3-wire
SEV 1011-S24507		10A, 250 volts AC	2-pole, 3-wire
SAA/3/15 AS/NZS 3112-1993		15A, 250 volts AC	2-pole, 3-wire
GB1002-1996		10A, 250 volts AC	2 pole, 3-wire

## PDU Safety Considerations

This section describes some important safety considerations for PDUs.

A PDU provides for the reliable distribution of power via eight outlets. When installed into a standard EIA 19-inch data, security, or industrial control rack, the PDU provides up to 3.84 kilowatts of filtered power to the system.

The PDU's input is filtered to reduce emissions in Information Technology (IT) applications and provides at least 30 decibels of common-mode noise reduction. It provides even greater differential noise reduction between the frequency ranges of 1 to 10 MHz. In addition, the PDU contains thermally protected transient voltage suppression (TVS) networks, which clamp common mode and differential mode voltage transients with up to 170 joules of energy content. The PDU is also equipped

with LEDs that are lit green if the main power input is present and if the TVS networks are ready and functional.

Transient voltages are unpredictable. The amount of energy associated with them varies greatly depending on amplitude and duration. This PDU with its 170-joule rating is designed to be effective at the equipment rack level. It should be part of a layered protection system, coordinated with higher energy-level protective devices such as AC distribution TVS devices, UPS systems with TVS devices, and building-level protective devices, including active or passive devices such as isolation transformers. In the event of a high voltage transient, the PDU TVS network will activate, clamping the voltage to protect the load. Based on the amplitude and duration of these abnormal events, higher source currents can trip the branch circuit breaker, leaving the PDU without an input source.

#### NOTICE \_\_\_\_\_

TVS devices have a finite life expectancy and wear out when subjected to input voltage transients. If either LED is off, the PDU's transient protection is not guaranteed and you should replace the PDU.

Be careful when specifying amperage and delay parameters for the branch circuit breaker that provides power to the PDU. Selection of circuit breakers in an electrical power system should be specified so that when an abnormal condition exists, the breaker closest to the abnormality in the distribution path trips before the larger upstream circuit breaker. This isolates and limits service interruption only to the branch experiencing the problem. The coordination of protective devices, especially in a continuous availability server environment, should be designed by an appropriately experienced engineering service.



#### CAUTION \_\_\_\_\_

High current leakage conditions exist when using a PDU because multiple loads are connected to a common source. Use only the locking line cords supplied with the PDU.



#### MISE EN GARDE \_\_\_\_\_

Il existe un risque élevé de fuite de courant lorsqu'une PDU est utilisée, car plusieurs charges sont reliées à une source commune. Utilisez uniquement les cordons d'alimentation dotés d'un système de verrouillage fournis avec la PDU.



**WARNING** \_\_\_\_\_

Do not connect the power supply until the PDU has a proper earth reference ground.



**AVERTISSEMENT** \_\_\_\_\_

Ne branchez pas l'alimentation électrique tant que la PDU a été correctement mise à la terre.

---

## Appendix C

# Hardware Replacement and System Support

Hardware replacement and system support services require a service agreement and are handled through the [Stratus Customer Assistance Center \(CAC\) or your authorized Stratus service representative](#). Support services are facilitated by the Stratus ActiveService Network (ASN), a worldwide network with secure dial-back capabilities.

If the system is covered by a service agreement, you can receive advanced parts exchange and support services as outlined in your agreement. Support coverage can include remote system support and monitoring, telephone support, electronic support services, and hardware remedial services.

The Stratus service model enables you to replace *customer-replaceable units* (CRUs) in accordance with the procedures explained in the documentation provided with your system. All *field-replaceable units* (FRUs) require replacement by authorized service personnel. If you are unsure whether the part needing replacement is a CRU or a FRU, contact the CAC or your authorized Stratus service representative, or see the following Stratus web page:

<http://www.stratus.com/go/services/ipb>

This web page provides links to illustrations of the CRUs and FRUs in Stratus systems.

If you suspect that a CRU has failed, and the system is not covered by a service agreement but is still under warranty, contact the party from whom you purchased your system for return instructions. You can also obtain return instructions from:

- Your local Stratus sales offices
- The Stratus ftServer Service Warranty Parts Replacement Process and Return Instructions web page at <http://www.stratus.com/go/support/ftserver/warrantyreplace>
- Your local authorized Stratus service representative

These sources can also provide information about the customer service assistance options available.

To view the ftServer limited hardware warranty, which is available in several languages, see the following web page:

<https://www.stratus.com/services-support/customer-support/platform-support/warranty-info/>



---

# Index

## A

- adapters. *See* PCI adapters
- APC UPS, 2-7
  - PowerChute Network Shutdown, 2-6
- AS/NZS 3112-1993 connector, B-10
- A-side power source, 2-1
- ASN
  - site planning, 3-3, 4-9

## B

- bezel
  - illustrated, 9-2
  - installing, 9-23
- BMC, A-6
- BS connector
  - 1363/A, B-10
- B-side power source, 2-1

## C

- cabinets
  - configuration planning, 5-1, 5-5
  - requirements, 6-1
  - specifications, A-3
- cables
  - Ethernet, 4-5
  - Ethernet network, 10-6
  - Fibre Channel, 4-3
  - managing, 10-4, 11-2
  - planning for, 3-3, 4-1
  - routing, 10-4, 11-2
  - telephone, 3-3
- CAC, getting assistance, 1-2
- cage nuts
  - front rail locations, 9-16
  - illustrated, 9-2
  - inserting, 9-8
- CEE connector
  - (7) VII, B-9
- checklist for site planning, 1-2

- circuit, electrical
  - planning information, B-1
  - wiring diagrams, B-2
- communications cables
  - planning for, 4-1
- compliance, 1-1
- connectors, electrical, B-9
  - BS 1363/A, B-10
  - CEE (7) VII, B-9
  - GB1002-1996, B-10
  - IEC 60309, B-9
  - NEMA 5-15, B-9
  - NEMA L6-20, B-9
  - SAA/3/15 AS/NZS 3112-1993, B-10
  - SABS 164-1:1992, B-9
  - SEV 1011-S24507, B-10
- CPU-I/O enclosures
  - installing, 9-21
- current requirements
  - from PDU, 5-2
- Customer Assistance Center. *See* CAC

## D

- documentation
  - ftScalable storage systems, 10-5
- dust contamination, 3-2

## E

- earth reference ground, B-1
- electrical
  - connectors, B-9
  - grounding, B-1
  - power planning, 2-1
  - wiring, B-1
- embedded Ethernet ports, 4-5
- environmental requirements
  - maximum rate of temperature change, A-4
  - operating humidity, A-5
  - storage humidity, A-5

## Ethernet

- cables, 4-5
- networks
  - connecting to PCI adapters, 10-6
- ports
  - channel-bond interfaces, 10-6
  - switches, 10-6
  - teams, 10-6

## F

### Fibre Channel

- cables, 4-3
- connections, 4-3
- switches electrical requirements, 2-3
- front vertical rails, cage nut locations, 9-16
- ftScalable Storage systems
  - documentation, 10-5
  - Ethernet cables, 4-8
  - Ethernet connections, 4-5
  - management PC, 4-6

## G

### GB connector

- GB1002-1996, B-10
- grounding the system, 2-10, 6-2, B-1

## H

### hardware

- connecting system components and peripherals, 10-1
- installing system in cabinet, 9-1
- replacement and system support, C-1
- hubs, network, 3-3

## I

### IEC connector

- 60309, B-9

### iSCSI

- connections, 10-5
- software initiator, 10-6

## J

### jacks

- Ethernet, 3-3

## K

### keyboards

- site planning, 7-2
- V115 specifications, 7-2

## M

### management PC

- for ftScalable Storage systems, 4-6, 4-8

### memory, A-5

### modems

- connecting to system, 10-7

### monitors

- connecting to system, 10-4
- power cords, 2-7
- requirements, 6-5

### mounting brackets

- system, 9-12

### mouse, connecting to keyboard, 10-4

## N

### NEMA connector

- 5-15, B-9
- L6-20, B-9

### network (Ethernet) cables, 4-6

### network management card

- UPS, 2-6

## O

### optical Fibre Channel connections, 4-3

## P

### PCI adapters, 10-2

- connecting to network, 10-6
- Ethernet, 10-6
- Linux-based systems, 7-4
- overview, 10-1
- slots, 10-1
- VMware vSphere-based systems, 7-5
- Windows-based systems, 7-3

### PCIe slots, A-5

### PDUs, 9-6

- A-side, B-side power, 9-7
- components, 9-6
- illustrated, 9-7
- configuration planning, 5-1
- connecting to power sources, 11-6

- connecting to system, 11-6
- installing, 9-6, 9-8
- maximum number in a cabinet, 9-6
- power (jumper) cables, 2-10
- power cords, 2-9, 9-7
- safety considerations, B-10
- site planning, A-8
- specifications, A-9
- usage calculation
  - sample, 5-4
  - worksheets, 5-4
- ports
  - illustrated, 10-3
- power (AC)
  - button, A-2
  - connecting directly to AC mains, 11-2
  - connecting system to, 11-2
  - connecting with PDUs, 11-6
  - connecting with UPS, 11-3, 11-4
  - cords
    - color coded, 11-6
    - illustrated, 9-2
    - monitors, 2-7
    - PDU, 9-7
    - safety precautions, 11-1
    - storage enclosures, 2-7
    - systems, 2-7
    - tape-drive enclosures, 2-7
  - electrical requirements, 2-2
  - PDU
    - connecting to AC, 11-6
  - service requirements, 2-2, 2-4, 2-5
  - sources, 2-1
    - direct, 2-5
    - UPS, 2-7
  - system connections, illustrated, 2-5
  - wall outlets, 2-4, 3-3
- power distribution units. *See* PDUs
- PowerChute Network Shutdown, 2-6
- protective earth ground, B-1

## R

- rack unit (U). *See* U (rack unit)
- racks
  - configuration planning, 5-1, 5-5
  - requirements, 6-1
- rear vertical rails
  - screw locations, 9-12

- regulatory notice, 1-1
- removing power, 8-1
- replacement systems
  - hardware replacement, C-1
- room requirements, 3-1

## S

- SAA/3/15 AS/NZS connector
  - 3112-1993, B-10
- SABS connector
  - 164-1:1992, B-9
- safety notices, 8-1
- screw locations
  - front rails, 9-16
  - rear rails, 9-12
- serial ports, A-5
- SEV connector
  - 1011-S24507, B-10
- single-phase circuit connections
  - 120 V AC, B-4
  - 240 V AC, B-5
- site planning
  - checklist, 1-2
  - overview, 1-1
- space planning, 3-1
  - cables, 3-3
  - future expansion, 3-2
  - room requirements, 3-1
- specifications
  - AC power, 2-2
  - cabinet, A-3
  - PDUs, A-9
  - rack-mountable system, A-1
  - V115 keyboards, 7-2
- split-phase circuit connections
  - 120–240 V AC, B-6
- standards compliance, 1-1
- star ground, B-2
- storage systems, connecting to, 10-4
- Stratus Customer Assistance Center. *See* CAC
- switches
  - circuit breaker
    - PDU, A-8
  - Ethernet
    - cable planning, 3-3, 4-6, 4-7
    - site network, 3-3
  - system power cords. *See* power (AC)

- system specifications
  - rack-mounted systems, A-1
- systems
  - components
    - illustrated, 9-2
  - connecting data cables, 10-4
  - installing in cabinet, 9-1
  - support, C-1

## T

- tape-drive enclosures
  - connecting to systems, 10-9
  - power cords, 2-7
- technical support. *See* CAC
- telephone lines, 4-9
  - for ASN modem, 1-3
  - for support calls, 4-9
- telephones
  - for support calls, 1-3
- three-phase circuit connections
  - 208 V AC, B-7
  - 380 V AC, B-8
- tools, for installation, 9-3
- toxic and hazardous substances, 1-1
- transient voltages, B-11

## U

- U (rack unit)
  - defined, 9-3
- uninterruptible power supply (UPS). *See* UPS
- UPS, 2-7
  - connecting, 11-4
  - network communication hardware, 2-6
  - network communication software, 2-6
  - network management card, 2-6
  - rack system connections, 2-7
- USB ports
  - front, A-2

## V

- V115 keyboards
  - platforms supported, 7-2
  - specifications, 7-2
- VTMs, A-6
  - cables, 4-6
  - ports
    - connecting to network, 10-7

## W

- weight
  - ftScalable Storage G3, 7-2
- wiring, electrical, B-1