Hitachi Virtual Storage Platform Gx00 and Fx00

83-04-2x or later

Site Preparation Guide

This guide describes how to plan and prepare for the installation of the Hitachi Virtual Storage Platform G200, G400, G600, and G800 storage systems and Hitachi Virtual Storage Platform F400, F600, and F800 all-flash arrays.

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Preface

Before you proceed with your installation, it is important to confirm that your site is ready to support your storage system.

This guide describes how to plan and prepare for the installation of the Hitachi Virtual Storage Platform G200, G400, G600, G800 storage systems and Hitachi Virtual Storage Platform F400, F600, F800 all-flash arrays.

As part of the site-preparation process, customers are required to purchase site-preparation services from Hitachi Global Services. These services include:

- A telephone predelivery site survey to confirm power, location of equipment, access, and expectations.
- Telephone consultation to determine a customer's optimum configuration.

- Comments

Safety and environmental notices

Equipment warranty

The term of guarantee of normal operation of the storage system and free service is one year from date of purchase.

If a failure occurs multiple times, the storage system might shut off to avoid a serious accident.

Notice of export controls

Export of technical data contained in this document might require an export license from the United States government, the government of Japan. or both. Contact the Hitachi Legal Department for guidance about any export compliance questions.

Backup

Hitachi cannot guarantee against data loss due to failures. Therefore, back up your data to minimize chances for data loss.

Data backup is also critical when hardware components are added or replaced, because performing such hardware procedures restores parameter settings that can affect how data is managed on the storage systems.

Disposal

This symbol on the product or on its packaging means that your electrical and electronic equipment should be disposed at the end of life separately from your household wastes.

There are separate collection systems for recycling in the European Union. For more information, contact the local authority or the dealer where you purchased the product.

UEFI Development Kit 2010

This product includes UEFI Development Kit 2010 written by the UEFI Open Source Community. For more information, see the UEFI Development Kit website:

http://sourceforge.net/apps/mediawiki/tianocore/index.php?title=UDK2010

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General safety guidelines

Before starting maintenance:

- Maintenance must be performed by trained and qualified engineers only.
- The safety guidelines and procedures in this manual must be read and followed.
- In this manual and on the storage system, hazard warnings are provided to aid you in preventing or reducing the risk of death, personal injury, or product damage. Understand and follow these hazard warnings fully.
- If the warning labels on the storage system become dirty or start peeling off, replace them.
- If an anomaly such as an unusual noise, smell, or smoke occurs on the storage system while it is running, turn off the system or remove the power cables immediately.
- Hazard warnings in this manual or on the storage system cannot cover every possible case, because it is impossible to predict and evaluate all circumstances beforehand. Be alert and use common sense.
- To verify normal operation, operate the storage system according to the information in this manual.

Read the following safety guidelines carefully and follow them when you conduct maintenance of the machine:

- Do not use materials that are outside the specifications for the storage system.
- Use the spare parts, consumables, and materials for maintenance that are specified in this manual; otherwise, personal injury, system damage, and degradation in system quality can occur.
- Keep the maintenance area neat.
- Always put away parts, materials, and tools when not in use.

Handling of heavy parts

- When lifting a heavy object, hold it close to yourself and keep your back erect to prevent back injury.
- When lifting an object designated with a caution in this manual, use a proper lifting tool or ask someone to assist you.

Preventing electric shock

- Before starting work, be sure that, unless otherwise specifically instructed, there is no potential electric hazard in the maintenance area such as insufficient grounding or a wet floor.
- Before starting work, know where the emergency off switches are located and know how to operate them.

- Unless otherwise specifically instructed, remove all power sources to the machine before starting maintenance. Switching off the storage system power supplies is usually not sufficient.
- Do not touch any uninsulated conductor or surface that remains charged shortly after the external power supply to the storage system is disconnected.
- Do not replace parts during a thunderstorm.

Avoiding rotating or moving parts

- Do not supply power to any device with rotating or moving parts that are not properly covered.
- Tuck in your tie, scarf, shirt, or any other loose clothing to prevent it from getting caught by a rotating or moving part.

Preventing machine damage

- Use the tools and instruments, as instructed in this manual, or equivalent commercially available tools and instruments suited for the purpose.
- Use measurement instruments and powered tools that are properly calibrated or periodically inspected.
- Before finishing your work, be sure all parts removed during maintenance have been installed in their original positions in the storage system. Do not leave any tools or foreign material in the storage system.

Working when the storage system is in operation

Observe the following safety measures when working on a storage system that is in operation. When you perform maintenance, do not touch live electric parts to prevent an electric shock.

- Do not touch heat sinks immediately after a board is removed because the heat sinks can be extremely hot.
- While performing maintenance, do not drop tools, screws, or other items into the storage system, because doing so can cause a short circuit.
- While performing maintenance, do not damage or pinch wires.
- When moving a heavy object, ask at least two people to move the object after confirming there are no obstacles nearby.

Precautions when using the storage system

- Use the supplied power cords included with the storage system. Do not use the supplied power cords for other products. Do not use other power cords with the storage system.
- Stop the power feed to the equipment and inform the system administrator immediately if you notice an unusual smell, abnormal heat generation, or smoke emission. Leaving such conditions unattended can cause electric shock or fire.

- Be careful when handling the storage system and its parts. Do not drop the equipment or parts.
- Avoid improperly using the storage system for any other purpose. Do not stand on the storage system.
- Do not place large, heavy objects on the storage system, near the vents on the front and rear panels, or on the cables attached to the storage system.
- Do not put a container with items such as water or paper clips on the storage system or near the power supply.
- Route cables so as to prevent people from tripping over them.
- Do not operate the storage system in a moist or dusty environment.
- Keep these vents open and verify they are not blocked to keep the storage system ventilated. Cool air enters the storage system from the air vent on the front panel and exits through the vent on the rear panel.
- If a failure occurs in the storage system, follow the instructions in this manual to resolve the situation. If the corrective action is not covered by this manual, contact your system administrator.

Emergency procedures

Use the following procedures to prevent electrical shock or fire when working with the storage system while it is in operation.

For electric shock

- Before performing maintenance, clear away any potential electric hazards in the maintenance area, such as insufficient grounding, loose electrical cables or a wet floor.
- Before performing maintenance, locate the emergency off switches and know how to operate them.
- Unless instructed, remove all power sources to the storage system before working on it. Switching off the storage system power supplies is not sufficient. When power is distributed from a wall or floor outlet, unplug the power supply cord or turn off the switch on the power distribution panel or board.
- If the power supply has a lockout device, lock the device after powering off the storage system and retain the key. Attach a notice on the panel or board prohibiting the use of the switch.
- If the machine power has been already turned off, verify these conditions have been satisfied.

For fire

- Stop all the power to the machine.
- Turn off the emergency power switch or stop the power supply to the storage system.
- If the fire continues to burn after the power is turned off, take necessary actions such as using a fire extinguisher or contacting the fire department.

Audience and qualifications

This guide is intended for data center administrators, facility managers, and others who perform the planning and preparation work for storage system installations. It references skilled tasks and describes important safety considerations, and is not intended as a training aid for untrained personnel.

The information in this guide assumes the reader has the following abilities:

- Is familiar with computing terminology, RAID technology, and optical and Ethernet connectivity.
- Understands networking concepts, network switch technology, and network cabling.
- Knows how to calculate floor loads and power budgeting.
- Understands the procedures for installing rack-mounted components and is trained in safe work procedures.
- Is familiar with high-speed interconnects for modular storage systems.

Product version

This document revision applies to Hitachi Virtual Storage Platform G200, G400, G600, G800 and Hitachi Virtual Storage Platform F400, F600, F800 firmware 83-04-2*x* or later.

Release notes

Read the release notes before installing and using this product. They may contain requirements or restrictions that are not fully described in this document or updates or corrections to this document. Release notes are available on Hitachi Data Systems Support Connect: https://knowledge.hds.com/Documents.

Changes in this revision

- Deleted Windows 8.1 as an SVP-supported operating system.
- Updated document to show that Windows Server 2012 and Windows 10 are qualified to run on Microsoft Hyper-V Server 2012 R2 only.

Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	• Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: Click **OK**. • Indicates emphasized words in list items.
Italic	• Indicates a document title or emphasized words in text. • Indicates a variable, which is a placeholder for actual text provided by the user or for output by the system. Example: `pairdisplay -g group` (For exceptions to this convention for variables, see the entry for angle brackets.)
`Monospace`	Indicates text that is displayed on screen or entered by the user. Example: `pairdisplay -g oradb`
< > angle brackets	Indicates variables in the following scenarios: • Variables are not clearly separated from the surrounding text or from other variables. Example: `Status-<report-name><file-version>.csv` • Variables in headings.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a | b] indicates that you can choose a, b, or nothing. { a | b } indicates that you must choose either a or b.

This document uses the following icons to draw attention to information:

Icon	Label	Description
	Note	Calls attention to important or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions and/or consequences (for example, disruptive operations, data loss, or a system crash).
	WARNING	Warns the user of a hazardous situation which, if not avoided, could result in death or serious injury.

Conventions for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 kilobyte (KB)	1,000 (10^3) bytes
1 megabyte (MB)	1,000 KB or $1,000^2$ bytes
1 gigabyte (GB)	1,000 MB or $1,000^3$ bytes
1 terabyte (TB)	1,000 GB or $1,000^4$ bytes
1 petabyte (PB)	1,000 TB or $1,000^5$ bytes
1 exabyte (EB)	1,000 PB or $1,000^6$ bytes

Logical capacity values (for example, logical device capacity, cache memory capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 cylinder	Mainframe: 870 KB Open-systems: • OPEN-V: 960 KB • Others: 720 KB
1 KB	1,024 (2^{10}) bytes
1 MB	1,024 KB or $1,024^2$ bytes
1 GB	1,024 MB or $1,024^3$ bytes
1 TB	1,024 GB or $1,024^4$ bytes
1 PB	1,024 TB or $1,024^5$ bytes
1 EB	1,024 PB or $1,024^6$ bytes

Accessing product documentation

Product user documentation is available on Hitachi Data Systems Support Connect: https://knowledge.hds.com/Documents. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

Hitachi Data Systems Support Connect is the destination for technical support of products and solutions sold by Hitachi Data Systems. To contact technical

support, log on to Hitachi Data Systems Support Connect for contact information: https://support.hds.com/en_us/contact-us.html.

Hitachi Data Systems Community is a global online community for HDS customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to community.hds.com, register, and complete your profile.

Comments

Please send us your comments on this document to doc.comments@hds.com. Include the document title and number, including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems Corporation.

Thank you!

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System components and specifications

Storage system components

The Hitachi Virtual Storage Platform G200, G400, G600, G800 storage systems and Hitachi Virtual Storage Platform F400, F600, F800 all-flash arrays are modular, rack-mountable systems that incorporate state-of-the-art virtualization, data-management, and fault-tolerant technologies.

All models are compatible with most industry-standard 4-post EIA 19-inch racks with square mounting holes. The storage system can be factory-configured and shipped in a Hitachi 600 x 1200 mm V2 Universal Rack, or shipped without a rack for customer installation into an existing rack.

The Hitachi rack comes with either two or four Power Distribution Units (PDUs), depending on the PDU model selected. The PDUs are installed vertically in the rack.

- If two PDUs are selected, one will be installed on the left side of the rack and the other will be installed on the right side.
- If four PDUs are selected, the PDUs will be half-length and mounted vertically, one above the other, with two on the left side of the rack and two on the right side.

All storage systems are comprised of controllers, drive trays, and a service processor (SVP).

Controllers

Controllers are components in the storage system that cache and manage data, and provide hosts with a coherent, virtualized view of the system. All storage systems have two controllers.

The controllers for the Hitachi Virtual Storage Platform G200 include either 24 2.5-inch small form-factor (SFF) disk drives or 12 3.5-inch large form-factor (LFF) disk drives.

Drive trays

Drive trays are intelligent and compact storage units, with each capable of holding a large numbers of disk drives in a small rack space (EIA-standard rack units). VSP G200, G400, G600, G800 storage systems support the following drive trays and drives:

- DW-F800-DBS: 2U drive tray that holds 24 2.5-inch SFF disk drives. Drives are arranged vertically in a single row.
- DW-F800-DBL: 2U drive tray that holds 12 3.5-inch LFF disk drives. Drives are arranged horizontally, with four columns of three disk drives.
- DW-F800-DBF: 2U drive tray that holds 12 Hitachi Accelerated Flash (HAF) or DC2 flash module drives. Drives are arranged horizontally, with three columns of three disk drives.

- DW-F800-DB60: 4U dense drive tray that holds 60 LFF disk drives. Drives are arranged horizontally, with five rows of 12 disk drives.

VSP F400, F600, F800 all-flash array models support various fixed storage capacity configurations of DC2 flash module drives within the DW-F800-DBF drive tray. To deliver consistent low latency host response times and highest IOP performance across all host connection ports, no HDDs are included or permitted to be configured as part of the all-flash array configurations.

NAS modules

Some storage systems support NAS modules for sharing file-based information over an IP network using system protocols such as Common Internet File System (CIFS), Network File System (NFS), and Server Message Block (SMB). NAS modules are installed in pairs.

Service processor

The SVP is available as a physical (Hitachi Data Systems bare metal) 1U management server or as a 64-bit software application supplied by Hitachi Data Systems. The physical SVP server and the SVP software applications are supported in the environments shown in the following tables. For the latest interoperability updates and details, see the *VSP Gx00 Fx00 Service Processor (SVP)* report at https://support.hds.com/en_us/interoperability.html.

SVP solutions	Windows Embedded Standard 7 (64-bit)	Windows 7 Professional (64-bit)	Windows 7 Professional Service Pack 1 (64-bit)
Hitachi Data Systems bare metal	Yes		
Customer bare metal (continued in the table below)		Yes	
Oracle Linux 7.2 KVM		Yes	
VMware ESXi 6.0.0		Yes	
VMware ESXi 6.0 U2 (including cluster)			Yes

SVP solutions	Windows Server 2012 (64-bit)	Windows Server 2012 R2 (64-bit)	Windows 10 Professional (64-bit)	Windows 10 Enterprise (64-bit)
Customer bare metal	Yes	Yes	Yes	Yes

Microsoft Hyper-V Server 2012 R2		Yes		Yes

VSP G200VSP G400, G600 VSP G800 VSP F400, F600 VSP F800 storage system components

The VSP G200VSP G400, G600 VSP G800 VSP F400, F600 VSP F800 includes essential building blocks such as controllers, drive trays, and other optional front and back end components.

Replacement parts

Part replacement is essential for maintaining the high performance of the system. Replacing system components is covered by the maintenance service contract.

Battery unit

Replacement period

Three years.

Treatment

Use the storage system in a place where the ambient temperature is 86°F (30°C) or less on average.

Periodic parts replacement is required. For customers with maintenance service contracts, parts are replaced periodically in keeping with the terms of the contract.

Note: The battery protects the data in the cache memory in an emergency, such as a sudden power failure. In these cases, follow the normal power down procedure. If not, the battery might reach its lifespan earlier than expected and become unusable within three years. When replacing the battery, follow the given procedure for disposing a used battery.

VSP G200VSP G400, G600 VSP G800 VSP F400, F600 VSP F800 storage system mechanical specifications

The storage system mechanical specifications are described for VSP G200 VSP G400, G600 VSP G800 VSP F400, F600 VSP F800.

VSP G200 mechanical specifications (AC power supply model)

Controllers

Quantity	Component	Description
1	CBSS	A SFF controller chassis consisting of controllers, channel boards, disk boards, NAS module (optional), AC or DC power supplies, and batteries with cooling fans.
1	CBSL	A LFF controller chassis consisting of controllers, channel boards, disk boards, NAS module (optional), AC or DC power supplies, and batteries with cooling fans.

Drive trays

Quantity	Component	Description
1	SFF drive tray (DBS)	A drive tray that supports 2.5-inch disk drives and 2.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and AC-DC power supplies or DC-DC power supplies.
1	LFF drive tray (DBL)	A drive tray that supports 3.5-inch disk drives and 3.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and AC-DC power supplies or DC-DC power supplies.
1	FMD tray	A drive tray that supports flash module drives and consists of an ENC and AC-DC power supplies equipped with built-in cooling fans.
1	Dense intermix drive tray	A drive chassis that supports a variety of drive types such as 2.5-inch drives, 3.5-inch drives, and flash drives. The chassis consists of an ENC and AC-DC power supplies equipped with built-in cooling fans.

Drive type specifications

Item	Component	Specification
Drive size (WxDxH)	CBSS, SFF drive tray	2.5-type: 3.21 x 8.10 x 0.74 inches (81.6 x 205.7 x 18.7 mm)
	CBSL, LFF drive tray	3.5-type: 4 x 5.78 x 1.02 inches (101.6 x 147.0 x 26.1 mm)
	FMD drive tray	Flash module drive: 5.74 x 14.44 x 0.78 inches (146 x 366.8 x 19.8 mm)
Data capacity (GB)	CBSS, SFF drive tray	2.5-type: 196.92, 288.20, 393.85, 472.61, 576.39, 945.23, 1152.79, 1729.29, 1890.46, 3780.92 GB
	CBSL, LFF drive tray, dense intermix drive tray	3.5-type: 393.85, 1152.79, 1729.29, 3916.14, 5874.22, 9790.36 GB
	FMD drive tray	Flash module drive: 1759.21, 3518.43 , 7036.87, 14073.74 GB
Rotational speed (min[1])	CBSS, SFF drive tray	2.5-type: 288.20 GB, 15,000 RPM 2.5-type: 576.39 GB, 10,000 or 15,000 RPM 2.5-type: 1152.79 GB, 10,000 RPM 2.5-type: 1729.29 GB, 10,000 RPM
	CBSL, LFF drive tray	3.5-type: 1152.79 GB, 10,000 RPM 3.5-type: 1729.29 GB, 10,000 RPM 3.5-type: 3916.14 GB, 7,200 RPM 3.5-type: 5874.22 GB, 7,200 RPM 3.5-type: 9790.36 GB, 7,200 RPM
	FMD drive tray	Flash module drive: 1759.21, 3518.43 , 7036.87, 14073.74 GB
Maximum number of drives that can be mounted	CBSS	24 drives
	CBSL	12 drives
	SFF drive tray (VSP Gx00 models only)	24 drives
	LFF drive tray (VSP Gx00 models only)	12 drives

Item	Component	Specification
	FMD drive tray	12 drives
	Dense intermix drive tray (VSP Gx00 models only)	60 drives
Maximum number of spare drives		16

Host interface

Item	Component	Specification
Interface type	Fibre Channel optical	8-Gbps, 16-Gbps, 32-Gbps
	iSCSI optical	10-Gbps
	Copper iSCSI	10-Gbps
Data transfer speed (maximum speed for transfer to host)	Fibre Channel optical	800-Mbps (Fibre Channel)
	Fibre Channel optical	1600-Mbps (Fibre Channel)
	Fibre Channel optical	3200-Mbps (Fibre Channel)
	iSCSI optical	10-Gbps (iSCSI optical)
	Copper iSCSI	10-Gbps (copper iSCSI)
Number of ports	8-Gbps Fibre Channel optical	16
	16-Gbps Fibre Channel optical (2-port)	8
	16-Gbps Fibre Channel optical (4-port)	16
	32-Gbps Fibre Channel optical (4-port)	16
	10-Gbps optical iSCSI	8
	10-Gbps copper iSCSI	8
Transferred block size		512 bytes
Maximum number of hosts using a Fibre Channel switch		255
Maximum number of hosts using a network switch		255

Battery specifications

Storage system intake temperature	CBSS	CBSL
Up to 75.2º F (24º C)	5 years	5 years
Up to 86º F (30º C)	5 years	4 years
Up to 93.2º (34º C)	4 years	3 years
Up to 104º (40º C)	3 years	2 years

RAID specifications

D: Data drive, P: Parity drive.

Although the storage system with a configuration of RAID 1, RAID 5, or RAID 6 provides data reliability enhanced by redundancy, there is a chance that user data could be lost due to an unexpected host, storage system hardware, or software failure. Therefore, users are requested to back up all data.

Item	Drive tray
RAID Level	SAS, SAS 7.2k, flash drives mounted
RAID 1	2D+2D, 4D+4D
RAID 5	3D+1P, 4D+1P, 6D+1P, 7D+1P
RAID 6	6D+2P, 12D+2P, 14D+2P

Item	Specification
Maximum number of parity groups	88
Maximum volume size	3 TB (or 4 TB when using the LDEVs of other storage systems)
Maximum volumes/host groups and iSCSI targets	2,048
Maximum volumes/parity groups	2,048

Internal logic specifications

Item	Component	Specifications
Shared memory	Flash memory	32 MB
	L3 cache memory	4 MB
	SDRAM	1 GB
Data assurance method	Data bus	Parity
	Cache memory	ECC (1 bit for correction, 2 bits for detection)
	Drive	Data assurance code

Physical specifications

Item	Component	Specifications
Start-up time (min)[1]	Controller	Standard: 5 to 8
	Drive trays	Standard: 5 to 8
Chassis size	Controller	WxDxH: 19 x 32 x 3.5 inches (483 x 813 x 88 mm)
	SFF drive tray (VSP Gx00 models only)	WxDxH: 19 x 22.2 x 3.5 inches (483 x 565 x 88.2 mm)

Item	Component	Specifications
	LFF drive tray (VSP Gx00 models only)	WxDxH: 19 x 22.2 x 3.5 inches (483 x 565 x 88.2 mm)
	FMD drive tray	WxDxH: 19 x 30 x 3.4 inches (483 x 762 x 87 mm)
	Dense intermix drive tray (VSP Gx00 models only)	WxDxH: 19 x 40.5 x 7 inches (482 x 1029 x 176 mm)
Mass (approximate)[2]	CBSS	97 lbs (44 kg)
	CBSL	101.4 lbs (46 kg)
	SFF drive tray (VSP Gx00 models only)	51 lbs (23 kg)
	LFF drive tray (VSP Gx00 models only)	59.5 lbs (27 kg)
	FMD drive tray	84 lbs (38 kg)
	Dense intermix drive tray (VSP Gx00 models only)	198 lbs (90 kg)
Required height	CBSS, CBSL	2
	SFF drive tray (VSP Gx00 models only)	2
	LFF drive tray (VSP Gx00 models only)	2
	FMD drive tray	2
	Dense intermix drive tray (VSP Gx00 models only)	4

Notes

1. The startup time might be longer in proportion to the number of drive trays connected. With a maximum configuration of 1 controller and 19 drive trays, startup time is approximately 8 minutes.
2. Value of maximum configuration when all controllers and drives are mounted.
3. Mixing SFF, LFF, FMD, and dense intermix drive trays might affect the maximum number of drives that can be mounted.
4. If a drive is inserted into a slot of a dense intermix drive tray when the installed number of drives exceeds 240 slots per path, the drive is blocked.

Cache specifications

Item	Specifications
Capacity (GB)	64 GB
Control method	Read LRU, Write after
Battery backup	Provided
Backup duration	Unrestricted (saving to a nonvolatile memory)

Data in the cache memory is preserved against power failures. If a power outage occurs, data in cache memory is written to drives.

When the storage system enters Cache Backup mode, the amber WARNING LED goes on to when the system starts. This warning indicates that the battery charge has dropped significantly and the remaining battery capacity is not sufficient; the storage system will continue operating with the Write Cache function disabled.

When the battery is charged, the warning indication disappears, and the storage system continues the operation in the Write Cache function.

The warning indication disappears within six hours. Even when the warning is shown, normal operation is assured in Write-Through. Read and write performance is lowered because the Write Cache function is disabled.

If the storage system is not charged for more than six months, the battery can become overcharged and sustain unrecoverable damage. To avoid this situation, charge the battery more than 3 hours every six months.

Insulation performance

Item	Specifications
Insulation withstand voltage	AC 1,500 V (100 mA, 1 min)
Insulation resistance	DC 500 V, 10 M Ω or more

VSP G200 mechanical specifications (DC power supply model)

Controllers

Quantity	Component	Description
1	CBSSD	A SFF controller chassis consisting of controllers, channel boards, disk boards, NAS module (optional), DC power supplies, and batteries with cooling fans.
1	CBSLD	A LFF controller chassis consisting of controllers, channel boards, disk boards, NAS module (optional), DC power supplies, and batteries with cooling fans.

Drive trays

Quantity	Component	Description
1	SFF drive tray (DBSD)	A drive tray that supports 2.5-inch disk drives and 2.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and DC-DC power supplies.
1	LFF drive tray (DBLD)	A drive tray that supports 3.5-inch disk drives and 3.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and DC-DC power supplies.

Drive specifications

Item	Component	Specification
Drive size (WxDxH)	CBSSD, SFF drive tray	2.5-type: 3.21 x 8.10 x 0.74 inches (81.6 x 205.7 x 18.7 mm)
	CBSLD, LFF drive tray	3.5-type: 4 x 5.78 x 1.02 inches (101.6 x 147.0 x 26.1 mm)
Data capacity (GB)	CBSSD, SFF drive tray	2.5-type: 196.92, 288.20, 393.85, 472.61, 576.39, 945.23, 1152.79, 1729.29, 1890.46, 3780.92 GB
	CBSLD, LFF drive tray	3.5-type: 393.85, 1152.79, 1729.29, 3916.14, 5874.22, 9790.36 GB
Rotational speed (min^{1})	CBSSD, SFF drive tray	2.5-type: 288.20 GB, 15,000 RPM 2.5-type: 576.39 GB, 10,000 or 15,000 RPM 2.5-type: 1152.79 GB, 10,000 RPM 2.5-type: 1729.29 GB, 10,000 RPM
	CBSLD, LFF drive tray	3.5-type: 1152.79 GB, 10,000 RPM 3.5-type: 1729.29 GB, 10,000 RPM 3.5-type: 3916.14 GB, 7,200 RPM 3.5-type: 5874.22 GB, 7,200 RPM 3.5-type: 9790.36 GB, 7,200 RPM

Item	Component	Specification
Maximum number of drives that can be mounted	CBSSD, SFF drive tray	24 drives
	CBSLD, LFF drive tray	12 drives
Maximum number of spare drives		16

Battery specifications

Storage system intake temperature	CBSS	CBSL
Up to 75.2º F (24º C)	5 years	5 years
Up to 86º F (30º C)	5 years	4 years
Up to 93.2º (34º C)	4 years	3 years
Up to 104º (40º C)	3 years	2 years

Host interface

Item	Component	Specification
Interface type	Fibre Channel optical	8-Gbps, 16-Gbps, 32-Gbps
	iSCSI optical	10-Gbps
	Copper iSCSI	10-Gbps
Data transfer speed (maximum speed for transfer to host)	Fibre Channel optical	800-Mbps (Fibre Channel)
	Fibre Channel optical	1600-Mbps (Fibre Channel)
	Fibre Channel optical	3200-Mbps (Fibre Channel)
	iSCSI optical	10-Gbps (iSCSI optical)
	Copper iSCSI	10 Gbps (copper iSCSI)
Number of ports	8-Gbps Fibre Channel optical	16
	16-Gbps Fibre Channel optical (2-port)	8
	16-Gbps Fibre Channel optical (4-port)	16
	32-Gbps Fibre Channel optical (4-port)	16
	10-Gbps optical iSCSI	8
	10 Gbps copper iSCSI	8
Transferred block size		512 bytes
Maximum number of hosts using a Fibre Channel switch		255
Maximum number of hosts using a network switch		255

RAID specifications

D: Data drive, P: Parity drive.

Although the storage system with a configuration of RAID 1, RAID 5, or RAID 6 provides data reliability enhanced by redundancy, there is a chance that user data could be lost due to an unexpected host, storage system hardware, or software failure. Therefore, users are requested to back up all data.

Item	Drive tray
RAID Level	SAS, SAS 7.2k, flash drives mounted
RAID 1	2D+2D, 4D+4D
RAID 5	3D+1P, 4D+1P, 6D+1P, 7D+1P
RAID 6	6D+2P, 12D+2P, 14D+2P

Item	Specification
Maximum number of parity groups	88
Maximum volume size	3 TB (or 4 TB when using the LDEVs of other storage systems)
Maximum volumes/host groups and iSCSI targets	2,048
Maximum volumes/parity groups	2,048

Internal logic specifications

Item	Component	Specifications
Shared memory	Flash memory	32 MB
	L3 cache memory	4 MB
	SDRAM	1 GB
Data assurance method	Data bus	Parity
	Cache memory	ECC (1 bit for correction, 2 bits for detection)
	Drive	Data assurance code

Physical specifications

Item	Component	Specifications
Start-up time (min)[1]	Controller	Standard: 5 to 8
	Drive trays	Standard: 5 to 8
Chassis size	Controller	WxDxH: 19 x 32 x 3.5 inches (483 x 813 x 88 mm)
	SFF drive tray (VSP Gx00 models only)	WxDxH: 19 x 22.2 x 3.5 inches (483 x 565 x 88.2 mm)

Item	Component	Specifications
	LFF drive tray (VSP Gx00 models only)	WxDxH: 19 x 22.2 x 3.5 inches (483 x 565 x 88.2 mm)
Mass (approximate)[2]	CBSSD	97 lbs (44 kg)
	CBSLD	101.4 lbs (46 kg)
	SFF drive tray (VSP Gx00 models only)	51 lbs (23 kg)
	LFF drive tray (VSP Gx00 models only)	59.5 lbs (27 kg)
Required height	CBSSD, CBSLD	2
	SFF drive tray (VSP Gx00 models only)	2
	LFF drive tray (VSP Gx00 models only)	2

Notes

1. The startup time might be longer in proportion to the number of drive trays connected. With a maximum configuration of 1 controller and 19 drive trays, startup time is approximately 8 minutes.
2. Value of maximum configuration when all controllers and drives are mounted.
3. Mixing DBSD and DBLD drive trays might affect the maximum number of drives that can be mounted.
4. If a drive is inserted into a slot of a dense intermix drive tray when the installed number of drives exceeds 240 slots per path, the drive is blocked.

Cache specifications

Item	Specifications
Capacity (GB)	64 GB
Control method	Read LRU, Write after
Battery backup	Provided
Backup duration	Unrestricted (saving to a nonvolatile memory)

Data in the cache memory is preserved against power failures. If a power outage occurs, data in cache memory is written to drives.

When the storage system enters Cache Backup mode, the amber WARNING LED goes on to when the system starts. This warning indicates that the battery charge has dropped significantly and the remaining battery capacity is not sufficient; the storage system will continue operating with the Write Cache function disabled.

When the battery is charged, the warning indication disappears, and the storage system continues the operation in the Write Cache function.

The warning indication disappears within six hours. Even when the warning is shown, normal operation is assured in Write-Through. Read and write performance is lowered because the Write Cache function is disabled.

If the storage system is not charged for more than six months, the battery can become overcharged and sustain unrecoverable damage. To avoid this situation, charge the battery more than 3 hours every six months.

Insulation performance

Item	Specifications
Insulation withstand voltage	AC 1,500 V (100 mA, 1 min)
Insulation resistance	DC 500 V, 10 M Ω or more

VSP G400 or VSP F400 and VSP G600 or VSP F600 mechanical specifications

Controller

Quantity	Component	Description
1	CBLM	A 4U controller chassis consisting of controllers, channel boards, disk boards, NAS module (optional), AC or DC power supplies, and batteries with cooling fans.

Drive trays

Quantity	Component	Description
1	SFF drive tray	A drive tray that supports 2.5-inch disk drives and 2.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and AC-DC power supplies or DC-DC power supplies.
1	LFF drive tray	A drive tray that supports 3.5-inch disk drives and 3.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and AC-DC power supplies or DC-DC power supplies.
1	FMD tray	A drive tray that supports flash module drives and consists of an ENC and AC-DC power supplies equipped with built-in cooling fans.

Quantity	Component	Description
1	Dense intermix drive tray	A drive chassis that supports a variety of drive types such as 2.5-inch drives, 3.5-inch drives, and flash drives. The chassis consists of an ENC and AC-DC power supplies equipped with built-in cooling fans.

NAS module

Component	Description
NAS module	Optional component for block and file storage configuration

Drive size

Component	Specification
2.5-inch drive (SFF) (VSP Gx00 models only)	3.21 x 8.10 x 0.74 inches (81.6 x 205.7 x 18.7 mm)
3.5-inch drive (LFF and dense intermix drive tray) (VSP Gx00 models only)	4 x 5.78 x 1.02 inches (101.6 x 147.0 x 26.1 mm)
Flash Module Drive (flash module drive tray)	5.74 x 14.44 x 0.78 inches (146 x 366.8 x 19.8 mm)

Data capacity (GB)

Component	Specification
2.5-inch drive (SFF) (VSP Gx00 models only)	196.92, 288.20, 393.85, 472.61, 576.39, 945.23, 1152.79, 1729.29, 1890.46, 3780.92 GB
3.5-inch drive (LFF and dense intermix drive tray) (VSP Gx00 models only)	393.85, 1152.79, 1729.29, 3916.14, 5874.22, 9790.36 GB
Flash Module Drive (flash module drive tray)	1759.21, 3518.43 , 7036.87, 14073.74 GB

Rotational speed (min^{-1})

Component	Specification
2.5-inch drive (SFF) (VSP Gx00 models only)	288.20 GB: 15,000 RPM 576.39 GB: 10,000 or 15,000 RPM

Component	Specification
	1152.79 GB: 10,000 RPM 1729.29 GB: 10,000 RPM
3.5-inch drive (LFF and dense intermix drive tray) (VSP Gx00 models only)	3916.14 GB: 7,200 RPM 5874.22 GB: 7,200 RPM 9790.36 GB: 7,200 RPM

Maximum mountable quantity

Mixing SFF, LFF, FMD, and dense intermix drive trays might affect the maximum number of drives that can be mounted.

Component	Specification
SFF (VSP Gx00 models only)	24
LFF (VSP Gx00 models only)	12
Flash module drive (flash module drive tray) (VSP Gx00 models only)	12
Dense intermix drive tray (VSP Gx00 models only)	60
Maximum number of flash module drives (VSP Fx00 models)	VSP F400: 8 +1 spare drive VSP F600 16 + 1 spare drive

Battery specifications

Storage system intake temperature	CBLMCBLH
Up to 75.2º F (24º C)	5 years
Up to 86º F (30º C)	5 years
Up to 93.2º (34º C)	4 years
Up to 104º (40º C)	3 years

Host interface

Item	Component	Specification
Interface type	Fibre Channel optical	8-Gbps, 16-Gbps, 32-Gbps
	iSCSI optical	10-Gbps
	iSCSI copper	10-Gbps
	NAS module	10-Gbps (Fibre Channel optical)

Item	Component	Specification
Data transfer speed (maximum speed for transfer to host)	Fibre Channel optical	800-Mbps (Fibre Channel)
		1600-Mbps (Fibre Channel)
		3200-Mbps (Fibre Channel)
	iSCSI optical	10-Gbps (iSCSI optical)
	iSCSI copper	10-Gbps (iSCSI copper)
	NAS module (Fibre Channel)	1000 Mbs
Number of ports	8-Gbps Fibre Channel optical	64
	16-Gbps Fibre Channel optical (2-port)	32
	16-Gbps Fibre Channel optical (4-port)	64
	32-Gbps Fibre Channel optical (4-port)	64
	10-Gbps optical iSCSI	32
	10-Gbps copper iSCSI	32
Number of ports (NAS Module not installed)	8-Gbps Fibre Channel optical	64 56
	16-Gbps Fibre Channel optical (2-port)	32 28
	16-Gbps Fibre Channel optical (4-port)	64 56
	32-Gbps Fibre Channel optical (4-port)	64 56
	10-Gbps optical iSCSI	32 28
	10-Gbps copper iSCSI	32 28
Number of ports (NAS Module installed)	8-Gbps Fibre Channel optical	24
	16-Gbps Fibre Channel optical (2-port)	12
	16-Gbps Fibre Channel optical (4-port)	24
	32-Gbps Fibre Channel optical (4-port)	24
	10-Gbps optical iSCSI	12
	10-Gbps copper iSCSI	12
	10-Gbps Fibre Channel optical	12
Transferred block size		512 bytes
Maximum number of hosts using a Fibre Channel switch		255

Item	Component	Specification
Maximum number of hosts using a network switch		255

RAID specifications

D: Data drive, P: Parity drive.

Although the storage system with a configuration of RAID 1, RAID 5, or RAID 6 provides data reliability enhanced by redundancy, there is a chance that user data could be lost due to an unexpected host, storage system hardware, or software failure. Therefore, users are requested to back up all data.

RAID Level	SAS, SAS 7.2k, flash drives mounted
RAID 1	2D+2D, 4D+4D
RAID 5	3D+1P, 4D+1P, 6D+1P, 7D+1P
RAID 6	6D+2P, 12D+2P, 14D+2P

Item	Specification
Maximum number of RAID groups	VSP G400 or VSP F400:160 VSP G600 or VSP F600:240
Maximum volume size	3 TB (or 4 TB when using the LDEVs of other storage systems)
Maximum volumes/host groups and iSCSI targets	2048
Maximum number of volumes per RAID group	2048

Shared memory and data assurance

Item	Specification
Flash memory	32 MB
L3 Cache memory	4 MB
SDRAM	1 GB
Data bus	Parity
Cache memory	ECC (1 bit for correction, 2 bits for detection)
Drive	Data assurance code

Start-up time

Item
Standard: 5-to-8 minutes. The start-up time may be longer in proportion to the number of drive trays connected. With a maximum configuration 1 controller tray and 19 drive trays, start-up time is approximately 8 minutes.

Chassis size

Component	Specification (WxDxH)
CBLM	19.01 x 35.10 x 6.86 inches (483 x 891.7 x 174.3 mm)
SFF/LFF (VSP Gx00 models only)	18.97 x 22.24 x 3.47 inches (482 x 565 x 88.2 mm)
DBF	19.01 x 30 x 3.42 inches (483 x 762 x 87 mm)
Dense intermix drive tray (VSP Gx00 models only)	18.97 x 40.51 x 6.92 inches (482 x 1,029 x 176 mm) (includes the depth of the cable-management arms)

Mass

The table lists the values of a maximum configuration when all controllers and drives are mounted.

Component	Specification
CBLM	187.39 pounds (85 kg)
SFF (VSP Gx00 models only)	Approx 50.70 inches (23 kg)
LFF (VSP Gx00 models only)	Approx 59.52 inches (27 kg)
DBF	Approx. 83.77 pounds (38 kg)
Dense intermix drive tray (VSP Gx00 models only)	Approx. 198.41 pounds (90 kg)

Required height

Component	Specification
CBLM	4 U
SFF (VSP Gx00 models only)	2 U
LFF (VSP Gx00 models only)	2 U
DBF	2 U

Component	Specification
Dense intermix drive tray (VSP Gx00 models only)	4 U If a drive is inserted into a slot of a dense intermix drive tray when the installed number of drives exceeds 240 slots per path, the drive is blocked.

Cache specifications

Item	Specification
Capacity (GB)	VSP G400: 128 VSP G600: 256 VSP F400: 128 VSP F600: 256
NAS module Cache Capacity	DDR3 DIMM 8GB x 12 [Slot] Note: • All 12 slots must be fully installed with DIMMs. • Each DIMM is replaceable when they fail. • The DIMM is not common and cannot be used with DKC DIMM.
Control method	Read LRU, Write after
Battery backup	Provided
Backup duration	Unrestricted (saving to a nonvolatile memory)

Data in the cache memory is preserved against power failures. If a power outage occurs, data in cache memory is written to drives.

When the storage system enters Cache Backup mode, the amber WARNING LED goes on to when the system starts. This warning indicates that the battery charge has dropped significantly and the remaining battery capacity is not sufficient; the storage system will continue operating with the Write Cache function disabled.

When the battery is charged, the warning indication disappears, and the storage system continues the operation in the Write Cache function.

The warning indication disappears within six hours. Even when the warning is shown, normal operation is assured in Write-Through. Read and write performance is lowered because the Write Cache function is disabled.

If the storage system is not charged for more than six months, the battery can become overcharged and sustain unrecoverable damage. To avoid this situation, charge the battery more than 3 hours every six months.

Insulation performance

Item	Specification
Insulation withstand voltage	AC 1,500 V (100 mA, 1 min)
Insulation resistance	DC 500 V, 10 M Ω or more

VSP G800VSP F800 mechanical specifications

Controller

Quantity	Component	Description
1	CBLH	A 4U controller chassis consisting of controllers, channel boards, disk boards, NAS module (optional), AC or DC power supplies, and batteries with cooling fans.

Drive tray

Quantity	Component	Description
1	SFF drive tray	A drive tray that supports 2.5-inch disk drives and 2.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and AC-DC power supplies or DC-DC power supplies.
1	LFF drive tray	A drive tray that supports 3.5-inch disk drives and 3.5-inch flash drives. The drive tray consists of an ENC, cooling fans, and AC-DC power supplies or DC-DC power supplies.
1	FMD tray	A drive tray that supports flash module drives and consists of an ENC and AC-DC power supplies equipped with built-in cooling fans.
1	Dense intermix drive tray	A drive chassis that supports a variety of drive types such as 2.5-inch drives, 3.5-inch drives, and flash drives. The chassis consists of an ENC and AC-DC power supplies equipped with built-in cooling fans.

NAS module

Component	Description
NAS module	Optional component for block and file storage configuration

Drive size

Component	Specification
2.5-inch drive (SFF) (VSP Gx00 models only)	3.21 x 8.10 x 0.74 inches (81.6 x 205.7 x 18.7 mm)
3.5-inch drive (LFF and dense intermix drive tray) (VSP Gx00 models only)	4 x 5.78 x 1.02 inches (101.6 x 147.0 x 26.1 mm)
Flash Module Drive (flash module drive tray)	5.74 x 14.44 x 0.78 inches (146 x 366.8 x 19.8 mm)

Data capacity (GB)

Component	Specification
2.5-inch drive (SFF) (VSP Gx00 models only)	196.92, 288.20, 393.85, 576.39, 945.23, 1152.79, 1729.29, 1890.46, 3780.92 GB
3.5-inch drive (LFF and dense intermix drive tray) (VSP Gx00 models only)	393.85, 1152.79, 1729.29, 3916.14, 5874.22, 9790.36 GB
Flash Module Drive (flash module drive tray)	1759.21, 3518.43 , 7036.87, 14073.74 GB

Rotational speed (min^{-1})

Component	Specification
2.5-inch drive (SFF) (VSP Gx00 models only)	288.20 GB: 15,000 RPM 576.39 GB: 10,000 or 15,000 RPM 1152.79 GB: 10,000 RPM 1729.29 GB: 10,000 RPM
3.5-inch drive (LFF and dense intermix drive tray) (VSP Gx00 models only)	3916.14 GB: 7,200 RPM 5874.22 GB: 7,200 RPM 9790.36 GB: 7,200 RPM

Maximum mountable quantity

Mixing SFF, LFF, FMD, and dense intermix drive trays might affect the maximum number of drives that can be mounted.

Component	Specification
SFF (VSP Gx00 models only)	24
LFF (VSP Gx00 models only)	12
Dense intermix drive tray (VSP Gx00 models only)	60
Flash module drive (flash module drive tray) (VSP Gx00 models only)	12
Maximum number of spare drives (VSP Gx00 models only)	64
Maximum number of flash module drives (VSP Fx00 models)	40
Maximum number of spare drives (VSP Fx00 models)	2

Battery specifications

Storage system intake temperature	CBLMCBLH
Up to 75.2º F (24º C)	5 years
Up to 86º F (30º C)	5 years
Up to 93.2º (34º C)	4 years
Up to 104º (40º C)	3 years

Host interface

Item	Component	Specification
Interface type	Fibre Channel optical	8-Gbps, 16-Gbps, 32-Gbps
	iSCSI optical	10-Gbps
	iSCSI (Copper)	10-Gbps
	NAS module	10 Gbps (Fibre Channel optical)
Data transfer speed (maximum speed for transfer to host)	Fibre Channel optical	800-Mbps (Fibre Channel)
		1600-Mbps (Fibre Channel)
		3200-Mbps (Fibre Channel)
	iSCSI optical	10-Gbps (iSCSI optical)
	iSCSI (Copper)	10 Gbps (iSCSI copper)
	NAS module (Fibre Channel)	1000 Mbs

Item	Component	Specification
VSP G800 maximum number of ports	8 Gbps Fibre Channel (optical)	64
	16 Gbps Fibre Channel (optical 2-port)	32
	16 Gbps Fibre Channel (optical 4-port)	64
	32 Gbps Fibre Channel (optical)	64
	10 Gbps iSCSI optical)	32
	10 Gbps iSCSI (copper)	32
VSP F800 maximum number of ports	8 Gbps Fibre Channel (optical)	48
	16 Gbps Fibre Channel (optical)	24
	32 Gbps Fibre Channel (optical)	48
	10 Gbps iSCSI (optical)	24
	10 Gbps iSCSI (copper)	24
Maximum number of ports (NAS module installed)	8 Gbps Fibre Channel (optical)	16
	16 Gbps Fibre Channel (optical 2-port)	8
	16 Gbps Fibre Channel (optical 4-port)	16
	32 Gbps Fibre Channel (optical)	16
	10 Gbps iSCSI (optical)	8
	10 Gbps iSCSI (copper)	8
	10 Gbps Fibre Channel (optical)	12
Maximum number of ports (NAS modules not installed)	8 Gbps Fibre Channel (optical)	80
	16 Gbps Fibre Channel (optical 2-port)	40
	16 Gbps Fibre Channel (optical 4-port)	80
	32 Gbps Fibre Channel (optical)	80
	10 Gbps iSCSI (optical)	40
	10 Gbps iSCSI (copper)	40
Maximum number of ports (host port expansion chassis and NAS module installed)	8 Gbps Fibre Channel (optical)	32
	16 Gbps Fibre Channel Optical (2-port)	16
	16 Gbps Fibre Channel Optical (4-port)	32
	32 Gbps Fibre Channel Optical (4-port)	32
	10 Gbps iSCSI (optical)	16
	10 Gbps iSCSI (copper)	16
	10 Gbps Fibre Channel (optical)	12
Transferred block size		512 bytes
Maximum number of hosts using a Fibre Channel switch		255

Item	Component	Specification
Maximum number of hosts using a network switch		255

RAID specifications

D: Data drive, P: Parity drive.

Although the storage system with a configuration of RAID 1, RAID 5, or RAID 6 provides data reliability enhanced by redundancy, there is a chance that user data could be lost due to an unexpected host, storage system hardware, or software failure. Therefore, users are requested to back up all data.

RAID Level	SAS, SAS 7.2k, flash drives mounted
RAID 1	2D+2D, 4D+4D
RAID 5	3D+1P, 4D+1P, 6D+1P, 7D+1P
RAID 6	6D+2P, 12D+2P, 14D+2P

Item	Specification
Maximum number of RAID groups	480
Maximum number of RAID groups	480
Maximum volume size	3 TB (or 4 TB when using the LDEVs of other storage systems)
Maximum volumes/host groups and iSCSI targets	2048
Maximum volumes/parity groups	2048

Shared memory and data assurance

Item	Specification
Flash memory	32 M bytes
L3 Cache memory	4 M bytes
SDRAM	1 G bytes
Data bus	Parity
Cache memory	ECC (1 bit for correction, 2 bits for detection)
Drive	Data assurance code

Start-up time

Item
Standard: 5-to-10 minutes. The start-up time may be longer in proportion to the number of drive trays connected. With a maximum configuration 1 controller tray and 19 drive trays, start-up time is approximately 10 minutes.

Chassis size

Component	Specification (W x D x H)
CBLH	19.01 x 35.10 x 6.86 inches (483 x 891.7 x 174.3 mm)
SFF/LFF (VSP Gx00 models only)	18.97 x 22.24 x 3.47 inches (482 x 565 x 88.2 mm)
DBF	19.01 x 30 x 3.42 inches (483 x 762 x 87 mm)
Dense intermix drive tray (VSP Gx00 models only)	18.97 x 40.51 x 6.92 inches (482 x 1,029 x 176 mm) (includes the depth of the cable-management arms)

Mass

The table lists the values of a maximum configuration when all controllers and drives are mounted.

Component	Specification
CBLH	187.39 pounds (85 kg)
SFF (VSP Gx00 models only)	Approx 50.70 inches (23 kg)
LFF (VSP Gx00 models only)	Approx 59.52 inches (27 kg)
DBF	Approx. 83.77 pounds (38 kg)
Dense intermix drive tray (VSP Gx00 models only)	Approx. 198.41 pounds (90 kg)

Required height

Component	Specification
CBLH	4 U
SFF (VSP Gx00 models only)	2 U
LFF (VSP Gx00 models only)	2 U
DBF	2 U
Dense intermix drive tray (VSP Gx00 models only)	4 U

Component	Specification
	If a drive is inserted into a slot of a dense intermix drive tray when the installed number of drives exceeds 240 slots per path, the drive is blocked.

Cache specifications

Item	Specification
Capacity (GB)	VSP G800: 512 VSP F800: 512
NAS module Cache Capacity	DDR3 DIMM 8GB x 12 [Slot] **Note:** • All 12 slots must be fully installed with DIMMs. • Each DIMM is replaceable when they fail. • The DIMM is not common and cannot be used with DKC DIMM.
Control method	Read LRU, Write after
Battery backup	Provided
Backup duration	Unrestricted (saving to a nonvolatile memory)

Data in the cache memory is preserved against power failures. If a power outage occurs, data in cache memory is written to drives.

When the storage system enters Cache Backup mode, the amber WARNING LED goes on to when the system starts. This warning indicates that the battery charge has dropped significantly and the remaining battery capacity is not sufficient; the storage system will continue operating with the Write Cache function disabled.

When the battery is charged, the warning indication disappears, and the storage system continues the operation in the Write Cache function.

The warning indication disappears within six hours. Even when the warning is shown, normal operation is assured in Write-Through. Read and write performance is lowered because the Write Cache function is disabled.

If the storage system is not charged for more than six months, the battery can become overcharged and sustain unrecoverable damage. To avoid this situation, charge the battery more than 3 hours every six months.

Insulation performance

Item	Specification
Insulation withstand voltage	AC 1,500 V (100 mA, 1 min)
Insulation resistance	DC 500 V, 10 M Ω or more

Electrical specifications for VSP G200VSP G400, G600VSP G800VSP F400, F600VSP F800

The electrical specifications are described for the storage systems.

Electrical specifications

Item	Controller	Drive tray
Input voltage (operable voltage range) (V)	AC 100-120/200-240 +6%/-11%	SFF, LFF, FMD, and dense intermix drive tray: AC 200-240 +6%/-11%
Input voltage (operable voltage range) (V)	AC 200-240 +6%/-11%	SFF, LFF, FMD, and dense intermix drive tray: AC 200-240 +6%/-11%
Frequency (Hz)	50/60 ±1	
Number of phases, cabling	Single-phase with protective grounding	
Steady-state current 100V/ 200V[1], [2]	CBSS: 4.0x2/2.0x2 CBSL: 4.0x2/2.0x2 CBLM: 4.0x2 CBLH: 4.0x2	SFF drive tray: 2.4x2/1.2x2 LFF drive tray: 1.9x2/1.0x2 FMD drive tray: 2.6x2/1.3x2 Dense intermix drive tray: -/ 3.0x2
Current rating of breaker/fuse (A)	16.0 (each electrical)	
Heat value (normal) (kJ/h)	CBSS: 1800 or less CBSL 1550 or less CBLM: 2160 or less 2810 or less	SFF drive tray: 1120 or less LFF drive tray: 940 or less FMD drive tray: 1300/1520 or less FMD drive tray: 1520 or less FMD drive tray: 1520 or less Dense intermix drive tray: 3460 or less
Steady-state power (VA/W)[3]	CBSS: 800/760 or less CBSL: 800/760 or less CBLM: 1600/1560 or less CBLH: 1600/1560 or less	SFF drive tray: 480/460 or less LFF drive tray: 380/350 or less FMD drive tray: 520/490 or less Dense intermix drive tray: 1200/1160 or less

Item	Controller	Drive tray
Power consumption (VA/W)	CBSS: 520/500 or less CBSL: 450/430 or less CBLM: 640/600 or less CBLH: 840/780 or less	SFF drive tray: 320/310 or less LFF drive tray: 280/260 or less FMD drive tray: 440/420 or less Dense intermix drive tray: 1000/960 or less

Notes:

1. The power current of Nx2 described in this table is required for a single power unit.
2. If one power unit fails, another power unit requires electric current for the two power units. Therefore, plan the power supply facility so that the current-carrying capacity for one power unit can provide the total capacity for two power units.
3. This table shows the power requirement (100 V or 200 V) for the maximum configuration . The actual required power might exceed the value shown in the table when the tolerance is included.

VSP G200 electrical specifications (DC power supply)

Input power specifications

Item	CBSSD	CBSLD	DBSD	DBLD
Rated input voltage (v)	DC -60 to -48			
Input voltage fluctuation (v)	DC -72 to -40			
Input voltage instant fluctuation (v)	DC -75 to -36			
Inrush current (v)	35 (Ta = 25°C, in the range of rated input voltage, except when voltage fluctuates)			
Input shape	Connection by connector. Connect the terminal by the dedicated cable with terminal. Connector: Positronic Industries Inc., PCS Series			
Heat value (kJ/h)	1800	1550	1120	940
Steady-state power (W)	760	760	460	350
Power consumption (W)	500	430	310	260
Input current (A)	15.9	15.9	9.6	7.3
UPS	No connection			
Remote adapter	No connection			

Environmental specifications for VSP G200VSP G400, G600VSP G800VSP F400, F600VSP F800

The environmental specifications are described for the storage systems.

Environmental specifications

Temperature

Caution: The following VSP Gx00/Fx00 storage system components are not supported in high-temperature environments. Do not operate the following components at temperatures of 40°C or higher:

- DB60 dense drive tray
- HDS provided service processor (SVP) server
- First-generation FMDs (non-DC2 FMDs)

State	Controller	SFF, LFF drive trays	Dense intermix drive tray
Operating	50°F to 104°F (10°C to 40°C)	50°F to 104°F (10°C to 40°C)	50°F to 95°F (10°C to 35°C)
Non-operating	14°F to 122°F (-10°C to 50°C)	14°F to 122°F (-10°C to 50°C)	14°F to 122°F (-10°C to 50°C)
Transport, storage	-22°F to 140°F (-30°C to 60°C)	-22°F to 140°F (-30°C to 60°C)	-22°F to 140°F (-30°C to 60°C)
Temperature change rate (°C/h)	10 or less		

State	Controller	FMD drive trays
Operating	50°F to 104°F (10°C to 40°C)	DKC-F710I-1R6FM or DKC-F710I-3R2FM drive is installed: 50°F to 95°F (10°C to 35°C)
Operating	50°F to 104°F (10°C to 40°C)	DKC-F810I-1R6FN/3R2FN/6R4FN/7R0FP/14RFP drive is installed: 50°F to 104°F (10°C to 40°C)
Non-operating	14°F to 122°F (-10°C to 50°C)	14°F to 95°F (-10°C to 35°C)
Transport, storage	-22°F to 140°F (-30°C to 60°C)	-22°F to 122°F (-30°C to 50°C)
Temperature change rate (°C/h)	10 or less	

Humidity

State	Percentage
Operating	8 to 80
Non-operating	8 to 90
Transport, storage (%)	5 to 95
Maximum wet bulb temperature (°C)	29 (non-condensing)

Vibration

State	m/s^2
Operating	2.5 or less Within 5 seconds (resonance point: 10 Hz or less)
Non-operating	5.0 or less at 5 Hz to 300 Hz (no damage to product) 9.8 (1.0 G) Within 5 seconds (resonance point: 10 Hz or less)
Transport (packed)	5.0 or less

Impact

State	m/s^2
Operating	20 or less (10 ms, half sine wave)
Non-operating	50 or less (10 ms, half sine wave)
Transport (packed)	80 or less

Altitude

State	Controller	FMD drive
Operating (m)	3,000 (Environmental temperature: 10°C to 32°C) 900 (Environmental temperature: 10°C to 40°C)	3,000 (Environmental temperature 10°C to 32°C) OR 900 (Environmental temperature: 10°C to 35°C) when DKC-F710I-1R6FM or DKC-F710I-3R2FM drive is installed.
Operating (m)	3,000 (Environmental	3,000 (Environmental temperature: 10°C to 32°C) OR

State	Controller	FMD drive
	temperature: 10°C to 32°C) 900 (Environmental temperature: 10°C to 40°C)	900 (Environmental temperature: 10°C to 40°C) when DKC-F810I-1R6FN/3R2FN/6R4FN/7R0FP/14RFP drive is installed.
Non-operating (m)	-60 to 12,000	N/A

State	Controller	SFF and LFF drives	Dense intermix drive tray
Operating (m)	3,000 (Environmental temperature: 10°C to 32°C)	3,000 (Environmental temperature: 10°C to 32°C)	3,000 (Environmental temperature: 10°C to 28°C) 1,000 (Environmental temperature: 10°C to 35°C)
	900 (Environmental temperature: 10°C to 40°C)	900 (Environmental temperature: 10°C to 40°C)	
Non-operating (m)		N/A	

Atmosphere

Avoid areas exposed to corrosive gas and salty air.

Acoustic Noise

State	Controller	SFF, LFF	Dense intermix drive tray
Operating	60 dB (Environmental temperature 32°C or less)[1]	60 dB (Environmental temperature 32°C or less)[1]	71 dB (Environmental temperature 32°C or less)[1], [2], [3], [4]
Non-operating	55 dB	55 dB	71 dB (Environmental temperature 32°C or less)[1], [2], [3], [4]

Notes:

1. The system's internal temperature controls the rotating speed of the fan module. Therefore, this standard value might be exceeded if the maximum load continues under high-temperature environment or if a failure occurs in the system.
2. Sound pressure level (LA) changes from 66 dB or 75 dB, according to the ambient temperature, drive configuration, and operating status. Maximum volume can reach 79 dB during maintenance procedure for a failed ENC or power supply.
3. Acoustic power level (LwA) measured by the ISO 7779 standard is 7.2 B. This value changes from 7.2 B to 8.1 B, according to the ambient temperature, drive configuration, and operating status.

State	Controller	SFF, LFF	Dense intermix drive tray
4. When accessing the dense intermix drive tray, do not work for long times at the rear of the rack.			

State	Controller	FMD	
Operating	60 dB (Environmental temperature 32°C or less)[1]	60 dB (Environmental temperature 32°C or less)[1], [2], [3] (When accessing the dense intermix drive tray, do not work for long times at the rear of the rack.)	
Non-operating	55 dB (Environmental temperature 32°C or less)[1], [2], [3], [4] 55 dB		

Notes:

1. The system's internal temperature controls the rotating speed of the fan module. Therefore, this standard value might be exceeded if the maximum load continues under high-temperature environment or if a failure occurs in the system.
2. Sound pressure level (LA) changes from 66 dB or 75 dB, according to the ambient temperature, drive configuration, and operating status. Maximum volume can reach 79 dB during maintenance procedure for a failed ENC or power supply.
3. Acoustic power level (LwA) measured by the ISO 7779 standard is 7.2 B. This value changes from 7.2 B to 8.1 B, according to the ambient temperature, drive configuration, and operating status.

VSP G200 environmental specifications (DC power supply)

Item		CBSSD/CBSLD/ DBSD/DBLD	Notes
Temperature	Operating	41°F to 104°F (5°C to 40°C)	
	Non-operating	23°F to 131°F (-5 to 55°C) in 16 hours	
	Transport/storage)	-22°F to 140°F (-30°C to 60°C)	
Humidity	Operating	5% to 85% (non-condensing)	
	Transportation/storage	5% to 95% (non-condensing)	
Vibration	Operating (m/s2)	2.5 or less (5 to 300 Hz)	Within 5 seconds (Resonance point:10 Hz or less)
	Non-operating (m/s2)	5.0 or less (5 to 300 Hz): No critical damage for product.	

Item		CBSSD/CBSLD/ DBSD/DBLD	Notes
		9.8 (1.0 G) Adopt fall-prevention safety measures.	
	Transport (packed) (m/s2)	5.0 or less	
Impact	Operating (m/s2)	20 or less	10 ms, half sine wave
	Non-operating (m/s2)	50 or less	
	Transport (packed) (m/s2)	80 or less	
Angle at which the storage system turns over		15° or less	To be measured when installed on leveling bolts.
Altitude	Operating (m)	-60 to 1,800 above sea level Environmental temperature: 41°F to 104°F (5°C to 40°C) -1,800 to 4,000 above sea level Environmental temperature: 41°F to 86°F (5°C to 30°C)	
Atmosphere		No corrosive gas and salty air must be found.	
Acoustic Noise	Operating	60 dB Environmental temperature: 89.6°F (32°C) or less The system's internal temperature controls the rotating speed of the fan. Therefore, this standard value might be exceeded if the maximum load continues under high-temperature environment or if a system failure occurs.	Measured at the position 1.5 meter away from the storage system, at a height of 1.5 meters.
	Standby	55 dB	

iSCSI specifications

Item	Specification	Comments
iSCSI target function	Supported	N/A

Item	Specification	Comments
iSCSI target function	Supported	TrueCopy® only
iSCSI ports	2 per interface board	VSP Gx00 models: Maximum 32 per iSCSI system VSP Fx00 models: Maximum 24 per iSCSI system
Connection methods	Direct and switch connections	
Host connections	255 (maximum per iSCSI port)	With Linux software initiator, the maximum number decreases.
Path failover	HDLM[1]	Supports Microsoft MPIO (Multi Path I/O)
Link	10 Gbps SFP+	N/A
Transfer speed	10 Gbps	N/A
Connector type	LC	N/A
Cable	Optical OM3, OM2 MMF cable	N/A
Network switch	L2 or L3 switch	Should comply with IEEE802.3ae
Switch cascading	Maximum: 5 switches or fewer	Minimum number of cascading switches is recommended.
MAC address	Per port (fixed value)	Factory setting: World Wide Unique value. Cannot be changed.
Maximum transfer unit (MTU)	1,500, 4,500, 9,000 bytes (Ethernet frame)	Jumbo frame, MTU size greater than 1500
Link aggregation	Not supported	N/A
Tagged VLAN	Supported	N/A
IPv4	Supported	N/A
IPv6	Supported	Note the following precautions: • When iSCSI Port IPv6 is set to Enabled, if the IPv6 global address is set to automatic, the address is determined by acquiring a prefix from an IPv6 router. • If the IPv6 router does not exist in the network, the address cannot be determined. As a result, an iSCSI connection might be delayed. When an iSCSI Port IPv6 is set to Enabled, verify the IPv6 router is connected to the same network, and then set IPv6

Item	Specification	Comments
		global address automatically.
Subnet mask	Supported	N/A
Gateway address	Supported	N/A
DHCP	N/A	N/A
DNS	N/A	N/A
Ping (ICMP ECHO) Transmit, Receive	Supported	N/A
IPsec[2]	N/A	N/A
TCP port number	3260	Changeable among 1 to 65,535. Observe the following if changing values: • The setting of the corresponding host should also be changed to log in the new port number. • The new port number might conflict with other network communication or be filtered on some network equipment, preventing the storage system from communicating through the new port number.
iSCSI name	Both iqn[3] and eui[4] types are supported	The unique iqn value is automatically set when a target is made. iSCSI name is configurable.
Error recovery level	0 (zero)	Error recovery by retrying from host. Does not support Level 1 and Level 2.
Header digest	Supported	Detects header error or data error with iSCSI communication. The storage system follows the host's digest setting. If digest is enabled, the performance degrades. The amount of the degradation depends on factors such as host performance of host and transaction pattern.
Data digest	Supported	
Maximum iSCSI connections at one time	255 per iSCSI port	N/A
CHAP	Supported	Authentication: login request is sent properly from host to

Item	Specification	Comments
		storage. CHAP is not supported during discovery session.
Mutual (2-way) CHAP	Supported (not available if connected to Linux software initiator)	Authentication: login request is sent properly from host to storage.
CHAP user registration	Max 512 users per iSCSI port	N/A
iSNS	Supported	With iSNS (name service), a host can discover a target without knowing the target's IP address.

Note:

1. JP1, HiCommand Dynamic Link Manager. Pass switching is achieved. Not supported on Windows Vista and Windows 7 operating systems.
2. IP Security. Authentication and encryption of IP packets. The storage system does not support IPsec.
3. iqn: iSCSI Qualified Name. The iqn consists of a type identifier, "iqn," a date of domain acquisition, a domain name, and a character string given by the individual who acquired the domain. Example: iqn.1994-04.jp.co.hitachi:rsd.d7m.t.10020.1b000.tar
4. eui: 64-bit Extended Unique Identifier. The eui consists of a type identifier, "eui," and an ASCII-coded, hexadecimal, EUI-64 identifier. Example: eui.0123456789abcdef

iSCSI standards

The following standards apply to the management, maintenance, and iSCSI data ports. To configure this system, use switches that comply with the following standards:

- IEEE 802.1D STP
- IEEE 802.1w RSTP
- IEEE 802.3 CSMA/CD
- IEEE 802.3u Fast Ethernet
- IEEE 802.3z 1000 BASE-X
- IEEE 802.1Q Virtual LANs
- IEEE 802.3ad Dynamic LACP
- IEEE 802.3ae 10 Gigabit Ethernet
- RFC 768 UDP
- RFC 783 TFTP
- RFC 791 IP
- RFC 793 TCP
- RFC 1157 SNMP v1
- RFC 1231 MIB II
- RFC 1757 RMON
- RFC 1901 SNMPv2

Regulatory compliance

This equipment has been tested and certified for compliance with the following standards.

Table 1 Country Specifications and Certifications

Standard	Specification	Product marking or logo	Country regulation
Electronic emission controls	FCC part 15 Subpart B: 2013	FCC	USA and Canada
	ICES-003 Issue 5:2012	ICES-003	USA and Canada
	AS/NZS CISPR 22:2009+A1	RCM	Australia and New Zealand
	TP TC 020/2011	EAC	Russia, Belarus, and Kazakhstan
	CNS 13438	BSMI	Taiwan
	KN22	KC	Korea
	KN24	KC	Korea
Electronic emission certifications	EN5522: 2010	CE	EU
	EN5524: 2010	CE	EU
	EN61000-3.2:2006+A1 +A2	CE	EU
	EN61000-3.3:2008	CE	EU
Safety certifications	UL and CSA 60950-1:2007	cTUVus	USA and Canada
	EN60950-1:2006+A1	TUV	Germany
	IEC60950-1:2005+A1	N/A	All CB countries
	IEC60950-1:2005+A1	S-Mark	Argentina
	TP TC 004/2011	EAC	Russia
	CNS 14336-1	BSMI	Taiwan
	EN60950-1:2006+A1	CE	EU
Radio interference voluntary control	VCCI V-3/2013.04	VCCI	Japan

Table 2 Cryptography Standards and Certifications for VSP G200

Standard	Certification	Country regulation	Description
Federal Information Processing Standards (FIPS)	#2694 FIPS 140-2 Level 1 Consolidated Validation Certificate http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140val-all.htm	USA and Canada	Encryption back end module provides high-speed data at rest encryption.

Table 3 Cryptography Standards and Certifications

Standard	Certification	Country regulation	Description
Federal Information Processing Standards (FIPS)	#2462 FIPS 140-2 Level 2 Consolidated Validation Certificate http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140val-all.htm #2727 FIPS 140-2 Level 1, 2 Consolidated Validation Certificate http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401val2016.htm	USA and Canada	Encryption back end module provides high-speed data at rest encryption.

Physical SVP specifications

The following sections describe the specifications for the physical SVP.

Service processor hardware specifications

The following table lists the hardware specifications for the service processor (SVP) provided by Hitachi Data Systems.

Caution: The SVP is not supported in high-temperature environments. Do not operate it in locations with temperatures of 40°C or higher.

Item	Specification
Dimensions	Height: 1.7 inches (43 mm) Width: 17.2 inches (437 mm) Depth: 14.5 inches (369 mm)

Item	Specification
	Weight: 14 lbs (6.4 kg)
Processor	Celeron G1820 2.7-GHz 2M, 2C, 2T • Cores: 2 • Instruction set: 64-bit • SmartCache: 2 MB • Maximum memory size: 32 GB • Memory types: DDR3-1333, DDR3L-1333 @ 1.5V
Memory	8-GB RAM DDR3
Hard drive	2 TB
Network interface card	x4 ports (on-board NIC) + x1 IPMI (BMC) port
Fans	2 x 4-cm 4-pin PWM fans
Operating system	Windows Embedded Standard 7

Physical SVP environmental specifications

The following table lists the environmental specifications for the physical SVP supplied by Hitachi Data Systems.

Item	Specification
Operating temperature	41°F ~ 95°F (5°C ~ 35°C)
Non-operating temperature range	-40°F ~ 140°F (-40°C ~ 60°C)
Operating relative humidity range	8% ~ 90% (non-condensing)
Non-operating relative humidity range	5% - 95% (non-condensing)

Physical SVP electrical specifications

The following table lists the electrical specifications for the physical SVP supplied by Hitachi Data Systems.

Item	Specification
Rated AC voltage	100-240 V, 50-60 Hz, 4.2 - 1.8A
Power supply	350-Watt AC power supply with PFC
AC voltage	100-240 V, 50-60 Hz, 4.2 - 1.8 Amp
Power supply safety / EMC	• USA - UL listed, FCC • Canada - CUL listed • Germany - TUV Certified

Item		Specification
		• Europe/CE Mark • EN 60950/IEC 60950-Compliant
MFT p-code	**Description**	**Watts**
MBD-X10SLM+-LN4F-O	Single-socket H3 (LGA 1150) / 32-GB DDR3 ECC 1600 MHz / 6x SATA / 4x GbE	20
CSE-512F-350B	Two 350 W 3.5-inch internal drive bays	26.4
CM8064601483405	Intel Celeron G1820 2.7 Ghz 2M tray	53
0F11000	3.5-inch 25.4 mm 2 TB 32 MB 7200 RPM	9.1
KVR16E11S8	4 GB 1600 Mhz DIMM SR x8 with TS Kingston F	4.05
		112.55 Watts total

VA is 140.69, with a 0.8 power factor.

Note: The measurements are not kilo values.

Minimum requirements for installing the SVP software on customer-supplied server hardware

Hitachi Data Systems allows the SVP software to be installed on customer-supplied servers that meet the following minimum requirements.

- Processor:
  - One core with hyper-threading, two cores without hyper-threading
  - Processor performance comparable to Celeron 1.6 GHz
- Random-access memory: 3.5 GB per storage system
- Hard drive: 120 GB per storage system
- LAN connection: one 1000Base-T
- Windows 7 Professional (64-bit), Windows Server 2012 (64-bit), Windows Server 2012 R2 (64-bit), Windows 10 Professional (64-bit), or Windows 10 enterprise (64-bit)

Virtual SVP requirements

The virtual SVP must meet the following minimum requirements.

ESX Server (provided by the customer)

- VMware ESXi server 6.x

- Two quad core processors, Intel Xeon 2.29 GHz
- One port network interface card (NIC)
- SVP guest OS
- 32 GB RAM

SVP Guest OS (maximum one DKC per SVP guest OS)
- Two virtual CPUs
- One virtual network adapter
- 4 GB RAM
- 120 GB disk space
- One of the following 64-bit operating systems:
  - For VMware ESXi 6.0.0: Windows 7 Professional (64-bit)
  - For VMware ESXi 6.0 U2: Windows 7 Professional Service Pack 1 (64-bit)

Miscellaneous
- WinZip

Minimum requirements for an Oracle Linux KVM SVP

An SVP that will be used in an Oracle Linux KVM environment requires the following minimum requirements.

Prerequisites

Linux KVM Server (provided by the customer)
- Oracle Linux 7.x server
- Two quad core processors, Intel Xeon 2.29 GHz
- One-port NIC
- SVP guest OS
- 128-GB RAM

SVP Guest OS (1 DKC) (maximum 1 DKC per SVP guest OS)
- Two vCPUs
- One virtual network adapter
- 4-GB RAM
- 120-GB disk space
- Windows 7 Professional (64-bit)

Miscellaneous
- WinZip

Minimum requirements for Hyper-V Server 2012 R2 VM

A host that runs the SVP software on a customer-supplied Microsoft Hyper-V Server 2012 R2 VM requires the following minimum requirements.

- Hyper-V Server Windows 2012R supplied by the customer
- Two quad core processors, Intel Xeon 2.29 GHz
- One-port NIC
- SVP guest OS
- 32-GB RAM

The SVP guest (1 DKC) (maximum one DKC per SVP guest OS)

- Two vCPUs
- One virtual network adapter
- 4-GB RAM
- 120-GB disk space
- One of the following 64-bit operating systems:
  - Windows 10 Professional
  - Windows 10 Enterprise
  - Windows Server 2012
  - Windows Server 2012 R2

To use Hyper-V Manager successfully, you must first configure your hosts correctly. In particular, confirm that each host:

- Is licensed for Windows 2012R2 OS.
- Meets the shared storage requirements for Hyper-V Management.
- Meets the networking requirements for Hyper-V Management.

2

Pre-installation planning

You should always pre-plan any deployment, no matter how big or small, so that you know what works and what does not before installing the new storage system on your network.

Hitachi Data Systems responsibilities

Your Hitachi Data Systems account team will assist you throughout the site planning process. The Hitachi Data Systems account team is responsible for:

- Assisting you as needed to plan the installation for your specific site and operational configuration.
- Coordinating Hitachi Data Systems resources to ensure smooth delivery, installation, and configuration of the units.

User responsibilities

When planning and preparing for the installation of a storage system, the user assumes the following responsibilities:

- Purchase site-planning services from Hitachi Global Services.
- Provide the space, people, and tools for unpacking, installing, and operating the storage system.
- Confirm that the path from where the storage system is delivered to the installation site is large enough to support the storage system. Take into account all ramps, walkways, and elevators and possible obstructions.
- Maintain the proper environmental conditions for the storage system.
- Provide adequate power facilities for the storage system.
- Supply the network connections and external cabling required by the storage system.

For optimal performance, storage systems require controlled environmental conditions that are often best facilitated through raised flooring and under-floor air conditioning. It is the user's responsibility to monitor this environment and ensure continued conformance with the recommended environmental specifications.

Adequate power is necessary for the reliable functioning of electronic equipment and for the safety of the user's installation. The user is responsible for procuring, installing, and maintaining adequate power to the equipment.

Related references

- Environmental specifications on page 47
- Pre-installation planning on page 62

Pre-installation planning

Successful installation of the storage system requires careful pre-installation planning. Proper planning will help provide for a more efficient installation and greater reliability, availability, and serviceability.

All pre-installation activities should be scheduled and completed before the equipment is delivered.

The pre-installation process includes:

- Hardware configuration planning, such as system component layout in the rack and drive allocation.
- Networking and cabling planning, such as network topologies, cabling configurations, network switches, and cabling of connected host computers.
- Ensuring that all controllers and drive trays in the specified configuration and all cables of the required length have been ordered.
- Selecting key personnel who will handle the installation.
- Confirming that all electrical service wiring has been installed at the predetermined location.

The following are suggested pre-installation tasks to be completed prior to the delivery and installation of the storage system:

- Prepare a preliminary layout of the installation.
- Review the power and the heating, ventilation, and air-conditioning (HVAC) requirements, and then ordering any additional support equipment.
- Work with your Hitachi representative to ensure that all controllers and drive trays in the specified configuration and all cables of the required length have been ordered.
- Make a final layout of the installation and reviewing the layout with your Hitachi representative.
- Verify the electrical service wiring has been installed at the predetermined location before installing the storage system.
- Verify that all additional equipment , such as switches and host computers, is installed and operational.

Delivery space requirements

Verify that the delivery area, the destination, and the path between them meet the standard delivery clearance and weight requirements of the storage system.

The delivery area must provide enough space and floor strength to support the packaged equipment cartons for the storage system. Doorways and hallways must provide enough clearance to move the equipment safely from the delivery area to the destination. Permanent obstructions such as pillars or narrow doorways can cause equipment damage. If necessary, plan for the removal of walls or doors.

Verify that all floors, stairs, and elevators you use when moving the storage system to its destination can support the weight and size of the equipment. Failure to do so could damage the equipment or your site.

Related references

- VSP G200 mechanical specifications (AC power supply model) on page 21
- VSP G400 or VSP F400 and VSP G600 or VSP F600 mechanical specifications on page 31
- VSP G800VSP F800 mechanical specifications on page 38

Electrostatic discharge

Electrostatic discharge (ESD) can harm the electronic components of your storage system.

ESD is created when the electrical field surrounding different objects varies and becomes balanced. The spark that is created when contact balances the fields can damage your storage system.

To minimize possible ESD-induced failures in your computer room:

- Verify that all equipment and flooring are grounded. Any charge that might build up would be discharged safely through that common ground.
- Maintain recommended humidity level and airflow rates. Relative humidity above 40% reduces the resistance of items that can generate a charge, making it more difficult to generate an ESD.
- Store spare electric parts in antistatic bags until you are ready to install them. These bags are designed to prevent a charge from building.
- When handling the storage system, wear protective devices like wrist straps, sole grounders, and conductive shoes. These items help to prevent electrostatic charge from building.
- Before working inside your storage system, ground yourself to the storage system enclosure by contact to verify that your personal static charge has been discharged.

Unpacking the equipment

The storage system is shipped directly from Hitachi.

Hitachi recommends that three physically able individuals unpack the storage system equipment. Individuals must be knowledgeable and experienced with the safe handling of large, heavy, and sensitive computer equipment.

As you unpack the equipment, match the delivered items to the packing list (invoice) and visually check the items for damage. If any items are missing, damaged, or not the ones you ordered, contact Hitachi.

Note: To avoid condensation from occurring with the storage system, do not unpack the storage system in a location subject to rapid differences in temperature.

Climatization

Storage systems that are shipped or stored at extreme temperatures require time to adjust to operating temperatures before startup.

If the storage system arrives in hot or cold weather, do not unpack it until it has been allowed to reach room temperature (one to two hours).

Immediately exposing the storage system to warm temperature can cause condensation to occur, which could damage the electronics.

If you notice any condensation, allow the storage system to stand unattended for one to two hours, and then unpack it.

3

Installation site considerations

Be sure your site has sufficient space to accommodate the storage system.

- ☐ Space requirements
- ☐ Floor load ratings
- ☐ Third-party rack support for VSP Gx00 models and VSP Fx00 models
- ☐ Using dense intermix drive trays with third-party racks
- ☐ Raised and non-raised floors
- ☐ Floor covering and cutouts
- ☐ Meeting environmental conditions
- ☐ Maintaining the optimal temperature
- ☐ Earthquake considerations

Space requirements

Be sure your site has sufficient space to accommodate the storage system.

When preparing the space required for your storage system, be sure the site:

- Is large enough to hold the new storage system and other equipment.
- Provides minimum clearance around the storage system for service access and to verify proper weight distribution on the computer room floor.
- Includes correctly positioned floor cutouts for the storage system's power and data cables.

To verify there is sufficient space for the storage system, document your site's floor plan, including the locations of:

- Structural support columns and other immovable objects
- Walls
- All existing equipment, cabinets, racks, networking equipment, and other systems
- Where the new storage system will be installed
- Floor and electrical cutouts
- Interconnecting cables and power cords, including lengths
- Floor vents

The space requirements must take into consideration the total floor clearance required for the storage system. This includes:

- The space required by the equipment
- Service clearance - the floor space required to access the storage system.
- Additional space required to distribute the equipment weight on your computer room's raised floor. The amount of additional space required depends on your floor load rating.
- Additional space required to view the storage system LEDs on the front and rear panels.

Floor load ratings

The floor space at the installation site must support the combined weight of the following components:

- Controller
- Drive trays
- Rack
- All associated equipment

To verify adequate load-bearing capacity, plan for the maximum configuration. The following table lists the weight for maximum configurations. The table also applies to third-party racks. The weights below do not include the rack itself, so add the weight of the rack to the values

shown below. The maximum allowable weight in the Hitachi rack is 2,000 pounds (907 kg). For more information about racks, see the *Hitachi Universal V2 Rack Reference Guide*.

Table 4 CBSS and physical SVP

Component	Drive trays	Weight
CBSS controller	7 SFF drive trays	1245.6 lbs (565 kg)
	7 LFF drive trays	1239.0 lbs (562 kg)
	7 FMD drive trays	1373.4 lbs (623 kg)
	4 dense intermix drive trays	1563.1 lbs (709 kg)
Physical SVP	N/A	39.5 lbs (17.9 kg)

Table 5 CBSL and physical SVP

Component	Drive trays	Weight
CBSL	7 SFF drive trays	1294.1 lbs (567 kg)
	7 LFF drive trays	1243.4 lbs (564 kg)
	7 FMD drive trays	1377.9 lbs (625 kg)
	8 dense intermix drive trays	3075.4 lbs (1395 kg)
Physical SVP	N/A	39.5 lbs (17.9 kg)

Table 6 CBLM and physical SVP

Component	Drive trays	Weight
CBLM	16 SFF drive trays	2597.1 lbs (1178 kg)
CBLM	16 LFF drive trays	2581.6 lbs (1171 kg)
CBLM	16 FMD drive trays	2940.9 lbs (1334 kg)
CBLM	8 dense intermix drive trays	3075.4 lbs (1395 kg)
Physical SVP	N/A	39.5 lbs (17.9 kg)

Table 7 CBLM and physical SVP

Component	Drive trays	Weight
CBLM	24 SFF drive trays	3243 lbs (1471 kg)
CBLM	24 LFF drive trays	3223.2 lbs (1462 kg)
CBLM	24 FMD drive trays	3734.6 lbs (1694 kg)
CBLM	12 dense intermix drive trays	4515.1 lbs (2048 kg)
Physical SVP	N/A	39.5 lbs (17.9 kg)

Table 8 CBLH and physical SVP

Component	Drive trays	Weight
CBLH	48 SFF drive trays	6236.9 lbs (2829 kg)
CBLH	48 LFF drive trays	6195 lbs (2810 kg)
CBLH	48 FMD drive trays	7167.2 lbs (3251 kg)
CBLH	24 dense intermix drive trays	8194.6 lbs (3717 kg)
Physical SVP	N/A	39.5 lbs (17.9 kg)

Third-party rack support for VSP Gx00 models and VSP Fx00 models

VSP Gx00 models and VSP Fx00 models support third-party racks that meet Hitachi Data Systems specifications.

Note: For information about the Hitachi Universal V2 Rack, see .

Observe the following mounting guidelines for third-party racks:

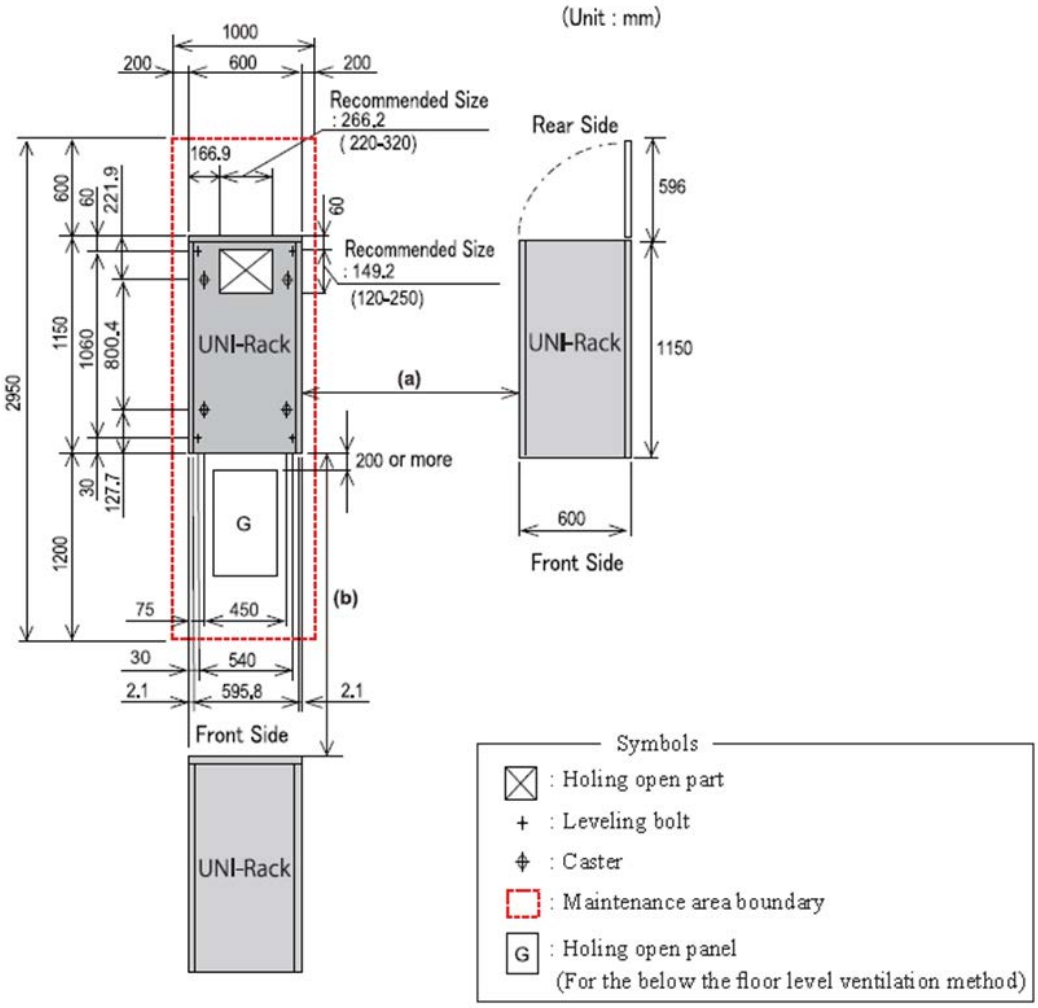
- VSP Gx00 models and VSP Fx00 models support any 4-post, EIA-310-D compliant rack that has adequate airflow and weight capacity.
- PDUs must be mounted properly, with no serviceability issues. The PDU receptacles must face toward the back (not toward each other). The area behind the storage system and between the vertical 19-inch mounting posts must be free of PDUs and cable loops.

Using dense intermix drive trays with third-party racks

Because of their size and weight, the DB60 dense intermix drive trays used with VSP Gx00 models and VSP Fx00 models require special attention when mounted in third-party racks.

When mounting DB60 dense intermix drive trays in third-party racks, observe the following guidelines and see the following figure.

- Use anti-tilt floor plates or ceiling-mounted fixing brackets to stabilize the rack.
- Use a rack that is at least 40.94 in. (1040 mm) deep to accommodate the DB60 dense intermix drive tray and cable-management arms.
- Dense tray rail kits require square mounting holed racks.
- If a dense intermix drive tray is mounted above shelf RU32, you must use a ladder to service the dense intermix drive tray safely.



Raised and non-raised floors

Your storage system can be installed on a raised or non-raised floor.

A raised floor consists of load-bearing floor panels laid in a horizontal grid above a building floor. The raised floor is supported by adjustable vertical pedestals to provide an underfloor space for distributing cables, power outlets, and other services.

Installing the storage system on a raised floor is preferred because it:

- Provides efficient cooling.
- Makes it easy to accommodate cabling layouts.
- Prevents tripping hazards because cables are routed below the raised floor.

If your site has a raised floor, consider the following factors:

- The raised floor must be built of noncombustible materials.
- Treat concrete subfloors to prevent them from releasing dust.
- Confirm there is positive air pressure below the raised floor to verify adequate airflow.
- The raised floor clearance must be adequate to accommodate cables. Remove all unused cables from the area below the raised floor to prevent these areas from becoming dust and dirt traps.
- Eliminate sharp edges on floor cutouts to avoid damage to cables.
- Apply sealant to raised-floor cable openings to prevent chilled air from escaping.
- For metallic raised floor structures, it is a safety hazard to expose metal or highly conductive material at ground potential to the walking surface.

Although raised floors are preferred, the storage system can be installed on non-raised floors. In these environments, overhead cabling can be used to provide power to the storage system. Installation planning, cable length, and rack location in relation to the cable openings on the rack are critical to installations that use overhead cabling.

Floor covering and cutouts

Do not use carpeting, including antistatic varieties, because they can shed dust over time that can cause problems with the storage system.

If your computer room has carpeting, place static discharge mats so that personnel must walk across them before touching any part of the storage system. Failing to comply with this precaution can damage the equipment through static discharge.

If your computer room uses floor cutouts to route power and data cables, position the cutouts toward the center of the rack. If this is not possible, position the cutouts off-center from the rack as long as the cutout is within the allowable range and allows smooth routing and entrance of cables. Check the relationship between the position of the cutout and the cable openings on the rack.

Meeting environmental conditions

For optimal performance, the storage system requires controlled environmental conditions.

Hitachi recommends that you maintain a controlled environment, with a high degree of cleanliness and close control of temperature and humidity. The storage system operating environment must be free from continuous vibration, dust, and other environmental contaminants.

Keep the location as free of airborne particulates as possible. To eliminate obvious sources of particulates, do not permit anyone to eat, drink, or smoke near the storage system. Do not place the storage system close to a copier or printer that can emit toner and paper dust.

If the site will be undergoing construction that involves sawing, welding, or drilling, protect the storage system from concrete, metal particles, and other debris during construction.

Related references

- Environmental specifications on page 47

Maintaining the optimal temperature

The site must provide sufficient airflow capacity to remove the heat generated by the storage system.

Prior to installation, verify that the site has a cooling system that can support all thermal emissions.

The level of cooling required for the storage system is not the same as the air conditioning used in offices and homes. Air-conditioning systems in offices and homes provide comfort for the low heat and higher moisture generated by the human body. In contrast, electronic equipment generates high dry-heat output that is moisture-free.

Your storage system can tolerate temperature and humidity fluctuations if the specified ranges are followed. Exceeding the maximum temperature and humidity ranges for any period of time, however, can affect storage system performance adversely. To ensure that the ambient temperature near the intake at the front of the storage system does not exceed system

specifications, verify that the location where the storage system will be installed has a cooling system that can support all thermal emissions.

Note: Do not store or install the equipment in an environment with temperatures of 104ºF (40ºC) or higher because battery life will be shortened.

Air enters the storage system at the front and exits through the rear. Be sure the front of the storage system is neither blocked nor exposed to heated air blown from nearby equipment.

If conditions at the site change (for example, new units are added or the system is moved), airflow checks should be made.

If the site has a raised floor, the room must have positive air pressure below the floor to verify adequate airflow. Remove all unused cables from the area below the raised floor to prevent these areas from becoming dust and dirt traps.

Earthquake considerations

Consider whether earthquake-restraining equipment is needed for your storage system installation.

In seismic-prone regions, use the appropriate flooring, racks, and fasteners to restrain the storage system during earthquakes, prevent human injury, and limit potential damage to system components.

4

Power requirements

To assure predictable and reliable performance of the storage system in the data center, observe the appropriate power requirements.

Electrical requirements

The storage system requires two easily accessible power outlets near the rear of each controller. Each drive tray requires an additional power outlet.

The storage system controller and drive trays are equipped with two fully redundant wide-ranging power supplies that automatically accommodate voltages to the AC power source. The power supplies operate within the range of the storage system model:

- Hitachi VSP G200: single phase 100-120 VAC or 200-240 VAC
- Hitachi VSP G400, G600 or VSP F400, F600: single phase 200-240 VAC
- Hitachi VSP G800 or VSP F800: single phase 200-240 VAC

The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. When connecting to an AC source, be sure the current does not exceed the rating of the power source circuitry. This includes cabling, power distribution units, filters, and any other components through which the main AC flows.

These requirements must be added to the power demands of any other electrical devices installed in the rack to arrive at a total power consumption figure. In addition, surge currents must be accommodated. Disk drives normally consume twice the amount of current at startup as they do during steady-state operation.

For more information, see Electrical specifications on page 45.

Power considerations

Hitachi storage systems have an input power rating of 125V–200V operation. The units come with a set of power cables.

Note: The power cables included with the storage system are considered part of the unit and are not intended for use with any other equipment.

A label near the power cord indicates the correct voltage, frequency, current draw, and power dissipation that should be used with the cable. Please be sure to use the appropriate power cable for your location. Also, check the power at your site to verify that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

Sources of electrical interference

Verify that the storage system is protected from sources of electrical interference.

The following table provides examples of electrical interference.

Potential source	Description
Wall outlets	Power outlets for building maintenance and janitorial equipment, such as vacuum cleaners and floor buffers, must be wired from circuit breakers on a power panel separate from the computer system panel. The ground wires from these outlets must connect to the normal building distribution panel and not to the system ground. If a separate power source and separate ground are not provided, maintenance and janitorial equipment can induce electrical noise that can affect operation of the storage system. Your electrician can verify whether maintenance outlets are on separate panels.
Lightning	In geographical areas subject to lightning storms, you may want install lightning protection for your storage system. The principles of lightning protection and personnel safety are described in the National Fire Protection Association (NFPA) Handbook.
Electromagnetic interference	Electromagnetic interference can cause various problems. The storage system is designed to reduce its susceptibility to radiated and conducted interference. A Hitachi representative can advise you about common causes of electromagnetic interference.

Branch circuits

Prepare your site to support the recommended power parameters of your storage system.

Plan to set up redundant power for each rack that contains a Hitachi VSP storage system. Supply the power with a minimum of two separate circuits on the building's electrical system. That way, if one circuit fails, the remaining circuit(s) should be able to handle the full power load of the rack. In addition, each Power Distribution Unit (PDU) within the rack should be powered by a separate power circuit.

Each circuit should be rated appropriately for the storage system model and input voltage. Refer to the storage system's electrical specifications for power requirements specific to each model.

Note: When calculating the power requirements for circuits that supply power to the rack, consider the power requirements for network switches.

Related references

- Electrical specifications on page 45

Emergency power control

For safety purposes, consider installing emergency power-off controls for disconnecting the main power to the storage system.

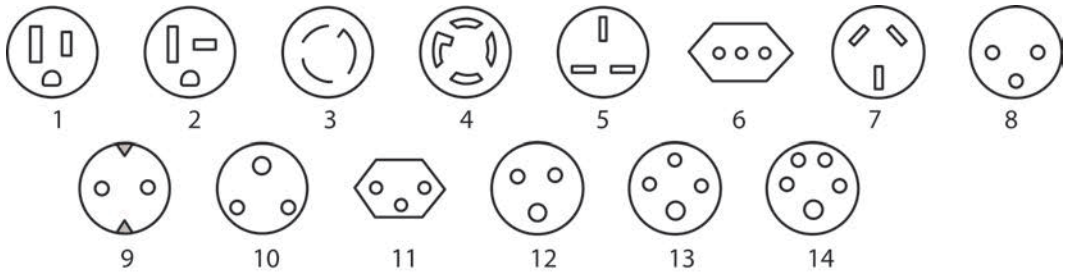
These controls should be installed at a location within easy access to operators, such as next to the exit doors of the computer room. Before installing power controls, check and comply with all local electrical codes.

Power cable assemblies

For information about racks and power distribution units (PDUs), refer to the *Hitachi Universal V2 Rack Reference Guide*.

Hitachi power cables consist of three parts:

- **Plug:** Male connector for insertion into the AC outlet providing power. The physical design and layout of the plug's contact meet a specific standard.
- **Cord:** Main section of insulated wires of varying length, whose thickness is determined by its current rating.
- **Receptacle:** Female connector to which the equipment attaches. The physical design and layout of the receptacle's contacts meet a specific standard. Common standards are the IEC C13 receptacle for loads up to 10 amperes (A) and the IEC C19 receptacle for loads up to 15 A.



Number	Country or region	Voltage rating (VAC)	Current rating (amperes)	Plug type
1[1]	North America	100-127	15	NEMA 5-15P
	Brazil	200-240	10, 20	NEMA 5-15P
	Japan	100-127	12	JIS C8303
	Taiwan	100-127	12, 16	CNS 690
2	North America	100-127	20	NEMA 5-20P
3	North America	200-240	20	NEMA L6-20P
3	North America	200-240	30	NEMA L6-30P
4[2]	North America	200-240	30	NEMA L15-30P
5[3]	Hong Kong	200-240	13	BS-1363
	Singapore	200-240	13	BS-1363
6	Chile	200-240	10, 16	CEI 23-50
	Italy	200-240	10, 16	CEI 23-50
7	Argentina	200-240	10, 15	IRAM 2073
	Australia	200-240	10, 15	AS-3112
	China	200-240	10, 16	GB-1002
	New Zealand	200-240	10, 15	AS-3112

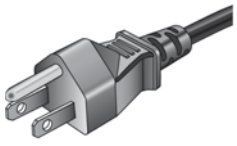
Number	Country or region	Voltage rating (VAC)	Current rating (amperes)	Plug type
8	Denmark	200-240	10	DK 2-5
	Israel	200-240	10, 16	SI-32
9[4]	Europe	200-240	CEE 7, 7	
10[5]	India	200-240	6, 16	IS-1293
	South Africa	200-240	10, 16	SABS-164
11	Switzerland	200-240	10	SEV 1011
12[6]	International	200-240	20	IEC 309
13[7]	United Kingdom	200-240	13	BS-1363
	International	200-240	20	IEC 309
14[8]	International	200-240	30	IEC 309

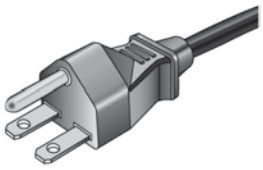
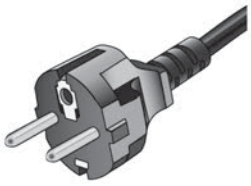
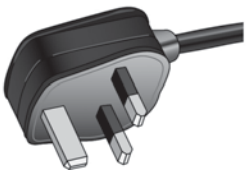
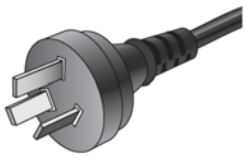
Notes:

1. Also used for 200-240 VAC applications in Korea and Philippines.
2. Three-phase AC.
3. Also Malaysia and Ireland.
4. Also known as "Schuko" connector and used in Austria, Belgium, Finland, France, Germany, Greece, Hungary, Indonesia, Netherlands, Norway, Poland, Portugal, Russia, Spain, and Sweden.
5. Supersedes type BS 546.
6. 3-wire (two-phase and earth). Physical variations (connector size and color) indicate amperage rating. Used in Switzerland for a true 16 A application.
7. 4-wire (three-phase and earth). Physical variations (connector size and color) indicate amperage rating.
8. 5-wire (three-phase, earth and neutral). Physical variations (connector size and color) indicate amperage rating.

AC connections

The following table shows and describes the types of AC connections on your storage system.

Description	Receptacle (male end)	Input rating	Reference standards
NEMA 5-15P		100V-120V (standard attachment)	1 ANSI C73.11 2 NEMA 5-15P 3 IEC 83
NEMA L6-20P		200V-240V	1 ANSI C73.11 2 NEMA 6-15P 3 IEC 83

Description	Receptacle (male end)	Input rating	Reference standards
			
CEE 7/7		200V-240V	4 CEE (7) II, IV, VII 3 IEC 83
BS-1363		200V-240V	5 BS 1365 3IEC 83
AS-3112		200V-240V	6 AS C112

5

Network, cabling, and connectivity

Observe the following guidelines for incorporating cabling in a typical data center.

- ☐ Controller connections
- ☐ Required cables
- ☐ Managing cables
- ☐ Cable retention
- ☐ Using the BECK tool
- ☐ Physical service processor connections
- ☐ Network access
- ☐ TCP/IP port assignments

Controller connections

The controllers provide the ports that are required to connect to the SVP, external drive trays, systems, and other devices.

A controller contains Fibre Channel ports, iSCSI ports, or both. The number and type of ports available for host connections vary based on the controller model.

- Fibre Channel SFP adapters are used to connect to the customer Fibre Channel switch and hosts.
- iSCSI ports come in optical and copper (RJ-45) interfaces, and are used to connect to the customer's Ethernet switch and hosts.

Each controller also has:

- A SAS port for connection to am external drive tray.
- An RJ-45 10/100/1000 bps user LAN port for performing management activities.
- An RJ-45 10/100/1000 bps maintenance LAN port for diagnostics.

Required cables

The quantities and lengths of the cables required for storage system installation vary according to the specific storage system and network configuration. Fibre Channel and iSCSI cables are used to connect the controllers to a customer switch or host. Serial Attached SCSI (SAS) cables are used to connect drive trays to controllers and other drive trays.

The following table describes the cables required to perform storage system connections at the time of installation.

Interface type	Connector type	Cable requirements
Fibre Channel	LC-LC	Use a Fibre Channel cable to connect the Fibre Channel ports on each controller to a host computer (direct connection), or to or several host computers via a Fibre Channel switch. See the note and table below.
iSCSI (optical)	LC-LC	Use an optical Ethernet cable to connect the iSCSI 10 Gb SFP ports on each controller to a host computer (direct connection), or to several host computers via an Ethernet switch.
iSCSI (copper)	RJ-45	Use a shielded Category 5e or 6a Ethernet cable to connect the iSCSI 10 Gb RJ-45 ports on each controller to a host computer (direct connection), or to several host computers via an Ethernet switch.
SAS	SAS optical	Connects the controller to a drive tray or a drive tray to another drive tray. Two SAS cables are

Interface type	Connector type	Cable requirements
		provided with each drive tray. SAS cables are also used to connect NAS modules to switches.
Ethernet	RJ-45	Four shielded Category 5e or 6a Ethernet cables are required for connecting the SVP to the controllers, management console PC, and network switch.

Note: The maximum distances in a typical Fibre Channel SAN depend on the kind of optical fiber used and its diameter. The following table lists the maximum supported Fibre Channel cable length based on cable size and port speed.

Cable size	Speed	Maximum cable length
9 micron	1 Gbps	3281 feet (1 km)
	2 Gbps	6562 feet (2 km)
50 micron	2 Gbps	984.2 feet (300 meters)
	4 Gbps	492.1 feet (150 meters)
	8 Gbps	164 feet (50 meters)
	16 Gbps	115 feet (35 meters)
62.5 micron	2 Gbps	328.1 feet (100 meters)
	4 Gbps	230 feet (70 meters)
	8 Gbps	69 feet (21 meters)

Managing cables

Organize cables to protect the integrity of your connections and allow proper airflow around your storage system.

Observing bend radius values

Never bend cables beyond their recommended bend radius. The following table provides general guidelines for minimum bend radius values, but you should consult the recommendation of your cable manufacturer.

Cable type	Minimum bend radius values
Fibre Channel	1.73 inch (40 mm)
iSCSI optical	1.73 inch (40 mm)
Category 5 Ethernet	Four times the outside diameter of the cable
SAS	1.73 inch (40 mm)

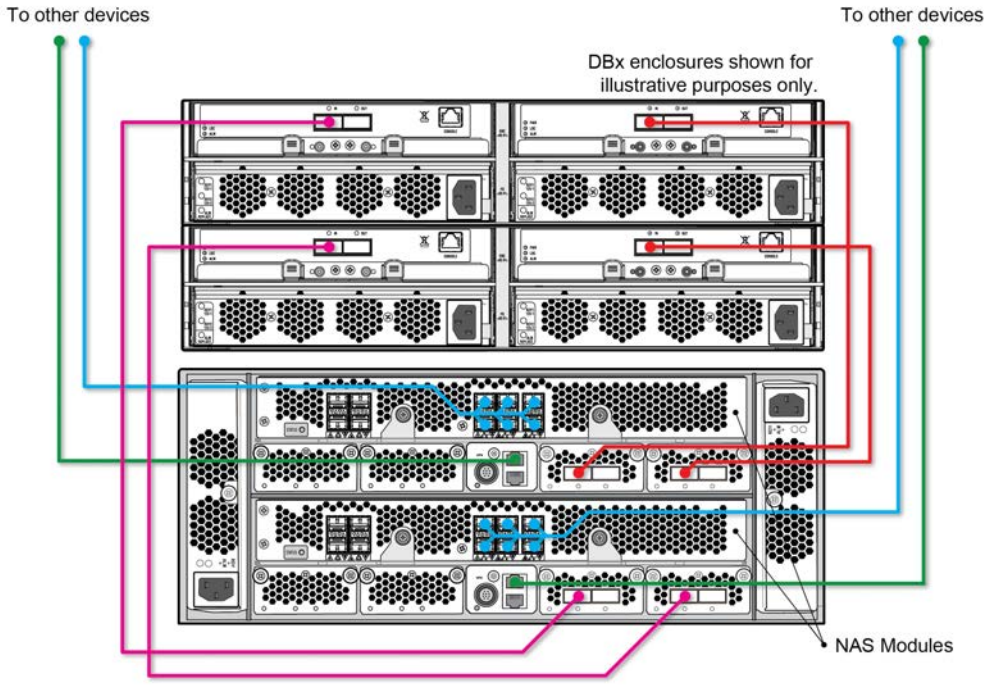
Protecting cables

Damage to your Fibre Channel and Ethernet cables can affect the performance of your storage system. Observe the following guidelines to protect cables

- Keep cables away from sharp edges or metal corners.
- When bundling cables, do not pinch or constrict the cables.
- Do not use zip ties to bundle cables. Instead, use velcro hook-and-loop ties that do not have hard edges and which you can remove without cutting.
- Never bundle network cables with power cables. If network and power cables are not bundled separately, electromagnetic interference (EMI) can affect your data stream.
- If you run cables from overhead supports or from below a raised floor, include vertical distances when calculating necessary cable lengths.
- If you use overhead cable supports:
  - Verify that your supports are anchored adequately to withstand the weight of bundled cables.
  - Gravity can stretch and damage cables over time. Therefore, do not allow cables to sag through gaps in your supports.
  - Place drop points in your supports that permit cables to reach racks without bending or pulling.

Cabling full-width modules

When cabling full-width modules, such as NAS modules as shown in the following figure, route the cables horizontally, so that they do not interfere when replacing a module.



Ensuring adequate airflow

Bundled cables can obstruct the movement of conditioned air around your storage system.

- Secure cables away from fans.
- Keep cables away from the intake holes at the front of the storage system.
- Use flooring seals or grommets to keep conditioned air from escaping through cable holes.

Preparing for future maintenance

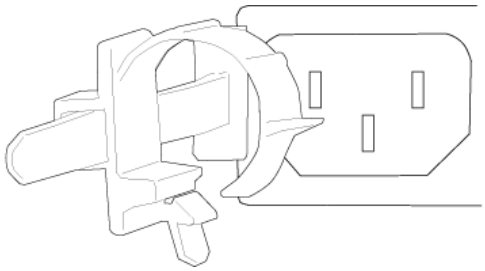
Design your cable infrastructure to accommodate future work on the storage system. Give thought to future tasks that will be performed on the storage system, such as locating specific pathways or connections, isolating a fault, or adding or removing components.

- Purchase colored cables or apply colored tags.
- Label both ends of every cable to denote the port to which it connects.

Cable retention

Unintentional unplugging or unseating of a power cable can have a serious impact on the operation of an enterprise storage system. Unlike data cables, power connectors do not have built-in retention mechanisms to prevent this from happening.

To prevent accidental unplugging or unseating of power cables, the storage system includes a rubber cable-retention strap near the AC receptacle on each controller. These straps, shown in the following image, loop around the neck of a power cable connector, and the notched tail is slipped over the hook of the restraining bar fixed to the storage system.



Using the BECK tool

The Backend Configuration Kit (BECK) tool is a graphical application for checking the cabling paths between controllers and drive trays. The BECK tool is available as a download from Hitachi.

Physical service processor connections

The SVP is available as a physical device provided by Hitachi, or as a virtual guest host running on customer-supplied ESX servers and VM/OS licenses and media. The SVP provides error detection and reporting, and supports diagnostic and maintenance activities involving the storage system.

In a Hitachi VSP configuration, both the storage system and the SVP reside on the same private network segment of the customer's local-area network. The management console PC used to administer the system must also reside on the same private network segment.

Physical SVP connectivity requires all of the following:

- A static IP address for the SVP that is on the same network segment as the storage system.
- One Ethernet connection from each controller to separate LAN ports on the SVP.
- One Ethernet connection to the customer's network switch.
- At least one management console PC on the same network segment as the SVP and storage system.

Virtual SVP connectivity requires all of the following:

ESX Server

- VMware ESXi server 6.x

- 2 quad core processors, Intel Xeon 2.29 GHz
- 1-port NIC
- SVP guest OS (2 DKCs)
- 32 GB RAM

SVP Guest OS (1 DKC)

- Windows 7 Professional x64 Service Pack 1
- 2 x vCPU
- 1 virtual network adapter
- 4 GB RAM
- 120 GB disk space

Network access

External Fibre Channel, iSCSI, or Ethernet cable connections are completed at the time of installation.

These connections are required to:

- Establish connections from the controllers to the host computers.
- Connect the storage system to the network, enabling storage system management through Hitachi Command Suite or Hitachi Storage Advisor.
- Allow communication to the storage system from the SVP.

TCP/IP port assignments

When you install your storage system, default ports must be opened to allow for incoming and outgoing requests.

Review the following ports before you install the storage system to avoid conflicts between the TCP/IP port assignments used by the storage system and those used by other devices and applications.

Note: Hitachi Command Suite has additional port considerations. For more information, refer to the *Hitachi Command Suite Administrator Guide.*

Port number	Usage description
80	Used by the SVP, Hitachi Storage Advisor, and Device Manager - Storage Navigatorto communicate through the HTTP protocol.
161	UDP (SNMP uses this port to send traps from the storage system) .
427	Used by SMI-S.

Port number	Usage description
1099	Used by Hitachi Command Suite products JAVA RMI Registry server.
2000	TCP (Device Manager - Storage Navigator: Nonsecure) Cisco Skinny Client Control Protocol (SCCP) uses port 2000 for TCP. If you use Device Manager - Storage Navigator in a network with SCCP, change the TCP port that Device Manager - Storage Navigator uses (refer to the Device Manager - Storage Navigator online help).
5989	Used by SMI-S.
10995	TCP Device Manager - Storage Navigator and Hitachi suite components)
23015	Used for Web browser communications.
23016	Used for Web browser communications via SSL.
28355	TCP (Device Manager - Storage Navigator: Secure)
31001	Used for communication by Hitachi Command Control Interface (CCI) data collection procedures.
34001	Used by RAID Manager.
51099	Used by Device Manager - Storage Navigator for communication.
51100	Used by Device Manager - Storage Navigator for communication.

A

Registering the storage system

Before you start using your storage system, you must register it.

- ☐ Register your storage system
- ☐ Support and documentation resources
- ☐ HDS Community
- ☐ Product interoperability
- ☐ Recording your configuration settings

Register your storage system

Before you start using your storage system for the first time, use HDS Support Connect to register your storage system. You will need your product serial number to complete the registration.

Procedure

1. Open a web browser on your PC or mobile device.
2. In the browser address bar, enter https://support.hds.com/en_us/contact-us.html.
3. Follow the on-screen instructions to register your storage system.

Support and documentation resources

Hitachi provides the following support and documentation resources for maximizing your experience.

- Customer Contact Us: https://support.hds.com/en_us/contact-us.html
- Documentation: https://knowledge.hds.com/Documents
- Self-Service: https://support.hds.com/content/hds/customer/en_us/selfservice.html

HDS Community

The HDS Community lets you exchange information, questions, and comments about Hitachi Data Systems products, services, and support.

To visit the HDS Community, go to https://community.hds.com.

Product interoperability

Hitachi Data Systems provides interoperability matrices of products that have been qualified by HDS to support seamless deployment of HDS storage systems.

To access the interoperability matrices, go to https://support.hds.com/en_us/interoperability.html.

Recording your configuration settings

Make a copy of the following table and record your configuration settings for future reference.

Field	Enter Your Setting Below
Initial Startup Wizard	
Default Account Maintenance Password	
IP v4 Configuration: Storage System Address, Controller 1	
IP v4 Configuration: Storage System Address, Controller 2	
IP v4 Configuration: SVP Address	
IP v4 Configuration: Subnet Mask	
IP v4 Configuration: Default Gateway	
IP v4 Configuration: DNS Server 1	
IP v4 Configuration: DNS Server 2	
IP v4 Configuration: DNS Server 3	
IP v6 Configuration Enabled or Disabled	
Initial Setup Wizard	
Storage System Name	
Contact	
Location	
UTC Time Zone	
Use NTP Server: Yes - Specify NTP Server IP Address: No - Specify Manually Entered Date and Time:	
Synchronizing Time	
Email Alert Notifications	
Notification Alert: Host Report, SIMs, or All	
Email Notice, Enable or Disable	
Email Address (To)	
Email Address (From)	
Email Address (Reply To)	
Description to Notify	
Mail Server Settings Mail Server: Identifier, IPv4, or IPv6 IP address SMTP Authentication: Enable or Disable	

Field	Enter Your Setting Below
If Enabled, Enter Account and Password	
Syslog Notifications	
Notification Alert: Host Report, SIMs, or All	
Transfer Protocol: TLS1.2/RFC5424 or UDP/ RFC3164	
Primary Server	
Primary Server - Syslog Server: IPv4 or IPv6 address	
Primary Server - Port Number	
Primary Server - Client Certificate File Name	
Primary Server - Password	
Primary Server - Root Certificate File Name	
Secondary Server	
Location Identification Name	
Retry	
Retry Interval	
SNMP Notifications	
Notification Alert: Host Report, SIMs, or All	
SNMP Agent, Enable or Disable	
Trap Destination	
SNMP Manager	
System Group Information Storage System Name Contact Location	
Installing Licenses	
Record each license installed on the storage system. You may want to include whether the license was installed by selecting a license key file or by typing a license key code.	
Host Port Settings	
iSCSI Port: _____	IP Address: Subnet Mask: Default Gateway:
iSCSI Port: _____	IP Address: Subnet Mask: Default Gateway:

Field	Enter Your Setting Below
iSCSI Port: ___________	IP Address: Subnet Mask: Default Gateway:
iSCSI Port: ___________	IP Address: Subnet Mask: Default Gateway:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:
Fibre Channel Port: ___________	Port Address: Transfer Rate: Topology:

B

Regulatory compliance

This equipment has been tested and certified for compliance with the following standards.

Table 9 Country Specifications and Certifications

Standard	Specification	Product marking or logo	Country regulation
Electronic emission controls	FCC part 15 Subpart B: 2013	FCC	USA and Canada
	ICES-003 Issue 5:2012	ICES-003	USA and Canada
	AS/NZS CISPR 22:2009+A1	RCM	Australia and New Zealand
	TP TC 020/2011	EAC	Russia, Belarus, and Kazakhstan
	CNS 13438	BSMI	Taiwan
	KN22	KC	Korea
	KN24	KC	Korea
Electronic emission certifications	EN5522: 2010	CE	EU
	EN5524: 2010	CE	EU
	EN61000-3.2:2006+A1 +A2	CE	EU
	EN61000-3.3:2008	CE	EU
Safety certifications	UL and CSA 60950-1:2007	cTUVus	USA and Canada
	EN60950-1:2006+A1	TUV	Germany
	IEC60950-1:2005+A1	N/A	All CB countries
	IEC60950-1:2005+A1	S-Mark	Argentina
	TP TC 004/2011	EAC	Russia
	CNS 14336-1	BSMI	Taiwan

Standard	Specification	Product marking or logo	Country regulation
	EN60950-1:2006+A1	CE	EU
Radio interference voluntary control	VCCI V-3/2013.04	VCCI	Japan

Table 10 Cryptography Standards and Certifications for VSP G200

Standard	Certification	Country regulation	Description
Federal Information Processing Standards (FIPS)	#2694 FIPS 140-2 Level 1 Consolidated Validation Certificate http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140val-all.htm	USA and Canada	Encryption back end module provides high-speed data at rest encryption.

Table 11 Cryptography Standards and Certifications

Standard	Certification	Country regulation	Description
Federal Information Processing Standards (FIPS)	#2462 FIPS 140-2 Level 2 Consolidated Validation Certificate http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140val-all.htm #2727 FIPS 140-2 Level 1, 2 Consolidated Validation Certificate http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401val2016.htm	USA and Canada	Encryption back end module provides high-speed data at rest encryption.

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Hitachi Vantara

Corporate Headquarters
2845 Lafayette Street
Santa Clara, CA 95050-2639 USA
www.HitachiVantara.com
community.HitachiVantara.com

Regional Contact Information
Americas: +1 866 374 5822 or info@hitachivantara.com
Europe, Middle East and Africa: +44 (0) 1753 618000 or info.emea@hitachivantara.com
Asia Pacific: +852 3189 7900 or info.marketing.apac@hitachivantara.com