

IBM TotalStorage  
SAN Volume Controller



# Installation Guide

*Version 1.2.0*



IBM TotalStorage  
SAN Volume Controller



# Installation Guide

*Version 1.2.0*

**Note**

Before using this information and the product it supports, read the information in "Notices" on page 53.

**Third Edition (April 2004)**

**© Copyright International Business Machines Corporation 2003, 2004. All rights reserved.**

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

# Contents

|   |          |
|---|----------|
| <b>About this guide</b> . . . . .       | <b>v</b> |
| Who should use this guide? . . . . .    | v        |
| Related publications . . . . .          | v        |
| How to order IBM publications . . . . . | vii      |
| Emphasis . . . . .                      | vii      |
| Related Web sites . . . . .             | viii     |
| How to send your comments . . . . .     | viii     |
| Definitions of notices . . . . .        | viii     |

|   |       |
|---|-------|
| Danger notices for the uninterruptible power supply . . . . .               | ix    |
| Danger notices for the SAN Volume Controller . . . . .                      | ix    |
| Caution notices for the uninterruptible power supply . . . . .              | x     |
| Caution notices for the SAN Volume Controller . . . . .                     | xi    |
| Inspecting the SAN Volume Controller for unsafe conditions . . . . .        | xi    |
| Inspecting the uninterruptible power supply for unsafe conditions . . . . . | xiv   |
| Uninterruptible power supply requirements . . . . .                         | xv    |
| Emergency power-off (EPO) event. . . . .                                    | xv    |
| Checking the safety labels on the SAN Volume Controller . . . . .           | xv    |
| Environmental notices and statements. . . . .                               | xviii |
| Handling static-sensitive devices . . . . .                                 | xix   |

## **Chapter 1. SAN Volume Controller . . . . . 1**

|   |   |
|---|---|
| Controls and indicators for the SAN Volume Controller . . . . . | 4 |
| Power button . . . . .  | 4 |
| Power LED . . . . .   | 5 |
| Check LED . . . . .   | 5 |
| Navigation buttons . . . . .                                    | 5 |
| Select button . . . . .   | 5 |
| Front panel display . . . . .                                   | 5 |
| Node identification label . . . . .                             | 6 |

## **Chapter 2. Uninterruptible power supply overview . . . . . 7**

|  |    |
|--|----|
| Controls and indicators for the uninterruptible power supply . . . . . | 9  |
| Mode indicator . . . . .   | 10 |
| On button . . . . .  | 10 |
| Off button . . . . .   | 11 |
| Test and alarm reset button . . . . .                                  | 11 |
| Load-level indicators . . . . .  | 11 |
| Site wiring fault indicators . . . . .                                 | 11 |
| Battery service indicator . . . . .                                    | 11 |
| Battery mode indicator . . . . .                                       | 12 |
| General alarm indicator . . . . .                                      | 12 |

## **Chapter 3. Master console . . . . . 13**

## **Chapter 4. Installing the uninterruptible power supply, the master console, and the SAN Volume Controller . . . . . 15**

|  |    |
|--|----|
| Preparing for installation . . . . .   | 15 |
| Installing the support rails for the uninterruptible power supply . . . . .          | 16 |
| Installing the uninterruptible power supply into the rack . . . . .                  | 18 |
| Installing the master console. . . . .   | 24 |
| Installing the support rails and the SAN Volume Controller into a rack . . . . .     | 26 |
| Installing the support rails for the SAN Volume Controller . . . . .                 | 26 |
| Installing the SAN Volume Controller into the rack . . . . .                         | 29 |
| Connecting the SAN Volume Controller to the uninterruptible power supply . . . . .   | 30 |
| Connecting the SAN Volume Controller to the SAN and to the Ethernet network. . . . . | 32 |
| Verifying the SAN Volume Controller installation. . . . .                            | 33 |

## **Chapter 5. Using the front panel display on the SAN Volume Controller . 37**

|   |    |
|---|----|
| Status indicators. . . . .                      | 37 |
| Boot progress indicator . . . . .               | 37 |
| Boot failed. . . . .                            | 38 |
| Hardware boot . . . . .                         | 38 |
| Node rescue request . . . . .                   | 38 |
| Power failure. . . . .                          | 38 |
| Powering off . . . . .                          | 39 |
| Restarting . . . . .                            | 39 |
| Shutting down . . . . .                         | 39 |
| Error codes . . . . .                           | 40 |
| SAN Volume Controller menu options . . . . .    | 40 |
| Cluster options . . . . .                       | 41 |
| Node options. . . . .                           | 42 |
| Ethernet option . . . . .                       | 45 |
| Fibre channel port-1 through 4 option . . . . . | 45 |
| Select language? option . . . . .               | 46 |

## **Appendix. Preparing your SAN Volume Controller environment. . . . . 47**

|   |    |
|---|----|
| Preparing your uninterruptible power supply environment . . . . . | 48 |
| Preparing your master console environment . . . . .               | 49 |

## **Accessibility . . . . . 51**

## **Notices . . . . . 53**

|   |    |
|---|----|
| Trademarks . . . . .  | 54 |
| Electronic emission notices . . . . .                       | 55 |
| Federal Communications Commission (FCC) statement . . . . . | 55 |

|  |    |
|--|----|
| Japanese Voluntary Control Council for Interference (VCCI) statement . . . . . | 55 |
| Korean Government Ministry of Communication (MOC) statement . . . . .          | 55 |
| China Class A EMC compliance in Simplified Chinese. . . . .                    | 55 |
| Avis de conformité à la réglementation d'Industrie Canada . . . . .            | 56 |
| New Zealand compliance statement . . . . .                                     | 56 |
| International Electrotechnical Commission (IEC) statement . . . . .            | 56 |

|  |    |
|--|----|
| Industry Canada compliance statement . . . . .           | 56 |
| United Kingdom telecommunications requirements . . . . . | 56 |
| European Union (EU) statement . . . . .                  | 56 |
| Radio protection for Germany . . . . .                   | 56 |
| Taiwan Class A compliance statement . . . . .            | 57 |

|                           |           |
|---------------------------|-----------|
| <b>Glossary . . . . .</b> | <b>59</b> |
|---------------------------|-----------|

|                        |           |
|------------------------|-----------|
| <b>Index . . . . .</b> | <b>63</b> |
|------------------------|-----------|

---

## About this guide

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

### Related topics:

- Chapter 1, “SAN Volume Controller,” on page 1
- Chapter 4, “Installing the uninterruptible power supply, the master console, and the SAN Volume Controller,” on page 15
- Chapter 5, “Using the front panel display on the SAN Volume Controller,” on page 37

---

## Who should use this guide?

This guide should be read by the IBM service representative who is responsible for the initial installation of the SAN Volume Controller, the uninterruptible power supply, and the master console at a customer site.

---

## Related publications

The tables in this section list and describe the following publications:

- The publications that make up the library for the IBM TotalStorage SAN Volume Controller
- Other IBM publications that relate to the SAN Volume Controller

### SAN Volume Controller library:

Table 1 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) on a compact disc (CD) that comes with the SAN Volume Controller. If you need additional copies of this CD, the order number is SK2T-8811. These publications are also available as PDF files from the following Web site:

<http://www.ibm.com/storage/support/2145/>

*Table 1. Publications in the SAN Volume Controller library*

| Title  | Description   | Order number |
|--|---|--------------|
| <i>IBM TotalStorage SAN Volume Controller: CIM Agent Developer's Reference</i>     | This reference guide describes the objects and classes in a Common Information Model (CIM) environment.         | SC26-7590    |
| <i>IBM TotalStorage SAN Volume Controller: Command-Line Interface User's Guide</i> | This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI). | SC26-7544    |
| <i>IBM TotalStorage SAN Volume Controller: Configuration Guide</i>                 | This guide provides guidelines for configuring your SAN Volume Controller.                                      | SC26-7543    |

Table 1. Publications in the SAN Volume Controller library (continued)

| Title  | Description   | Order number |
|--|---|--------------|
| <i>IBM TotalStorage SAN Volume Controller: Host Attachment Guide</i>     | This guide provides guidelines for attaching the SAN Volume Controller to your host system.   | SC26-7575    |
| <i>IBM TotalStorage SAN Volume Controller: Installation Guide</i>        | This guide includes the instructions the service representative uses to install the SAN Volume Controller.  | SC26-7541    |
| <i>IBM TotalStorage SAN Volume Controller: Planning Guide</i>            | 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. | GA22-1052    |
| <i>IBM TotalStorage SAN Volume Controller: Service Guide</i>             | This guide includes the instructions the service representative uses to service the SAN Volume Controller.  | SC26-7542    |
| <i>IBM TotalStorage SAN Volume Controller: Translated Safety Notices</i> | This guide contains the danger and caution notices for the SAN Volume Controller. The notices are shown in English and in numerous other languages.   | SC26-7577    |

**Other IBM publications:**

Table 2 lists and describes other IBM publications that contain additional information related to the SAN Volume Controller.

Table 2. Other IBM publications

| Title   | Description   | Order number |
|---|---|--------------|
| <i>IBM TotalStorage Enterprise Storage Server, IBM TotalStorage SAN Volume Controller, IBM TotalStorage SAN Volume Controller for Cisco MDS 9000, Subsystem Device Driver: User's Guide</i> | This guide describes the IBM Subsystem Device Driver Version 1.5 for TotalStorage Products and how to use it with the SAN Volume Controller. This publication is referred to as the <i>IBM TotalStorage Subsystem Device Driver: User's Guide</i> . | SC26-7608    |

**Related topics:**

- “How to order IBM publications” on page vii
- “How to send your comments” on page viii



---

## How to order IBM publications

This topic explains how to order copies of IBM publications and how to set up a profile to receive notifications about new or changed publications.

### The IBM publications center:

The 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 free of 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/](http://www.ibm.com/shop/publications/order/)

### Publications notification system:

The IBM publications center Web site offers you a notification system for IBM publications. Register and you can create your own profile of publications that interest you. The publications notification system sends you a daily e-mail that contains information about new or revised publications that are based on your profile.

If you want to subscribe, you can access the publications notification system from the IBM publications center at the following Web site:

[www.ibm.com/shop/publications/order/](http://www.ibm.com/shop/publications/order/)

### Related topics:

- “Related publications” on page v

---

## 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.

---

## Related Web sites

Table 3 lists Web sites that have information about SAN Volume Controller or related products or technologies.

Table 3. Web sites

| Type of information                        | Web site  |
|--|---|
| SAN Volume Controller support              | <a href="http://www.ibm.com/storage/support/2145/">http://www.ibm.com/storage/support/2145/</a> |
| Technical support for IBM storage products | <a href="http://www.ibm.com/storage/support/">http://www.ibm.com/storage/support/</a>           |

---

## 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](mailto: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 or fax

Fill out the Readers' Comments form (RCF) at the back of this book. Return it by mail or fax (1-408-256-0488), or give it to an IBM representative. 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.

### Related topics:

- "Related publications" on page v

---

## Definitions of notices

The following notices are used throughout this library to convey the following specific meanings:

**Note:** These notices provide important tips, guidance, or advice.

**Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice appears before the instruction or situation in which damage could occur.

### CAUTION:

**These notices indicate situations that can be potentially hazardous to you. A caution notice precedes the description of a potentially hazardous procedural step or situation.**

## DANGER

These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice precedes the description of a potentially lethal or extremely hazardous procedural step or situation.

### Related topics:

- *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*

## Danger notices for the uninterruptible power supply

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

## DANGER

An electrical outlet that is not correctly wired could place a hazardous voltage on the metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (1)

## DANGER

To prevent possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones. (2)

## DANGER

Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are replaced as a unit. (3)

## DANGER

To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables. (4)

## DANGER

The uninterruptible power supply contains lethal voltages. All repairs and service should be performed by an authorized service support representative only. There are no user serviceable parts inside the uninterruptible power supply. (5)

### Related topics:

- "Caution notices for the uninterruptible power supply" on page x
- *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*

## Danger notices for the SAN Volume Controller

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

## DANGER

Do not try to open the covers of the power supply assembly (32).

### Related topics:

- *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*

## Caution notices for the uninterruptible power supply

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

### CAUTION:

The uninterruptible power supply contains its own energy source (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. This 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 comply with international standards and wiring regulations, the total equipment connected to the output of the uninterruptible power supply must not have an earth leakage current greater than 2.5 milliamperes. (14)

### CAUTION:

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

The uninterruptible power supply weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:

- Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representatives for assistance.
- Remove the battery assembly from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton.
- Do not attempt to install the uninterruptible power supply into the rack unless the electronics assembly and the battery assembly have been removed.

### CAUTION:

The electronics assembly weighs 6.4 kg (14 lb). Take care when you remove it from the uninterruptible power supply. (16)

### CAUTION:

The uninterruptible power supply battery unit weighs 21 kg (45 lb). Do not attempt to lift the uninterruptible power supply battery unit by yourself. Ask another service representative for aid. (18)

**CAUTION:**

Do not dispose of the battery in a fire. The battery might explode. Correct disposal of the battery is required. Refer to your local regulations for disposal requirements. (20)

**Related topics:**

- “Danger notices for the uninterruptible power supply” on page ix
- *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*

## Caution notices for the SAN Volume Controller

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

**CAUTION:**

This product contains a registered/certified class 1 laser that complies with the FDA radiation performance standards and is in compliance with the IEC/EN 60825-1 standards (21)

**CAUTION:**

A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery might present a risk of fire or explosion. The battery connector is polarized; do not attempt to reverse the polarity. Dispose of the battery according to local regulations. (22)

**Related topics:**

- “Danger notices for the SAN Volume Controller” on page ix
- *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*

## Inspecting the SAN Volume Controller for unsafe conditions

Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

**Prerequisites:**

Consider the following conditions and the safety hazards they present:

**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.

**Steps:**

Using the following inspection checklist as a guide, inspect the IBM<sup>®</sup> TotalStorage<sup>™</sup> SAN Volume Controller for unsafe conditions. If necessary, see any suitable safety publications.

1. Turn off the SAN Volume Controller.

2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables and ensure that:
  - a. 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. The insulation is not worn or damaged.
4. Check for any obvious nonstandard changes. 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, 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 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 SAN, check the grounding.

**Related topics:**

- “Checking the grounding of the SAN Volume Controller and the uninterruptible power supply” on page xiii

**External machine checks**

This topic describes the checks that you should perform on the outside of the SAN Volume Controller.

**Steps:**

Perform the following external machine checks before you install the SAN Volume Controller:

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.

**Related topics:**

- “Inspecting the SAN Volume Controller for unsafe conditions” on page xi

**Internal machine checks**

This topic describes the checks that you should perform on the inside of the SAN Volume Controller.

**Steps:**

Perform the following internal machine checks before you install the SAN Volume Controller:

1. Check for any non-IBM changes that might have been made to the machine. 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 machine 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.

**Related topics:**

- “Inspecting the SAN Volume Controller for unsafe conditions” on page xi
- “External machine checks” on page xii

**Checking the grounding of the SAN Volume Controller and the uninterruptible power supply**

This topic tells you how to check the grounding of the SAN Volume Controller. Figure 1 shows the connectors for the SAN Volume Controller and the uninterruptible power supply.

**Steps:**

Perform the following steps to ensure that the SAN Volume Controller is properly grounded:

1. Ensure that all power is removed.
2. Ensure that the power cable **1** is plugged into the uninterruptible power supply. Also ensure that the other ends of the power cable are connected to the power supply in the rack. See Figure 1.

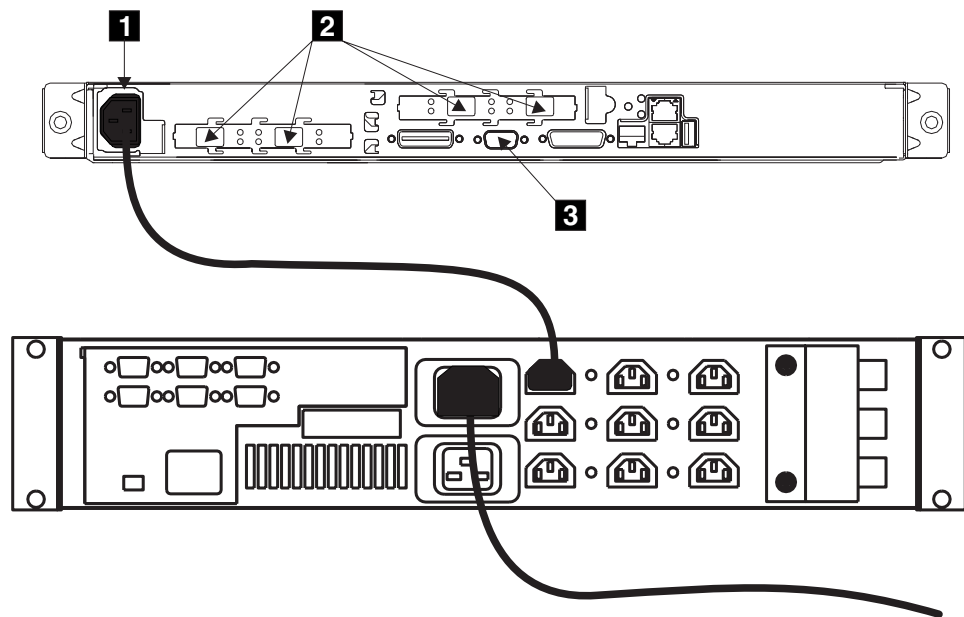


Figure 1. Power cable and signal sockets

3. **Attention:** Some electrical circuits could be damaged if the external signal cables are present at the SAN Volume Controller while the grounding check is being done.

Ensure that no external cables are present at connectors **2** and **3**.

4. Disconnect and remove the Ethernet cable.
5. Follow your local procedures and check the grounding of the SAN Volume Controller. Any test equipment must be connected to the frame of the SAN Volume Controller.

If the grounding is correct, go no further with these instructions.

If the grounding is *not* correct, unplug the power cable **1** from the uninterruptible power supply in the SAN Volume Controller.

6. Check for continuity between the frame of the SAN Volume Controller and the ground pin **1** of each main power connector as shown in Figure 2.

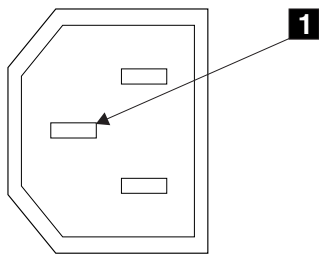


Figure 2. Ground pin

7. If the uninterruptible power supply has no continuity, exchange it for a new one. Then perform a complete grounding check again.  
If the uninterruptible power supply has continuity, you might have a problem with the power cable or with the grounding of the host system.
8. Check the power cable for continuity.  
If the power cable does not have continuity, exchange it for a new one, then perform step 1 on page xiii through step 5 again.

## Inspecting the uninterruptible power supply for unsafe conditions

Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

### Prerequisites:

Consider the following conditions and the safety hazards they present:

#### 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.



### Steps:

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. File a claim for shipping damage within fifteen days of receipt of the equipment.

## Uninterruptible power supply requirements

This topic lists the requirements for the uninterruptible power supply.

Ensure that you comply with the following requirements for uninterruptible power supplies:

- Each uninterruptible power supply should be connected to a separate branch circuit.
- A UL listed 15 A circuit breaker must be installed in each branch circuit that supplies power to the uninterruptible power supply.
- If a rack power distribution unit is used, each uninterruptible power supply must be connected to a separate power distribution unit.
- The voltage supplied to the uninterruptible power supply must be 200–240 V single phase.
- The frequency supplied must be between 50 and 60 Hz.

**Note:** If the uninterruptible power supply is cascaded from another uninterruptible power supply, the source uninterruptible power supply must have at least 3 times the capacity per phase and the total harmonic distortion must be less than 5% with any single harmonic being less than 1%. The uninterruptible power supply also should have input voltage capture that has a slew rate faster than 3 Hz per second and 1 msec glitch rejection.

## Emergency power-off (EPO) event

In the event of a room emergency power-off (EPO) shutdown, the SAN Volume Controller completes the process of shutting down the output from the uninterruptible power supplies within 5 minutes.

**Attention:** If an EPO event occurs and the uninterruptible power supply is not connected to at least one operational SAN Volume Controller the output cables of the uninterruptible power supply must be unplugged to remove output power from the uninterruptible power supply.

## Checking the safety labels on the SAN Volume Controller

The following topics describe how to check the labels on the SAN Volume Controller.

### Steps:

Perform the following label checks:

1. Agency/ratings label. See Figure 3 on page xvi.

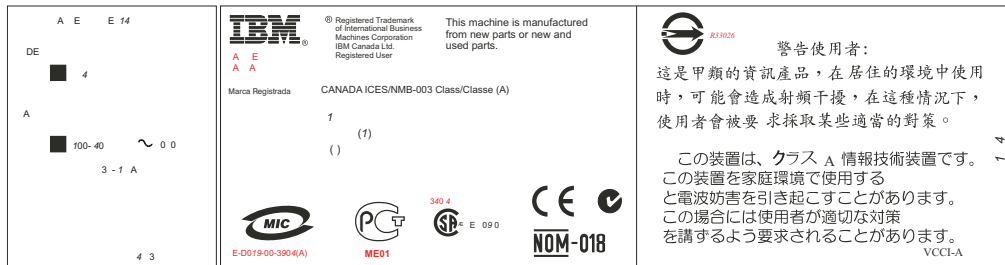


Figure 3. Agency/ratings label for SAN Volume Controller

2. No user access label. See Figure 4.



Figure 4. No user access label for SAN Volume Controller

3. Class 1 laser label. See Figure 5.

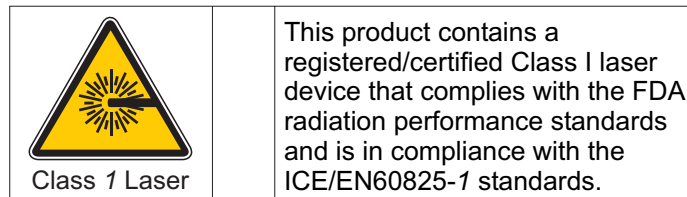


Figure 5. Class 1 laser label

## Checking the labels on the outside of the uninterruptible power supply

This topic tells you how to perform the safety label checks for the uninterruptible power supply.

### Steps:

Perform the following safety label checks for the uninterruptible power supply:

1. Agency label. See Figure 6 on page xvii.

EC: H63317  
 IBM Model: 2145UPS  
 P18P5864  
 SNYM1000YMDXXX [4.4]  
 Input ~ :  
 200-240V, 50/60Hz  
 16A MAX  
 Input --- : DC 120V, 30A  
 Output ~ :  
 200-240V, 50/60Hz  
 15A MAX  
 3000VA/2700W  
 Assembled in Mexico - TWWYY [4.7]



Figure 6. Agency label for the uninterruptible power supply

2. Rear panel configuration. See Figure 7 is installed on the cover of the power supply of the SAN Volume Controller.

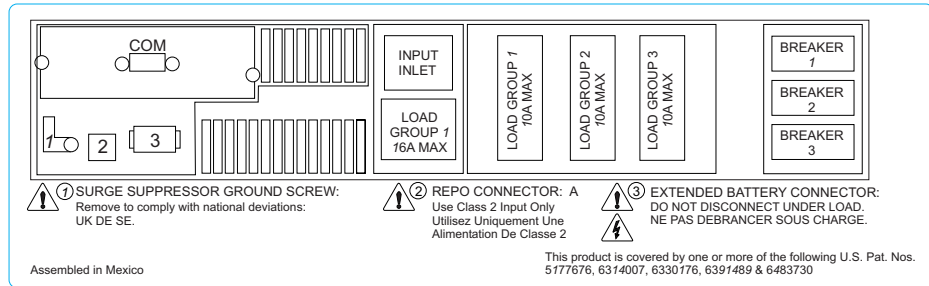


Figure 7. Rear panel configuration label

3. Three-man lift. See Figure 8.

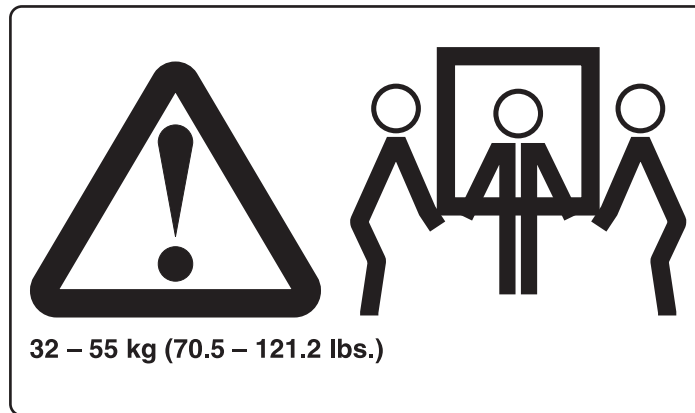


Figure 8. Three-man lift label

4. Weight label. See Figure 9 on page xviii.



Figure 9. Weight label for the uninterruptible power supply

5. IT compatible label. See Figure 10.

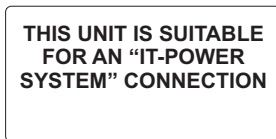


Figure 10. IT compatible label for the uninterruptible power supply

6. No user access label. See Figure 11.



Figure 11. No user access label for the uninterruptible power supply

## Environmental notices and statements

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

### Product recycling

This unit contains recyclable materials. These materials should be recycled where processing sites are available and according to local regulations. In some areas, IBM provides a product take-back program that ensures proper handling of the product. Contact your IBM representative for more information.

### Product disposal

This unit might contain batteries. Remove and discard these batteries, or recycle them, according to local regulations.

### Battery disposal

This topic identifies the precautions you need to take when disposing of batteries.

**CAUTION:**

A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery might present a risk of fire or explosion. The battery connector is polarized; do not attempt to reverse the polarity. Dispose of the battery according to local regulations. (51)

**Related topics:**

- “Definitions of notices” on page viii
- *IBM TotalStorage SAN Volume Controller: Translated Safety Notices*

## Handling static-sensitive devices

**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 its 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 anti-static bag, touch it to an unpainted metal part of the system unit for at least 2 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 handling devices during cold weather because heating reduces indoor humidity and increases static electricity.



---

## Chapter 1. SAN Volume Controller

The SAN Volume Controller is a SAN appliance that attaches open-systems storage devices to supported open-systems hosts. The IBM TotalStorage SAN Volume Controller provides symmetric virtualization by creating a pool of managed disks from the attached storage subsystems, which are then mapped to a set of virtual disks for use by attached host computer systems. System administrators can view and access a common pool of storage on the SAN, which enables them to use storage resources more efficiently and provides a common base for advanced functions.

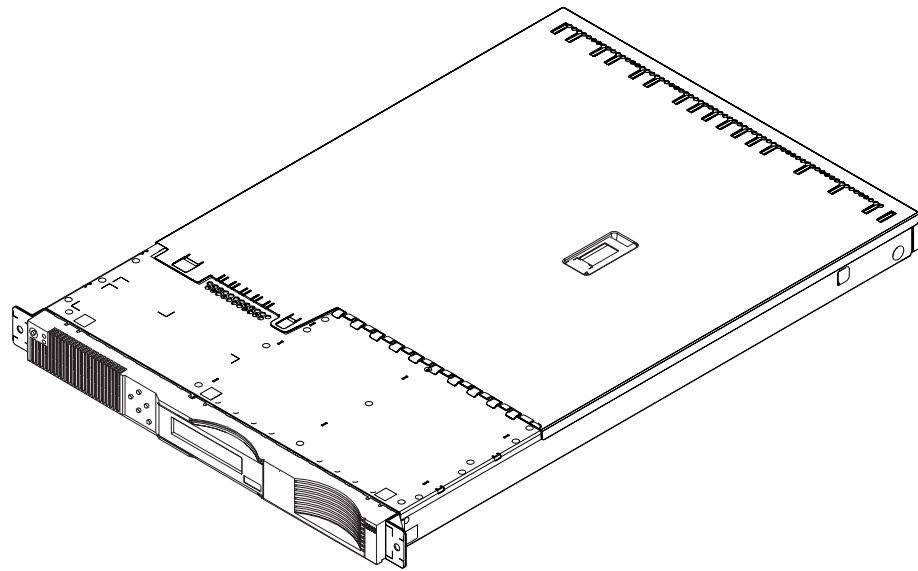


Figure 12. A SAN Volume Controller node

The SAN Volume Controller is analogous to a logical volume manager (LVM) on a SAN. It performs the following functions for the SAN storage that it is controlling:

- Creates a single pool of storage
- Manages logical volumes
- Provides advanced functions for the SAN, such as:
  - Large scalable cache
  - Copy services
    - FlashCopy® (point-in-time copy)
    - Remote Copy (synchronous copy)
  - Space management
    - Mapping that is based on desired performance characteristics
    - Quality of service metering

A *node* is a single storage engine. The storage engines are always installed in pairs with one or two pairs of nodes constituting a *cluster*. Each node in a pair is configured to back up the other. Each pair of nodes is known as an *I/O group*. All I/O operations handled by the nodes in an I/O group are cached on both nodes

for resilience. Each virtual volume is defined to an I/O group. To eliminate any single point of failure, each of the two nodes in the I/O group are protected by different uninterruptible power supplies.

The SAN Volume Controller I/O groups see the storage presented to the SAN by the back-end controllers as a number of disks known as *managed disks*. The application services do not see these managed disks. Instead they see a number of logical disks, known as *virtual disks*, that are presented to the SAN by the SAN Volume Controller. Each node must only be in one I/O group and provide access to the virtual disks in the I/O group.

The SAN Volume Controller helps to provide continuous operations and can also optimize the data path to ensure performance levels are maintained.

The fabric contains two distinct zones: a host zone and a disk zone. In the host zone, the host systems can identify and address the nodes. You can have more than one host zone. Generally, you will create one host zone per operating system type. In the disk zone, the nodes can identify the disk drives. Host systems cannot operate on the disk drives directly; all data transfer occurs through the nodes. As shown in Figure 13, several host systems can be connected to a SAN fabric. A cluster of SAN Volume Controllers is connected to the same fabric and presents virtual disks to the host systems. You configure these virtual disks using the disks located on the RAID controllers.

**Note:** You can have more than one host zone. Generally you create one host zone per operating system type because some operating systems will not tolerate other operating systems in the same zone.

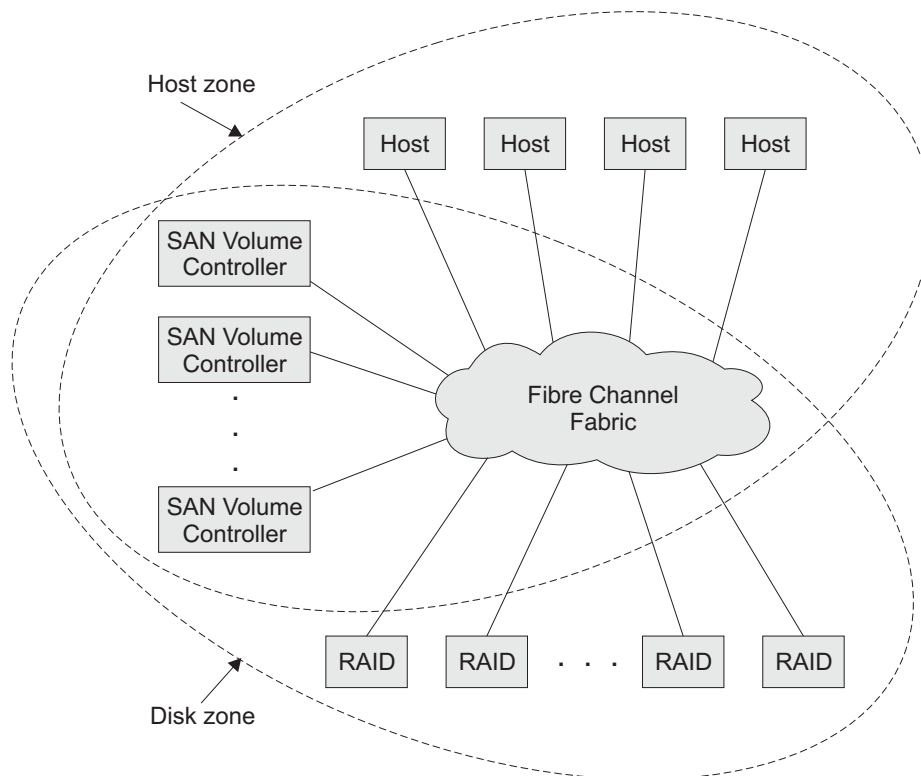


Figure 13. Example of a SAN Volume Controller in a fabric



You can remove one node in each I/O group from a cluster when hardware service or maintenance is required. After you remove the node, you can replace the field replaceable units (FRUs) in the node. All disk drive communication and communication between nodes is performed through the SAN. All SAN Volume Controller configuration and service commands are sent to the cluster through an Ethernet network.

Each node contains its own vital product data (VPD). Each cluster contains VPD that is common to all the nodes on the cluster, and any system connected to the Ethernet network can access this VPD.

Enclosure configuration information is stored on every node that is in the cluster to allow concurrent replacement of FRUs. An example of this information might be information that is displayed on the menu screen of the SAN Volume Controller. When a new FRU is installed and when the node is added back into the cluster, configuration information that is required by that node is ready from other nodes in the cluster.

**SAN Volume Controller operating environment:**

- Minimum of one pair of SAN Volume Controller nodes
- Two uninterruptible power supplies
- One master console is required per SAN installation for configuration

**Features of a SAN Volume Controller node:**

- 19-inch rack mounted enclosure
- 4 fibre channel ports
- 2 fibre channel adapters
- 4 GB cache memory

**Supported hosts:**

For a list of supported operating systems, see the IBM TotalStorage SAN Volume Controller Web site at <http://www.ibm.com/storage/support/2145/> and click

**Supported software levels.**

**Multipathing software:**

- IBM Subsystem Device Driver (SDD)
- Redundant Dual Active Controller (RDAC)

**Note:** The multipath drivers, SDD and RDAC, can coexist on a host for certain operating systems.

Check the following Web site for the latest support and coexistence information:

<http://www.ibm.com/storage/support/2145>

**User interfaces:**

The SAN Volume Controller provides the following user interfaces:

- IBM TotalStorage SAN Volume Controller Console, a Web-accessible graphical user interface (GUI) that supports flexible and rapid access to storage management information
- A command-line interface (CLI) using Secure Shell (SSH)

## Application programming interfaces:

The SAN Volume Controller provides the following application programming interface:

- IBM TotalStorage Common Information Model (CIM) Agent for the SAN Volume Controller, which supports the Storage Management Initiative Specification of the Storage Network Industry Association.

---

## Controls and indicators for the SAN Volume Controller

All the controls for the SAN Volume Controller are located on the front panel (see Figure 14).

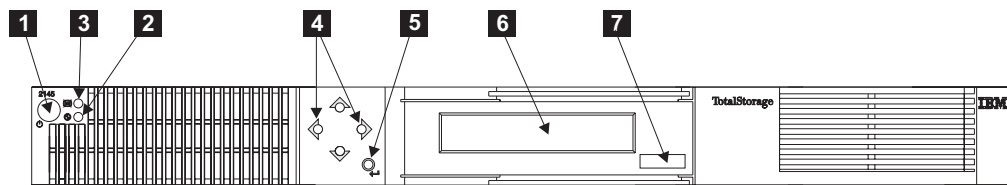


Figure 14. SAN Volume Controller front panel assembly

- 1** Power button
- 2** Power LED
- 3** Check LED
- 4** Navigation buttons
- 5** Select button
- 6** Front panel display
- 7** Node identification label

### Related topics:

- “Node identification label” on page 6
- “Power button”
- “Power LED” on page 5
- “Check LED” on page 5
- “Navigation buttons” on page 5
- “Select button” on page 5
- “Front panel display” on page 5

## Power button

The power button **1** switches the main power to the SAN Volume Controller on or off.

To turn on the power, press and release the power button.

To turn off the power, press and release the power button.

**Attention:** If a SAN Volume Controller is powered off for more than five minutes and it is the only SAN Volume Controller connected to an uninterruptible power supply, the uninterruptible power supply will also power off. To power on the SAN Volume Controller you must first power on its uninterruptible power supply.

**Related topics:**

- “Controls and indicators for the SAN Volume Controller” on page 4

## Power LED

The green power LED **2** indicates the power status of the SAN Volume Controller:

**Properties:**

**Off** One or more output voltages from the power supply are not present.

**On** All the output voltages from the power supply are present.

**Blinking**

The service controller, which provides the graphics and text for the front panel display, is in standby mode. (The rate of blinking is 0.5 seconds on, 0.5 seconds off.)

**Related topics:**

- “Controls and indicators for the SAN Volume Controller” on page 4

## Check LED

The amber check LED **3** comes on continuously if a critical failure occurs in the service controller. If the check LED is off and the power LED is on, the service controller is working correctly.

The amber check LED also comes on while the service controller code is being re-programmed. For example, when the SAN Volume Controller cluster code is being upgraded, it is normal for the check LED to come on.

**Related topics:**

- “Controls and indicators for the SAN Volume Controller” on page 4

## Navigation buttons

Four navigational buttons **4** are provided. They are arranged in a circle. You press these directional buttons to move through the menu options. For example, to move up, press the top button in the circle; to move right, press the right button in the circle. The fifth button, which is outside the circle, is the select button.

**Related topics:**

- “Controls and indicators for the SAN Volume Controller” on page 4

## Select button

The select button **5** enables you to select an item from a menu.

**Related topics:**

- “Controls and indicators for the SAN Volume Controller” on page 4

## Front panel display

The front panel display **6** shows service, configuration, and navigation information. The information is available in several national languages. The display can show both alphanumeric information and graphical information (progress bars). The front panel displays configuration and service information about the

SAN Volume Controller and the SAN Volume Controller cluster. The information you see can be one of the following items:

- Hardware boot
- Node rescue request
- Boot progress
- Boot failed
- Powering off
- Restarting
- Shutting down
- Power failure
- Error codes

**Related topics:**

- “Controls and indicators for the SAN Volume Controller” on page 4

## Node identification label

The node identification label **7** is a six-digit node identification number that is printed on a label on the front panel. This number is the same as the six-digit number used in the `addnode` command, is readable by system software, and is used by configuration and service software as a node identifier. The node identifier can also be displayed on the front panel display when node is selected from the menu.

If the front panel is replaced the configuration and service software will display the number that is printed on the front of the replacement panel. Future error reports will also contain the new number. No cluster reconfiguration is necessary when the front panel is replaced.

The node also contains a SAN Volume Controller product serial number that is imbedded on the system board hardware. 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.

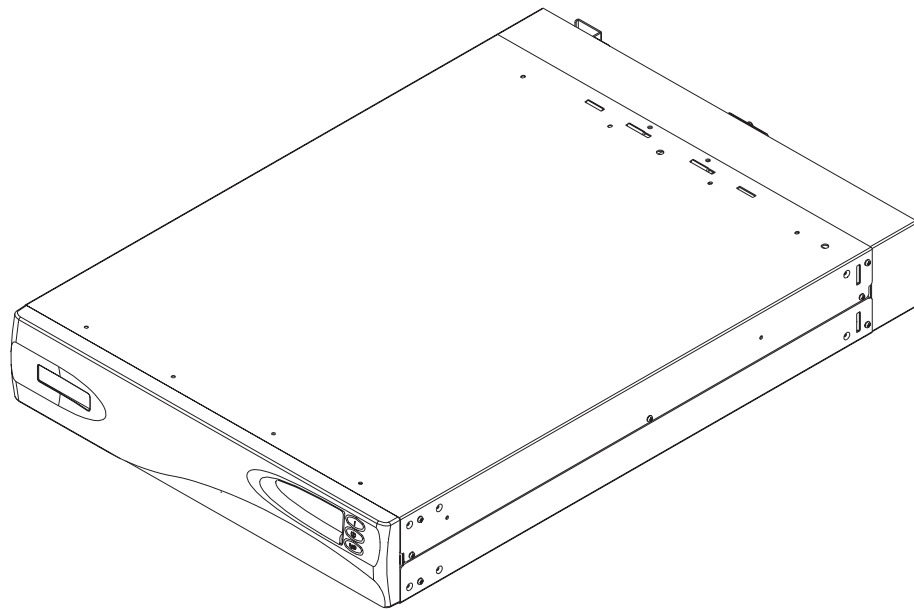
**Related topics:**

- “Controls and indicators for the SAN Volume Controller” on page 4

---

## Chapter 2. Uninterruptible power supply overview

The uninterruptible power supply provides the SAN Volume Controller with a secondary power source to be used if you lose power from your primary power source due to power failures, power sags, power surges, or line noise. If a power outage occurs, the uninterruptible power supply will maintain power long enough to save any configuration and cache data contained in the dynamic random access memory (DRAM). The data will be saved to the SAN Volume Controller internal disk.



*Figure 15. Uninterruptible power supply*

**Note:** The SAN Volume Controller uninterruptible power supply is an integral part of the SAN Volume Controller solution, and maintains continuous SAN Volume Controller-specific communications with its attached SAN Volume Controller nodes. The SAN Volume Controller uninterruptible power supply must be used in accordance with documented guidelines and procedures and must not be used for any other purpose.

To provide full redundancy and concurrent maintenance, SAN Volume Controllers must be installed in pairs. Each SAN Volume Controller of a pair must be connected to a different uninterruptible power supply. Each uninterruptible power supply can support up to two SAN Volume Controller nodes. It is also recommended that you connect the two uninterruptible power supply units for the pair to different independent electrical power sources. This reduces the chance of an input power failure at both uninterruptible power supply units.

**Attention:**

1. Do not connect the uninterruptible power supplies to an input power source that does not conform to standards. Review the requirements for uninterruptible power supplies.
2. Each uninterruptible power supply pair must power only one SAN Volume Controller cluster.

Each uninterruptible power supply includes power (line) cords that will connect the uninterruptible power supply to either a rack power distribution unit (PDU), if one exists, or to an external power source. Each uninterruptible power supply power input requires the protection of a UL approved (or equivalent) 250 volt, 15 amp circuit breaker.

The uninterruptible power supply is connected to the SAN Volume Controllers 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 cables enable the SAN Volume Controllers to read status and identification information from the uninterruptible power supply.

Each SAN Volume Controller monitors the operational state of the uninterruptible power supply to which it is attached. If the uninterruptible power supply reports a loss of input power, the SAN Volume Controller stops all I/O operations and dumps the contents of its DRAM to the internal disk drive. When input power to the uninterruptible power supply is restored, the SAN Volume Controllers restart and restore the original contents of the DRAM from the data saved on the disk drive.

A SAN Volume Controller is not fully operational until the uninterruptible power supply battery charge state indicates that it has sufficient capacity to power the SAN Volume Controller for long enough to permit it to save all its memory to the disk drive in the event of a power loss. The uninterruptible power supply has sufficient capacity to save all the data on the SAN Volume Controller at least twice. For a fully-charged uninterruptible power supply, even after battery capacity has been used to power the SAN Volume Controllers while they save DRAM data, sufficient battery capacity will remain to let the SAN Volume Controllers become fully operational as soon as input power is restored.

**Note:** Under normal circumstances, if input power is disconnected from the uninterruptible power supply, the SAN Volume Controller(s) connected to that uninterruptible power supply will perform a power down sequence. This operation, which saves the configuration and cache data to an internal disk in the SAN Volume Controller, typically takes about 3 minutes, at which time power is removed from the output of the uninterruptible power supply. In the event of a delay in the completion of the power down sequence, the uninterruptible power supply output power will be removed 5 minutes after the time that power was disconnected to the uninterruptible power supply. Since this operation is controlled by the SAN Volume Controller, an uninterruptible power supply that is not connected to an active SAN Volume Controller will not shut off within the 5 minute required period. In the case of an emergency, you will need to manually shut down the uninterruptible power supply by pushing the uninterruptible power supply power off button.

**Attention:** Data integrity could be compromised by pushing the uninterruptible power supply power off button. Never shut down an uninterruptible power supply without first shutting down the SAN Volume Controller nodes that it supports.

It is very important that the two nodes in the I/O group are connected to a different uninterruptible power supply. This configuration ensures that the cache and cluster state information is protected against the failure of the uninterruptible power supply or of the mainline power source.

When nodes are added to the cluster, you must specify the I/O group they will join. The configuration interfaces will also check the uninterruptible power supply units and ensure that the two nodes in the I/O group are not connected to the same uninterruptible power supply units.

The following figure shows a cluster of four nodes, with two I/O groups and two uninterruptible power supply units.

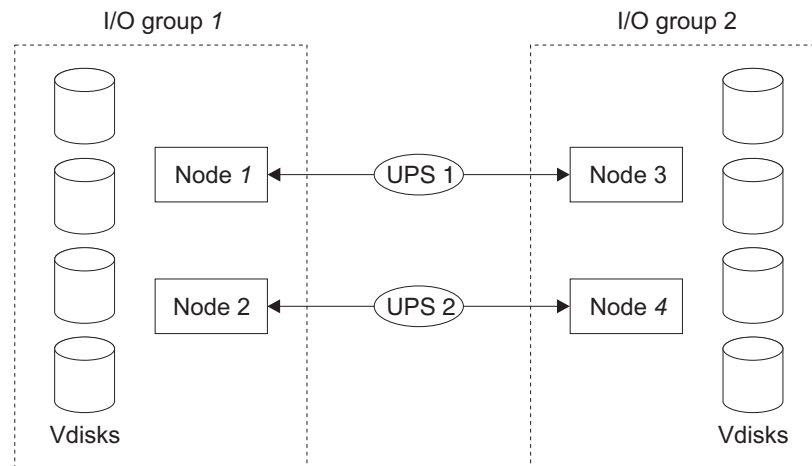


Figure 16. I/O groups and uninterruptible power supply relationship

**Related topics:**

- “Uninterruptible power supply requirements” on page xv

## Controls and indicators for the uninterruptible power supply

All the controls for the uninterruptible power supply are contained on the front panel assembly. See Figure 17.

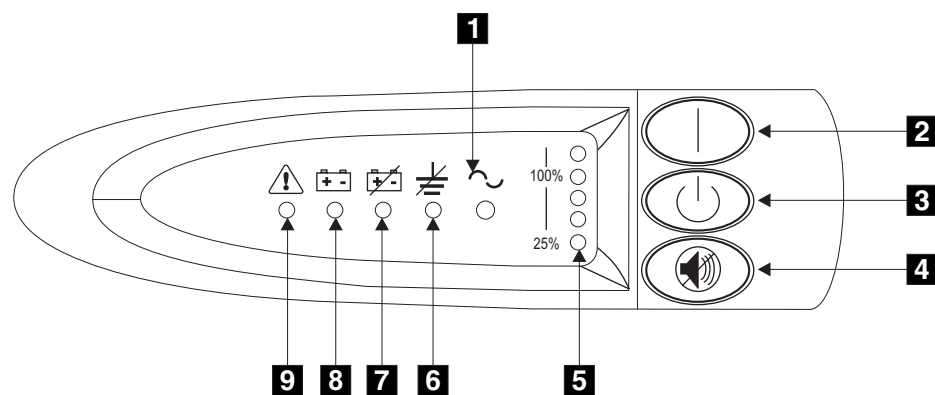


Figure 17. Uninterruptible power supply front panel assembly

- 1** Mode indicator
- 2** On button
- 3** Off button
- 4** Test and alarm reset button
- 5** Load-level indicators

- 6 Site wiring fault indicators
- 7 Battery service indicator
- 8 Battery mode indicator
- 9 General alarm indicator

**Related topics:**

- “On button”
- “Off button” on page 11
- “Test and alarm reset button” on page 11
- “Load-level indicators” on page 11
- “Site wiring fault indicators” on page 11
- “Battery service indicator” on page 11
- “Battery mode indicator” on page 12
- “General alarm indicator” on page 12

## Mode indicator

The mode indicator **1** shows the mode of the uninterruptible power supply.

When the mode indicator is steady green, the uninterruptible power supply is in normal mode. The uninterruptible power supply checks and charges its battery as necessary.

When the mode indicator is flashing green, the uninterruptible power supply is in standby mode. Standby mode means that the uninterruptible power supply is turned off, but is still connected to the main power source. No power is available from the uninterruptible power supply output sockets.

When the mode indicator is steady red, the uninterruptible power supply is in bypass mode because of one of the following conditions:

- The uninterruptible power supply has overheated
- The uninterruptible power supply has an overload condition of 103% through 110% for 30 seconds
- The uninterruptible power supply detects a fault in the battery or in the uninterruptible power supply electronics assembly

When the mode indicator is flashing red and the alarm is sounding, the voltage range alarm setting might not be correct. When a SAN Volume Controller is connected to the uninterruptible power supply, the SAN Volume Controller automatically adjusts the voltage range settings. 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 uninterruptible power supply and powered on.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## On button

Use the on button **2** to turn on the main power to the uninterruptible power supply.



To turn on the power, press and hold the on button until you hear a beep (approximately one second). The mode indicator stops flashing, and the load-level indicators **5** display the percentage of load that is being applied to the uninterruptible power supply.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## Off button

Use the off button **3** to turn off the main power to the uninterruptible power supply.

**Attention:** Never use the off button unless you are specifically directed to in the instructions that are given in the publications for the SAN Volume Controller. If you press it at any other time, you might lose data in the cluster if the other uninterruptible power supply fails.

To turn off the power, press and hold the off button until the long beep stops (approximately five seconds). The mode indicator starts to flash, and the uninterruptible power supply remains in standby mode until you disconnect the uninterruptible power supply from the main power outlet.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## Test and alarm reset button

Use the test and alarm reset button **4** to start the self-test. To start the self-test, press and hold the button for three seconds. This button also resets the alarm.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## Load-level indicators

The load-level indicators **5** show the percentage of uninterruptible power supply capacity that the SAN Volume Controller are using. When all the indicators are lit, the power requirements of the SAN Volume Controller have exceeded the capacity of the uninterruptible power supply.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## Site wiring fault indicators

The site wiring fault indicator **6** shows that either a ground wire connection does not exist or the live and neutral wires are reversed in the input power connection.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## Battery service indicator

The battery service indicator **7** shows that the charge in the battery has become low while the uninterruptible power supply is in battery mode. The alarm continues to beep once every five seconds. The application programs immediately

complete and save the work to prevent loss of data. If the uninterruptible power supply shuts down, it automatically restarts when the main power returns.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## **Battery mode indicator**

The battery mode indicator **8** shows that the uninterruptible power supply is operating in battery mode. It comes on when the main power source fails and the uninterruptible power supply is running on battery power. The alarm beeps once every five seconds. When main power returns, the uninterruptible power supply returns to normal mode, and the battery recharges. The battery mode indicator goes out, and the alarm stops.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

## **General alarm indicator**

The general alarm indicator **9**, when accompanied by the audio alarm beeping every 5 seconds, shows that the battery is low. When accompanied by a continuous audio alarm, it shows that the internal temperature of the uninterruptible power supply is too high, or there has been a momentary output overload.

**Related topics:**

- “Controls and indicators for the uninterruptible power supply” on page 9

---

## Chapter 3. Master console

This topic provides an overview of the master console.

The SAN Volume Controller provides a master console that is used as a single platform to configure, manage, and service software required to manage the SAN Volume Controller.

The master console allows system administrators to rapidly integrate the virtualization controller into their environment. The master console monitors the configuration of the whole system and all of the internal components. It offers a standard and central location for all aspects of the operation, including SAN topology rendering, SNMP trap management, Call Home (Service Alert) and Remote Service facilities, as well as all the configuration and diagnostic utilities for the components.

**Note:** VPN connection is required for Remote Service facilities.

The master console provides the following functions:

- Browser support for:
  - SAN Volume Controller Console
  - Fibre channel switch
- CLI configuration support using Secure Shell (SSH)
- SAN Topology rendering using Tivoli<sup>®</sup> SAN Manager
- Remote Service capability through VPN
- IBM Director
  - SNMP Trap management
  - Call Home (Service Alert) capability
  - E-mail notification to the customer, for example, to the System Administrator

**Related topics:**

- “Installing the master console” on page 24



---

## Chapter 4. Installing the uninterruptible power supply, the master console, and the SAN Volume Controller

This chapter describes the steps that you need to perform to install the SAN Volume Controller and the uninterruptible power supply including the following:

1. Preparing for the installation
2. Installing the support rails for the uninterruptible power supply
3. Installing the uninterruptible power supply
4. Installing the master console
5. Installing the support rails for the SAN Volume Controller
6. Installing the SAN Volume Controller into the rack
7. Connecting the SAN Volume Controller to the uninterruptible power supply

**Attention:** Before you begin the installation, ensure that the customer has completed the planning table for the hardware that you are about to install. If you are connecting cables to switches that are currently in use, confirm with the customer that it is safe for you to proceed. Go no further with these instructions until you are satisfied that all the information is correct and valid.

### Related topics:

- *IBM TotalStorage SAN Volume Controller: Planning Guide*

---

## Preparing for installation

Before you start to install the uninterruptible power supply and the SAN Volume Controller, ensure that you have everything that you need, including the customer completed planning tables and charts provided in the *IBM TotalStorage SAN Volume Controller: Planning Guide*. These tables include the location of hardware, cable connection, and configuration data information that you will need to complete the installation procedures.

### Steps:

Perform the following steps:

1. Check all the parts and quantities against the items shown in the following figure. If any item is missing, contact your marketing representative.

- |  |  |
|--|--|
| <b>1</b> SAN Volume Controller                   | <b>4</b> Uninterruptible power supply rail kit |
| <b>2</b> SAN Volume Controller support rails (2) | <b>5</b> Power and signal cable                |
| <b>3</b> Uninterruptible power supply (2)        |  |

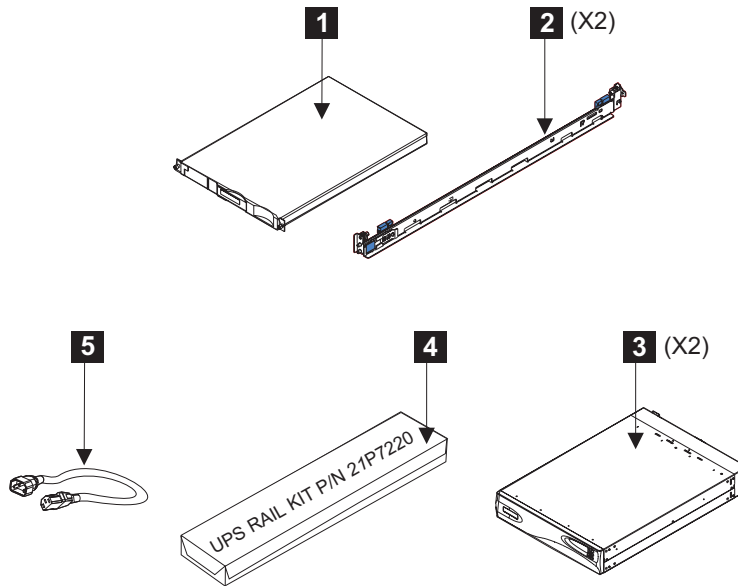


Figure 18. Items for installation into a rack

2. If you are installing uninterruptible power supplies, read through the safety and environmental notices.

**Note:** If you are installing the SAN Volume Controller into a rack that already contains other SAN Volume Controller and uninterruptible power supplies, the installed uninterruptible power supplies might have spare capacity. If the customer intends to use that spare capacity, the SAN Volume Controller that you are going to install might have been delivered without uninterruptible power supplies.

**Related topics:**

- *IBM TotalStorage SAN Volume Controller: Planning Guide*
- “Installing the support rails for the uninterruptible power supply”
- “Installing the support rails and the SAN Volume Controller into a rack” on page 26

---

## Installing the support rails for the uninterruptible power supply

Before you can install the uninterruptible power supply, you must install the support rails into the rack.

**Note:** If you are installing the SAN Volume Controller into a rack that already contains other SAN Volume Controllers and uninterruptible power supply, the installed uninterruptible power supply might have spare capacity. If the customer intends to use that spare capacity, the SAN Volume Controllers that you are going to install might have been delivered without uninterruptible power supply.

**Steps:**

Perform the following steps to install the support rails for the uninterruptible power supply:

1. Refer to the customer's hardware location table to find out where in the rack the uninterruptible power supplies are to be installed.
2. Discard the two handles and their associated nuts that are shipped with the support rails for the uninterruptible power supply.
3. At the back of the rack, observe the Electrical Industries Association (EIA) positions, and determine where you are going to install the uninterruptible power supply (see Figure 19). An uninterruptible power supply must always be installed into the lowest available position in the rack. The only device that can be below a uninterruptible power supply is another uninterruptible power supply.

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

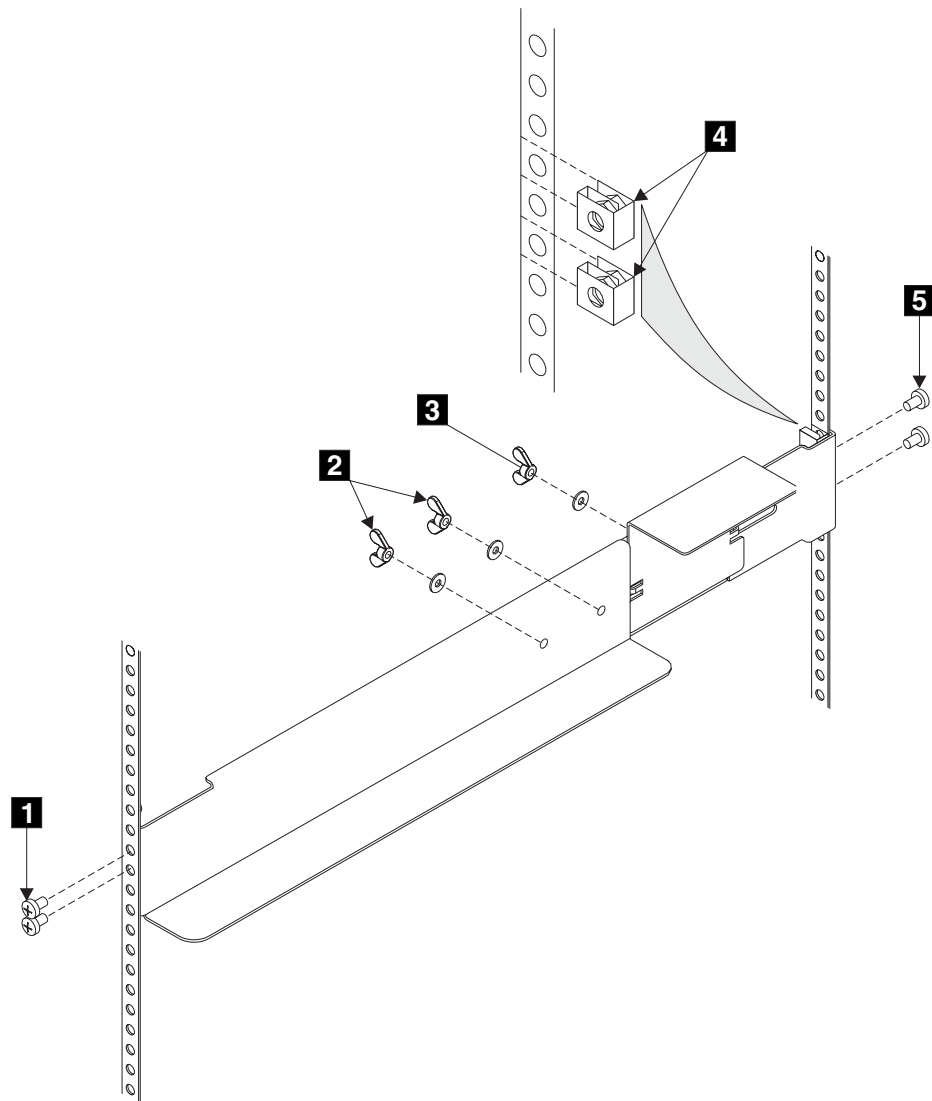


Figure 19. Installing support rails for a uninterruptible power supply into the rack

**Attention:** To tighten wing nuts **2** and **3** you will require access from above the rails. Ensure that the support rails are installed before anything is installed in the 8 EIA units above the rails. If any pre-existing devices have been installed in that space it might be necessary to remove those devices before installing the rails.

4. Perform the following steps for each rail:
  - a. Attach nut clips **4** to the rack. These nut clips must align with the second and fourth holes of the support rail flange.
  - b. Loosen the two wing nuts **2**.
  - c. Loosen the wing nut **3** and slide the bracket toward the back of the rail.
  - d. Remain at the back of the rack, hold the support rail in position in the rack, then install and fully tighten the two mounting screws **5**.
  - e. Go to the front of the rack.
  - f. Extend the support rail toward the front of the rack.

**Note:** Hold the support rail in position until you have completed step 4h.

- g. Ensure that the support rail is horizontal (a level might be useful here).
- h. Install the two mounting screws **1** into the third and fourth holes of the support rail flange. Fully tighten the screws.
- i. Fully tighten the two wing nuts **2**.
- j. Loosen the wing nut **3** and slide the bracket toward the front of the rail, as far as it will go, with the front edge of the bracket against the back end of the front support rail. Fully tighten the wing nut **3**.

---

## Installing the uninterruptible power supply into the rack

After you have completed the preparation procedures for installing the uninterruptible power supply into the rack, you are ready to install the uninterruptible power supply into the rack.

### Prerequisites:

Ensure that you have completed the following:

- The pre-installation procedures
- Installing the support rails for the uninterruptible power supply
- Preparing your uninterruptible power supply environment

**Attention:** Before you begin to install the uninterruptible power supply, read through the safety and environmental notices.

### Steps:

Perform the following steps to install the uninterruptible power supply into the rack:

1. **CAUTION:**

**The uninterruptible power supply weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:**

- **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**



- **Remove the battery assembly from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton.**
- **Do not attempt to install the uninterruptible power supply into the rack unless the electronics assembly and the battery assembly have been removed.**

The weight of the uninterruptible power supply must be reduced by removing the battery assembly before removing it from the shipping carton. Perform the following steps to remove the battery assembly:

- a. Open the top of the uninterruptible power supply shipping carton; and then, with the assistance of another service representative, grip the flaps on either side of the uninterruptible power supply.



*Figure 20. Opening the top of the uninterruptible power supply shipping carton*

- b. Slide the uninterruptible power supply to the end of the carton and rest its front edge of the edge of the carton as shown.



Figure 21. Sliding the uninterruptible power supply to the end of the carton

- c. Remove the two bolts **1** and additional nut **2** on the left side of the bracket and remove the battery retaining bracket **3**.

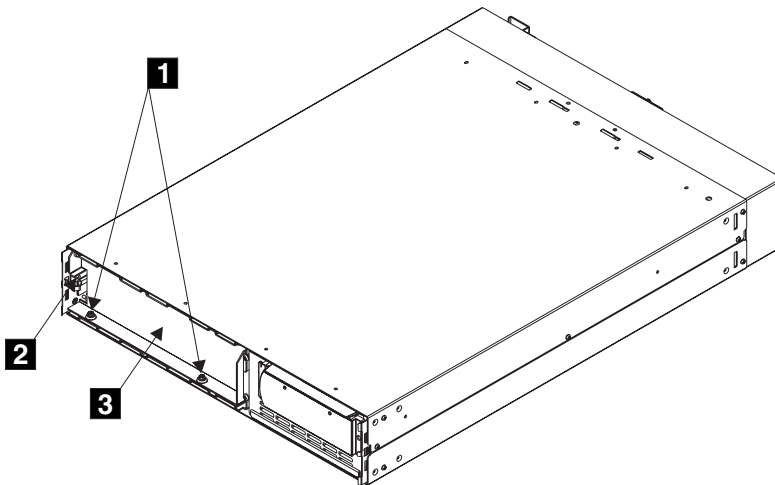


Figure 22. Removing the battery retaining bracket

- d. Grip the tab on the front of the battery and pull the battery forward until it can be accessed by two service representatives.
- e. With the assistance of another service representative lift the battery assembly clear of the uninterruptible power supply and place to one side.

**Note:** The cover for the uninterruptible power supply is not installed, however, it is included in the box with the uninterruptible power supply. Install the front cover after you have completed the other installation steps.

2. With the assistance of another service representative, lift the uninterruptible power supply clear of the shipping carton and place it on a flat, stable surface.
3. Remove the two screws **1**, (see Figure 23 on page 21).

**CAUTION:**

The electronics assembly weighs 6.4 kg (14 lb). Take care when you remove it from the uninterruptible power supply.

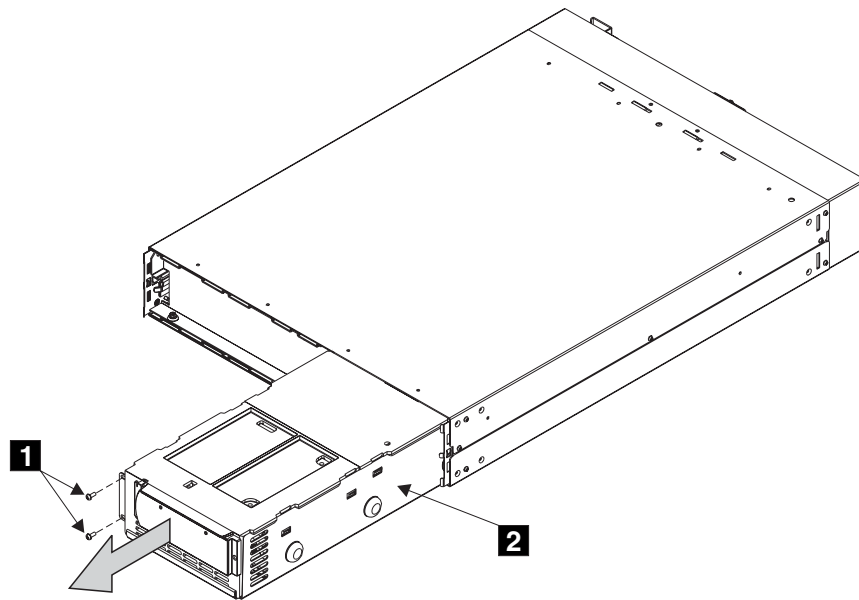


Figure 23. Removing the uninterruptible power supply electronics assembly

4. Pull the electronics assembly **2** out of the uninterruptible power supply, and put it to one side.
5. Stand at the front of the rack and, with aid from another service representative, place the back of the uninterruptible power supply onto the support rails, then slide the uninterruptible power supply into the rack.
6. Install the front flathead screws **1** (see Figure 24 on page 22).

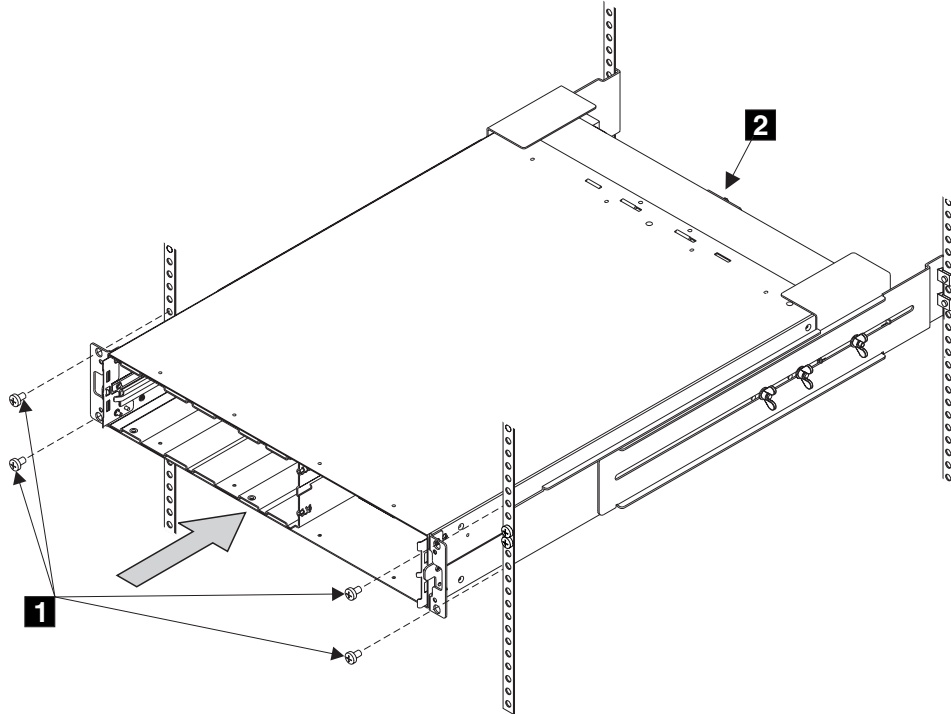


Figure 24. Installing the uninterruptible power supply into a rack

7. With aid from another service representative, reinstall the following parts:
  - a. Battery assembly
  - b. Battery retaining bracket
  - c. Electronics assembly

**Attention:** A grounding screw feature **2** is provided on the back of the uninterruptible power supply so that you can attach a ground bonding wire if required by local wiring codes. Since safety earthing of the uninterruptible power supply chassis is maintained through the input line power cord, you are usually not required to use this additional grounding screw feature.

8. At the back of the uninterruptible power supply, plug the uninterruptible power supply main power cable into the power socket **1** (see Figure 25).

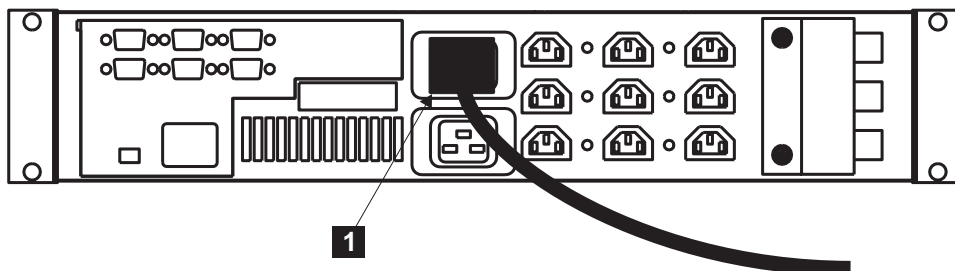


Figure 25. Installing the uninterruptible power supply power cable

9. **Attention:** If possible, ensure that the two uninterruptible power supplies are not both connected to the same power source. Plug the uninterruptible power supply main cable into the main power source.

**Attention:** Ensure that you comply with the following requirements for uninterruptible power supplies:

- Each uninterruptible power supply should be connected to a separate branch circuit.
- A UL listed 15 A circuit breaker must be installed in each branch circuit that supplies power to the uninterruptible power supply.
- If a rack power distribution unit is used, each uninterruptible power supply must be connected to a separate power distribution unit.
- The voltage supplied to the uninterruptible power supply must be 200–240 V single phase.
- The frequency supplied must be between 50 and 60 Hz.

**Note:** If the uninterruptible power supply is cascaded from another uninterruptible power supply, the source uninterruptible power supply must have at least 3 times the capacity per phase and the total harmonic distortion must be less than 5% with any single harmonic being less than 1%. The uninterruptible power supply also should have input voltage capture that has a slew rate faster than 3 Hz per second and 1 msec glitch rejection.

10. All front panel indicators of the uninterruptible power supply flash for a short time while the uninterruptible power supply runs a self test. When the test is complete, the mode indicator **1** flashes to show that the uninterruptible power supply is in standby mode (see Figure 26).

Press and hold the uninterruptible power supply on switch **2** until you hear the uninterruptible power supply beep (approximately one second). The mode indicator stops flashing and the load level indicators display the percentage of load that is being supplied by the uninterruptible power supply. The uninterruptible power supply is now in normal mode, and is charging its battery.

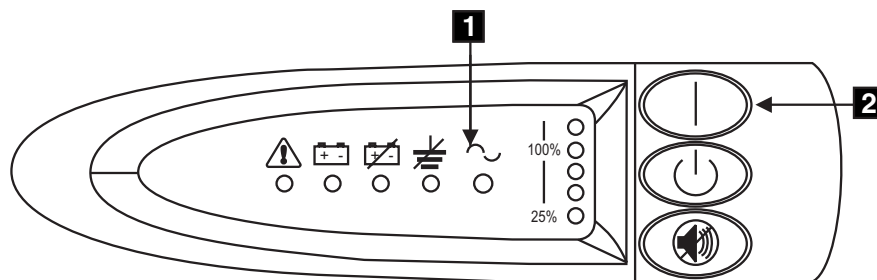


Figure 26. Power switch and indicators of the uninterruptible power supply

If the mode indicator is flashing red and the alarm is sounding, the voltage range alarm setting might not be correct. When a SAN Volume Controller is connected to the uninterruptible power supply, the SAN Volume Controller automatically adjusts the voltage range settings. 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 uninterruptible power supply and powered on.

11. Repeat this entire procedure to install the other uninterruptible power supply.

**Attention:** The uninterruptible power supply 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 uninterruptible power supply or the SAN Volume Controller cluster will malfunction.

**Related topics:**

- “Installing the uninterruptible power supply into the rack” on page 18
- “Installing the support rails for the uninterruptible power supply” on page 16
- “Preparing your uninterruptible power supply environment” on page 48

---

## Installing the master console

This section provides information on how to install the master console with the SAN Volume Controller. To install the master console into the rack, follow the instructions provided in your *xSeries® Installation Guide* plus those provided with the mounting rails.

This section provides information on how to install the master console with the SAN Volume Controller.

**Important:** Do not perform any of the software instructions; all of the required software is pre-installed on the master console.

**Prerequisites:**

**Attention:** Before you begin the installation, ensure that you review and complete all of the safety checks detailed in the documentation for the master console, the keyboard, and the display.

Ensure that the customer has all of the information needed prior to installation. Refer to the *IBM TotalStorage SAN Volume Controller: Planning Guide*, which provides the hardware location chart, the cable connection table, and the configuration data table for the customer to complete prior to installation.

**Steps:**

To complete the installation of the master console, perform the following steps:

1. Ensure that no cables are connected to the Ethernet ports.
2. Connect a fibre channel cable from one port on the fibre channel host bus adapter (HBA) to the other port to allow for a loopback data test to check that the fibre channel HBA is operational.
3. Turn on the master console.
4. When the following message displays, immediately press Ctrl-Q to display a list of I/O address:

```
Qlogic Corporation
Q123XX PCI Fibre Channel ROM BIOS version X
Copyright (C) Qlogic Corporation 1993 2002 all rights reserved
www.qlogic.com
Press <Ctrl-Q> for Fast!UTIL
```

**Note:** This message displays for only a few seconds and you must press Ctrl-Q while it displays.

5. Select one of the I/O address and press Enter.
6. A Fast!UTIL Option list is displayed.

7. Select the Loopback data test option and press Enter.
8. Select the Continue with loopback data test option and press Enter. One of the following messages is displayed:
  - Loopback Data Test failed

If this message is displayed, either try a different fibre channel cable or replace the fibre channel HBA to correct this problem.

- Press any key to stop the Loopback Data Test
  - Press Enter twice to get back to the Fast!UTIL Option List
  - Select Exit Fast!UTIL
9. Remove the fibre channel cable that you installed between the two ports on the fibre channel HBA.
  10. Restart the machine to start the Windows® operating system:
    - a. Enter administrator in the User ID field.
    - b. Enter password in the password field; this password applies to all required password fields.
    - c. The master console continues booting.

**Note:** This process can take several minutes before all services are started and operations are completely responsive.

11. Refer to the *IBM TotalStorage SAN Volume Controller: Planning Guide* for the customer-completed configuration data table and connect the fibre-channel cables from the master console as specified in that table.

**Note:** You will also use the configuration data table for steps 12 and 13.

12. To enter the master console IP address provided by the customer, complete the following steps:
  - a. Right-click the My Network Places icon and select Properties
  - b. Right-click the Local Area Connection 2 option and select Properties.
  - c. Select Internet Protocol (TCP/IP) and select Properties
  - d. Enter all required information for the IP and DNS addresses.
  - e. Connect Ethernet port-2 to the users network.
13. To enter the master console name provided by the customer, complete the following steps:
  - a. Right-click the My Computer icon and select Properties.
  - b. Select the Network Identification tab and select Properties.
  - c. Enter the master console name.
  - d. Select the More button.
  - e. Enter the full path information in the Primary DNS suffix of this computer field.
  - f. If the customer needs Remote Support, perform step 12 again for Local Area Connection and connect an Ethernet cable from Ethernet port 1 on the master console to the designated connection (for example, Firewall DMZ Port). For more information on configuring a Remote Support, go to the following Web site and select the Enhanced Remote Support topic:

[www.ibm.com/storage/support/2145](http://www.ibm.com/storage/support/2145)

- g. Restart the master console.
14. Attach a RID tag to the master console using machine type **2145** and the serial number of the SAN Volume Controller that is being installed with the master console.

15. **IMPORTANT:** This step must be the last step you perform on the master console before handing over the machine; it sets up the master console to present a Windows license agreement screen at the next power on and then shuts down the master console.
  - a. Select Start → Run
  - b. Enter `c:\sysprep\sysprep.exe`
  - c. Click **OK**.

**Note:** It is important that you do this step; otherwise, the customer will not be presented with the choice to accept or decline Windows registration conditions.

**Related topics:**

- *IBM TotalStorage SAN Volume Controller: Planning Guide*

---

## Installing the support rails and the SAN Volume Controller into a rack

This topic and its subtopics provides information about installing the support rails for the SAN Volume Controller and installing the SAN Volume Controller into a rack.

### Installing the support rails for the SAN Volume Controller

The following task describes how to install the support rails for the SAN Volume Controller.

**Steps:**

Perform the following steps to install the support rails for the SAN Volume Controller:

1. Refer to the customer's hardware location table to find out where in the rack the SAN Volume Controller is to be installed.
2. Refer to the EIA markings on the rack and decide where you are going to install the support rails.
3. 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.
4. Put your finger against the side of the latch lever **1**, and put your thumb against the front of the latch lock **2** (see Figure 27 on page 27).



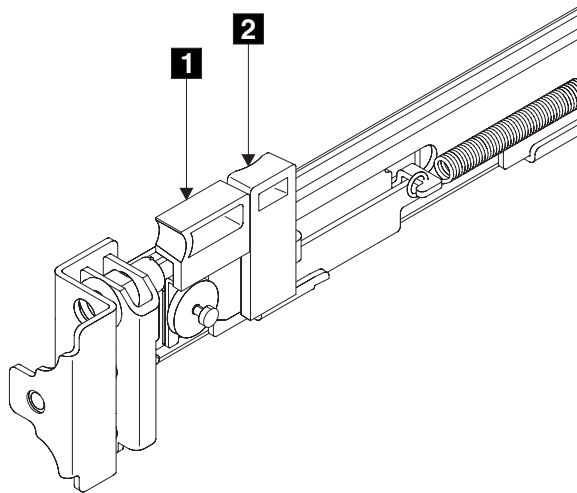


Figure 27. Retracting the latch lock carrier

5. Gently push the latch lock **2** (Figure 28 ) away from the rail as you move the latch lever **1** towards the far end of the rail. The latch-lock carrier assembly slides against the spring tension.

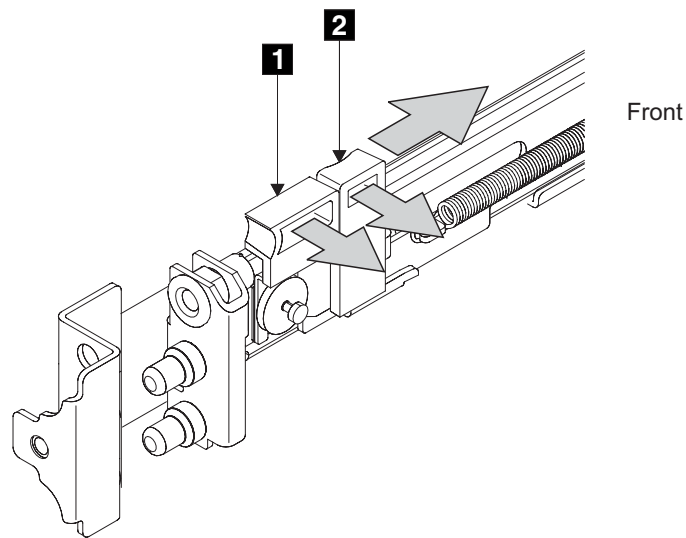


Figure 28. Opening the front latch-lock carrier assembly

6. 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.
7. Push the back rail bracket **1** (Figure 29 on page 28) toward the front of the rail until it stops. The rail is now at its shortest adjustment.

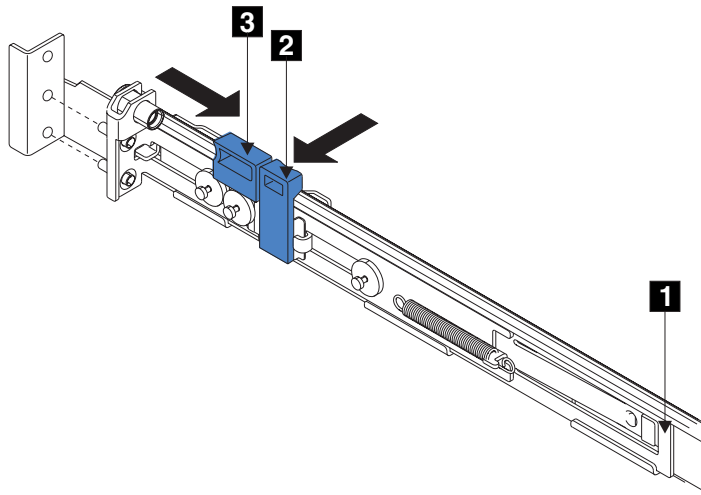


Figure 29. Opening the back latch-lock carrier assembly

8. Put your index finger against the side of the latch lever **3**, and your thumb against the front of the latch lock **2**.
9. Gently push the latch lock **2** away from the rail as you move the latch-lever **3** towards the front of the rail. The latch-lock carrier assembly slides against the spring tension.
10. Release the latch lock and continue to slide the latch-lock carrier for approximately 13 mm (0.5 in). The latch lever engages in a hole in the back bracket assembly, and holds the latch-lock carrier in the retracted position
11. Place the front end of the left rail in the rack cabinet. Align the top of the front bracket **1** (Figure 30) with the required EIA marking that is on the rack.

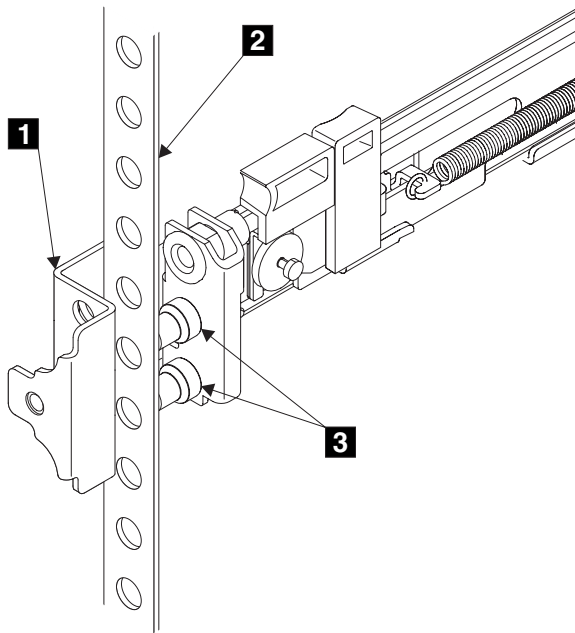


Figure 30. Installing the front end of the rail

12. Align the locating pins **3** with the holes that are in the rack-mounting flange **2**.

13. Push the latch lock **2** (Figure 31) 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.

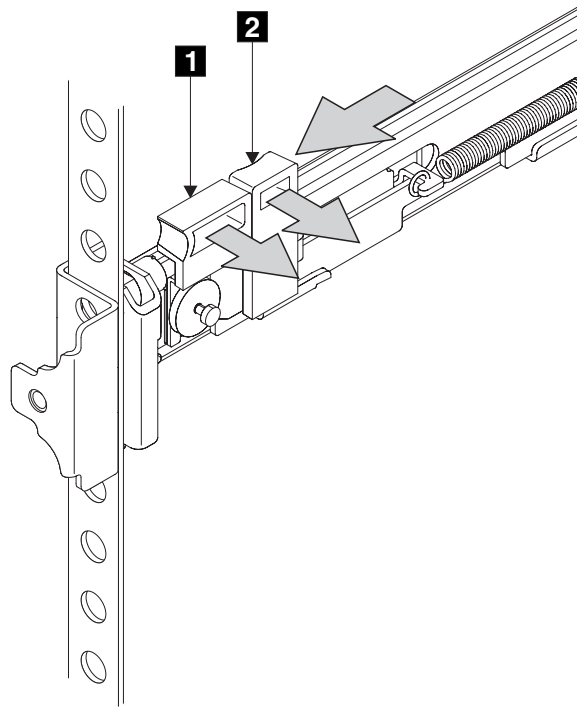


Figure 31. Closing the latch-lock carrier assembly

14. Push the back rail bracket **1** (see Figure 29 on page 28) toward the rear of the rack and align the locating pins with the rack-mounting flange.
15. Push the latch lock **2** (see Figure 29 on page 28) 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.

16. 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 into the rack

This task includes the steps you must complete to install the SAN Volume Controller into the rack.

### Prerequisites:

Before you install the SAN Volume Controller into the rack; review the following caution notice.

**CAUTION:**

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

**Steps:**

Perform the following steps to install the SAN Volume Controller into the rack:

1. Stand at the front of the rack and place the back of the SAN Volume Controller onto the support rails; then slide the SAN Volume Controller fully into the rack.
2. Fully tighten the two captive thumbscrews **1** (see Figure 32).

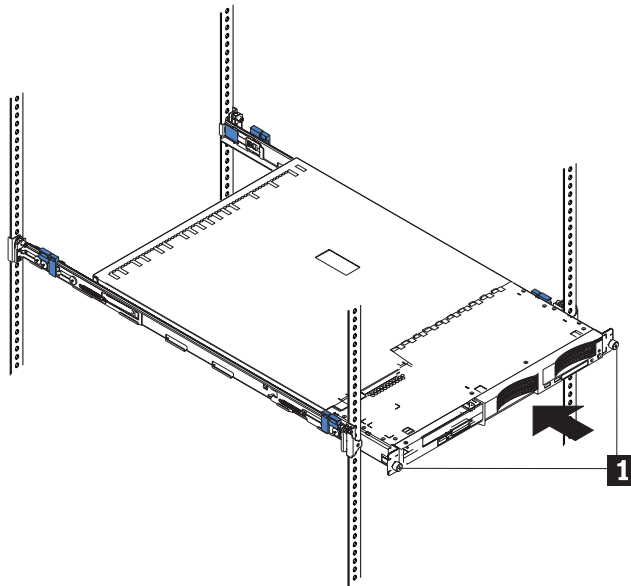


Figure 32. Installing the SAN Volume Controller into a rack

3. Repeat this procedure for each SAN Volume Controller.

---

## Connecting the SAN Volume Controller to the uninterruptible power supply

This task includes the steps you complete to connect the SAN Volume Controller to the uninterruptible power supply.

Each SAN Volume Controller of a pair should be connected to a different uninterruptible power supply. Each uninterruptible power supply can support up to two SAN Volume Controllers.

**Attention:** Do not connect two clusters to the same pair of uninterruptible power supplies. Both clusters will be lost in the event that a power failure occurs on both of those uninterruptible power supplies.

**Note:** You must have two uninterruptible power supplies per cluster. A cluster can contain no more than four SAN Volume Controllers. Also, each uninterruptible power supply of a pair must be connected to a separate

electrical input power source (if possible) to reduce the chance of input power failure at both uninterruptible power supplies.

The SAN Volume Controller software determines whether the input voltage to the uninterruptible power supply is within range and sets an appropriate voltage alarm range on the uninterruptible power supply. The software continues to re-check the input voltage every few minutes; if it changes substantially but remains within the permitted range, the alarm limits are readjusted.

### Prerequisites:

Before you begin this task, refer to the customer's cable connection table in the *IBM TotalStorage SAN Volume Controller: Planning Guide* to identify the uninterruptible power supply to which this SAN Volume Controller is to be connected.

### Steps:

Perform the following steps to connect the SAN Volume Controller to the uninterruptible power supply.

1. At the back of the SAN Volume Controller, plug a power cable into the socket **1** (see Figure 33).

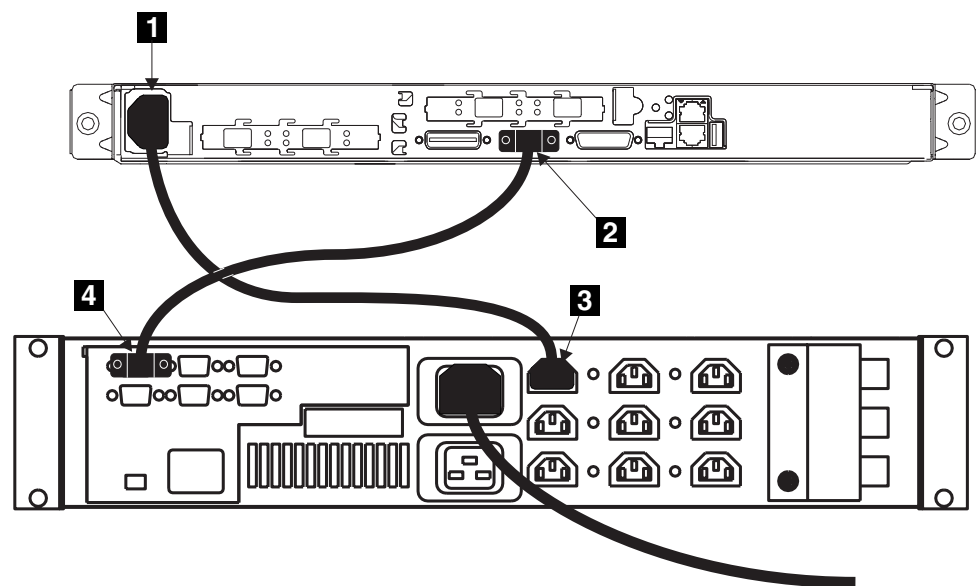


Figure 33. Connecting the SAN Volume Controller power cable to the uninterruptible power supply

2. Plug the serial cable of the power cable assembly into the serial socket **2**.
3. **DANGER**

**You have already switched on the uninterruptible power supply. The output sockets of the uninterruptible power supply are live.**

Plug the free end of the SAN Volume Controller power cable into any vacant output socket **3** on the uninterruptible power supply.

4. Plug the free end of the signal cable into any vacant position on the top row of serial connectors **4** on the uninterruptible power supply. Do not plug any serial cables into the bottom row of serial connectors or the uninterruptible power supply will malfunction.

**Result:**

The SAN Volume Controller power is connected to the uninterruptible power supply.

**Related topics:**

- “Uninterruptible power supply requirements” on page xv

---

## Connecting the SAN Volume Controller to the SAN and to the Ethernet network

This task includes the steps you complete to connect the SAN Volume Controller to the SAN.

**Prerequisites:**

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

**Steps:**

Perform the following steps to connect the SAN Volume Controller to the SAN and to the Ethernet network.

1. **Attention:** You must use only Ethernet port 1 on the SAN Volume Controller. The software is configured only for Ethernet port 1.  
Connect the Ethernet cable to the Ethernet port 1 connector **5** (see Figure 34).

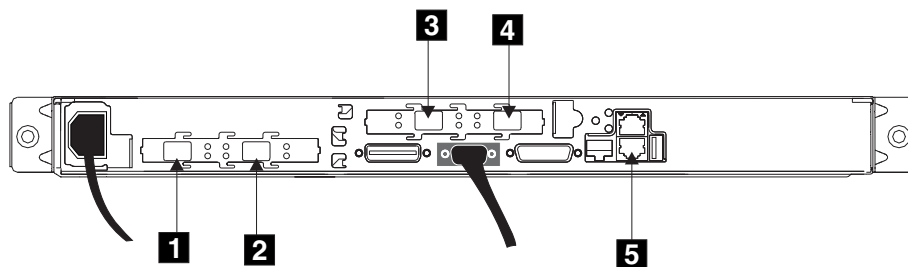


Figure 34. Connectors at the back of the SAN Volume Controller

- 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.).
2. Connect the fibre channel cables to the fibre channel connectors as required by the customer’s configuration. The connectors are numbered **1**, **2**, **3**, and **4** from left to right, as shown in the figure above. These numbers correspond to the numbers that are shown in the customer’s cable connection table.
  3. Connect the other end of the Ethernet cable to the designated connector on the Ethernet hub or switch.
  4. Connect the other ends of the fibre channel cables to the designated connectors of the fibre channel switches.

**Related topics:**

- “SAN Volume Controller menu options” on page 40
- “Controls and indicators for the SAN Volume Controller” on page 4

---

## Verifying the SAN Volume Controller installation

After you have installed the SAN Volume Controller into the rack and connected it to both the uninterruptible power supply and the SAN, this task provides the steps you complete to verify the installation.

**Prerequisites:**

Check the configuration data table provided by the customer the speed at which the SAN Volume Controller nodes are to be operated (usually 2 Gbps).

**Steps:**

Perform the following steps to verify the installation of the SAN Volume Controller.

1. Press the SAN Volume Controller power switch. Verify that the green power light is on. If the light is not on go to MAP 5000: Start 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, the Charging message is displayed in line 1 of the front panel display. A progress bar is displayed in line 2 of the front panel display. Battery charging can take up to 3 hours until the battery is fully charged. When the battery is charged enough, Cluster: is displayed in line 1 of the front panel display; line 2 is blank.

2. Press and hold the select button for five seconds. The check light comes on and a display test is performed. 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. See Figure 35, which shows four examples of what the front panel should display when you press the buttons. When you have finished testing the buttons, press and hold the select button for five seconds to exit the test.

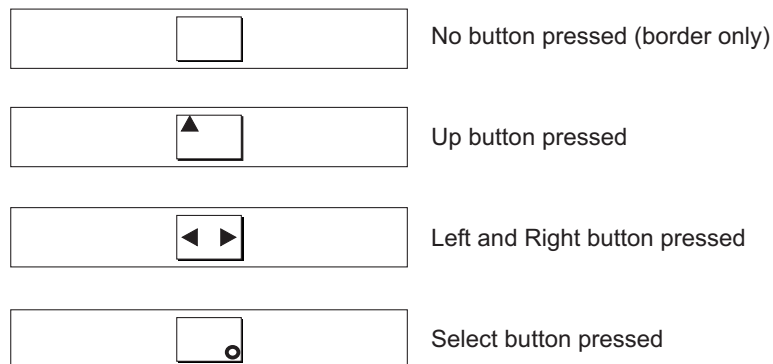


Figure 35. Front panel display when push buttons pressed

4. If the Charging 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. Keep pressing and releasing the up or down button until the Node: option is displayed in line 1 of the front panel display.
6. Verify that the node number that is displayed in line 2 of the display is the same as the node number that is printed on the front panel of the node (see Figure 36).



Figure 36. Node number

The XXXXXX in Figure 36 represents the node number. If the numbers do not match, exchange the Front Panel FRU on the SAN Volume Controller.

7. Keep pressing and releasing the up or down button until the Ethernet option is shown on the front panel display. Line 2 of the front panel display shows the message Inactive. This message shows that, although an Ethernet connection is available, it cannot yet be used (see Figure 37).

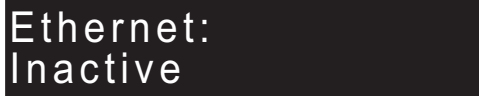


Figure 37. Ethernet mode

8. Keep pressing and releasing the up or down button until the FC Port-1 option shows in the display.
9. Check whether line 2 of the display shows the message Active.
10. Keep pressing and releasing the left or right button to display the other port options. Check whether for each port, line 2 of the display shows the message Active. If Active is not shown for any port, go to MAP 5600: Fibre-channel to repair the fault.
11. If the configuration data table provided by the customer indicates that the SAN Volume Controller nodes are to be operated at 1 Gbps, press and hold the down button; press and release the select button. Release the down button. The second line of the display will show 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.
12. If you want to select a language other than English, perform the following steps:
  - a. Press the up or down button until Select Language? displays.
  - b. Press the select button.
  - c. Press the left or right button until the required language is displayed.
  - d. Press the select button.
13. Repeat steps 1 through 12 for each SAN Volume Controller.
14. When the battery is fully charged, the charge progress bar is replaced by the Cluster option on the front panel display of the SAN Volume Controller.



| You have completed the hardware installation for the SAN Volume Controller. The  
| customer can now begin to create clusters and perform other configuration tasks.  
| See the *IBM TotalStorage SAN Volume Controller: Configuration Guide* for detailed  
| configuration instructions.



---

## Chapter 5. Using the front panel display on the SAN Volume Controller

This chapter provides information about how to use the front panel display which includes:

- Status indicators
- Menu selections

**Related topics:**

- “Status indicators”
- “SAN Volume Controller menu options” on page 40

---

### Status indicators

Status indicators are shown on the front panel for the following processes:

- Boot progress
- Boot failed
- Hardware boot
- Node rescue request
- Power failure
- Powering off
- Restarting
- Shutting down
- Error codes

**Related topics:**

- “Boot failed” on page 38
- “Hardware boot” on page 38
- “Node rescue request” on page 38
- “Power failure” on page 38
- “Powering off” on page 39
- “Restarting” on page 39
- “Shutting down” on page 39

### Boot progress indicator

Figure 38 shows that the node is starting.



*Figure 38. Boot progress display*

During the boot operation, boot progress codes are displayed and the progress bar moves to the right while the boot operation proceeds.

## Boot failed

Figure 39 shows that the boot operation has failed.



Figure 39. Boot failed display

If the boot operation fails, a boot code is displayed.

See the boot codes in the appropriate section of the service documentation for a description of the failure and the appropriate steps you must perform to correct the failure.

## Hardware boot

Figure 40 shows the what is displayed when you first power on the node while the node searches for a disk drive to boot.

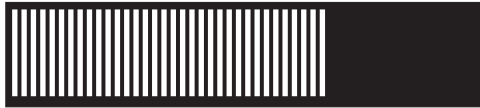


Figure 40. Hardware-boot display

If this display remains active for longer than 3 minutes, there might be a problem.

## Node rescue request

Figure 41 shows that a request has been made to exchange the software on this node. The SAN Volume Controller software is pre-installed on all SAN Volume Controller nodes. This software includes the operating system, the application software, and the SAN Volume Controller publications. It is not normally necessary to replace the software on a node but if the software is lost for some reason, for example if the hard disk drive in the node fails, it is possible to copy all the software from another node connected to the same Fibre Channel fabric. This process is known as node rescue.



Figure 41. Node-rescue-request display

## Power failure

Figure 42 on page 39 shows that the SAN Volume Controller is running on battery power because main power has been lost. All I/O operations have stopped. The node is saving cluster metadata and the node cache data to the internal disk drive. When the progress bar reaches zero, the node will power off.

**Note:** When input power is restored to the uninterruptible power supply, the SAN Volume Controller is turned on without the front panel power button being pressed.



Figure 42. Power failure display

## Powering off

Figure 43 shows that the power button has been pressed and the node is powering off.



Figure 43. Powering-off display

The progress bar moves backward when the power is removed. The power-off operation might take several minutes.

## Restarting

Figure 44 shows that the software on a node is restarting.



Figure 44. Restarting display

The software is restarting either because:

- An internal error was detected
- A power-off operation was ended when the power button was pressed again while the node was powering off

If a power-off operation was ended, the progress bar continues to move backward until the node finishes saving its data. After the data is saved, the progress bar moves forward during the restart operation.

## Shutting down

Figure 45 on page 40 is an example of what the front panel indicator shows when you issue a shutdown command to a SAN Volume Controller cluster or a SAN Volume Controller node. The progress bar continues to move left until it is safe to be powered off. When the shutdown operation is complete, all power will be removed from the node. When power has been removed from the last node connected to the uninterruptible power supply, the uninterruptible power supply also will be shut down.



- Node
- Ethernet
- FC port–1 through 4
- Select language

**Related topics:**

- “Cluster options”
- “Node options” on page 42
- “Ethernet option” on page 45
- “Fibre channel port–1 through 4 option” on page 45
- “Select language? option” on page 46

## Cluster options

The main cluster option displays the cluster name that the user has assigned. If no name has been assigned, the IP address of the cluster is displayed. If this SAN Volume Controller is not assigned to a cluster, the field is blank.

**Related topics:**

- “Status”
- “IP address”
- “Subnet mask”
- “Recover cluster?” on page 42

### Status

This field is blank if this SAN Volume Controller is not a member of a cluster. If this SAN Volume Controller is a member of a cluster, the field indicates the operational status of the cluster, as follows:

**Active** Indicates that this SAN Volume Controller is an active member of the cluster.

**Inactive**

Indicates that the SAN Volume Controller is a member of a cluster, but is not now operational. It is not operational either because the other SAN Volume Controllers that are in the cluster cannot be accessed, or because this SAN Volume Controller has been excluded from the cluster.

**Degraded**

Indicates that the cluster is operational, but one or more of the member SAN Volume Controllers are missing or have failed.

### IP address

This field contains the existing Ethernet IP address of the cluster. It is set during the create-cluster operation. You use this address to access the cluster from the command line tools or from a web browser. If this SAN Volume Controller is not a member of a cluster, this field is blank.

### Subnet mask

The subnet mask option displays the subnet mask address. It is set during the create-cluster operation.

## Gateway

The gateway option displays the gateway address. It is set during the create-cluster operation.

## Recover cluster?

This field allows you to recover a lost administrator password or make the node accessible via the service password.

Figure 47 shows the Recover cluster? menu sequence.

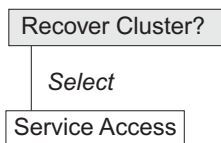


Figure 47. Recover Cluster? menu sequence

During installation, you should not need to use this field. For more information about this field, see the *IBM TotalStorage SAN Volume Controller: Service Guide*.

## Node options

The main node option displays the identification number of the SAN Volume Controller or the name of the SAN Volume Controller if the user has assigned a name.

### Related topics:

- "Status"
- "Create cluster?"

## Status

This field helps you to isolate failures that cause a cluster to be unavailable. It indicates the operational state of the node, as follows:

### Properties:

**Active** The SAN Volume Controller is operational and assigned to a cluster. It has access to the fibre channel fabric.

### Inactive

The SAN Volume Controller is operational and assigned to a cluster. It does not have access to the fibre channel fabric.

**Free** The SAN Volume Controller is operational, but has not been assigned to any cluster. It has access to the fibre channel fabric.

### Disconnected

The SAN Volume Controller is operational, but has not been assigned to any cluster. It has no access to the fibre channel fabric.

**Failed** The SAN Volume Controller is not operational. A hardware fault is preventing the SAN Volume Controller from being part of a cluster.

## Create cluster?

This field allows you to create a new SAN Volume Controller cluster. Press select to go to the create cluster menu. Figure 48 on page 43 shows the create cluster menu sequence.



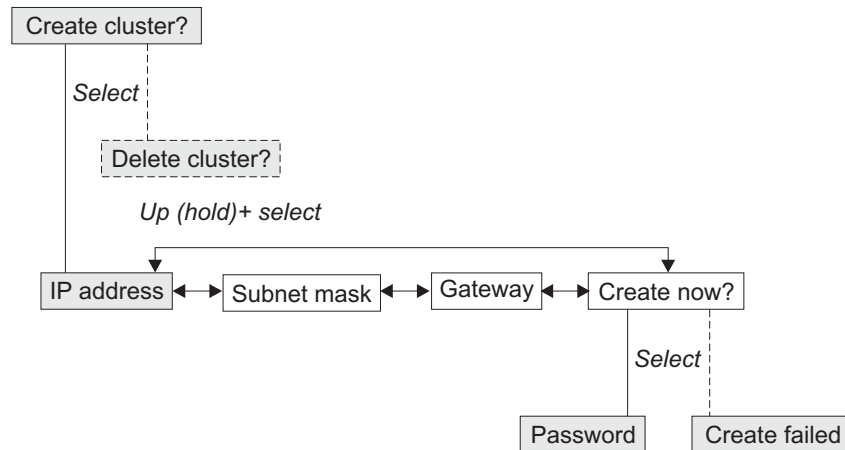


Figure 48. Create cluster? menu sequence

Press the left and right buttons to navigate through the secondary options that are associated the create cluster option. When you have navigated to the desired option, press the select button. The secondary options available include:

- IP address
- Subnet mask
- Gateway
- Create now?

**IP address:**

The IP address lets you display or change the Ethernet IP address for the cluster that you are going to create. Be sure to verify the correct IP address with the customer before you create a cluster.

**Attention:** If you change the IP address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command line tools or a web browser.

Perform the following steps to change the IP address:

|  
|  
|

1. From the Create Cluster? option, press the select button. The IP address option displays.
2. Press the select button again. The first IP address number is highlighted.
3. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to quickly increase or decrease the value, hold the up or down button, respectively.
4. Press the right or left buttons to move to the number field that you want to update.
5. Repeat steps 3 and 4 for each number field that you want to update.
6. Press the select button to complete the change.

Press the right button to display the next secondary option or the left button to display the previous options.

**Subnet Mask:**

This option lets you display or change the subnet mask.

**Attention:** If you change the subnet mask address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command line tools or a web browser.

Perform the following steps to change the subnet mask:

1. Press the select button. The first subnet mask number is displayed.
2. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to quickly increase or decrease the value, hold the up or down button, respectively.
3. Press the right or left buttons to move to the number field that you want to update.
4. Repeat steps 2 and 3 for each number field that you want to update.
5. Press the select button to complete the change.

#### **Gateway:**

**Attention:** If you change the gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the web interface or command line.

Perform the following steps to change the gateway address:

1. Press the select button. The first gateway address number field is highlighted.
2. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to quickly increase or decrease the value, hold the up or down button, respectively.
3. Press the right or left buttons to move to the number field that you want to update.
4. Repeat steps 2 and 3 for each number field that you want to update.
5. Press the select button to complete the change.

#### **Create Now?:**

This option lets you start an operation to create a cluster. Press the select button to start the operation.

If the create operation is successful, Password is displayed on line 1. The password that you can use to access the cluster is displayed on line 2. Be sure to immediately record the password; it is required on the first attempt to access the cluster.

**Attention:** The password displays for only 60 seconds, or until a front panel button is pressed. The cluster is created only after the password display is cleared.

If the create operation fails, Create Failed: is displayed in line 1 of the service display screen. Line 2 of the service displays one of two possible error codes that you can use to isolate the cause of the failure.

Press the up button to return to the Create Cluster? option.

#### **Delete Cluster?:**

The field for Delete Cluster? is displayed only if you select Create Cluster? on a SAN Volume Controller that is already a member of a cluster. Normally, you can use the command line or the graphical user interface (GUI) to delete a cluster. However, if you cannot use the command line or GUI, you can use Delete Cluster to force the deletion of a node from a cluster. To delete a node from the cluster:

- Press and hold Up
- Press and release Select
- Then release Up

The SAN Volume Controller is deleted from the cluster, and the node is restarted. The display will then return to the default menu. The create cluster option must be selected again to start the create option.

Use the up button to return to the Create Cluster? option.

## Ethernet option

This option displays the operational states of the Ethernet port. When a cluster is created, only one IP address and one Ethernet port in the cluster gain configuration and service access to that cluster. If a loss of access through one port occurs, an alternative port is assigned to manage the configuration and service interface.

The possible states of the Ethernet port are as follows:

### Properties:

**Active** The cluster is accessible through this port.

### Inactive

The port is operational, but it is not being used to access the cluster. This port can be used to access the cluster if the cluster active port fails.

**Failed** The port is not operational.

## Fibre channel port–1 through 4 option

The FC port–1 through 4 options display the operational status of the fibre channel ports as follows:

### Properties:

**Active** The port is operational and can access the fibre channel fabric.

### Inactive

The port is operational, but cannot access the fibre channel fabric. One of the following conditions exists:

- The fibre channel cable has failed.
- The fibre channel cable is not installed.
- The device that is at the other end of the cable has failed.

**Failed** The port is not operational because of a hardware failure.

### Not installed

This port is not installed.

To display the current fibre-channel port speed, press and hold the down button, then press the select button, and release the down button. This action also allows you to change the fibre-channel port speed.

## Select language? option

The select language option allows you to change the language that is displayed on the menu. Figure 49 shows the select language option sequence.

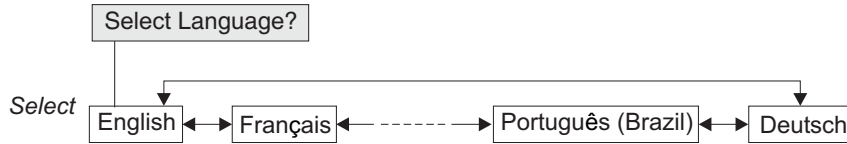


Figure 49. Select language? menu sequence

Press the right button to display the national language that you want. When the required language is displayed, press the select button.

**Note:** Line 1 of the menu displays an option. For some options, additional data is displayed on line 2. If, the front panel is set to Japanese, Korean, or Chinese, the menu shows only line 1. To display line 2, press the select button. To return to the option on line 1, press the select button again.

The following languages are available:

- English
- French
- German
- Italian
- Japanese
- Korean
- Portuguese
- Spanish
- Chinese (simplified)
- Chinese (traditional)

If you do not understand the language that is displayed, wait for at least 60 seconds for the menu to reset to the default option. To select the required language, perform the following steps:

1. Press the up button once.
2. Press the select button once. If the display changes, go to step 5.
3. Press the up button once.
4. Press the select button once.
5. Press the right button until your required language is displayed.
6. Press the select button.

**Note:** This procedure will not work if the node is displaying a boot error.

## Appendix. Preparing your SAN Volume Controller environment

This topic provides information you need to ensure that your physical site meets the installation requirements for the SAN Volume Controller.

### Dimensions and weight:

| Height    | Width      | Depth    | Approximate Maximum Weight |
|-----------|------------|----------|----------------------------|
| 43 mm     | 440 mm     | 660 mm   | 12.7 kg                    |
| (1.7 in.) | (17.3 in.) | (26 in.) | (28 lb.)                   |

### Additional space requirements:

| Location                   | Additional space required | Reason           |
|----------------------------|---------------------------|------------------|
| Left- and right-hand sides | 50 mm (2 in.)             | Cooling air flow |
| Back                       | 100 mm (4 in.) minimum    | Cable exit       |

### AC input-voltage requirements:

| Power Supply Assembly Type | Voltage        | Frequency   |
|----------------------------|----------------|-------------|
| 220 V                      | 88 to 264 V ac | 47 to 63 Hz |

### Environment:

| Environment | Temperature                      | Altitude                            | Relative humidity                                 | Maximum wet bulb temperature |
|-------------|----------------------------------|-------------------------------------|---|------------------------------|
| Operating   | 10°C to 35°C<br>(50°F to 95°F)   | 0 to 914 m<br>(0 to 2998 ft.)       | 8% to 80%<br>noncondensing                        | 23°C (74°F)                  |
|             | 10°C to 32°C<br>(50°F to 88°F)   | 914 to 2133 m<br>(2998 to 6988 ft.) | 8% to 80%<br>noncondensing                        | 23°C (74°F)                  |
| Powered off | 10°C to 43°C<br>(50°F to 110°F)  | –                                   | 8% to 80%<br>noncondensing                        | 27°C (81°F)                  |
| Storing     | 1°C to 60°C<br>(34°F to 140°F)   | 0 to 2133 m<br>(0 to 6988 ft.)      | 5% to 80%<br>noncondensing                        | 29°C (84°F)                  |
| Shipping    | –20°C to 60°C<br>(–4°F to 140°F) | 0 to 10668 m<br>(0 to 34991 ft.)    | 5% to 100%<br>condensing,<br>but no precipitation | 29°C (84°F)                  |

### Heat output (maximum):

350 watts (1195 Btu per hour)

**Related topics:**

- “Preparing your uninterruptible power supply environment”

---

## Preparing your uninterruptible power supply environment

This topic provides information you need to ensure that your physical site meets the installation requirements for the uninterruptible power supply.

**Attention:** Ensure that you comply with the following requirements for uninterruptible power supplies:

- Each uninterruptible power supply should be connected to a separate branch circuit.
- A UL listed 15 A circuit breaker must be installed in each branch circuit that supplies power to the uninterruptible power supply.
- If a rack power distribution unit is used, each uninterruptible power supply must be connected to a separate power distribution unit.
- The voltage supplied to the uninterruptible power supply must be 200–240 V single phase.
- The frequency supplied must be between 50 and 60 Hz.

**Note:** If the uninterruptible power supply is cascaded from another uninterruptible power supply, the source uninterruptible power supply must have at least 3 times the capacity per phase and the total harmonic distortion must be less than 5% with any single harmonic being less than 1%. The uninterruptible power supply must also have input voltage capture that has a slew rate faster than 3 Hz per second and 1 msec glitch rejection.

**Dimensions and weight:**

| Height    | Width    | Depth      | Maximum weight |
|-----------|----------|------------|----------------|
| 89 mm     | 483 mm   | 622 mm     | 39 kg          |
| (3.5 in.) | (19 in.) | (24.5 in.) | (86 lb.)       |

**AC input-voltage requirements:**

| Power supply assembly type | Voltage         | Frequency   |
|----------------------------|-----------------|-------------|
| 220 V                      | 160 to 288 V ac | 46 to 64 Hz |

**Environment:**

|                   | Operating environment          | Nonoperating environment       | Storing environment           | Shipping environment              |
|-------------------|--------------------------------|--------------------------------|-------------------------------|-----------------------------------|
| Air temperature   | 0°C to 40°C<br>(32°F to 104°F) | 0°C to 40°C<br>(32°F to 104°F) | 0°C to 25°C<br>(32°F to 77°F) | –25°C to 55°C<br>(–13°F to 131°F) |
| Relative humidity | 5% to 95%<br>noncondensing     | 5% to 95%<br>noncondensing     | 5% to 95%<br>noncondensing    | 5% to 95%<br>noncondensing        |

**Altitude:**

|                              | Operating environment          | Nonoperating environment       | Storing environment            | Shipping environment               |
|------------------------------|--------------------------------|--------------------------------|--------------------------------|------------------------------------|
| Altitude<br>(from sea level) | 0 to 2000 m<br>(0 to 6560 ft.) | 0 to 2000 m<br>(0 to 6560 ft.) | 0 to 2000 m<br>(0 to 6560 ft.) | 0 to 15 000 m<br>(0 to 49 212 ft.) |

#### Heat output (maximum):

142 watts (485 Btu per hour) during normal operation.

553 watts (1887 Btu per hour) when power has failed and the uninterruptible power supply is supplying power to the nodes of the SAN Volume Controller.

#### Related topics:

- “Preparing your SAN Volume Controller environment,” on page 47

## Preparing your master console environment

This topic provides information you need to ensure that your physical site meets the installation requirements for the master console server and console monitor kit.

#### Server dimensions and weight:

| Height             | Width                 | Depth                 | Approximate Maximum Weight                                    |
|--------------------|-----------------------|-----------------------|---|
| 43 mm<br>(1.7 in.) | 430 mm<br>(16.69 in.) | 424 mm<br>(16.54 in.) | 12.7 kg<br>(28 lb.)<br><br>(depending on your configuration.) |

**Note:** The above dimensions are for a 1U monitor and keyboard assembly.

#### Server acoustical noise emissions:

| Sound power, idling | Sound power, operating |
|---------------------|------------------------|
| 6.5 BEL maximum     | 6.5 BEL maximum        |

#### Server AC and input-voltage requirements:

| Power Supply                            | Electrical input  |
|---|---|
| 203 watt (110 or 220 V ac auto-sensing) | Sine-wave input (47–63 Hz) required<br>Input voltage low range:<br>Minimum: 100 V ac<br>Maximum: 127 V ac<br>Input voltage high range:<br>Minimum: 200 V ac<br>Maximum: 240 V ac<br>Input kilovolt-amperes (kVA), approximately:<br>Minimum: 0.0870 kVA<br>Maximum: 0.150 kVA |

### Server environment:

| Environment | Temperature                                 | Altitude                     | Relative humidity |
|-------------|---|------------------------------|-------------------|
| Server on   | 10° to 35°C (50°F to 95°F)                  | 0 to 914 m (2998.0 ft.)      | 8% to 80%         |
| Server off  | Server off: -40°C to 60°C (-104°F to 140°F) | Maximum: 2133 m (6998.0 ft.) | 8% to 80%         |

### Server heat output:

Approximate heat output in British thermal units (BTU) per hour:

- Minimum configuration: 87 watts (297 BTU)
- Maximum configuration: 150 watts (512 BTU)

### Monitor console kit dimensions and weight:

| Height             | Width                | Depth                | Approximate Maximum Weight                                      |
|--------------------|----------------------|----------------------|---|
| 43 mm<br>(1.7 in.) | 483 mm<br>(19.0 in.) | 483 mm<br>(19.0 in.) | 17.0 kg<br>(37.0 lb.)<br><br>(depending on your configuration.) |

### Related topics:

- “Preparing your uninterruptible power supply environment” on page 48



---

## 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 master console:

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. The following screen readers have been tested: JAWS v4.5 and IBM Home Page Reader v3.0.
- You can operate all features using the keyboard instead of the mouse.

### 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 on a CD that is packaged with the product or you can access them at the following Web site:

<http://www.ibm.com/storage/support/2145/>

### Related topics:

- “Related publications” on page v



---

## Notices

This information was developed for products and services offered in the U.S.A.

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

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

*IBM Director of Licensing  
IBM Corporation  
North Castle Drive  
Armonk, NY 10504-1785  
U.S.A.*

**The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:**

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

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

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

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

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been

estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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

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

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

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

**Related topics:**

- "Trademarks"

---

## Trademarks

The following terms are trademarks of the International Business Machines Corporation in the United States, other countries, or both:

- AIX
- e (logo)
- Enterprise Storage Server
- FlashCopy
- IBM
- Tivoli
- TotalStorage
- xSeries

Intel and Pentium are trademarks of Intel Corporation in the United States, other countries, or both.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, and service names may be trademarks or service marks of others.

---

## Electronic emission notices

The following electronic emission statements apply to this product. The statements for other products that are intended for use with this product are included in their accompanying documentation.

### **Federal Communications Commission (FCC) statement**

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer is responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

### **Japanese Voluntary Control Council for Interference (VCCI) statement**

This product is a Class A Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). In a domestic environment, this product might cause radio interference, in which event the user might be required to take adequate measures.

### **Korean Government Ministry of Communication (MOC) statement**

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you can exchange it for one that is approved for non-business purposes.

### **China Class A EMC compliance in Simplified Chinese**

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

## 声 明

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

Figure 50. Chinese EMC compliance statement

### **Avis de conformité à la réglementation d'Industrie Canada**

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

### **New Zealand compliance statement**

This is a Class A product. In a domestic environment this product might cause radio interference, in which event the user might be required to take adequate measures.

### **International Electrotechnical Commission (IEC) statement**

This product has been designed and built to comply with (IEC) Standard 950.

### **Industry Canada compliance statement**

This Class A digital apparatus complies with IECS-003.

### **United Kingdom telecommunications requirements**

This apparatus is manufactured to the International Safety Standard EN60950 and as such is approved in the U.K. under approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

### **European Union (EU) statement**

This product is in conformity with the protection requirements of EU council directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards not supplied by the manufacturer.

### **Radio protection for Germany**

**Zulassungsbescheinigung laut Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30, August 1995.**

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

Der Aussteller der Konformitätserklärung ist die IBM Deutschland.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2):

|  |
|--|
| Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A. |
|--|

EN55022 Klasse A Geräte bedürfen folgender Hinweise:

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministeriums für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Para.3, Abs.4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Massnahmen durchzuführen und dafür aufzukommen."

Anmerkung: Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den Handbüchern angegeben zu installieren und zu betreiben.

## **Taiwan Class A compliance statement**

### **警告使用者:**

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





---

## Glossary

This glossary includes terms for the IBM TotalStorage SAN Volume Controller.

This glossary includes selected terms and definitions from *A Dictionary of Storage Networking Terminology* (<http://www.snia.org/education/dictionary>), copyrighted 2001 by the Storage Networking Industry Association, 2570 West El Camino Real, Suite 304, Mountain View, California 94040-1313. Definitions derived from this book have the symbol (S) after the definition.

The following cross-references are used in this glossary:

- See** Refers the reader to one of two kinds of related information:
- A term that is the expanded form of an abbreviation or acronym. This expanded form of the term contains the full definition.
  - A synonym or more preferred term.

**See also** Refers the reader to one or more related terms.

**Contrast with** Refers the reader to a term that has an opposite or substantively different meaning.

### A

**asymmetric virtualization.** A virtualization technique in which the virtualization engine is outside the data path and performs a metadata-style service. The metadata server contains all the mapping and locking tables while the storage devices contain only data. See also *symmetric virtualization*

### C

**cache.** A high-speed memory or storage device used to reduce the effective time required to read data from or write data to lower-speed memory or a device. Read cache holds data in anticipation that it will be requested by a client. Write cache holds data written by a client until it can be safely stored on more permanent storage media such as disk or tape.

**cluster.** In SAN Volume Controller, a pair of nodes that provides a single configuration and service interface.

**CIM.** See *Common Information Model*.

**Common Information Model (CIM).** A set of standards developed by the Distributed Management Task Force (DMTF). CIM provides a conceptual framework for storage management and an open approach to the design and implementation of storage systems, applications, databases, networks, and devices.

### D

**degraded.** Pertaining to a valid configuration that has suffered a failure but continues to be supported and legal. Typically, a repair action can be performed on a degraded configuration to restore it to a valid configuration.

**directed maintenance procedures.** The set of maintenance procedures that can be run for a cluster. These procedures are documented in the service guide.

**disk zone.** A zone defined in the storage area network (SAN) fabric in which the SAN Volume Controller can detect and address the logical units that the disk controllers present.

### E

**error code.** A value that identifies an error condition.

**excluded.** In SAN Volume Controller, the status of a managed disk that the cluster has removed from use after repeated access errors.

**extent.** A unit of data that manages the mapping of data between managed disks and virtual disks.

### F

**failover.** In SAN Volume Controller, the function that occurs when one redundant part of the system takes over the workload of another part of the system that has failed.

**fibre channel.** A technology for transmitting data between computer devices at a data rate of up to 4 Gbps. It is especially suited for attaching computer servers to shared storage devices and for interconnecting storage controllers and drives.

**FC.** See *fibre channel*.

## G

**GBIC.** See *gigabit interface converter*.

**gigabit interface converter (GBIC).** An interface module that converts the light stream from a fibre-channel cable into electronic signals for use by the network interface card.

## H

**HBA.** See *host bus adapter*.

**host bus adapter (HBA).** In SAN Volume Controller, an interface card that connects a host bus, such as a peripheral component interconnect (PCI) bus, to the storage area network.

**host ID.** In SAN Volume Controller, a numeric identifier assigned to a group of host fibre-channel ports for the purpose of logical unit number (LUN) mapping. For each host ID, there is a separate mapping of Small Computer System Interface (SCSI) IDs to virtual disks (VDisks).

**host zone.** A zone defined in the storage area network (SAN) fabric in which the hosts can address the SAN Volume Controllers.

## I

**inconsistent.** In a Remote Copy relationship, pertaining to a secondary virtual disk (VDisk) that is being synchronized with the primary VDisk.

**input/output (I/O).** Pertaining to a functional unit or communication path involved in an input process, an output process, or both, concurrently or not, and to the data involved in such a process.

**Internet Protocol (IP).** In the Internet suite of protocols, a connectionless protocol that routes data through a network or interconnected networks and acts as an intermediary between the higher protocol layers and the physical network.

**IP.** See *Internet Protocol*.

**I/O.** See *input/output*.

**I/O group.** A collection of virtual disks (VDisks) and node relationships that present a common interface to host systems.

## L

**local fabric.** In SAN Volume Controller, those storage area network (SAN) components (such as switches and cables) that connect the components (nodes, hosts, switches) of the local cluster together.

**logical unit (LU).** An entity to which Small Computer System Interface (SCSI) commands are addressed, such as a virtual disk (VDisk) or managed disk (MDisk).

**logical unit number (LUN).** The SCSI identifier of a logical unit within a target. (S)

**LU.** See *logical unit*.

**LUN.** See *logical unit number*.

## M

**managed disk (MDisk).** A Small Computer System Interface (SCSI) logical unit that a redundant array of independent disks (RAID) controller provides and a cluster manages. The MDisk is not visible to host systems on the storage area network (SAN).

**managed disk group.** A collection of managed disks (MDisks) that, as a unit, contain all the data for a specified set of virtual disks (VDisks).

**mapping.** See *FlashCopy mapping*.

**MDisk.** See *managed disk*.

## N

**node.** One SAN Volume Controller. Each node provides virtualization, cache, and Copy Services to the storage area network (SAN).

## O

**object.** In object-oriented design or programming, a concrete realization of a class that consists of data and the operations associated with that data.

**offline.** Pertaining to the operation of a functional unit or device that is not under the continual control of the system or of a host.

**online.** Pertaining to the operation of a functional unit or device that is under the continual control of the system or of a host.

## P

**port.** The physical entity within a host, SAN Volume Controller, or disk controller system that performs the data communication (transmitting and receiving) over the fibre channel.

## R

**RAID.** See *redundant array of independent disks*.

**reliability.** The ability of a system to continue to return data even if a component fails.

## S

**SAN.** See *storage area network*.

**SCSI.** See *Small Computer Systems Interface*.

**Small Computer System Interface (SCSI).** A standard hardware interface that enables a variety of peripheral devices to communicate with one another.

**SNMP.** See *Simple Network Management Protocol*.

**storage area network (SAN).** A network whose primary purpose is the transfer of data between computer systems and storage elements and among storage elements. A SAN consists of a communication infrastructure, which provides physical connections, and a management layer, which organizes the connections, storage elements, and computer systems so that data transfer is secure and robust. (S)

**IBM Subsystem Device Driver (SDD).** An IBM pseudo device driver designed to support the multipath configuration environments in IBM products.

## U

**uninterruptible power supply.** A device connected between a computer and its power source that protects the computer 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.

## V

**valid configuration.** A configuration that is supported.

**VDisk.** See *virtual disk*.

**virtual disk (VDisk).** In SAN Volume Controller, a device that host systems attached to the storage area network (SAN) recognize as a Small Computer System Interface (SCSI) disk.

**virtualization.** In the storage industry, a concept in which a pool of storage is created that contains several disk subsystems. The subsystems can be from various vendors. The pool can be split into virtual disks that are visible to the host systems that use them.

**virtualized storage.** Physical storage that has virtualization techniques applied to it by a virtualization engine.

## W

**worldwide node name (WWNN).** An identifier for an object that is globally unique. WWNNs are used by Fibre Channel and other standards.

**worldwide port name (WWPN).** A unique 64-bit identifier associated with a fibre-channel adapter port. The WWPN is assigned in an implementation- and protocol-independent manner.



---

# Index

## A

- about this guide v
- ac voltage requirements 49
- ac/dc voltage requirements 47
  - uninterruptible power supply 48
- accessibility 51
  - keyboard 51
  - shortcut keys 51
- acoustical noise emissions
  - master console 49
- additional space requirements
  - SAN Volume Controller 47
- air temperature 47, 50
  - uninterruptible power supply 48
- altitude
  - uninterruptible power supply 48
- attachment
  - Non-IBM Alteration form xiii

## B

- batteries
  - caution notice xi
  - disposal xviii
- battery mode indicator
  - uninterruptible power supply 12
- buttons
  - alarm reset 12

## C

- Canadian electronic emission notice 56
- caution notices x, xi
  - battery disposal xviii
- checklist, safety inspection xi, xv
- connecting
  - SAN Volume Controller to a SAN 32
  - SAN Volume Controller to an
    - uninterruptible power supply 30
- connecting the SAN Volume Controller to the uninterruptible power supply and to the SAN 33
- controls and indicators
  - uninterruptible power supply
    - battery mode indicator 12
    - general alarm indicator 12
- controls and indicators on the front panel 4, 5, 37
  - SAN Volume Controller
    - power button 4
    - power LED 5
  - uninterruptible power supplies
    - battery mode button 12
    - battery service indicator 11
    - off button 11
    - on button 10
    - test and alarm-reset button 11
- conventions
  - emphasis in text vii

## D

- danger notices ix
- dc/ac voltage requirements 47
  - uninterruptible power supply 48
- dimensions and weight
  - master console 49
  - SAN Volume Controller 47
  - uninterruptible power supply 48
- disability 51
- display on front panel 37
  - status indications 37
    - boot failed 38
    - boot progress 37
    - hardware boot 38
    - node rescue request 38
    - power failure 38
    - powering off 39
    - restarting 39
    - shutting down 39
- disposal
  - batteries xviii
  - product xviii

## E

- electrical input 49
- electrical requirements 47
  - uninterruptible power supply 48
- electronic emission notices 55
  - European Union (EU) 56
  - Federal Communications Commission (FCC) 55
  - French Canadian 56
  - German 56
  - Industry Canada 56
  - International Electrotechnical Commission (IEC) 56
  - Japanese Voluntary Control Council for Interference (VCCI) 55
  - Korean Government Ministry of Communication (MOD) 55
  - New Zealand 56
  - Taiwan 57
  - United Kingdom 56
- emergency power-off (EPO) event xv
- emphasis in text vii
- environmental characteristics 47, 50
  - uninterruptible power supply 48
- environmental notices
  - product disposal xviii
  - product recycling xviii
- EPO (emergency power-off) event xv
- European Union electronic emission notice 56
- external machine safety check xii

## F

- FCC (Federal Communications Commission) electronic emission notice 55
- Federal Communications Commission (FCC) electronic emission notice 55
- fibre channel
  - port menu options 45
- French Canadian electronic emission notice 56
- frequency (voltage) 47
  - uninterruptible power supply 48
- front panel
  - menu options 40, 42
  - uninterruptible power supply 9

## G

- gateway menu option 42
- general alarm indicator
  - uninterruptible power supply 12
- general details
  - nodes 6
- German
  - radio protection notice 56
- grounding, checking
  - SAN Volume Controller xiii
  - uninterruptible power supplies xiii

## H

- hazards
  - electrical xi, xiv
  - explosive xi, xiv
  - mechanical xi, xiv
- heat output 49
  - master console 50
  - SAN Volume Controller 47
- humidity 47, 50
  - uninterruptible power supply 48

## I

- IEC (International Electrotechnical Commission) electronic emission notice 56
- indicators and controls
  - uninterruptible power supply
    - battery mode indicator 12
- indicators and controls on the front panel 9
  - SAN Volume Controller
    - check LED 5
    - navigation button 5
    - select button 5
  - uninterruptible power supplies
    - load level indicator 11
- information
  - center v

- inspections, safety xi, xiv, xv
  - external machine check xii
  - internal machine check xii
- installing
  - SAN Volume Controller 15, 29
  - support rails 16
    - SAN Volume Controller 26
  - uninterruptible power supply 15, 18
- installing support rails
  - uninterruptible power supply 18
- installing the SAN Volume Controller into the rack 30
- internal machine safety check xii
- International Electrotechnical Commission (IEC) electronic emission notice 56
- IP addresses 41

## J

- Japanese
  - electronic emission notice 55

## K

- keyboard 51
  - shortcut keys 51
- Korean
  - electronic emission notice 55

## L

- language
  - menu selection options 46
- laser xi

## M

- master console
  - configuring 15, 24
  - overview 13
- menu options
  - clusters 41
    - status 41, 42
    - subnet mask 41
  - Ethernet 45
  - nodes
    - create a cluster 42
  - SAN Volume Controller
    - active 41
    - create cluster 42
    - degraded 41
    - gateway 42
    - inactive 41
    - IP address 41
    - recover cluster 42
    - subnet mask 41

## N

- New Zealand electronic emission statement 56
- notices viii
  - environmental notices xviii
  - legal 53

- notices (*continued*)
  - safety
    - caution x

## O

- operation mode indicator 10
- ordering publications vii

## P

- power
  - emergency power-off event xv
  - power requirements 47, 49
  - uninterruptible power supply 48
- preparing
  - physical configuration 15
  - physical environment 15
- product characteristics 48
  - master console 49
  - SAN Volume Controller 47
- publications
  - ordering vii

## R

- recovery cluster menu option 42
- recycling, product xviii
- related information v
- requirements
  - uninterruptible power supplies xv

## S

- safety
  - caution notices viii, x, xi
  - danger notices viii, ix
  - hazards xi
  - inspections xi, xiv, xv
    - external machine check xii
    - internal machine check xii
    - label checks xv, xvi
  - labels, inspections xv, xvi
- SAN Volume Controller
  - checking grounding xiii
  - installing into the rack 30
  - installing the support rails 26
  - menu options
    - active 41
    - create cluster 42
    - degraded 41
    - gateway 42
    - inactive 41
    - IP address 41
    - recover cluster 42
    - subnet mask 41
  - overview 1
  - safety notices ix, xi
  - support rails 26
  - verifying the installation 35
- shortcut keys 51
- site requirements
  - environment 11
- specifications 48
  - master console 49

- specifications (*continued*)
  - SAN Volume Controller 47
- static-sensitive devices xix
- support
  - Web sites viii

## T

- Taiwan electronic emission notice 57
- temperature, air 47, 50
  - uninterruptible power supply 48
- text emphasis vii
- trademarks 54
- troubleshooting
  - using error logs 40

## U

- uninterruptible power supplies
  - overview 7
  - requirements xv
  - safety notices ix, x
- uninterruptible power supply
  - installing support rails 18
- United Kingdom electronic emission notice 56

## V

- verifying the SAN Volume Controller installation 35
- voltage and frequency 47
  - uninterruptible power supply 48

## W

- Web sites viii
- weight and dimensions
  - % 49
  - SAN Volume Controller 47
  - uninterruptible power supply 48
- who should read this guide v

---

## Readers' Comments — We'd Like to Hear from You

IBM TotalStorage  
SAN Volume Controller  
Installation Guide  
Version 1.2.0

Publication No. SC26-7541-02

Overall, how satisfied are you with the information in this book?

|                      | Very Satisfied           | Satisfied                | Neutral                  | Dissatisfied             | Very Dissatisfied        |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Overall satisfaction | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

How satisfied are you that the information in this book is:

|                          | Very Satisfied           | Satisfied                | Neutral                  | Dissatisfied             | Very Dissatisfied        |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Accurate                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Complete                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Easy to find             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Easy to understand       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Well organized           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Applicable to your tasks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please tell us how we can improve this book:

Thank you for your responses. May we contact you?  Yes  No

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Company or Organization

\_\_\_\_\_  
Phone No.



Fold and Tape

Please do not staple

Fold and Tape



NO POSTAGE  
NECESSARY  
IF MAILED IN THE  
UNITED STATES

# BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

International Business Machines Corporation  
Information Development  
Department 61C  
9032 South Rita Road  
Tucson, Arizona  
USA 85775-4401



Fold and Tape

Please do not staple

Fold and Tape







Part Number: 64P8120

Printed in USA

SC26-7541-02



(1P) P/N: 64P8120



Spine information:



IBM TotalStorage  
SAN Volume Controller

Installation Guide

Version 1.2.0