IBM System Storage SAN Volume Controller

Models 2145-8F2 and 2145-8F4 Hardware Installation Guide

Version 4.3.1

GC27-2221-00

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Note:
Before using this information and the product it supports, read the information in **Safety and environmental notices** and **Notices**.

This edition applies to the IBM System Storage SAN Volume Controller Models 2145-8F2 and 2145-8F4 running version 4, release 3, modification 1 of IBM System Storage SAN Volume Controller software and to all subsequent releases and modifications until otherwise indicated in new editions. The information in this guide was formerly provided in GC27-2132-02.

Contents

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Safety and environmental notices

Review the multilingual safety notices for the IBM® System Storage™ SAN Volume Controller, redundant ac-power switch, and the uninterruptible power supply before you install and use the product.

To find the translated text for a caution or danger notice:

1. Look for the identification number at the end of each caution notice or each danger notice. In the following examples, the numbers (C001) and (D002) are the identification numbers.

   CAUTION:
   A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)

   DANGER

   A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)

2. Locate *IBM Systems Safety Notices* with the user publications that were provided with the SAN Volume Controller hardware.
3. Find the matching identification number in the *IBM Systems Safety Notices*. Then review the topics concerning the safety notices to ensure that you are in compliance.
4. Optionally, read the multilingual safety instructions on the SAN Volume Controller Web site. Go to www.ibm.com/storage/support/2145, click the current product documentation link, and then click **Multi-language**.

Inspecting the SAN Volume Controller for unsafe conditions

Use caution when working in any potential safety hazardous situation that is not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you can continue before you correct the problem.

Before you start the safety inspection, make sure that the power is off, and that the power cord is disconnected.

Each device has required safety items installed to protect users and IBM service personnel from injury. This guide addresses only those items.

Important: Good judgment must also be used to identify potential safety hazards due to the attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem. For example, consider the following conditions and their potential safety hazards:

Electrical hazards (especially primary power)
Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards
A damaged CRT face or a bulging capacitor can cause serious injury.

Mechanical hazards
Loose or missing items (for example, nuts and screws) can cause serious injury.

To inspect each SAN Volume Controller node for unsafe conditions, perform the following steps. If necessary, see any suitable safety publications.

1. Turn off the SAN Volume Controller and disconnect the power cord.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables using the following steps:
   a. Ensure that the third-wire ground connector is in good condition. Use a meter to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the frame ground.
   b. Ensure that the power cord is the appropriate type, as specified in the parts listings.
   c. Ensure that the insulation is not worn or damaged.
4. Check for any obvious nonstandard changes, both inside and outside the unit. Use good judgment about the safety of any such changes.
5. Check inside the SAN Volume Controller for any obvious unsafe conditions, such as metal particles, contamination, water or other fluids, or marks of overheating, fire, or smoke damage.
6. Check for worn, damaged, or pinched cables.
7. Ensure that the voltage that is specified on the product-information label matches the specified voltage of the electrical power outlet. If necessary, verify the voltage.
8. Inspect the power-supply assemblies and check that the fasteners (screws or rivets) in the cover of the power-supply unit have not been removed or disturbed.
9. Before connecting the SAN Volume Controller to the storage area network (SAN), check the grounding.

External device check

Ensure that you perform an external device check before you install the SAN Volume Controller.

To conduct an external device check, perform the following steps:

1. Verify that all external covers are present and are not damaged.
2. Ensure that all latches and hinges are in the correct operating condition.
3. If the SAN Volume Controller is not installed in a rack cabinet, check for loose or broken feet.
4. Check the power cord for damage.
5. Check the external signal cable for damage.
6. Check the cover for sharp edges, damage, or alterations that expose the internal parts of the device.
7. Correct any problems that you find.

Internal device checks

Ensure that you perform an internal device check before you install the SAN Volume Controller.

To conduct the internal device check, perform the following steps:

1. Check for any non-IBM changes that might have been made to the device. If any are present, obtain the "Non-IBM Alteration Attachment Survey," form number R009, from the IBM branch office. Complete the form and return it to the branch office.
2. Check the condition of the inside of the device for any metal or other contaminants, or any indications of water, other fluid, fire, or smoke damage.
3. Check for any obvious mechanical problems, such as loose components.
4. Check any exposed cables and connectors for wear, cracks, or pinching.

Checking the grounding of a SAN Volume Controller, the uninterruptible power supply, and the redundant ac-power switch

Ensure that you understand how to check the grounding of a SAN Volume Controller, the uninterruptible power supply, and the optional redundant ac-power switch feature.

Ensure that you understand how to check the grounding of a SAN Volume Controller, the uninterruptible power supply, and the optional redundant ac-power switch.

To test the grounding of a SAN Volume Controller node, perform the following steps. Before you start, confirm that you know the SAN Volume Controller model type and whether you are using redundant ac power. Determine the location of the signal cables that are attached to the SAN Volume Controller.

When you are asked to test the grounding continuity, use your local procedures to perform the test. The test is successful if the measured resistance is 0.1 ohm or less.

Attention: Some electrical circuits can be damaged if the external signal cables are present at the SAN Volume Controller while it is undergoing a grounding test.

1. Ensure that the SAN Volume Controller node is powered off. See "MAP 5350: Powering off a SAN Volume Controller node" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.
2. Disconnect all signal cables from the SAN Volume Controller node, which includes the following cables:
   - The fibre-channel cables
   - The Ethernet cable or cables
   - The serial cable that is connected to the uninterruptible power supply
3. Disconnect all signal cables from the uninterruptible power supply.
4. If redundant ac power is not used, disconnect the uninterruptible power-supply power cable from the site power-distribution unit.
5. If redundant ac power is used, turn off any SAN Volume Controller that is being supplied from the redundant ac-power switch, and remove the power cable to this system from the redundant ac-power switch.
6. If redundant ac power is used, disconnect ***both*** input power leads from the site power distribution units.
7. If redundant ac power is not used, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the uninterruptible power-supply input-power cable.
8. If redundant ac power is used, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on

the plug of the main power cable of the redundant ac-power switch. If the test is successful, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the backup power cable of the redundant ac-power switch. Both tests must be successful.

9. After you have completed testing the grounding continuity, perform one of the following procedures, depending on the outcome of the test.
   - If the test is successful, reconnect any cables that were removed, and power on any uninterruptible power-supply units and SAN Volume Controller nodes that were powered off.
   - If the test was not successful, ensure that all cables are securely connected. If the test still fails, test the individual system components. Before you test the individual components, remove all cables from the components. If any component test fails, replace the component. After each component has been tested and the failing ones have been replaced, repeat the complete system test by returning to step 1 on page ix.

     Test the components in the following order:

     a. The SAN Volume Controller node, from the frame to the ground pin of the input power receptacle
     b. The uninterruptible power supply from the ground pin of the input power receptacle to the ground conductor of the output power receptacle
     c. If used, the redundant ac-power switch from the ground pin of the main input power receptacle to the ground conductor of the output power receptacle, and from the ground pin of the backup input power receptacle to the ground conductor of the output power receptacle
     d. The SAN Volume Controller node to uninterruptible power-supply power-cable assembly, between the two ground conductors of the power cable
     e. The uninterruptible power-supply input-power cable, between the two ground conductors of the power cable
     f. If used, the redundant ac-power switch main input-power cable, between the two ground conductors of the cable
     g. If used, the redundant ac-power switch backup input-power cable, between the two ground conductors of the cable

Inspecting the uninterruptible power supply for unsafe conditions

Ensure that you take the time to inspect the uninterruptible power supply for unsafe conditions.

Consider the following conditions and their potential safety hazards:

Electrical hazards (especially primary power)
Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards
A bulging capacitor can cause serious injury.

Mechanical hazards
Loose or missing items (for example, nuts and screws) can cause serious injury.

Use caution when working in a potential safety hazard that is not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you can continue before you correct the problem.

Using the following inspection checklist as a guide, inspect the uninterruptible power supply for unsafe conditions. If necessary, see any suitable safety publications.

1. If any equipment has been damaged during the shipment, keep the shipping cartons and packing materials.
2. To file a claim for the shipping damage, perform the following steps:
   a. File with the carrier within fifteen days of receipt of the equipment.
   b. Send a copy of the damage claim within fifteen days to your service support representative.

Handling static-sensitive devices

Ensure that you understand how to handle devices that are sensitive to static electricity.

Attention: Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static-protective bags until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its antistatic bag, touch it to an unpainted metal part of the system unit for at least two seconds. (This action removes static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your SAN Volume Controller, without putting it down. If it is necessary to put the device down, place it onto its static-protective bag. (If your device is an adapter, place it component-side up.) Do not place the device onto the cover of the SAN Volume Controller or onto a metal table.
- Take additional care when you handle devices during cold weather because heating reduces indoor humidity and increases static electricity.

Environmental notices and statements

You must become familiar with the environmental notices and statements.

The following topics describe the environmental notices and statements that are applicable to this product.

1089CORE

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

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

The equipment is suitable for installation in the following:

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

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

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

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

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

Product recycling and disposal

Ensure that you are aware of the materials that must be recycled. Before using this information and the product that it supports, read the *IBM Environmental Notices and User Guide* on the SAN Volume Controller Documentation CD.

About this guide

This guide provides an overview of the IBM System Storage SAN Volume Controller and detailed installation instructions.

Use this guide to perform the following tasks:

- Install a new SAN Volume Controller system or extend an existing system.
- Install one or more SAN Volume Controller nodes and related hardware components, such as uninterruptible power supply units or an optional redundant ac-power switch.
- Connect SAN Volume Controller components to a SAN.
- Manage connections to an Ethernet network.
- Verify the completeness of a SAN Volume Controller installation.

The topics within this book provide conceptual, planning, and installation information for the SAN Volume Controller hardware model that was ordered.

Who should use this guide

The intended audience for this guide is the IBM service representative.

This guide should be read by the IBM service representative who is responsible for the initial installation of the SAN Volume Controller hardware, including the redundant ac-power switch and the uninterruptible power supply.

After the IBM service representative has installed the SAN Volume Controller hardware, the customer must use the *IBM System Storage SAN Volume Controller Software Installation and Configuration Guide* to install any additional software and to configure the SAN Volume Controller.

Emphasis

Different typefaces are used in this guide to show emphasis.

The following typefaces are used to show emphasis:

Boldface	Text in **boldface** represents menu items and command names.
Italics	Text in *italics* is used to emphasize a word. In command syntax, it is used for variables for which you supply actual values, such as a default directory or the name of a cluster.
`Monospace`	Text in `monospace` identifies the data or commands that you type, samples of command output, examples of program code or messages from the system, or names of command flags, parameters, arguments, and name-value pairs.

SAN Volume Controller library and related publications

Product manuals, other publications, and Web sites contain information that relates to SAN Volume Controller.

SAN Volume Controller Information Center

The IBM System Storage SAN Volume Controller information center contains all of the information that is required to install, configure and manage the SAN Volume Controller. The information center is updated between SAN Volume Controller product releases to provide the most current documentation. The information center is available at the following Web site:

http://publib.boulder.ibm.com/infocenter/svcic/v3r1m0/index.jsp

SAN Volume Controller library

The following table lists and describes the publications that make up the SAN Volume Controller library. Unless otherwise noted, these publications are available in Adobe® portable document format (PDF) from the following Web site:

www.ibm.com/storage/support/2145

Title	Description	Order number
IBM System Storage SAN Volume Controller Planning Guide	This guide introduces the SAN Volume Controller and lists the features you can order. It also provides guidelines for planning the installation and configuration of the SAN Volume Controller.	GA32-0551
IBM System Storage SAN Volume Controller Model 2145-CF8 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-CF8.	GC52-1356
IBM System Storage SAN Volume Controller Model 2145-8A4 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-8A4.	GC27-2219
IBM System Storage SAN Volume Controller Model 2145-8G4 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-8G4.	GC27-2220

Title	Description	Order number
IBM System Storage SAN Volume Controller Software Installation and Configuration Guide	This guide provides guidelines for configuring your SAN Volume Controller. Instructions for backing up and restoring the cluster configuration, using and upgrading the SAN Volume Controller Console, using the CLI, upgrading the SAN Volume Controller software, and replacing or adding nodes to a cluster are included.	SC23-6628
IBM System Storage SAN Volume Controller CIM Agent Developer's Guide	This guide describes the concepts of the Common Information Model (CIM) environment. Steps about using the CIM agent object class instances to complete basic storage configuration tasks, establishing new Copy Services relationships, and performing CIM agent maintenance and diagnostic tasks are included.	SC23-6665
IBM System Storage SAN Volume Controller Command-Line Interface User's Guide	This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	SC26-7903
IBM System Storage SAN Volume Controller Host Attachment Guide	This guide provides guidelines for attaching the SAN Volume Controller to your host system.	SC26-7905
IBM System Storage SAN Volume Controller Troubleshooting Guide	This guide describes the features of each SAN Volume Controller model, explains how to use the front panel, and provides maintenance analysis procedures to help you diagnose and solve problems with the SAN Volume Controller.	GC27-2227
IBM System Storage SAN Volume Controller Hardware Maintenance Guide	This guide provides the instructions that the IBM service representative uses to service the SAN Volume Controller hardware, including the removal and replacement of parts.	GC27-2226
IBM System Storage SAN Volume Controller Models 2145-8F2 and 2145-8F4 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller models 2145-8F2 and 2145-8F4.	GC27-2221

Title	Description	Order number
IBM System Storage SAN Volume Controller Model 2145-4F2 Hardware Installation Guide	This guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-4F2.	GC27-2222
IBM System Storage SAN Volume Controller Master Console Guide	This guide describes how to install, maintain, and service the master console.	GC27-2223
IBM Systems Safety Notices	This guide contains translated caution and danger statements. Each caution and danger statement in the SAN Volume Controller documentation has a number that you can use to locate the corresponding statement in your language in the *IBM Systems Safety Notices* document.	G229-9054

Other IBM publications

These IBM publications contain information that is related to the SAN Volume Controller.

Title	Description	Order number
IBM System Storage Productivity Center Introduction and Planning Guide	This guide introduces the IBM System Storage Productivity Center hardware and software.	SC23-8824
Read This First: Installing the IBM System Storage Productivity Center	This guide describes how to install the IBM System Storage Productivity Center hardware.	GI11-8938
IBM System Storage Productivity Center User's Guide	This guide describes how to configure the IBM System Storage Productivity Center software.	SC27-2336
IBM System Storage Multipath Subsystem Device Driver User's Guide	This guide describes the IBM System Storage Multipath Subsystem Device Driver for IBM System Storage products and how to use it with the SAN Volume Controller.	GC52-1309

Title	Description	Order number
Implementing the IBM System Storage SAN Volume Controller V4.3	This IBM Redbooks® publication is a detailed technical guide to the IBM System Storage SAN Volume Controller. It provides a high-level overview of storage virtualization and the SAN Volume Controller architecture, discusses implementing and configuring the SAN Volume Controller, and tells you how to migrate existing storage to the SAN Volume Controller.	SG24-6423

IBM documentation and related Web sites

The following Web sites provide publications and other information about the SAN Volume Controller or related products or technologies.

Web site	Address
Support for SAN Volume Controller (2145)	www.ibm.com/storage/support/2145
Support for IBM System Storage and TotalStorage® products	www.ibm.com/storage/support/
IBM Publications Center	www.ibm.com/shop/publications/order/
IBM Redbooks publications	www.redbooks.ibm.com/

Related accessibility information

To view a PDF file, you need Adobe Acrobat Reader, which can be downloaded for free from the Adobe Web site:

www.adobe.com/support/downloads/main.html

Related Web sites

The following Web sites provide information about the SAN Volume Controller or related products or technologies:

Type of information	Web site
SAN Volume Controller support	www.ibm.com/storage/support/2145
Technical support for IBM storage products	www.ibm.com/storage/support/

How to order IBM publications

The IBM Publications Center is a worldwide central repository for IBM product publications and marketing material.

The IBM Publications Center offers customized search functions to help you find the publications that you need. Some publications are available for you to view or

download at no charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM Publications Center through the following Web site:

www.ibm.com/shop/publications/order/

How to send your comments

Your feedback is important to help us provide the highest quality information. If you have any comments about this book or any other documentation, you can submit them in one of the following ways:

- E-mail

  Submit your comments electronically to the following e-mail address:

  starpubs@us.ibm.com

  Be sure to include the name and order number of the book and, if applicable, the specific location of the text you are commenting on, such as a page number or table number.

- Mail

  Fill out the Readers' Comments form (RCF) at the back of this book. If the RCF has been removed, you can address your comments to:

  International Business Machines Corporation
  RCF Processing Department
  Department 61C
  9032 South Rita Road
  Tucson, Arizona 85775-4401
  U.S.A.

SAN Volume Controller installation and configuration overview

The installation and configuration of a SAN Volume Controller cluster requires the completion of various tasks, some of which are normally completed by an IBM service representative.

Additional publications are included with some of the hardware components; however, use the installation and configuration procedures in the documents that are listed here.

When you plan or perform the installation and configuration tasks, have the following SAN Volume Controller publications available:

- *IBM System Storage SAN Volume Controller Planning Guide*
- *IBM System Storage SAN Volume Controller Hardware Installation Guide* for the model that was ordered.
- *IBM System Storage SAN Volume Controller Software Installation and Configuration Guide*

To access the SAN Volume Controller publications, click the product documentation link, and then click your language from the following Web site:

www.ibm.com/storage/support/2145

The IBM System Storage Productivity Center (SSPC) is the management environment for SAN Volume Controller clusters. For SSPC planning, installation, and configuration information, see the following publications:

- *IBM System Storage Productivity Center Introduction and Planning Guide*, SC23-8824
- *Read This First: Installing the IBM System Storage Productivity Center*, GI11-8938
- *IBM System Storage Productivity Center User's Guide*, SC27-2336

To access the SSPC publications, go to the **Printable PDFs** section and click the **IBM System Storage Productivity Center** link from the following Web site:

publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp

Note: An existing master console can be upgraded to support clusters that are running the latest SAN Volume Controller software. See the *IBM System Storage SAN Volume Controller Master Console Guide* at the following Web site:

www.ibm.com/storage/support/2145

Planning tasks to complete before installing the SAN Volume Controller

Before you install the SAN Volume Controller, you must complete the following planning tasks or have them completed by an IBM service representative or IBM Business Partner:

1. **Verify that all the SAN Volume Controller installation requirements have been met.**

Review Chapter 2 of the *IBM System Storage SAN Volume Controller Planning Guide* to make sure that space and power requirements have been met before you begin the installation. SAN Volume Controller nodes and uninterruptible power supply units are installed in pairs.

2. **Review SAN fabric and zoning guidelines and develop your SAN Volume Controller cluster, host systems, and storage controllers plan.**

   This task helps to assure a seamless configuration. For more information, see Chapters 3 and 4 of the *IBM System Storage SAN Volume Controller Planning Guide*.

3. **Complete all physical planning charts.**

   Chapter 2 of the *IBM System Storage SAN Volume Controller Planning Guide* provides instructions for accessing and completing the following charts and tables:

   - Hardware location chart
   - Cable connection table
   - Configuration data table
   - Redundant ac-power connection chart

   The SAN Volume Controller charts and tables are available at the following Web site:

   www.ibm.com/storage/support/2145

   You can save, edit, and share the charts and tables between members of the installation team.

   For the SSPC, complete the planning worksheet in the Appendix of the *IBM System Storage Productivity Center Introduction and Planning Guide*.

Hardware installation tasks that an IBM service representative performs

To install the SAN Volume Controller hardware, an IBM service representative must complete the following tasks:

1. **Verify that you have all of the required parts for the installation.**

   Chapter 2 of the *IBM System Storage SAN Volume Controller Hardware Installation Guide* provides a list of all the parts that are required for an installation. The list includes the SAN Volume Controller nodes, uninterruptible power supply units, optional redundant ac-power switches, and associated parts.

2. **Install the SAN Volume Controller hardware.**

   Chapter 2 of the *IBM System Storage SAN Volume Controller Hardware Installation Guide* describes the procedures for installing the uninterruptible power supply units, SAN Volume Controller nodes, and the optional redundant ac-power switches.

3. **Install the SSPC server.**

   Read This First: Installing the IBM System Storage Productivity Center describes how to install the SSPC server.

Configuration tasks

To configure a SAN Volume Controller cluster, you must complete the following tasks or have them completed by an IBM service representative or IBM Business Partner:

1. **Register your product.**

To receive product support notifications from IBM, you must register your product. To register your product, click **Register** at the following Web site:

www.ibm.com/systems/support/supportsite.wss/brandmain?brandind=5345868

2. **Optionally, check for an updated version of the SAN Volume Controller CIM agent and GUI software.**

   For the latest information, click **Install/use**, and then click the link for the appropriate recommended software level from the following Web site:

   www.ibm.com/storage/support/2145

   Additionally, preinstalled software on the SSPC console might need to be updated to fully support the latest level of SAN Volume Controller. For the latest information, go to the following Web site:

   www.ibm.com/systems/support/storage/software/sspc

3. **Configure the IBM System Storage Productivity Center.**

   In the *IBM System Storage Productivity Center User's Guide*, the chapter about configuring the SSPC for the SAN Volume Controller describes the procedures for configuring the server and accessing the SAN Volume Controller Console and command-line interface (CLI). This chapter also describes how to use the PuTTY client to generate secure shell (SSH) key pairs that secure data flow between the SAN Volume Controller cluster configuration node and a client.

4. **Create a SAN Volume Controller cluster.**

   Chapter 4 of the *IBM System Storage SAN Volume Controller Software Installation and Configuration Guide* describes this procedure, which is completed in two phases:

   a. Use the Create Cluster option on the front panel of one of the SAN Volume Controller nodes that you have installed to create the cluster.

      This procedure is usually performed by an IBM representative or IBM Business Partner using information that the customer provides.

   b. Use the Add a Cluster function from the SAN Volume Controller Console.

5. **Complete the initial SAN Volume Controller configuration.**

   After you create the SAN Volume Controller cluster, you must perform the configuration procedures that are needed to meet your requirements. You can perform these procedures in stages; for example, add nodes to a cluster, set cluster date and time, and set license features immediately. Later, after your applications are tested and migrated to SAN Volume Controller, create host definitions, assign managed disks (MDisks) to MDisk groups, and set up virtual disks (VDisks) and assign them to hosts.

   You can also set up error and event notifications, including Call Home e-mails, to immediately notify you and the IBM Support Center if critical problems occur.

   The following chapters include procedures for these tasks:

   - Chapter 5 of the *IBM System Storage SAN Volume Controller Software Installation and Configuration Guide* describes how to perform these steps using the SAN Volume Controller Console.
   - Chapter 6 of the *IBM System Storage SAN Volume Controller Software Installation and Configuration Guide* describes how to perform these steps using the CLI.

Chapter 1. SAN Volume Controller overview

The SAN Volume Controller combines software and hardware into a comprehensive, modular appliance that uses symmetric virtualization.

Symmetric virtualization is achieved by creating a pool of managed disks (MDisks) from the attached storage systems. Those storage systems are then mapped to a set of virtual disks (VDisks) for use by attached host systems. System administrators can view and access a common pool of storage on the storage area network (SAN). This functionality helps administrators to use storage resources more efficiently and provides a common base for advanced functions.

Each SAN Volume Controller node is an individual server in a SAN Volume Controller cluster on which the SAN Volume Controller software runs.

The nodes are always installed in pairs, with a minimum of one and a maximum of four pairs of nodes constituting a *cluster*. Each pair of nodes is known as an *I/O group*. All I/O operations that are managed by the nodes in an I/O group are cached on both nodes.

Operating environment for the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2

To use the SAN Volume Controller, you must meet the minimum hardware and software requirements and ensure that other operating environment criteria are met.

Minimum requirements

You must set up your SAN Volume Controller operating environment according to the following requirements:

- Minimum of one pair of SAN Volume Controller nodes
- Minimum of two uninterruptible power supply units
- One IBM System Storage Productivity Center or one master console per SAN installation for configuration

SAN Volume Controller 2145-8F4 node features

The SAN Volume Controller 2145-8F4 node has the following features:

- A 19-inch rack-mounted enclosure
- One 4-port 4 Gbps fibre-channel adapter (four fibre-channel ports)
- 8 GB cache memory

SAN Volume Controller 2145-8F2 node features

The SAN Volume Controller 2145-8F2 node has the following features:

- A 19-inch rack-mounted enclosure
- Two 2 Gbps 2-port fibre-channel adapters (four fibre-channel ports)
- 8 GB cache memory

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 environment requirements

Before the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Input-voltage requirements

Ensure that your environment meets the following voltage requirements.

Voltage	Frequency
200 to 240 V single phase ac	50 or 60 Hz

Power requirements for each node

Ensure that your environment meets the following power requirements.

The power that is required depends on the node type and whether the redundant ac power feature is used.

Components	Power requirements
SAN Volume Controller 2145-8F4 and 2145 UPS-1U	520 W
SAN Volume Controller 2145-8F2 and 2145 UPS-1U	520 W

For each redundant ac-power switch, add 20 W to the power requirements.

Circuit breaker requirements

The 2145 UPS-1U has an integrated circuit breaker and does not require additional protection.

Environment requirements without redundant ac power

Ensure that your environment falls within the following ranges if you are not using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	10°C to 35°C (50°F to 95°F)	0 to 914.4 m (0 to 3000 ft)	8% to 80% noncondensing	23°C (74°F)
Operating in higher altitudes	10°C to 32°C (50°F to 88°F)	914.4 to 2133.6 m (3000 to 7000 ft)	8% to 80% noncondensing	23°C (74°F)
Turned off	10°C to 43°C (50°F to 110°F)	0 to 2133.6 m (3000 to 7000 ft)	8% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133.6 m (0 to 7000 ft)	5% to 80% noncondensing	29°C (84°F)

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Environment requirements with redundant ac power

Ensure that your environment falls within the following ranges if you are using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	15°C to 32°C (59°F to 89°F)	0 to 914.4 m (0 to 3000 ft)	20% to 80% noncondensing	23°C (74°F)
Operating in higher altitudes	15°C to 32°C (50°F to 88°F)	914.4 to 2133.6 m (3000 to 7000 ft)	20% to 80% noncondensing	23°C (74°F)
Turned off	10°C to 43°C (50°F to 110°F)	0 to 2133.6 m (0 to 7000 ft)	20% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133.6 m (0 to 7000 ft)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Preparing your environment

The following tables list the physical characteristics of the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 nodes.

Dimensions and weight

Ensure that space is available in a rack that is capable of supporting the node.

Height	Width	Depth	Maximum weight
43 mm (1.69 in.)	440 mm (17.32 in.)	686 mm (27 in.)	12.7 kg (28 lb)

Additional space requirements

Ensure that space is also available in the rack for the following additional space requirements around the node.

Location	Additional space requirements	Reason
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	Minimum: 100 mm (4 in.)	Cable exit

Heat output of each SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 node

The nodes dissipate the following maximum heat output.

Model	Heat output per node
SAN Volume Controller 2145-8F4	450 W (1540 Btu per hour)
SAN Volume Controller 2145-8F2	450 W (1540 Btu per hour)

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 controls and indicators

The controls and indicators are used for power and navigation and to indicate information such as system activity, service and configuration options, service controller failures, and node identification.

Figure 1 shows the controls and indicators on the front panel of the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2.

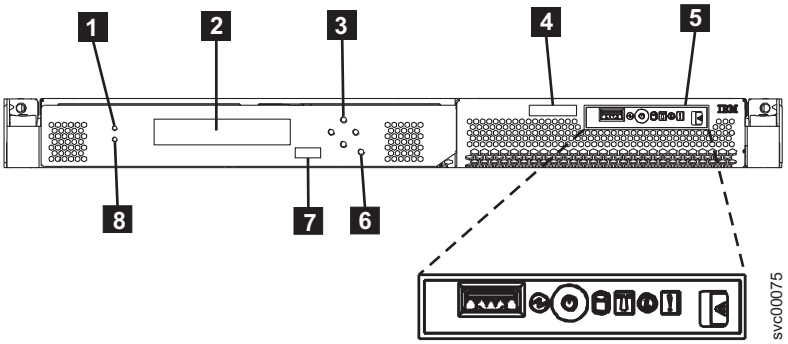


Figure 1. SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 front-panel assembly

1. Node status LED
2. Front-panel display
3. Navigation buttons
4. Serial number label
5. Operator-information panel
6. Select button
7. Node identification label
8. Error LED

Node status LED

System activity is indicated through the green LED.

The node status LED provides the following system activity indicators:

Off The node is not operating as a member of a cluster.

On The node is operating as a member of a cluster.

Flashing
The node is dumping cache and state data to the local disk in anticipation of a system reboot (from a pending power-off action or other controlled restart sequence).

Front-panel display

The front-panel display shows service, configuration, and navigation information.

You can select the language that is displayed on the front panel. The display can show both alphanumeric information and graphical information (progress bars).

The front-panel display shows configuration and service information about the SAN Volume Controller node and the SAN Volume Controller cluster, including the following items:

- Boot progress indicator
- Boot failed
- Charging
- Hardware boot
- Node rescue request
- Power failure
- Powering off
- Recovering
- Restarting
- Shutting down
- Error codes
- Validate WWNN?

Navigation buttons

You can use the navigation buttons to move through menus.

There are four navigational buttons that you can use to move throughout a menu: up, down, right, and left.

Each button corresponds to the direction that you can move in a menu. For example, to move right in a menu, press the navigation button that is located on the right side. If you want to move down in a menu, press the navigation button that is located on the bottom.

Note: The select button is used in tandem with the navigation buttons.

Product serial number

The node contains a SAN Volume Controller product serial number that is written to the system board hardware. The product serial number is also printed on the serial number label on the right side of the front panel.

This number is used for warranty and service entitlement checking and is included in the data sent with error reports. It is essential that this number is *not* changed during the life of the product. If the system board is replaced, you must follow the system board replacement instructions carefully and rewrite the serial number on the system board.

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 operator information panel

The operator-information panel contains buttons and indicators such as the release latch for the light path diagnostics panel, the power-control button, and LEDs that indicate information such as system-board errors, hard-drive activity, and power status.

Figure 2 shows the operator-information panel that is used by the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2 models.

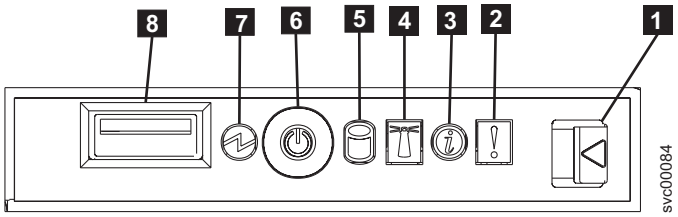


Figure 2. SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-8F4 operator-information panel

1. Release latch for light path diagnostics panel
2. System-error LED (amber)
3. Information LED (amber)
4. Location LED (blue)
5. Hard disk drive activity LED (green)
6. Power control button
7. Power LED (green)
8. USB connector

Release latch

The release latch on the SAN Volume Controller 2145-8F4 and 2145-8F2 give you access to the light path diagnostics panel, which provides a method for determining the location of a problem.

After pressing the release latch on the operator-information panel, you can slide the light path diagnostics panel out to view the lit LEDs. The LEDs indicate the type of error that has occurred. See MAP 5800: Light path for more detail.

To retract the panel, push it back into the node and snap it into place.

System-error LED

When it is lit, the system-error LED indicates that a system-board error has occurred.

This amber LED lights up if the SAN Volume Controller hardware detects a fatal error that requires a new field-replaceable unit (FRU).

Note: See MAP 5800: Light path to help you isolate the faulty FRU.

A system-error LED is also at the rear of the node.

Information-error LED

When the information-error LED is lit, a noncritical event has occurred.

Check the light path diagnostics panel and the error log. Light path diagnostics are described in more detail in the light path maintenance analysis procedure (MAP).

Location LED

The SAN Volume Controller does not use the location LED.

Hard disk drive activity LED

When it is lit, the green hard disk drive activity LED indicates that the hard disk drive is in use.

Hard disk drive activity is shown on the hard disk drive activity LED. For the SAN Volume Controller 2145-8F2, hard disk drive activity is also shown on the hard disk drive itself.

Power control button

The power control button turns on or turns off the main power to the SAN Volume Controller.

To turn on the power, press and release the power control button. You must have a pointed device, such as a pen, to press the button.

To turn off the power, press and release the power control button. For more information about how to turn off the SAN Volume Controller node, see "MAP 5350: Powering off a SAN Volume Controller node" in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*.

Attention: When the node is operational and you press and immediately release the power control button, the SAN Volume Controller indicates on its front panel that it is turning off and writes its control data to its internal disk. This can take up to five minutes. If you press the power control button but do not release it, the node turns off immediately without the SAN Volume Controller control data being written to disk. Service actions are then required to make the SAN Volume Controller operational again. Therefore, during a power-off operation, do not press and hold the power control button for more than two seconds.

Note: The 2145 UPS-1U does not turn off when the SAN Volume Controller is shut down from the power control button.

Power LED

The green power LED indicates the power status of the SAN Volume Controller.

The power LED has the following properties:

Off One or more of the following are true:

- No power is present at the power supply input.
- The power supply has failed.
- The LED has failed.

On The SAN Volume Controller node is turned on.

Flashing
The SAN Volume Controller node is turned off, but is still connected to a power source.

Note: A power LED is also at the rear of the node.

Select button

Use the select button to select an item from a menu.

The select button and navigation buttons help you to navigate and select menu and boot options, and start a service panel test. The select button is located on the front panel of the SAN Volume Controller, near the navigation buttons.

Node identification label

The node identification label on the front panel displays a six-digit node identification number. Sometimes this number is called the panel name or front panel ID.

The node identification label is the six-digit number that is input to the **svctask addnode** command. It is readable by system software and is used by configuration and service software as a node identifier. The node identification number can also be displayed on the front-panel display when `node` is selected from the menu.

If the service controller assembly front panel is replaced, the configuration and service software displays the number that is printed on the front of the replacement panel. Future error reports contain the new number. No cluster reconfiguration is necessary when the front panel is replaced.

Error LED

Critical faults on the service controller are indicated through the amber error LED.

The error LED has the following two states:

OFF The service controller is functioning correctly.

ON A critical service-controller failure was detected and you must replace the service controller.

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 rear panel indicators

The rear-panel indicators consist of LEDs that indicate the status of the fibre-channel ports, Ethernet connection and activity, power, electrical current, and system-board errors.

SAN Volume Controller 2145-8F4 rear panel indicators

The rear panel indicators are located on the back panel assembly.

Figure 3 on page 9 shows the rear panel indicators on the SAN Volume Controller 2145-8F4 back panel assembly.

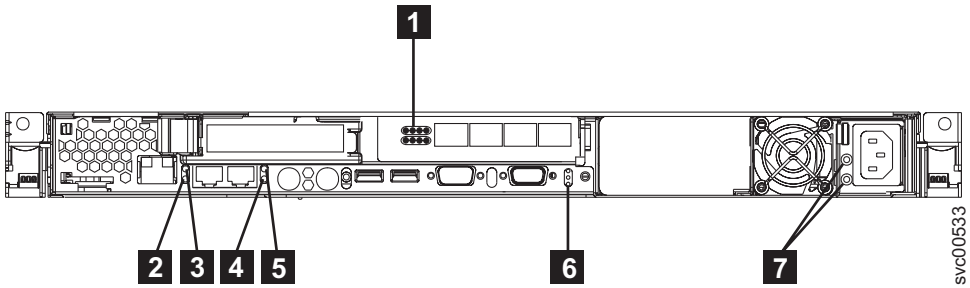


Figure 3. SAN Volume Controller 2145-8F4 rear-panel indicators

1. Fibre-channel LEDs
2. Ethernet port 1 link LED
3. Ethernet port 1 activity LED
4. Ethernet port 2 link LED
5. Ethernet port 2 activity LED
6. Power, location, and system error LEDs
7. Ac and dc LEDs

SAN Volume Controller 2145-8F2 rear panel indicators

The rear panel indicators are located on the back panel assembly.

Figure 4 shows the rear panel indicators on the SAN Volume Controller 2145-8F2 back panel assembly.

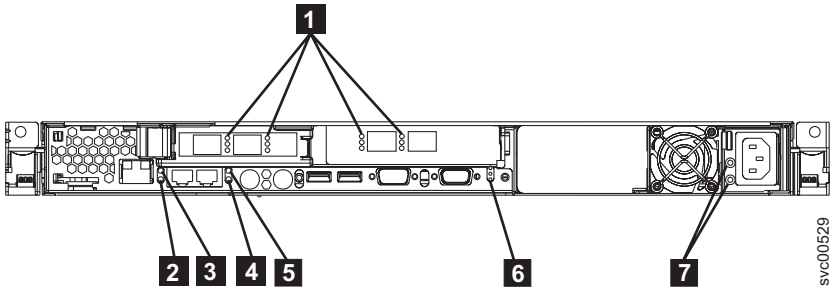


Figure 4. SAN Volume Controller 2145-8F2 rear-panel indicators

1. Fibre-channel LEDs
2. Ethernet port 1 link LED
3. Ethernet port 1 activity LED
4. Ethernet port 2 link LED
5. Ethernet port 2 activity LED
6. Power, location, and system error LEDs
7. Ac and dc LEDs

Fibre-channel LEDs

The fibre-channel LEDs indicate the status of the fibre-channel ports on the SAN Volume Controller 2145-8F4 node.

The SAN Volume Controller 2145-8F4 uses two fibre-channel LEDs per fibre-channel port, which are arranged one above the other.The LEDs are arranged in the same order as the ports.

The fibre-channel LEDs indicate the following link status.

Top row (link speed)	Bottom row (link activity)	Link status
Off	Off	Inactive
Off	On / Blinking	Active 1 Gbps
Blinking	On / Blinking	Active 2 Gbps
On	On / Blinking	Active 4 Gbps
Note: Blinking indicates I/O activity.		

Figure 5 shows the fibre-channel LEDs on the SAN Volume Controller 2145-8F4.

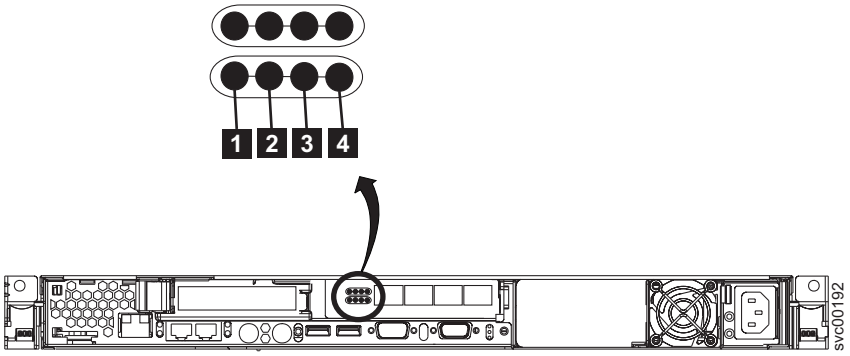


Figure 5. SAN Volume Controller 2145-8F4 fibre-channel LEDs

The fibre-channel LEDs are not used by the SAN Volume Controller 2145-8F2.

Ethernet link LED

The Ethernet link LED indicates that there is an active connection on the Ethernet port.

There is a set of LEDs for each Ethernet connector. The top LED is the Ethernet link LED. When it is lit, it indicates that there is an active connection on the Ethernet port. The bottom LED is the Ethernet activity LED. When it flashes, it indicates that data is being transmitted or received between the server and a network device.

Power, location, and system error LEDs

The power, location, and system error LEDs are housed together on the rear of the SAN Volume Controller next to the monitor port.

The following terms describe the power, location, and system error LEDs:

Power LED

This is the top of the three LEDs and indicates the following states:

Off One or more of the following are true:

- No power is present at the power supply input
- The power supply has failed
- The LED has failed

On The SAN Volume Controller is powered on.

Flashing
The SAN Volume Controller is turned off but is still connected to a power source.

Location LED
This is the middle of the three LEDs and is not used by the SAN Volume Controller.

System-error LED
This is the bottom of the three LEDs that indicates that a system board error has occurred. The light path diagnostics provide more information.

Ac and dc LEDs

The ac and dc LEDs indicate whether the node is receiving electrical current.

Ac LED

The upper LED **1** next to the power supply, indicates that ac current is present on the node.

Dc LED

The lower LED **2** next to the power supply, indicates that dc current is present on the node.

Ac and dc LEDs on the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2:

The ac LED and dc LED are located on the rear of the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2.

Figure 6 on page 12 shows the location of the ac and dc LEDs.

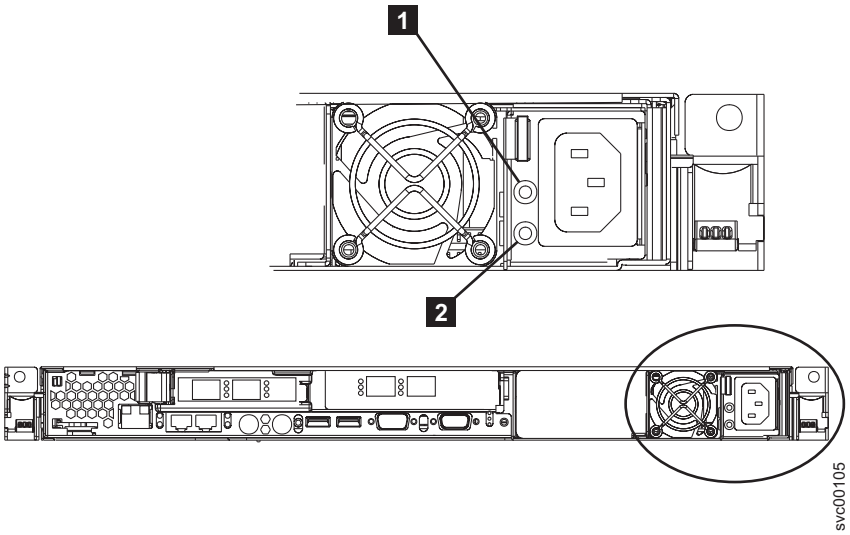


Figure 6. SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 ac and dc LEDs

External connectors on the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2

The external connectors consist of PCI slots, fibre-channel, Ethernet, and serial ports, and the power supply.

SAN Volume Controller 2145-8F4 connectors

The external connectors consist of Ethernet, serial, and fibre-channel ports, and the power supply.

Figure 7 shows the external connectors on the SAN Volume Controller 2145-8F4 back panel assembly.

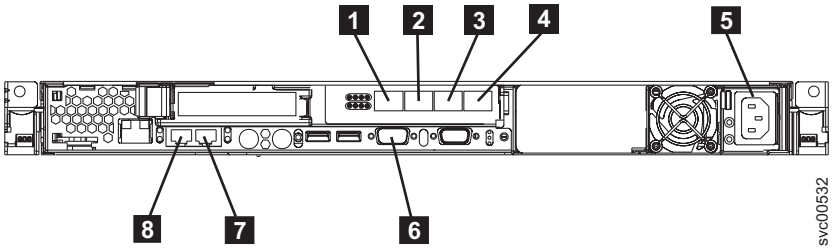


Figure 7. SAN Volume Controller 2145-8F4 external connectors

1 **1** Fibre-channel port 1

1 **2** Fibre-channel port 2

1 **3** Fibre-channel port 3

1 **4** Fibre-channel port 4

1 **5** Power supply

6 Serial connection

7 Ethernet port 2

8 Ethernet port 1

Figure 8 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8F4 to the power source from the uninterruptible power supply.

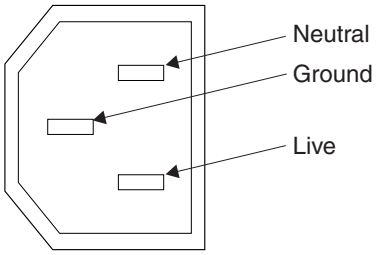


Figure 8. Power connector

SAN Volume Controller 2145-8F4 ports used during service procedures

The SAN Volume Controller 2145-8F4 contains the keyboard service port and the monitor service port. These ports are used only during service procedures. Figure 9 provides the locations of the service ports.

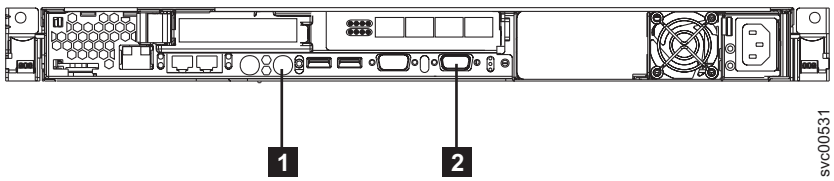


Figure 9. Service ports of the SAN Volume Controller 2145-8F4

1 Keyboard port

2 Monitor port

SAN Volume Controller 2145-8F4 ports not used during normal operation

The SAN Volume Controller 2145-8F4 is equipped with several ports that are not used by the SAN Volume Controller during normal operation. Figure 10 on page 14 and Figure 11 on page 14 show the ports that are not used by the SAN Volume Controller.

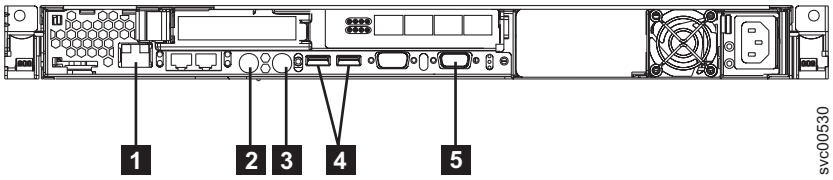


Figure 10. Ports not used during normal operation by the SAN Volume Controller 2145-8F4

1 **1** System management port

1 **2** Mouse port

1 **3** Keyboard port

1 **4** USB ports

1 **5** Monitor port

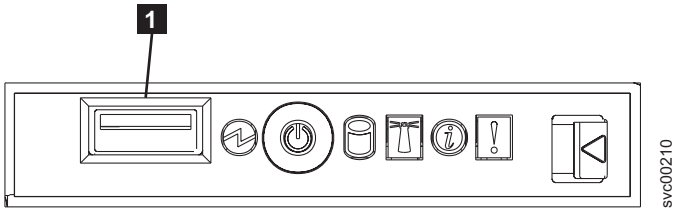


Figure 11. Ports not used on the front panel of the SAN Volume Controller 2145-8F4

1 USB port

SAN Volume Controller 2145-8F2 connectors

The external connectors consist of the power supply and Ethernet, fibre-channel, and serial ports.

Figure 12 shows the external connectors on the SAN Volume Controller 2145-8F2 back panel assembly.

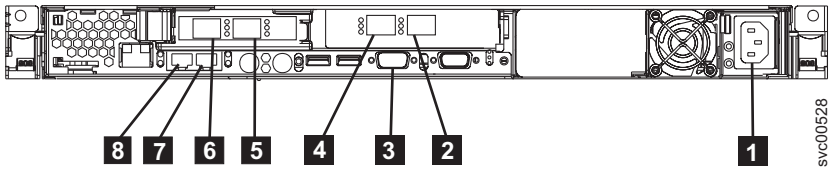


Figure 12. SAN Volume Controller 2145-8F2 external connectors

1 Power supply

2 Fibre-channel port 4

3 Serial connection

4 Fibre-channel port 3

5 Fibre-channel port 2

6 Fibre-channel port 1

1 **7** Ethernet port 2

8 Ethernet port 1

Figure 13 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8F2 to the power source from the uninterruptible power supply.

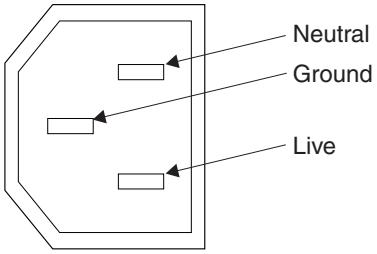


Figure 13. Power connector

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 fibre-channel port numbers and worldwide port names

The SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 fibre-channel ports are identified by their physical port number and by a worldwide port name (WWPN).

Figure 14 provides a view of the rear of the SAN Volume Controller 2145-8F4.

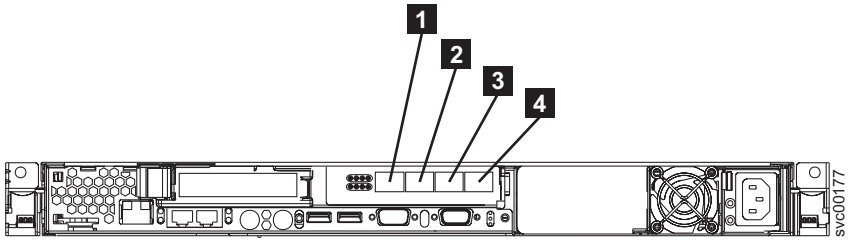


Figure 14. The physical port numbers for the SAN Volume Controller 2145-8F4

Figure 15 provides a view of the rear of the SAN Volume Controller 2145-8F2.

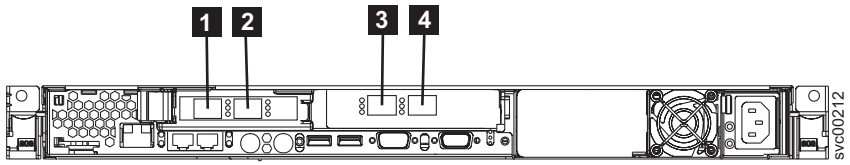


Figure 15. The physical port numbers for the SAN Volume Controller 2145-8F2

The physical port numbers identify fibre-channel cards and cable connections when you perform service tasks. The WWPNs are used for tasks such as fibre-channel switch configuration and to uniquely identify the devices on the SAN.

The WWPNs are derived from the worldwide node name (WWNN) of the SAN Volume Controller node in which the card is installed.

The WWNN is in the form 50050768010*XXXXX*, where *XXXXX* is initially derived from the unit and is specific to a SAN Volume Controller node. You can change the *XXXXX* value by using the front panel to facilitate service controller concurrent replacement and to enable some concurrent upgrade operations.

The WWPNs are in the form 5005076801*QXXXXX*, where *XXXXX* is as previously stated and *Q* is related to the port number as follows:

Port	**Value of Q**
1	4
2	3
3	1
4	2

Chapter 2. Redundant ac-power switch

The redundant ac-power switch is an optional feature that makes the SAN Volume Controller nodes resilient to the failure of a single power circuit. The redundant ac-power switch is not a replacement for an uninterruptible power supply. You must still use a uninterruptible power supply for each node.

You must connect the redundant ac-power switch to two independent power circuits. One power circuit connects to the main power input port and the other power circuit connects to the backup power input port. If the main power to the SAN Volume Controller node fails for any reason, the redundant ac-power switch automatically uses the backup power source. When power is restored, the redundant ac-power switch automatically changes back to using the main power source.

Place the redundant ac-power switch in the same rack as the SAN Volume Controller node. The redundant ac-power switch logically sits between the rack power distribution unit and the 2145 UPS-1U.

You can use a single redundant ac-power switch to power one or two SAN Volume Controller nodes. If you use the redundant ac-power switch to power two nodes, the nodes must be in different I/O groups. In the event that the redundant ac-power switch fails or requires maintenance, both nodes power off. Because the nodes are in two different I/O groups, the hosts do not lose access to the back-end disk data.

For maximum resilience to failure, use one redundant ac-power switch to power each SAN Volume Controller node.

Figure 16 shows a redundant ac-power switch.

Figure 16. Photo of the redundant ac-power switch

Redundant ac power environment requirements

Ensure that your physical site meets the installation requirements for the redundant ac-power switch.

The redundant ac-power switch requires two independent power sources that are provided through two rack-mounted power distribution units (PDUs). The PDUs must have IEC320-C13 outlets.

The redundant ac-power switch comes with two IEC 320-C19 to C14 power cables to connect to rack PDUs. There are no country-specific cables for the redundant ac-power switch.

The power cable between the redundant ac-power switch and the 2145 UPS-1U is rated at 10 A.

Redundant ac-power switch specifications

The following tables list the physical characteristics of the redundant ac-power switch.

Dimensions and weight

Ensure that space is available in a rack that is capable of supporting the redundant ac-power switch.

Height	Width	Depth	Maximum weight
43 mm (1.69 in.)	192 mm (7.56 in.)	240 mm	2.6 kg (5.72 lb)

Additional space requirements

Ensure that space is also available in the rack for the side mounting plates on either side of the redundant ac-power switch.

Location	Width	Reason
Left side	124 mm (4.89 in.)	Side mounting plate
Right side	124 mm (4.89 in.)	Side mounting plate

Heat output (maximum)

The maximum heat output that is dissipated inside the redundant ac-power switch is approximately 20 watts (70 Btu per hour).

Cabling of redundant ac-power switch (example)

You must properly cable the redundant ac-power switch units in your environment.

Note: While this topic provides an example of the cable connections, it does not indicate a preferred physical location for the components.

Figure 17 on page 19 shows an example of the main wiring for a SAN Volume Controller cluster with the redundant ac-power switch feature. The four-node cluster consists of two I/O groups:

- I/O group 0 contains nodes A and B
- I/O group 1 contains nodes C and D

Figure 17. A four-node SAN Volume Controller cluster with the redundant ac-power switch feature

1. I/O group 0
2. SAN Volume Controller node A
3. 2145 UPS-1U A
4. SAN Volume Controller node B
5. 2145 UPS-1U B
6. I/O group 1
7. SAN Volume Controller node C
8. 2145 UPS-1U C
9. SAN Volume Controller node D
10. 2145 UPS-1U D
11. Redundant ac-power switch 1
12. Redundant ac-power switch 2
13. Site PDU X (C13 outlets)
14. Site PDU Y (C13 outlets)

The site PDUs X and Y (**13** and **14**) are powered from two independent power sources.

In this example, only two redundant ac-power switch units are used, and each power switch powers one node in each I/O group. However, for maximum redundancy, use one redundant ac-power switch to power each node in the cluster.

Chapter 3. Uninterruptible power supply

The uninterruptible power supply protects a SAN Volume Controller node against blackouts, brownouts, and power surges. The uninterruptible power supply contains a power sensor to monitor the supply and a battery to provide power until an orderly shutdown of the system can be performed.

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 use the 2145 UPS-1U.

2145 UPS-1U

A 2145 UPS-1U is used exclusively to maintain data that is held in the SAN Volume Controller dynamic random access memory (DRAM) in the event of an unexpected loss of external power. This use differs from the traditional uninterruptible power supply that enables continued operation of the device that it supplies when power is lost.

With a 2145 UPS-1U, data is saved to the internal disk of the SAN Volume Controller node. The uninterruptible power supply units are required to power the SAN Volume Controller nodes even when the input power source is considered uninterruptible.

Note: The uninterruptible power supply maintains continuous SAN Volume Controller-specific communications with its attached SAN Volume Controller nodes. A SAN Volume Controller node cannot operate without the uninterruptible power supply. The uninterruptible power supply must be used in accordance with documented guidelines and procedures and must not power any equipment other than a SAN Volume Controller node.

2145 UPS-1U configuration

A 2145 UPS-1U powers one SAN Volume Controller node.

To make the SAN Volume Controller cluster more resilient against power failure, the 2145 UPS-1U units can be connected to the redundant ac-power switch.

If a redundant ac-power switch is not used, the two uninterruptible power supply units that power an I/O group can be connected to different, independent electrical power sources. In this case, if a single power source fails, only one node in the I/O group stops and the SAN Volume Controller cluster can continue to operate although with reduced performance.

Each uninterruptible power supply must be in the same rack as the node that it powers.

Each 2145 UPS-1U includes one power cord that connects the uninterruptible power supply to a redundant ac-power switch, if one exists, or to a rack power distribution unit (PDU), if one exists. The 2145 UPS-1U also includes an alternative power cable to connect to an external power source that is specific to your geography.

Each 2145 UPS-1U is connected to a SAN Volume Controller node with a power cable and a signal cable. To avoid the possibility of power and signal cables being connected to different uninterruptible power supply units, these cables are wrapped together and supplied as a single field-replaceable unit. The signal cable enables the SAN Volume Controller node to read status and identification information from the uninterruptible power supply.

2145 UPS-1U controls and indicators

All controls and indicators for the 2145 UPS-1U are located on the front-panel assembly.

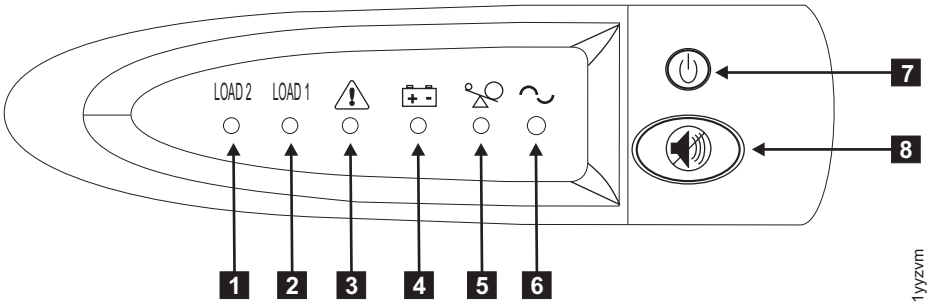


Figure 18. 2145 UPS-1U front-panel assembly

1. Load segment 2 indicator
2. Load segment 1 indicator
3. Alarm or Service indicator
4. On-battery indicator
5. Overload indicator
6. Power-on indicator
7. On/off button
8. Test and alarm reset button

Table 1 identifies which status and error LEDs that display on the 2145 UPS-1U front-panel assembly relate to the specified error conditions. It also lists the uninterruptible power supply alert-buzzer behavior.

Table 1. 2145 UPS-1U error indicators

[1] Load2	[2] Load1	[3] Alarm	[4] Battery	[5] Overload	[6] Power-on	Buzzer	Error condition
Green (see Note 1)					Green	(see Note 3)	No errors; the 2145 UPS-1U was configured by the SAN Volume Controller
Green	Amber (see Note 2)				Green		No errors; the 2145 UPS-1U is not yet configured by the SAN Volume Controller

Table 1. 2145 UPS-1U error indicators (continued)

[1] Load2	[2] Load1	[3] Alarm	[4] Battery	[5] Overload	[6] Power-on	Buzzer	Error condition
Green	Either on or off		Amber		Green	Beeps for two seconds and then stops	The ac power is over or under limit. The uninterruptible power supply has switched to battery mode.
		Flashing red	Flashing amber	Flashing red	Flashing green	Three beeps every ten seconds	Battery undervoltage
Green	Either on or off	Flashing red			Flashing green	Solid on	Battery overvoltage
		Flashing red	Flashing amber		Flashing green	Solid on	Output wave is abnormal when the charger is open, on battery mode
		Flashing red	Flashing amber			Solid on	The ac-power output wave is under low limit or above high limit on battery mode
Green	Either on or off		Amber			Beeps for four seconds and then stops	On battery (no ac power)
Green	Either on or off		Flashing amber			Beeps for two seconds and then stops	Low battery (no ac power)
Green	Either on or off			Red	Green	Beeps for one second and then stops	Overload while on line
			Amber	Red		Beeps for one second and then stops	Overload while on battery
Either on or off	Either on or off	Flashing red			Green	Solid on	Fan failure
Either on or off	Either on or off	Flashing red	Amber			Solid on	Battery test fail
		Flashing red		Red		Solid on	Overload timeout
		Flashing red	Amber		Green	Solid on	Over temperature
		Flashing red	Amber	Red	Green		Output short circuit

Table 1. 2145 UPS-1U error indicators (continued)

[1] Load2	[2] Load1	[3] Alarm	[4] Battery	[5] Overload	[6] Power-on	Buzzer	Error condition
Notes: 1. The green Load2 LED ([1]) indicates that power is being supplied to the right pair of ac-power outlets as seen from the rear of the 2145 UPS-1U. 2. The amber Load1 LED ([2]) indicates that power is being supplied to the left pair of ac-power outlets as seen from the rear of the 2145 UPS-1U. These outlets are not used by the SAN Volume Controller. This LED might be illuminated during power-on sequences, but it is typically extinguished by the SAN Volume Controller node that is attached to the 2145 UPS-1U. 3. A blank cell indicates that the light or buzzer is off.							

Load segment 2 indicator

The load segment 2 indicator on the 2145 UPS-1U is lit (green) when power is available to load segment 2.

When the load segment 2 indicator is green, the 2145 UPS-1U is running normally and power is available to this segment.

Load segment 1 indicator

The load segment 1 indicator on the 2145 UPS-1U is not currently used by the SAN Volume Controller.

Note: When the 2145 UPS-1U is configured by the SAN Volume Controller, this load segment is disabled. During normal operation, the load segment 1 indicator is off. A “Do not use” label covers the receptacles.

Alarm

If the alarm on the 2145 UPS-1U is flashing red, maintenance is required.

If the alarm is on, go to the 2145 UPS-1U MAP to resolve the problem.

On-battery indicator

The amber on-battery indicator is on when the 2145 UPS-1U is powered by the battery. This indicates that the main power source has failed.

If the on-battery indicator is on, go to the 2145 UPS-1U MAP to resolve the problem.

Overload indicator

The overload indicator lights up when the capacity of the 2145 UPS-1U is exceeded.

If the overload indicator is on, go to MAP 5250: 2145 UPS-1U repair verification to resolve the problem.

Power-on indicator

The power-on indicator is displayed when the 2145 UPS-1U is functioning.

When the power-on indicator is a steady green, the 2145 UPS-1U is active.

On/off button

The on/off button turns the power on or turns the power off to the 2145 UPS-1U.

Turning on the 2145 UPS-1U

After you connect the 2145 UPS-1U to the outlet, it remains in *standby* mode until you turn it on. Press and hold the on/off button until the power-on indicator is illuminated (approximately five seconds). On some versions of the 2145 UPS-1U, you might need a pointed device, such as a screwdriver, to press the on/off button. A self-test is initiated that takes approximately 10 seconds, during which time the indicators are turned on and off several times. The 2145 UPS-1U then enters *normal* mode.

Turning off the 2145 UPS-1U

Press and hold the on/off button until the power-on light is extinguished (approximately five seconds). On some versions of the 2145 UPS-1U, you might need a pointed device, such as a screwdriver, to press the on/off button. This places the 2145 UPS-1U in *standby* mode. You must then unplug the 2145 UPS-1U to turn off the unit.

Attention: Do not turn off the uninterruptible power supply before you shut down the SAN Volume Controller node that it is connected to. Always follow the instructions that are provided in MAP 5350 to perform an orderly shutdown of a SAN Volume Controller node.

Test and alarm reset button

Use the test and alarm reset button to start the self-test.

To start the self-test, press and hold the test and alarm reset button for three seconds. This button also resets the alarm.

2145 UPS-1U connectors and switches

The 2145 UPS-1U has external connectors and dip switches.

Locations for the 2145 UPS-1U connectors and switches

Figure 19 shows the location of the connectors and switches on the 2145 UPS-1U:

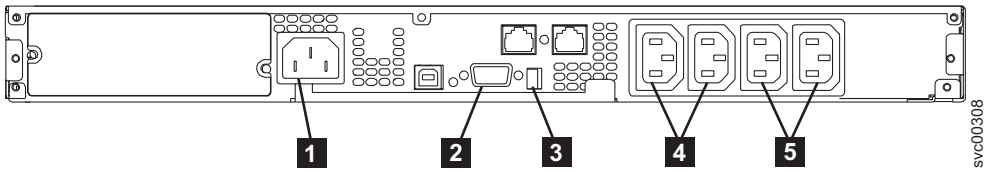


Figure 19. 2145 UPS-1U connectors and switches

1. Main power connector
2. Communication port
3. Dip switches
4. Load segment 1 receptacles
5. Load segment 2 receptacles

2145 UPS-1U dip switches

Figure 20 shows the dip switches, which can be used to configure the input and output voltage ranges. Because this function is performed by the SAN Volume Controller software, both switches must be left in the OFF position.

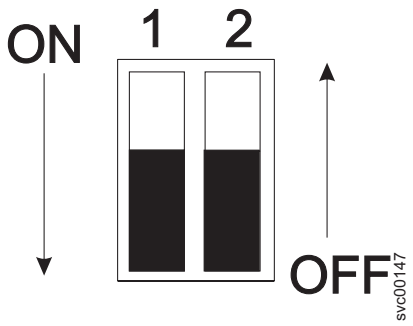


Figure 20. 2145 UPS-1U dip switches

2145 UPS-1U ports not used

The 2145 UPS-1U is equipped with ports that are not used by the SAN Volume Controller and have not been tested. Use of these ports, in conjunction with the SAN Volume Controller or any other application that might be used with the SAN Volume Controller, is not supported. Figure 21 shows the 2145 UPS-1U ports that are not used.

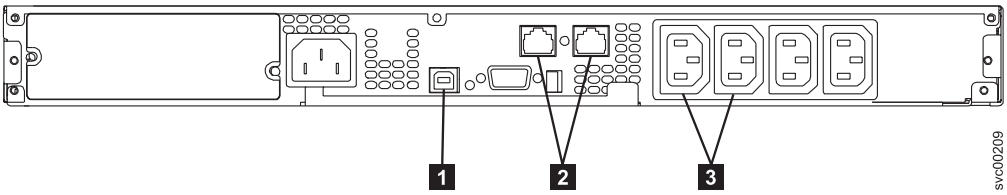


Figure 21. Ports not used by the 2145 UPS-1U

1. USB interface port
2. Network ports
3. Load segment receptacles

2145 UPS-1U power connector

Figure 22 shows the power connector for the 2145 UPS-1U.

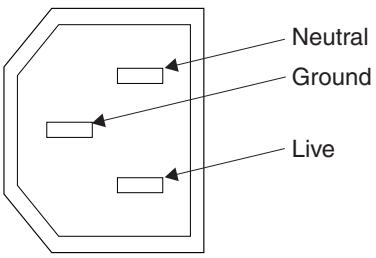


Figure 22. Power connector

Uninterruptible power-supply environment requirements

An uninterruptible power-supply environment requires that certain specifications for the physical site of the SAN Volume Controller must be met.

2145 UPS-1U environment

All SAN Volume Controller models are supported with the 2145 UPS-1U.

2145 UPS-1U specifications

The following tables describe the physical characteristics of the 2145 UPS-1U.

2145 UPS-1U dimensions and weight

Ensure that space is available in a rack that is capable of supporting the 2145 UPS-1U.

Height	Width	Depth	Maximum weight
44 mm (1.73 in.)	439 mm (17.3 in.)	579 mm (22.8 in.)	16 kg (35.3 lb)
Note: The 2145 UPS-1U package, which includes support rails, weighs 18.8 kg (41.4 lb).			

Heat output

The 2145 UPS-1U unit produces the following approximate heat output.

Model	Heat output during normal operation	Heat output during battery operation
2145 UPS-1U	10 W (34 Btu per hour)	150 W (512 Btu per hour)

Power cables for the 2145 UPS-1U

If you do not connect the 2145 UPS-1U to a rack power distribution unit (PDU) or redundant ac-power switch, you must follow your country or region's power requirements to choose the appropriate power cable for the 2145 UPS-1U.

The 2145 UPS-1U is supplied with an IEC 320-C13 to C14 jumper to connect it to a rack PDU. You can also use this cable to connect the 2145 UPS-1U to the redundant ac-power switch.

The following table lists the power cable options for your country or region.

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
United States of America (Chicago), Canada, Mexico	1.8 m (6 ft)	NEMA L6-15P	39M5115

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela	2.8 m (9 ft)	NEMA L6-15P	39M5116
Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macao S.A.R. of China, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	2.8 m (9 ft)	CEE 7-VII	39M5123
Antigua, Bahrain, Brunei, Channel Islands, Hong Kong S.A.R. of China, Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	2.8 m (9 ft)	BS 1363/A	39M5151
Argentina	2.8 m (9 ft)	IRAM 2073	39M5068
Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.8 m (9 ft)	AS/NZS 3112/2000	39M5102
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.8 m (9 ft)	SABS 164	39M5144
Chile, Ethiopia, Italy, Libya, Somalia	2.8 m (9 ft)	CEI 23-16	39M5165
People's Republic of China	2.8 m (9 ft)	GB 2099.1	39M5206
Denmark	2.8 m (9 ft)	DK2-5a	39M5130
Israel	2.8 m (9 ft)	SI 32	39M5172

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
Liechtenstein, Switzerland	2.8 m (9 ft)	IEC 60884 Stnd. Sheet 416534?2 (CH Type 12)	39M5158
Thailand	2.8 m (9 ft)	NEMA 6-15P	39M5095

Chapter 4. Installing the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 hardware

There are several steps that you must perform to prepare and then install the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 hardware.

The following topics describe the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 hardware installation tasks in the order that they should be performed.

Note: If you are adding a new I/O group to an existing SAN Volume Controller cluster, there is no need to turn off the existing, operating cluster nodes.

1. Prepare for the SAN Volume Controller hardware installation by confirming that you have all the planning information and parts that you require.
2. Optionally, install and verify the redundant ac-power switch, if it is to be used and is not already being used for a node.
3. Install the uninterruptible power supply.
4. Install the node.
5. Connect the fibre-channel and Ethernet cables to the node.
6. Connect the node to the uninterruptible power supply.
7. Verify the node.
8. Install and verify the master console, unless it is already installed. Optionally, this step can be performed first.

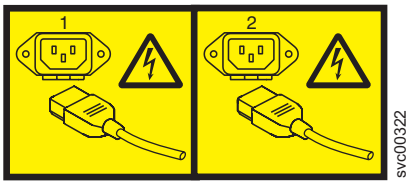
After you finish these steps, the hardware installation is complete.

Optionally installing the redundant ac-power switch

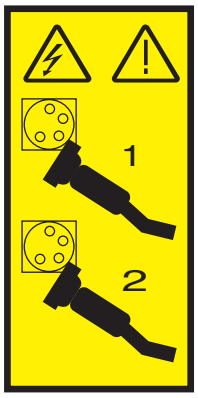
Use the redundant ac-power switch to make the SAN Volume Controller cluster more resilient to power failure.

DANGER

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



or



The following topics describe the redundant ac-power switch installation tasks in the order that they must be performed:

1. Attach the mounting plates to the redundant ac-power switch.
2. Label the cables.
3. Connect the power input cables to the redundant ac-power switch.
4. Install the redundant ac-power switch in the rack.
5. Connect the redundant ac-power switch to the site power.
6. Test the redundant ac-power switch to ensure that it automatically switches power supplies when the main power source fails or is restored.

Attaching the mounting plates to the redundant ac-power switch

Attach the mounting plates to the redundant ac-power switch before you label the cables.

Perform the following steps to attach the mounting plates to the redundant ac-power switch:

Attach each of the two mounting plates to the redundant ac-power switch using three M3 Torx T8 head screws. Position the mounting face on the side of the redundant ac-power switch containing the output power sockets. See Figure 23.

Figure 23. Attaching the mounting plates

Labeling the cables

You must label each end of the two redundant ac-power switch input-power cables before you connect the input-power cables to the redundant ac-power switch.

Perform the following steps to label each end of the two redundant ac-power switch input-power cables:

1. Label the rack power-distribution end “Power source <name>, outlet <id> to redundant ac-power switch <location> <MAIN | BACKUP> input.” For example, “Power source D2, outlet 4 to redundant ac-power switch pos 7 MAIN input.” One cable is labeled “MAIN;” the other is labeled “BACKUP.”
2. Label the redundant ac-power switch end “redundant ac-power switch <location> <MAIN | BACKUP> input from Power source <name>, outlet <id>.” One cable is labeled “MAIN;” the other is labeled “BACKUP.”

Connecting the input-power cables to the redundant ac-power switch

You will find it easier to connect the input-power cables to the redundant ac-power switch before you install the redundant ac-power switch in the rack.

Perform the following steps to connect the input-power cables to the redundant ac-power switch:

1. Connect the main input-power cable to the redundant ac-power switch.
2. Connect the backup input-power cable to the redundant ac-power switch.
3. Secure both the redundant ac-power switch input-power cables using the clips of the redundant ac-power switch. See Figure 24.

Figure 24. Power cable clips

Installing the redundant ac-power switch in the rack

You must install the redundant ac-power switch in the rear of the rack before you connect the redundant ac-power switch to the site power.

Perform the following steps to install the redundant ac-power switch in the rack:

1. Use the hardware location chart to determine where to install the redundant ac-power switch in the rack. The redundant ac-power switch can be installed horizontally in a rack slot or vertically in one of the side slots of the rack.
2. Position the four “C” clips in the rack’s mounting bar, as shown in Figure 25 on page 34.

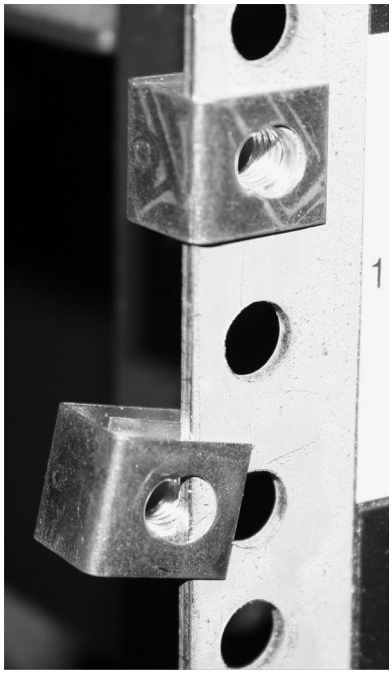


Figure 25. Positioning the clips

3. Position the redundant ac-power switch in the rack first, pushing the cables through to the front of the rack. Mount in place, as shown in Figure 26, using the four M6 screws.

Figure 26. Positioned in rack

Connecting the redundant ac-power switch to the site power

You must connect the redundant ac-power switch to the site power before you test the redundant ac-power switch.

Perform the following steps to connect the redundant ac-power switch to the site power:

1. Determine a suitable cable route from the redundant ac-power switch to the power distribution units.
2. Route the main input-power cable of the redundant ac-power switch to the specified power distribution unit, and connect it.
3. Route the backup input-power cable of the redundant ac-power switch to the specified power distribution unit, and connect it.
4. Verify that the redundant ac-power switch power cables are tidy. Ensure that they do not obstruct other equipment and that they are tied in place where necessary.

Testing the redundant ac-power switch

You can test the redundant ac-power switch before you continue installing other SAN Volume Controller components. You can test the redundant ac-power switch later if a suitable test device is not available.

You can test whether the redundant ac-power switch correctly switches between power inputs when the main input power fails or is restored. You can either use a volt meter to measure for voltage at the output or attach a work light, or similar device with a C14 plug, to the redundant ac-power switch output and verify that it remains powered when a failure is simulated on either of the inputs.

Notes:

- If you do not have a separate device to verify that there is power on the output port of the redundant ac-power switch, you can delay this test until you connect the redundant ac-power switch to the uninterruptible power supply. In that case, turn on the uninterruptible power supply (not the SAN Volume Controller node) and see if it changes to battery power. The test fails if the uninterruptible power supply switches to battery power for more than five seconds.
- Any transient indications of battery power can be ignored.

When the instructions say to "remove power," you can either turn the power off if the site power-distribution unit (PDU) has outputs that are individually switched or remove the specified redundant ac-power switch power cable from the outlet of the site PDU.

Note: If at any time there is no power on the output socket, ensure that the power distribution sockets of the power source are turned on. If they are, recheck all of the connections and decide if the redundant ac-power switch assembly, which includes the input-power cables, is defective.

Perform the following steps to test the redundant ac-power switch:

1. Confirm that there is power at redundant ac-power switch output socket 2.
2. Confirm that there is power at redundant ac-power switch output socket 1.
3. Remove power from the main power cable to the redundant ac-power switch and confirm that there is power at the redundant ac-power switch output 1.
4. Reconnect the main power cable.
5. Remove power from the backup power cable to the redundant ac-power switch and confirm that there is power at the redundant ac-power switch output 1.
6. Reconnect the backup power cable and remove the monitoring device.

   Note: After any failure, repeat the test phase from the start until all the tests succeed.

Installing the 2145 UPS-1U

Before you can use the SAN Volume Controller, you need to install the uninterruptible power supply.

Complete the following steps to install the 2145 UPS-1U:

1. Install the support rails for the 2145 UPS-1U.
2. Install the 2145 UPS-1U in the rack.
3. Install the 2145 UPS-1U cable-retention bracket.

Installing the support rails for the 2145 UPS-1U

You must install the support rails in the rack before installing the 2145 UPS-1U.

Complete the following prerequisites before installing the support rails:

1. Use the customer's hardware-location chart to determine where in the rack that the 2145 UPS-1U is to be installed.
2. At the back of the rack, observe the Electronic Industries Alliance (EIA) positions and determine where you are going to install the 2145 UPS-1U. Because of its weight, position the 2145 UPS-1U where it is easy to handle in one of the lower positions in the rack.

Perform the following steps to install the support rails for the 2145 UPS-1U:

1. Open the top of the 2145 UPS-1U shipping carton. Grip the flaps on either side of the 2145 UPS-1U.
2. Lift the 2145 UPS-1U clear of the shipping carton and place it on a flat, stable surface with the front facing you.
3. Attach the long side of a mounting bracket **1** to each side of the 2145 UPS-1U using four M3 × 6 screws **2** for each bracket, as shown in Figure 27.

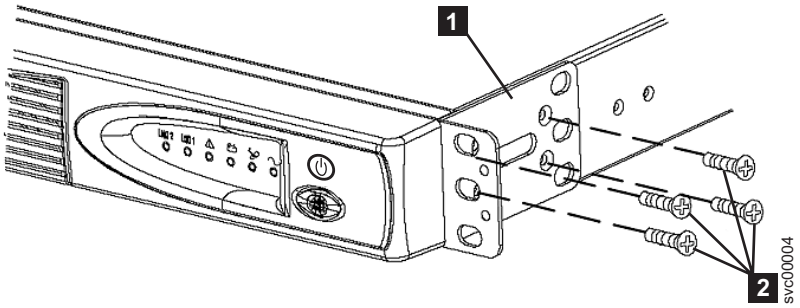


Figure 27. Installing the support rails for a 2145 UPS-1U into the rack

4. Loosen the assembly wing nuts (**1** in Figure 28) on both rail assemblies and adjust the rail size to the depth of your rack. After you adjust the depth, tighten the assembly wing nuts as much as possible while still allowing some movement.

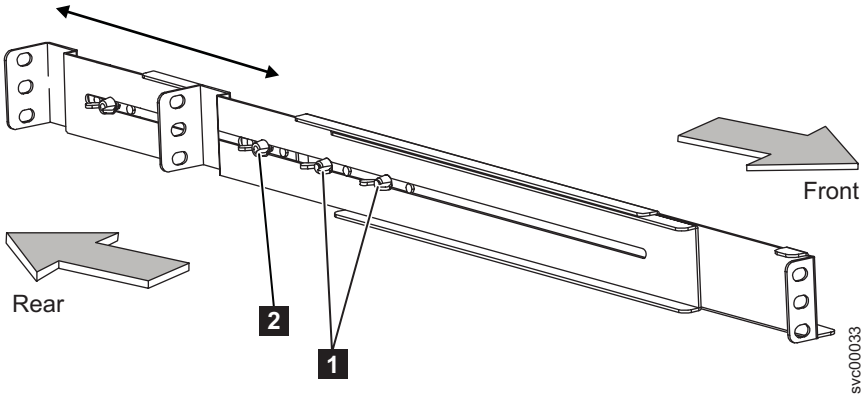


Figure 28. Adjusting the rail depth on the 2145 UPS-1U

1 Assembly wing nuts

2 Wing nut

5. Select the holes in the rail where you want to position the 2145 UPS-1U.

   Note: The bottom flange of the support rail must align with the EIA mark on the rack.

6. Using two M6 × 10 screws (1 in Figure 29) and two clip nuts 2 , attach the rail to the rear of the rack. The customer's rack might be different than the one shown here, and if so, might require different clip nuts or fasteners.

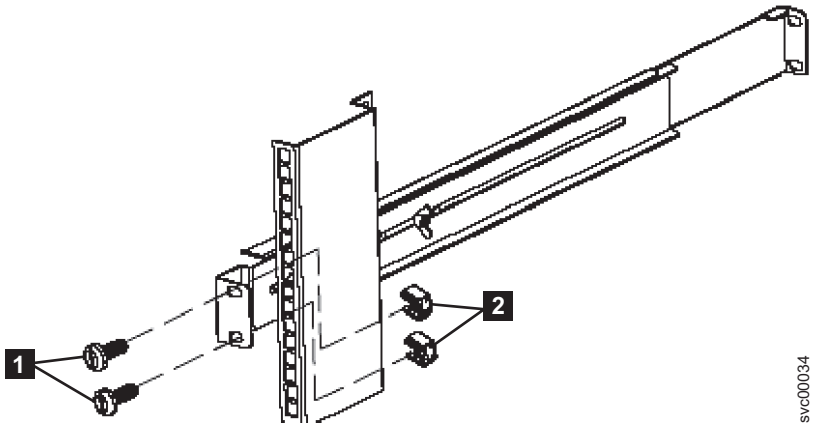


Figure 29. Securing the rear rail on the 2145 UPS-1U

7. Install two clip nuts (2 and 3 in Figure 30) to the front of the rack and then attach the rail using just one M6 x 10 screw in the bottom mounting hole 1 .

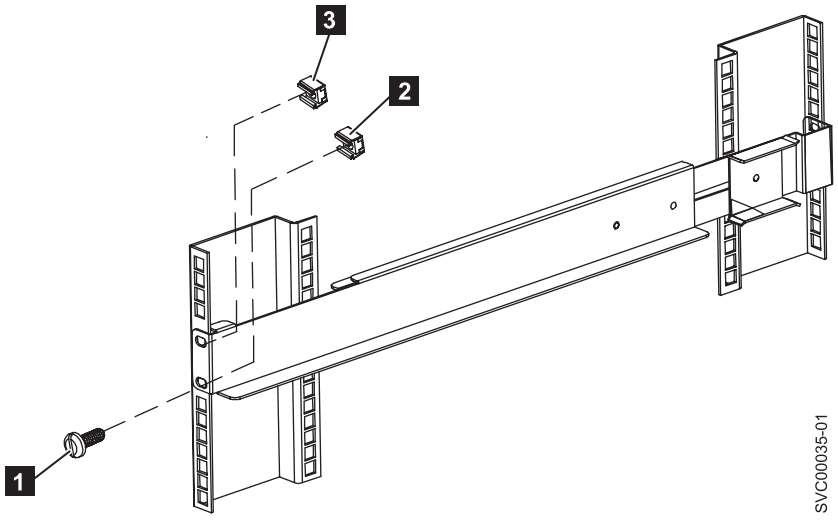


Figure 30. Securing the front rail on the 2145 UPS-1U

8. Repeat steps 6 and 7 for the other rail.
9. Tighten the assembly wing nuts on both rail assemblies.

Installing the 2145 UPS-1U in the rack

After you have completed the preparation procedures, you are ready to install the 2145 UPS-1U in the rack.

Attention: See "Safety and environmental notices" on page vii before you start the installation process. Use the reference numbers in parentheses at the end of each safety notice to find the matching translated notice. For the translation of the danger, caution, and attention notices, see the *IBM Systems Safety Notices*.

CAUTION:
The uninterruptible power supply contains its own energy source (sealed, lead-acid batteries). The output receptacles might carry live voltage, even when the uninterruptible power supply is not connected to an ac supply. (11)

CAUTION:
Do not remove or unplug the input cord when the uninterruptible power supply is turned on. Unplugging the input cord removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply. (12)

CAUTION:
To reduce the risk of fire or electric shock, install the uninterruptible power supply in a temperature- and humidity-controlled indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). (13)

CAUTION:
To avoid any hazard from the rack tipping forward when devices are installed, observe all safety precautions for the rack into which you are installing the device.

Perform the following steps to install the 2145 UPS-1U in the rack.

Note: You might have already completed steps 3 on page 39 through 6 on page 40 if you used the *Read Me First* pamphlet, which is included with the 2145 UPS-1U.

1. Stand at the front of the rack and place the back of the 2145 UPS-1U onto the support rails, and then slide the 2145 UPS-1U into the rack.

   CAUTION:
   The 2145 UPS-1U weighs 16 kg (35.3 lb). If you feel unsure about lifting the uninterruptible power supply to its location in the rack, seek assistance or remove the battery to reduce its weight.

2. At the front of the 2145 UPS-1U, install the two mounting screws (M6x10) **1** as shown in Figure 31 on page 39.

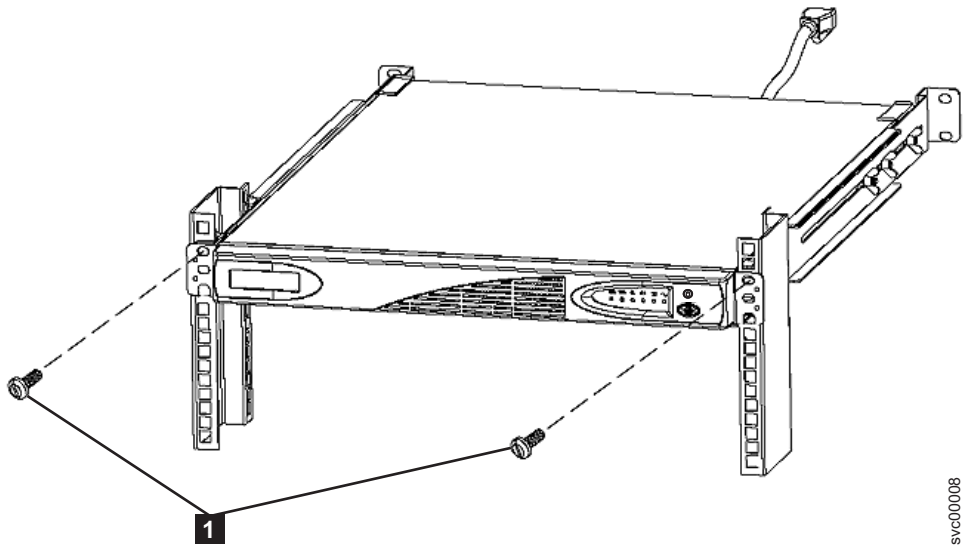


Figure 31. Mounting screws for the 2145 UPS-1U

3. If you have not already connected the internal battery connector, remove the 2145 UPS-1U front panel, shown in Figure 32, by pushing the panel to the left and then pulling it forward.

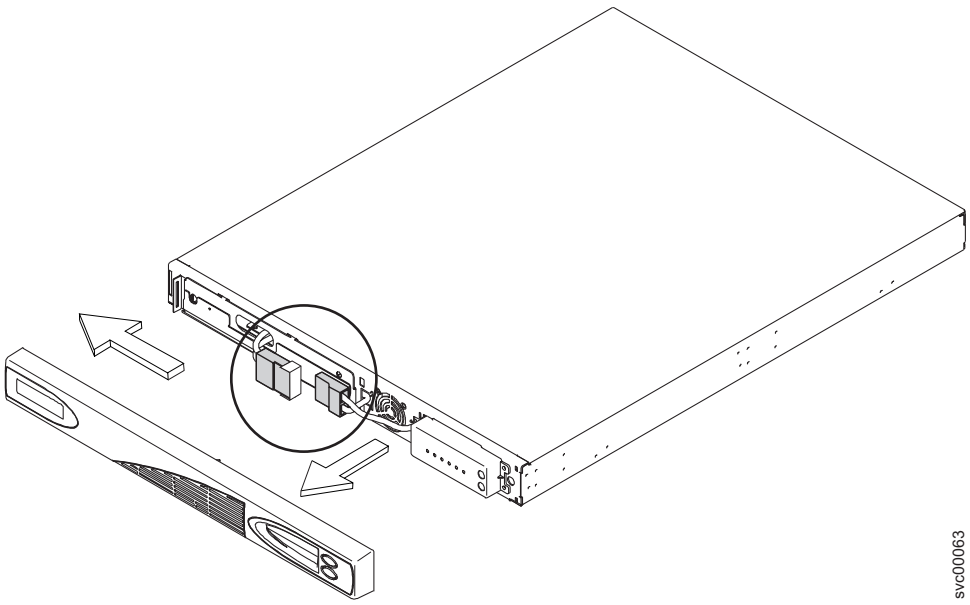


Figure 32. Removing the 2145 UPS-1U front panel

4. Remove the protective label from the internal battery connector (shown in Figure 33 on page 40).

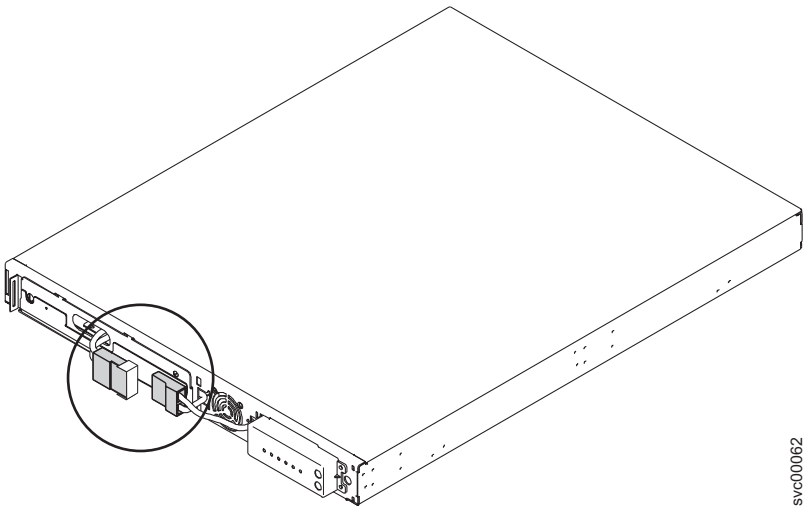


Figure 33. The 2145 UPS-1U internal battery connector with protective tape

5. Connect the internal battery connector (shown in Figure 34). Each end of the keyed connector has two wires: one red (+) and one black (–). Align the connector so that the two red wires are joined together and the two black wires are joined together.

   Note: A small amount of arcing might occur when connecting the batteries. This is normal and does not damage the unit or present any safety concerns.

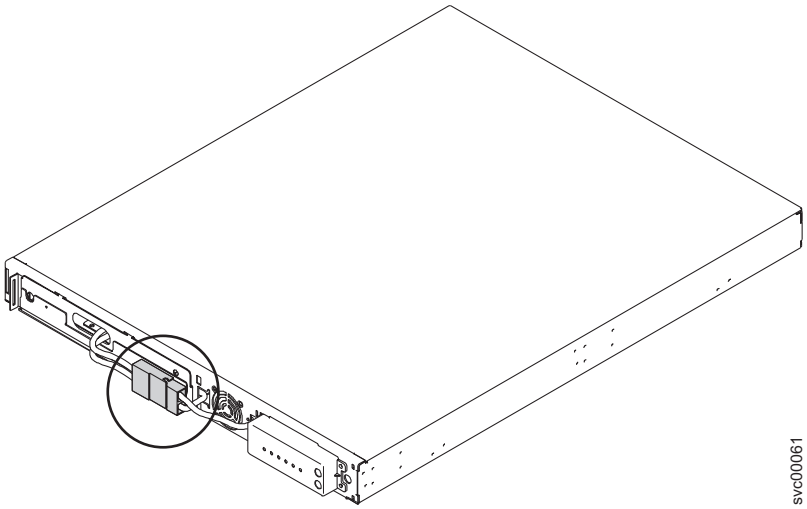


Figure 34. The 2145 UPS-1U internal-battery connector

6. Reinstall the front panel. You might first need to move the sliding section on the front of the 2145 UPS-1U to the closed position.
7. At the back of the 2145 UPS-1U, plug the 2145 UPS-1U main-power connector into the power socket (**1** in Figure 35 on page 41). The 2145 UPS-1U is in standby mode, so all indicators are off.

   It is recommended that each 2145 UPS-1U for an I/O group is connected to a different power source.

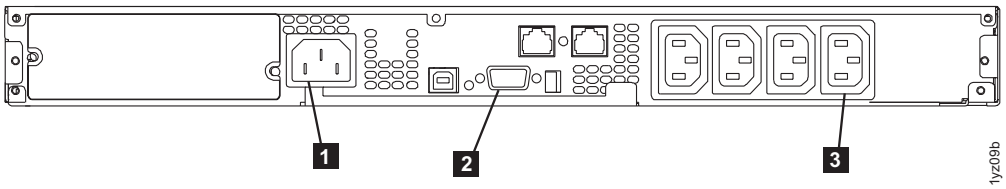


Figure 35. 2145 UPS-1U (rear view)

1. Main power connector
2. Communication port
3. Load segment 2 receptacle

Attention: Ensure that you comply with the following requirements:

- The voltage supplied to the 2145 UPS-1U must be 200 - 240 V single phase.
- The frequency supplied must be 50 or 60 Hz.

Notes:

a. The 2145 UPS-1U has an integrated circuit breaker and does not require external protection.

b. The 2145 UPS-1U is intended to maintain power on SAN Volume Controller nodes until data can be saved to the local hard-disk drive. Only SAN Volume Controller nodes can be plugged into the 2145 UPS-1U or the SAN Volume Controller cluster malfunctions.

8. Press and hold the on/off button (7 in Figure 36) for approximately five seconds. You might need a pointed device, such as a screwdriver, to press the on/off button. The front panel indicators cycle through a startup sequence while the 2145 UPS-1U conducts a self-test.

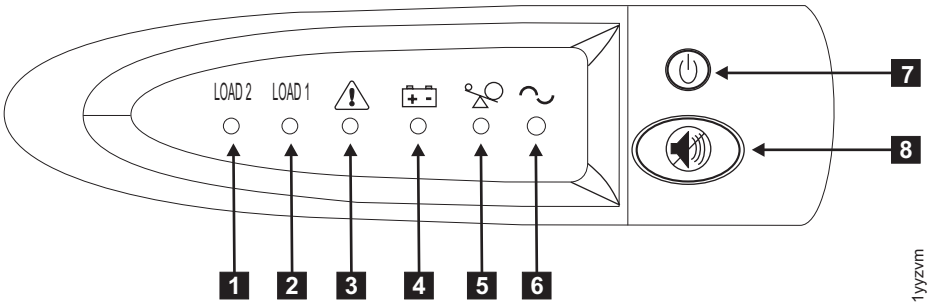


Figure 36. 2145 UPS-1U front-panel assembly

When the self-test is complete, the power-on indicator 6 and the load indicators (1 and 2) illuminate to indicate that power is being supplied by the 2145 UPS-1U. The 2145 UPS-1U is now in normal mode, and is charging its battery. If the battery indicator 4 is on and the alarm is sounding, the voltage range setting might not be correct. When a SAN Volume Controller is connected to the 2145 UPS-1U, the SAN Volume Controller automatically adjusts the voltage range setting. Take no action for this alarm condition unless it persists for more than five minutes after a SAN Volume Controller has been connected to this 2145 UPS-1U and turned on.

9. Repeat all of these steps to install additional 2145 UPS-1U units.

Installing the 2145 UPS-1U cable-retention bracket

The 2145 UPS-1U cable-retention bracket ensures that the power cable connection between the 2145 UPS-1U and the SAN Volume Controller node is stable.

Install the bracket after you install the power and signal cable assembly that was supplied with the node to connect the 2145 UPS-1U and the node.

You can attach the bracket by performing the following steps:

1. Install the power cable into the rightmost power outlet on the rear of the 2145 UPS-1U.
2. Remove the bracket and the two screws (shown in Figure 37) from the packaging.

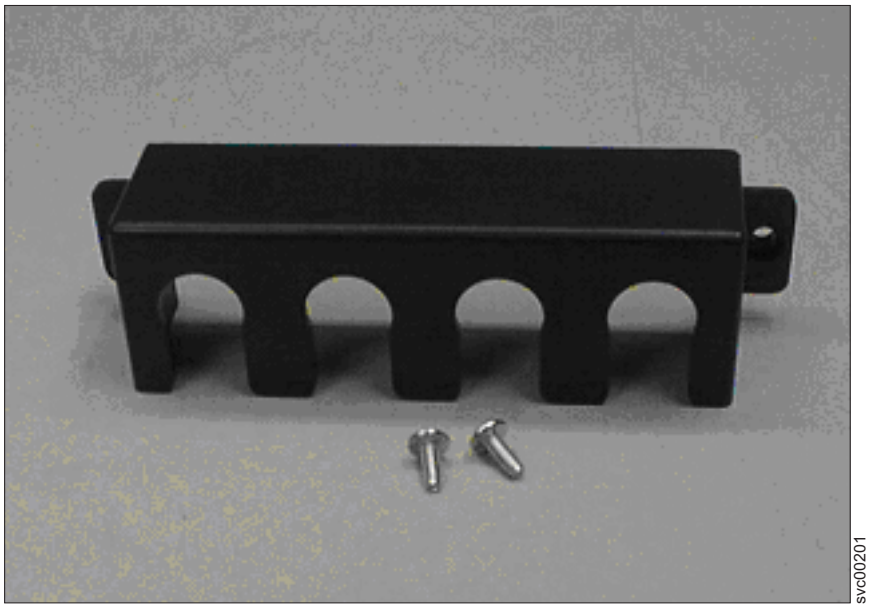


Figure 37. 2145 UPS-1U power cable-retention bracket hardware

3. Place the bracket over the power outlets on the right rear of the 2145 UPS-1U, so that the two screw holes line up.
4. Position the bracket with the power cable protruding through the rightmost slot in the bracket.
5. Secure the bracket in place with one screw on each side, as shown in Figure 38.

Figure 38. 2145 UPS-1U power cable-retention bracket

Installing the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4

There are several steps that you must perform to install the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 nodes.

Installing the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 consists of the following tasks:

1. Installing the support rails in the rack cabinet.
2. Installing the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4.
3. Connecting the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 to the uninterruptible power supply.
4. Installing the cable retention bracket on the SAN Volume Controller 2145-8F4.

Installing the support rails for the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2

You must install the support rails that hold the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2.

When you are ready to install the support rails, use the customer's hardware-location chart and the Electronic Industries Alliance (EIA) positions on the rack to determine where in the rack that the SAN Volume Controller node is to be installed.

Perform the following steps to install the support rails:

1. Check the labels on the support rails. Each rail has a label that indicates which is the front end of the rail and whether the rail is for the left or right side of the rack. Perform this procedure for both rails.
2. Put your index finger against the side of the latch-lever, **1** in Figure 39, and put your thumb against the front of the latch-lock **2**.

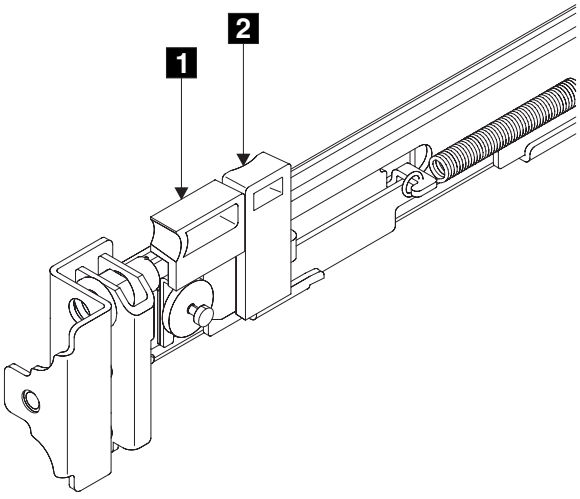


Figure 39. Retracting the latch-lock carrier

1 Latch-lever

2 Latch-lock

3. Gently push the latch lock 2 away from the rail as you move the latch lever 1 toward the far end of the rail (Figure 40). The latch-lock carrier assembly slides against the spring tension.

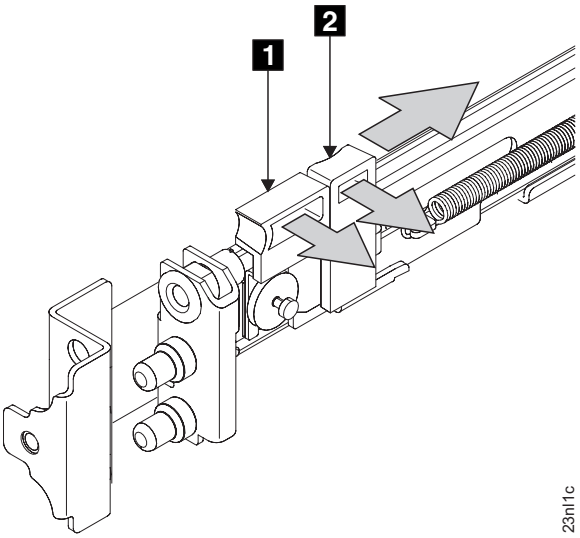


Figure 40. Opening the front latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

4. Continue to slide the latch-lock carrier for approximately 13 mm (0.5 in). The latch-lever engages a hole in the back bracket assembly and holds the latch-lock carrier in the retracted position.
5. Push the back rail bracket 1 (Figure 41) toward the front of the rail until it stops. The rail is now at its shortest adjustment.

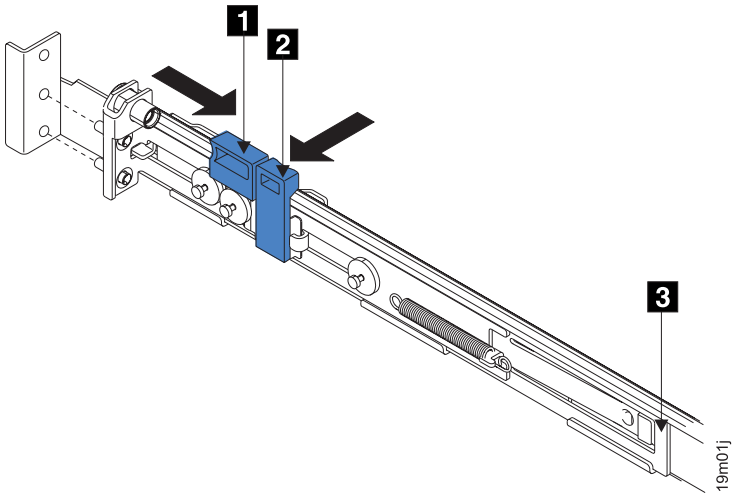


Figure 41. Opening the back latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

3 Back rail bracket

6. Place the front end of the left rail in the rack cabinet. Align the top of the front bracket 1 (Figure 42) with the required EIA marking that is on the rack.

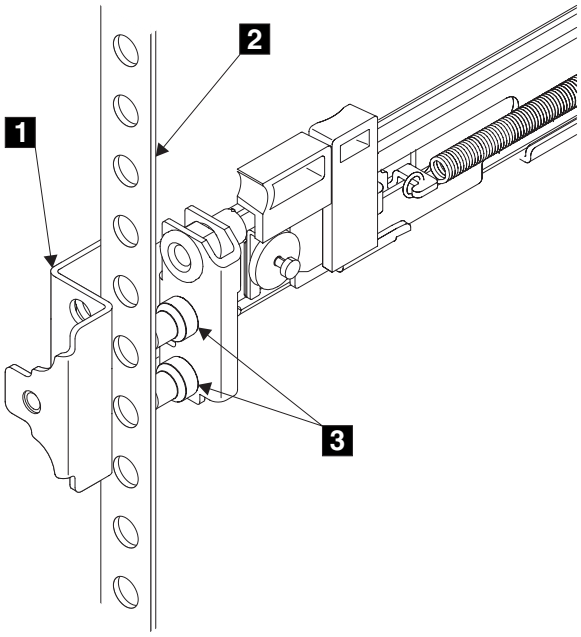


Figure 42. Installing the front end of the rail

1 Front bracket

2 Rack-mounting flange

3 Locating pins

7. Align the locating pins 3 with the holes that are in the rack-mounting flange.
8. Push the latch lock 2 (Figure 43 on page 46) away from the rail to release the carrier. The latch-lock carrier slides toward the front of the rack and the locating pins project through the holes that are in the front flange and in the front rail bracket.

   Important: Ensure that the locating pins are fully extended through the front rail bracket.

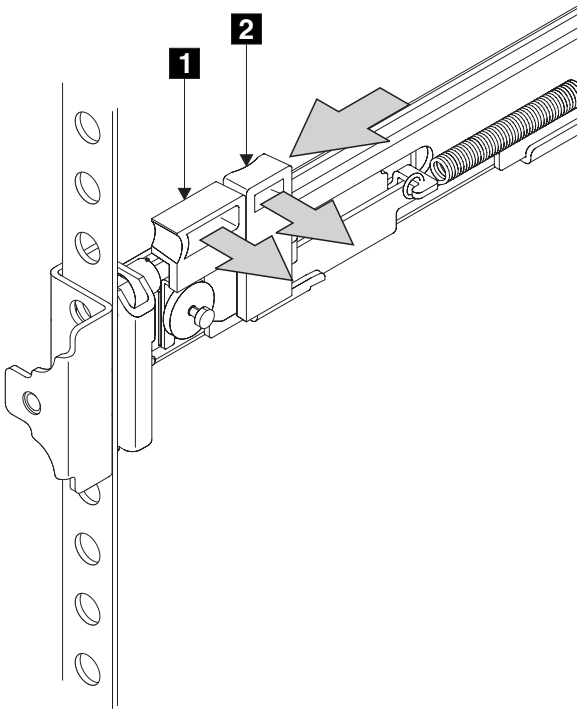


Figure 43. Closing the latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

9. Push the back rail bracket toward the rear of the rack and align the locating pins with the rack-mounting flange.
10. Push the latch lock **2** away from the rail to release the carrier. The latch-lock carrier slides toward the rear of the rack, and the locating pins project through the holes that are in the rear flange and in the rear rail bracket.

    Important: Ensure that the locating pins are fully extended through the rear rail bracket.
11. On the rear of each rail, press the blue release tab and slide the shipping bracket off the slide rail. Store the shipping bracket for further use.

Installing the SAN Volume Controller in a rack

After installing the support rails, you can install the SAN Volume Controller in a rack.

Installing the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 in a rack

After installing the support rails, you can install the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 in the rack.

CAUTION:
To avoid any hazard from the rack tipping forward when devices are installed, observe all safety precautions for the rack into which you are installing the device.

Perform the following steps to install the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 node in the rack:

1. Stand at the front of the rack and place the back of the node onto the support rails, as low in the rack as possible.
2. Slide the node fully into the rack.

   The node snaps into place.
3. Repeat this procedure for each node that needs to be installed.

   Tip: If you have available space, leave a 1U space between each node to improve the air circulation in the rack.

Connecting the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 to the 2145 UPS-1U

Connect the SAN Volume Controller to the 2145 UPS-1U to protect your data in the event of an unexpected loss of external power.

Note: To make the SAN Volume Controller cluster more resilient to power failure, the 2145 UPS-1U units can be connected to the redundant ac-power switch. If a redundant ac-power switch is not used, you can connect the two uninterruptible power supply units that are powering an I/O group to different, independent electrical power sources. If a single power source fails, the SAN Volume Controller cluster can then continue to operate with reduced performance.

Before you begin this task, see the completed customer's cable-connection table, which is described in the *IBM System Storage SAN Volume Controller Planning Guide* and can be downloaded from www.ibm.com/storage/support/2145.

Use the information in this table to identify the 2145 UPS-1U unit to which this node is to be connected.

Perform the following steps to connect the SAN Volume Controller to the 2145 UPS-1U:

1. At the back of the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4, plug the combined power and serial cable into the power connector **2** . See Figure 44 on page 48.

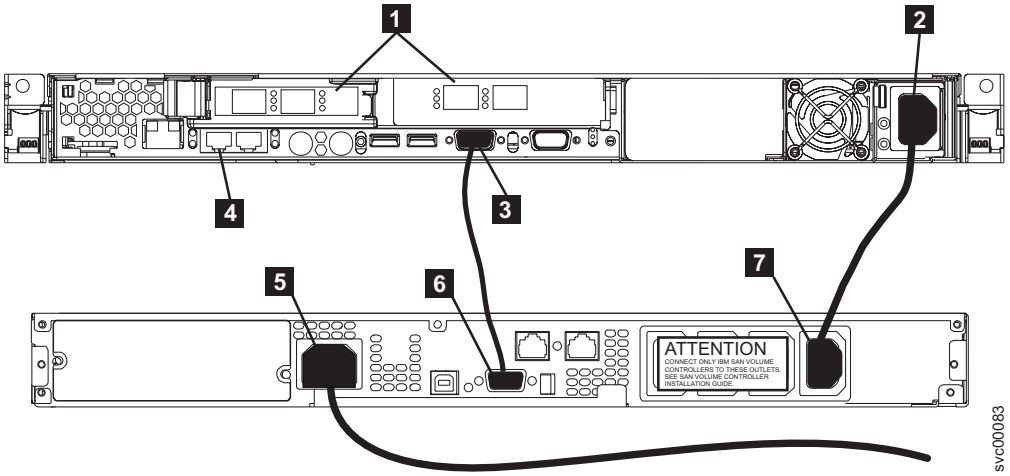


Figure 44. Connecting the SAN Volume Controller 2145-8F2 power cable to the 2145 UPS-1U

1. Fibre-channel ports
2. Power connector
3. Serial connector
4. Ethernet ports
5. Main power connector
6. Communication port
7. Load segment 2 receptacle

2. Place the other end of the power cable into the rightmost load segment 2 receptacle **7** on the 2145 UPS-1U.

   DANGER

   You have already switched on the 2145 UPS-1U. The output sockets of the 2145 UPS-1U are live.

3. Plug the signal cable into the serial connector **3** located on the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2.
4. Place the other end of the signal cable into the communication port **6** on the 2145 UPS-1U.

The SAN Volume Controller power is now connected to the 2145 UPS-1U.

Installing the SAN Volume Controller 2145-8F4 cable retention bracket

The cable retention bracket ensures that the SAN Volume Controller 2145-8F4 node does not mistakenly become unplugged from the uninterruptible power supply.

Install the SAN Volume Controller 2145-8F4 cable retention bracket after you install the node in the rack.

To attach the bracket to the support rail, perform the following steps:

1. Install the power cable into the power supply.

2. Insert the bracket onto the power cable so that the power cable is held by the slot on the end of the bracket. Figure 45 provides a view of how to align the cable retention bracket with the cable.

Figure 45. Attaching the cable retention bracket to the SAN Volume Controller 2145-8F4 power cable

3. Position the cable retention bracket against the support rail and attach the bracket onto the slot in the rear of the rail. Figure 46 provides a view of the cable retention bracket that is attached to the SAN Volume Controller 2145-8F4.

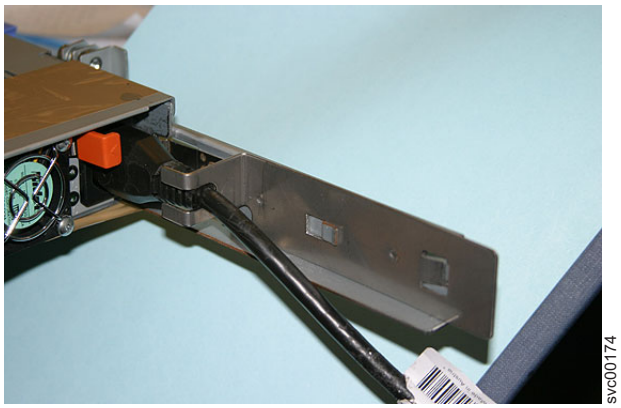


Figure 46. SAN Volume Controller 2145-8F4 with cable-retention bracket attached

Connecting the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 to the SAN and to the Ethernet network

Before you connect the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 to the SAN, you must connect the Ethernet and fibre-channel cables.

Before you begin this task, refer to the user's cable connection table to find out where to connect the Ethernet and fibre-channel cables.

To connect the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 to the SAN and to the Ethernet network, perform the following steps:

1. Connect the Ethernet cable to Ethernet port 1 **5** in Figure 47 on page 50 or Figure 48 on page 50.

Attention: You must use only Ethernet port 1 on the SAN Volume Controller. The software is configured only for Ethernet port 1.

2. Connect the other end of the Ethernet cable to the proper connector on the Ethernet hub or switch.

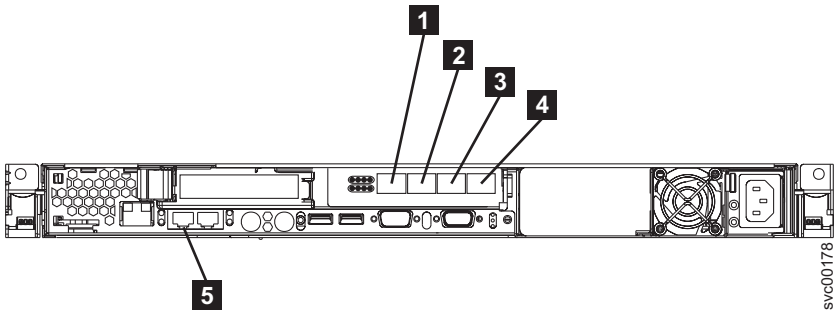


Figure 47. Connectors at the back of the SAN Volume Controller 2145-8F4

1 Fibre-channel port 1

2 Fibre-channel port 2

3 Fibre-channel port 3

4 Fibre-channel port 4

5 Ethernet port 1

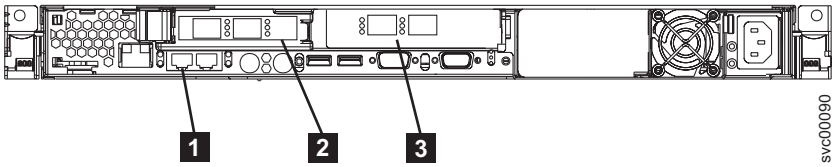


Figure 48. Connectors at the back of the SAN Volume Controller 2145-8F2

1 Ethernet port 1

2 Low-profile, dual-port fibre-channel host bus adapter (HBA) with ports 1 and 2 (left to right)

3 Full-height, dual-port fibre-channel HBA with ports 3 and 4 (left to right)

Attention: When routing the fibre-channel cables, do not tighten the cable straps or bend the cables to a radius smaller than 76 mm (3 in.).

3. Connect the fibre-channel cables to the fibre-channel ports as required by the user's configuration.
4. Connect the other ends of the fibre-channel cables to the proper connectors of the fibre-channel switches.

Verifying the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 installation

You must verify the SAN Volume Controller installation after the installation has completed.

This task shows you how to verify the installation after you install the SAN Volume Controller in the rack and connect it to the uninterruptible power supply, the storage area network (SAN), and the Ethernet.

Note: If at any point the SAN Volume Controller does not operate as described, see MAP 5000 in the *IBM System Storage SAN Volume Controller Troubleshooting Guide*, unless a different maintenance analysis procedure (MAP) is specified.

Perform the following steps to verify installation:

1. Press the SAN Volume Controller power-control button. Because the button is recessed, you might need a pointed device, such as a screwdriver, to press the power-control button. Verify that the green power LED is lit. If the LED is not illuminated, see MAP 5000: Start in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to repair the problem.

   Note: You do not need to install any software. The node boots automatically.

   Verify that the node is booting without error. If it boots without error, either the `Charging`, `Recovering`, or the `Cluster:` message is displayed in the first line of the front-panel display.
2. Press and hold the select button for five seconds. The check light comes on and a display test is performed. Check that all display cells light and that a bar scrolls horizontally and vertically across the display. When the display test is complete, the check light goes off and a button test is started.
3. Press the up, down, left, and right buttons to verify that they are working. Figure 49 shows four examples of what the front panel should display when you press the buttons. After you finish testing the buttons, press and hold the select button for five seconds to exit the test.

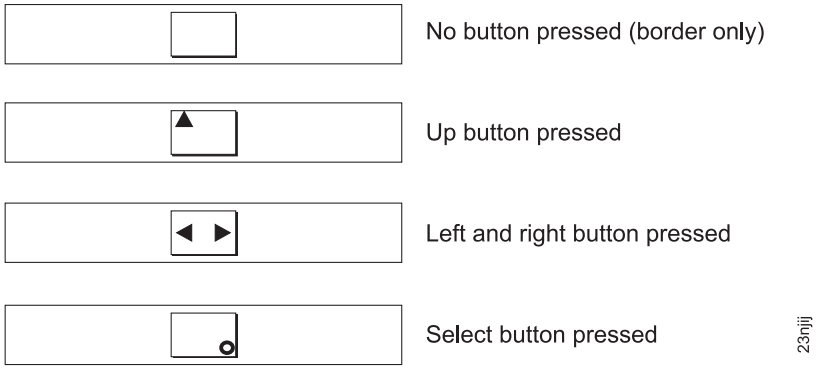


Figure 49. Front-panel display when push buttons are pressed

4. If the `Charging` or `Recovering` message is displayed on the front-panel display, press the select button to switch to the menu. The menu continues to be displayed while you press the buttons on the front panel. If you do not press any buttons within 60 seconds, the menu changes to display the charging progress. You can switch the front-panel display to the menu at any time by pressing the select button again.
5. Press and release the up button or down button until the `Node:` option is displayed on the first line of the front-panel display.
6. Verify that the node number that is displayed on the second line of the front-panel display is the same as the node number that is printed on the front panel of the node. Figure 50 on page 52 shows how the node number is

displayed on the front panel. If the node number is not the same, contact the IBM Support Center.

Figure 50. Node number

7. Press and release the up button or down button until the `Node:` option is displayed on the first line of the front-panel display. The second line of the front-panel display in Figure 51 shows the message `Inactive`. This message indicates that, although an Ethernet connection is available, it cannot yet be used.

Figure 51. Ethernet mode

8. Press and release the up button or down button until the `FC Port-1` option shows in the display.
9. Check whether the second line of the front-panel display shows the message `Active`. If `Active` is not shown on the second line, go to MAP 5600: Fibre channel in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to repair the fault.
10. If you are installing a SAN Volume Controller 2145-8F2 node, go to step 16. If you are installing a SAN Volume Controller 2145-8F4 node, go to step 11.
11. Press and hold the down button.
12. Press and release the select button.
13. Release the down button. The operational speed of the fibre-channel link is displayed. Use the cable connection table that is provided by the customer to verify that the fibre-channel link is operating at the expected speed. If the operational speed does not match the expected speed, go to MAP 5600: Fibre channel in the *IBM System Storage SAN Volume Controller Troubleshooting Guide* to repair the fault.
14. Press the select button to return to the fibre-channel status display.
15. Press the right button to display each port in turn and ensure that the port is active and the speed is correct. Go to step 18 on page 53
16. Press and release the left or right button to display the other port options. Check whether for each port, the second line of the front-panel display shows the message `Active`. If `Active` is not shown for any port, go to "MAP 5600: Fibre channel" in the *IBM System Storage SAN Volume Controller Service Guide* to repair the fault.
17. If the configuration data table provided by the user indicates that the SAN Volume Controller nodes are to be operated at 1 Gbps, follow these steps:
    a. Press and hold the down button.
    b. Press and release the select button.
    c. Release the down button.

The second line of the front-panel display shows the current fibre-channel speed setting of the node. Press the up or down button until `1 Gbps` is displayed and then press the select button. This changes the fibre-channel speed for all ports on this node to 1 Gbps.

18. If you want to select a language other than English, perform the following steps:
    a. Press the up or down button until `Select Language?` is displayed.
    b. Press the select button.
    c. Press the left or right button until the required language is displayed.
    d. Press the select button.

    If the battery needed to be charged, the `Charging` or `Recovering` message is replaced by the `Cluster:` message when the battery is fully charged. The progress bar no longer displays. The installation of the SAN Volume Controller hardware is now complete. No software installation is required. Continue with the instructions in the *IBM System Storage SAN Volume Controller Software Installation and Configuration Guide* to create, if necessary, a new SAN Volume Controller cluster and to add the nodes into a SAN Volume Controller cluster.

Appendix. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully.

Features

These are the major accessibility features in the SAN Volume Controller Console:

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. The following screen reader has been tested: Window-Eyes v6.1.
- You can operate all features using the keyboard instead of the mouse.
- You can change the initial delay and repeat rate of the up and down buttons to two seconds when you use the front panel of the SAN Volume Controller to set or change an IPv4 address. This feature is documented in the applicable sections of the SAN Volume Controller publications.

Navigating by keyboard

You can use keys or key combinations to perform operations and initiate many menu actions that can also be done through mouse actions. You can navigate the SAN Volume Controller Console and help system from the keyboard by using the following key combinations:

- To traverse to the next link, button, or topic, press Tab inside a frame (page).
- To expand or collapse a tree node, press → or ←, respectively.
- To move to the next topic node, press V or Tab.
- To move to the previous topic node, press ^ or Shift+Tab.
- To scroll all the way up or down, press Home or End, respectively.
- To go back, press Alt+←.
- To go forward, press Alt+→.
- To go to the next frame, press Ctrl+Tab.
- To move to the previous frame, press Shift+Ctrl+Tab.
- To print the current page or active frame, press Ctrl+P.
- To select, press Enter.

Accessing the publications

You can view the publications for the SAN Volume Controller in Adobe Portable Document Format (PDF) using the Adobe Acrobat Reader. The PDFs are provided at the following Web site:

www.ibm.com/storage/support/2145

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Verantwortlich für die Konformitätserklärung des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

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Models 2145-8F2 and 2145-8F4
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