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Hitachi Virtual Storage Platform G200

Hardware Installation and Reference Guide

Hitachi Data Systems

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Preface

Before you install a Hitachi Virtual Storage Platform (VSP) storage system, 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 a Hitachi VSP storage system.

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.

☐ Safety and environmental notices

☐ General safety guidelines

☐ Intended audience

☐ Product version - reference guide

☐ Release notes

☐ Document conventions

☐ Conventions for storage capacity values

☐ Accessing product documentation

☐ Getting help

☐ 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.

Recycling

A nickel-metal hydride battery is used in the Cache Backup Battery.

A nickel-metal hydride battery is a resource that can be recycled. When you want to replace the Cache Backup Battery, call the service personnel. They will dispose of it for you. This nickel-metal hydride battery, which is designated as recycling product by a recycling promotion low, must be recycled.

The mark posted on the Cache Backup Battery is a three-arrow mark that indicates a recyclable part.



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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Notes on use

When using the Hitachi storage system, be sure to read this guide and understand the operating procedures and instructions described herein thoroughly before staring your operation.

The array complies with FDA radiation performance standard 21 CFR subchapter J.

EMI regulation

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference in which case the user will be required to correct the interference at his own expense. Testing was done with shielded cables. Therefore, in order to comply with the FCC regulations, you must use shielded cables with your installation.

The electromagnetic interference (EMI) test was done in the following configuration.

If trouble occurs in another configuration, a user might be requested to take appropriate preventative measures:

- RKU CBSS dense intermix drive tray flash module drive tray+2 small form factor drive trays + 1 large form factor drive tray.
- RKU CBSL 1 small form factor drive tray
- RKU CBL dense intermix drive tray flash module drive tray 3 small form factor drive trays 3 large form factor drive trays

This product must not be used in residential areas.

This is a class A product. In a domestic environment this product can cause radio interference in which case the user can be required to take adequate measures.

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 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, power off 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 ensure 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 have somebody 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 power-off switches are located and be sure you 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 for a limited time 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 turned on

Observe the following safety measures when working on the storage system with the system power turned on. 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 are 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, have at least two people 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.
- Shut off 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.

- Exercise care when handling the storage system and its parts. Do not drop the equipment or parts.
- Do not stand on the storage system. Avoid using the storage system for any use other than the one for which it was originally designed.
- Do not place 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 water, paper clips, or the like on the storage system or near the power supply.
- Route cables in a way to prevent people from tripping over them.
- Do not operate the storage system in a moist or dusty place.
- Keep these vents open and be sure 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. If the problem is not covered by this manual, contact your system administrator.

Procedures in an emergency

For electric shock

- Before performing maintenance, be sure that there is no potential electric hazard in the maintenance area, such as insufficient grounding or a wet floor.
- Before performing maintenance, observe where the emergency poweroff switches are located and be sure you know how to operate them.
- Unless otherwise instructed, remove all power sources to the storage system before starting work. Switching off the storage system power supplies is not sufficient. When power is fed 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, confirm that these conditions have been satisfied.

For fire

- Shut off 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 shut off, take suitable actions, including the use of a fire extinguisher, or call the fire department.

Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and authorized service providers who install, configure, or operate Hitachi Virtual Storage Platform G200, G400, G600 storage systems.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- The Hitachi Virtual Storage Platform G200, G400, G600 storage system.
- The operating system and web browser software on the system hosting the storage management software.

Product version - reference guide

This document revision applies to Hitachi Virtual Storage Platform G200 firmware 83-01-0*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.

Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click **OK**.
Italic	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: `copy source-file target-file` **Note:** Angled brackets (< >) are also used to indicate variables.
`Monospace`	Indicates text that is displayed on screen or entered by the user. Example: `pairdisplay -g oradb`
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: `pairdisplay -g <group>` **Note:** Italic font is also used to indicate variables.
[ ] 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.

Convention	Description
| 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 or consequences (for example, disruptive operations).
	WARNING	Warns the user of severe conditions or consequences (for example, destructive operations).

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

Logical capacity unit	Value
1 block	512 bytes
1 KB	1,024 (2^{10}) bytes
1 MB	$1,024$ KB or $1,024^2$ bytes

Logical capacity unit	Value
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 the Hitachi Data Systems Portal: https://portal.hds.com. 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 Portal is the destination for technical support of your current or previously-sold storage systems, midrange and enterprise servers, and combined solution offerings. The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, log on to the Hitachi Data Systems Support Portal for contact information: https://portal.hds.com.

Hitachi Data Systems Community is a new global online community for HDS customers, partners, independent software vendors, employees, and prospects. It is an open discussion among these groups about the HDS portfolio of products and services. It is the destination to get answers, discover insights, and make connections. The HDS Community complements our existing Support Portal and support services by providing an area where you can get answers to non-critical issues and questions. **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!

1

Product overview

Hitachi Virtual Storage Platform G200 is a modular, rack-mountable storage system.

The storage systems have dual controllers that provide the interface to a data host. Each controller contains its own processor, dual in-line cache memory modules (DIMMs), cache flash memory (CFM), battery, and fans. Each controller also has an Ethernet connection for out-of-band management using Hitachi Device Manager - Storage Navigator. If the data path through one controller fails, all hard drives remain available to data hosts using a redundant data path through the other controller. The storage system allows a defective controller to be replaced.

Hitachi VSP storage systems allow defective drives to be replaced without interruption of data availability to host computers. A hot spare drive can be configured to replace a failed drive automatically, securing the fault-tolerant integrity of the logical drive. Self-contained, hardware-based RAID logical drives provide maximum performance in compact external enclosures.

Key components are implemented with a redundant configuration, so that the storage system can remain operational in the unlikely event that a component should fail. Adding and replacing components, along with firmware upgrades, can be conducted while the storage system is operating.

- ☐ Block configuration
- ☐ Hitachi Virtual Storage Platform G200 model
- ☐ Features
- ☐ Scalability

Block configuration

A block configuration supports the Fibre Channel, Internet Small Computer System Interface (iSCSI), and Fibre Channel over Ethernet (FCoE) protocols, and consists of:

- One controller.
- One or more drive trays (at least one drive tray is required for controllers that do not contain drives).
- One 1U block service processor server (SVP).

Hitachi Virtual Storage Platform G200 model

The Hitachi Virtual Storage Platform G200 consists of:

- A 2U controller that includes either 24 small factor form factor (SFF) disk drives or 12 large form factor (LFF) disk drives.
- An associated number of drive trays.

The Hitachi Virtual Storage Platform G200 supports 64 GB of high-speed memory cache, arranged as 32 GB per controller.

The Hitachi Virtual Storage Platform G200 interface consists of:

- **8 GB Fibre Channel:** 16 ports per system.
- **16 GB Fibre Channel:** 8 ports per system.
- **10 GB iSCSI:** 8 ports per system.

Controller	Controller chassis	Height	Number of drives supported	Drive type
CBSS	DW800-CBSS	2U (86 mm)	24	2.5 inch
CBSS	DW800-CBSSE (encryption model)	2U (86 mm)	24	2.5 inch
CBSL	DW800-CBSL	2U (86 mm)	12	3.5 inch
CBSL	DW800-CBSLE (encryption model)	2U (86 mm)	12	3.5 inch

Drive tray	Drive tray model name	Supported drive types	Number of drives supported	Height
SFF drive tray	• DW-F800-DBS (power supply, contains BNST)	2.5-inch SFF	24	2U (86.2 mm)

Drive tray	Drive tray model name	Supported drive types	Number of drives supported	Height
	• DW-F800-DBSC			
LFF drive tray	• DW-F800-DBL (power supply, contains BNST) • DW-F800-DBLC	3.5-inch LFF	12	2U (86.2 mm)
FMD drive tray	• DW-F800-DBF	Flash module drive (FMD)	12	2U (86.2 mm)
Dense intermix drive tray	• DW-F800-DB60 (power supply, contains BNST) • DW-F800-DB60C	3.5-inch LFF	60	4U (174.3 mm)

Features

Feature	Value
Maximum cache memory supported	64 GB
Maximum number of spare drives	16
Maximum number of RAID groups	75
Maximum volume size	128 TB
Maximum number of volumes and host groups	2,047
Maximum number of volumes and RAID groups	1,024
Maximum number of DP pool volumes	4,095
Maximum number of DP pools	64
Maximum number of Fibre Channel devices connected through a Fibre Channel switch	128
Maximum number of iSCSI hosts connected through a network switch	255

Scalability

All storage systems offer pay-as-you-grow scalability by allowing you to hot-add drives as you need them.

Examples of supported Hitachi Virtual Storage Platform G200 configurations

Controller	Drive tray	Maximum number of drives supported	Number of mountable flash drives
CBSS	SFF drive tray	192	192
	LFF drive tray	108	108
	FMD drive tray	108	N/A
	Dense intermix drive tray	264	264

Controller	Drive tray	Maximum number of drives supported	Number of mountable flash drives
CBSL	SFF drive tray	180	180
	LFF drive tray	96	96
	FMD drive tray	96	N/A
	Dense intermix drive tray	252	252

Note: The Hitachi Virtual Storage Platform G200 includes the drive to be installed in the controller chassis.

Maximum number of mounted drive trays

Controller	Number of mounted drive trays (up to 7 per path)		Maximum number of mounted drives	
	SFF, LFF drives	Dense intermix drive tray	SFF drive + dense intermix drive tray	LFF drive + dense intermix drive tray
CBSS	7	0	192	108
	5	1	204	144
	3	2	216	180
	1	3	228	216
	0	4	264	264

Controller	Number of mounted drive trays (up to 8 per path)		Maximum number of mounted drives	
	SFF, LFF drives	Dense intermix drive tray	SFF drive + dense intermix drive tray	LFF drive + dense intermix drive tray
CBSL	7	0	180	96
	5	1	192	132
	3	2	204	168
	1	3	216	204
	0	4	252	252

Note: Some configurations might exceed 240 slots per path. If a drive is inserted into a configuration that exceeds 240 slots per path, the drive is blocked.

2

Hardware description

This chapter provides a tour of the storage system hardware.

- Storage system controllers
- Controller interfaces
- Storage system drive trays
- Service Processor

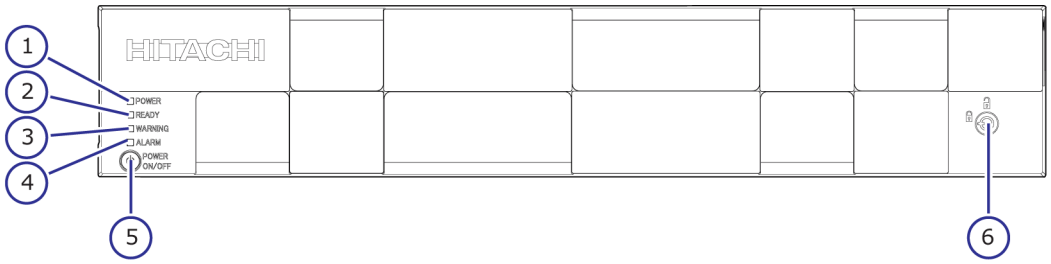
Storage system controllers

Every storage system has two controllers. The controllers contain fans and power supplies, and provide the interfaces between a host and the storage system.

A controller manages the I/O between the host system and data volumes.

CBSS controller

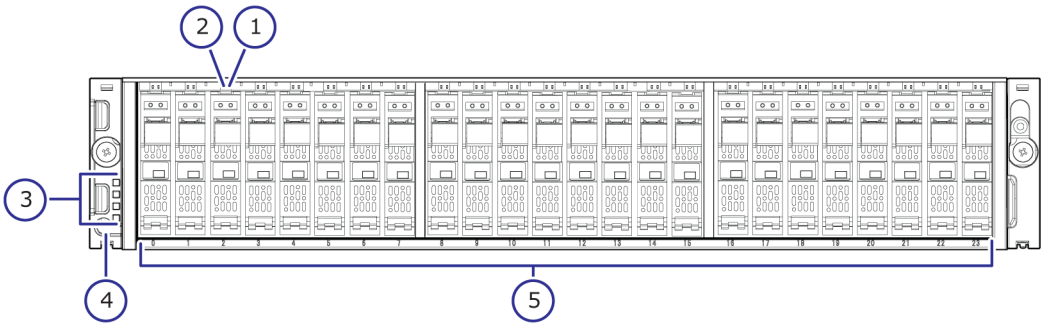
CBSS with front panel bezel



Number	Item	Description
1	POWER LED	Green: storage system is powered on. Amber: storage system is receiving power.
2	READY LED	Green: normal operation.
3	WARNING LED	Off: normal operation. Amber: component requires maintenance. Blink: failure requires maintenance. LED might go OFF during user maintenance.
4	ALARM LED	Off: normal operation. Red: processor failure (system may be down). See the HDS Support Portal at https://portal.hds.com
5	POWER ON/OFF (main switch)	Powers the storage system.
6	Lock	Locks and unlocks the front panel bezel using the supplied key.

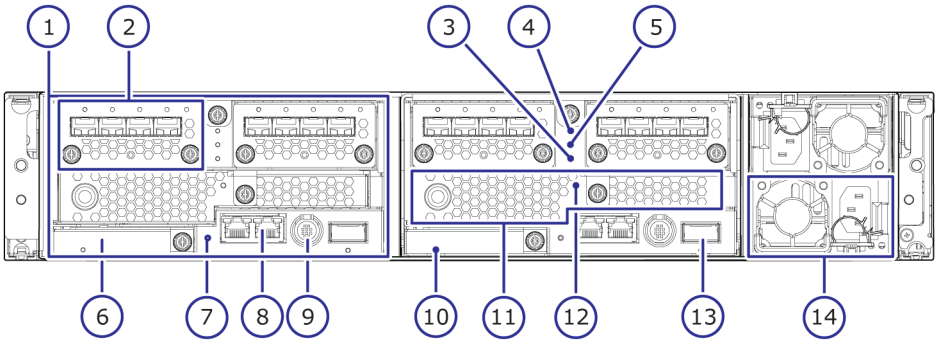
Note: Removing a controller can cause the POWER, READY, WARNING, and ALARM LEDs on the front panel to go off. These LEDs return to their on state after the storage system recovers from the controller replacement.

CBSS front panel without bezel



Number	Item	Description
1	ACT LED	Green: normal operation. Blink green: drive is being accessed.
2	ALM LED	Red: drive stopped due to a failure and can be removed safely.
3	POWER, READY, WARNING, ALARM LEDs	See previous table.
4	POWER ON/OFF (main switch)	Powers the storage system.
5	Small form factor drives	Twenty-four 2.5-inch small form factor drives oriented vertically. Slots are designated 0-23 ,moving from left to right.

CBSS rear panel

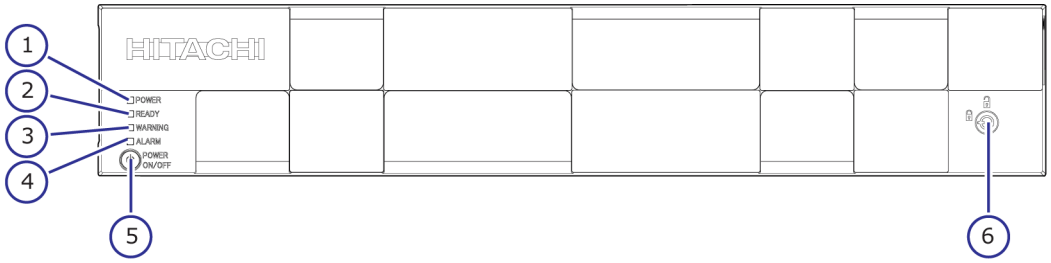


Number	Item	Description
1	Controllers	Controller 1 (left) and Controller 2 (right).
2	Front end module	N/A
3	CTL ALM LED	Red: controller can be removed safely. Blink red: failure with the controller's power supply unit. Amber: LAN reset switch was pressed.
4	BACKUP STTS LED	Green: power restoration in progress following power outage. Fast blink green: restoring. Slow blink green: restoring or sequential shutdown in progress.
5	CTL WARN LED	Amber blink one time: failure with fan 0. Amber blink two times: failure with fan 1.
6	Cache flash memory	N/A
7	LAN-RST switch	Use only when instructed by Hitachi Support.
8	LAN port	Maintenance LAN port (left) and user LAN port (right).
9	Uninterruptible power supply port	N/A
10	ALARM LED (for cache flash memory)	Red: cache flash memory can be removed safely.
11	Backup module	N/A
12	STATUS	Green: charging of the battery in the backup module is complete. Blink green: battery in the backup module is charging or discharging. Red: backup module can be removed safely. Blink red: backup module can be removed safely. Blink red one time: battery failure

Number	Item	Description
		Off: battery is not installed, failure occurred, or firmware is being upgraded.
13	SAS port	N/A
14	Power supply unit	N/A

CBSL controller

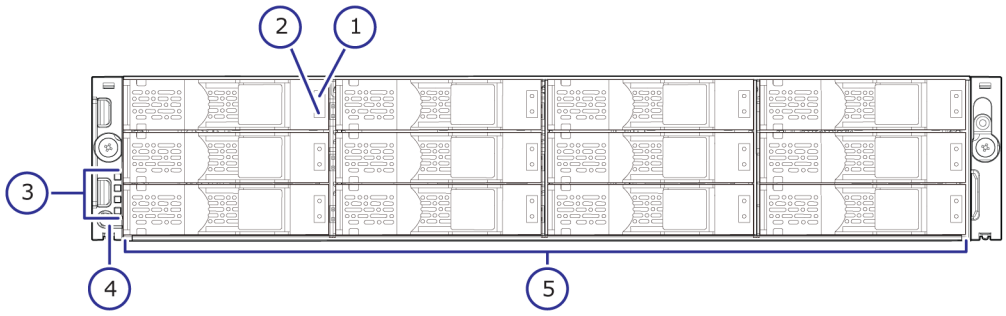
CBSL with front panel bezel



Number	Item	Description
1	POWER LED	Green: storage system is powered on. Amber: storage system is receiving power.
2	READY LED	Green: normal operation.
3	WARNING LED	Off: normal operation. Amber: component requires maintenance. Blink: failure requires maintenance. LED might go OFF during user maintenance.
4	ALARM LED	Off: normal operation. Red: processor failure (system may be down). See the HDS Support Portal at https://portal.hds.com
5	POWER ON/OFF (main switch)	Powers the storage system.
6	Lock	Locks and unlocks the front panel bezel using the supplied key.

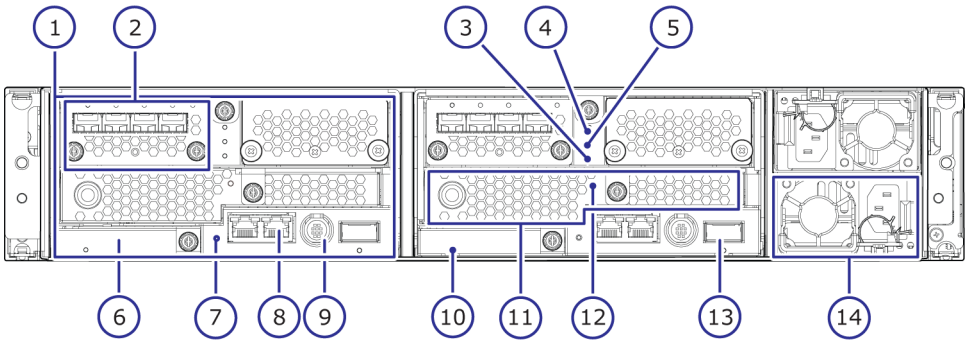
Note: Removing a controller can cause the POWER, READY, WARNING, and ALARM LEDs on the front panel to go off. These LEDs return to their on state after the storage system recovers from the controller replacement.

CBSL front panel without bezel



Number	Item	Description
1	ACT LED	Green: normal operation. Blink green: drive is being accessed.
2	ALM LED	Red: drive stopped due to a failure and can be removed safely.
3	POWER, READY, WARNING, ALARM LEDs	See previous table.
4	POWER ON/OFF (main switch)	Powers the storage system.
5	Large Form Factor Drives	Twelve 3.5-inch large form factor drives stacked horizontally. Slots are designated the following way: 8 9 10 11 4 5 6 7 0 1 2 3

CBSL rear panel



Number	Item	Description
1	Controllers	Controller 1 (left) and Controller 2 (right).
2	Front end module	N/A
3	CTL ALM LED	Red: controller can be removed safely. Blink red: failure with the controller's power supply unit. Amber: LAN reset switch was pressed.
4	BACKUP STTS LED	Green: power restoration in progress following power outage. Fast blink green: restoring. Slow blink green: restoring or sequential shutdown in progress.
5	CTL WARN LED	Amber blink one time: failure with fan 0. Amber blink two times: failure with fan 1.
6	Cache flash memory	N/A
7	LAN-RST switch	Use only when instructed by Hitachi Support.
8	LAN port	Maintenance LAN port (left) and user LAN port (right).
9	Uninterruptible power supply port	N/A
10	ALARM LED (for cache flash memory)	Red: cache flash memory can be removed safely.
11	Backup module	N/A

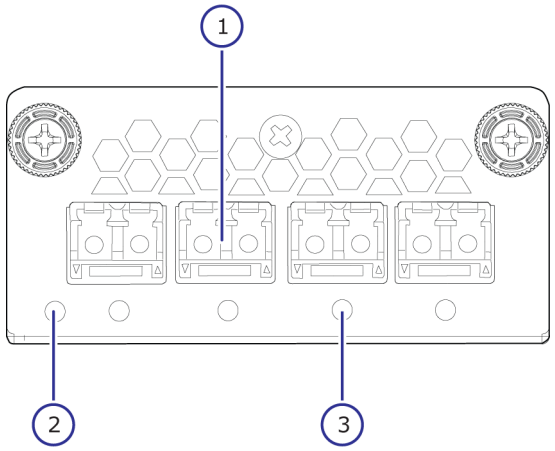
Number	Item	Description
12	STATUS	Green: charging of the battery in the backup module is complete. Blink green: battery in the backup module is charging or discharging. Red: backup module can be removed safely. Blink red: backup module can be removed safely. Blink red one time: battery failure Off: battery is not installed, failure occurred, or firmware is being upgraded.
13	SAS port	N/A
14	Power supply unit	N/A

Controller interfaces

Controllers provide interfaces for connecting, powering, and configuring and managing the storage system. They also have LEDs to show the status of the storage system.

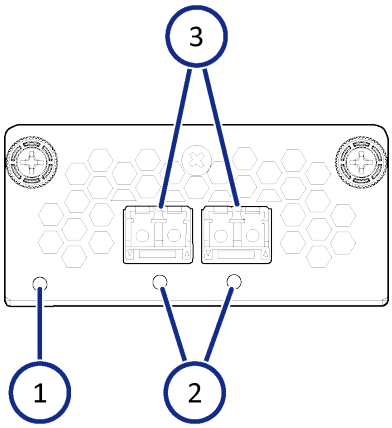
Front end module descriptions

8 Gbps Fibre Channel board LEDs and connectors



Number	Item	Description
1	Fibre Channel connectors	Connect to Fibre Channel cables.
2	STATUS LED	Green: front end module is in power-on state. Red: front end module can be removed safely.
3	PORT LED	Red: small form-factor pluggable can be removed safely. Blue: normal link status at 8 Gbps. Green: normal link status at 2 Gbps or 4 Gbps.

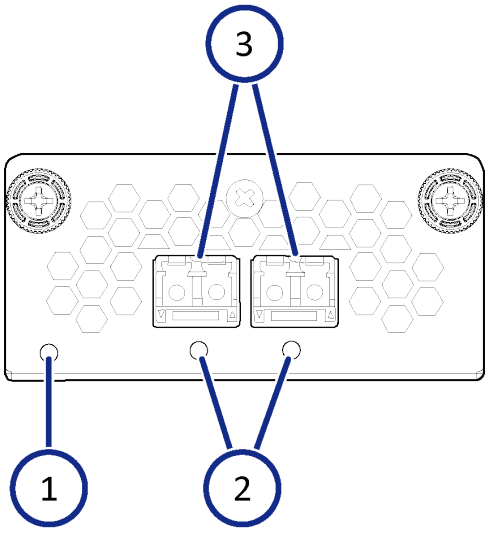
16 Gbps Fibre Channel board LEDs and connectors



Number	Item	Description
1	STATUS LED	Green: front end module is in the power-on state. Red: front end module can be removed safely.
2	PORT LED	Red: small form-factor pluggable can be removed safely. Blue: normal link status at 16 Gbps. Green: normal link status at 4 or 8 Gbps.

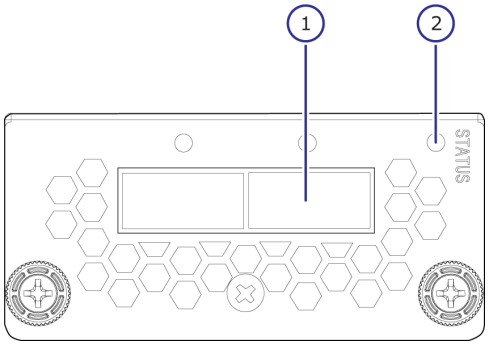
Number	Item	Description
3	Fibre Channel connectors	Connect to Fibre Channel cables.

10 Gbps iSCSI board LEDs and connectors



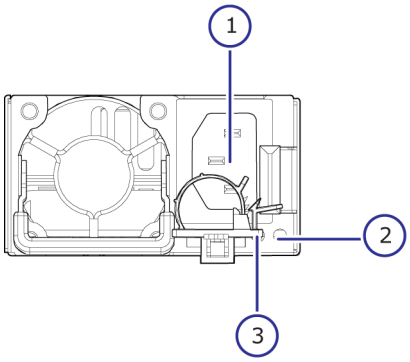
Number	Item	Description
1	STATUS LED	Green: front end module is in the power-on state. Red: front end module can be removed safely.
2	PORT LED	Red: small form-factor pluggable can be removed safely. Blue: normal link status. Blink blue: front end module is in communication status.
3	iSCSI connectors	Connect to Ethernet LAN cables.

Back end module LEDs and connectors



Number	Item	Description
1	PATH 1 connector	Connect to a drive tray.
2	PORT LED	Blue: normal link status.

Power supply unit LEDs and connectors



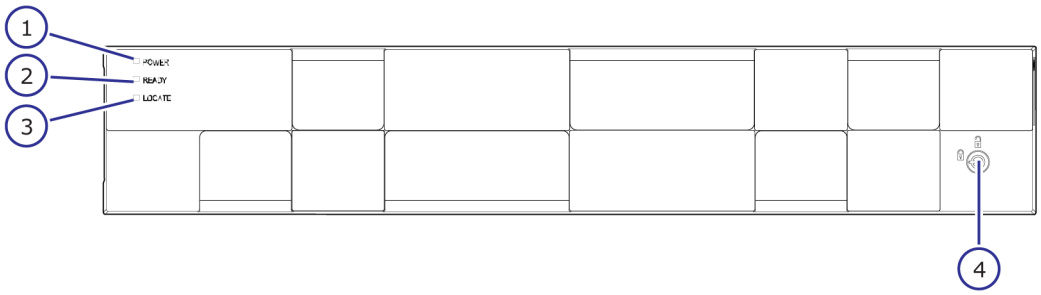
Number	LED or connector	Description
1	Receptacle	Connect to the power cable supplied with the storage system.
2	AC IN LED	Blue: AC input is normal.
3	ALM/RDY LED	Red: power supply unit can be removed safely. Green: normal operation.

Storage system drive trays

Drive trays contain drives, power supplies, fans, and status LEDs. They also provide interfaces for connecting to controllers and other drive trays.

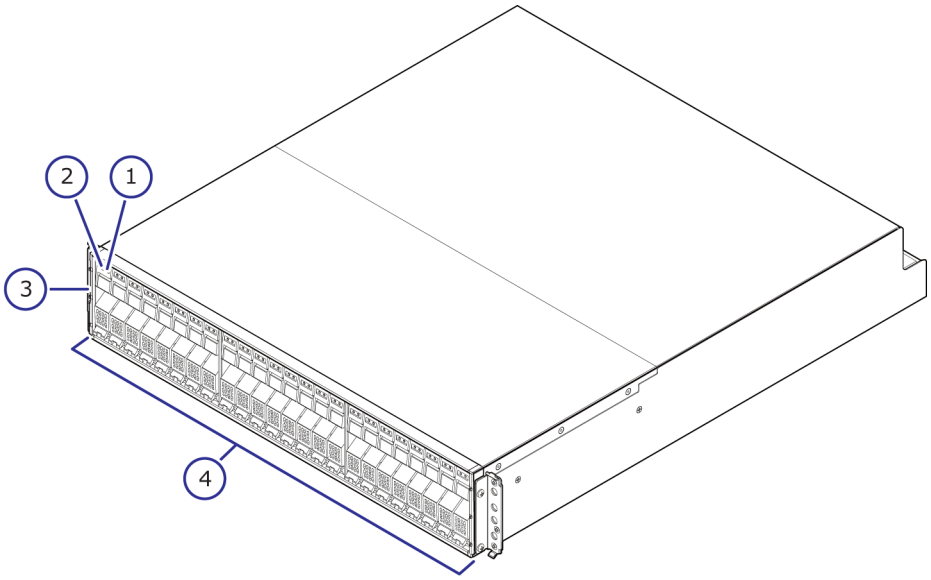
Small form factor (SFF) drive tray

SFF with front panel bezel



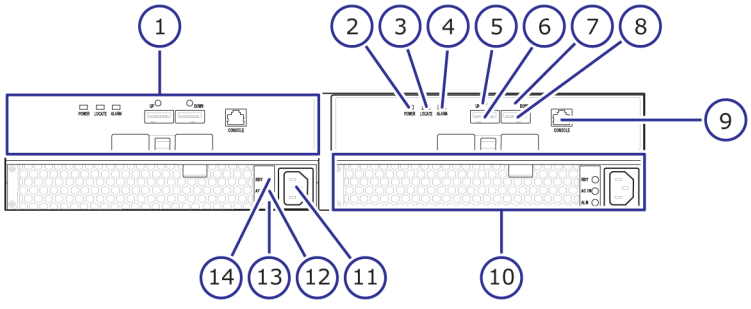
Number	Item	Description
1	POWER LED	Green: Drive tray is powered on.
2	READY LED	Green: Drive tray is operational.
3	LOCATE LED	Amber: Nonfatal error. Storage system can remain operating. This LED can also go ON to identify the drive tray being added.
4	Lock	Locks and unlocks the front panel bezel using the supplied key.

SFF front panel without bezel



Number	Item	Description
1	ACT LED	Green: normal operation. Blink green: drive is being accessed.
2	ALM LED	Red: drive stopped due to a failure and can be removed safely.
3	POWER, READY, LOCATE LEDs	See previous table.
4	Small form factor drives	Twenty-four 2.5-inch small form factor drives oriented vertically. Slots are designated 0-23 ,moving from left to right.

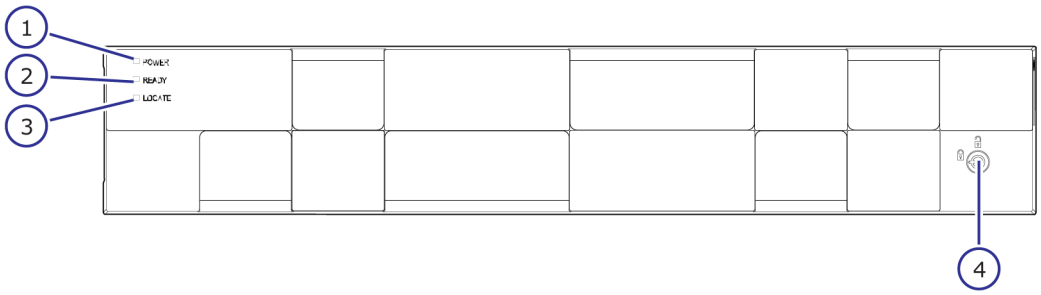
SFF rear panel



Number	Item	Description
1	ENC	N/A
2	POWER LED	Green: ENC is in the power-on state.
3	LOCATE LED	Amber: Shows the ENC when adding drive trays.
4	ALARM LED	Red: ENC can be removed safely.
5	PATH (IN) LED	Blue: IN side port is linked up.
6	PATH (IN) connector	Connect to a controller or drive tray.
7	PATH (OUT) LED	Blue: OUT side port is linked up.
8	PATH (OUT) connector	Connect to a drive tray.
9	Console	This port is reserved.
10	Power supply unit	N/A
11	Receptacle	Connect to the power cable supplied with the storage system.
12	AC IN LED	Green: normal operation.
13	ALM LED	Red: power supply unit can be removed safely.
14	RDY LED	Green: normal operation.

Large form factor (LFF) drive tray

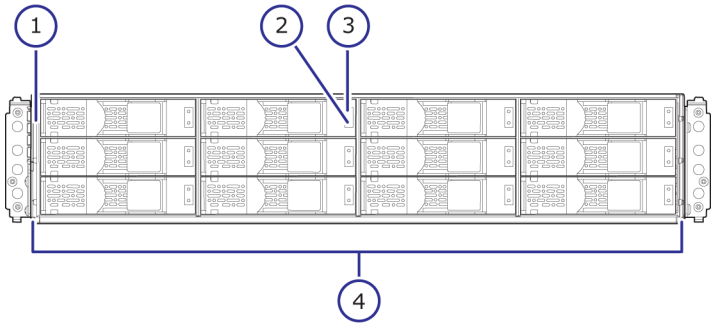
LFF with front panel bezel



Number	Item	Description
1	POWER LED	Green: Drive tray is powered on.

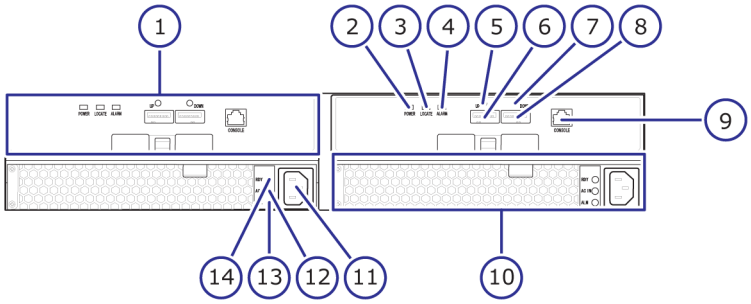
Number	Item	Description
2	READY LED	Green: Drive tray is operational.
3	LOCATE LED	Amber: Nonfatal error. Storage system can remain operating. This LED can also go ON to identify the drive tray being added.
4	Lock	Locks and unlocks the front panel bezel using the supplied key.

LFF front panel without bezel



Number	Item	Description
1	POWER, READY, LOCATE LEDs	See previous table.
2	ACT LED	Green: normal operation. Blink green: drive is being accessed.
3	ACT LED	Red: drive stopped due to a failure and can be removed safely.
4	Large Form Factor Drives	Twelve 3.5-inch large form factor drives stacked horizontally. Slots are designated the following way: 8 9 10 11 4 5 6 7 0 1 2 3

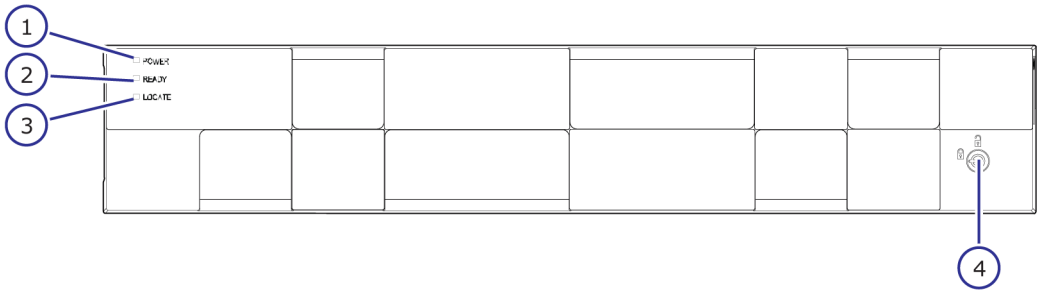
LFF rear panel



Number	Item	Description
1	ENC	N/A
2	POWER LED	Green: ENC is in the power-on state.
3	LOCATE LED	Amber: Shows the ENC when adding drive trays.
4	ALARM LED	Red: ENC can be removed safely.
5	PATH (IN) LED	Blue: IN side port is linked up.
6	PATH (IN) connector	Connect to a controller or drive tray.
7	PATH (OUT) LED	Blue: OUT side port is linked up.
8	PATH (OUT) connector	Connect to a drive tray.
9	Console	This port is reserved.
10	Power supply unit	N/A
11	Receptacle	Connect to the power cable supplied with the storage system.
12	AC IN LED	Green: normal operation.
13	ALM LED	Red: power supply unit can be removed safely.
14	RDY LED	Green: normal operation.

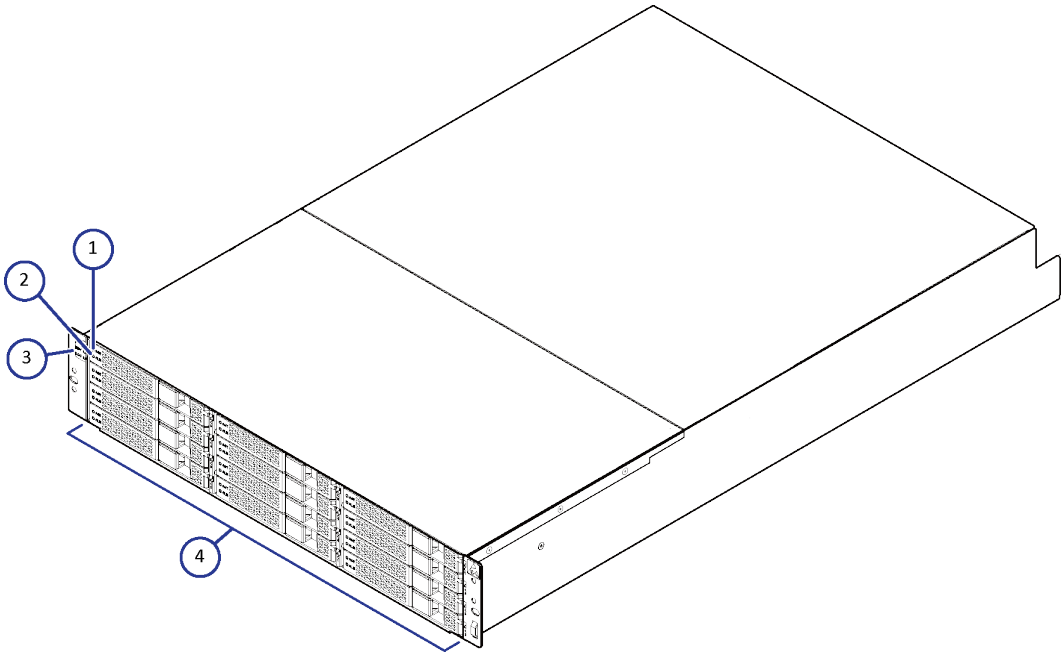
Flash module drive (FMD) tray

FMD with front panel bezel



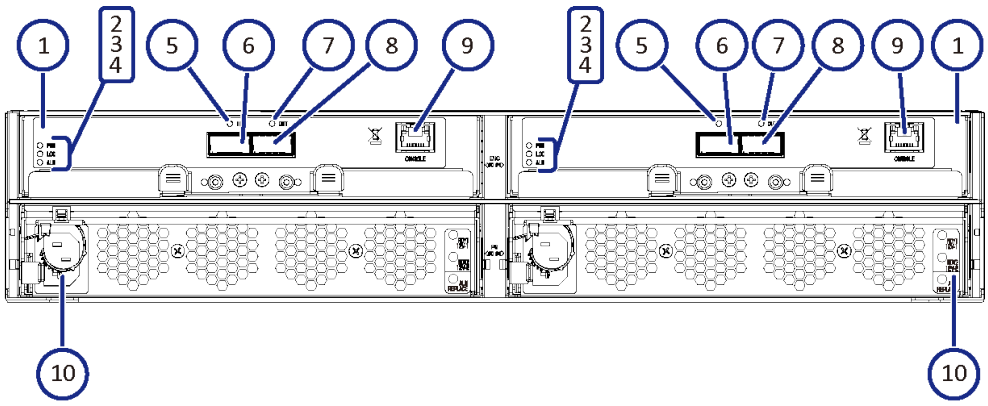
Number	Item	Description
1	POWER LED	Green: Drive tray is powered on.
2	READY LED	Green: Drive tray is operational.
3	LOCATE LED	Amber: can be forced on using the maintenance utility when adding drive trays.
4	Lock	Locks and unlocks the front panel bezel using the supplied key.

FMD front panel without bezel



Number	Item	Description
1	ACT LED	Green: normal operation. Blink green: drive is being accessed.
2	ALM LED	Red: drive stopped due to a failure and can be removed safely.
3	POWER, READY, LOCATE LEDs	See previous table.
4	Flash module drives	Twelve flash module drives. Slots are designated the following way: 9, 10, 11 6, 7, 8 3, 4, 5 0, 1, 2

FMD rear panel

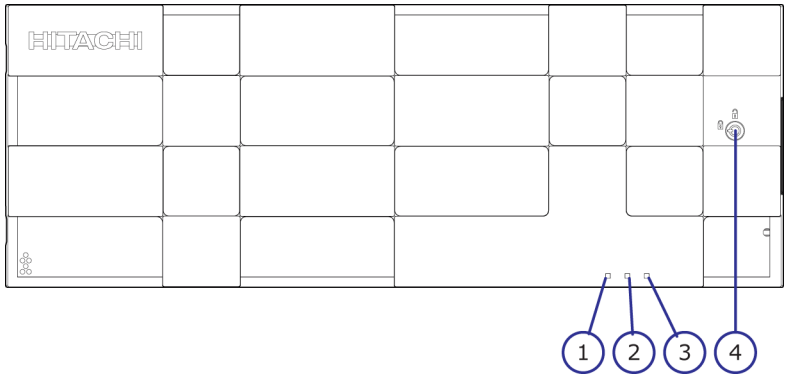


Number	Item	Description
1	ENC	N/A
2	POWER LED	Green: ENC is in the power-on state.
3	LOCATE LED	Amber: Shows the ENC when adding drive trays.
4	ALARM LED	Red: ENC can be removed safely.
5	PATH (IN) LED	Blue: IN side port is linked up.
6	PATH (IN) connector	Connect to a controller or drive tray.

Number	Item	Description
7	PATH (OUT) LED	Blue: OUT side port is linked up.
8	PATH (OUT) connector	Connect to a drive tray.
9	Console	This port is reserved.
10	Receptacle	Connect to the power cable supplied with the storage system.

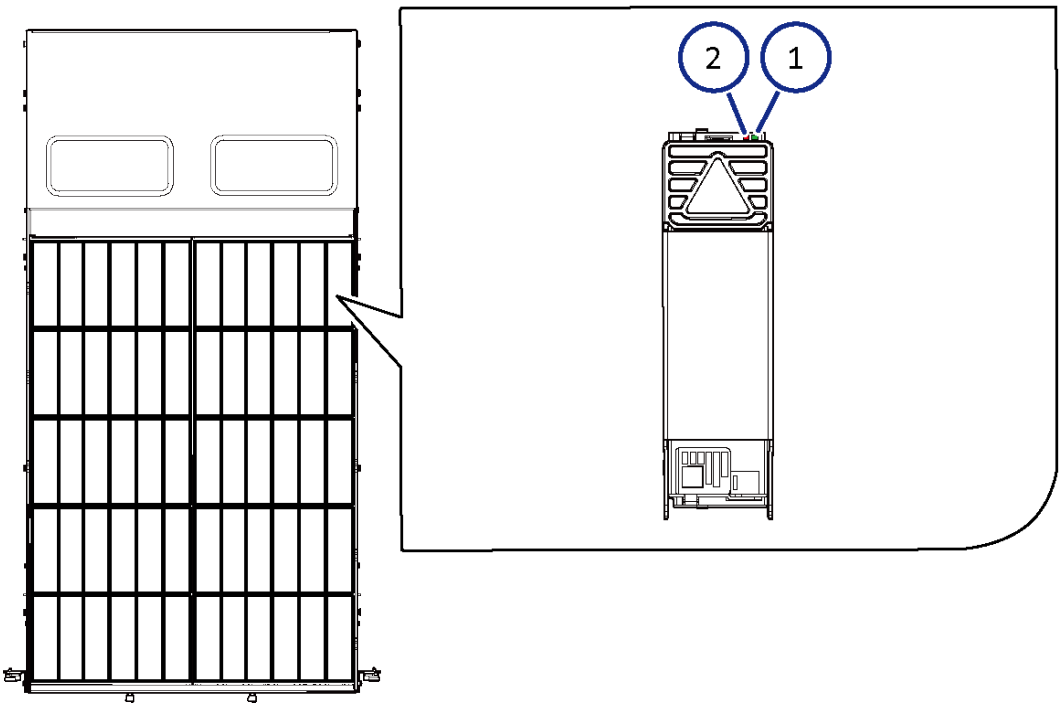
Dense intermix drive tray

Dense intermix drive tray with front panel bezel



Number	Item	Description
1	POWER LED	Green: Drive tray is powered on.
2	READY LED	Green: Drive tray is operational.
3	LOCATE LED	Amber: Nonfatal error. Storage system can remain operating. This LED can also go ON to identify the drive tray being added.
4	Lock	Locks and unlocks the front panel bezel using the supplied key.

Dense intermix drive tray display LEDs

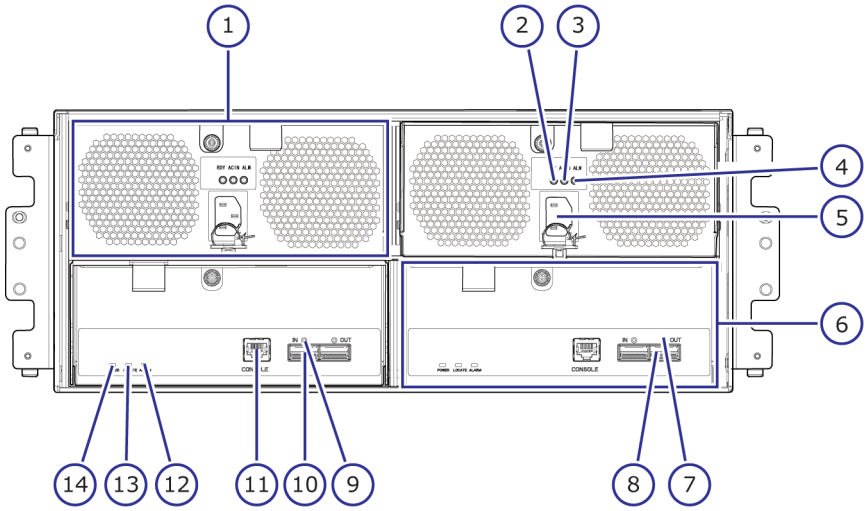


Number	Item	Description
1	ACT	Green: normal operation. Blink green: drive is being accessed.
2	ALM LED	Red: drive stopped due to a failure and can be removed safely.

Note: Drives are organized as follows, starting from the rear of the drive tray and moving left to right. In the above figure on the left, the rear of the drive tray is at the top.

- Rear of drive tray: 48 - 59
- 36 - 47
- 24 - 35
- 12 - 23
- Front of drive tray: 00 - 11

Dense intermix drive tray rear panel



Number	Item	Description
1	Power supply unit	N/A
2	RDY LED	Green: normal operation.
3	AC IN LED	Green: normal operation.
4	ALM LED	Red: power supply unit can be removed safely.
5	Receptacle	Connect to the power cable supplied with the storage system.
6	ENC	N/A
7	PATH (OUT) LED	Blue: OUT side port is linked up.
8	PATH (OUT) connector	Connect to a drive tray.
9	PATH (IN) LED	Blue: IN side port is linked up.
10	PATH (IN) connector	Connect to a controller or drive tray.
11	Console	This port is reserved.
12	ALARM LED	Red: ENC can be removed safely.
13	LOCATE LED	Amber: Shows the ENC when adding drive trays.
14	POWER LED	Green: ENC is in the power-on state.

Service Processor

Storage systems come with a separate, dedicated 1U service processor (SVP) on which element manager runs. The SVP (model number 3919435.P) operates independently from the storage system's CPU and operating system,

and provides out-of-band configuration and management of the storage system. It also collects performance data for key components of the storage system to enable diagnostic testing and analysis.

Note: This product is also designed for IT power distribution systems with phase-to-phase voltage.

The SVP runs Microsoft Windows Embedded Standard 7. This operating system provides the same look and feel and desktop environment as Microsoft Windows 7 Professional.

The SVP provides four RJ-45 ports:

- Two ports connect to the storage system controllers (one port for each controller).
- One port connects to the user's IP network.
- One port connects to a user-supplied management console PC.

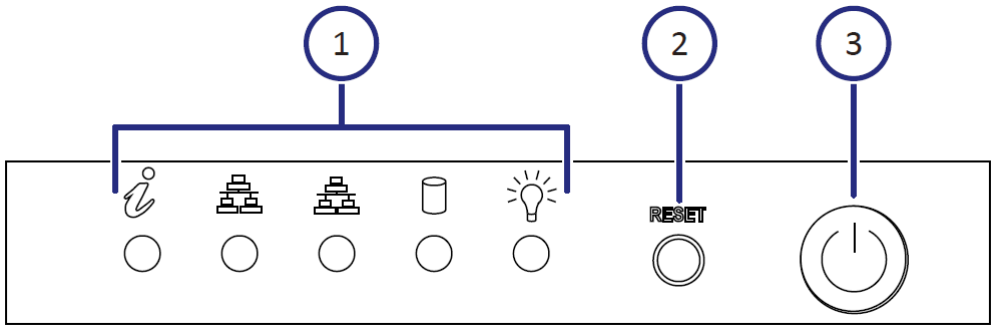
Three of the four RJ-45 ports (the ones that connect to the controllers and the IP network) are configured as a bridge. The SVP can be addressed using the default IP address 192.168.0.15.

Users are responsible for adopting the appropriate security procedures with the SVP, including:

- Applying Windows security patches.
- Turning on automatic Windows updates or using the manual Windows update method.
- Installing antivirus software that has been tested and approved by Hitachi.
- Installing the latest SVP firmware releases from Hitachi.

SVP front panel

The SVP front panel has LEDs, a reset button, and a power button.

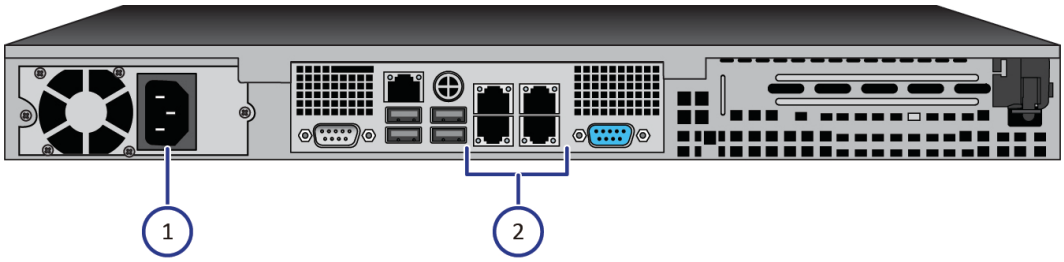


Number	Description
1	LEDs. From left to right, the LEDs are:

Number	Description
	• BMC Heartbeat • LAN card 2 • LAN card 1 • Hard drive • System standby power
2	Reset button.
3	Power button. Applies power to or removes power from the SVP.

SVP rear panel

The only ports used on the rear panel of the SVP are the power socket and the four LAN ports.



Number	Description
1	Power socket. Attach the power cable supplied with the SVP.
2	Four LAN ports arranged as follows: LAN3 LAN4 LAN1 LAN2 These ports connect to your IP network, the management console PC, and the user LAN port on each storage system controller.

3

Installing the hardware

The following sections describe how to mount, connect, and power up the storage system hardware.

The following steps describe the recommended order to follow when installing your storage system.

Note: Do not install the equipment in an environment with temperatures of 104ºF (40ºC) or higher because battery life will be shortened. For more information about site preparation and installation, refer to the *Hitachi Virtual Storage Platform G200, G400, G600 Site Preparation Guide*.

Procedure

1. If your storage system hardware did not arrive in a rack, unpack the hardware and mount it in a rack.
2. If you ordered drive trays, use SAS cables to connect the controllers to drive trays and to connect one drive tray to another.
3. Make the required SVP connections.
4. Power up the hardware and confirm normal operation.
5. Configure the storage system for host connections, and then connect the storage system data ports to a switch that is connected to the hosts.
6. Connect the front bezels to all controllers and drive trays if not already connected.

☐ Unpacking

☐ Mounting the hardware

☐ Connecting drive trays

☐ Connecting to the SVP

☐ Powering up the hardware

☐ Making host connections

- ☐ Confirming your connections
- ☐ Attaching and removing the front panel bezel
- ☐ Powering off the storage system
- ☐ Removing cables
- ☐ Storing the storage system
- ☐ Where to go from here

Unpacking

There are two ways in which the storage system is packed and shipped to you. It can be shipped completely installed and cabled in a Hitachi rack, or it will be shipped in multiple boxes for installation into a customer-provided rack.

If your system was shipped fully assembled and cabled in a Hitachi rack, start the installation process by connecting the drive trays.

If your system was shipped in separate boxes and needs to be assembled in your own rack, unpack the storage system.

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.

Procedure

1. Verify that you have received all system components. For damaged or missing items, contact the shipper.
2. Remove all packing materials, envelopes, and boxes from the cartons.

   WARNING!: Because storage system components are heavy, unpacking should be done by three or more persons.

3. Keep the keys for the front bezels in a safe place.

   You will need them to remove the storage system bezel if you upgrade or replace components.
4. Keep all packing materials and cartons in case you need to transport or ship the storage system.
5. Start the installation process by mounting the hardware.

Mounting the hardware

After you remove the storage system hardware from the packaging, you are ready to mount the hardware into a rack. The following procedures assume that the rack is already assembled.

Hitachi recommends that the storage system hardware be mounted only by qualified personnel, experienced in mounting hardware into racks, and knowledgeable of all safety regulations and practices. These instructions are intended only for use by qualified individuals using all proper safety equipment.

Note: Storage system hardware can be extremely heavy, and if not installed properly could fall, possible causing injury as well as damage to property.

Floor load ratings

The floor space at the installation site must be strong enough to support the combined weight of the:

- Controller.
- Drive trays.
- Rack.
- All associated equipment.

To ensure adequate load-bearing capacity, plan for the maximum configuration. The following table lists the weight for maximum configurations. The table takes into account a rack that is not sold by Hitachi Data Systems. For rack information, refer to the *Hitachi Universal V2 Rack Reference Guide*.

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 the Hitachi rack, refer to the *Hitachi Universal V2 Rack Reference Guide*.

Table 1 CBSS and SVP

Controller, SVP	Drive trays	Weight
1 CBSS	7 SFF drive trays	1245.6 lbs (565 kg)
	7 LFF drive trays	1239 lbs (562 kg)
	7 FMD drive trays	1373.4 lbs (623 kg)
	4 dense intermix drive trays	1563.1 lbs (709 kg)
SVP	—	39.5 lbs (17.9 kg)

Table 2 CBSL and SVP

Controller, SVP	Drive trays	Weight
1 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)

Controller, SVP	Drive trays	Weight
	8 dense intermix drive trays	1567.5 lbs (711 kg)
SVP	—	39.5 lbs (17.9 kg)

Mounting the SVP

The SVP comes with two rack rail assemblies. Each assembly consists of an inner fixed chassis rail that secures directly to the SVP chassis, and an outer fixed rack rail that secures directly to the rack itself.

Use the following procedures to mount the SVP in a rack.

Choose a mounting location

Procedure

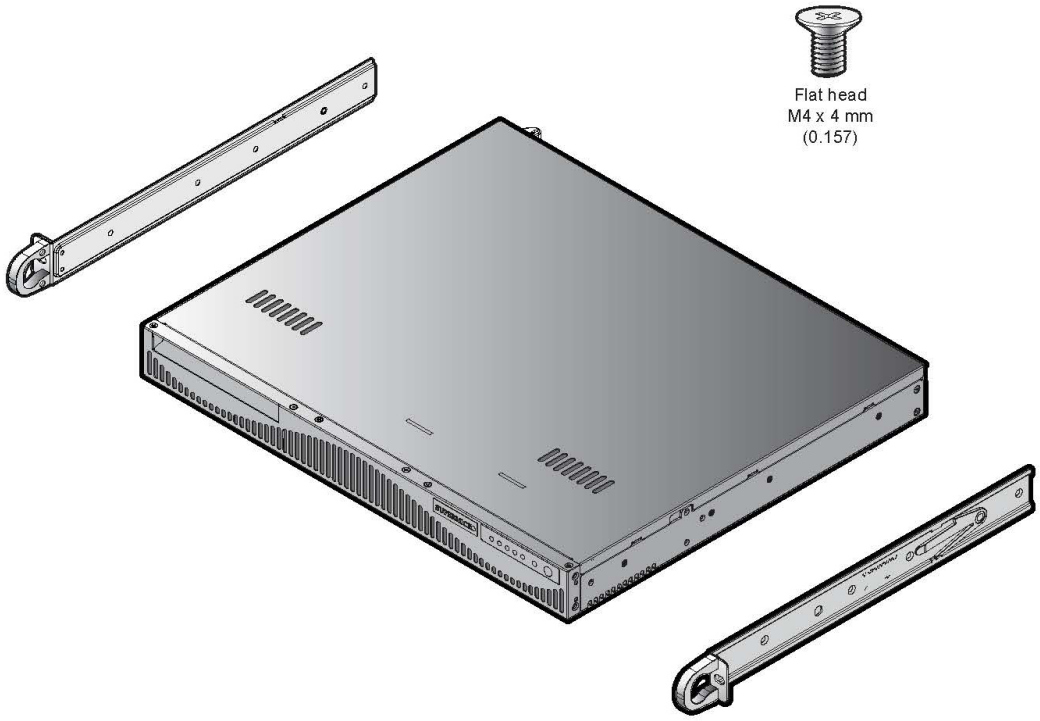
1. Install the SVP in the top bay of the rack.
2. Leave enough distance in front of the rack to enable you to open the front bezel (approximately 25 inches).
3. Leave approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.

Installing the inner rail extension

The SVP includes chassis ears that you must remove before installing the rails.

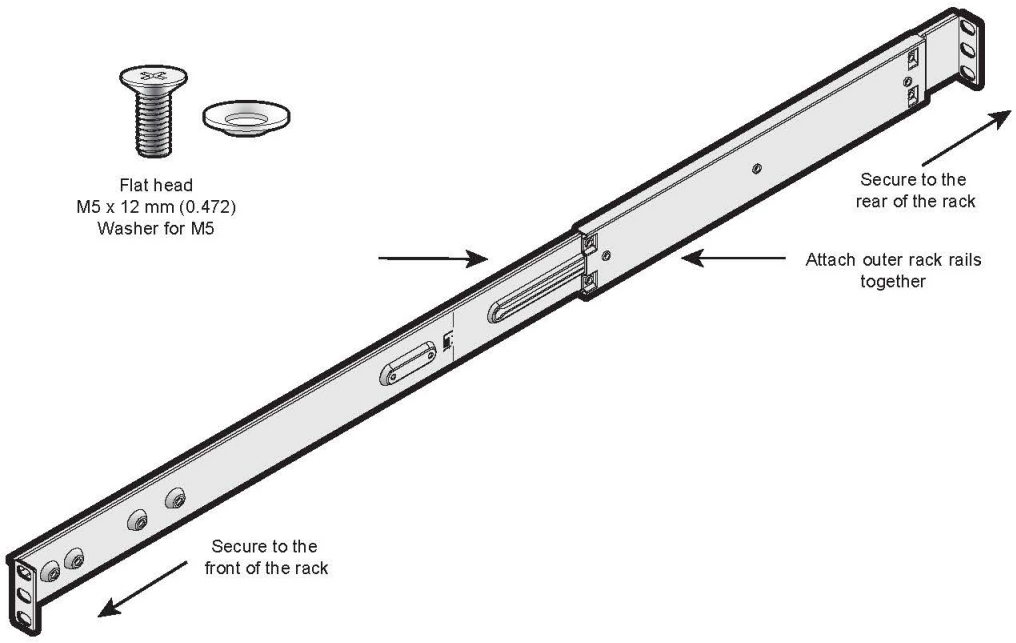
Procedure

1. Remove the chassis ears.
   a. Locate and remove the three screws holding the chassis ear in place.
   b. Repeat with the other chassis ear.



2. Place the inner rail on the side of the chassis aligning the hooks of the chassis with the rail holes.
3. Slide the rail toward the front of the chassis to secure the rail in place.
4. Secure the chassis with four screws.

5. Repeat steps 2 through 4 for the other inner rail extension.



Installing the outer rails to the rack

Procedure

1. Attach the short bracket to the outside of the long bracket.

   You must align the pins with the slides. Orient both bracket ends so they face the same direction.
2. Adjust both the short and long brackets to the proper distance so the rail fits snugly into the rack.
3. Secure the long bracket to the front side of the outer rail with two M5 screws and the short bracket to the rear side of the outer rail with three M5 screws.

   Use a washer with each screw.
4. Repat steps 1 through 3 for the left outer rail.

Installing the chassis into the rack

Prerequisites

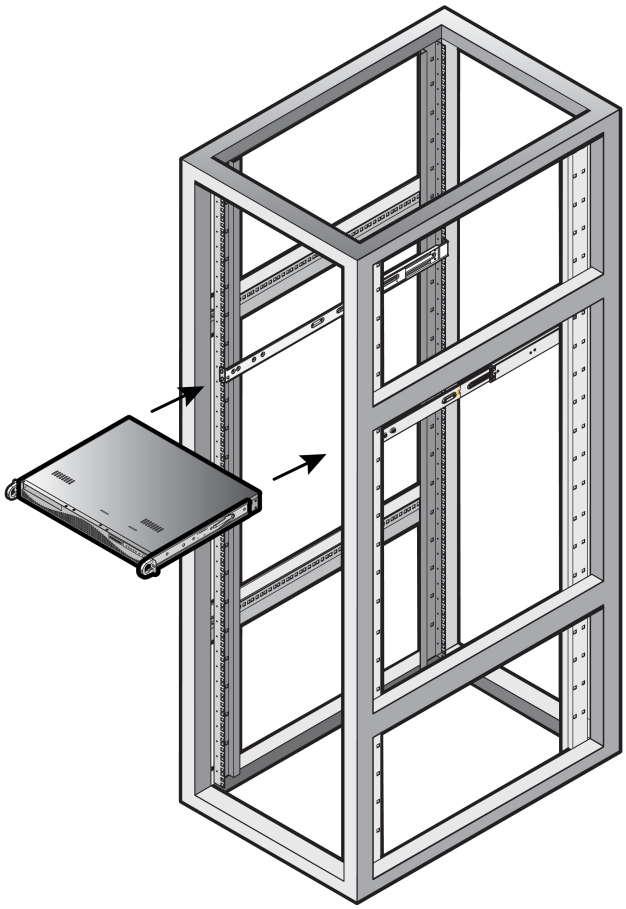
- The inner rails are attached to the chassis.
- The outer rails are installed on the rack.

Procedure

1. Align chassis rails with the front of the rack rails.
2. Slide the chassis rails into the rack rails, keeping the pressure even on both sides.

   If necessary, press the locking tabs when inserting.

   When the server is pushed completely into the rack, the locking tabs "click" into the locked position.
3. Optional: Insert and tighten the thumbscrews that hold the front of the server to the rack.



Mounting the storage system

The storage systems are designed to be installed in a Hitachi rack or equivalent. The location should not exceed 104°F (40°C); otherwise, the storage system's battery life will be shortened. For the SFF and dense trays, the location should not exceed 95°F (35°C). For more information about the Hitachi rack, refer to the *Hitachi Rack Guide*.

Note: Due to the heavy weight of the controller chassis and drive trays, we recommend at least two people perform the following procedure.

Prerequisites

- Be sure the rack is secure and is in no danger of falling over.
- Verify that the storage system is turned off, the main switch is in the off position, and all power cables are removed from the sockets on all controllers and drive trays.
- Install the rack stabilizers before mounting or servicing the storage system in the rack.

Procedure

1. Adjust the length of the mounting rails as needed.

   The rear rail slides inside the front rail. The rail halves are riveted together and use no adjustment screws.
2. Attach the mounting rail assemblies to the outside of the rack posts, using the attaching screws and flange nuts from your rack system.
   a. Be sure the front rail support is on the bottom facing forward.
   b. The alignment pins fit into the rack holes above and below the attaching screws.
   c. Use the attaching screws and flange nuts from your rack system.
   d. Tighten the screws and flange nuts according to your rack system instructions.
3. Place the controller onto the rails.
4. Secure the controller to the rack.

   One screw each side, in the upper hole only. Use the attaching screws and flange nuts from your rack system. Tighten the screws and flange nuts according to your rack system instructions.
5. Place the drive tray onto the rails.
6. Secure the drive tray to the rack.

   One screw each side, in the upper hole only. Use the attaching screws and flange nuts from your rack system. Tighten the screws and flange nuts according to your rack system instructions.
7. To mount additional drive trays, repeat steps 5 and 6.

Connecting drive trays

Drive trays let you increase capacity by adding drives to your storage system. A drive tray contains both physical components (drives, power, and fan modules) and logical components (volumes, host groups, and RAID groups). Each drive tray comes with a SAS cable for connecting to the controller or another drive tray.

Maximum drive boxes supported

The CBSS controller supports a maximum number of 264 drives:

- **SFF drive trays:** 7 (CBSS must contain drives)
- **LFF drive trays:** 7 (CBSS must contain drives)
- **FMD drive trays:** 8
- **Dense intermix drive trays: 4:**

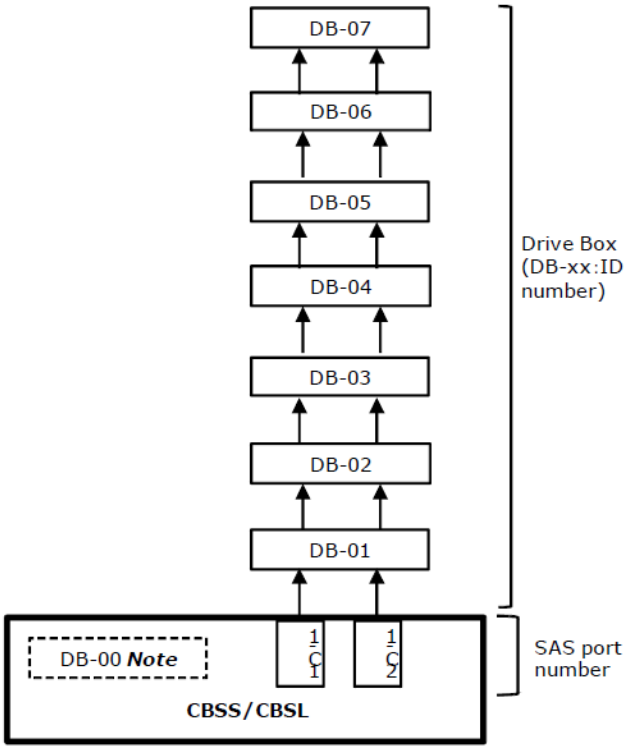
The CBSL controller supports a maximum number of 264 drives:

- **SFF drive trays:** 8 (CBSS must contain drives)
- **LFF drive trays:** 8 (CBSS must contain drives)
- **FMD drive trays:** 8
- **Dense intermix drive trays:** 4

Hitachi Virtual Storage Platform G200 connection rules

Drive trays are installed and connected according to the unit ID number in ascending order, from bottom to top.

The example in the following figure shows the maximum number of connectable Hitachi Virtual Storage Platform G200 drive trays and the SAS port numbers for connecting them. Drive trays are installed and connected in ascending order of unit ID number, from the bottom of the rack. The maximum number of drive trays that can be installed depends on the drive tray type.



Note: DB-00 is installed in the front of the CBSS or CBSL as standard.

Selecting SAS cables

You connect the controllers to the drive trays using a SAS cable. The following tables are provided to help you choose the SAS cable best suited to your requirements.

Connecting controllers to drive trays

Connection source	Connection destination chassis	Distance between chassis*	Cable length (meters)	Cable designation
CBSS, CBSL	SFF, LFF, FMD drive trays	2-10	1	DW-F800-SCQ1
		11-20	1.5	DW-F800-SCQ1F
		21-36	3	DW-F800-SCQ3
		37 or more	5	DW-F800-SCQ5
* One EIA unit is approximately 44.45 mm.				

SAS cable connections for SFF, LFF, and FMD drive trays

Connection destination chassis	Distance between chassis	Cable length (meters)	Cable designation
SFF, LFF, and FMD drive trays	2-8	1	DW-F800-SCQ1
	9-20	1.5	DW-F800-SCQ1F
	21-36	3	DW-F800-SCQ3
	37 or more	5	DW-F800-SCQ5

Connecting drive trays

Before connecting drive trays, observe the following guidelines:

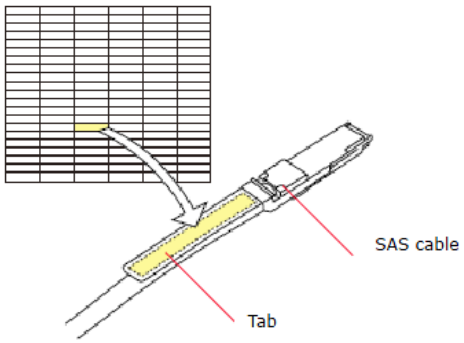
- If connecting two or more drive trays, use the SAS cable to connect ENC #1 and ENC #2.
- When using a SAS cable, bend it at least 40 mm and wind it at least 200 mm to relieve cable stress.
- If you insert a SAS cable incorrectly, remove it while gently pulling the tab on the cable.
- Before attaching SAS cables, unwind, stretch, and untwist them.
- When inserting the connector into the socket, do not turn the connector more than 90 degrees. Turn the cable with the cable connector and orient the connector to match the insertion direction.

Prerequisites

If the ends of the SAS cable have a rubber cap, remove the cap.

Procedure

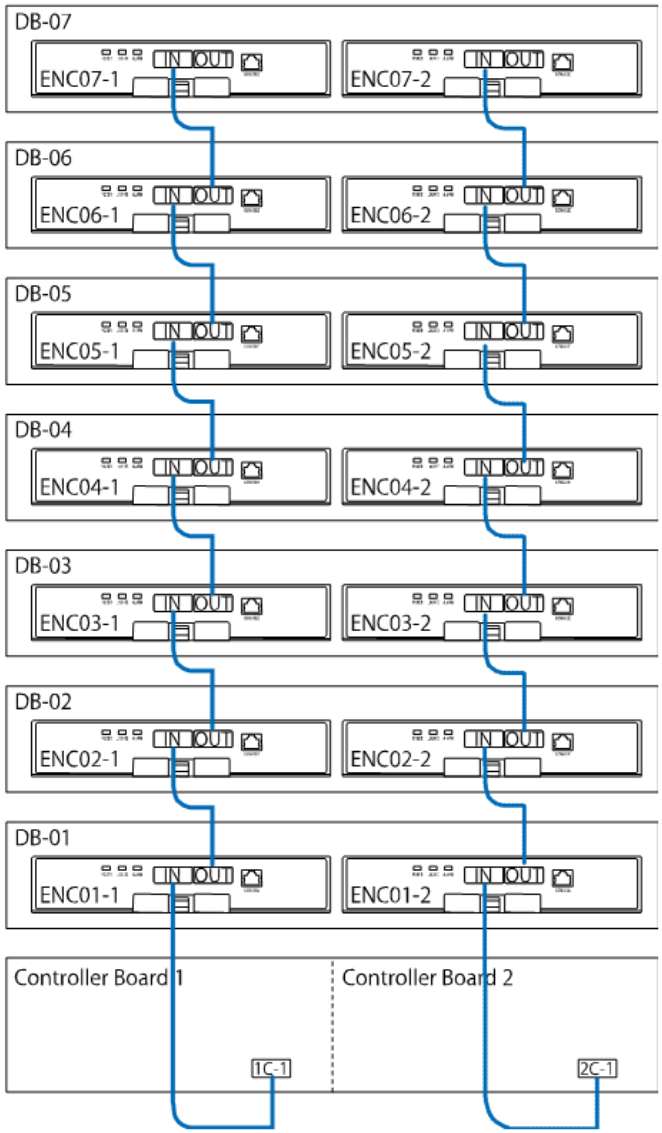
1. Connect either end of the SAS cable to the SAS port on the controller chassis. Connect the other end of the cable to the IN port on the drive tray.
   The connector locks in place when secure. Gently tug at the end of the cable to confirm it is secure; if the cable comes out of the connector, repeat this step.
2. To connect two or more drive trays, use another SAS cable to connect the OUT port of the previous drive tray to the IN port on the next drive tray. Repeat this step for each additional drive tray you want to want to connnect.
3. Attach labels to all SAS cables.



   The cable snaps into place when connected securely.
4. Pull gently on the cable to confirm that it is connected securely.

5. Route the SAS cables. For a SFF, LFF, and FMD drive trays: Keep the cable length between the two connectors at approximately 13.8 - 15.8 inches (350-400 mm). Do not secure SAS cables and the power cables together.

   Connecting a CBSS or CBSL to seven SFF or LFF drive trays

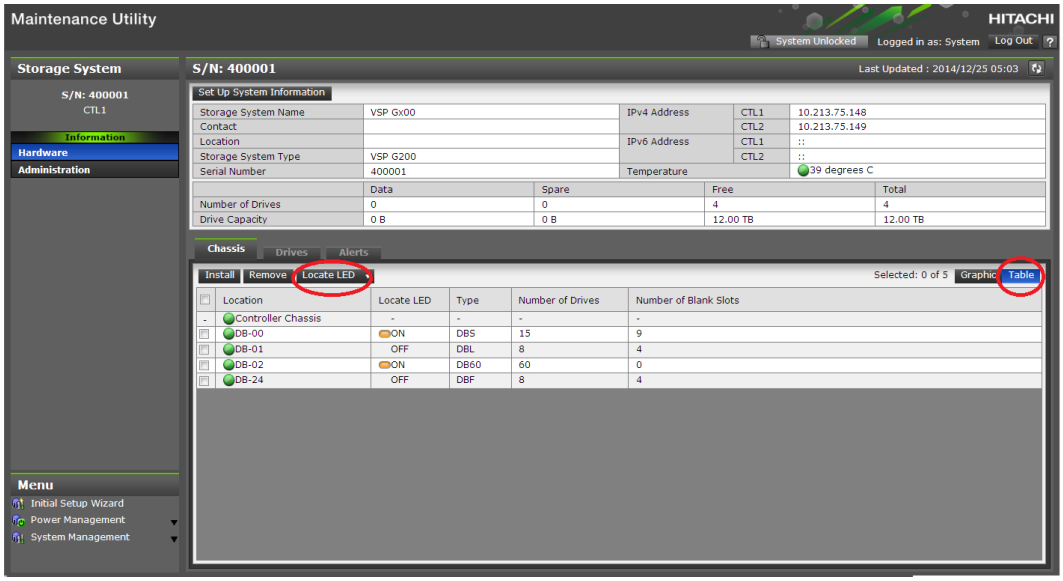


Turning on the drive tray Locate LED

When connecting drive trays, you may find it helpful to have the LOCATE LED on the drive tray go on.

Procedure

1. In the **Hitachi Command Suite** main window, click the **Resource** tab.
2. From the tree view, click **Storage Systems**.
3. Expand the tree, and then click **Maintenance Utility**.
4. In the **Chassis** tab, click **Table** to switch the table view.



5. To turn on the **Locate** LED, select one or more drive trays, and then click **Turn on**from the **Locate LED** list.
   The confirmation window appears.
6. Confirm that the information in the window is correct, and then click **Apply**.
7. When the Completion message appears, click **Close**.
8. To turn off the LOCATE LED, repeat steps 5 through 7, but in step 5, click **Turn off**from the **Locate LED** list.

Connecting to the SVP

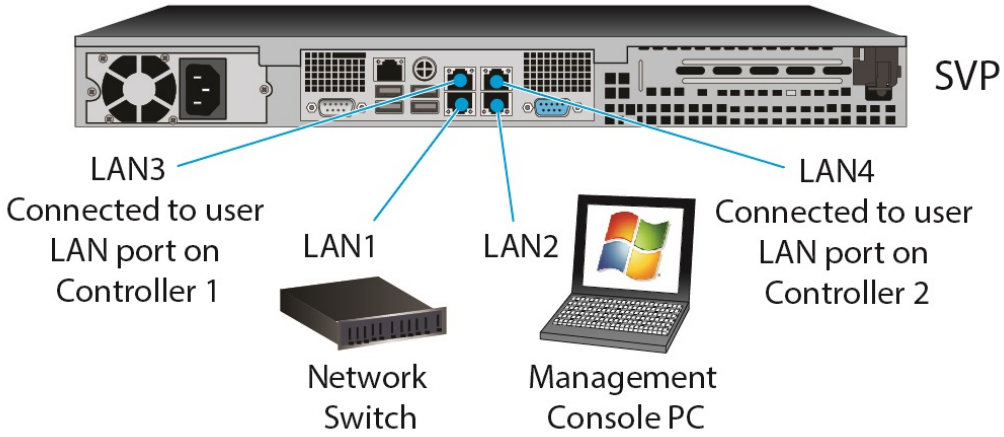
The rear panel of the SVP has four RJ-45 ports. Using Category 5 or better Ethernet cables, perform the following connections on the SVP. Your management console must be able to access the SVP.

Procedure

1. Connect **LAN1** to a switch on your IP network.

Note: If your network uses IP addresses 192.168.0.15-17, do not connect the **LAN1** port to your switch until after you complete the Initial Startup.

2. Connect **LAN2** to a management console PC.
   Typically, this is a notebook PC.
3. Connect **LAN3** to the user LAN port on storage system controller 1.
4. Connect **LAN4** to the user LAN port on storage system controller 2.



Powering up the hardware

Power up the storage system hardware in the proper sequence.

1. Power up the SVP.
2. Power up the storage system controllers.
3. Power up storage system drive trays.

Powering up the SVP

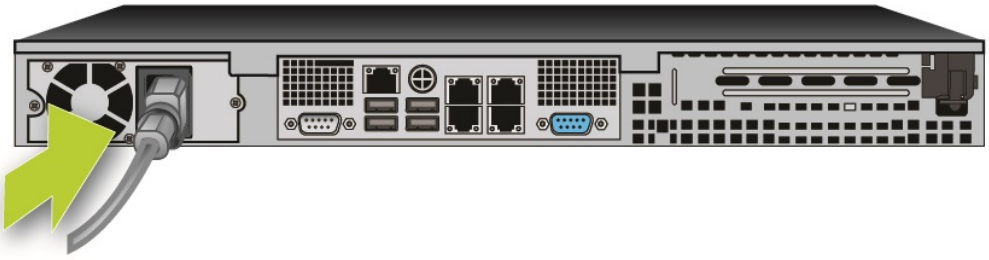
Prerequisites

Power up the SVP before you power up the storage system.

Procedure

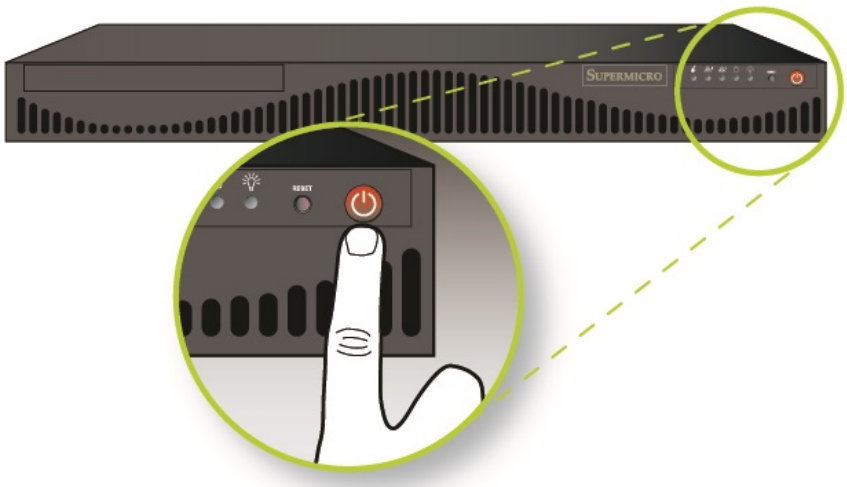
1. Attach the supplied power cable to the power socket on the rear panel of the SVP.

SVP (rear)



2. Plug the other end of the power cable into an AC power source.
3. Push the power button on the front of the SVP.

SVP
(front)



Powering up the storage system

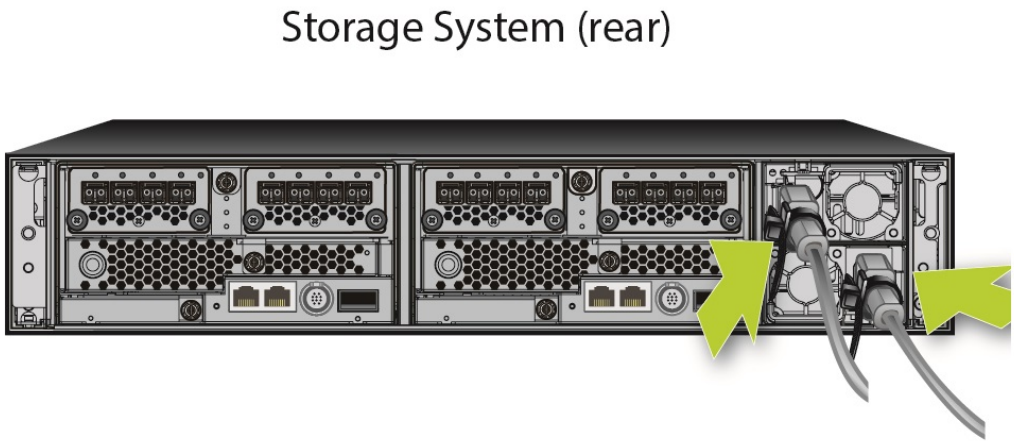
Hitachi Virtual Storage Platform G200 input power ratings: single-phase AC 100-120V or 200-240V.

Note: The load on a PDU must not exceed 16 A. The load on a PDU breaker must not exceed 8 A. Load values are:

- **One CBSS:** 4.0 A
- **One CBSL:** 4.0 A
- **One SFF drive tray:** 2.4 A
- **One LFF drive tray:** 1.9 A
- **One FMD drive tray:** 2.6 A
- **One dense intermix drive tray:** 6.0 A

Procedure

1. Check that the breaker of each PDU is turned off.
2. Connect the power cables to each power socket on the storage system controllers and drive trays.



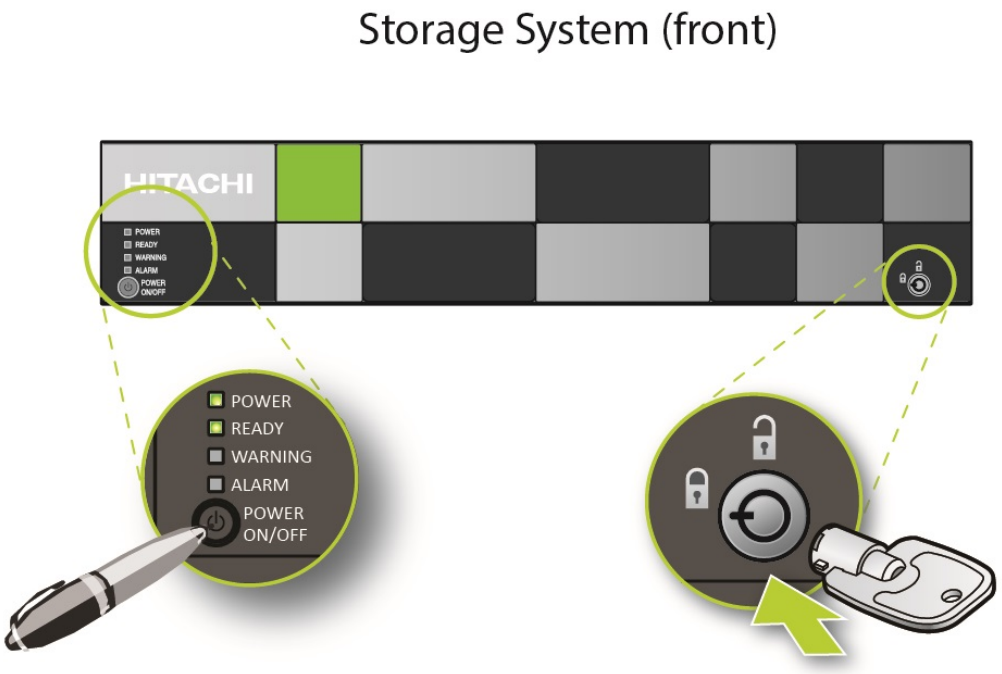
3. Secure the power cable holders on the rear panel of the storage system to the power cables and route the power cables appropriately.

   Note: For SFF, LFF, and FMD drive trays, use omega clips to secure the power cable.

4. Plug the other end of the power cables into an AC power source.

Note: For redundancy, connect the power cables to feeds from separate power sources.

5. To ensure that the controller and drive trays are receiving power, confirm that the POWER LED is on at the front panel of the controller and drive trays.
6. Press the main switch on the front of the controller chassis for about three seconds.



7. Verify that the READY LED on the controller chassis changes from amber to green (takes approximately 33 minutes).

Confirming normal operation

After powering up the storage system, confirm that the system is operating normally.

Check the storage system for any alarm indications indicated by the LEDs. For example:

- The amber WARNING LED or red ALARM LED is on.
- The green READY LED does not go on.

If you suspect there might be a problem and you enabled email notifications, check for an email about an error. If you enabled Simple Management

Network Protocol (SMNP), check your SNMP application for any traps received from the storage system.

If an error has occurred, use the maintenance utility to identify and correct the problem.

Making host connections

A host is a server that can store and retrieve data on the storage system. Each host runs its own operating system.

Your storage system provides Fibre Channel ports, iSCSI ports, or both to connect to your hosts. Before you make these connections, prepare the storage system and the hosts by:

- Configuring the storage system for the operating systems running on the hosts. Refer to the *Hitachi Open-Systems Host Attachment Guide* and the HDS Product Interoperability Documentation at http://www.hdss.com/products/interoperability.
- Following the instructions in your vendor documentation for preparing your hosts, HBAs, NICs, and iSCSI initiators for use with the storage system.

Note: When configuring your switch, be sure the number of hosts connected to the storage system does not exceed the number of data ports on the storage system.

Fibre Channel connections

A Fibre Channel SAN requires:

- A Fibre Channel switch.
- A Fibre Channel HBA in each host computer.

After you prepare the storage system for your host operating systems, establish the data path between the storage system and hosts using the following procedure and referring to the figures of the storage system.

Tip: Before connecting Fibre Channel cables, use the Backend Configuration Kit (BECK) tool to ascertain the recommended data paths for the controller and drive trays in your configuration.

Procedure

1. Using LC-LC optical cables, connect the Fibre Channel data ports on each controller to your Fibre Channel switch.
2. Connect your Fibre Channel switch to the Fibre Channel HBA card in each host computer (refer to your vendor documentation).

iSCSI connections

If your storage system has iSCSI ports, use the information in this section to connect the ports to your hosts.

An iSCSI SAN requires:

- A 10 Gigabit Ethernet switch.
- A 10 Gb NIC or HBA card in each host computer.
- A 10 Gb iSCSI initiator.

After you prepare the storage system for your host operating systems, establish the data path between the storage system and hosts using the following procedure.



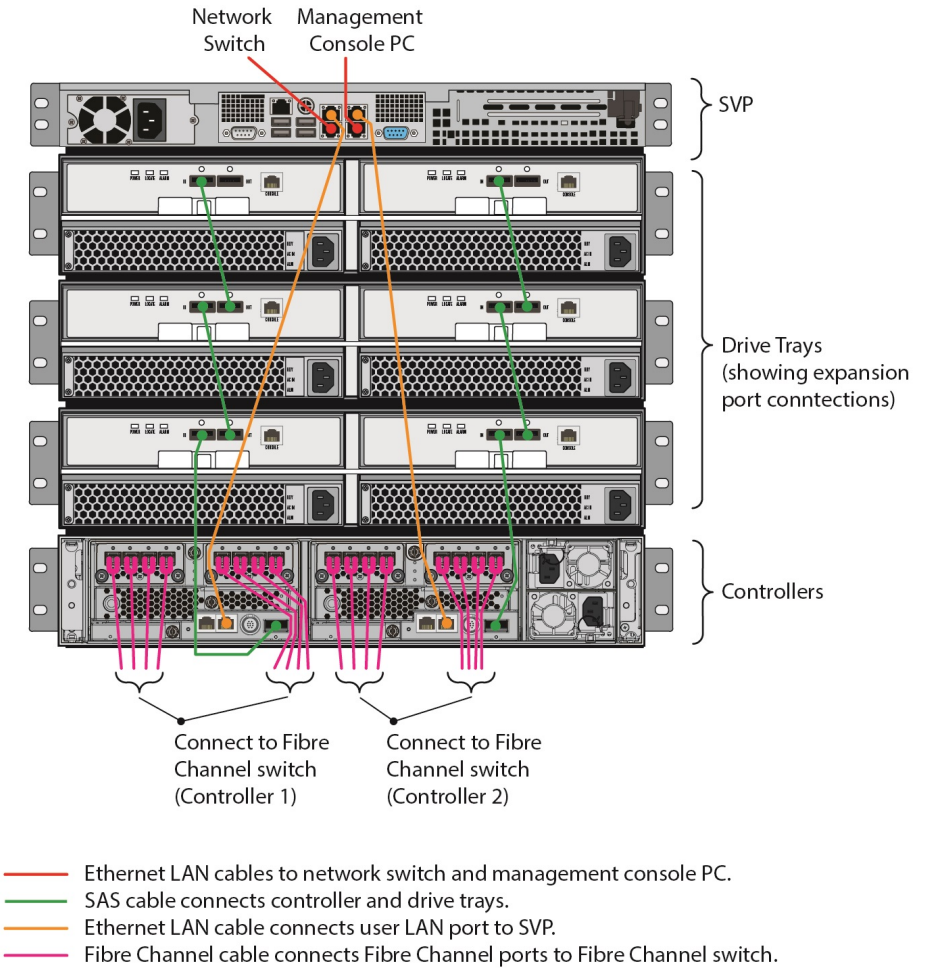
Tip: Before connecting iSCSI cables, use the Backend Configuration Kit (BECK) tool to ascertain the recommended data paths for the controller and drive trays in your configuration.

Procedure

1. Using LC-LC optical cables, connect the iSCSI data ports on each controller to your Gigabit Ethernet network switch.
2. Connect your network switch to the NIC or iSCSI HBA in each host computer (refer to your vendor documentation).

Confirming your connections

After you make your hardware connections at the storage system rear panel, ensure that all connections are correct. Use the following sample figure as a guide.



Attaching and removing the front panel bezel

The following procedures describe how to attach the front panel bezel on the storage system controllers and drive trays, and how to remove the front bezel.

Attaching the front bezel to the SVP

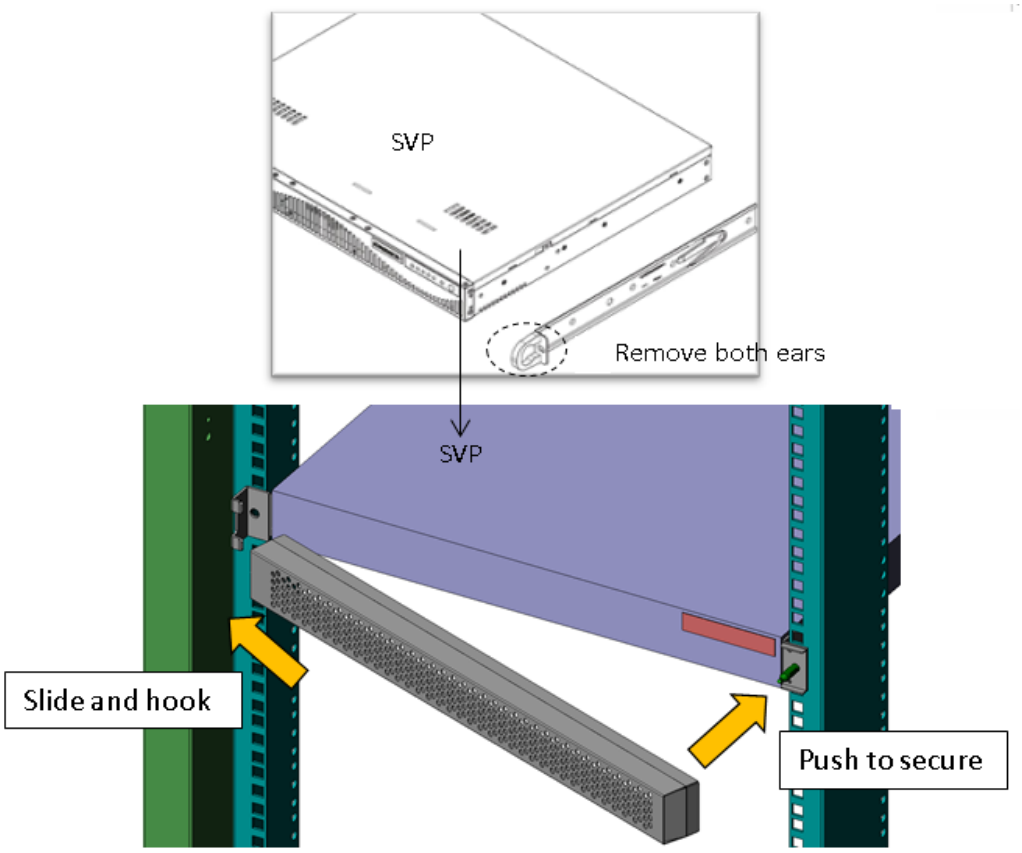
The SVP has a removable front bezel.

To attach the SVP front bezel:

Procedure

1. Use the supplied key to unlock the front bezel. Hold the key and the bottom of the bezel with both hands, so the front of the bezel is facing you.

2. Insert the tabs on the left-front side of the SVP into the tab holes on the front bezel.
3. Push the right side of the bezel to engage it with the ball catch on the front of the SVP to secure the bezel.
4. Use the supplied key to lock the front bezel. Before turning the key, verify that it is inserted completely into the lock. Otherwise, you can damage the key.



Removing the front bezel from the SVP

Procedure

1. Use the supplied key to unlock the bezel.
2. Holding the lower right part of the bezel, gently pull the key toward you and disengage the right side of the bezel from the ball catch
3. Holding the lower right part of the bezel, gently pull the key toward you and disengage the right side of the bezel from the ball catch.

Note: When disengaging the front bezel, do not open the bezel more than 45 degrees; otherwise, you can damage the bezel.

4. Disengage the front bezel from the left tabs and then remove the bezel.

Attaching the front bezel to a CBSS, CBSL,SFF, LFF, or FMD

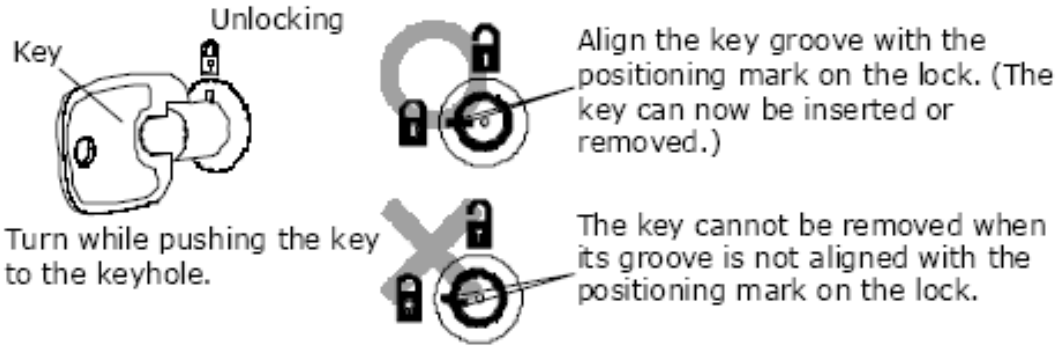
Procedure

1. Use the supplied key to unlock the front bezel.

   Hold the key and the bottom of the bezel with both hands, so the front of the bezel is facing you.
2. Insert the tabs on the left-front side of the storage system into the tab holes on the front bezel.
3. Use the supplied key to lock the front bezel.

   Before turning the key, verify that it is inserted completely into the lock. Otherwise, you can damage the key.
4. Remove the key from the lock.

   Align the groove of the key with the positioning mark on the lock. Otherwise, you can damage the lock.



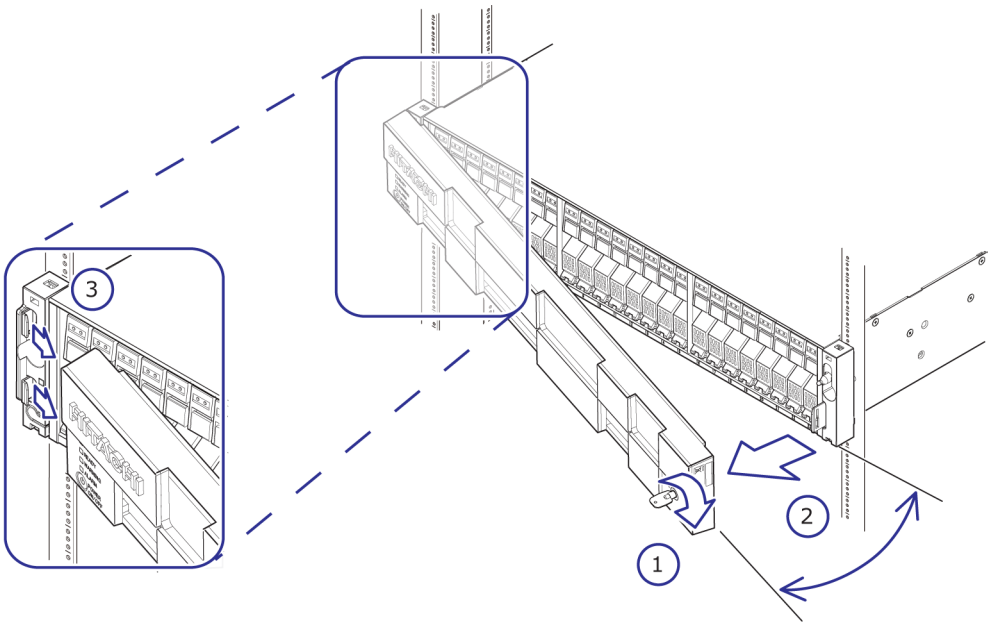
Removing the front bezel from a DBS or DBL drive tray

Procedure

1. Use the supplied key to unlock the bezel.

2. Holding the lower right part of the bezel, gently pull the key toward you and disengage the right side of the bezel from the ball catch.

Note: When disengaging the front bezel, do not open the bezel more than 45 degrees; otherwise, you can damage the bezel.



3. Disengage the front bezel from the left tabs and then remove the bezel.

Attaching the front bezel to a dense intermix drive tray

Procedure

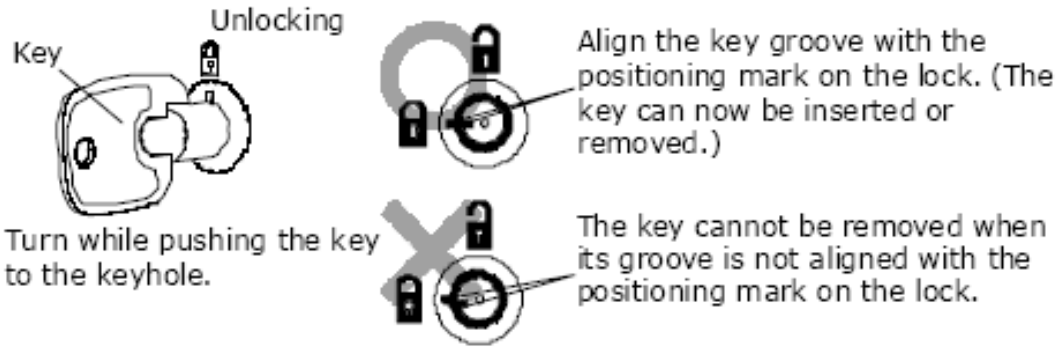
1. Use the supplied key to unlock the front bezel.

   Hold the key and the bottom of the bezel with both hands, so the front of the bezel is facing you.
2. Insert the tabs on the left-front side of the storage system into the tab holes on the front bezel.
3. Push the right side of the bezel until it engages with the ball catch on the front of the storage system to secure the bezel.
4. Use the supplied key to lock the front bezel.

   Before turning the key, verify that it is inserted completely into the lock. Otherwise, you can damage the key.

5. Remove the key from the lock.

   Align the groove of the key with the positioning mark on the lock. Otherwise, you can damage the lock.



Removing the front bezel from a dense intermix drive tray

To prevent the rack from tipping when removing a dense intermix drive tray:

- Do not remove multiple dense intermix drive trays at one time.
- After removing the dense intermix drive tray, do not place objects on it or use it as working space.

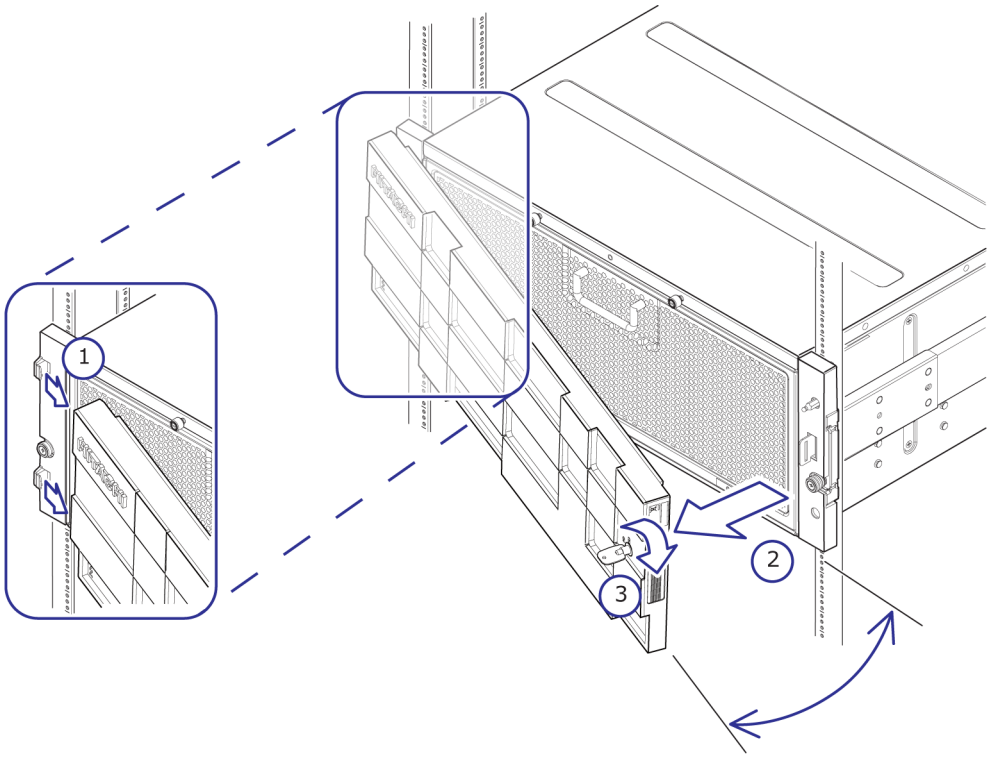
To remove the front bezel from the dense intermix drive tray:

Procedure

1. Use the supplied key to unlock the bezel.

2. Holding the lower right part of the bezel, gently pull the key toward you and disengage the right side of the bezel from the ball catch.

Note: When disengaging the front bezel, do not open the bezel more than 45 degrees; otherwise, you can damage the bezel.



3. Disengage the front bezel from the left tabs and then remove the bezel.

Powering off the storage system

Procedure

1. Press the main switch for three seconds until the POWER LED blinks.
2. Verify that the POWER LED on the front of the storage system changes from green to amber.

   It can take from 25 minutes to 4 hours for the POWER LED to turn amber, depending on the configuration of the system (check after 33 minutes).
3. To stop the power supply from supplying power, remove the power cables from the power supply units on the controller chassis and drive box.

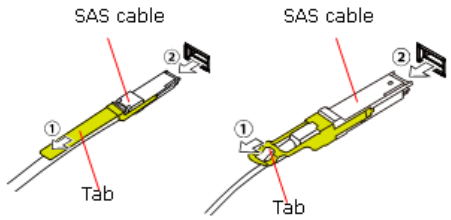
   If the storage system is connected to a PDU, you can stop the power supply by turning off the PDU breaker.

Note: If the storage system does not receive power for more than six months, the battery can become discharged and possibly damaged. To avoid this situation, charge the battery for more than three hours at least once every six months.

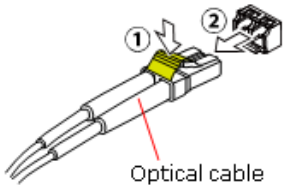
Removing cables

Observe the following instructions when removing cables form the storage system.

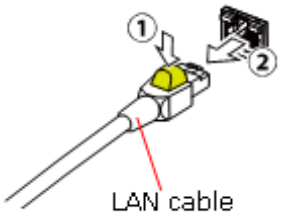
To remove a SAS cable, pull the tab of the SAS cable (1) to release the latch and remove the SAS cable (2).



To remove an optical cable, push the top of the connector of the optical cable (1) to release the latch and remove the SAS cable (2).



To remove a LAN cable, push the top of the LAN cable connector (1) to release the latch and remove the LAN cable (2).



Storing the storage system

If the storage system does not receive power for more than six months, the battery can become discharged and possibly damaged. To avoid this situation, charge the battery for more than three hours at least once every six months.

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

Using flash drives and flash module drives

If a storage system contains flash drives, power up the flash drives using power from the storage system for at least 90 minutes every month. Failing to do so may render a flash drive or FMD drive tray unusable and will abrogate replacement under the terms of the warranty.

Where to go from here

After you complete all of the installation steps, continue to set up your system by performing the initial configuration procedures.

4

Performing the initial configuration

After all storage system installation procedures are complete, configure the storage system for the first time.

When configuring the storage system for the first time, you run the Initial Startup Wizard followed by the Initial Setup Wizard.

After running the Initial Setup Wizard, you configure email and SNMP alert notifications, and install and enable licenses, using the maintenance utility.

You perform these procedures using Remote Desktop Client on a management console computer (PC) connected to LAN port 2 on the SVP. The PC must be on the same subnet as the SVP and the storage system.

- ☐ Running the Initial Startup Wizard
- ☐ Running the Initial Setup Wizard
- ☐ Configuring alert notifications
- ☐ Installing and enabling licenses
- ☐ Setting the SVP date, time, and timezone settings
- ☐ Disconnecting from the SVP

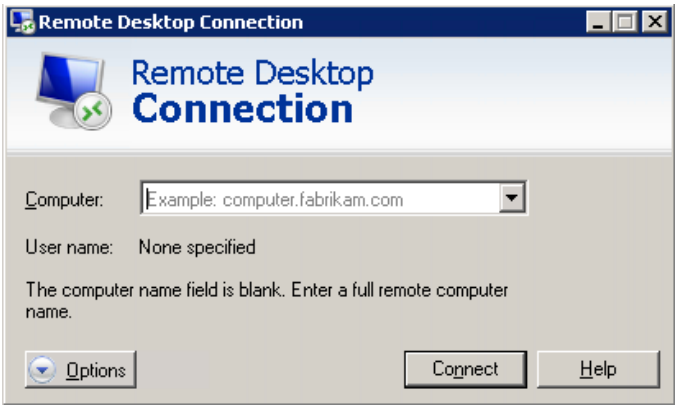
Running the Initial Startup Wizard

The Initial Startup Wizard allows you to specify the storage system IP addresses. As you specify your configuration settings, record them for future reference. You run this Wizard using the PC connected to the LAN1 port of the SVP.

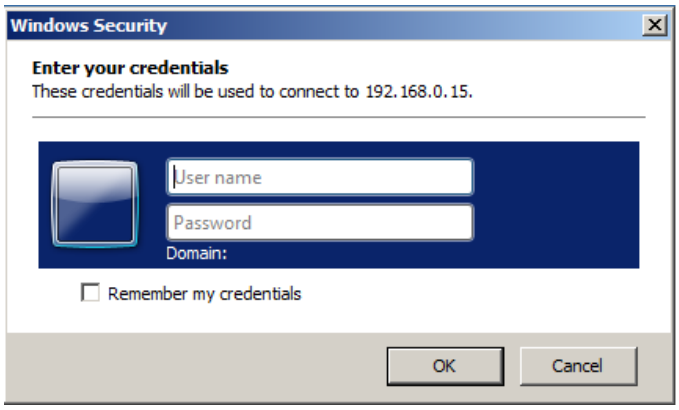
Note: The Initial Startup Wizard takes about 15 minutes to complete.

Procedure

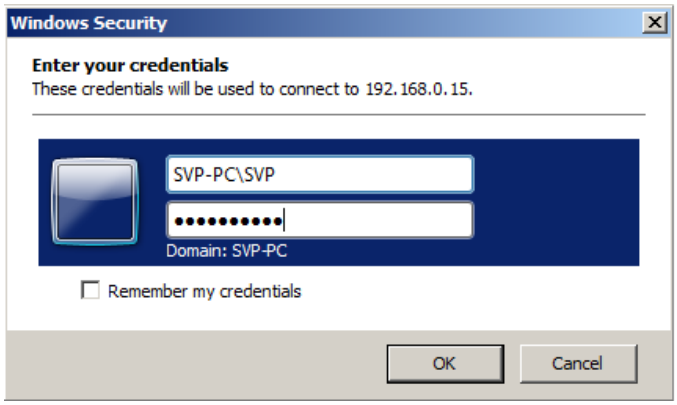
1. From the PC connected to the SVP, click **Start > All Programs> > Accessories > Remote Desktop Connection**.
   The **Remote Desktop Connection** window appears.



2. In the **Computer** field, type `192.168.0.15`, and then click **Connect**. The Windows Security screen appears.



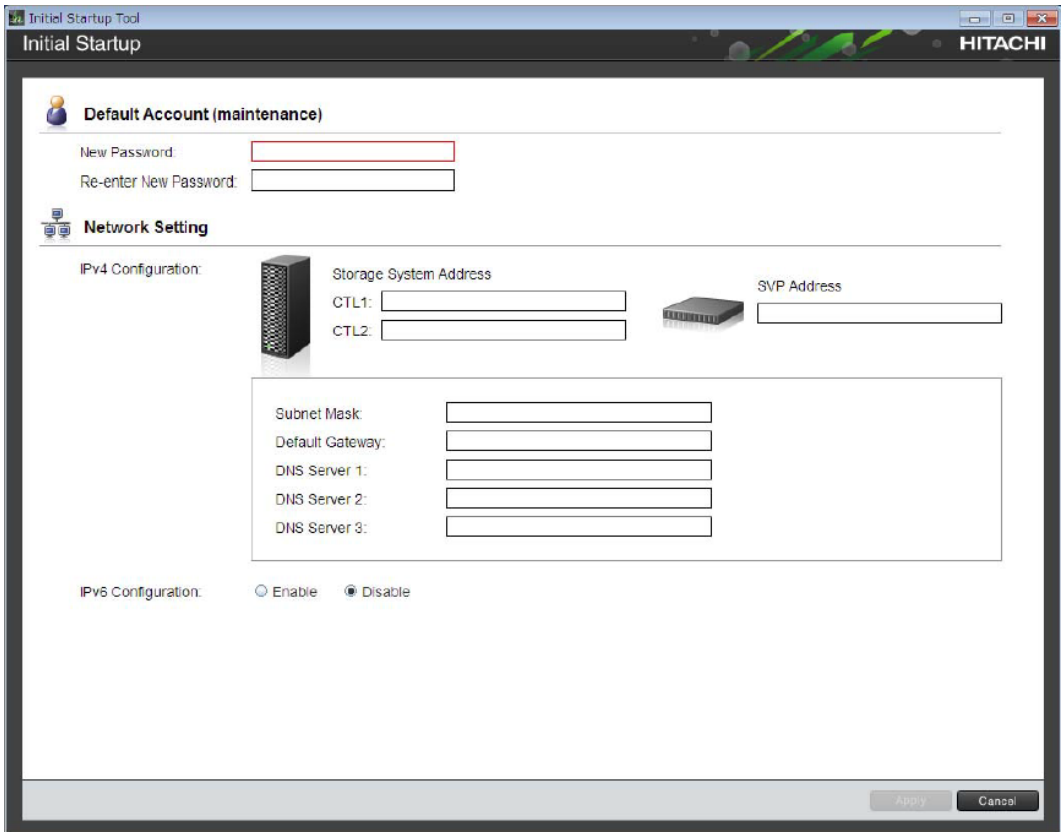
3. Type the following in the top and bottom fields, and then click **OK**:
   - Top field: `SVP-PC\SVP`
   - Bottom field: `raid-login`



4. If prompted that the identity of the remote computer cannot be verified, click **Yes**.
5. Perform the following steps on the SVP:
   a. Click the **Start** button, and then click **All Programs > Hitachi Device Manager-Storage Navigator**.
   b. Right-click **Initial Startup Tool** and click **Run as administrator**.
   c. At the bottom of the **Initial Startup** screen, click **Start Setup**.
   d. When a message about checking the initial environment appears, click **OK**.

Note: If an error message states that the SVP does not support the DHCP network setting, close the error window, assign a static address to the SVP, and log in to the SVP again.

6. Complete the fields on the **Initial Startup Tool** page and record your settings.



Parameter	Description	Factory default
Default Account	Read-only field that shows the currently logged in user.	
New Password	Enter a new case-sensitive password of your choice that you will use to access the maintenance utility. Range: 6-255 characters. If you will use Hitachi HiCommand Initial Setup wizard, you will need to enter this password again in the Add Storage System page.	N/A
Re-enter New Password	Enter the same case-sensitive password you entered in the New Password field. Record this password, as you will enter it in the Initial Setup Wizard.	N/A

Parameter	Description	Factory default
Network Settings - IPv4 Configuration		
Storage System Address	IP address for each controller, entered in dotted-decimal notation.	**Controller 1** 192.168.0.16 **Controller 2** 192.168.0.17
SVP Address	IP address for the SVP, entered in dotted-decimal notation. Record the IP address, as you will refer to it when running the Initial Setup Wizard.	192.168.0.15
Subnet Mask	Subnet mask of the network to which the storage system is connected.	255.255.255.0
Default Gateway	Default gateway address of the network to which the storage system is connected.	N/A
DNS Server 1 DNS Server 2 DNS Server 3	IP addresses for up to three Domain Name Systems servers, entered in dotted-decimal notation. DNS servers translate (resolve) human-memorable domain names and hostnames into the corresponding numeric Internet Protocol (IP) addresses.	N/A
IPv6 Configuration	Enables or disables IPv6 addressing. If you select Enable, the settings for configuring IPv6 appear.	Disable

7. Click **Apply**.
   A **Setup Progress** screen shows the progress of the initial startup.
8. When the Initial Startup is complete, click **Close**.
   The SVP reboots automatically (5 to 10 minutes).

Note: The Remote Desktop Connection session ends when the SVP reboots. Restart the Remote Desktop Connection using the procedure above to prepare for the Initial Setup Wizard.

9. Remove the PC cable from the LAN2 port on the SVP and connect the cable to SVP LAN port 1.
10. Proceed to Running the Initial Setup Wizard on page 87.

Running the Initial Setup Wizard

After you run the Initial Startup Wizard, run the Initial Setup Wizard from the same management console PC.

The Initial Setup Wizard allows you to specify the storage system name and location, date and time, and network settings. As you specify your configuration settings, record them for future reference.

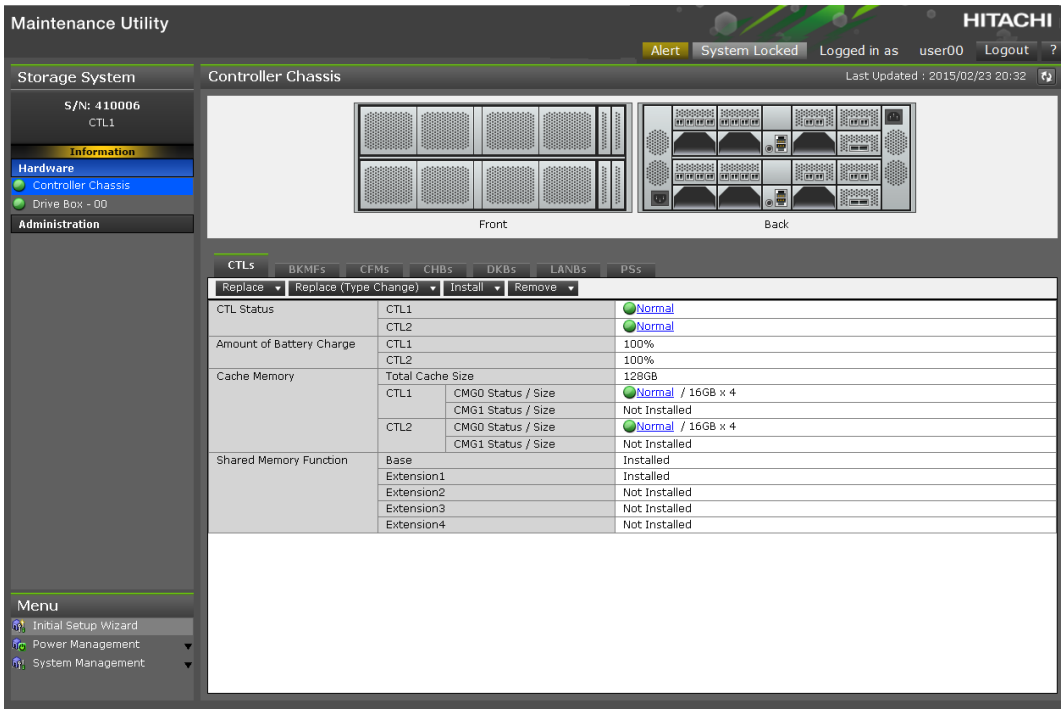
Procedure

1. From the PC connected to the SVP, click **Start > All Programs> > Accessories > Remote Desktop Connection**.
   The **Remote Desktop Connection** window appears.
2. In the **Computer** field, type `192.168.0.15`, and then click **Connect**.
3. At the next screen, click the **SVP** icon.
4. At the next screen, type the username `maintenance` and the password `raid-maintenance`, and then press Enter:
5. If prompted that the identity of the remote computer cannot be verified, click **Yes**.
6. Double-click the following icon on the SVP desktop:

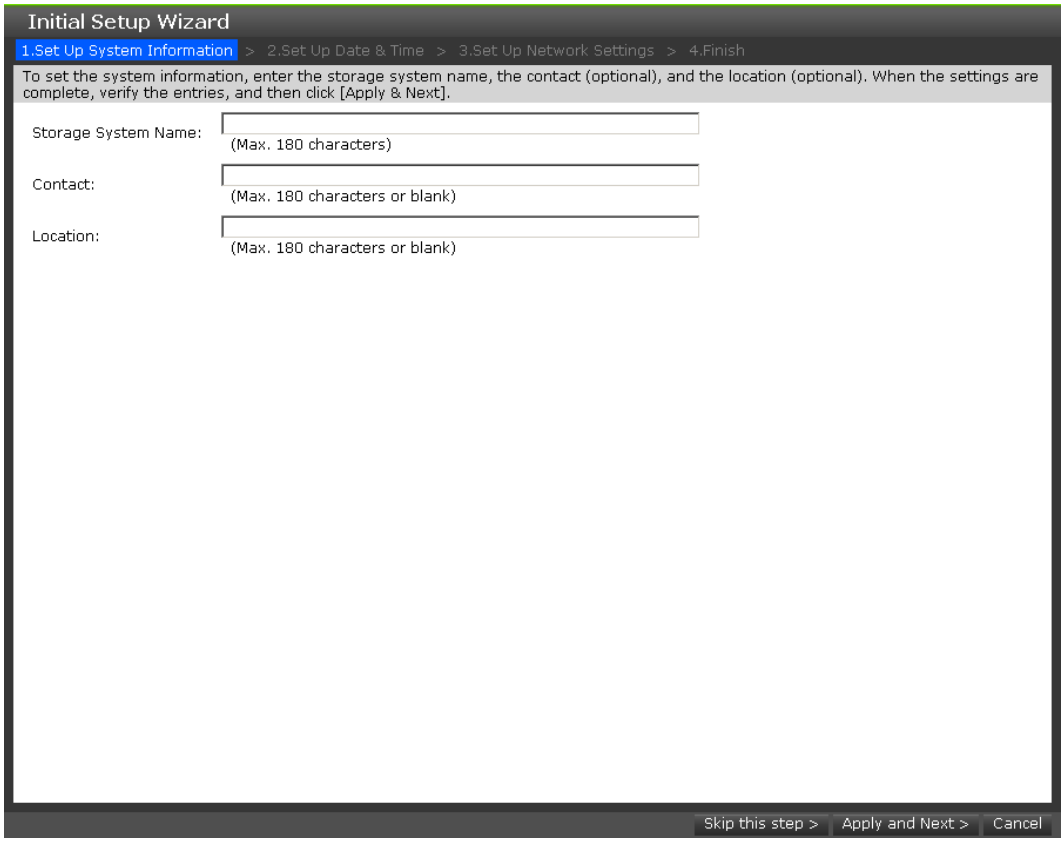


   The **Storage Device List** appears.
7. Click the plus (+) sign in the **Storage Device List**.
8. On the SVP, click **Start > All Programs > Hitachi Device Manager-Storage Navigator > StorageDeviceList**.
9. In the **Storage Device List** window, click the picture of the registered storage system.
10. If prompted about a security certificate, select **Continue to this website**.
11. Log in to Hitachi Device Manager - Storage Navigator.

12. On the **Maintenance Utility** menu, click **Hardware > Other hardware maintenance**.
The maintenance utility starts.



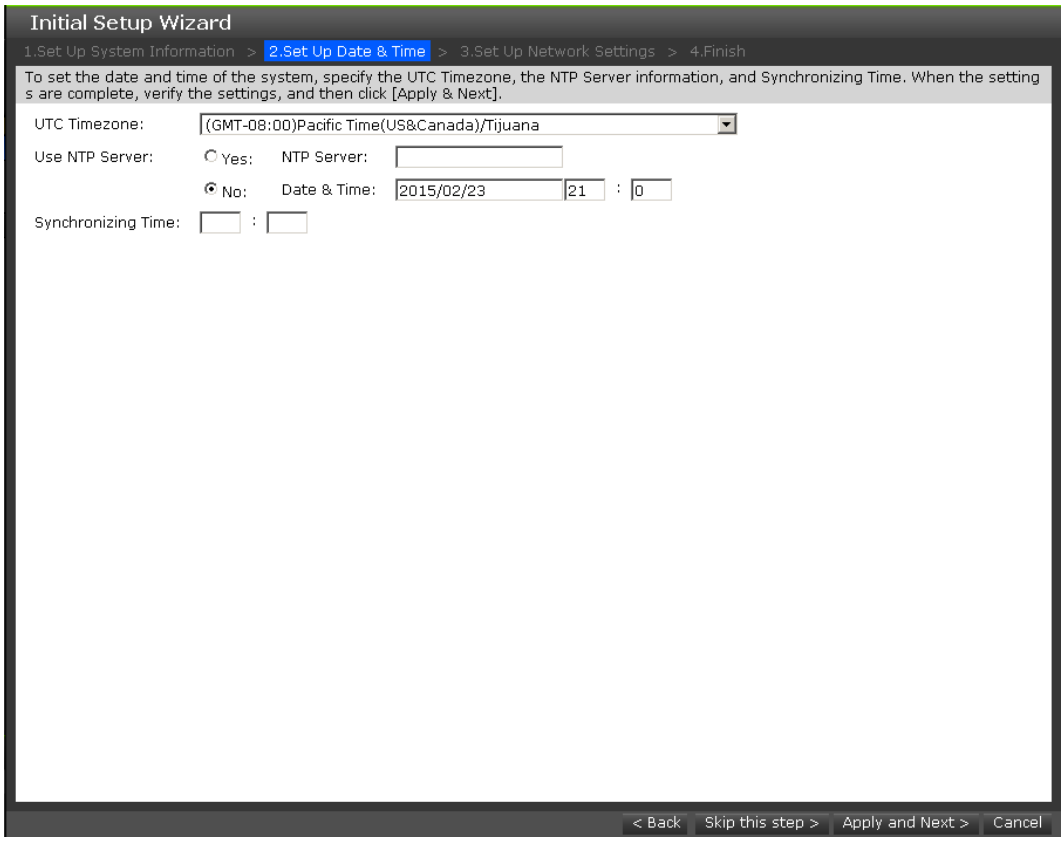
13. In the left pane of the **Maintenance Utility** window, under **Menu**, click **Initial Setup Wizard**.
The Initial Setup Wizard starts, with the **Set Up System Information** page displayed.



14. Complete the fields in the **Set Up System Information** page.

Parameter	Description
Storage System Name	Enter a name to identify this storage system, up to 180 alphanumeric characters. The following characters are not permitted: \ , / ; : * ? ” < > | & % ^
Contact	Enter the name of the contact person for the storage system, up to 180 alphanumeric characters.
Location	Enter the location where the storage system resides, up to 180 alphanumeric characters.

15. Click **Apply and Next**.
The **Set Up Date & Time** page appears.



16. Complete the fields in the **Set Up Date & Time** page.

Note: The settings on the **Set Up Date & Time** page do not apply to the SVP. Date and time settings on the SVP can be changed using the controls in the Microsoft Windows 7 operating system running on the SVP (see Managing the SVP date and time settings on page 99).

Parameter	Description
UTC Timezone	Select the time zone in which the storage system is located.
Use NTP Server	Select whether you want the time source for the storage system to be a Network Time Protocol (NTP) server. An NTP server receives its time from an authoritative time source, such as an atomic clock attached to a time

	server, and then distributes this time across the network to your storage system. • Yes = storage system time will be synchronized to an NTP server. Enter the IP address of the NTP server in the **NTP Server** field. • No = storage system will use the date and time you enter in the **Date & Time** fields.
Synchronizing Time	To synchronize the storage system with a specific time every day, enter the synchronizing time.

17. Click **Apply and Next**.
18. When the**Set Up Network Settings** page appears, click **Apply** to accept the settings on this page.
    The **Finish** page appears.
19. Click **Close** to complete the Initial Setup Wizard.
20. Leave the **Maintenance Utility** window open and proceed to Configuring alert notifications on page 91.

Configuring alert notifications

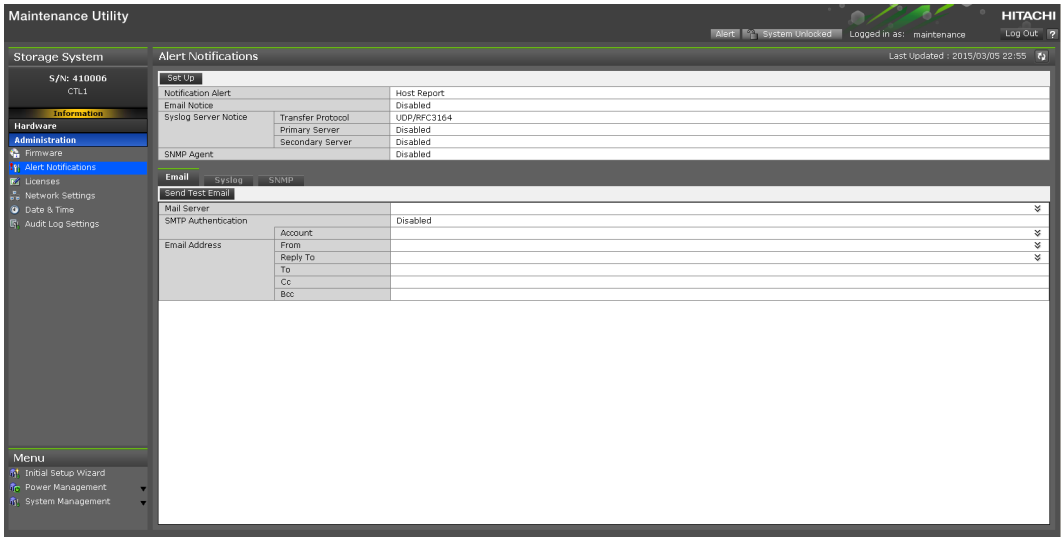
After running the Initial Setup Wizard, use the maintenance utility to configure email and SNMP delivery of alert notifications, and location identification. You can also send a test alert e-mail.

You perform this procedure using the management console PC. This procedure assumes the following:

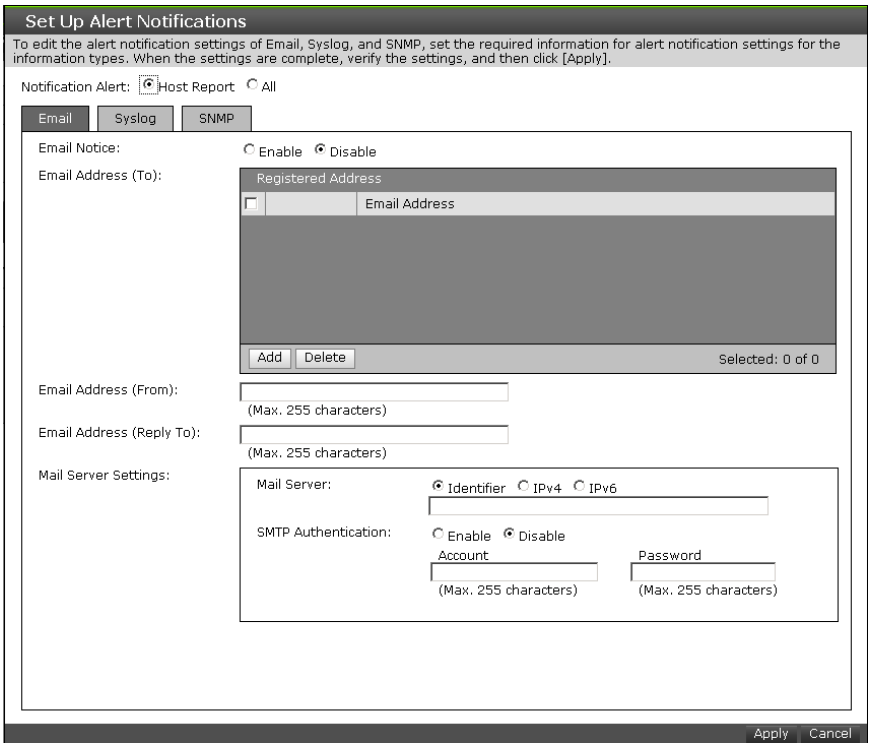
- The management PC is connected to the LAN 2 port on the SVP.
- The PC has established a Remote Desktop Connection with the SVP.
- The **Management Utility** window is displayed on the PC.

Procedure

1. In the left pane of the **Maintenance Utility** window, click **Administration > Alert Notification**.
   The **Alert Notifications** page appears.



2. In the **Alert Notifications** page, click **Set Up**.
   The **Set Up Alert Notifications** page appears, with the **Email** tab displayed.

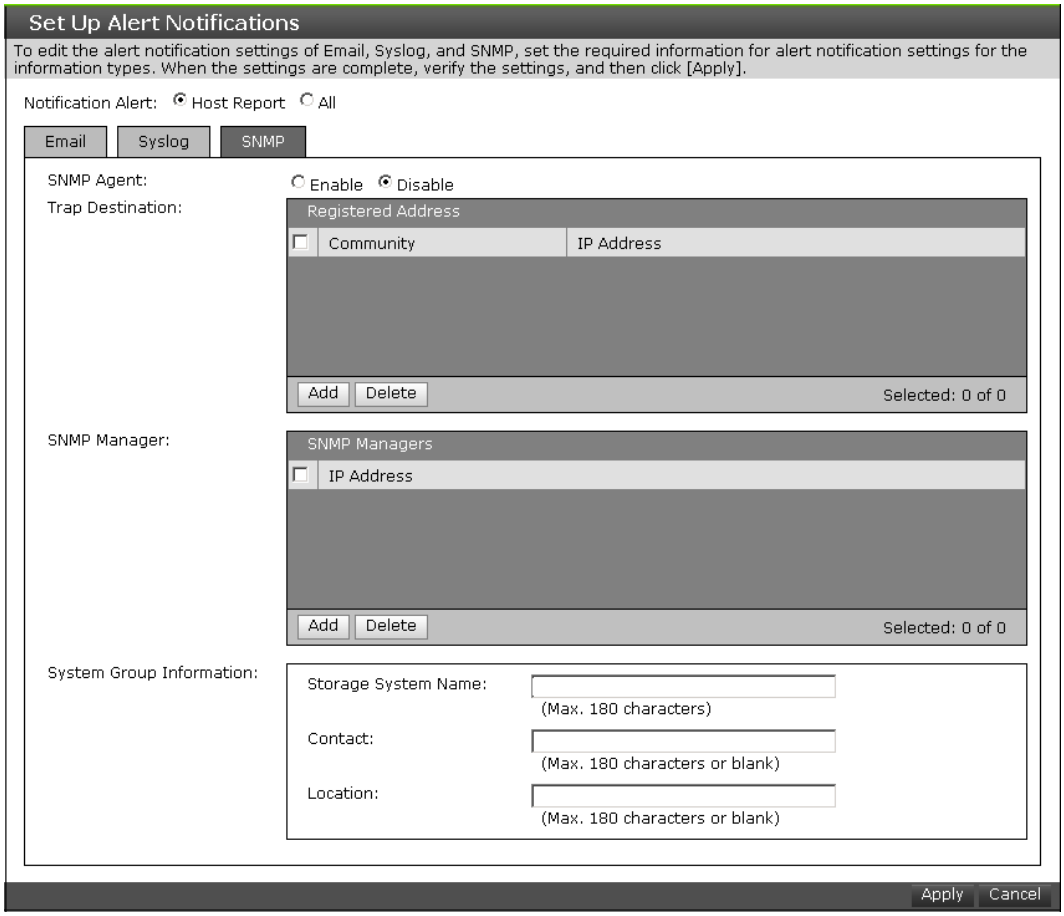


3. Complete the fields in the **Email** tab and record your settings.

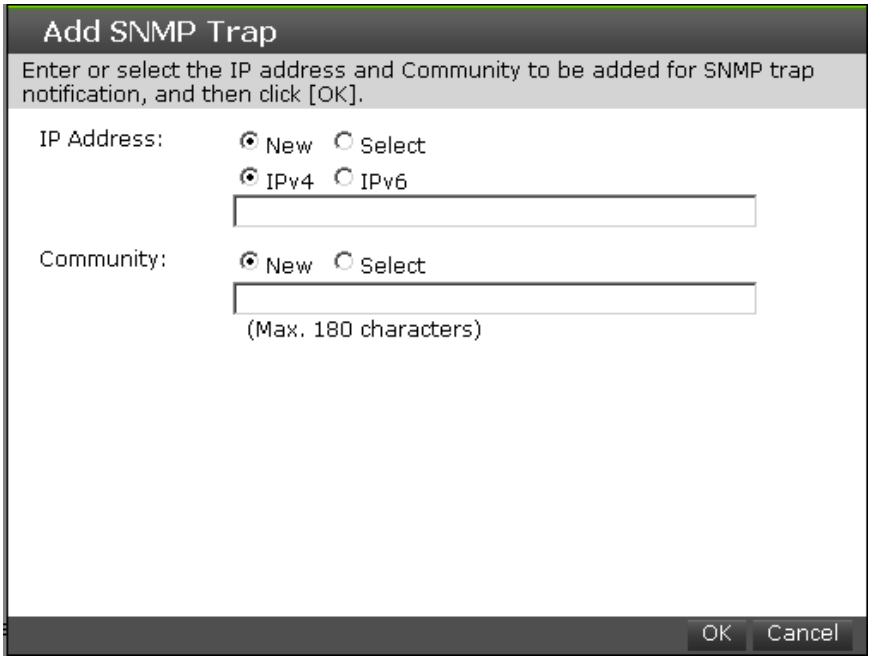
Parameter	Description
Notification Alert	Set to Host Report to receive notifications about meaningful events only (not all events).
Email Notice	Click Enable to activate email alert notifications.
Email Address (To)	Click Add to add an email address. When the Add Email Address window appears: • Enter an email address. • Select whether this address receives the alert (To), a copy of the alert (Cc), or a blind copy (Bcc) of the alert. • Click OK. A Delete button lets you delete selected email addresses.
	
Email Address (From)	Enter the name that will appear as the sender on the email alert.
Email Address (Reply To)	Enter the email address to which replies can be directed.
Mail Server Settings	Mail Server: Select Identifier or the IP addressing scheme (IPv4 or IPv6) used by the mail server. • If you selected Identifier, enter the name of the mail server. • If you selected IPv4 or IPv6, enter the appropriate IP address for the mail server.
SMTP Authentication	If your mail server uses authentication, enter the name (Account) and password required to authenticate to the mail server.

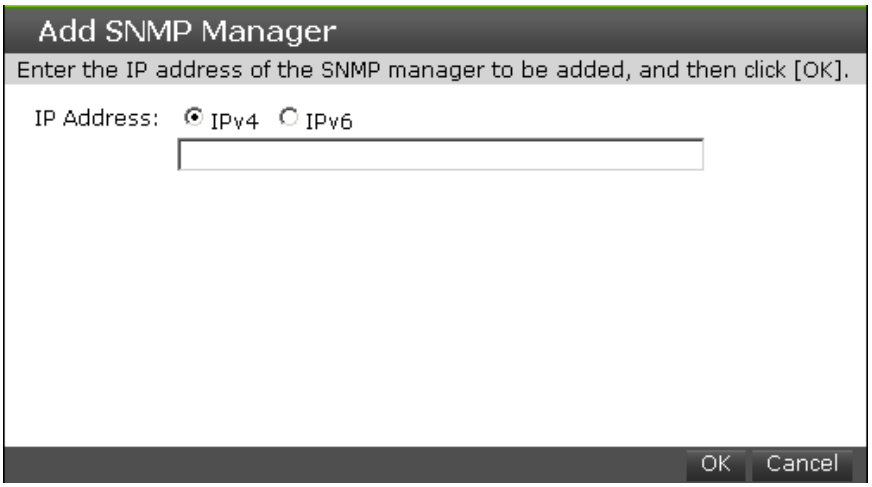
4. To configure SNMP alert notifications, click the **SNMP** tab, and then complete the fields in the**SNMP** tab and record your settings.

Note: Before enabling SNMP, configure your trap receiver or SNMP server with the Management Information Base (MIB) definition file `VSPGx00MIB.txt`. The MIB definition file is located in the `program \SNMP` folder of the software media kit.



Parameter	Description
Notification Alert	Set to Host Report to receive notifications about meaningful events only (not all events).
SNMP Agent	Click Enable to activate SNMP alert notifications.
Trap Destination	Click Add to add an SNMP trap. When the Add SNMP Trap window appears: • Enter a new IPv4 or IPv6 address, or select an existing one.

	• Enter or select an existing community string. • Click OK. A Delete button lets you delete selected trap destinations.
	
SNMP Manager	Click Add to add an SNMP manager. When the Add SNMP Manager window appears: • Enter a new IPv4 or IPv6 address, or select an existing one. • Click OK. A Delete button lets you delete selected trap destinations.



System Group Information	If the storage system name, contact, or location need to be changed, edit the information shown as required.

5. Click **Apply**.
6. When the Information window tells you that alert notifications are complete, click **OK**.
7. To send a test email, click **Send Test Email** in the **Email** tab.
   A test email is sent to the IP address(es) you specified in the Set Up Alert Notifications page.
8. Proceed to Installing and enabling licenses on page 97.

Installing and enabling licenses

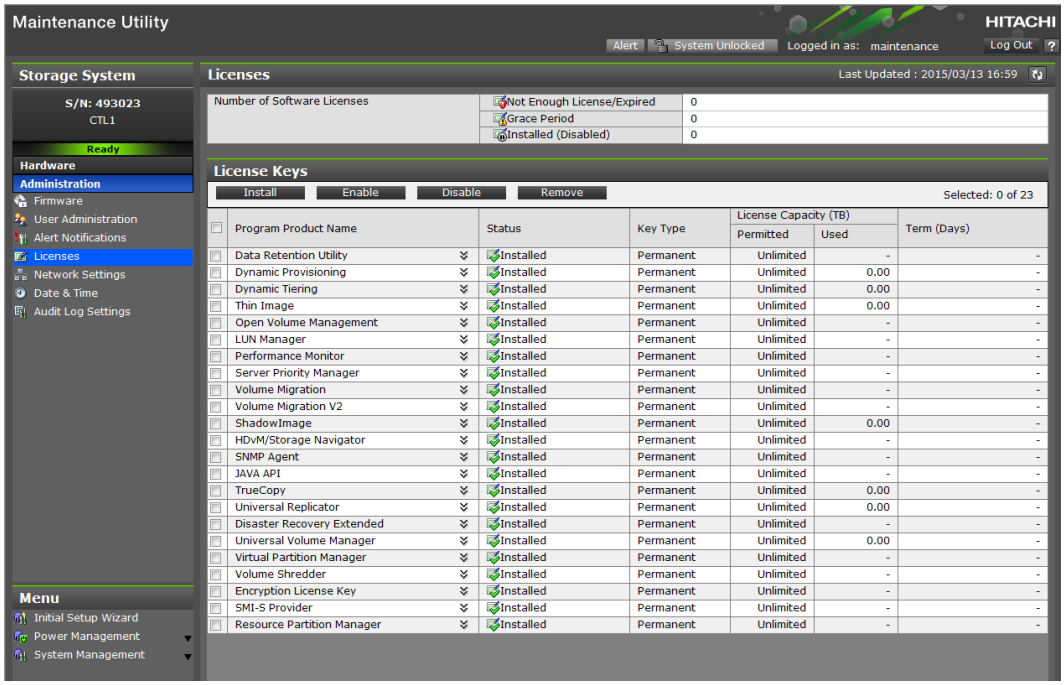
After configuring alert notifications, use the maintenance utility to add and install and enable licenses for the Hitachi program products you want to install.

You perform this procedure using the management console PC. This procedure assumes the following:

- The management PC is connected to the LAN 2 port on the SVP.
- The PC has established a Remote Desktop Connection with the SVP.
- The **Management Utility** window is displayed on the PC.

Procedure

1. In the left pane of the **Maintenance Utility** window, click **Administration > Licenses**.
   The **Licenses** page appears.



2. To install a license key:
   a. In the **License Keys** window, click **Install**.
      The **Install Licenses** window appears.



   b. If you have a license key code, click **License Key Code** and enter the code in the adjacent field. If you have a license key file, click **License Key File**, and then click the **Browse** button, go to the location where the license key file is located, click the file, and click **Open**.
   c. Click **Apply**.
   d. When the completion message appears, click **OK**.
3. After you install licenses, you can enable them:
   a. On the **Licenses** page, check the licenses you want to enable.
   b. Click **Enable**.
   c. When the **Selected License Keys** page appears, click **Apply**.
   d. When the **Completion** message appears, click **OK**.
4. After installing and enabling the desired licenses, proceed to Setting SVP date and time on page 99.

Setting the SVP date, time, and timezone settings

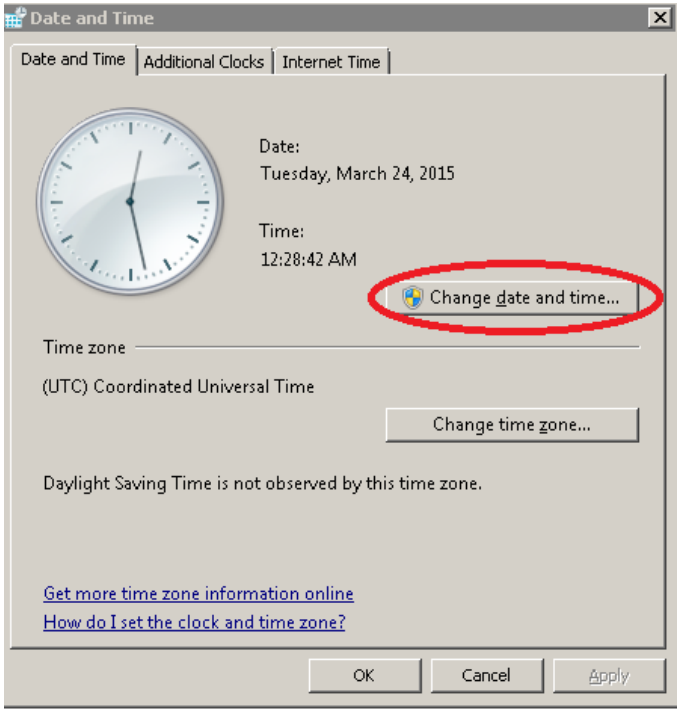
Set the SVP date, time, and timezone to the local time where the SVP is installed. You specify these settings using the Microsoft Windows 7 operating system running on the SVP.

You perform this procedure using the management console PC. This procedure assumes the following:

- The management PC is connected to the LAN 2 port on the SVP.
- The PC has established a Remote Desktop Connection with the SVP.
- The **Management Utility** window is displayed on the PC.

Procedure

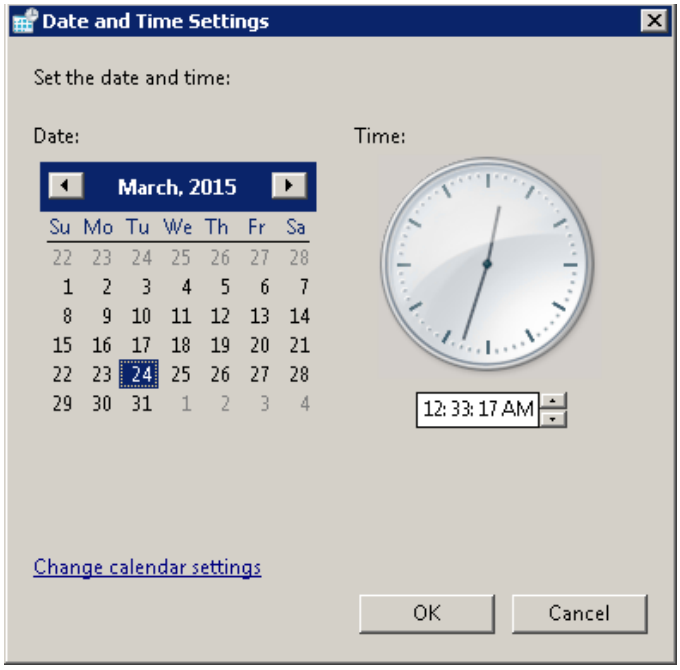
1. In the desktop, click the **Start** button, and then click **Control Panel**.
2. Click **Clock, Language, and Region**.
   The **Clock, Language, and Region** window appears.
3. Click **Date and Time**.
   The **Date and Time** window appears, with the **Date and Time** tab displayed.



4. Click **Change date and time**.

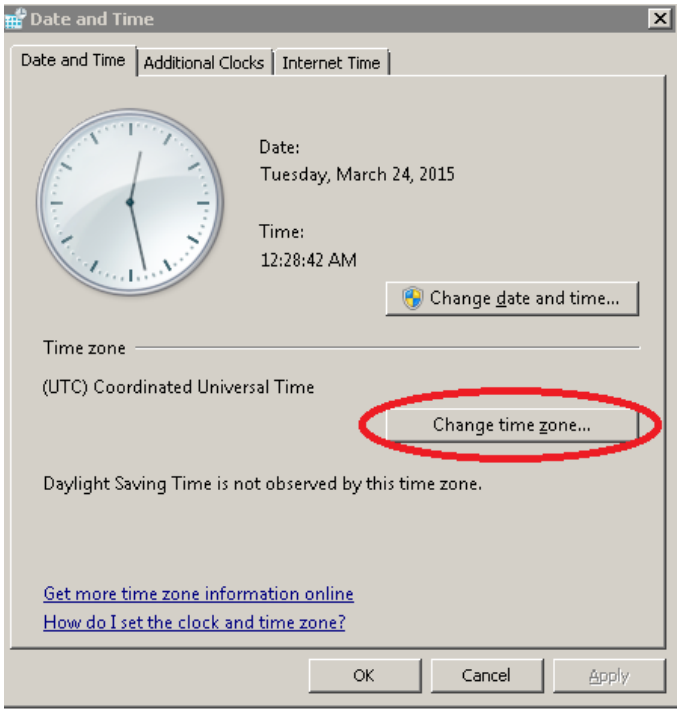
   The **Date and Time Settings** window appears.

5. Set the year, month, day, and time.



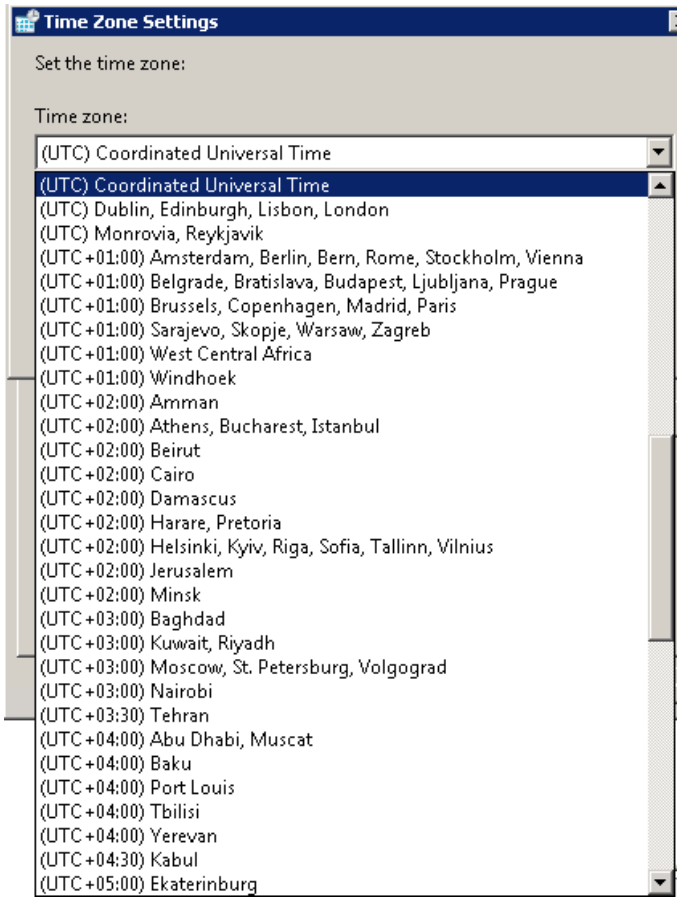
6. Click **OK**.

7. In the **Date and Time** tab, click **Change time zone**.



The Time Zone Settings window appears.

8. Select a UTC timezone from the drop-down list, and then click **OK**.



9. Click **OK**.
10. Close the Windows Control Panel.

Disconnecting from the SVP

To disconnect the management console PC from the SVP:

Procedure

1. Click the **Start** button on the SVP desktop.

2. Click **Log off > Disconnect**.



Result

The SVP disconnects from the PC.

5

Troubleshooting

This chapter covers troubleshooting topics related to the replacement of components.

- General troubleshooting
- Using LEDs to diagnose problems
- Checking alerts
- Checking SIM alerts
- Checking hardware replacement alerts
- Troubleshooting Hitachi Device Manager - Storage Navigator
- Dump tool
- Troubleshooting the maintenance utility
- Turning the storage system on or off using the maintenance utility
- iSCSI troubleshooting
- SVP troubleshooting
- About working with firewalls
- Configuring the audit log

General troubleshooting

Host cannot access storage

Procedure

1. Verify that the ACT LED on the data port is on. If not, try a different data port.
2. Check that all data port cables are connected securely at both ends.
3. Send a **ping** command from the host to the storage system. If the **ping** fails, verify that the host is communicating with the storage system at the appropriate IP address.
4. Check whether other devices in your network, such as a router or switch, are the cause of the problem.
5. If these steps do not fix the problem, contact HDS support at http://portal.hds.com.

Correct values for the storage system IP address

Set appropriate value IP address, subnet mask, and default gateway settings for the storage system for the customer environment.

IPv4 default value

Controller 1:
Controller 2:
IP Address: 192.168.0.16
Subnet Mask: 255.255.255.0
Default gateway: 0.0.0.0
Controller board #2:
IP Address: 192.168.0.17
Subnet Mask: 255.255.255.0
Default gateway: 0.0.0.0

IPv6 default value

Controller 1:
IP Address: Auto
Controller 2:
IP Address: Auto

DHCPv4 configuration for storage systems

If the storage system is configured to use DHCPv4, connect with the IP address assigned by the DHCPv4 server. When using DHCPv4 server, configure the storage system to use a static IP address.

If the storage system does not receive an IP address from a DHCP server when it is configured for DHCP, Hitachi Device Manager - Storage Navigator cannot connect to the storage system. Contact your network administrator, and review the DHCPv4 server settings.

Default value

DHCPv4: Off (Static IP Address)

IP address being used by other storage systems or hosts

If the storage system is using the same IP address is used by other devices, Hitachi Device Manager - Storage Navigator cannot connect to the storage system. Assign an IP address to the storage system that is not used by another device.

IP address configuration for the host

Use Hitachi Device Manager - Storage Navigator to set the IP address, subnet mask, and default gateway that the host can use to communicate with the storage system.

TCP/UDP port filtering being performed on the network switch

The default TCP port number for Hitachi Device Manager - Storage Navigator is 2000. Set an appropriate value for the customer's environment.

```
[default port number]: 2000 (standard)
28355 (secure)
```

Change the port number in environments that use Cisco SIP Phones.

Search Storage system performed across the IPv6 routers

The Auto Search Storage system of IPv6 uses link-local scope multicast. The IPv6 router is unable to transfer this multicast to other local links, so the IPv6 router is unable to search storage systems across the IPv6 router. For different local links, register the storage system using a static IP address search.

Using LEDs to diagnose problems

If the storage system used in a remote TrueCopy configuration restarts with the TrueCopy status of `enabled`, the following occur:

- The path used by TrueCopy becomes blocked. Notifications from the Hitachi Device Manager - Storage Navigator email alert function, SNMP Agent Support function, and TRAP occur when the path is blocked. Follow the instructions in the notification. The blocked path recovers automatically after restarting the storage system.

- If the TrueCopy pair status is PAIR or COPY, the pair changes to PSUE. In this case, suspend the paris before restarting the storage system.

POWER LED does not go on

Procedure

1. Set the main switch to on.
2. Is the POWER LED on at the controller?
   - Yes: Go to step 10.
   - No: Power on the host computer.
3. Is the POWER LED on at the controller?
   - Yes: Go to step 10.
   - No: Set the main switch to off.
4. Check that the PDU on the rack is delivering power to the storage system.
5. Verify that the AC cable is correctly connected to the plug socket and the equipment.
6. Set the main switch to on.
7. Is the POWER LED on at the controller?
   - Yes: Go to step 10.
   - No: Set the main switch to off.
8. Contact your administrator. Go to step 10.
9. Is the READY LED on?
   - Yes: Continue to use the equipment, even if the green READY LED blinks fast.
   - No: See *READY LED does not go on or READY LED went on and then off.*
10. End of procedure.

POWER LED turned off

Procedure

1. Is AC power being supplied?
   - Yes: Go to step 2.
   - No: Supply AC power to the storage system and restart the storage system. Go to step 2.
2. Set the main switch to off.
3. Wait over a minute and then set the main switch to on.
4. Is the POWER LED on at the controller?
   - Yes: go to step 6.
   - No: set the main switch to off.
5. Contact your administrator. Go to step 7.
6. Is the READY LED on at the controller?

- Yes: Use the equipment in its current operational state, even if the green READY LED blinks fast.
- No: See *READY LED does not go on or READY LED when on and then off.*

7. End of procedure.

READY LED does not go on or READY LED went on and then off

Procedure

1. Is the controller POWER LED on?
   - Yes: Go to step 2.
   - No: Go to step 4 in *POWER LED does not go on.*
2. Is the ALARM LED on at the controller?
   - Yes: See *ALARM LED is on.*
   - No: Go to step 3.
3. Turn off the main switch.
4. Wait more than one minute and then set the main switch to on.
5. Is the READY LED on at the controller?
   - Yes: Continue to use the equipment. If the green READY LED blinks fast, the storage system is operational. Go to step 8.
   - No: Go to step 8.
6. Set the main switch to off.
7. Contact your system administrator.
8. End of procedure.

ALARM LED is on.

Procedure

1. Identify which components failed.
2. Contact your system administrator and do not disturb the equipment.

WARNING LED goes on or blinks.

Procedure

1. Does the amber WARNING LED on the controller blink fast?
   - Yes: Identify which components in the controller chassis failed using Hitachi Device Manager - Storage Navigator. Go to step 5.
   - No: Go to step 2.
2. Does the amber WARNING LED at the controller blink slowly?
   - Yes: At the controller, wait for the amber WARNING LED to go off and the green READY LED to go on.
   - No: Go to step 3.

3. Is the green READY LED at the controller on?
   - Yes: Go to step 5.
   - No: See *READY LED does not go on* or *READY LED went on and then off*
4. Continue to use the equipment and contact your system administrator.
5. End of procedure.

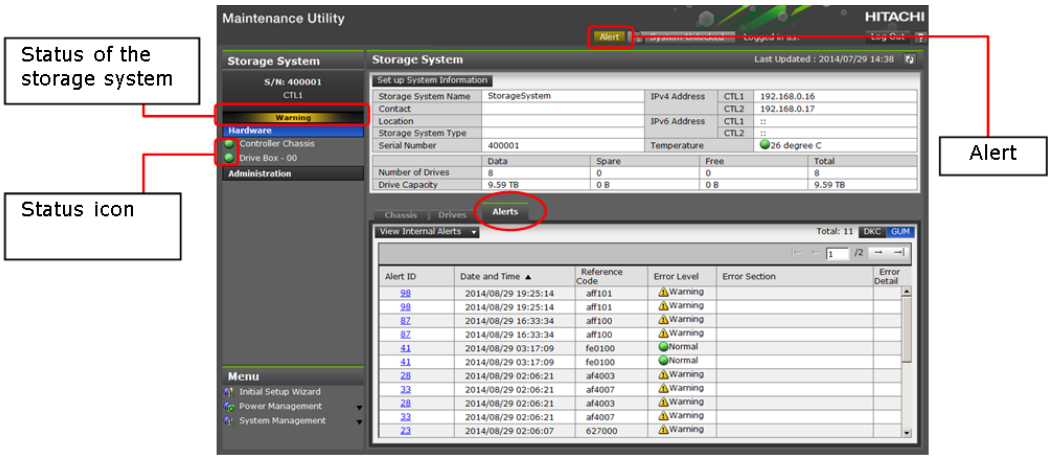
Checking alerts

If an alert, warning, or information item appears in the maintenance utility, but there is no service information message (SIM) associated with it, use the following procedure to obtain more information about the item.

Procedure

1. In the navigation area of the **Maintenance Utility** window, check the status of the storage system.

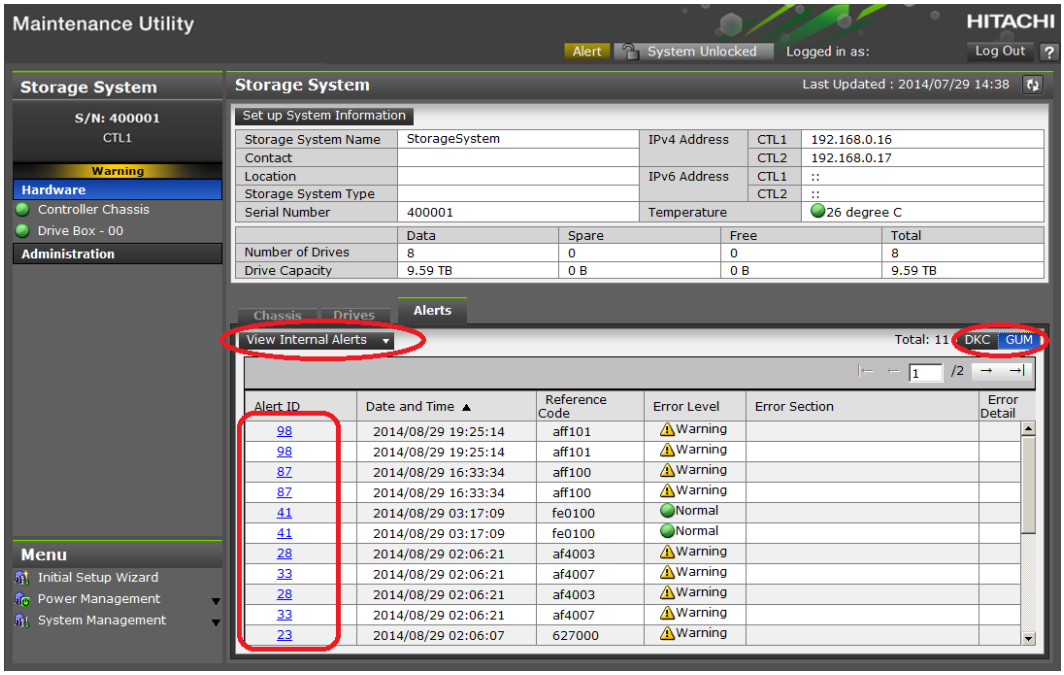
2. In the header area, click **Alert**.
   The **Alerts** tab appears.



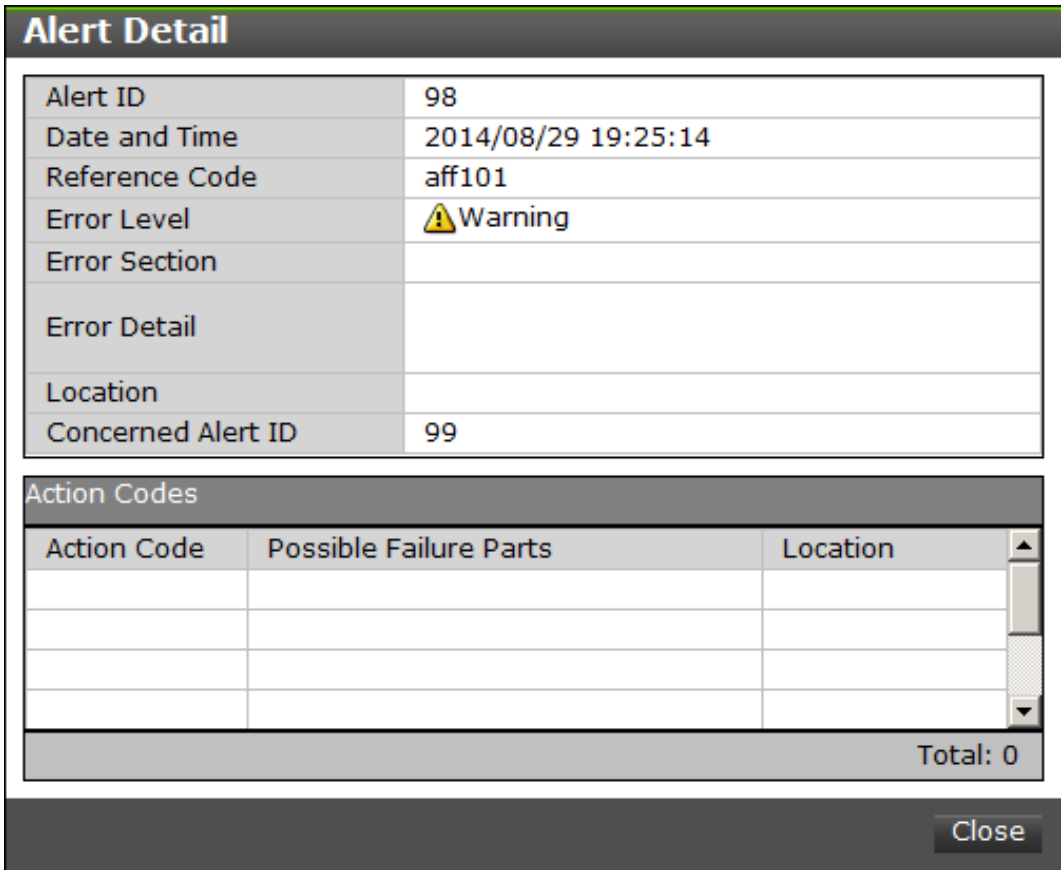
Status	Description	Navigation area	Alert color
Failed	The storage system might be down.	Failed	Red
Warning	A part has a Blocked, Failed, or Warning status.	Warning	Amber
Information	Alert does not have a SIM defined for it.	Information	Amber
Ready	All parts have a normal status.	Ready	Green
Power-on in progress	Power-on is in progress.	Power-on in progress	—
Power-off in progress	Power-off is in progress.	Power-off in progress	—

Status	Description	Navigation area	Alert color
Unknown	The storage system is in an unknown state prior to power on..	Unknown	—

3. In the **Alerts** tab, click **DKC** and **GUM**, and then check the alerts.



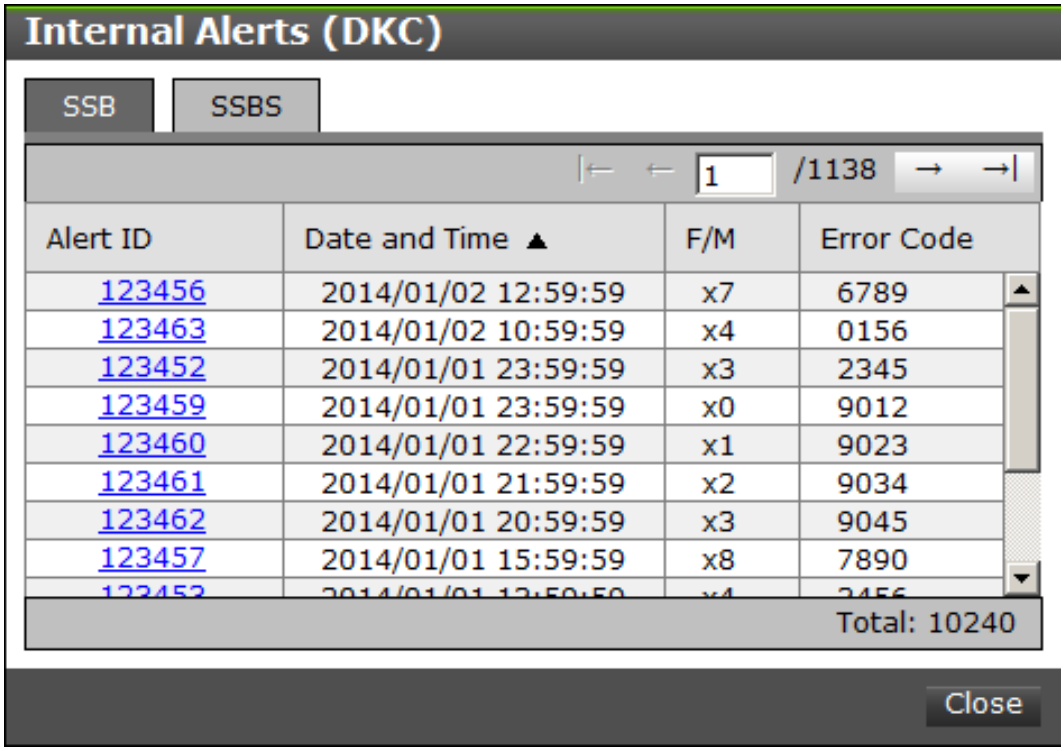
4. Under the **Alert ID** column, click an entry.
   The **Alert Detail** window appears.



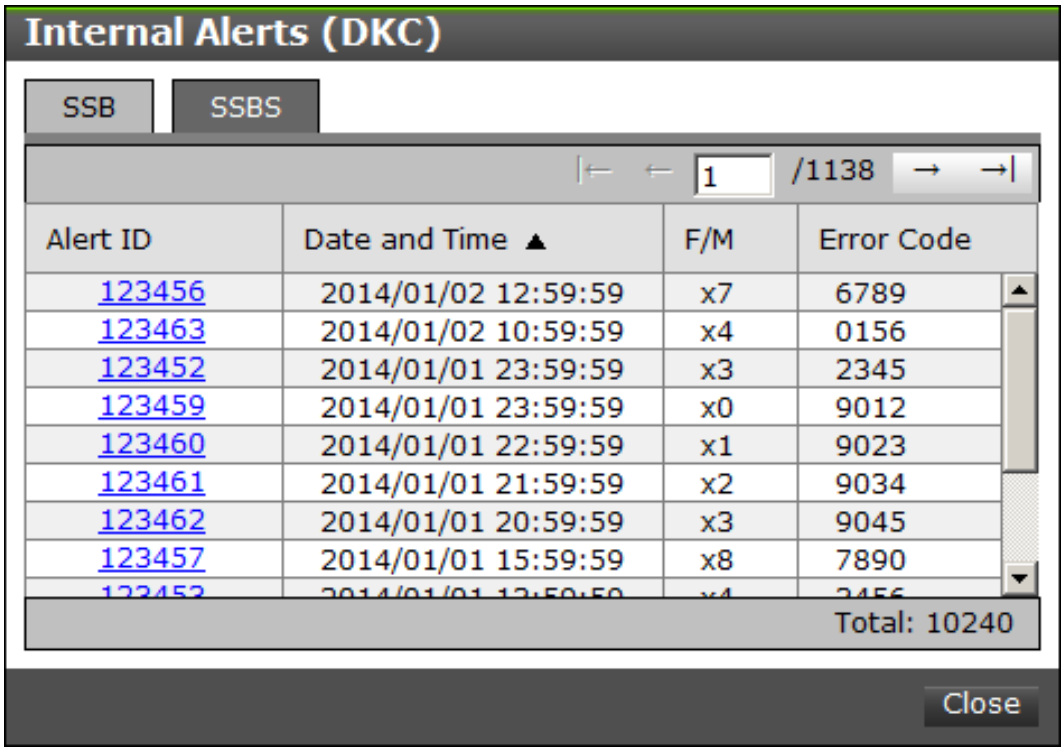
5. To check the internal alert, click **Internal Alerts (DKC)** or **Internal Alerts (GUM)** from the **View Internal Alerts** list. Click an entry under **Alert ID**.

6. When the **Alert Detail** window appears, check the alert information:
   - SSB shows high-priority error information.
   - SSBS = shows low-priority error information.

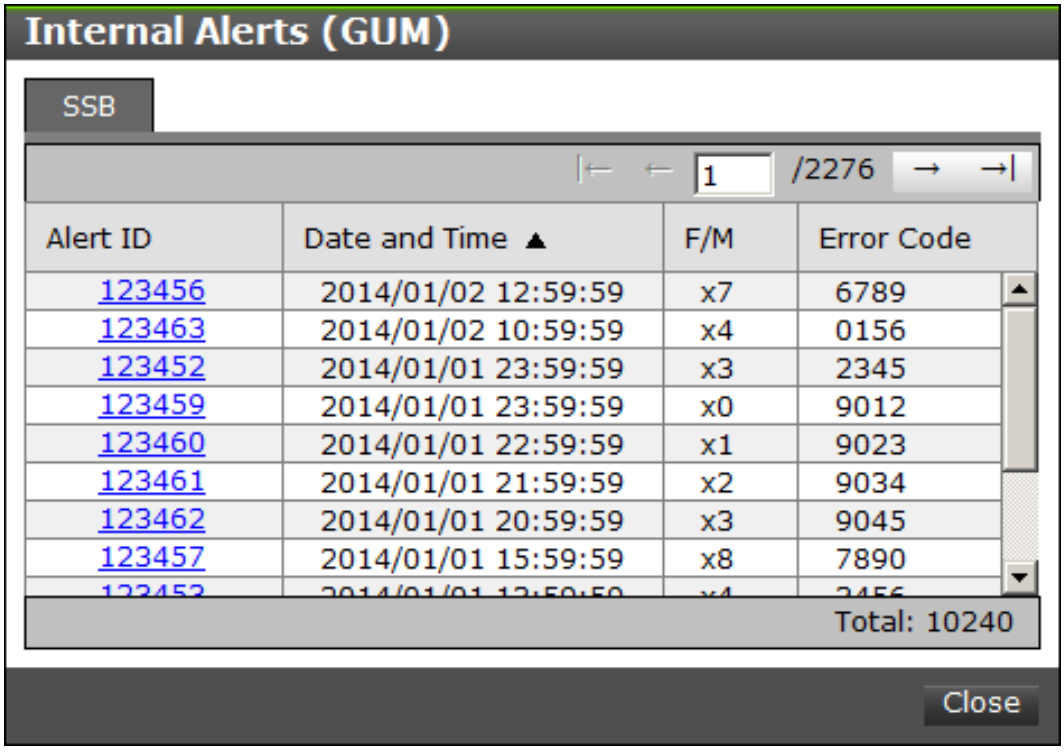
SSB Tab in the Internal Alerts (DKC) Window



SSBs Tab in the Internal Alerts (DKC) Window



Internal Alerts (GUM) Window

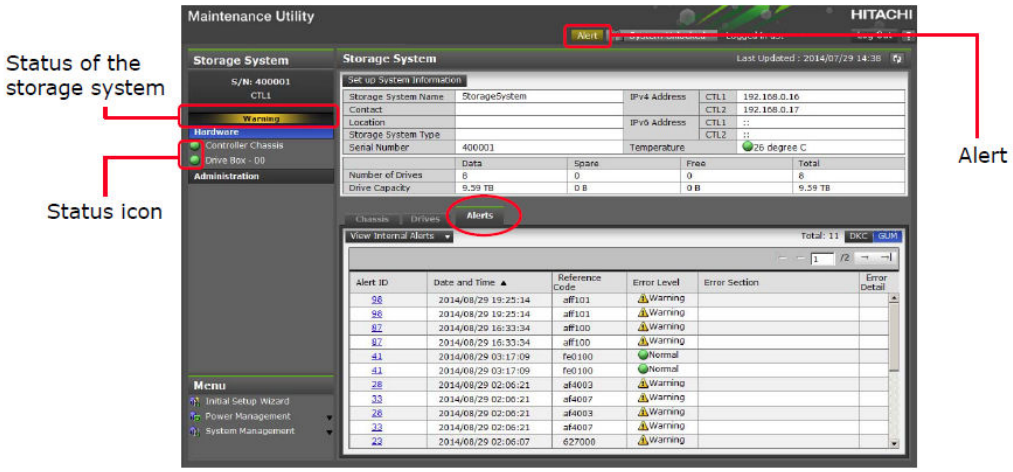


Checking SIM alerts

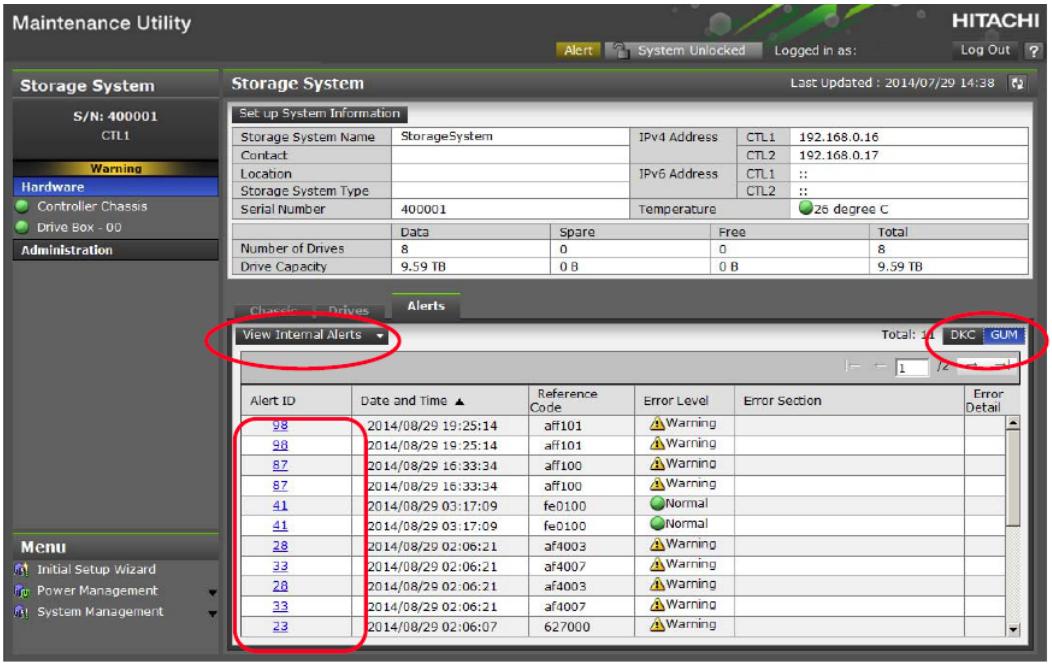
Some alarm, warning, and information notifications shown in the **Maintenance Utility** window include service information message (SIM) alerts.

Procedure

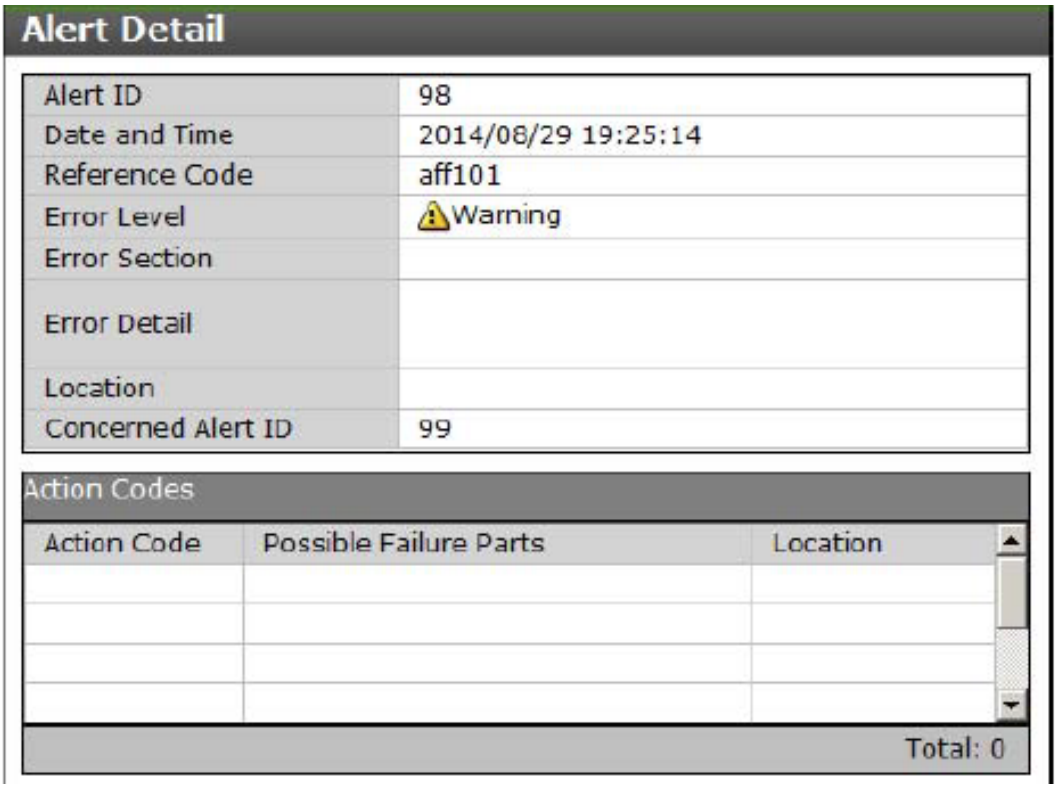
1. In the navigation area of the **Maintenance Utility** window, check the status of the storage system.
2. In the header area, click **Alert**.
   The **Alerts** tab appears.



3. In the **Alerts** tab, click **DKC** and **GUM**, and then check the SIM alerts.



4. Under the **Alert ID** column, click a character string.
   An **Alert Detail** window similar to the following appears.



5. Check the alert information in the window.
6. To check an internal alert:
   a. Click **Internal Alerts (DKC)** or **Internal Alerts (GUM)** from the **View Internal Alerts** list.
   b. Click the character string of the Alert ID to open the **Alert Detail** window.
   c. Check the alert information. The **SSB** tab shows high-priority error information, while the **SSBS** tab shows low-priority error information.

Checking hardware replacement alerts

The **Maintenance Utility** window displays alerts when hardware components need to be replaced.

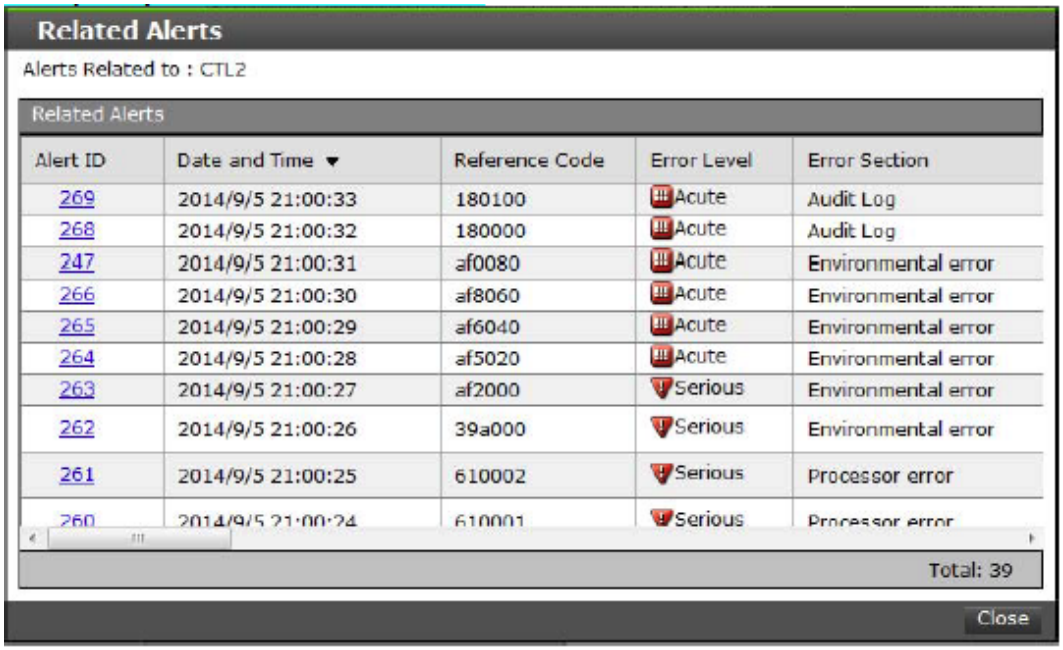
Procedure

1. In the **Maintenance Utility** window, click **Hardware > target hardware**.
2. Click the **Status** link for the hardware.

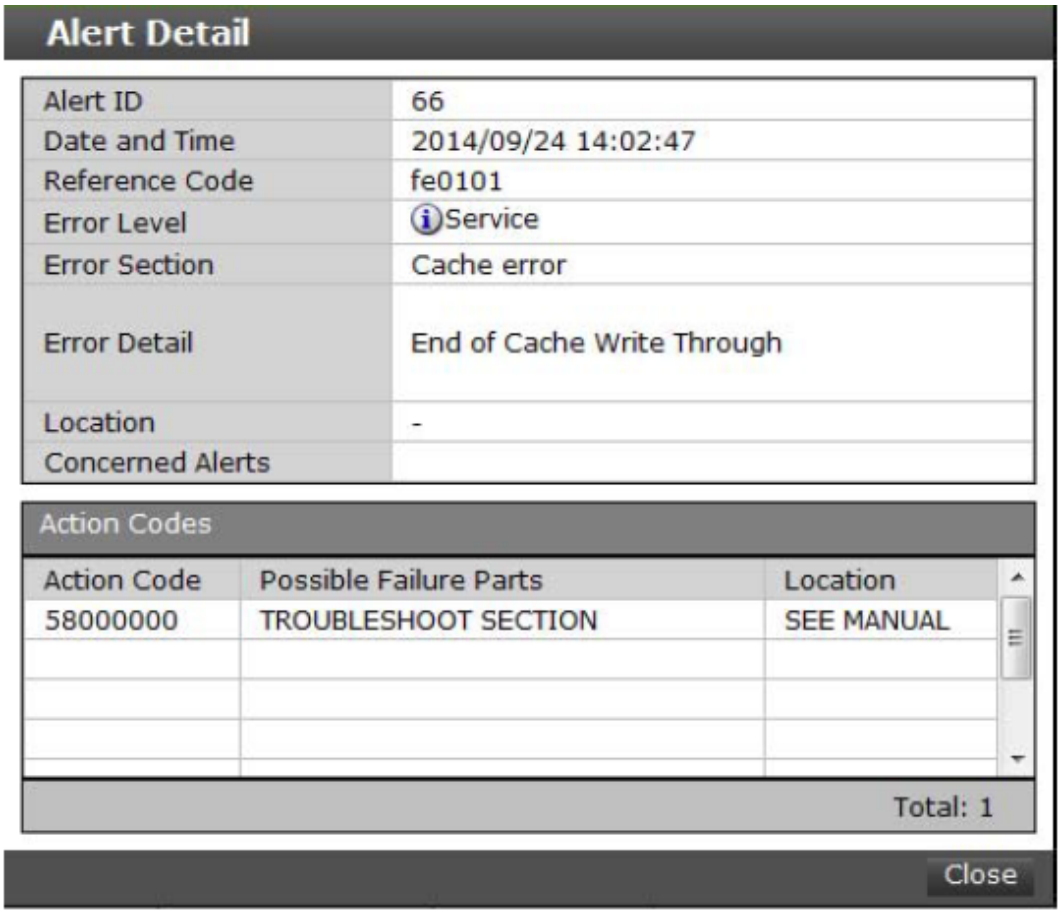
3. Open the **Related Alerts** window for the appropriate hardware component (see the following table).

Parts	Main window	Tab	Status link
Controller chassis	Controller Chassis window	Drives	Status
		CTLs	CTL Status
			Fan Status
		CHBs	Status
			SFP Status
		BKMs	BKM Status
			Battery - Status
		CFMs	Status
		PSs	Status
	Small Form-Factor Pluggable window	—	SFP Status
Drive tray	Drive Box window	Drives	Status
		ENCs	Status
		PSs	Status

4. When the **Related Alerts** window appears, check for alerts that indicate hardware that needs to be replaced. For example:



Only the alerts including the action codes of the specified parts and the related parts are displayed. To check the action codes, click the character string in the **Alert ID** column to open an **Alert Detail** window similar to the following:



The **Related Alerts** window shows a maximum of 256 alerts. Alerts detected one hour or more before the most recent alert are not displayed; in this case, refer to the **Alert** window.

Troubleshooting Hitachi Device Manager - Storage Navigator

Message ID	Description	Recovery Action
21542 005011	Clicking the Apply button in the **Add System** window caused the error, and the storage icon is not created.	The SVP does not have sufficient free space to create the storage icon. Make 20 GB or more of free space available in the installation directory of the drive.
21542 005019	Clicking Start Service caused the error, and the service cannot start.	Two or more services cannot be executed simultaneously. Stop the service that started before starting the other service.
21542 005026	Clicking Start Service caused the error and the service cannot start.	The SVP IP address is invalid. At the top-right of the screen of the **Storage Device List** window, click SVP IP Address. In the **Change SVP IP**

Message ID	Description	Recovery Action
		Address window, set the IP address of the SVP, and then retry Start Service.
21542 005026	The status of the service changed to `Error` after rebooting the SVP with the Start-up service set to `Auto`. The **Service Status** window shows the error, and the Status field shows `BASE`.	The SVP IP address is invalid. At the top-right of the screen of the **Storage Device List** window, click SVP IP Address. In the **Change SVP IP Address** window, set the IP address of the SVP, and then retry Start Service.
21041-006002	Clicking the storage system in the **Storage Device List** window caused the error, and Hitachi Device Manager - Storage Navigator cannot start.	The default browser is not defined. Specify your browser as the default browser (refer to the documentation for your browser) and retry.
21041-006005	Starting the Storage Device List caused the error, and the Storage Device List cannot start.	Failed to connect to the Supervisor service (`DKCMan/MAPPAppServer/MAPPWebServer`). Select Control Panel > Administrative Tools > Services in Windows, and confirm that the DKCMan, MAPPAppServer, and MAPPWebServer services started. Start the Storage Device List again. If the status of DKCMan, MAPPAppServer, and MAPPWebServer did not start, right-click the service and select Start, or reboot the SVP.

Dump tool

About the Dump tool

Use the Dump tool to collect Hitachi Device Manager - Storage Navigator configuration information.

You can use the collected dump files:

- Before deleting the storage management software.
- To collect the dump files from the SVP.
- To troubleshoot using Device Manager - Storage Navigator.
- To check the Device Manager - Storage Navigator configuration. In Device Manager - Storage Navigator, click File > Refresh All to update the configuration information, and then use the Dump tool to collect dump files.

The Dump tool has two files.

- `Dump_Normal.bat` collects dump files containing information about the SVP and minimum information about the storage system. Use

this tool when there is no fatal error, such as a problem with accessing Device Manager - Storage Navigator.

- `Dump_Detail_bat` collects detailed dump files and contains comprehensive information about the storage system in addition to the contents of the normal dump file. Use this tool if you cannot start Device Manager - Storage Navigator or to check for problems with the storage system.

Using the Dump tool

Prerequisites

- The client PC must be connected to the SVP using the Remote Desktop Connection.
- No other user should be using the Dump tool.
- No maintenance operation is being performed.

Procedure

1. Close all Hitachi Device Manager - Storage Navigator sessions on the SVP.
2. On the SVP, exit to a Windows command prompt as Administrator.
3. Change to the directory where the Dump tool is located.
   For example, **`C:\Mapp\wk\83xxxxxxx\DKC200\mp\pc`** where **`83xxxxxxx`** is the DKC serial number.
4. Specify the output folder for the dump file (for example, **`C:\Mapp\wk\83xxxxxxx\DKC200\tmp`**) as an output destination, and then execute **`Dump_Normal.bat`** or **`Dump_Detail.bat`**.
5. When the completion message appears, close the command prompt.
6. Under the output destination folder, check that the following files are created.:
   - `hdcp.tgz` = dump file
     `zSv_AutoDump.log` = dump tool log file. If the dump file was not created, give this log file to your administrator. Otherwise, delete the log file.
7. Exit the command prompt.

Collecting dump files manually

If you cannot use the Dump tool or the Dump tool fails, collect the following dump files manually.

Note: In the following list:

- `installDir` = the SVP installation directory (for example, `C:\Mapp`).
- `%USERPROFILE%` = the installation login user of the SVP (for example, `C:\Users\<user name>`).

- %WINDIR% = the Windows folder in the system drive (for example, C:\Windows).

```
<installDir>\wk\supervisor\dkcman\log\*.*
<installDir>\wk\supervisor\dkcman\cnf\*.*
<installDir>\wk\supervisor\rmiserver\log\*.*
<installDir>\wk\supervisor\rmiserver\cnf\*.*
<installDir>\wk\supervisor\sdlist\log\*.*
<installDir>\wk\supervisor\mappiniset\logs\MappIniSet\*.*
<installDir>\OSS\apache\logs\*.log
<installDir>\OSS\apache\logs\ssl\*.log
<installDir>\OSS\jetty\logs\*.log
%USERPROFILE%\AppData\LocalLow\Sun\Java\Deployment\log
%WINDIR%\system32\config\SysEvent.Evt
%WINDIR%\system32\config\SecEvent.Evt
%WINDIR%\system32\config\AppEvent.Evt
%WINDIR%\minidump\*.dmp
%WINDIR%\System32\Winevt\Logs\Application.evtx
%WINDIR%\System32\Winevt\Logs\Security.evtx
%WINDIR%\System32\Winevt\Logs\System.evtx
%WINDIR%\system32\drivers\etc\HOSTS*
%WINDIR%\system32\drivers\etc\services*
%WINDIR%\minidump\*.dmp
c:\SetupTrace\*.*
```

Troubleshooting the maintenance utility

JavaScript security

The **Maintenance Utility** window opens, but it is blank, even after one or more minutes elapse.

Use the following procedure to add the **Maintenance Utility** window to the trusted sites, and then open the **Maintenance Utility** window again.

Procedure

1. In Internet Explorer, select **Tools > Internet Options** and select the **Security** tab.
2. Click **Trusted Sites > Sites**.
3. Clear the **Require server verification (https:) for all sites in this zone** check box.
4. Enter the IP address of controller 1 to **Add this website to the zone** and click **Add**.
5. Add the IP address of controller 2 using the same method.
6. Click **Close**.
7. When returning to the **Internet Options** window, click **OK** to close the window.

Compatibility view

Contents displayed in the **Maintenance Utility** window may be corrupted. Exclude the maintenance utility from the compatibility view target. In Internet Explorer, check the Compatibility View on the address bar. In Internet Explorer versions 10 and earlier:

Procedure

1. Select **Tools > Compatibility View setting**.
2. Clear the **Display intranet sites in Compatibility View** and the **Display all websites in Compatibility View** check box.
3. Click **Close**.

Clearing the browser cache

In the unlikely event that the login to the **Maintenance Utility** window fails, or the **Maintenance Utility** window opens but is blank, even after one or more minutes elapse, clear the browser cache and open the **Maintenance Utility** window again.

Refreshing the Maintenance Utility window

Images are not displayed properly in the **Maintenance Utility** window.

In the unlikely event that images do not appear properly in the **Maintenance Utility** window, refresh the browser.

Procedure

1. Log out of the maintenance utility.
2. Press the `Ctl` key and the `F5` key at the same time to perform a manual refresh.

Maintenance Utility window freezes

Window freezes when performing maintenance utility operations.

In the unlikely event the **Maintenance Utility** window freezes ("hangs") when performing operations, perform the following procedure:

Procedure

1. Check that the network between the SVP and the storage system is operating properly.
2. Log out of the **Maintenance Utility** window, and then log in again.
3. If the message **System Locked** appears, click **System Locked** to unlock the system.

Turning the storage system on or off using the maintenance utility

In the unlikely event the SVP will not run or it cannot connect to the storage system, you can power on and off the storage system using the maintenance utility.

Prerequisites

- The breaker is turned on.
- The amber POWER LED on the storage system is on.

Procedure

1. Start the browser on the client PC.
2. In the browser address bar, enter the address of controller 1, and press **Enter**.
   The login window opens.
3. Log in.
   The **Maintenance Utility** window opens.
4. To power on the storage system, select **Power Management > Power on Storage System**. When the confirmation message appears, click **Submit**.
5. To power off the storage system, select **Power Management > Power off Storage System**. When the confirmation message appears, click **Submit**.

iSCSI troubleshooting

The following list summarizes issues associated with iSCSI configurations.

- Is the link status of the host LAN port normal?

- Check the power status of the network peripherals (switches, routers, NICs, and other devices) between the storage system and the host.
- Its power being supplied to devices, are the devices turned on, and are all cables to devices connected securely to the appropriate connectors?
- If the LAN cable is connected loosely, secure it.
- Does the port transfer speed of the HBA, switch, or NIC connected to the storage system match the transfer speed of the storage system configured in Storage Navigator?
- Match the transfer speeds between the storage system (configured in Hitachi Device Manager - Storage Navigator) and the customer device.
- Check the following:
  - VLANs
  - Firewall settings
  - Level 3 switches and routers
  - Installing and configuring host iSCSI drivers
- Confirm that IPsec is turned off at the host storage system port.
- Are the IP address, subnet mask, default gateway, and MTU value for each storage system and host set properly for the network over which they communicate? The MTU value must be the same as all the devices (host, switches, storage systems, and so on) in the LAN environment.
  When connecting using an IPv6 address, check whether the IPv6 address, subnet mask, default gateway, and MTU value are configured appropriately for the network. Check the address status of the IPv6 address.
- Does the host recognize the iSCSI driver? Can the host log into the target using the appropriate IP address and iSCSI name?
- Is the storage system TCP port number set correctly for the host?
- Are discovery and login performed by the host?
- If using an iSNS server, is the IP address of the iSNS server set correctly for the host and storage system? Can the iSNS server register the IP address, iSCSI name, and other information for new iSCSI devices?
- If using CHAP authorization, is the CHAP user (initiator) registered for the storage system port? If not, register them.
- If using initiator authentication (part of CHAP authentication), is the target name (for example, [000:T000]) registered on the storage system for the CHAP user? If not, use Device Manager - Storage Navigatorto assign a target name to the CHAP user of the initiator.
- If using bidirectional CHAP authentication, are the user name and target secret set appropriately for the host?
- If using target security by unlocking the LUN Manager function, does the HBA iSCSI name appear in the list of iSCSI initiators assigned to the storage system target? If not, use Device Manager - Storage Navigator to assign the HBA iSCSI name to the target.

Check these items		Description
Are the values of the IPv6 address and the default gateway address of the iSCSI port to be connected set correctly?		The IPv6 address and default gateway of the iSCSI Port are generated automatically. When set manually, select a suitable value for the environment.
Display the address status of the IPv6 address for the iSCSI port.	`Confirming`	IPv6 is checking whether other hosts and addresses in the network connection are not duplicated. Confirm the transition.
	`Enabled`	The IPv6 address of the iSCSI port is not duplicated and set correctly. The address is in normal status.
	`Disabled`	The iSCSI port is in `Link Down` status. When using an IPv6 address with an iSCSI port, check that the cable is connected correctly.
	`Duplicated`	The IPv6 address for the iSCSI port is the same as the address of other hosts in the network connection. Set the unassigned IPv6 address manually.
	`Not confirmed`	The IPv6 address of the iSCSI port is the same as other addresses on the same iSCSI port. Set the unassigned IPv6 address on the iSCSI port manually.
Is the value of the MTU size set correctly?		The IPv6 Link MTU size shows the MTU size current value on the network. If the Link MTU size and the MTU size for an iSCSI port are different, the MTU size of the host or the router or switch is different from the storage system. Set the MTU sizes to the same value.
Is the IPv6 address of the remote pass setting on the IPv6 address set correctly?		Set IPv6 address to the appropriate setting at the local and remote paths of the iSCSI port.
Is the prefix set as IPv6 Global Address in a server correct?		When IPv6 Global Address is set to two or more interfaces in

Check these items	Description
	a Linux system, set the IPv6 address with different prefix.

SVP troubleshooting

When the user-supplied management console PC is connected to the SVP via Remote Desktop, you can turn off or reboot the SVP.

Powering off the SVP

Procedure

1. From a management console PC, connect to the SVP using Windows Remote Desktop Connection.
2. On the SVP, click **Start** in Windows desktop.
3. From the displayed menu, click **Windows Security**.
4. In the **Windows Security** window, click the option in the power (up arrow) menu.
5. From the displayed menu, click **Shut down**.
   The SVP power and POWER LED go off.

Rebooting the SVP

Procedure

1. From a management console PC, connect to the SVP using Windows Remote Desktop Connection.
2. On the SVP, click **Start** in Windows desktop.
3. From the displayed menu, click **Windows Security**.
4. In the **Windows Security** window, click the up arrow option in the power menu:



5. From the displayed menu, click **Reboot**.

Backing up the SVP configuration

In the unlikely event the SVP fails and needs to be replaced, back up the SVP configuration file to a USB flash drive before returning the failed SVP. When you receive the replacement SVP, you can use the USB flash drive to restore

the previous configuration on the new SVP. This procedure assumes that the client PC is connected to the SVP using a Remote Desktop connection.

When you back up the SVP configuration, the following items are backed up:

- Parameters set in the Hitachi Device Manager - Storage Navigator Environment window
- Connection setting to the authentication server
- Connection setting to the key management server
- Password policy for backing up the encryption key on the client PC
- Window view setting (table width) in Device Manager - Storage Navigator
- Warning message in the Device Manager - Storage Navigator login window
- Device Manager - Storage Navigator task information
- SMI-S application settings
- HTTPS and SMI-S SSL certificates, and RM

To back up the SVP configuration:

Procedure

1. From a management console PC, connect to the SVP using Windows Remote Desktop Connection.
2. Close all Device Manager - Storage Navigator sessions on the SVP.
3. On the SVP, exit to a Windows command prompt as Administrator.
4. Move to the directory where the tool exists, and then issue the following command:

   ```
   C:\MAPP\wk\Supervisor\MappIniSet\MappBackup.bat [absolute path of the backup (tgz zip) file]
   ```
5. When the completion message appears, press any key to continue.
6. Exit the command prompt.
7. Move the configuration file from the SVP to a USB flash drive.



Note: Do not edit the contents of the backup file.

Restoring the SVP configuration

If you backed up the SVP configuration, you can use the following procedure to restore the configuration. This procedure is particularly useful when you receive a replacement SVP and want to install a configuration that was used on your previous SVP.

This procedure assumes that:

- The client PC is connected to the SVP using a Remote Desktop Connection.
- The storage system you want to restore is registered on the SVP.
- The service setting is configured to not start automatically when the SVP reboots.

To restore the SVP configuration:

Procedure

1. Copy the backup file to a folder on the SVP.
2. On the SVP, exit to a Windows command prompt as Administrator.
3. Move to the directory where the backup file exists, and then issue the following command:

   ```
   C:\MAPP\wk\Supervisor\MappIniSet\MappRestore.bat [absolute path of the backup (tgz zip) file]
   ```
4. When the restoration message appears, press any key to continue.
5. Exit the command prompt.
6. Atach a USB flash drive to a USB port on the SVP, and then move the backup file from the SVP to the USB flash drive.
7. Configure the service setting to start automatically the next time the SVP reboots, and then reboot the SVP.

Changing the SVP IP address

You can change the IP address for the SVP using the Microsoft Windows Embedded Standard 7 operating system on the SVP or the Storage Device List.

Changing the SVP IP address in Windows 7

Use this procedure so long as no storage system has been registered on the SVP, or the storage system service has not been started.

Procedure

1. From a management console PC, connect to the SVP using Windows Remote Desktop Connection.
2. On the SVP, click **Start > Control PanelNetwork and Sharing Center**.
3. Click **Change adapter settings**.
4. Click a network for which you want to set an IP address, and then set the IP address.

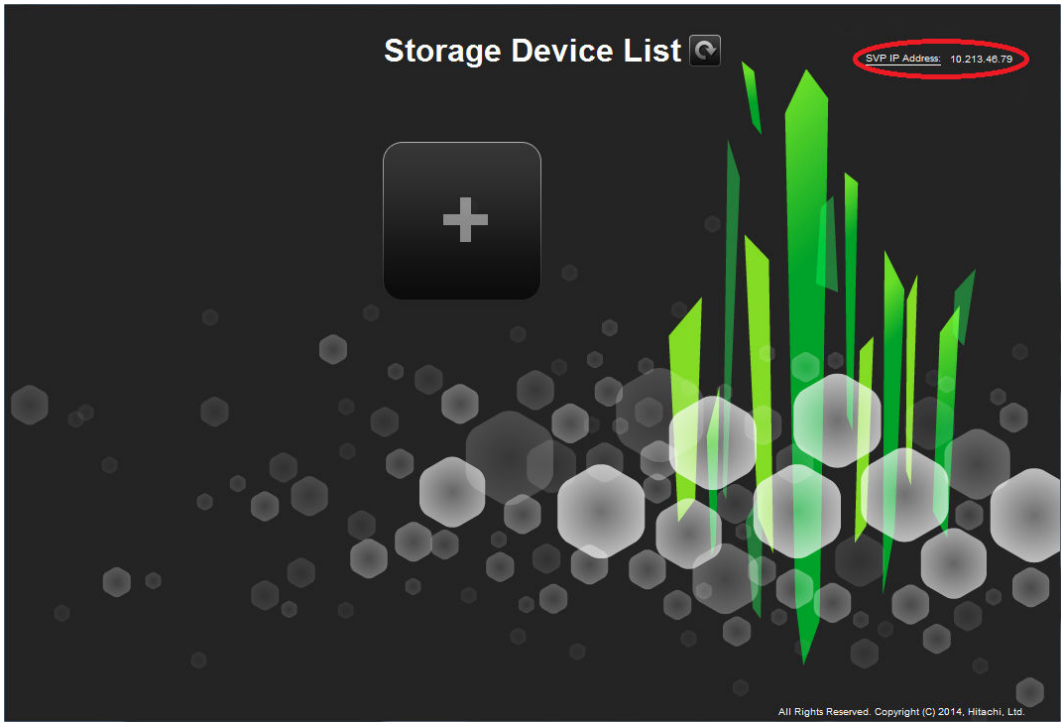
Changing the SVP IP address using the Storage Device List

To use this procedure, there must be no storage system registered on the SVP or the storage system service must not have been started.

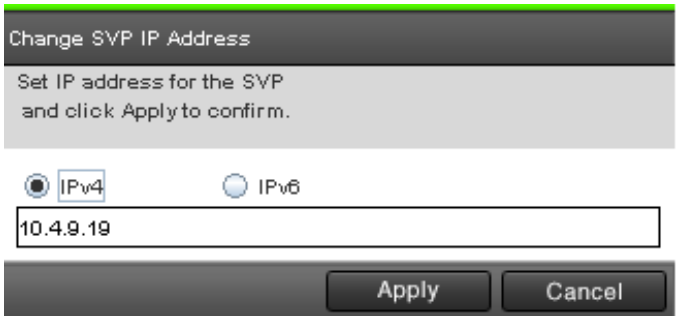
Procedure

1. If you have not connected a management console PC to the SVP using Windows Remote Desktop Connection, do so now.
2. On the SVP, click **Start > All Programs > Hitachi Device Manager-Storage Navigator > StorageDeviceList**.
   The **Storage Device List** window opens.

3. Click **SVP IP Address** at the top-right side of the window.



The **Change SVP IP Address** window appears.



4. Click an IP addressing method (**IPv4** or **IPv6**).
5. Enter the new IP address of the SVP.
6. Click **Apply**.

Blocking communications to port 80

The following procedure describes how to block HTTP communications to the SVP using port 80.

Procedure

1. Close all Device Manager - Storage Navigator sessions on the SVP.

2. Using a management console PC attached to the SVP, connect to the SVP using Windows Remote Desktop Client.
3. On the SVP, exit to a Windows command prompt as Administrator.
4. Move to the directory where the block file exists, and then issue the following command:

   ```
   C:\MAPP\wk\Supervisor\MappIniSet\MappHttpBlock.bat
   ```
5. When the completion message appears, press any key to continue.
6. Exit the command prompt.

Postrequisites

To unblock port 80, repeat this procedure, but issue the following command in step 3:

C:\MAPP\wk\Supervisor\MappIniSet\MappHttpRelease.bat

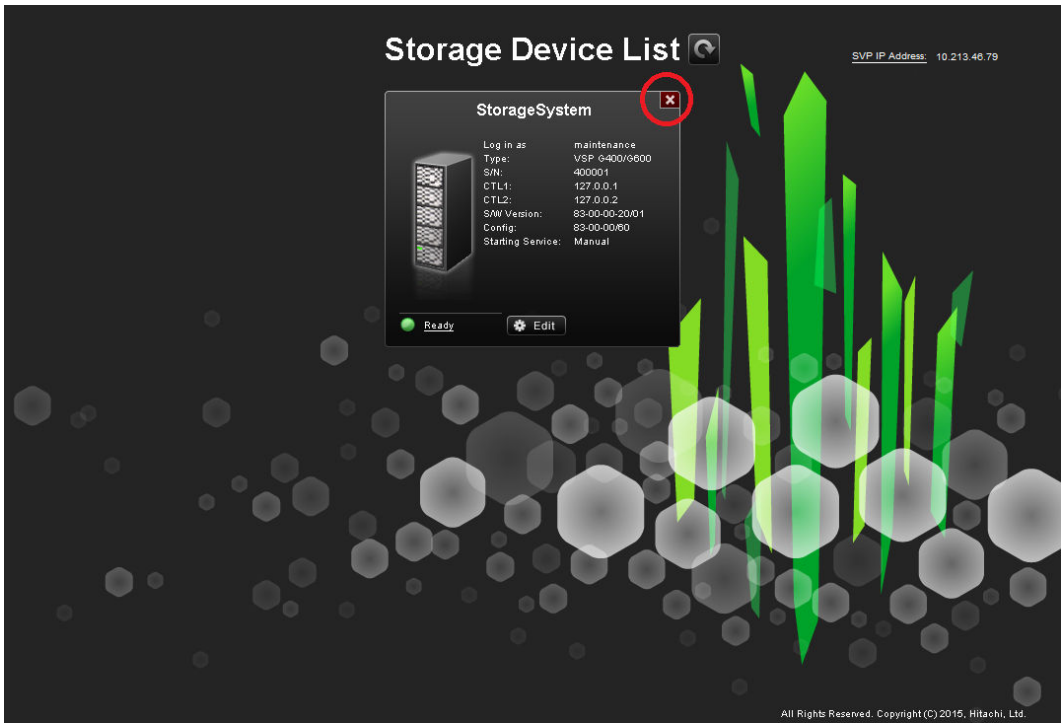
Deleting the registered storage system

Use the following procedure in the unlikely event you need to delete the registered storage system from the SVP.

Procedure

1. From a management console PC, connect to the SVP using Windows Remote Desktop Connection.
2. Stop the SVP service (see Stopping the SVP service on page 192).
3. On the SVP desktop, double-click the **Open StorageDeviceList** icon. The **Storage Device List** window opens.

4. In the **Storage Device List** window, click **x** for the storage system that you want to delete.



Registering the storage system on the SVP

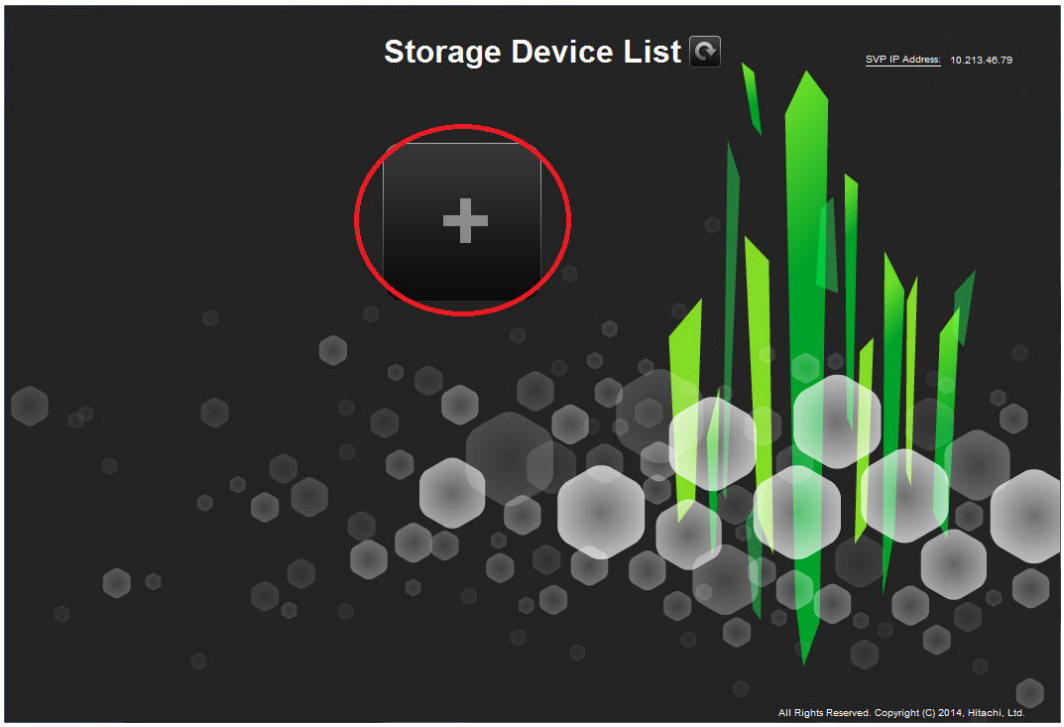
If you delete the registered storage system from the SVP, use this procedure to register the storage system with the SVP.

You register the storage system using the Storage Device List.

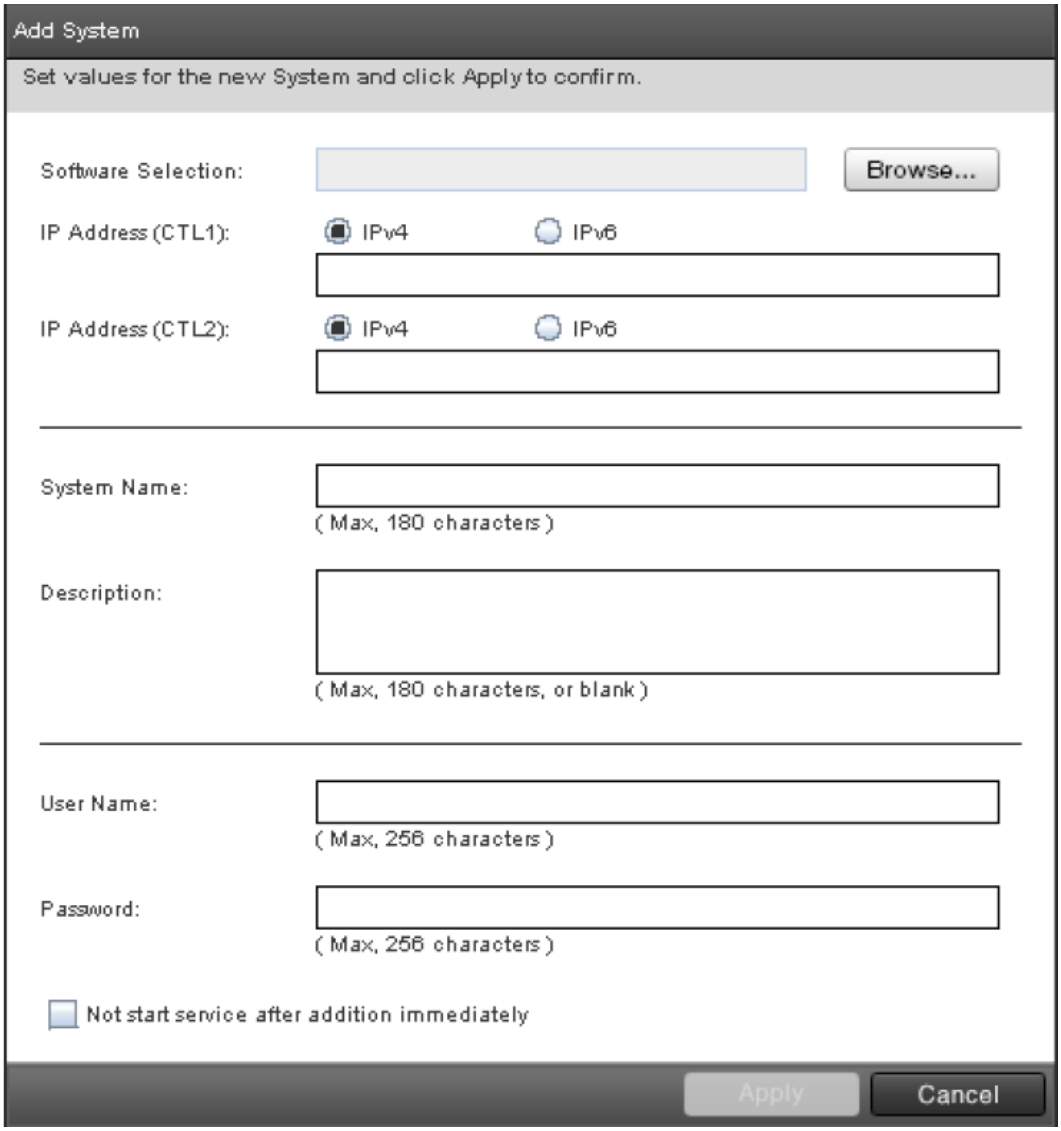
Procedure

1. From a management console PC, connect to the SVP using Windows Remote Desktop Connection.
2. On the SVP, click **Start > All Programs > Hitachi Device Manager-Storage Navigator > StorageDeviceList**.

3. Click the plus sign in the center of the window.
   The **Add System** window appears.



4. Complete the fields in the **Add System** window.

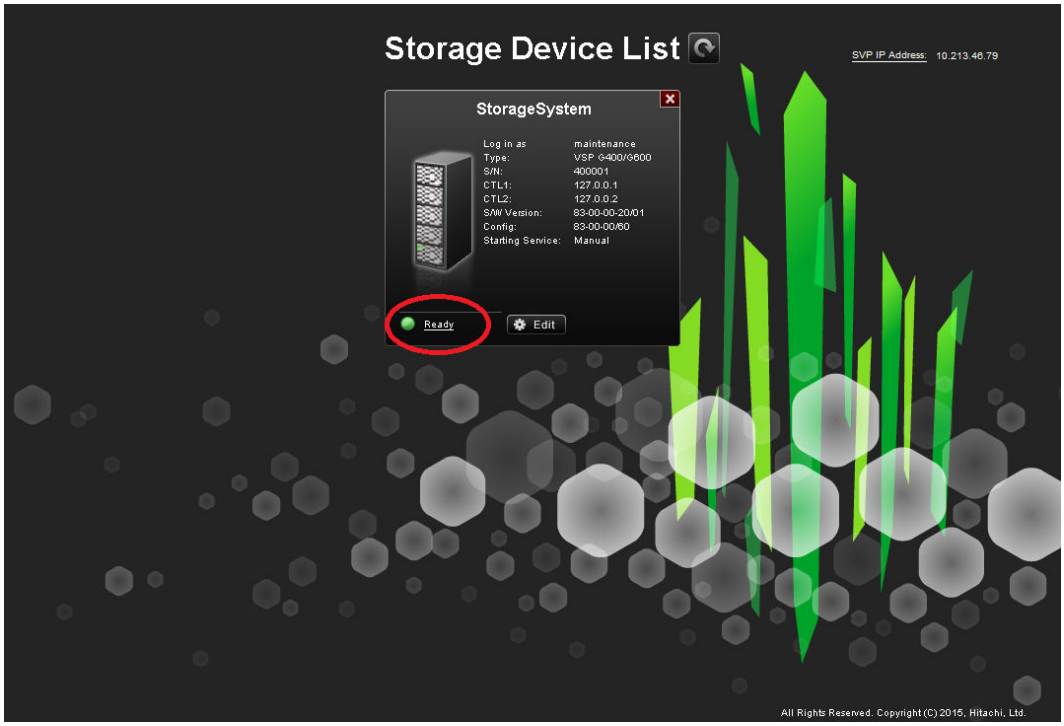


Field	Description
Software Selection	Click Browse and select the installation media, which ends in a `.inf` extension.
IP Address (CTL 1)	Enter the IP address for controller 1. Accept the default IPv4 setting or select IPv6, and then enter the IP address in the appropriate format for the addressing method selected.
IP Address (CTL 2)	Enter the IP address for controller 2. Accept the default IPv4 setting or select IPv6, and

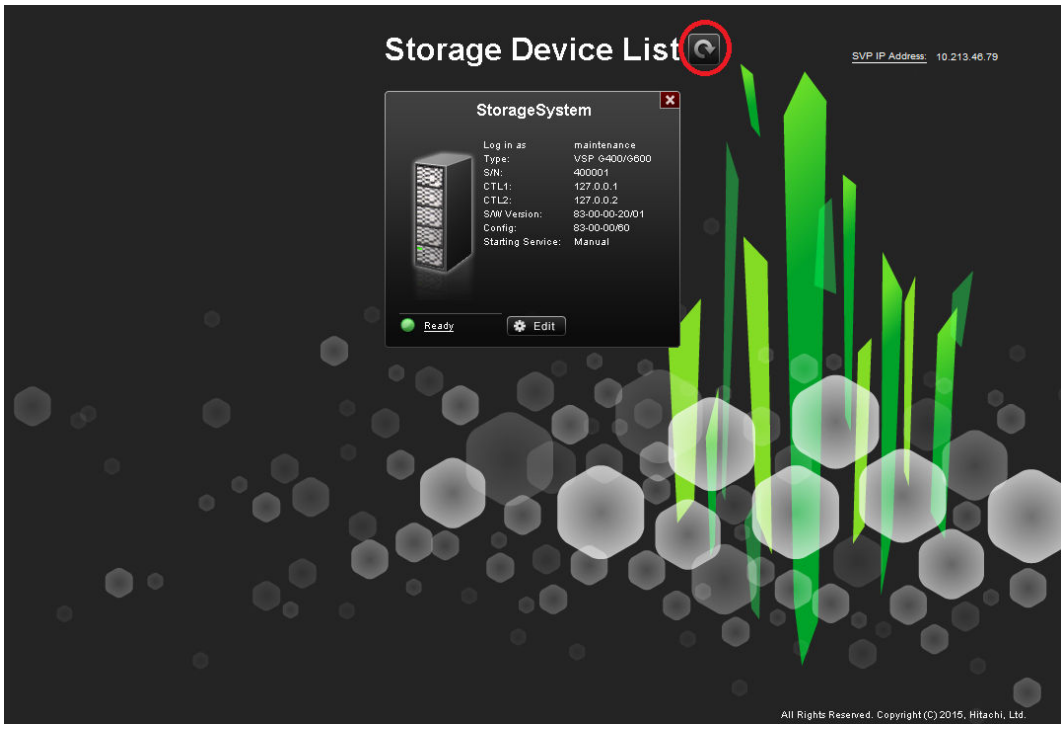
Field	Description
	then enter the IP address in the appropriate format for the addressing method selected.
System Name	Enter the display name of the storage system, up to 180 characters.
Description	Enter the description of the storage system, up to 180 characters.
User Name	Enter a user name, up to 256 characters. Permitted characters are alphanumeric characters and the following: (# $ % & ' * + - . / = ? @ ^ _ ` { | } ~)
Password	Enter a password, from 6 to 256 characters.

5. Click **Apply**.
   The confirmation window appears and the registered storage system appears in the **Storage Device List** window.
6. Reboot the SVP (see Rebooting the SVP on page 129).
7. After the SVP reboots, click **Start > All Programs > Hitachi Device Manager-Storage Navigator > StorageDeviceList**.

8. Wait for the storage system status becomes **Ready**.



Note: If the storage system status does not become **Ready**, click **Refresh**.



If an error message appears, see Troubleshooting Storage Navigator on page 121.

About working with firewalls

A firewall's main purpose is to block incoming unsolicited connection attempts to your network. If the storage system is used within an environment that uses a firewall, there will be times when the storage system's outbound connections will need to traverse the firewall.

The storage system's incoming indication ports are ephemeral, with the system randomly selecting the first available open port that is not being used by another TCP application. To permit outbound connections from the storage system, you must either disable the firewall or create or revise a source-based firewall rule (not a port-based rule) so that items coming from the storage system are allowed to traverse the firewall.

A firewall can also interfere when upgrading the storage system software. Software upgrades on the storage system are FTP connections, where the host computer acts as a server and the software acts as the client. In these roles, the host listens for a storage system's software upgrade request on an FTP socket and then makes an incoming connection to the storage system. The firewall must permit this incoming socket for the upgrade to succeed.

The following table lists the ports used by the storage system and Hitachi Device Manager - Storage Navigator. We suggest you create or revise your source-based firewall rules and policies to accommodate outbound connections to the storage system via these ports.

Port	Description
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).
28355	TCP (Device Manager - Storage Navigator: Secure)
161	UDP (SNMP uses this port to send traps from the storage system)
23015	Web browser
23016	Web browser using SSL
10995	TCP Device Manager - Storage Navigator and Hitachi suite components)

Note: For outgoing traffic from the storage system's management port, there are no fixed port numbers (ports are ephemeral), so all ports should be open for traffic from the storage system management port. The storage system iSCSI data ports use port 3260 (standard iSCSI port) only.

Configuring the audit log

The audit log is a file that contains a history of the operations performed on the storage system and the person that performed them.

Audit log files

Audit log files are stored in the SVP or the storage system, and can be exported.

SVP audit logs

When non-transferred logs are accumulated, the icon shown in the top right of the Device Manager - Storage Navigator main window changes.

- : Number of saved lines is below the threshold.
- : Number of saved lines exceeds the threshold, but the data is still being saved.
- : Number of saved lines exceeds the maximum, and data is partly lost because the oldest lines were overwritten by the newest lines.

The threshold of 70% of the maximum stored capacity of the audit logs. If the audit log file reaches the maximum capacity, files with the oldest data are overwritten by the newest data.

Storage system logs

When non-transferred logs are accumulated, a SIM is generated.

- **Reference code (0x7d03xx):** Number of accumulated logs reached the threshold.
- **Reference code (0x7d04xx):** Some audit logs were overwritten and some data are lost because the file is full.

Observe the following:

- **xx=00:** An event occurred on the controller 1 side.
- **xx=01:** An event occurred on the controller 2 side.

Note: The capacity of the audit logs that can be stored at the SVP or storage system is limited. When the audit log file reaches the maximum capacity, the oldest data is overwritten by the newest data. For this reason, we recommend you transfer the audit logs to the Syslog server.

When audit logs are not transferred or the Syslog server is not used

If audit logs are not transferred due to a LAN failure, the logs are accumulated, and either an icon shows the accumulated status in the window or a SIM is generated. If the Syslog server is not used, the logs are accumulated as a non-transferred log; however, the icon showing the accumulated status in the window does not change and a SIM is not generated.

Audit log storage location	Maximum storage capacity (maximum number of stored rows)	When non-transferred logs are accumulated
SVP	250,000 rows	• : Number of saved lines is below the threshold. • : Number of saved lines exceeds the threshold, but the data is still being saved. • : Number of saved lines exceeds the maximum, and data is partly lost because the oldest lines were overwritten by the newest lines.
Storage system	1,000 rows	A SIM is generated. • Reference code (0x7d03xx): The number of accumulated logs reaches the threshold. See Note.

Audit log storage location	Maximum storage capacity (maximum number of stored rows)	When non-transferred logs are accumulated
		• Reference code (0x7d04xx, see Note): Some audit logs are overwritten and some data are lost because the file is full.

Note: The threshold is 70% of the maximum stored capacity of the audit logs. When the audit log file reaches the maximum capacity, the oldest data is lost as it is overwritten by the newest data (wrap around). `xx=00` indicates an event occurred on the CTL1 side.

`xx=01` indicates an event occurred on the CTL2 side.

Perform the following when non-transferred logs are accumulated.

- Export non-transferred logs. All stored audit logs including transferred logs are exported in this operation. The operation window to be used depends on where the audit logs are stored. For the procedure to export operation, see the related items.

Type or contents of audit log	Storage place	Exporting operation window
• Operations set by the Device Manager - Storage Navigator client computer (Except operations in the **Maintenance Utility** menu. • Operations and events on encryption keys for encrypting stored data. • Execution logs of Remote Maintenance API, • Commands that the storage system received from a host or computers using RAID Manager.	SVP	**Audit Log Properties** window
• Maintenance utility operations • Maintenance operations by the service personnel	Storage system	**Audit Log Settings** window

Eliminate the cause of the transfer failure to the Syslog server, and then perform a test transfer of syslogs to confirm that the transmission is recovered. Audit logs generated during the transfer failure are not retransferred.

Exporting audit log files

All stored audit logs, including transferred logs, are exported in this operation. The operation window you use depends on where the audit logs are stored.

Type of audit log	Location	Window to export
• Operations set in the Device Manager - Storage Navigator (management server). • Operations and events on encryption keys for encrypting stored data. • Execution logs of remote maintenance API. • Commands that the storage system received from the host or RAID Manager.	SVP	Audit Log properties window
• Operations set in the Device Manager - Storage Navigator (except operations in the maintenance utility). • Operations configured by the SVP.	Storage system	Audit Log Settings window

Exporting audit log files stored from the SVP

To export the audit log files stored in the SVP:

Procedure

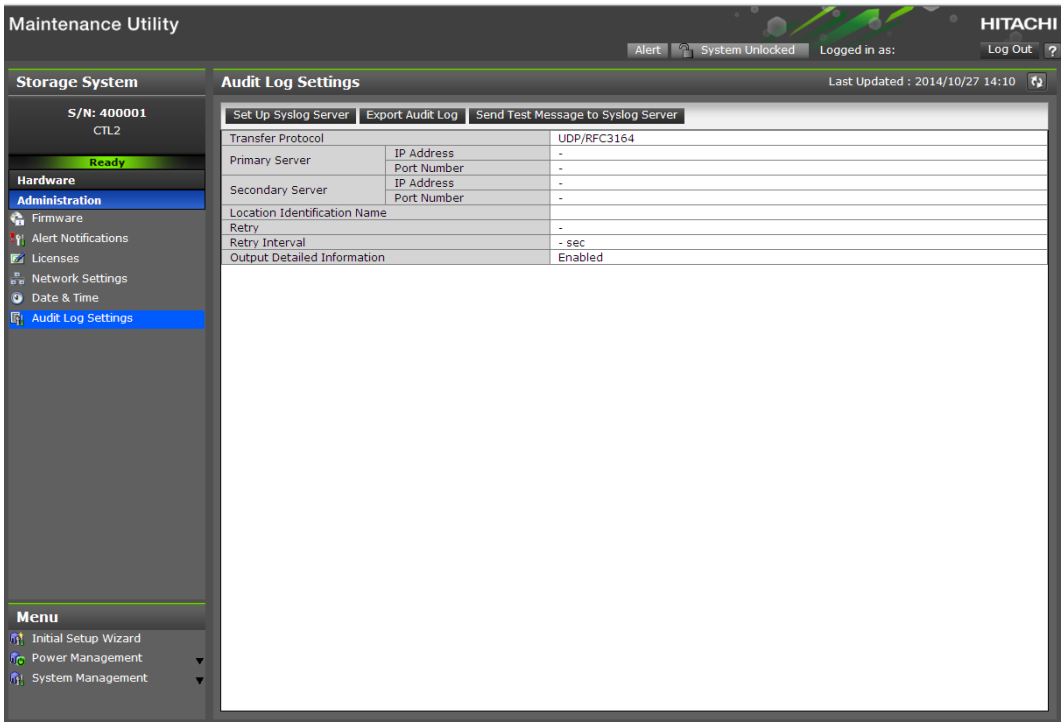
1. In the Hitachi Device Manager - Storage Navigator main window, click **Audit Log** on the menu bar.
   The Audit Log Properties window opens.
2. Expand the tree, and then right-click the target storage system. Select **Other functions**.
3. In the Device Manager - Storage Navigator main window, click **Audit Log** on the menu bar.
   The icons on the menu bar show the accumulated status of the audit log files.
4. From the **Audit Log Properties** window, click **Download (SVP)** to export logs operated by the Device Manager - Storage Navigator client computer (SVP window), or **Download (DKC)** to export commands sent from a host or computers using RAID Manager or logs of events on encryption keys.
   The preparation message appears.
5. Click **OK**.
   A window opens where you can specify the export destination.
6. Specify the export destination and file name, and then click **Save**.

7. Click **Close**.

Exporting audit log files from the storage system

Procedure

1. In the Hitachi Device Manager - Storage Navigator main window, click the **Resources**tab.
2. Expand the tree, and then right-click the target storage system and click **Other Functions**.
3. From the **Maintenance Utility** menu, click **Audit Log Settings**.



4. Click **Export Audit Log** in the **Audit Log Settings** window.
   A window opens where you can specify the export destination.
5. Specify a destination for the file and file name, and then click **Save**.

6

Adding components

- Guidelines when adding optional components
- Procedures for adding optional components
- Conditions when adding optional components
- Starting the maintenance utiility
- Adding disk drives
- Adding cache memory
- Shared memory
- Front end module
- Small form factor pluggable
- Adding drive trays

Guidelines when adding optional components

Observe the following guidelines before adding optional components to storage systems.

- To avoid the chance of losing data in the event you make a mistake while adding an optional component, back up all user data at the host before performing the procedures in this chapter.
- When a procedure involves replacing a mock ("dummy") drive, perform the procedure with the storage system power on and complete the procedure within 10 minutes.
- Do not add optional components while the storage system is being started.
- Before performing the procedures in this chapter, collect simple trace information (refer to the *Hitachi Virtual Storage Platform G200 Hardware Service Guide*) if the storage system will be returned to the original state after the optional work.

Procedures for adding optional components

The following sections summarize the procedures for addition optional components to the storage system. You can add optional components with the storage system power turned on or off.

Adding optional components with power applied

The summarized steps below are associated with adding optional components when power is applied to the storage system.

Procedure

1. Unpack the optional components.
2. Optional: add drives.
3. Mount the storage system on a rack.
4. Connect cables.
5. Use the service PC to:
   - Check restoration of system information.
   - Set a spare drive
   - Set RAID and volume(s)
   - Set volume recognition

   The system copy takes approximately 1.5 minutes to complete for each drive.
6. Prepare the uninterruptible power supply (UPS), if required.
7. Optional: add the front end modules.
8. Install the host.
9. Close the front bezel after the operation.

Conditions when adding optional components

Observe the conditions in the following sections when adding optional components.

Conditions when adding drive trays

Note: Data is exchanged between a host and the storage system.

Model name	Specification	Minimum requirements	Condition
			Power online and host is operating
DW-F800-DBS or DW-F800-DBSC	A G400 or G600 storage system and basic accessories to be mounted on a rack.	Two drives and up to 7 SFF drive trays.	Supported
DW-F800-DBL or DW-F800-DBLC	A storage system and basic accessories to be mounted on a rack.	Two drives and up to 7 LFF drive trays.	Supported
DW-F800-DBF	A storage system and basic accessories to be mounted on a rack.	Two drives and up to 7 SFF drive trays.	Supported

Optional components that can be added

Conditions when adding drives

Note: Data is exchanged between a host and the storage system.

Note: Drive capacity values are calculated as 1 Gb = 1,000,000,000 bytes. If your PC calculates 1 kilobyte as 1,024 bytes, the capacity indication will be different. The RAID group capacity values displayed in the Hitachi Device Manager - Storage Navigator are calculated as 1 KB = 1,024 bytes.

Requirements: Select from the drives shown in the following table according to the intended total capacity of the storage system.

Sixteen spare drives can be set up in CBSS or CBSL.

Conditions vary, depending on the storage system to be added.

Model name	Specification
DKC-F810I-200MEM	200-GB, 2.5-inch, MLC, 12-Gbps flash drive
DKC-F810I-300KCM	300-GB, 2.5-inch, 15kmin^{-1}, 6-Gbps SAS drive (contains BNST)
DKC-F810I-300KCMC	300-GB, 2.5-inch, 15kmin^{-1}, 6-Gbps SAS drive
DKC-F810I-400MEM	400-GB, 2.5-inch, MLC, 12-Gbps flash drive
DKC-F810I-600JCM	600-GB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)
DKC-F810I-600JCMC	600-GB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive
DKC-F810I-600KGM	600-GB, 2.5-inch, 15kmin^{-1}, 12-Gbps SAS drive
DKC-F810I-1R2JCM	1.2-TB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)
DKC-F810I-1R2JCMC	1.2-TB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive
DKC-F810I-400M6M	400-GB, 3.5-inch, MLC, 12-Gbps flash drive
DKC-F810I-1R2J5M	1.2-TB, 3.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)
DKC-F810I-1R2J5MC	1.2-TB, 3.5-inch, 10kmin^{-1}, 6-Gbps SAS drive
DKC-F810I-4R0H3M	4-TB, 7.2K, 3.5-inch, 7200min^{-1}, 6-Gbps SAS drive (contains BNST)
DKC-F810I-4R0H3MC	4-TB, 7.2K, 3.5-inch, 7200min^{-1}, 6-Gbps SAS drive
DKC-F810I-6R0H9M	6-TB, 7.2K, 3.5-inch, 7200min^{-1}, 12-Gbps SAS drive

Conditions for adding cache memory

Requirements: Install cache memory of the same capacity in controllers 1 and 2.

Adding cache memory is not supported when the power is online and host is operating. Add cache memory only when the storage system is powered off.

Model name	Specification
DKC-F810I-CM8G	Cache memory (8 GB)
DKC-F810I-CM16G	Cache memory (16 GB)
DKC-F810I-CM32G	Cache memory (32 GB)

Conditions for adding Fibre Channel front end module

Requirements:

- Install the front end module after removing the dummy board from the controller.
- Front end module type must correspond to the slot type.

Installation of the fibre channel front end module can be done with the storage system is on or off.

Model name	Specification
DW-F800-4HF8	8 Gbps Fibre Channel
DW-F800-2HF16	16 Gbps Fibre Channel

Conditions for adding iSCSI front end module

Requirements:
- Install the front end module after removing the dummy board from the controller.
- Front end module type must correspond to the slot type.

Installation of the iSCSI front end module can be done with the storage system is on or off.

Model name	Specification
DW-F800-2HS10S	10 Gbps SFP iSCSI

Conditions for adding small form-factor pluggable

Installation of the SFP can be done with the storage system is on or off.

Model name	Specification
DKC-F810I-1PL8	SFP for 8 Gbps Longwave
DKC-F810I-1PS8	SFP for 8 Gbps Shortwave
DKC-F810I-1PL16	SFP for 16 Gbps Longwave
DKC-F810I-1PS16	SFP for 16 Gbps Shortwave

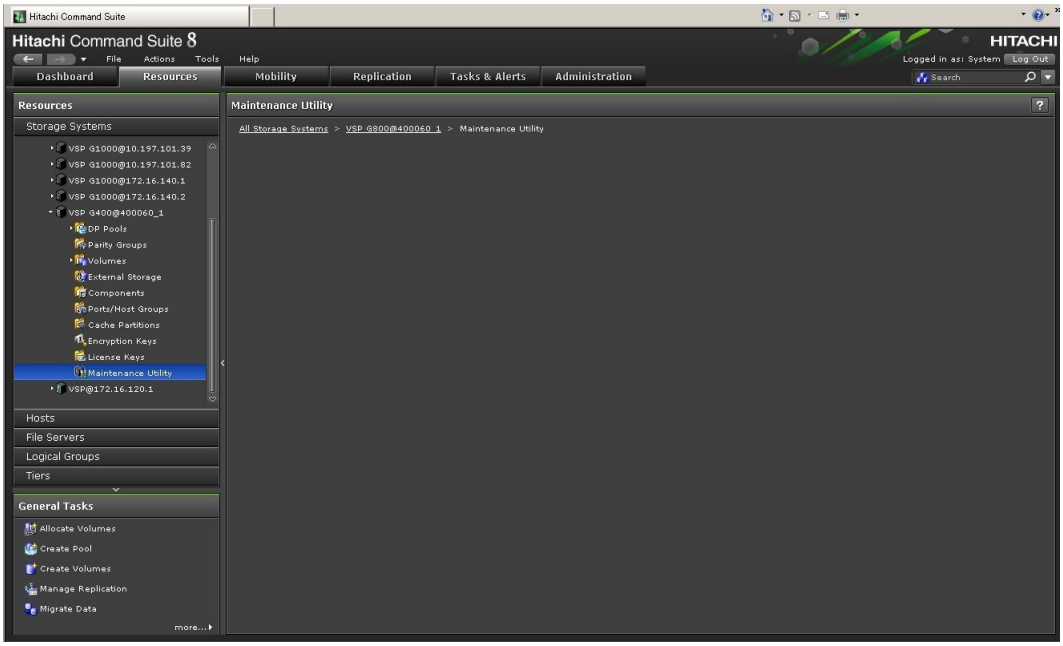
Starting the maintenance utiility

You can start the maintenance utility from Hitachi Command Suite or Hitachi Device Manager - Storage Navigator.

Starting the maintenance utility from Hitachi Command Suite

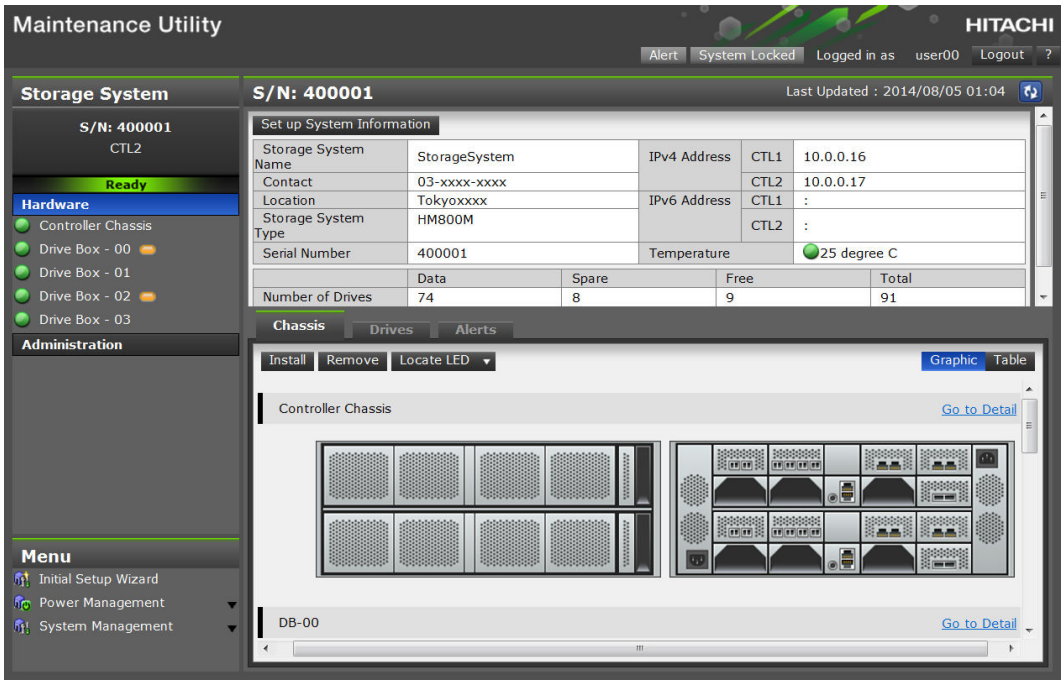
Procedure

1. Start Hitachi Command Suite.



2. In the **Hitachi Command Suite** main window, click the **Resources** tab, and then click **Storage Systems** from the tree view.
3. Expand the tree, and then right-click a storage system and click **Other Functions**.

4. In Hitachi Device Manager - Storage Navigator, click the **Maintenance Utility** menu, and then click **Hardware** to start the maintenance utility.

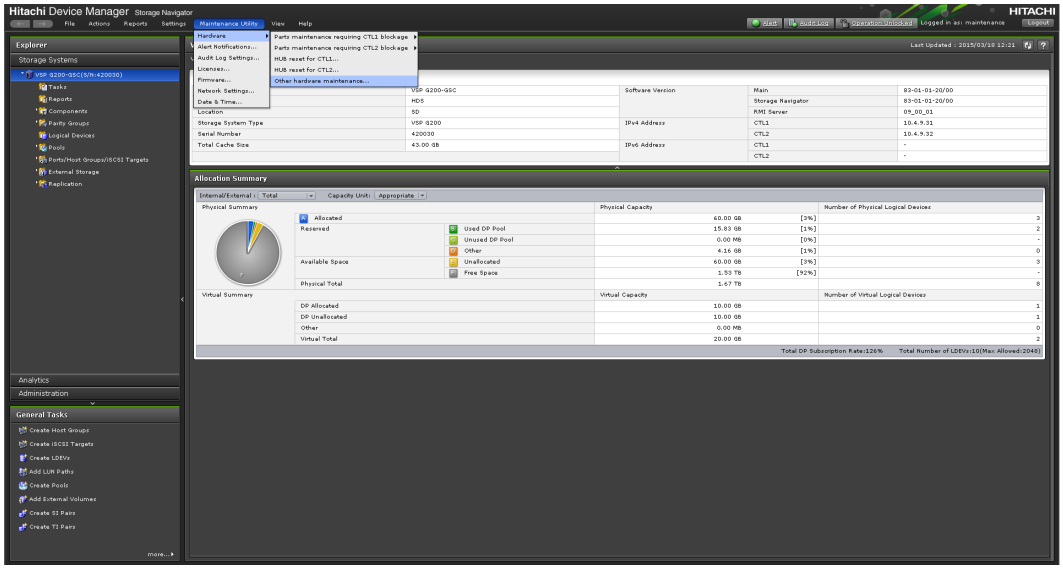


Starting the maintenance utility from Hitachi Device Manager - Storage Navigator

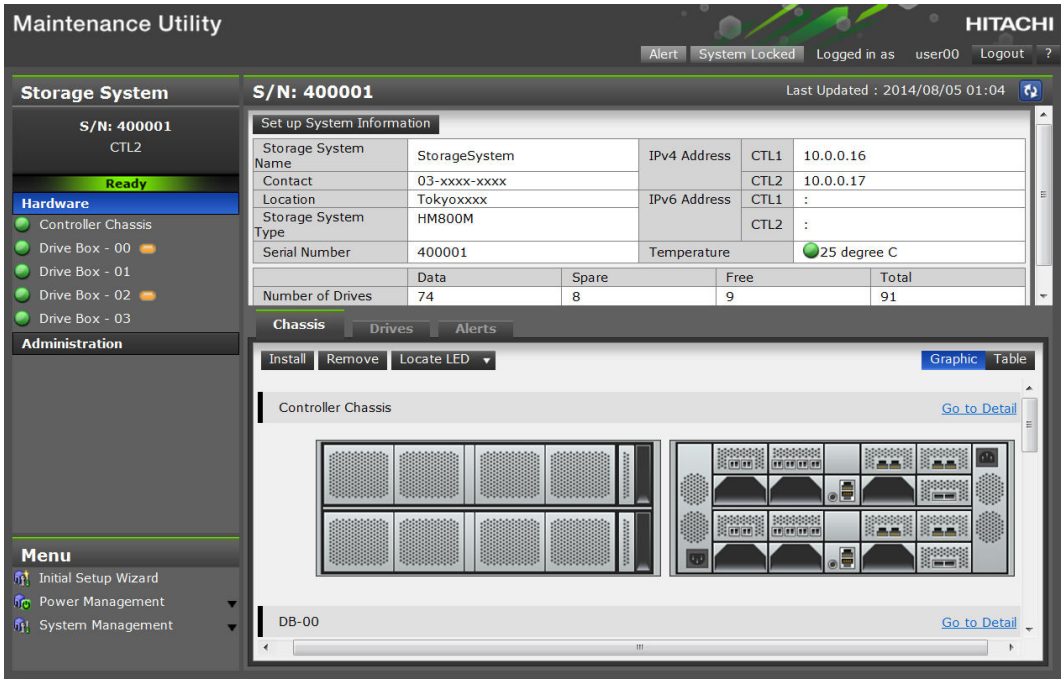
Procedure

1. Launch a web browser from the console PC connected to the SVP, and then start Device Manager - Storage Navigator.
2. Enter the following URL in the address field of your browser, and then press the Enter key: `http://[IP address of SVP]/module/sn2/0/index.do`
3. In the **Storage Device List** window, click the picture of the registered storage system.
4. Log in to Device Manager - Storage Navigator.

5. On the **Maintenance Utility** menu, click **Hardware > Other hardware maintenance** to start the maintenance utility.



Note: If a message reports a problem with the website's security, click **Continue to this website (not recommended)**.



Adding disk drives

The procedure you use to add drives depends on the drive's location and whether the storage system is powered on or off.

Exercise care to use the appropriate procedure; otherwise, user data could be lost.

Replacing a drive for the dense intermix drive tray

Facing the front of the chassis, drive numbering is #0 to #59, from the bottom left to the top right.

When dealing with a dense intermix drive tray:

- Be mindful of other workers nearby.
- Exercise care when removing or storing the dense intermix drive tray.
- Do not pull out multiple dense intermix drive trays at one time because the rack can fall over.
- Do not put objects on a dense intermix drive tray you removed from the rack.
- Do not use the dense intermix drive tray as working space because the rack can fall over.

Prerequisites

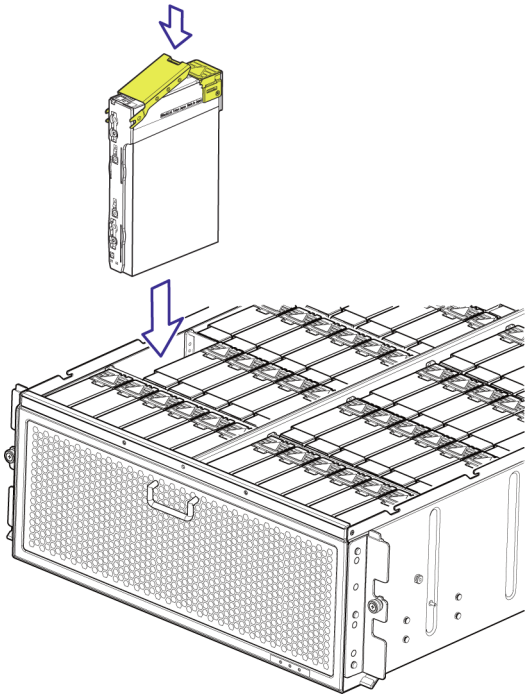
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.
- The red `ALM` LED for the drive to be replaced is on.

Procedure

1. Remove the dense intermix drive tray from the rack and remove the top cover and bezel.
2. Pull up the stopper of the drive handle toward you to release the lock.
3. Open the handle toward you, and then gently remove the drive to be replaced.

   Handle the drive with care.
4. Place the drive into the guide rail and slide it gently in the direction of the arrow.

5. Push the drive until a click indicates it has locked in place.



6. In the maintenance utility, click **Hardware > Controller Chassis** or **Hardware > Drive Box**.
7. Click the **Drives** tab.
8. Confirm that the status of the drive to be replaced is `Normal`.

   If necessary, click **Refresh** at the top-right of the window to update the status in the window.
9. Confirm that the red `ALM` LED is off at the new drive.
10. Attach the front bezel, and then replace the dense intermix drive tray in the rack.

Adding drives to a SFF drive tray

Facing the front of the chassis, drive numbering in a chassis is #0 to #23, from the bottom left to the top right.

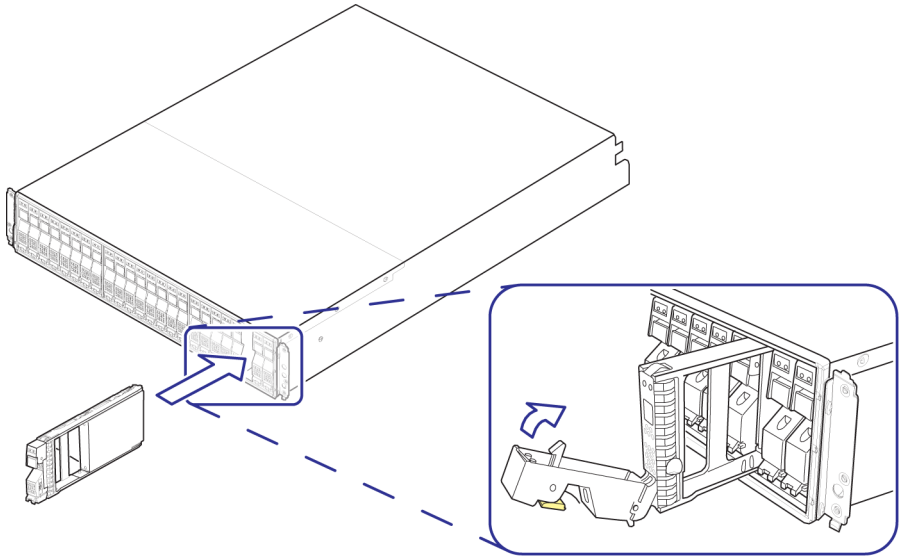
Prerequisites

- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.

Procedure

1. Remove the front bezel.
2. Pull up the stopper of the drive handle toward you to release the lock.
3. Open the handle toward you, and then pull out and remove the dummy drive.
4. Place the drive into the guide rail and slide it gently in the direction of the arrow.
5. Push the lower part of the drive until it reaches the position where the hook on the handle engages with the square hole on the frame.
6. Raise the stopper, which is tilted toward you, and then press the stopper to disengage the lock.

   If the handle is raised so the hook of the handle cannot enter into each hole, the drive cannot be installed properly because it is blocked by the frame of the storage system.



7. Attach the front bezel.

Adding drives to a LFF drive tray

Facing the front of the chassis, drive numbering in the chassis is #0 to #11, from the bottom left to the top right.

Prerequisites

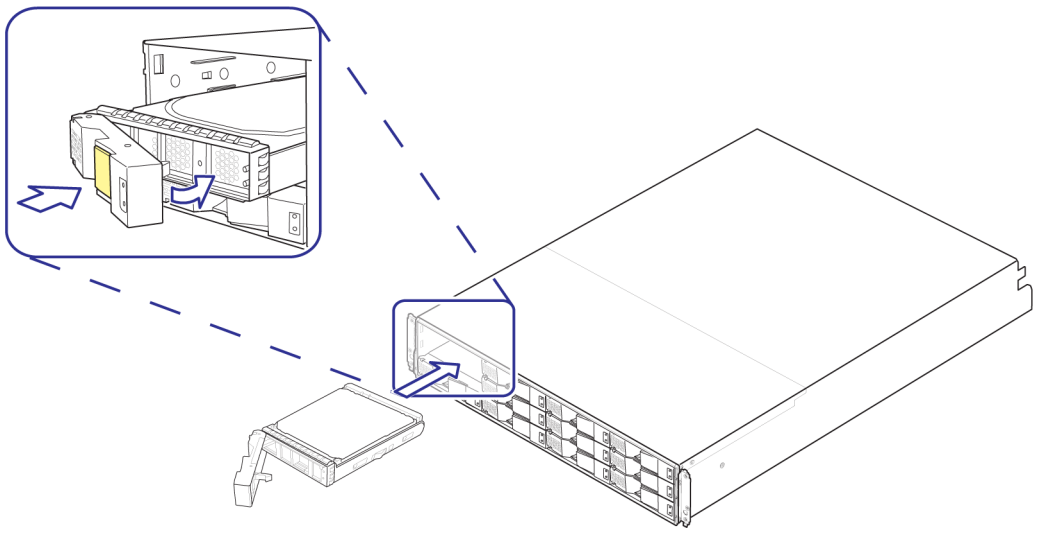
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.

Procedure

1. Remove the front bezel.
2. Pull up the stopper of the drive handle toward you to release the lock.
3. Open the handle toward you, and then pull out and remove the dummy drive.

   Hold the rail side of the drive because the shield spring is subject to breakage.
4. Place the drive into the guide rail and slide it gently in the direction of the arrow.
5. Push the lower part of the drive until it reaches the position where the hook on the handle engages with the square hole on the frame.
6. Pull the stopper lightly, close the handle, and then press the stopper to engage the lock.

   If the hook of the handle cannot enter the square hole, the drive cannot be installed properly because it gets blocked by the frame of the storage system.



7. Attach the front bezel.

Recognizing drives

Use the **Maintenance Utility** window to recognize the new drive you added.

Procedure

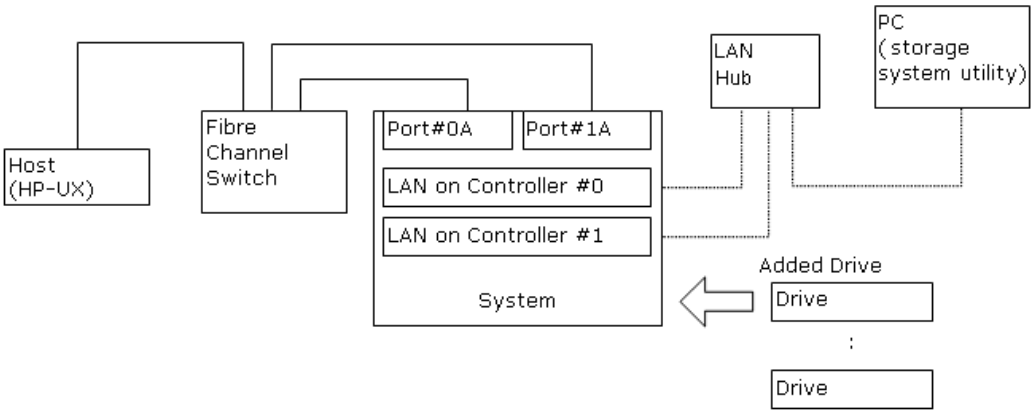
1. Start the maintenance utility.
2. In the **Maintenance Utility** window, select the controller chassis or drive tray in which the drives are added.
3. Click **Install**.
4. When the storage system detects the added drives, a window appears.

5. Check the slot positions where you added the new drive.
   a. If the positions are incorrect, re-install the drives in the correct positions.
   b. Click **Reload**.
   c. Check that the LEDs go off at the drives to be re-installed.
6. Mount all the drives to be added on the storage system and click **Install**. The storage system will recognize the added drive and displays a dialog box.
7. Click **Close** to close the completion message.
8. If the drive addition fails:
   a. Click **Close** on the completion message.
   b. Click **Refresh**.
   c. Click the **Drives** tab on the **Controller Chassis** window or the **Drive Box** window.
   d. Check the drive status.
9. Verify that the added drives and the storage system are operating normally.
10. Log out and close the maintenance utility.

    After adding drives, set parity groups, spare drive settings, logical device settings, and volume settings according to your requirements.

Configuring a host to recognize a volume with power on

The following example describes how an HP-UX host recognizes a newly added drive with storage system power on. In the following figure, the PC connected to the LAN has an installed version of Hitachi Device Manager - Storage Navigator.



Prerequisites

The host and storage system are in the READY status.

Procedure

1. Create a new RAID group for the installed drives.
2. Create one or more new volumes for the RAID group.
3. Format the volumes.
4. At the host:
   a. Issue the **`ioscan -nfC`** disk command to verify that the host recognizes the storage system.
      The status of the newly added volume appears as `NO-NW`.
   b. Issue the **`insf -e`** command to create a device file for the new volumes.
   c. Issue the **`ioscan -nfC`** disk command to verify that the host recognizes the storage system.
      The status of the new volume appears as `CLAIMED`.
   d. Create a file system by creating the volume group and logical volume for the newly added volume.

Result

The host can now use the new volumes.

Adding cache memory

Cache memory for Hitachi Virtual Storage Platform G200

Controller 1 and controller 2 must have the same capacity of cache memory installed. Cache memory modules come in 8 GB and 16 GB capacities.

The Hitachi Virtual Storage Platform G200 supports 32 GB or 64 GB of cache memory.

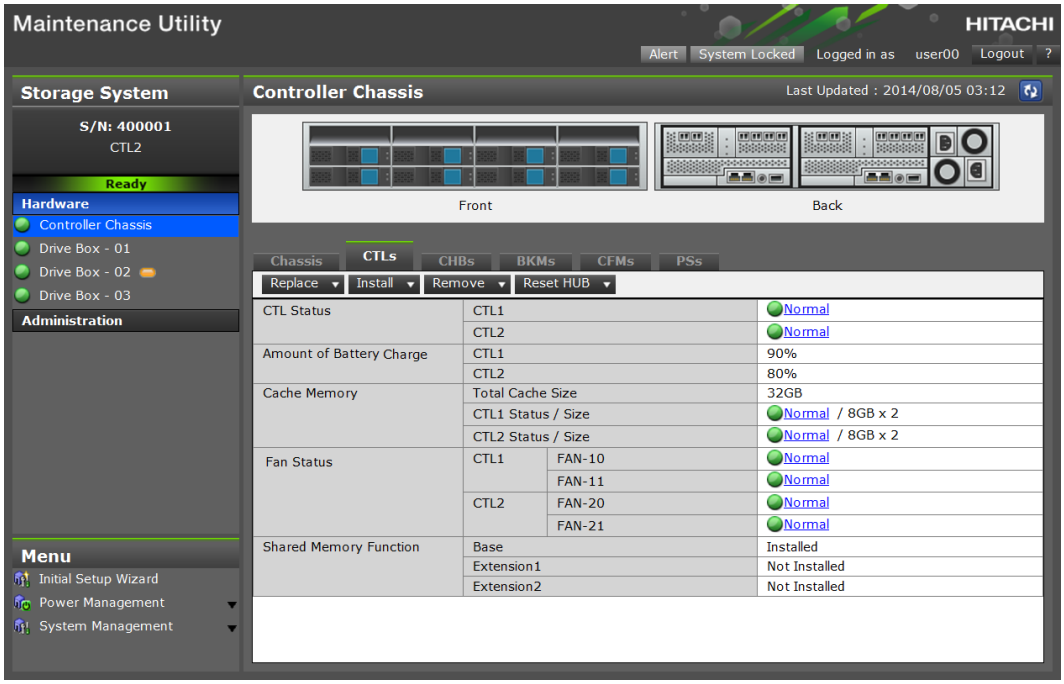
Cache memory capacity per system	Controller 1	Controller 2
32	8 GB x 2 (16 GB)	8 GB x 2 (16 GB)
64	16 GB x 2 (32 GB)	16 GB x 2 (32 GB)

Checking cache memory

Procedure

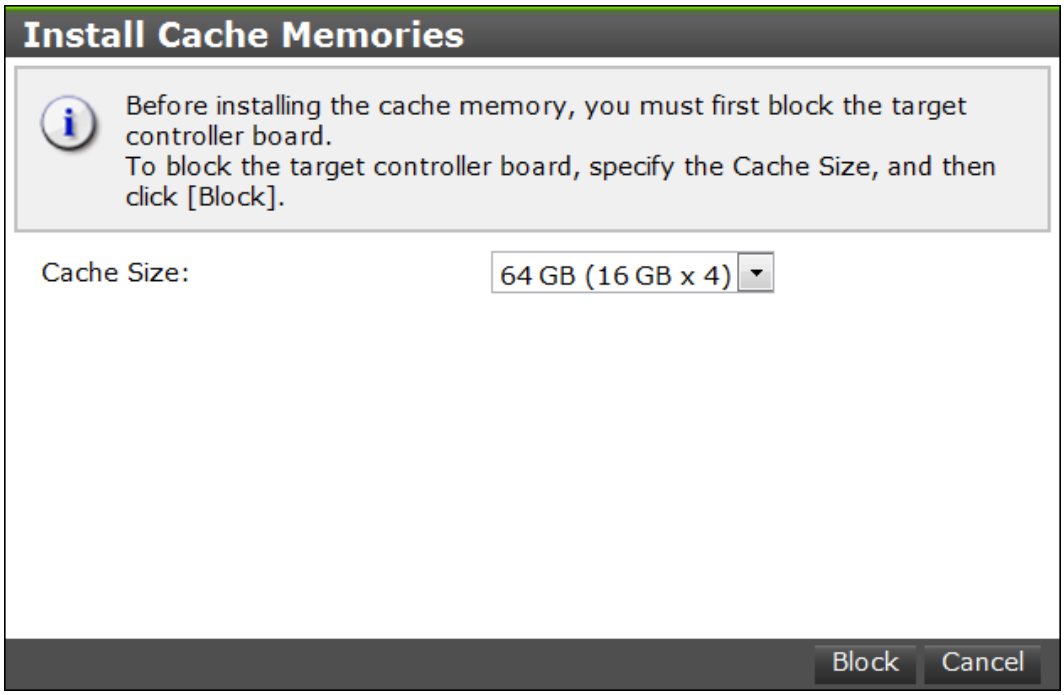
1. Start the maintenance utility.
2. Click **Hardware > Controller Chassis**.

3. Click the **CTLs** tab.

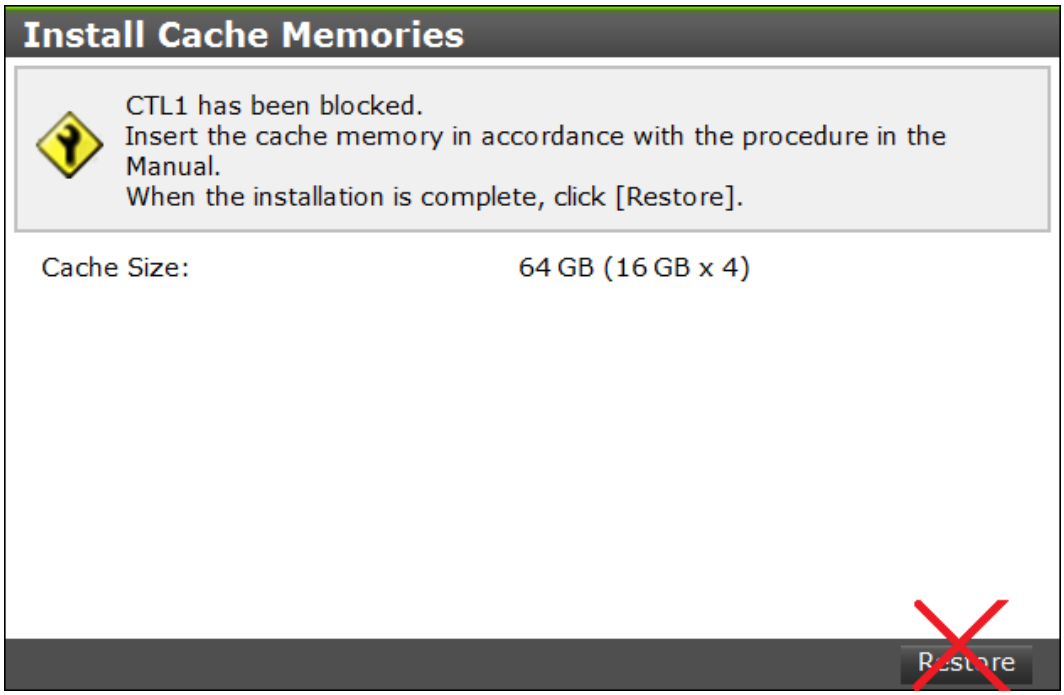


4. Verify the status and capacity of the installed cache memory.
5. Click **Install** list and select the controller where you want to add the cache memory.

6. When the Install Cache Memories page appears, specify the cache size that will be reached after you install the cache memory, and then click **Block**



7. Check that the controller is blocked and becomes ready for adding. Do not click **Restore**.



If the controller block fails, click **Close** on the completion message and click **Refresh**:  . Then click the **CTLs** tab on the Controller Chassis window and check the controller status.

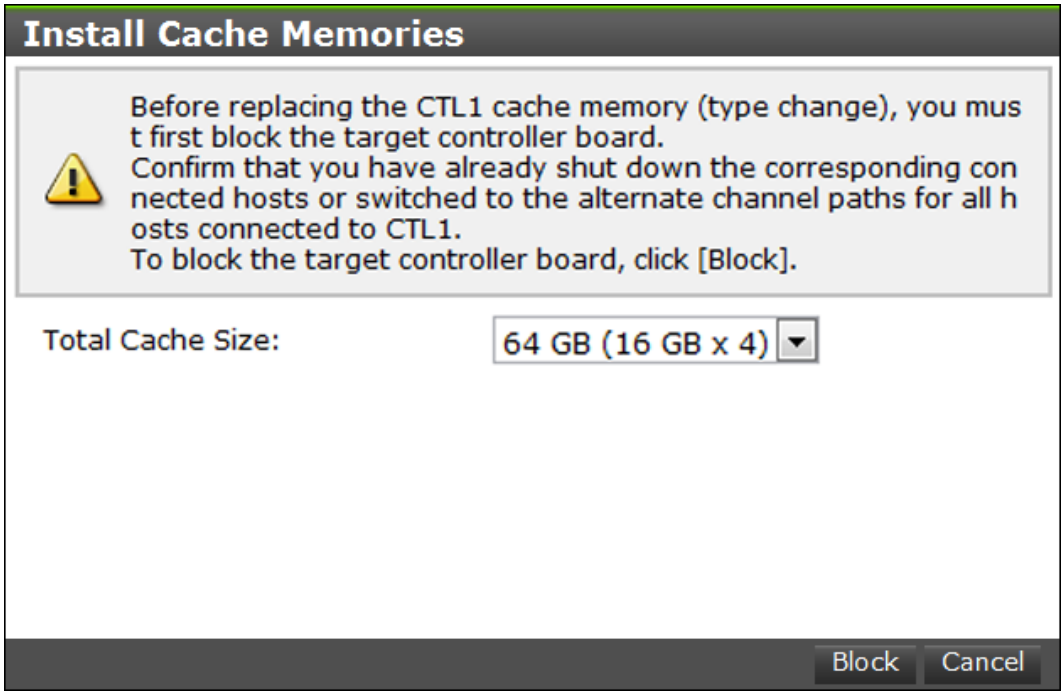
Blocking a controller

Blocking a controller is done within the maintenance utility.

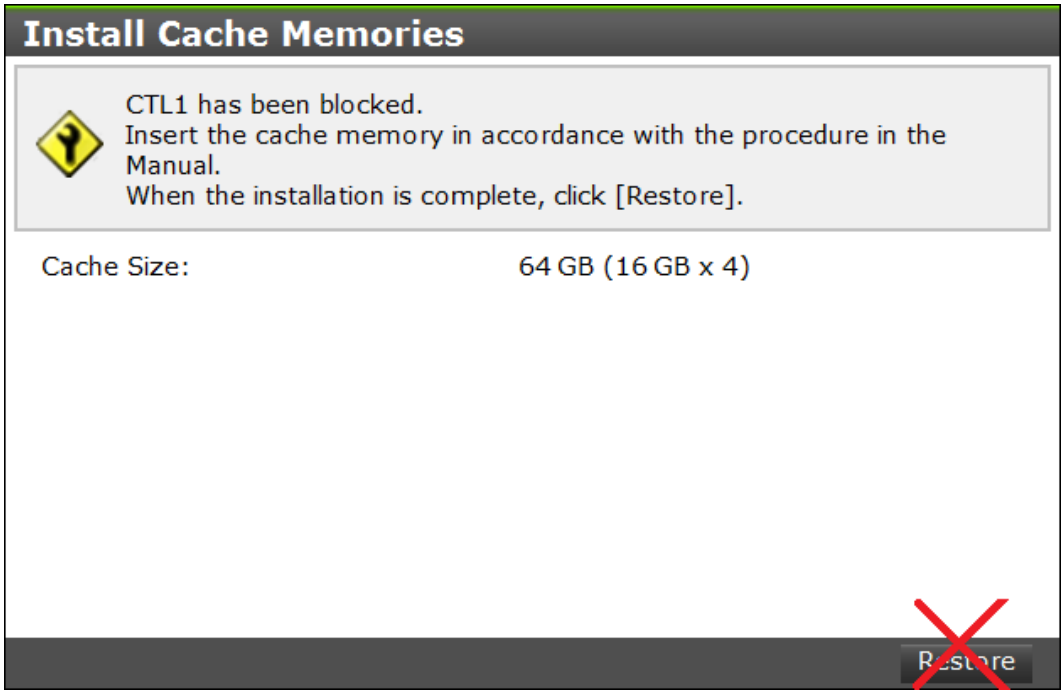
Procedure

1. Click the **Install** list and select the controller in which the cache memory will be added.
2. Specify how large the cache memory size will be after the cache memory is added.

3. Check the cache size, and then click **Block**.



4. Check that the controller is blocked and becomes ready for adding. Do not click **Restore**.



5. If the controller block fails:
   a. Click **Close** on the completion message.
   b. Click **Refresh**.
   c. Click the **CTLs** tab on the Controller Chassis window.
   d. Check the controller status.

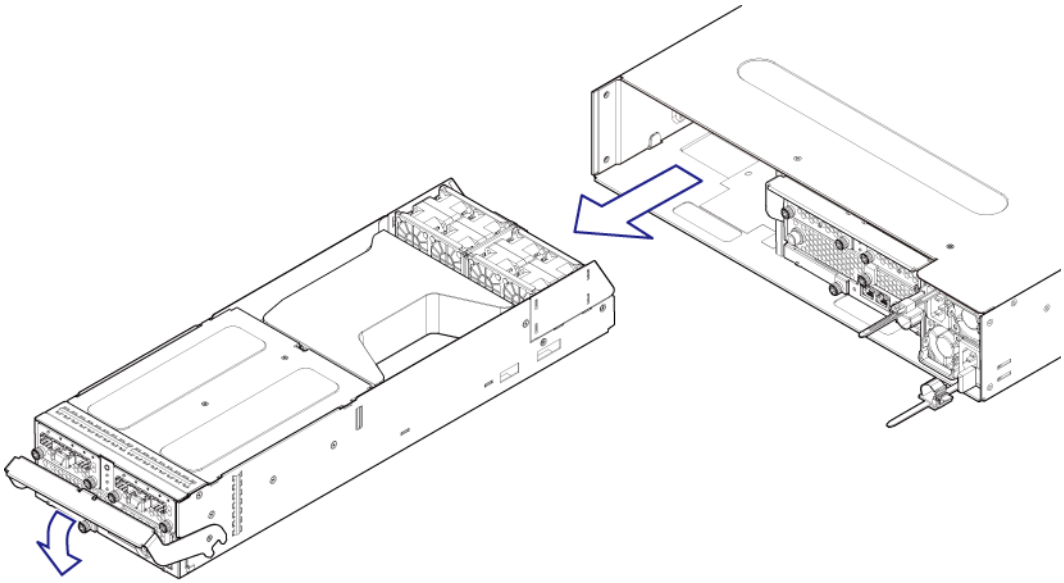
Adding cache memory to a CBSS or CBSL controller

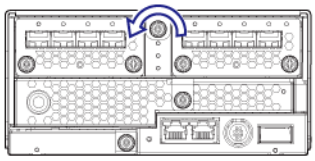
Cache memory must be installed in cache memory group 0 (standard).

Procedure

1. Remove all optical and SAS cables connected to the controller.
2. Loosen the blue screw that secures the controller and open the lever.
3. Gently remove the controller.

   When removing the controller, hold it with both hands and keep it straight to avoid touching the components above and below it.

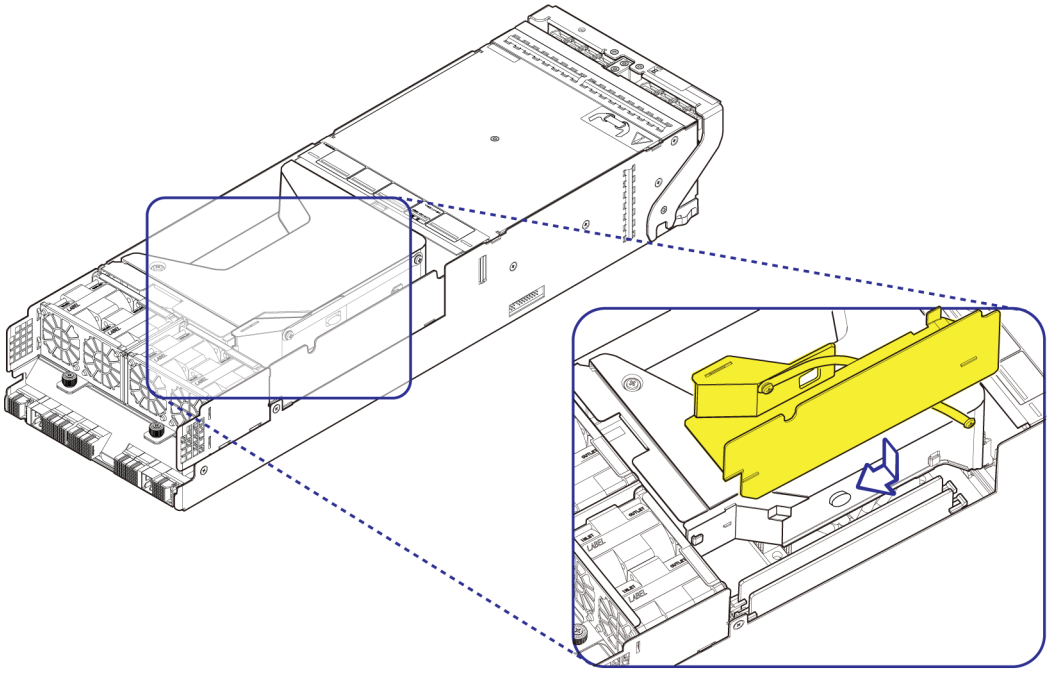




4. Press the button, and then slide the dual in-line memory module (DIMM) cover in the direction of the arrow and remove the DIMM cover from the hooks on either side.

5. Lift the DIMM cover gently to remove it.

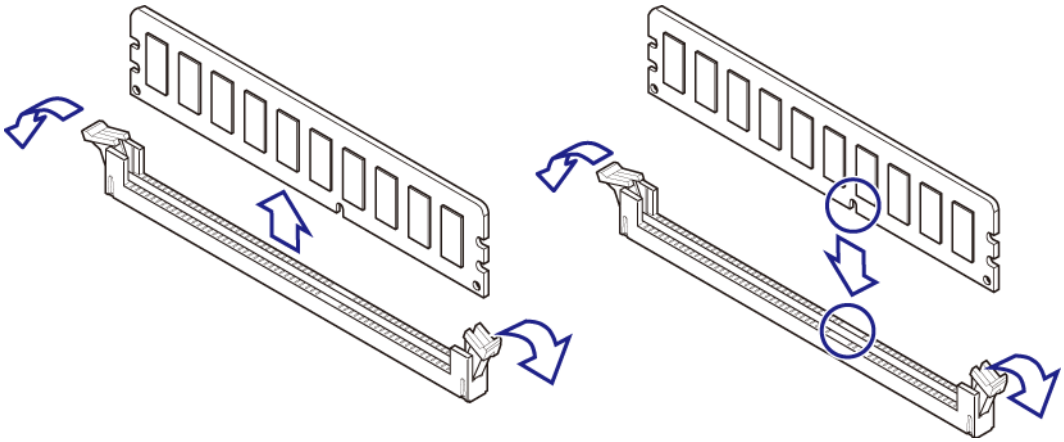
Note: The DIMM cover has a band that can be damaged easily. Exercise care when removing the DIMM cover.



6. Pull the lever outward.

7. Hold both ends of the cache memory, and then gently pull out the cache memory from the socket.

Note: Do not exert pressure on the cache memory. Otherwise, you can damage the printed-circuit board.



8. Align the notch on the cache memory board with the projection inside the slot.
9. Holding both ends of the cache memory, insert it into the socket.
10. Confirm that the lever is securing the cache memory.
11. To install the DIMM cover, slide it in the direction of the arrow. Confirm that the DIMM cover is secured by the two hooks on either side.
12. Confirm that the connector of the controller is not damaged, deformed, or dusty.
13. With the right and left levers of the controller opened completely, insert it into the slot of the controller.
14. Push the controller in all the way.

    The right and left levers close completely.
15. Tighten the blue screw to secure the controller.
16. Connect all the optical and SAS cables removed from the controller.

Restoring cache memory

Procedure

1. At the **Replace Cache Memories** window, click **Restore**.
   A progress bar shows the replacement status.

Note: The restore operation can take up to 20 minutes to complete. If a message states that the recovery failed, go to the HDS Support Portal at https://portal.hds.com.

2. When the progress bar goes away and the completion message appears, click **Close**.
3. Click **CTLs** tab and confirm that all status conditions are `Normal`.

   If necessary, click **Refresh** at the top-right of the window to update the status in the window.
4. Log out and close the **Maintenance Utility** window.

Shared memory

The same capacity of shared memory must be installed in controller 1 and controller 2.

Required shared memory capacity is determined by the storage application being used. In the following table:

- **NO:** The functions and storage applications in the table cannot be used.
- **YES:** The functions and storage applications in the table can be used.

To configure the storage system to use the shared memory capacity in the table, configure the shared memory setting in the maintenance utility. Storage applications may require a license before they can be used.

Note: Volume Migration is included in Hitachi Tiered Storage Manager.

Shared memory function	Hitachi storage application					ShadowImage or Volume Migration Extension		TrueCopy or Universal Replicator Extension		Dynamic Provisioning, Dynamic Tiering, or Thin Image Extension		Shared memory capacity (GB)
	ShadowImage or Volume Migration	Thin Image	TrueCopy or Universal Replicator	Dynamic Provisioning	Dynamic Tiering	1	2	1	2	1	2	
Base	NO	NO	NO	NO	NO	Extension is used	Extension is used	Extension is used	Extension is used	Extension is used	Extension is used	4
Extension 1	NO	NO	NO	NO	NO	Extension	Extension	Extension	Extension	Extension	Extension	8

Shared memory function	Hitachi storage application					ShadowImage or Volume Migration Extension		TrueCopy or Universal Replicator Extension		Dynamic Provisioning, Dynamic Tiering, or Thin Image Extension		Shared memory capacity (GB)
	ShadowImage or Volume Migration	Thin Image	TrueCopy or Universal Replicator	Dynamic Provisioning	Dynamic Tiering	1	2	1	2	1	2	
						is not used	is used	is not used	is used	is not used	is used	
Extension 2	NO	NO	NO	NO	NO	Extension is not used	Extension is not used	Extension is not used	Extension is not used	Extension is not used	Extension is not used	12

Note: Volume Migration function is included in Hitachi Tiered Storage Manager

When using Hitachi Dynamic Provisioning, Dynamic Tiering, or Thin Image, the pool or virtual volume capacity that can be created is enhanced according to the addition condition of Shared Memories. When using a pool or virtual volume capacity that exceeds 0.12 PB (VSP G200) and 0.2 PB (VSP G400, G600, G800), use the DP, DT, or TI Extension. If you do not use the DP, DT, or TI Extension, delete all DP, DT, and TI pools.

The following table shows the usabale capacity of the pool or virtual volume:

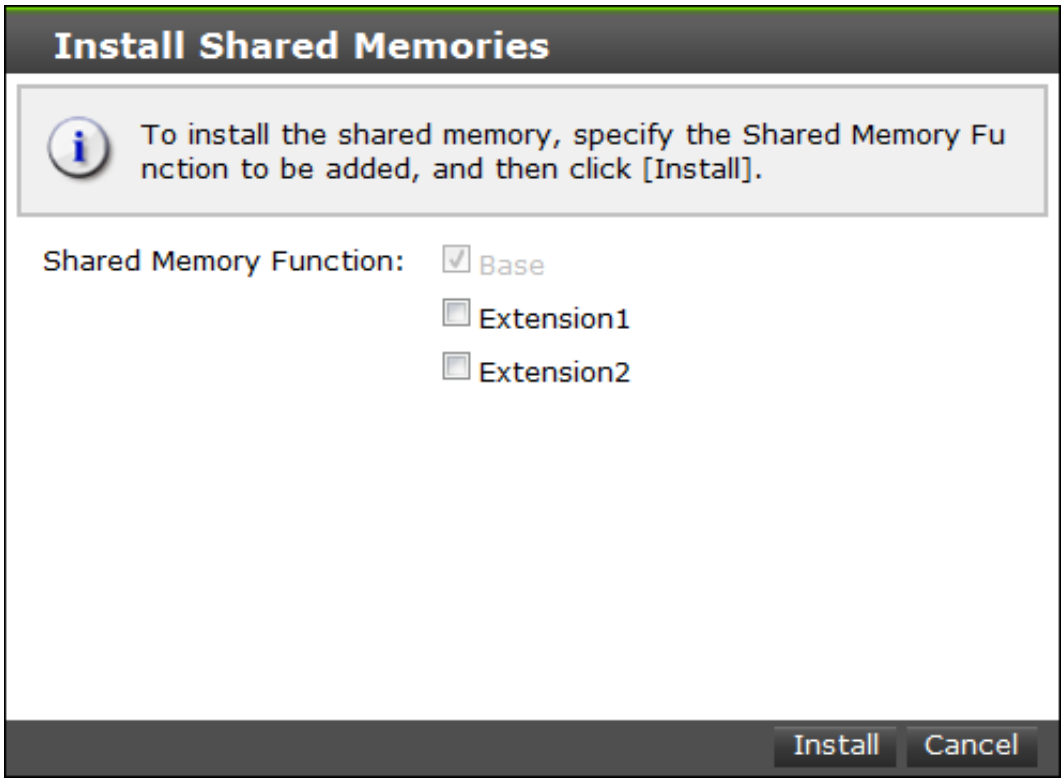
Hitachi storage application	Maximum pool or virtual volume capacity (Pb)
Dynamic Provisioning, Dynamic Tiering, Thin Image	0.12
Dynamic Provisioning, Dynamic Tiering, Thin Image Extension 1	1.2
Dynamic Provisioning, Dynamic Tiering, Thin Image Extension 2	3.5

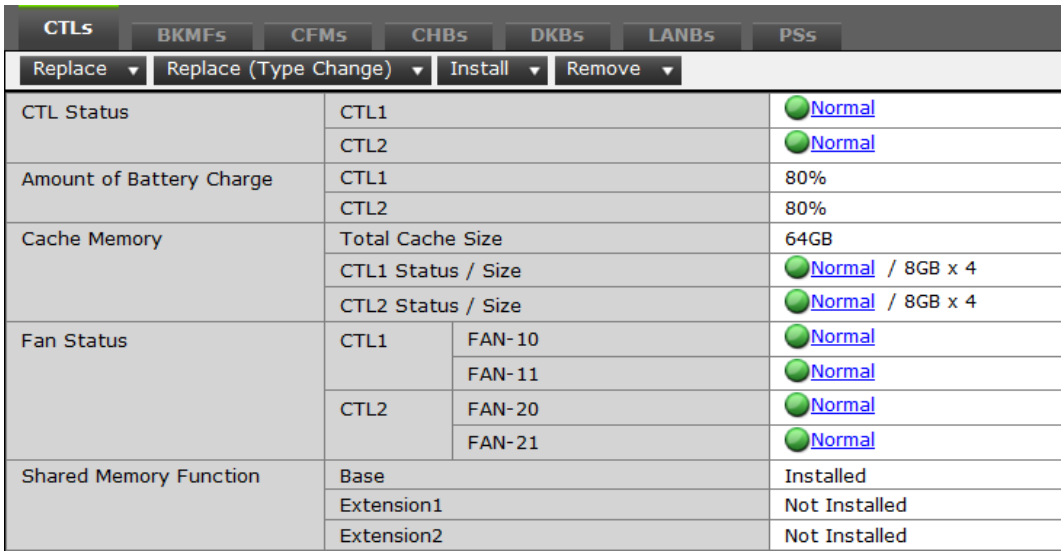
The following table shows the shared memory capacity for is a conversion table for the **Maintenance Utility** window and reference table.

Shared memory	Hitachi storage application	Shared memory capacity (GB)
Basic only	Apply: • ShadowImage, Volume Migration	4

Shared memory	Hitachi storage application	Shared memory capacity (GB)
	• Thin Image • TrueCopy • Universal Replicator • Dynamic Provisioning • Dynamic Tiering	
Basic, Extension 1	Apply: • ShadowImage, Volume Migration • Thin Image • TrueCopy • Universal Replicator • Dynamic Provisioning • Dynamic Tiering Apply: • ShadowImage, Volume Migration Extension 1 • TrueCopy, Universal Replicator Extension 1 • Dynamic Provisioning, Dynamic Tiering-Thin Image Extension 1	8
Basic, Extension 1, Extension 2	Apply: • ShadowImage, Volume Migratio • Thin Image • TrueCopy, Universal Replicator • Dynamic Provisioning • Dynamic Tiering Apply: • ShadowImage, Volume Migration Extension 1 • TrueCopy, Universal Replicactor Extension 1 • Dynamic Provisioning, Dynamic Tiering, Thin Image Extension 1 Apply: • Dynamic Provisioning, Dynamic Tiering, Thin Image Extension 2	12

The following figures show the **Install Shared Memories** window with the base and extension settings, followed by the **Maintenance Utility** window.





CTL Status	CTL1		Normal
	CTL2		Normal
Amount of Battery Charge	CTL1		80%
	CTL2		80%
Cache Memory	Total Cache Size		64GB
	CTL1 Status / Size		Normal / 8GB x 4
	CTL2 Status / Size		Normal / 8GB x 4
Fan Status	CTL1	FAN-10	Normal
		FAN-11	Normal
	CTL2	FAN-20	Normal
		FAN-21	Normal
Shared Memory Function	Base		Installed
	Extension1		Not Installed
	Extension2		Not Installed

Adding shared memory

Procedure

1. Start the maintenance utility.

2. In the **Maintenance Utility** window, click **Hardware > Controller Chassis**.
3. In the **Controller Chassis** window, click the **CTLs** tab.
4. Check the status and capacity of the mounted shared memory.
5. Click **Install** list, and then click **Shared Memory**.
6. In the **Install Shared Memory** window, check the **Shared Memory Function** and click **Install**.
7. When the completion message appears, click **Close**.
8. Click the **CTLs** tab on the **Controller Chassis** window, and then confirm that the shared memory size has changed and that the **Status** is `Normal`.
9. If the shared memory addition fails:
   a. Click **Close** on the completion message.
   b. Click **Refresh**.
   c. Click the **CTLs** tab on the **Controller Chassis** window.
   d. Check the shared memory status.
10. Add shared memory to controller 2 using the same procedures.
11. Log out and close the **Maintenance Utility** window.

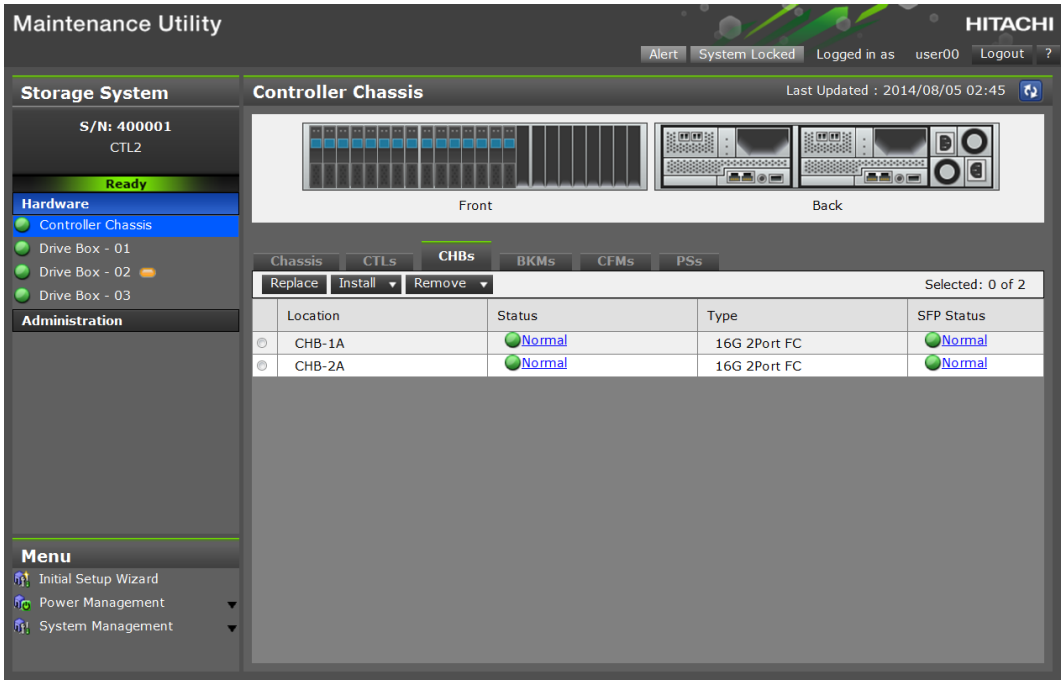
Front end module

Blocking a front end module

Procedure

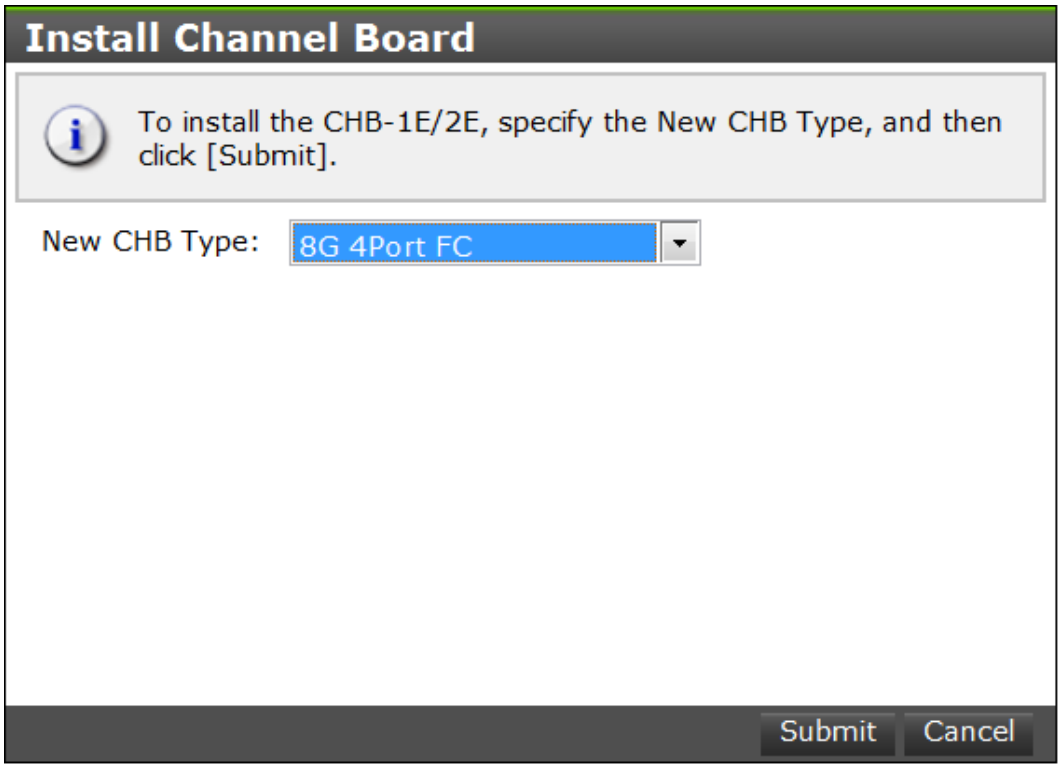
1. Start the maintenance utility.
2. In the **Maintenance Utility** window, click **Hardware > Controller Chassis**.

3. In the **Controller Chassis** window, click the **CHBs** tab.

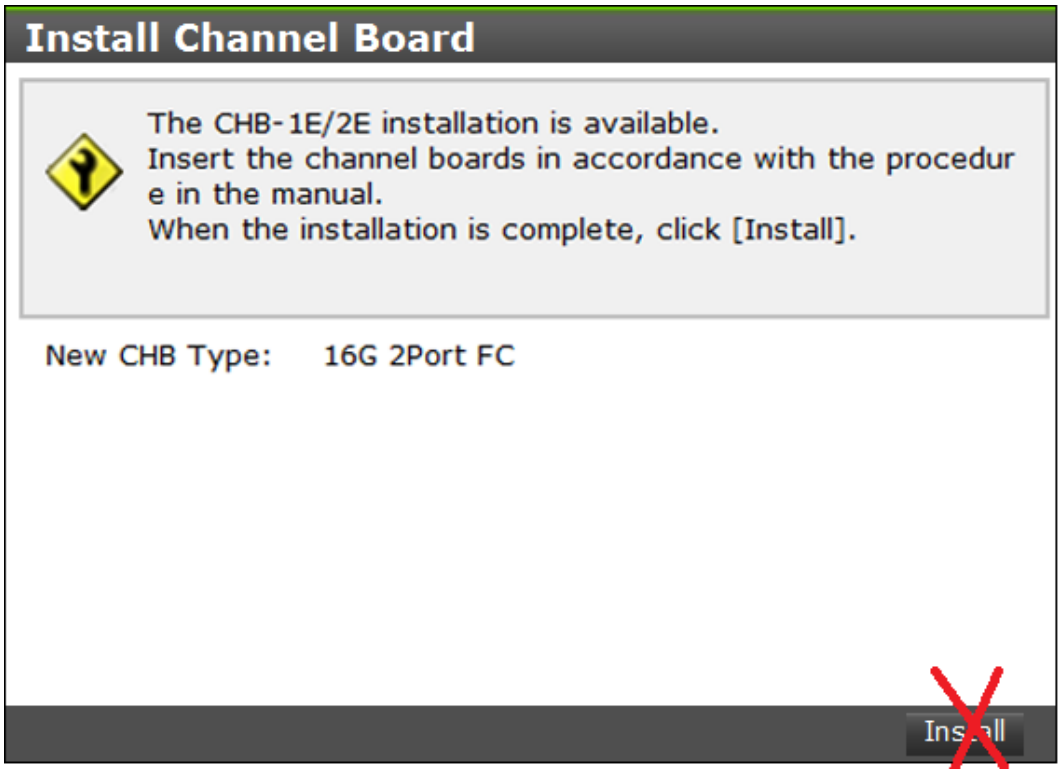


4. Check the status of the front end module.
5. Click the **Install** list.

6. In the following window, select the front end module (**CHB Type**) to be added, and then click **Submit**.



7. Check that the front end module becomes ready for adding, but do not click the **Install** button.



Adding a front end module

Prerequisites

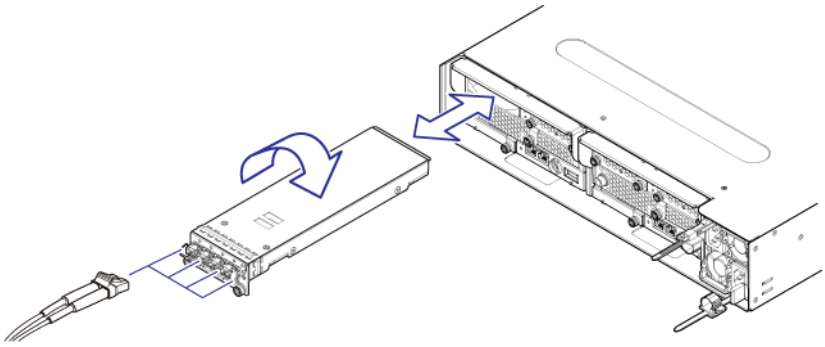
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Use the maintenance utility to block the front end module.
- Storage system power is turned on.

Procedure

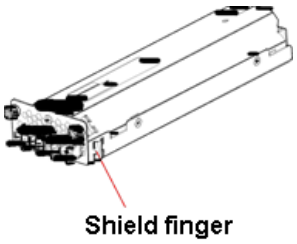
1. Disconnect the optical fiber cable from the front end module.
2. Loosen the two blue screws that secure the front end module.

3. Gently remove the front end module.

   When removing the front end module, hold the blue screw and keep the front end module straight avoid jostling the components above and below it.



4. Orient the new front end module upside-down.
5. Connect the optical fiber cable to the new front end module.
6. Insert the new front end module into the slot, just before the "shield finger."



7. Gently push the front end module all the way into the slot.
8. Tighten the two blue screws to secure the front end module.
9. Confirm that the red `STATUS` LED on the front end module goes off.

Postrequisites

- Use the maintenance utility to restore (unblock) the front end module.

Recognizing a front end module

Recognizing a front end module is done in the maintenance utility.

Procedure

1. Click **Install**.
2. When the completion message appears, click **Close**.
3. Click **CHBs** tab in the **Controller Chassis** window and confirm that the status of the new front end module is `Normal`.

4. If the front end module addition fails:
   a. Click **Close** on the completion message.
   b. Click **Refresh**.
   c. Click the **CHBs** tab on the **Controller Chassis** window.
   d. Check the front end module status.
5. Log out and close the **Maintenance Utility** window.
6. Configure host group and iSCSI target settings, as apppropriate.

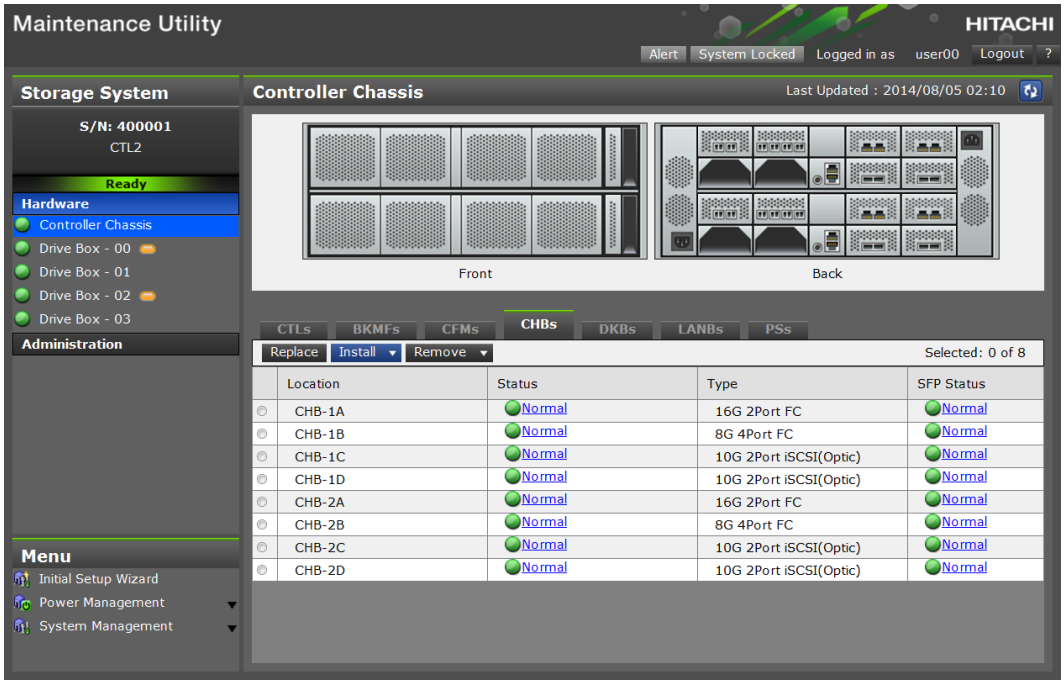
Small form factor pluggable

Checking a small form factor pluggable

Verify the status of the small form factor pluggable in the **Maintenance Utility** window.

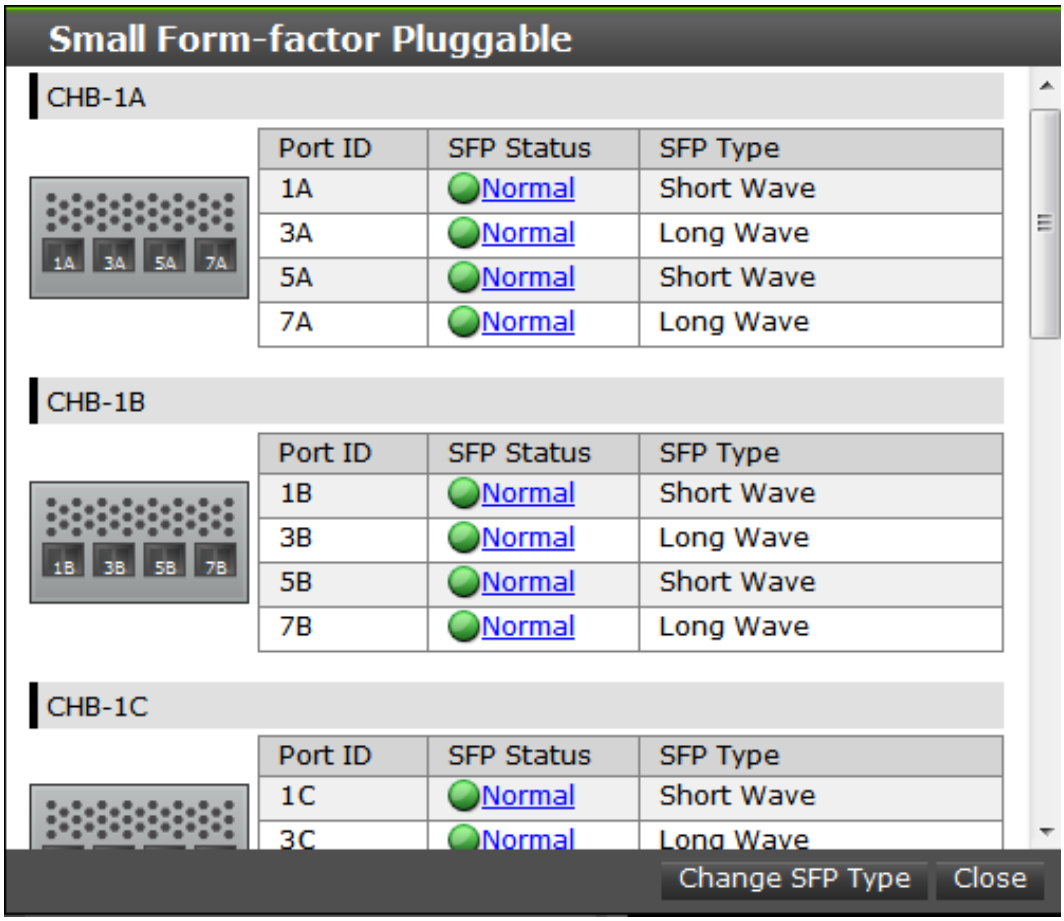
Procedure

1. Start the maintenance utility.
2. In the **Maintenance Utility** window, click **Hardware > Controller Chassis**.
3. In the **Controller Chassis** window, click the **CHBs** tab.
4. Check the status of the small form factor pluggable.

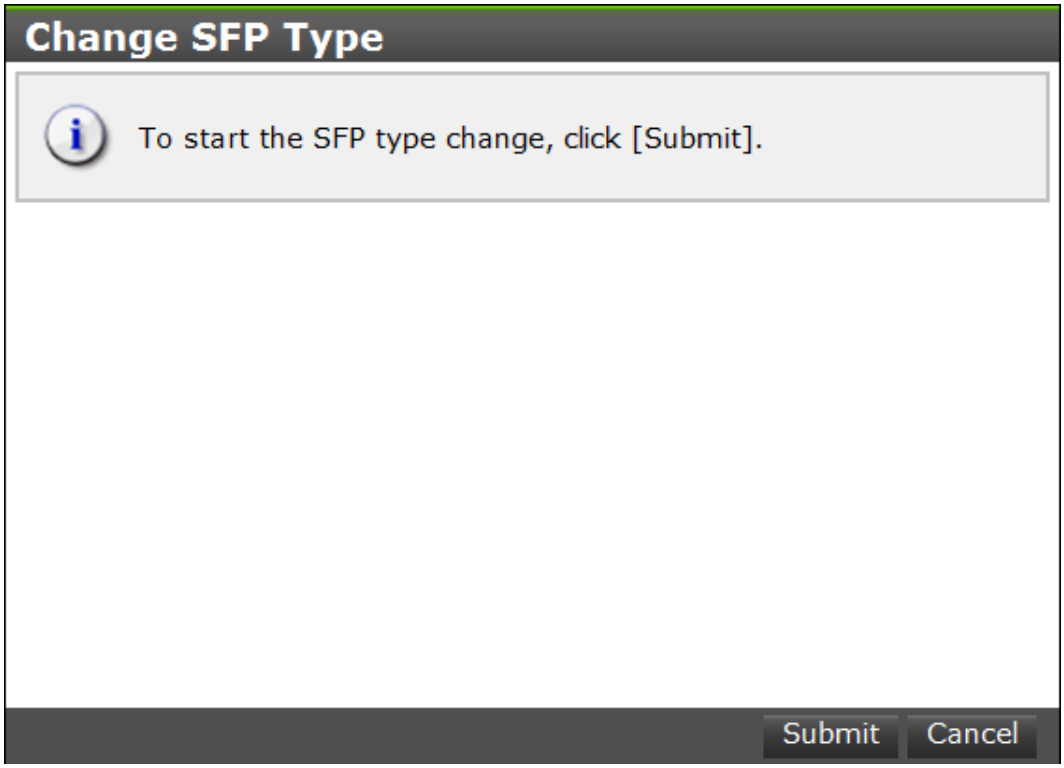


5. Click the status of the small form factor pluggable.

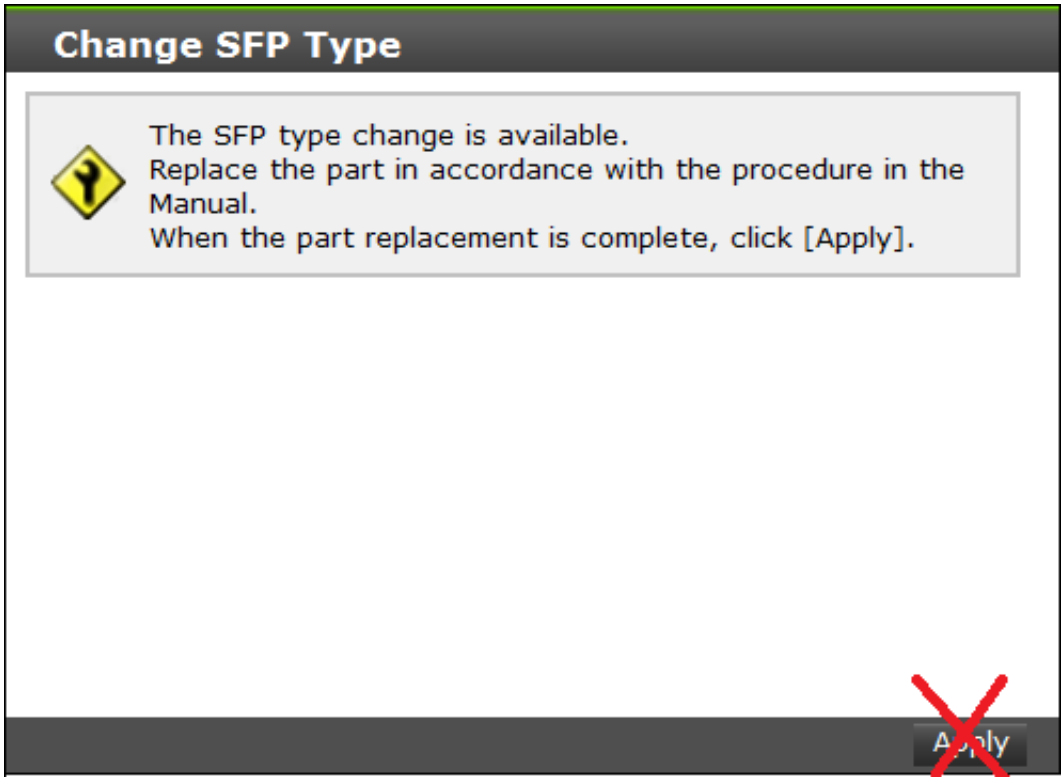
6. Click the **SFP Status** of the SFP you want to replace.
7. Click **Change SFP Type**.



8. Click **Submit**.



9. Check that the SFP can be changed. Do not click **Apply**.



Replacing an SFP

Install the same type of SFP as the one being replaced. The color of the lever or the entire SFP identifies the SFP type:

- Shortwave SFPs are black.
- Longwave SFPs are blue.

Prerequisites

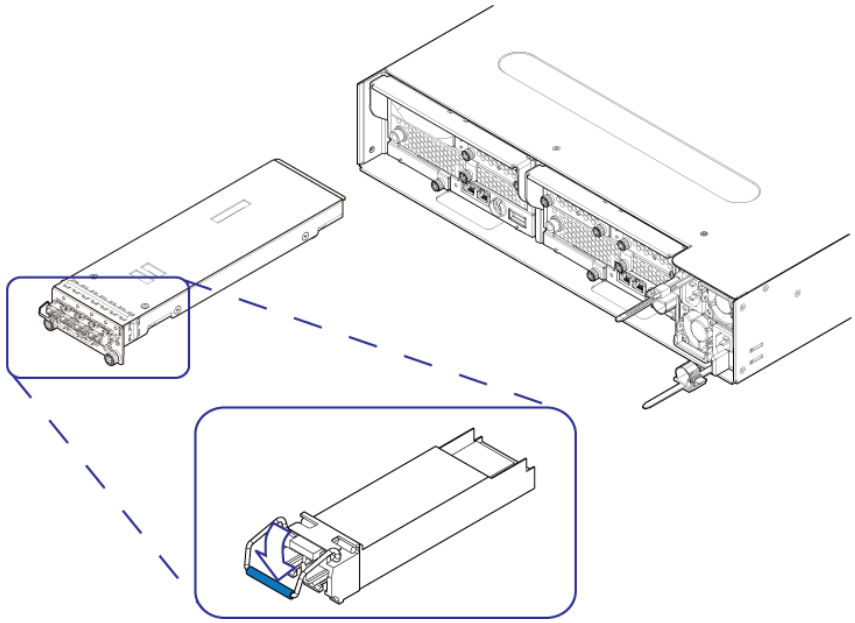
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.

Procedure

1. Disconnect the optical cable from the SFP to be replaced.

2. Pull the SFP lever down toward you and pull out the SFP.

   If you cannot remove the SFP, pull it out while pushing open the lever toward you.



3. Wait at least 10 seconds, and then check the SFP insertion direction and insert the SFP into the port until it clicks.

   Note: Replace the SFP with the same type being removed.

4. Connect the optical cable to the new SFP. Check that optical cable latch clicks and the cables are surely connected.
5. Confirm that the red `STATUS` LED on the front end module is off.
6. In the **Controller Chassis** window, confirm that the status of the replacement SFP is `Normal`.

   If necessary, click **Refresh** at the top-right of the window to update the status in the window.
7. Log out and close the **Maintenance Utility** window.

Recognizing an SFP

The new SFP must be recognized through the **Maintenance Utility** window.

Procedure

1. Click **Apply**.
2. When the completion message appears, click **Close**.

3. In the **Controller Chassis** window, click the **CHBs** tab, and then check that the SFP status is `Normal`.
4. If the SFP type change fails:
   a. Click **Close** on the completion message.
   b. Click **Refresh**.
   c. Click the **CHBs** tab on the **Controller Chassis** window.
   d. Check the status of the SFP.
5. Log out and close the **Maintenance Utility** window.

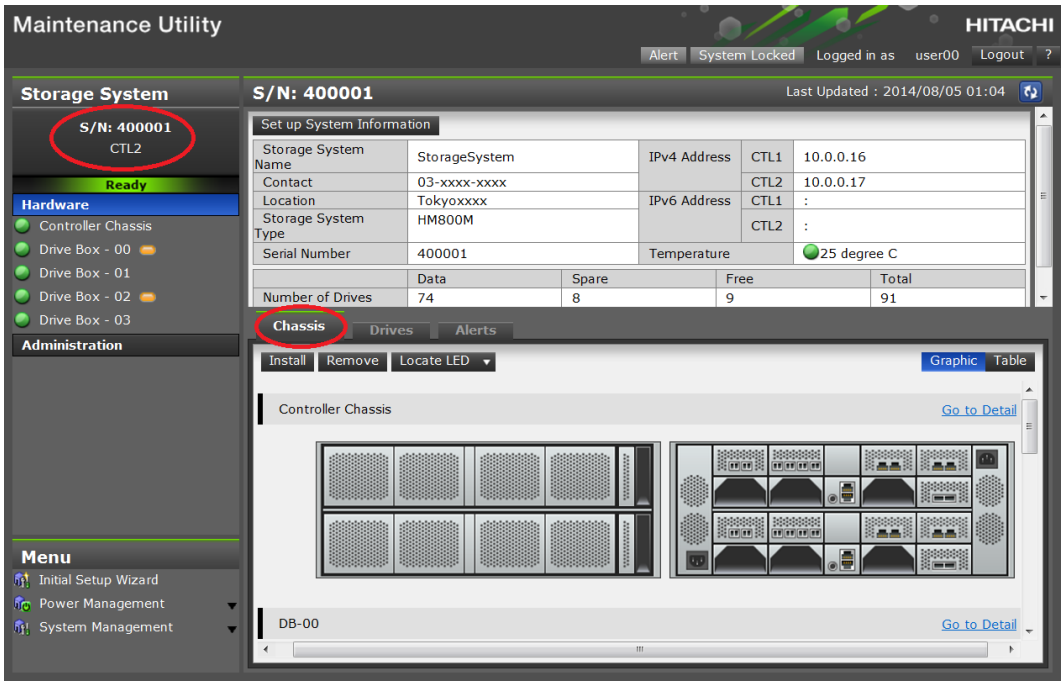
Adding drive trays

Prerequisites

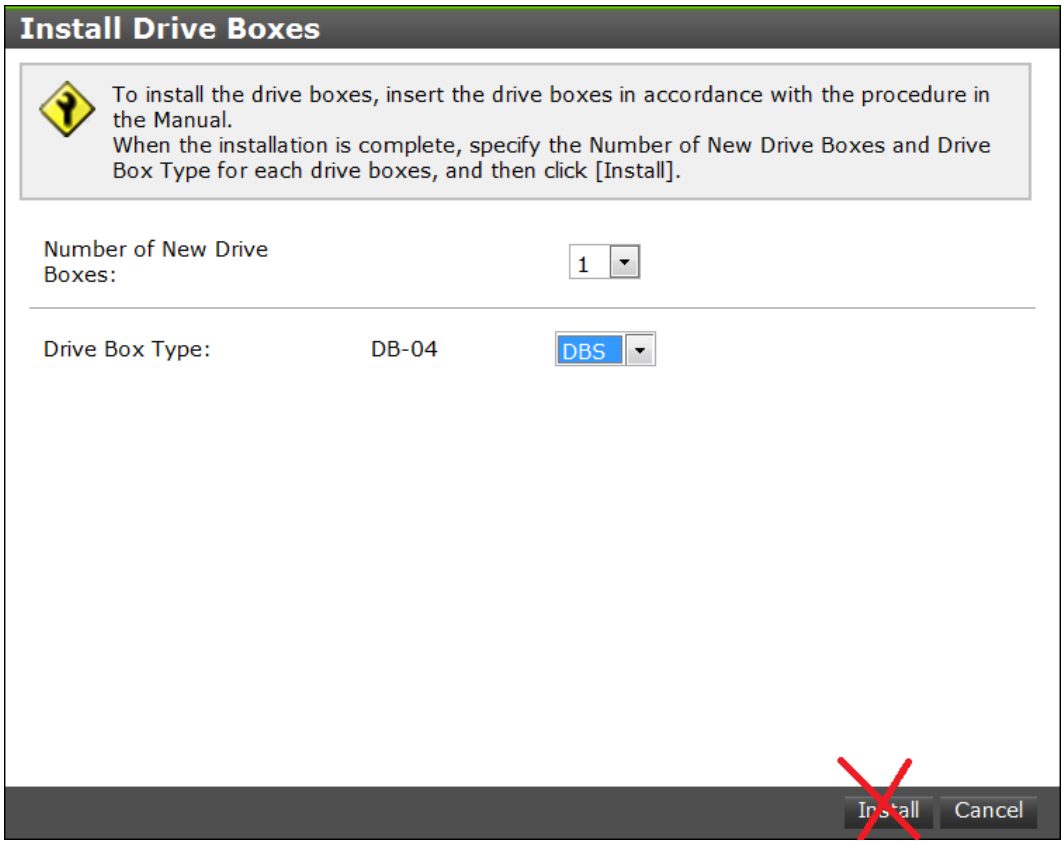
Prior to installing a drive tray, verify that the drive tray contains no drives. If drives are installed, remove them prior to installing the drive tray.

Procedure

1. Start the maintenance utility.
2. In the **Maintenance Utility** window, click the storage system information.
3. Click the **Chassis** tab.
4. Click **Install**.



5. Check that the drive tray becomes ready for installation. Do not click **Install** at this time.



6. Mount the drive tray in the rack.
7. Secure the SFF or LFF drive tray.
8. Install the drives in the drive tray.
9. Connect the SAS cables.
10. Connect the power cables.
11. Check that the green READY LED is on at the newly added drive tray.
12. Attach the front bezel to the drive tray.
13. In the **Install Drive Boxes** window, specify the number of drive trays added and the drive tray type, and then click **Install**.
14. When the completion message appears, click **Close**.

15. Click **Chassis** tab on the **Maintenance Utility** window, and then check the added drive tray is **Normal**.

    If the drive tray addition fails:
    - Click **Close** in the completion message.
    - Click **Refresh**.
    - Click the **Chassis** tab.
    - Check the **Drive Box** status.
    - Click the **Refresh** icon: 
16. After adding the drive tray, log out and close the **Maintenance Utility** window.
17. Configure the following system settings to suit your requirements:
    - Set parity groups.
    - Format volumes.
    - Set spare drives.
    - Allocate volumes.

A

Registration, resources, and checklists

This appendix contains instructions for registering your storage system and information about the available resources you can use to enhance your experience with your storage system. Also, included is a table where you can record your configuration settings for future reference.

- ☐ Register your storage system
- ☐ Creating a user account
- ☐ Logging in to the HDS Support Portal
- ☐ Additional resources
- ☐ Recording your configuration settings

Register your storage system

Before you start using your storage system for the first time, use the HDS Support Portal to register your storage system.

If you encounter a problem visit https://portal.hds.com/index.php/contact-us or contact the Hitachi Global Contact Center (GCC):

- **From the US:** (800) 446 0744
- **Outside the US:** (858) 547-4526
- **Web:** portal.support@hds.com
- **EMEA assistance:** maito:hdsservicerequests@hds.com or call +44 1753 216064

When calling the GCC, please have the following information available:

- Customer site ID
- Product model and serial number
- Contact name, phone number, and email address

Creating a user account

The first time you log in to the HDS Support Portal, you must create a user account before you register your storage system.

Procedure

1. Open a browser and go to the HDS Support Portal at https://portal.hds.com.
2. When the landing page appears, click **Need to register?** under **Login** at the bottom-right area of the page.
3. At the **User Registration** page, click your country or region, and then click **Submit**.
4. At the **Global Personal Data Protection & Privacy Policy** page, read the policy. When you finish, click **I accept**.

   You must accept the policy to continue with the registration process.
5. At the **User Type** page, select a user type.
   - Customer
   - Channel Partner
   - Other (OEM, Supplier, Global Solutions)
   - Guest
6. Click **Next**.
7. At the **Contact Info** page, enter your customer contact information.

Note: In the Registering with a Company field, enter your company's Site ID to ensure accurate user to site matching.

8. When you finish, click **Next**.
9. Follow the remaining on-screen instructions.
10. At the **Confirmation** page, confirm that the information shown is correct.

    If you need to change it:

    a. Click the appropriate topic link in the bread crumbs at the top of the page or in the body of the page.
    b. Edit the information.
    c. Click **Next** until the **Confirm** page appears.
11. Click **Register**.

Result

The storage system is registered, the Landing page appears, and a login password is sent to the email address you specified during product registration. You can use the email address and password to log in to the HDS Support Portal.

Logging in to the HDS Support Portal

After you create a user account in the HDS Support Portal and receive a password, you can log in to the Portal to register additional Hitachi storage systems.

The HDS Support Portal also provides the following support tools:

- Knowledge Base
- Case management
- Downloads
- Product Interoperability
- Technical bulletins
- Product documents

Procedure

1. At the **Login** page, enter your login credentials.
   - **Username:** Enter the email address you specified when you created your user account.
   - **Password:** Enter the case-sensitive password you received by email when you created your user account. For security, each typed password character is mased with a dot (·).
2. Click **LOGIN**.

3. Confirm that all of your products are registered by clicking the **My Products** link at the top of the page or at the bottom-right area of the page.
4. If all of your products are shown under **My Products** for all of your sites, your Hitachi storage systems are registered.

   Otherwise, perform the following steps:
5. Click the **Register Additional Product** link at the top of the page or the **Register Additional Products** link at the bottom-right area of the page.
6. At the **Product Registration** page, under **Product Information**, click the **Product Category** menu and select the product category for the product you are registering.
7. Click the **Product Model** menu and select the product you are registering.
8. Click in the **Serial Number** field and enter the serial number for your product.

   For your convenience, the Hitachi Virtual Storage Platform G200, G400, G600 models provide a **serial #** label on the top of the enclosure.



9. Optional: Click in the **Alias** field and enter a "friendly" name for the product you are registering.
10. Click the **Next** button at the bottom of the page.
11. At the **Site Information** page, click the site where the product is installed.

    If the site does not exist, create a new site.
    - If you clicked an existing site, click **Next**.
    - If you clicked **Create a New Site**, complete the on-screen site information. When that is complete, click **Next**.
12. At the **Confirm Registration** page, click **Register** at the bottom of the page.
13. Wait 15 minutes, then go to the **My Products** page link and confirm that the storage system is registered.

Additional resources

Hitachi provides a number of resources for maximizing your experience.

Product documentation

Refer to the Related documents section in the Preface and the supplied documentation CD.

All documentation is also available at https://portal.hds.com/.

Product interoperability

For convenience, Hitachi Data Systems provides an interoperability matrix that can be accessed from the Support Portal and the Hitachi web site.

- **HDS Support Portal:** Log into the Portal and click the Product Interoperability link.
- **Hitachi web site:** http://www.hds.com/products/interoperability/.

Global services

Hitachi Data Systems Global Services can increase the value of IT to your business with carefully applied technologies for reducing risk, accelerating ROI, lowering costs, and managing your storage infrastructure successfully.

http://www.hds.com/services/

For a list of in-country toll-free phone numbers, go to https://portal.hds.com/index.php/contact-us/in-country-toll-free-numbers.

HDS Community

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

http://community.hds.com

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	

Field	Enter Your Setting Below
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	
Alert Notifications	
Notification Alert, Host Report or All	
Email Notice, Enable or Disable	
Email Address (To)	
Email Address (From)	
Email Address (Reply To)	
Mail Server Settings Mail Server: Identifier, IPv4, or IPv6 IP address SMTP Authentication, Enable or Disable If Enabled, Enter Account and Password	
SNMP Agent, Enable or Disable	
Trap Destinations	
SNMP Managers	
System Group Information Storage System Name Contact Location	

Field	Enter Your Setting Below
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	
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:
iSCSI Port: _____	IP Address: Subnet Mask: Default Gateway:
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:

B

Upgrading firmware

- Firmware upgrade prerequisites
- Upgrading the SVP software
- Upgrading firmware for the storage system

Firmware upgrade prerequisites

Before upgrading the firmware on a storage system, observe the following prerequisites:

- Firmware upgrades can cause a single controller to handle all host I/O. Therefore, we recommend you upgrade firmware when host I/O is low, such as during non-peak hours or on weekends or holidays.
- If the storage system and the computer that will be used during the upgrade are connected directly, check that the storage system LAN port is linked up. If they are connected using a switch, check that the LAN port on the switch is linked up.
- If you need to upgrade the SVP and storage system firmware, upgrade the SVP firmware first.
- Confirm that other applications (JP1 andHitachi Device Manager - Storage Navigator, other Device Manager - Storage Navigator operations, and so on) that access the storage system over a network are not operating.
- Do not upgrade firmware when TrueCopy is used.

Upgrading the SVP software

Hitachi provides regular software upgrades for the SVP.

You should always run the latest SVP software. The software-upgrade procedure requires an SVP reboot, so allow sufficient time to upgrade the software and reboot the SVP.

Upgrading the SVP software consists of the following steps:

Procedure

1. Stopping the SVP service.
2. Upgrading the SVP software.
3. Starting the SVP service.

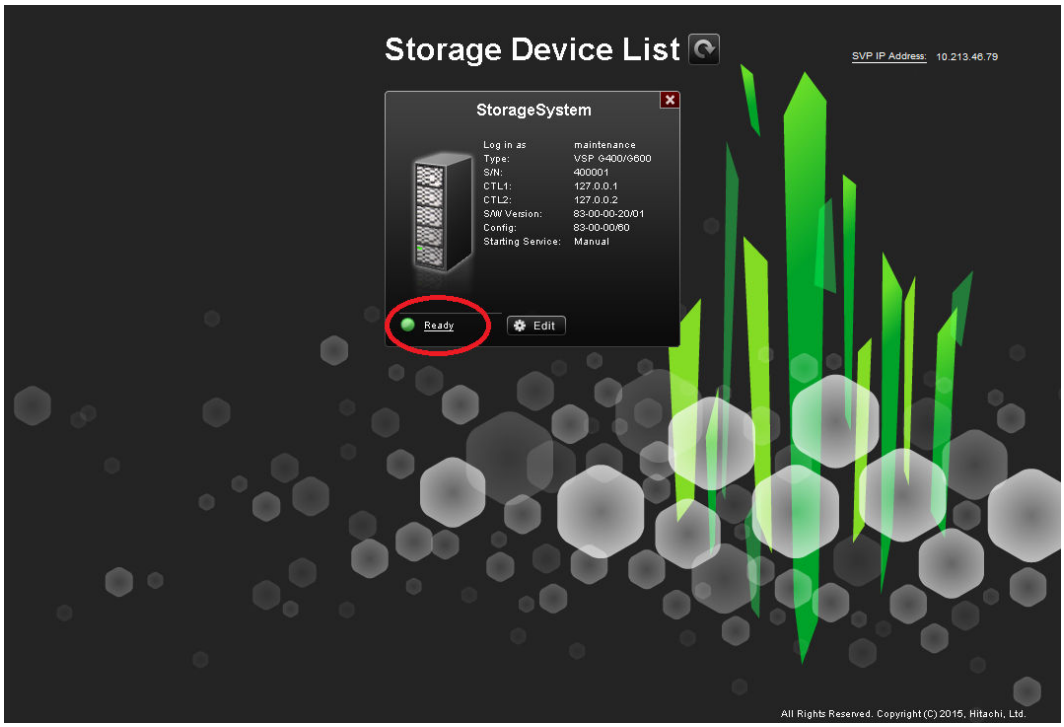
Stopping the SVP service

Before upgrading the SVP software, stop the SVP service.

Procedure

1. Connect the management console PC attached to the SVP, connect to the SVP using Windows Remote Desktop Client.
2. On the SVP, click **Start > All Programs > Hitachi Device Manager-Storage Navigator > StorageDeviceList**.
   The **Storage Device List** window opens.

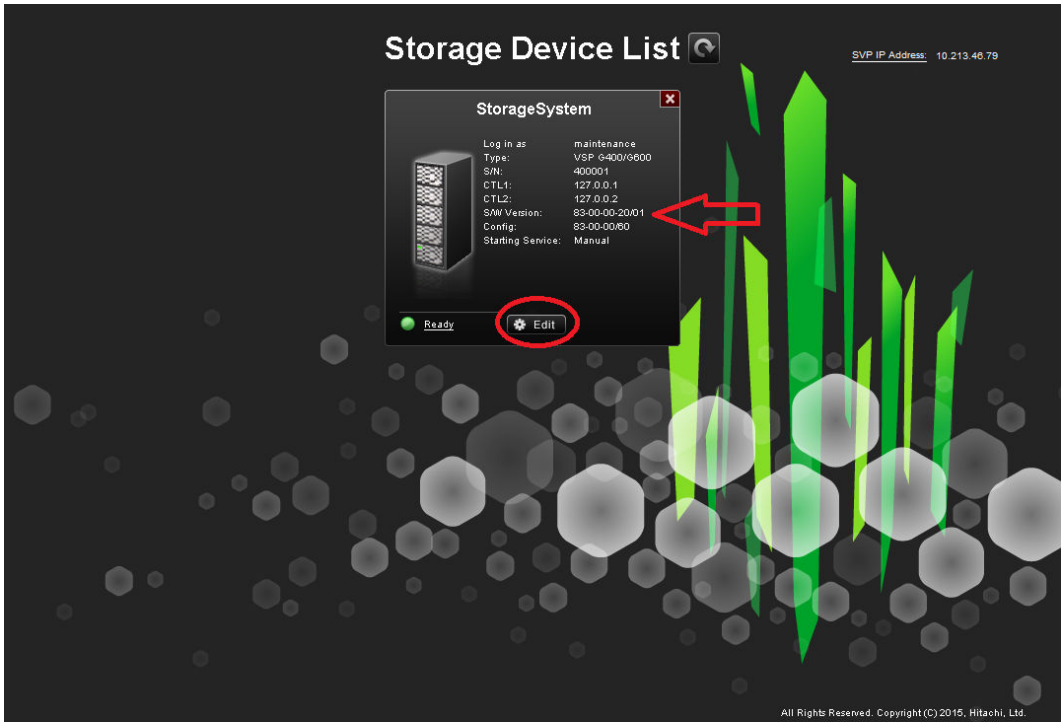
3. Wait for the `Ready` LED to turn green in the **Storage Device List** window.



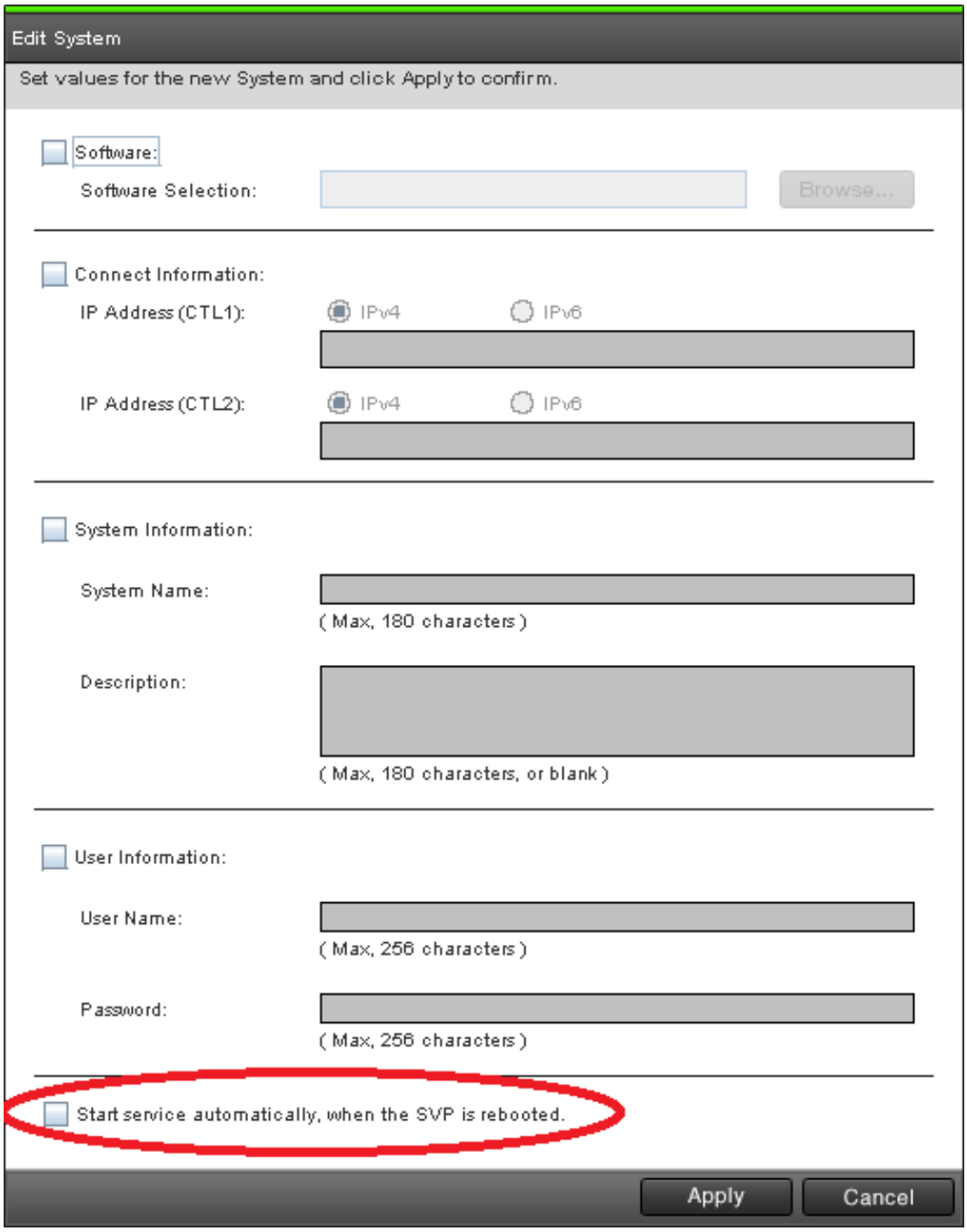
Note: If the storage system status does not become **Ready**, click the **Refresh** icon to the right of **StorageDeviceList** at the top of the page: 

4. In the **Storage Device List** window, record the **S/W Version**:_____

5. Click **Edit**.


Storage Device List
SVP IP Address: 10.213.46.79
StorageSystem
Log in as maintenance
Type: VSP G400/G600
S/N: 400001
CTL1: 127.0.0.1
CTL2: 127.0.0.2
SAN Version: 83-00-00-20/01
Config: 83-00-00/60
Starting Service: Manual
Ready
Edit
All Rights Reserved. Copyright (C) 2015, Hitachi, Ltd.

6. Uncheck **Start service automatically, when the SVP is rebooted** at the bottom of the **Edit System** window.



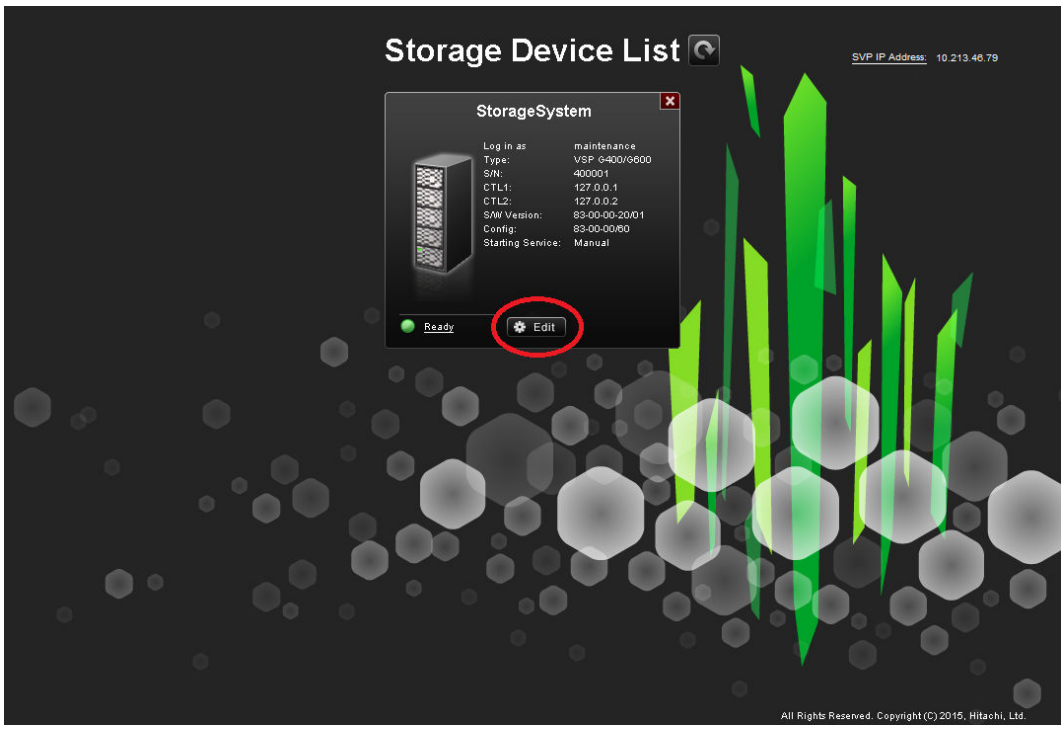
7. Click **Apply**, and then click **Close**.
8. Reboot the SVP (see Rebooting the SVP on page 129).
9. Proceed to Upgrading the software on page 196.

Upgrading the software

After stopping the SVP service, use the following procedure tp upgrade the SVP software. As part of this procedure, you will specify that the SVP service should restart when the SVP is rebooted. This procedure assumes that you have the new SVP software file at a location that can be accessed by the PC.

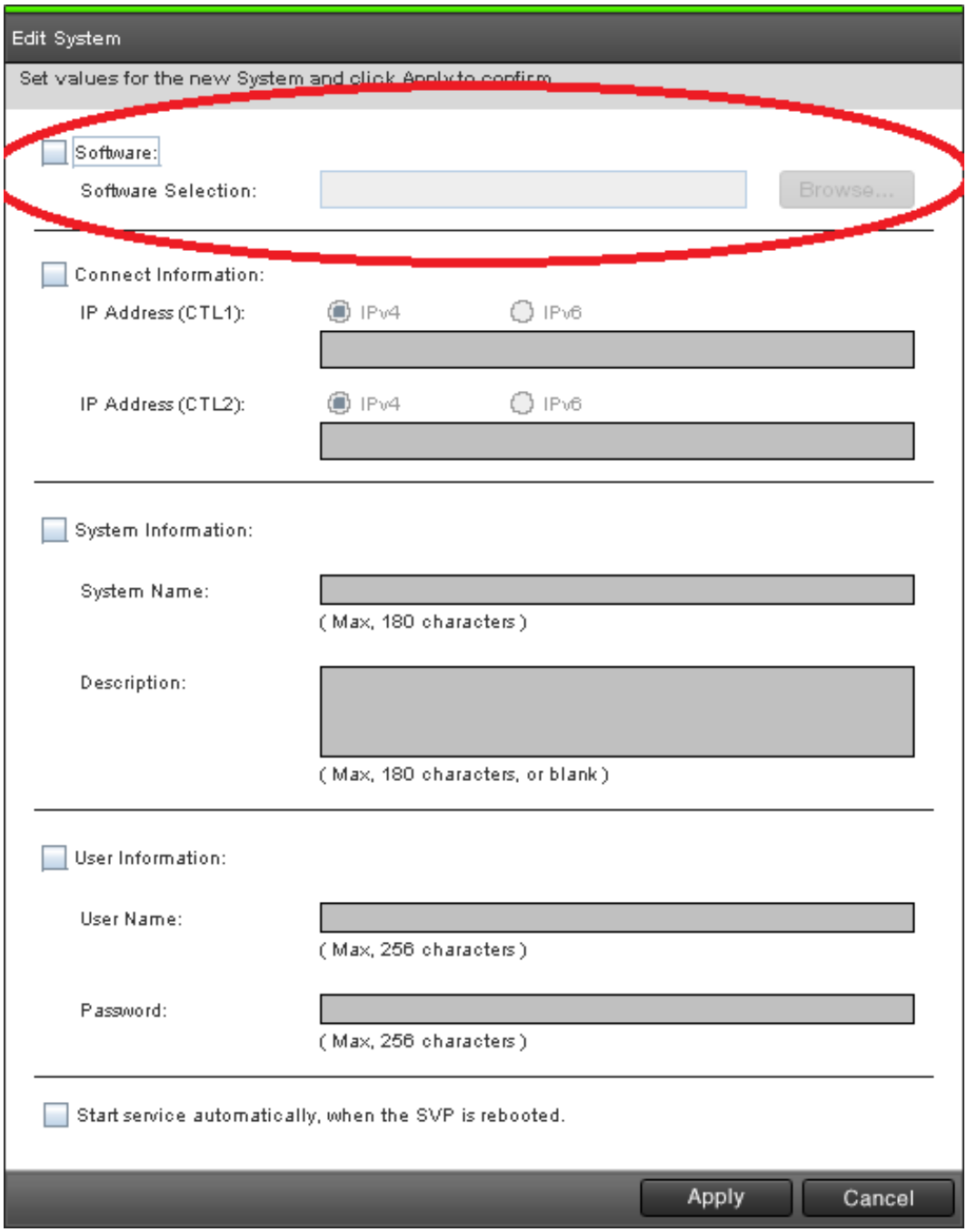
Procedure

1. On the SVP, click **Start > All Programs > Hitachi Device Manager-Storage Navigator > StorageDeviceList**.
   The **Storage Device List** window opens.
2. In the **Storage Device List** window, click **Edit** for the storage system whose SVP software you want to upgrade.



The **Edit System** window appears.

3. At the top of the window, check **Software Selection**, and then click **Browse**.



4. Go to the location where you downloaded the software file (for example, **Software\productname.inf**), and then click the software file and click **Open**.
5. At the bottom of the **Edit System** window, check the check box **Start service automatically, when the SVP is rebooted**.

6. Click **Apply**.
7. In the **Storage Device List** window, confirm that the software version shown is later than the version you recorded prior to the upgrade.

Upgrading firmware for the storage system

Hitachi works hard to constantly improve the operation and performance of your storage system. When improvements are available, they are offered to customers as upgraded firmware releases.

We recommend you check that your storage system has the latest firmware after you install and configure the storage system. Thereafter, check for firmware releases and install them as they become available.

Upgrading the firmware

Use the following procedure to determine whether your storage system is using the most recent firmware version. This procedure assumes that you have the new storage system firmware file at a location that can be accessed by the PC.

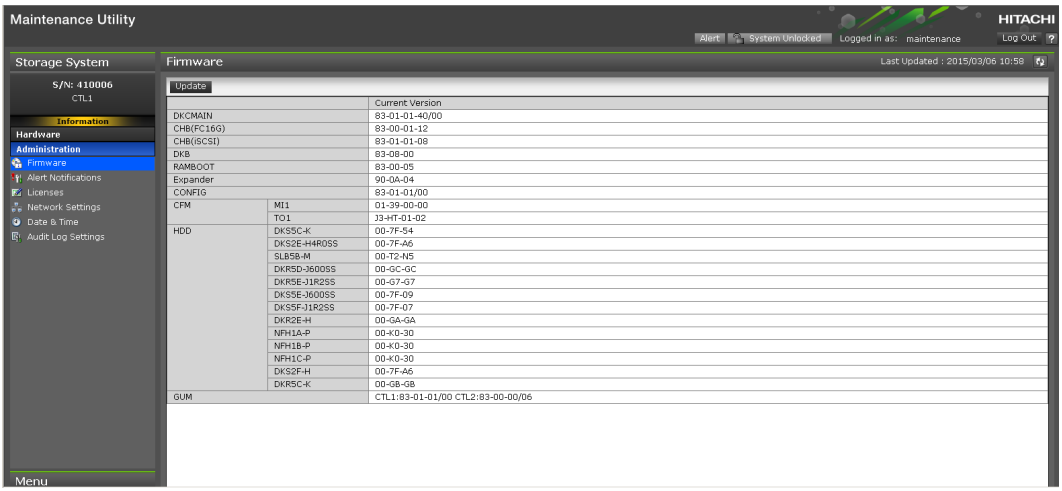


Note: If you need to upgrade the SVP software and the storage system firmware, upgrade the SVP software first, and then upgrade the storage system firmware.

Procedure

1. In the Hitachi Command Suite main window, click the **Resource** tab.
2. Click **Storage Systems** from the tree view
3. Expand the tree, and then click **Maintenance Utility**.
   The **Maintenance Utility** window appears.

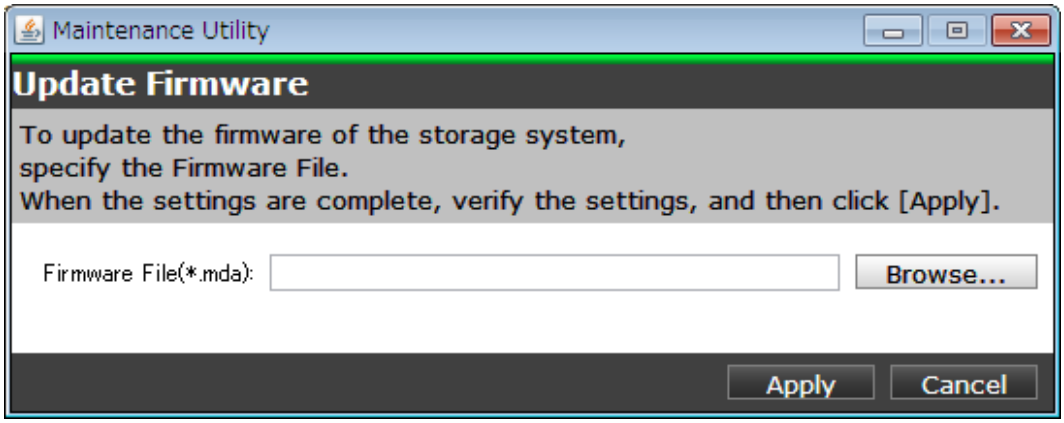
4. In the **Maintenance Utility** window, click **Administration > Firmware**.
   The **Firmware** page appears.



5. Record the currently installed firmware shown on the bottom (**GUM**) row:

   _____

6. Click the **Update** button.
   The **Update Firmware** window appears.



7. Next to **Firmware File(*mda)**, click **Browse**.
8. Go to the location where the new firmware file is located (the file ends with the extension `.mda`).
9. Click the filename, and then click **Open**.
10. Click **Apply**.
    The firmware version confirmation window appears.
11. Click **Apply**.
    The **Update Progress** window shows the progress of the upgrade.

12. When the Information window informs you about the maintenance utility (GUM) reboot, click **OK**, and then click the X in the top-right corner to close the window.
13. When the **Firmware** window appears, close it, and then wait for the maintenance utility to start.
14. Repeat steps 4 and 6.
15. When a window tells you that firmware renewal was completed, click **OK**.
16. Log out of the maintenance utility, and then log back in, go to the **Firmware version** window, and confirm that the firmware for GUM is higher than the one you recorded before the upgrade.

C

Specifications

- Model lists
- Replacement parts
- Hitachi Virtual Storage Platform G200 mechanical specifications
- Electrical specifications
- Environmental specifications
- Battery specifications
- RAID specifications
- iSCSI specifications
- iSCSI standards
- Regulatory compliance
- Dense intermix drive tray connection restrictions
- SVP hardware specifications

Model lists

Hitachi Virtual Storage Platform G200 controller model lists

CBSS controller components

Part number	Part name	Quantity
DW800-CBSS	2U Chassis	1
	Power supply unit	2
	Power cable (0.9 m)	2
	Power cable (2.5 m)	2
	Backup module (BKM)	2
	Front bezel (2U)	1
	Binder	1
	SAS cable label	2
	Controller	2
DW-F800-BM10	Cache flash memory	2

CBSS controller optional components

Part number	Part name	Quantity
DW-F800-4HF8	Front end module (8 Gbps - FC)	2-4
DW-F800-2HF16	Front end module (16 Gbps - FC)	2-4
DW-F800-2HS10S	Channel Board (10 Gbps SFP - iSCSI)	2-4
DKC-F810I-CM8G	Cache memory (8 GB)	4
DKC-F810I-CM16G	Cache memory (16 GB)	4
DKC-F810I-200MEM	200 GB, 2.5-inch, MLC, 12 Gbps flash drive	2-24
DKC-F810I-300KCM	300 GB, 2.5-inch, 15kmin^{-1} 6-Gbps SAS drive (contains BNST)	2-24
DKC-F810I-300KCMC	300 GB, 2.5-inch,15kmin^{-1}, 6-Gbps SAS drive	2-24
DKC-F810I-400MEM	400 GB, 2.5-inch, MLC, 12-Gbps SAS drive	2-24
DKC-F810I-600JCM	600 GB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)	2-24

Part number	Part name	Quantity
DKC-F810I-600JCMC	600 GB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive	2-24
DKC-F810I-600KGM	600 GB, 2.5-inch, 15kmin^{-1} 12-Gbps SAS drive	2-24
DKC-F810I-1R2JCM	1.2 TB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)	2-24
DKC-F810I-1R2JCMC	1.2 TB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive	
DW-F800-1PS8	SFP for 8 Gbps Shortwave	2-4
DW-F800-1PL8	SFP for 8 Gbps Longwave	2-4
DW-F800-1PS16	SFP for 16 Gbps Shortwave	2-4
DW-F800-1PL16	SFP for 16 Gbps Longwave	2-4

CBSL controller components

Part number	Part name	Quantity
DW800-CBSL	2U Chassis	1
	Power supply unit	2
	Power cable (0.9 m)	2
	Power cable (2.5 m)	2
	Backup module	2
	Front bezel (2U)	1
	Binder	1
	SAS cable label	2
	Controller	2
DW-F800-BM10	Cache flash memory	2

CBSL controller optional components

Part number	Part name	Quantity
DW-F800-4HF8	Front end module (8 Gbps - FC)	2-4
DW-F800-2HF16	Front end module (16 Gbps - FC)	2-4
DW-F800-2HS10S	Front end module (10 Gbps SFP-iSCSI)	2-4
DKC-F810I-CM8G	Cache memory (8 GB)	4
DKC-F810I-CM16G	Cache memory (16 GB)	4

Part number	Part name	Quantity
DKC-F810I-400M6M	400 GB, 3.5-inch, MLC, 12 Gbps flash drive	2-12
DKC-F810I-1R2J5M	1.2 TB, 3.5-inch, 10kmn^{-1}, 6-Gbps SAS drive (contains BNST)	2-12
DKC-F810I-1R2J5MC	1.2 TB, 3.5-inch, 10kmn^{-1}, 6-Gbps SAS drive	2-12
DKC-F810I-4R0H3M	4 TB, 7.2K 3.5-inch, 7200min^{-1}, 6-Gbps SAS drive (contains BNST)	2-12
DKC-F810I-4R0H3MC	4 TB, 7.2K 3.5-inch, 7200min^{-1} 6-Gbps SAS drive	2-12
DKC-F810I-6R0H9M	6 TB, 7.2K 3.5-inch, 7200min^{-1} 12-Gbps SAS drive	2-12
DKC-F810I-1PS8	SFP for 8 Gbps Shortwave	2-4
DKC-F810I-1PL8	SFP for 8 Gbps Longwave	2-4
DKC-F810I-1PS16	SFP for 16 Gbps Shortwave	2-4
DKC-F810I-1PL16	SFP for 16 Gbps Longwave	2-4

Drive tray model lists

SFF drive tray components

Model number	Part name	Quantity
DW-F800-DBS and DW-F800-DBSC	2U chassis	1
	ENC	2
	Power supply unit	2
	Power cable (0.9 m)	2
	Power cable (2.5 m)	2
	Front bezel (2U)	1

SFF drive tray optional components

Model number	Part name	Quantity
DKC-F810I-200MEM	200-GB, 2.5-inch, MLC, 12-Gbps flash drive	2-24
DKC-F810I-300KCM	300-GB, 2.5-inch, 15kmin^{-1}, 6-Gbps SAS drive (contains BNST)	2-24
DKC-F810I-400MEM	400-GB, 2.5-inch, MLC, 12-Gbps flash drive	2-24

Model number	Part name	Quantity
DKC-F810I-600JCM	600-GB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)	2-24
DKC-F8191-600KGM	600-GB, 2.5-inch SAS drive	2-24
DKC-F810I-1R2JCM	1.2-TB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)	2-24

LFF drive tray components

Model number	Part name	Quantity
DW-F800-DBL and DW-F800-DBLC	2U chassis	1
	ENC	2
	Power supply unit	2
	Power cable (0.9 m)	2
	Power cable (2.5 m)	2
	Front bezel (2U)	1

Optional LFF drive tray components

Model number	Part name	Quantity
DKC-F810I-400M6M	400-GB, 3.5-inch, MLC, 12-Gbps flash drive	2-12
DKC-F810I-1R2J5M	1.2-TB, 3.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)	2-12
DKC-F810I-1R2J5MC	1.2-TB, 3.5-inch,10kmin^{-1}, 6-Gbps SAS drive	2-12
DKC-F810I-4R0H3M	4-TB, 7.2K 3.5-inch, 7200min^{-1}, 6-Gbps SAS drive (contains BNST)	2-12
DKC-F810I-6R0H9M	6-TB, 7.2K 3.5-inch, 7200min^{-1}, 12-Gbps SAS drive	2-12

FMD drive tray components

Model number	Part name	Quantity
DW-F800-DBF	2U chassis	1
	ENC	2
	Power supply unit	2
	Power cable (0.9 m)	2

Model number	Part name	Quantity
	Power cable (2.5 m)	2
	Front bezel (2U)	1

FMD drive tray optional components

Model number	Part name	Quantity
DKC-F710I-1R6FM	1.6-TB, MLC, 6-Gbps Flash Module Drive	2-12
DKC-F710I-3R2FM	3.2-TB, MLC, 6-Gbps Flash Module Drive	2-12

Dense intermix drive tray components

Model number	Part name	Quantity
DW-F800-DB60 and DW-F800-DB60C	4U box	1
	ENC	2
	Power supply unit	2
	Power cable (0.9 m)	2
	Power cable (2.5 m)	2
	Front bezel (dense intermix drive tray)	1
DW-F800-SCQ3	SAS cable (3 m), including 2 omega clips	2

Dense intermix drive tray optional components

Model number	Part name	Quantity
DKC-F810I-400M8M	1.6-GB, MLC, 12-Gbps flash drive	2-60
DKC-F810I-1R2J7M	1.2-TB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive (contains BNST)	2-60
DKC-F810I-1R2J7MC	1.2-TB, 2.5-inch, 10kmin^{-1}, 6-Gbps SAS drive	2-60
DKC-F810I-4R0H4M	4-TB, 7.2K 3.5-inch, 7200min^{-1}, 6-Gbps SAS drive (contains BNST)	2-60
DKC-F810I-4R0H4MC	4-TB, 7.2K 3.5-inch, 7200min^{-1}, 6-Gbps SAS drive	2-60

Model number	Part name	Quantity
DKC-F810I-6R0HLM	6-TB, 7.2K 3.5-inch, 7200min^{-1}, 12 Gbps SAS drive	2-60

Other model list

Numbers in parentheses show the quantities of the components.

Power cables

Model number	Specification
DW-F800-J1H	2.5 m, 2-pole power cable with grounding terminal (AC 125 V, 13 A or 15 A)
DW-F800-J2H	2.5 m, 2-pole power cable with grounding terminal (AC 250 V, 13 A or 15 A)
DW-F800-J2H5	5.0 m, 2-pole power cable with grounding terminal (AC 200 V, 13 A or 15 A)
DW-F800-J2H10	10.0 m, 2-pole power cable with grounding terminal (AC 200 V, 13 A or 15 A)
A-F6516-P620	Power cable for PDU (1)
A-F6516-P630	Power cable for PDU (1)

SAS cables

Model number	Specification
DW-F800-SCQ1	1 m SAS cable, including omega clips (2)
DW-F800-SCQ1F	1.5 m SAS cable, including omega clips (2)
DW-F800-SCQ3	3 m SAS cable, including omega clips (2)
DW-F800-SCQ5	5 m SAS cable, including omega clips (2)
DW-F800-SCQ10A	10 m SAS optical cable
DW-F800-SCQ30A	30 m SAS optical cable
DW-F800-SCQ1HA	100 m SAS optical cable

Optical cables

Model number	Specification
A-6515-GM5L	5 m LC-LC optical cable for optical
A-6515-GM10L	10 m LC-LC optical cable for optical
A-6515-GM20L	20 m LC-LC optical cable for optical

Model number	Specification
A-6515-GM30L	30 m LC-LC optical cable for optical
A-6515-GM40L	40 m LC-LC optical cable for optical
A-6515-GM50L	50 m LC-LC optical cable for optical
A-6515-GM1JL	100 m LC-LC optical cable for optical
A-6515-GS10L	10 m LC-LC optical cable for optical
A-6515-GS20L	20 m LC-LC optical cable for optical
A-6515-GS30L	30 m LC-LC optical cable for optical
A-6515-GS50L	50 m LC-LC optical cable for optical
A-6515-GS1JL	100 m LC-LC optical cable for optical
A-6515-HM5L	5 m LC-LC optical cable for optical
A-6515-HM10L	10 m LC-LC optical cable for optical
A-6515-HM20L	20 m LC-LC optical cable for optical
A-6515-HM30L	30 m LC-LC optical cable for optical
A-6515-HM50L	50 m LC-LC optical cable for optical
A-6515-HM100L	100 m LC-LC optical cable for optical
A-6515-HM200L	200 m LC-LC optical cable for optical
A-6515-HM300L	300 m LC-LC optical cable for optical
A-6515-JM5L	5 m LC-LC optical cable for optical
A-6515-JM10L	10 m LC-LC optical cable for optical
A-6515-JM20L	20 m LC-LC optical cable for optical
A-6515-JM30L	30 m LC-LC optical cable for optical
A-6515-JM50L	50 m LC-LC optical cable for optical
A-6515-JM100L	100 m LC-LC optical cable for optical
A-6515-JM200L	200 m LC-LC optical cable for optical
A-6515-JM300L	300 m LC-LC optical cable for optical

Replacement parts

Part replacement is required to maintain high performance. Replacement of parts 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 is designed to protect the data in the cache memory in an emergency, such as a sudden power failure. In these situations, 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.

Hitachi Virtual Storage Platform G200 mechanical specifications

Configuration

Controller

1 CBSS
1 CBSL

Drive tray

1 SFF drive tray
1 LFF drive tray
1 FMD drive tray
1 Dense intermix drive tray

Drive

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, 576.39, 1152.79
	CBSL, LFF drive tray, dense intermix drive tray	3.5-type: 393.85, 1152.79, 3916.14, 5874.22

Item	Component	Specification
	FMD drive tray	Flash Module Drive: 1759.21, 3518.43
Rotational speed (min^{-1})	CBSS, SFF drive tray	Flash drive, 2.5-type: 196.92 GB, 393.85 GB 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
	CBSL, LFF drive tray	Flash drive, 3.5-type: 393.85 GB 3.5-type: 1152.79 GB, 10,000 RPM 3.5-type: 3916.14 GB, 7,200 RPM 3.5-type: 5874.22 GB, 7,200 RPM
	FMD drive tray	Flash Module Drive: 1759.21 GB, 3518.43 GB
Maximum number of drives that can be mounted	CBSS	24 drives
	CBSL	12 drives
	SFF drive tray	FMD drive tray
	LFF drive tray	12 drives
	FMD drive tray	12 drives
	Dense intermix drive tray	60 drives
Maximum number of spare drives		16

Host interface

Item	Component	Specification
Interface type	Fibre Channel optical	8 Gbps, 16 Gbps
	Optical iSCSI	10 Gbps
Data transfer speed (maximum speed for transfer to host)	Fibre Channel optical	800 Mbps
	Fibre Channel optical	1600 Mbps
	Optical iSCSI	1000 Mbps
Number of ports	8-Gbps Fibre Channel optical	16
	16-Gbps Fibre Channel optical	4
	10-Gbps optical iSCSI	8
Transferred block size	N/A	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.

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 (using the LDEVs of other storage systems: 4 TB)
Maximum volumes/host groups and iSCSI targets	2048
Maximum volumes/parity groups	2048

Internal logic specifications

Item	Component	Specifications
Control 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 22.2 x 3.5 inches (482 x 565 x 88.2 mm)
	SFF drive tray	WxDxH: 19 x 30 x 3.42 inches (483 x 762 x 87 mm)
	LFF drive tray	WxDxH: 19 x 30 x 3.42 inches (483 x 762 x 87 mm)
	FMD drive tray	WxDxH: 19 x 40.5 x 7 inches (482 x 1,029 x 176 mm)
	Dense intermix drive tray	WxDxH: 17.55 x 33.85 x 6.9 inches (446 x 860 x 175.3 mm)
Mass (approximate)[2]	CBSS	97 lbs (44 kg)
	CBSL	101.4 lbs (46 kg)
	SFF drive tray	51 lbs (23 kg)
	LFF drive tray	59.5 lbs (27 kg)
	FMD drive tray	84 lbs (38 kg)
	Dense intermix drive tray	198 lbs (90 kg)
Required height	CBSS, CBSL	2
	SFF drive tray	2
	LFF drive tray	2
	FMD drive tray	2
	Dense intermix drive tray	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.

Cache specifications

Item	Specifications
Capacity (GB)	64 GB
Control Method	Read LRU, Write after
Battery backup	Provided

Item	Specifications
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

Electrical specifications

Item	Controller	Drive tray
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	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

Item	Controller	Drive tray
Current rating of breaker/fuse (A)	16.0	
Heat value (normal) (kJ/h)	CBSS: 1800 or less CBSL 1550 or less	SFF drive tray: 1120 or less LFF drive tray: 940 or less FMD drive tray: 1300 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	SFF drive tray: 480/460 or less LFF drive tray: 380/350 or less FMD drive tray: 520/470 or less Dense intermix drive tray: 1200/1160 or less
Power consumption (VA/W)	CBSS: 520/500 or less CBSL: 450/430 or less	SFF drive tray: 320/310 or less LFF drive tray: 280/260 or less FMD drive tray: 380/360 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.

Environmental specifications

Temperature

State	Controller	SFF, LFF drive trays	FMD 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)	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 122°F (-10°C to 50°C)	14°F to 95°F (10°C to 35°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 122°F (-30°C to 50°C)	-22°F to 140°F (-30°C to 60°C)

State	Controller	SFF, LFF drive trays	FMD drive trays	Dense intermix drive tray
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	SFF and LFF drives	FMD drive	Dense intermix drive tray
Operating (m)	3,000 (Environmental temperature: 10°C to 32°C) 900 (Environmental temperature: 32°C to 40°C)	3,000 (Environmental temperature: 10°C to 32°C) 0 (Environmental temperature: 32°C to 35°C)	3,000 (Environmental temperature: 10°C to 28°C) 1,000 (Environmental temperature: 28°C to 35°C)	Depends on specifications of installed devices shown at left.
Non-operating (m)	-60 to 12,000	N/A	N/A	N/A

Atmosphere

Avoid areas exposed to corrosive gas and salty air.

Acoustic Noise

Controller	SFF, LFF	FMD	Dense intermix drive tray
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]	72 dB (Environmental temperature 32°C or less)[1, 2, 3, 4]
60 dB	60 dB	71 dB (Environmental temperature 32°C or less)[1, 2, 3, 4]	72 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.
4. When accessing the dense intermix drive tray, do not work for long times at the rear of the rack.

Battery specifications

The following table shows the lifetime expectancy of the batteries installed in the storage system.

Storage system intake temperature	CBSS	CBSL	CBLM/CBLH
Up to 75.2º F (24º C)	5 years	5 years	5 years
Up to 86º F (30º C)	5 years	4 years	5 years

RAID specifications

Item		Controller	SFF, LFF, dense intermix drive tray (range for setup)
RAID level		SAS, SAS 7.2k, flash drives mounted: 1, 5, 6	
RAID configuration (unit of addition)	RAID 1	2D+2D, 4D+4D	
	RAID 5	3D+1P, 4D+1P, 6D+1P, 7D+1P	
	RAID 6	6D+2P, 12D+2P, 14D+2P	

Note: Although certain RAID configurations support redundancy in the event of a drive failure, best practices dictate that you back up data on a regular basis.

iSCSI specifications

Item	Specification	Comments
iSCSI target function	Supported	N/A
iSCSI target function	Supported	TrueCopy® only
iSCSI ports	2 per interface board	Maximum 32 per iSCSI system
Host connections	255 (maximum per iSCSI port)	With Linux software initiator, the maximum number decreases.
Path fallover	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

Item	Specification	Comments
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	N/A
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
Data digest	Supported	

Item	Specification	Comments
		performance degrades. The amount of the degradation depends on factors such as host performance of host and transaction pattern.
Maximum iSCSI connections at one time	255 per iSCSI port	N/A
CHAP	Supported	Authentication: login request is sent properly from host to 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 Microsoft 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.

Standard	Specification	Mark on the product	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	CEmarking	EU
	EN5524: 2010	CEmarking	EU
	EN61000-3.2:2006+A1 +A2	CEmarking	EU
	EN61000-3.3:2008	CEmarking	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	CEmarking	EU
Radio interference voluntary control	VCCI V-3/2013.04	VCCI	Japan

Dense intermix drive tray connection restrictions

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.

SVP hardware specifications

The following table lists the SVP hardware specifications.

Item	Specification
Dimensions	Height: 1.7 inches (43 mm) Width: 17.2 inches (437 mm) Depth: 14.5 inches (369 mm) Weight: 14 lbs (6.4 kg)
Processor	Celeron G1820 2.7 GHz 2M, 2C, 2T
Memory	8 GB RAM DDR3
Hard drive	2 TB
Network interface card	x4 ports (on-board NIC) + x1 IPMI (BMC) port
Rated AC voltage	100-240 V, 50-60 Hz, 4.2 - 1.8A
Power supply	350 Watt AC power supply w/ 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 • Europe/CE Mark • EN 60950/IEC 60950-Compliant
Fans	2x 4cm 4-pin PWM fans
Operating system	Microsoft Windows Embedded Standard 7
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)

D

Cables

- Fibre Channel cables
- iSCSI cables
- AC power cables

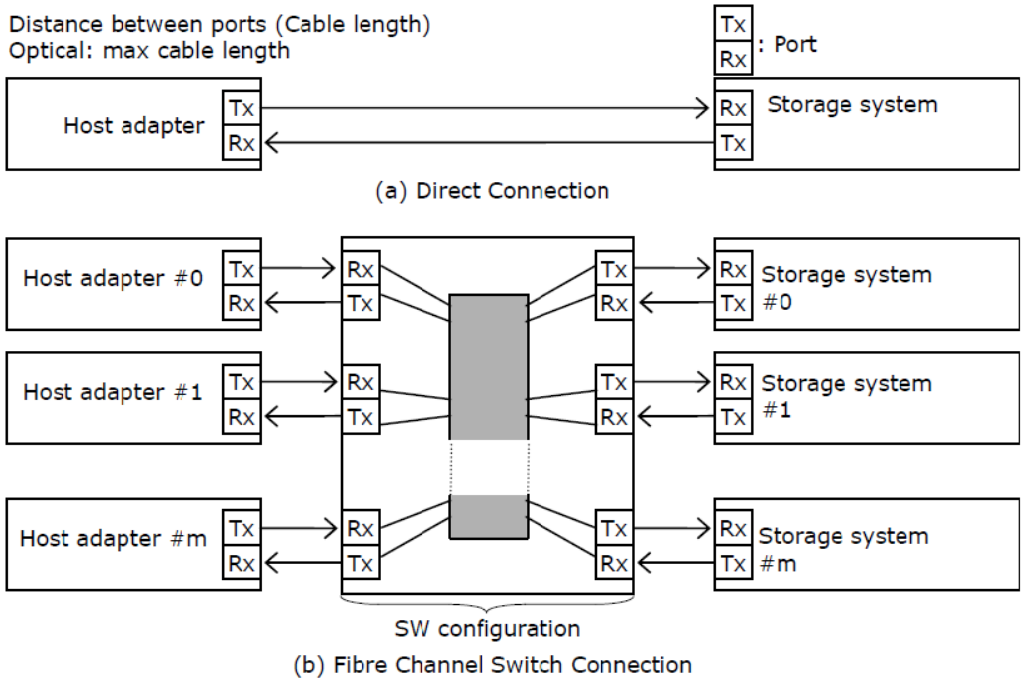
Fibre Channel cables

When constructing a system with the direct connection or Fibre Channel switch connection, consider the following:

- If you connect a storage system directly to a host adapter, set the `Loop` value to Fibre Channel topology. 16 Gbps Fibre Channel does not support Loop.
- If you connect a storage system to a fibre channel switch, set the `Point to Point` value to Fibre Channel topology. The 16 Gbps Fibre Channel does not support Point to Point connection to a host server.

Topology direct connection	16 Gbps Point to Point	8 Gbps Loop Point to Point	4 Gbps Loop Point to Point	2 Gbps Loop
Switch connection	Point to Point	Point to Point	Point to Point	Point to Point

- Because high-speed serial data transfer is performed via Fibre Channel, use high-quality Fibre Channel cables that conform to the Fibre Channel-PH standard.

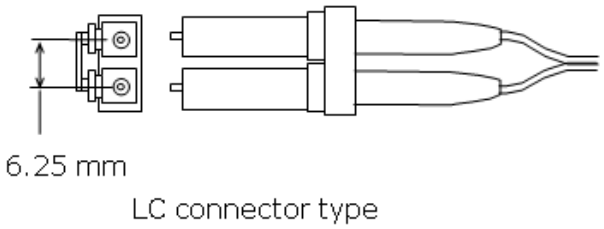


Data transfer rate	Maximum length of cable			
	Multimode cable			Single mode cable
	OM2	OM3	OM4	
2 Gbps	984.25 ft (300 m)	1640.4 ft (500 m)	—	3280.8 ft (10 km)
4 Gbps	493 ft (150 m)	1246.72 ft (380 m)	1312.3 ft (400 m)	
8 Gbps	164.04 ft (50 m)	493 ft (150 m)	623.36 ft (190 m)	
16 Gbps	114.8 ft (35 m)	328.08 ft (100 m)	410.1 ft (125 m)	

The following table lists specifications of the Fibre Channel interface cable.

Cable type	Interface	Cable mode name	Nominal		
			Cable	Connector	
				One side	Other side
LC-LC cable	Optical	Equivalent to DXLC-2P-PC-xxM-GC50, 125-2SR (OMx)	50, 125 µm, 62.5, 125 µm Multimode Wavelength; 850 nm	LC connector	LC connector

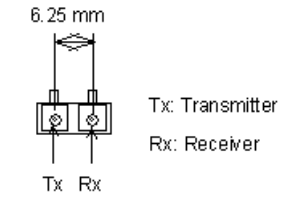
The following figure shows the connector used for optical interfaces.



LC connector type

The following figure shows the type of optical connector that connects the storage system Fibre Channel ports.

- LC connector type
- **Connector type:** LC duplex receptacle connector
- **Interval:** 6.25 mm flat type, two rows



LC connector type

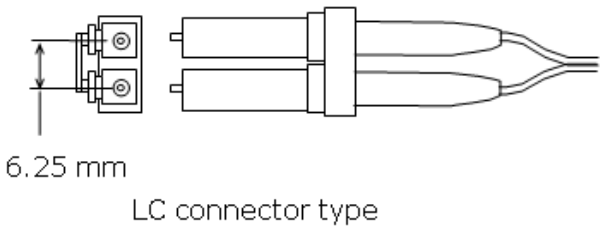
iSCSI cables

This section describes typical iSCSI cable lengths for a given type of connection.

Data transfer rate	Maximum length of cable			
	Multimode cable			Single mode cable
	OM2	OM3	OM4	
10 Gbps (FCoE)	269.02 ft (82 m)	984.25 ft (300 m)	1804.46 ft (550 m)	—

Cable type	Interface	Cable mode name	Nominal		
			Cable	Connector	
				One side	Other side
LC-LC cable	Optical	Equivalent to DXLC-2P-PC-xxM-GC50, 125-2SR (OMx)	50, 125 mm Multimode Wavelength: 850 nm	LC connector	LC connector

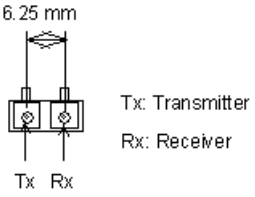
The following figure shows the connector used for optical interfaces.



LC connector type

The following figure shows the type of optical connector that connects the storage system optical iSCSI ports.

- LC connector type
- **Connector type:** LC duplex receptacle connector
- **Interval:** 6.25 mm flat type, two rows



LC connector type

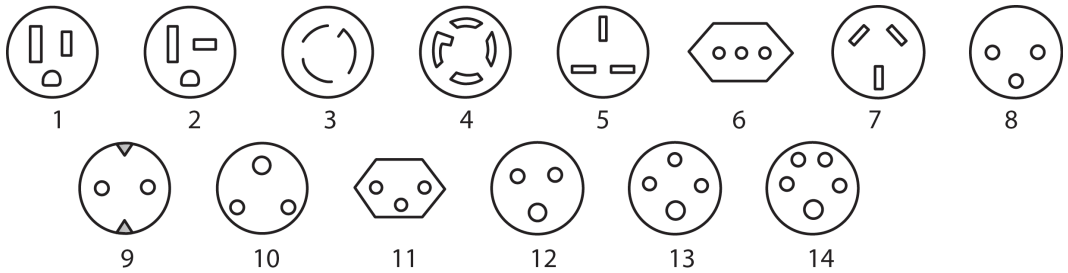
AC power cables

Utility AC power standards for connector types and voltage levels vary by country. Hitachi provides a variety of power cables that facilitate using storage systems around the world. Hitachi power cables meet the safety standards for the country for which they are intended.

Power cable assemblies

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.



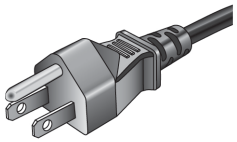
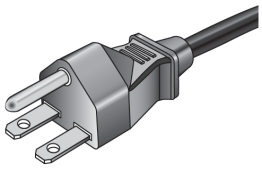
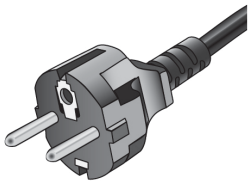
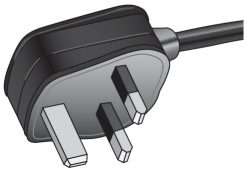
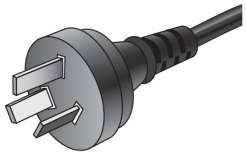
Number	Countryor region	Plug type	Voltage rating (VAC)	Current rating (amperes)
1[1]	North America	100-127	15	NEMA 5-15P
	Brazil	200-240	10, 20	NEMA 5-15P
	Japan	100-127	12	JIS C8303
	Taiwan	100-127	12, 16	CNS 690
2	North America	100-127	20	NEMA 5-20P
3	North America	200-240	20	NEMA L6-20P
4[2]	North 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
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
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

Power cable usage guidelines

Hitachi storage systems are intended for rack installation and ship with power cords. Installation and service requirements may require additional cords and

cables to be ordered. The type of power cable required by a given installation is determined primarily by the:

- Type of AC line feed provided by the facility.
- Type of AC source (wall outlet or modular and monitored PDU) to be used.
- Serviceability of components to be connected.

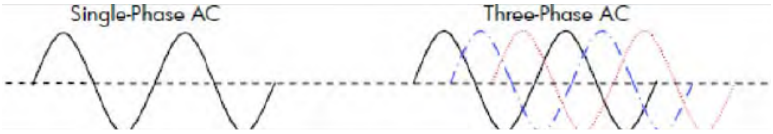
Storage systems require a country-specific power cable for direct connection to a facility AC feed.

Storage systems are designed to allow replacement of hot-pluggable components without removing the chassis from the rack. As a result, power cables can be short because cable movement is of minimal consideration.

Three-phase power considerations for racks

Increasing power requirements for racks are making the use of three-phase power at the rack level compelling.

- With single-phase power, at any given time the voltage across the hot and neutral conductors can be anywhere between its peak (maximum) and zero. Electrical conductors must be large to meet high amperage requirements.
- Three-phase power uses three cycles that are 120 degrees out of phase, which never allows the voltage to drop to zero. The more consistent voltage derived from the three hot conductors results in smoother current flow and allows small-gauge conductors to be used to distribute the same amount of AC power. As a result, the load balancing and increased power handling capabilities of three-phase distribution can result in more efficient and less costly installations that require fewer AC cables and PDUs.



Cable management

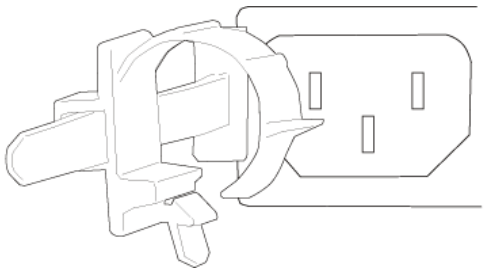
Rack installations should be planned for operational efficiency, ease of maintenance, and safety. Hitachi offers the Backend Configuration Utility (BECK), a graphical, cable-management application that can relieve the typical cable congestion created when populating a rack with storage systems and their accessories.

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.



Port address mapping

- Port address mapping

Port address mapping

For the port address (AL_PA) of each fibre channel port of the Hitachi Virtual Storage Platform G200, G400, G600, EF is set. You do not have to change the AL_PA because the storage system port can connect to the host bus adapter (HBA) with the current setting.

To change the AL_PA, select the value described in the following table.

When setting a value not described in the following table, or when setting a value already used by the HBA, the host might not be able to recognize the VOL. If this problem or other problems occur, restore the value to the default value of EF

EF*	CD	B2	98	72	55	3A	25
E8	CC	B1	67	7	64	39	23
E4	CB	AE	90	6E	53	36	1F
E2	CA	AD	8F	6D	52	35	1E
E1	C9	AC	88	6C	51	34	1D
E0	C7	AB	84	6B	4E	33	1B
DC	C6	AA	82	6A	4D	32	18
DA	C5	A9	81	69	4C	31	17
D9	C3	A7	80	67	4B	2E	10
D6	BC	A6	7C	66	4A	2D	0F
D5	BA	A5	7A	65	49	2C	08
D4	B9	A3	79	63	47	2B	04
D3	B6	9F	76	5C	46	2A	02
D2	B5	9E	75	5A	45	29	01
D1	B4	9D	74	59	43	27	N/A
CE	B3	9B	73	56	3C	26	N/A
* A value set as the default value.							

F

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.

- System requirements
- Drive tray specifications
- Installing the BECK tool
- Uninstalling the BECK tool
- BECK tool at a glance
- Starting the BECK tool
- BECK tool configuration screen
- Working with cable figures
- Expanding a configuration
- Saving and loading a configuration file
- BECK tool messages
- Special guidelines

System requirements

To use the BECK tool, verify the following system requirements.

Item	Description
Operating system	Microsoft Windows XP (x86), Windows Vista (x86) or Windows 7 (x86)
Available disk space	5 MB or more for installation. At least 100 MB if the simple trace function will be used.
Memory	1 GB or more is recommended. We recommend you close memory-intensive programs before using the BECK tool.
Related file	To use the simple trace function, place the file `UNLHA32.DLL` in the Windows system folder.
Screen resolution	1280 x 700, 96 DPI or less is recommended. For Windows XP (x86) English version, the screen resolution of 1280 x 1024 or more is recommended.

Drive tray specifications

Model	Drive count	Unit size (U)	Path	Number of drive tray connections				Maximum number of drives[1]	Maximum number of drives per path
				LFF drive tray	SFF drive tray	FMD drive tray	Dense intermix drive tray		
VSP G200	2.5 inch : 24	2	1	7	8	7	4	264[2]	264[2]
	3.5 inch : 12	2	1	8	7	7	4	252[2]	252[2]
VSP G400	-	4	2	16	16	16	8	480	240
VSP G600	-	4	2	24	24	24	12	720	360
Notes:									

Model	Drive count	Unit size (U)	Path	Number of drive tray connections				Maximum number of drives[1]	Maximum number of drives per path
				LFF drive tray	SFF drive tray	FMD drive tray	Dense intermix drive tray		

1. The maximum number of drives may be limited depending on the mounting pattern when LFF, SFF, FMD, or dense intermix drive trays are used together
2. A drive tray in the unit and four dense intermix drive trays are connected.

Installing the BECK tool

Procedure

1. In a new (empty) folder, place the file `BECK_Tool_wxyz.zip`, where *wxyz* represents the BECK version number.
2. Double-click the zip file.
   A `BECK_Tool_wxyz` subfolder is created automatically within the folder where the zip file is located, and `BECK_Tool.exe` and initialization (`INI`) files are displayed in the folder.

   Note: Do not move the `INI` files from the folder or change the `INI` file names or `INI` file contents.

3. To verify that the BECK tool is installed, double-click the executable file `BECK_Tool.exe` in the `BECK_Tool_wxyz` folder to start the BECK tool.
4. Confirm that the **Language** dialog box appears.

Uninstalling the BECK tool

Procedure

1. Confirm that the computer is operating normally.
2. If the BECK tool is running, stop it.
3. If there are files in the `BECK_Tool_wxyz` subfolder that you want to keep, copy them to another folder.
4. Delete the `BECK_Tool_wxyz` subfolder containing the `BECK_Tool.exe` and INI files.

BECK tool at a glance

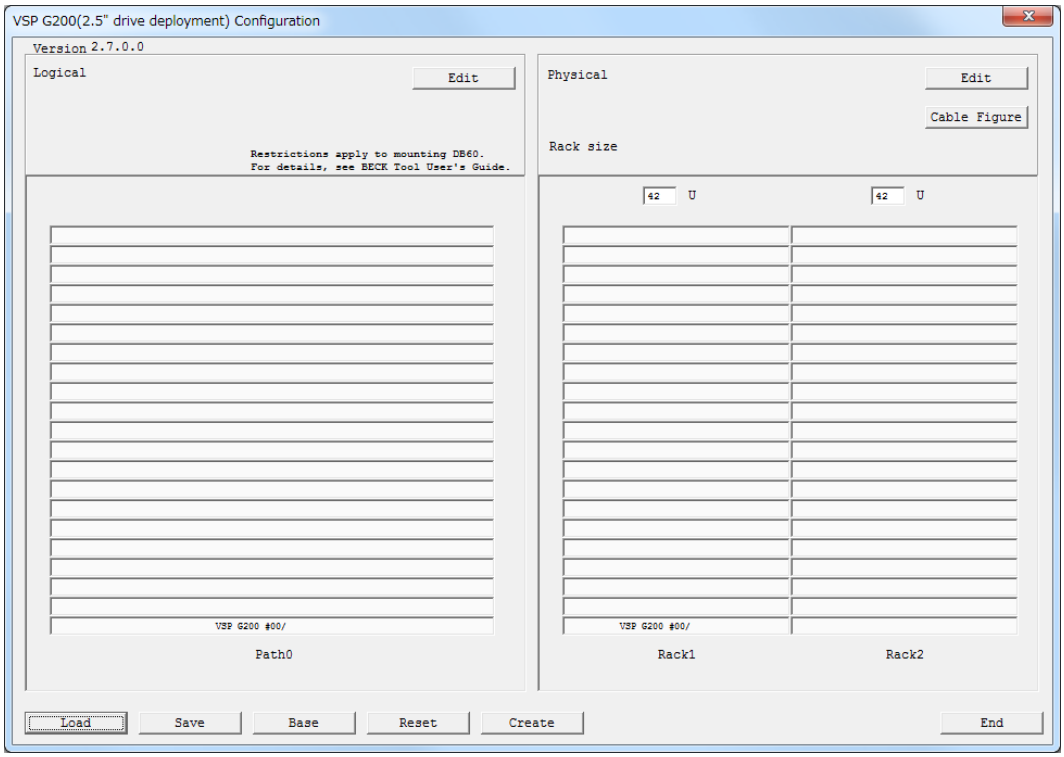
Procedure

1. Select a language from the **Language** dialog box.
   - English
   - Japanese
2. At the **Array Unit Type** dialog box, click an array unit type or enter a box code of up to 8 alphanumeric characters.

   You can enter the serial unit number and an optional name as the box code. A configuration screen appears that corresponds to the array unit type selected in the **Array Unit Type** dialog box.
3. Create logical and physical configuration figures.
   - Automatically by specifying the number of units.
   - Manually by entering values in supplied fields.

   Configurations can be expanded after you create them. You can also expand a configuration loaded from simple trace in step 2. At the **Array Unit Type** dialog box, select a storage system array unit type and load an existing configuration. Configurations in the configuration file for the BECK tool can also be loaded and saved.

4. A cable figure appears based on the logical and physical configuration figures.



Starting the BECK tool

Procedure

1. Store the executable file on your computer's desktop.
2. In the `BECK_Tool_wxyz` folder, run the BECK executable file `BECK_Tool.exe`.
3. At the **Language** dialog box, click a language, and then click **OK**.
   The selected language will be used in the subsequent screens.
4. At the **Array Unit Type** dialog box, perform one of the following steps:
   - Click a storage system from the menu.
   - Enter the system's box code, up to 8 alphanumeric characters. Or enter the system's serial unit number and optional name as the box code.
5. Click **OK**.
   The configuration screen appears.

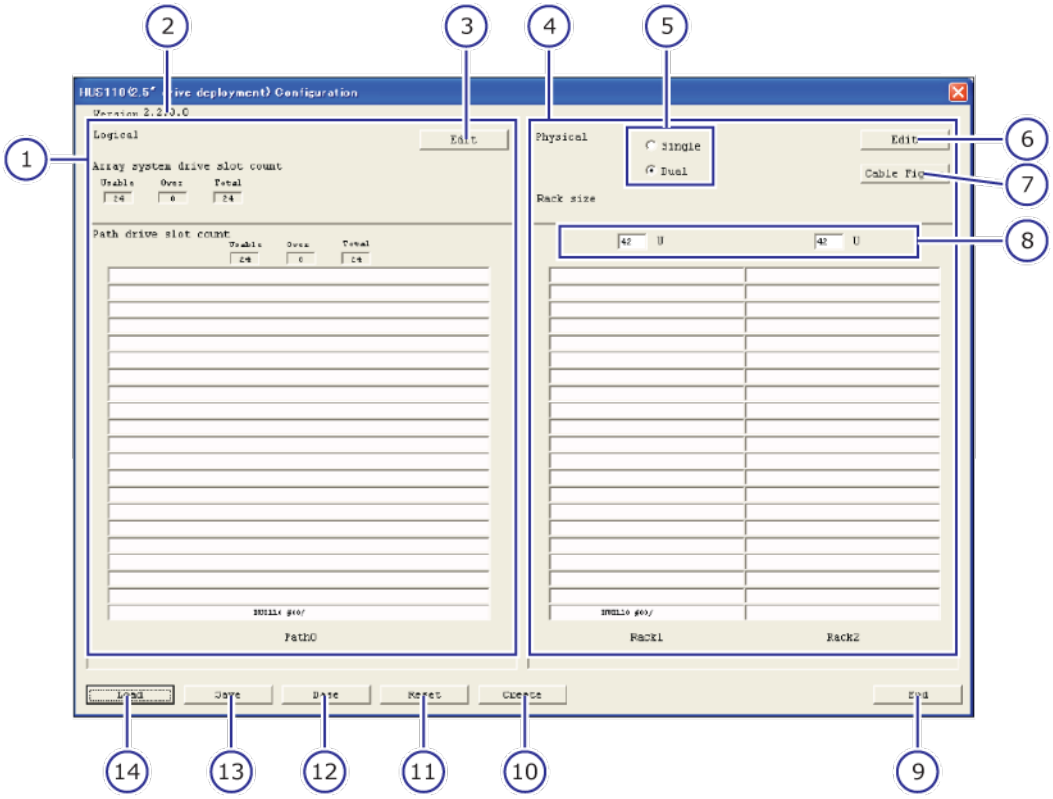
BECK tool configuration screen

The configuration screen consists of Logical and Physical areas:

- **Logical:** At the left side, shows logical path information about the storage system. To activate this area, click any of the fields in the path columns. When the message asks whether the physical configuration should be initialized, click OK.
- **Physical:** At the right side, shows rack information about the storage system. To activate this area, click any field in the rack columns. When the message asks whether the logical configuration should be initialized, click OK.

Only one side, Logical or Physical, can be active at a time. The background of the Logical or Physical area turns light green to show it is activated.

Understanding the BECK tool configuration screen



Number	Name	Description
1	Logical	Displays units, unit IDs, and box codes in each path.
2	Version	Shows the BECK tool version.
3	Edit button	Click the button to edit the logical configuration figure manually.
4	Physical	Displays units, unit IDs, and box codes in each rack. The number of racks vary, depending on the controller.
5	Single and Dual buttons	N/A
6	Edit (Physical)	Lets you edit the physical configuration figure manually.
7	Cable figure button	Displays the SAS (ENC) cable figure
8	Rack size	Size of each rack, specified in 0 to 42 U.
9	End button	Closes the configuration screen.
10	Create button	Creates the configuration edited in the logical and physical configuration figures. Displays units, unit IDs, and box codes in the logical and physical configuration figures.
11	Reset button	Resets the created configuration (units, unit IDs, and box codes). If you load a simple trace, clicking this button redisplays the configuration screen that was shown after the simple trace was loaded. If loading a configuration information file, the configuration screen displayed after the configuration information file was loaded is redisplayed.
12	Base button	Displays units and unit IDs in the Logical and Physical configuration figures automatically created after you enter the number of LFF, SFF, FMD, and dense intermix drive trays.

Number	Name	Description
13	Save button	Saves configuration information to a CSV file.
14	Load button	Loads configuration information from a CSV file.

Creating new configurations

Using the BECK tool, you can create new configuration diagrams automatically or manually.

Creating a configuration automatically

You can use the BECK tool to create a configuration automatically by entering a drive tray value.

Procedure

1. In the configuration screen, click **Base**.
2. At the **Number of Drive Box** dialog box, change the values shown for the number of drive trays.
3. Click **OK**.
   Using the entered values, the BECK tool generates logical and physical configuration figures. Drive trays are added to a path and rack for each storage system in the following order: FMD, dense intermix drive tray, SFF to LFF
4. Click **Cable Figure**.
   A cable figure is displayed based on the logical and physical configuration.

Creating a configuration manually

An alternative to creating a configuration automatically is to create a configuration manually by entering the drive trays in the logical or physical configuration figure.

Procedure

1. In the logical or physical figure of the configuration screen, click the **Edit** button or left-click the areas of the logical or physical configuration figure.
2. If you clicked **Edit** in the physical figure, the message `May logical configuration figure be initialized?` appears. Click **OK** to remove the message.
3. All the units, unit IDs, and box codes in the logical configuration figure are cleared and the physical configuration figure is highlighted in light green. Right-click an empty box in a rack.

The clicked box is highlighted in orange and the **Select Box** dialog box appears.

4. In the **Select Box** dialog box, click the desired drive tray.
   - You can optionally enter a box code for the selected drive tray in the Enter box code (optional) field.
5. Click **OK**.
   The selected drive tray appears in the box you clicked in the physical configuration figure.
6. Click **Create**.
   The logical configuration figure is updated based on the changes made. Unit IDs are assigned automatically.
7. Click **Cable Figure**.
   The BECK tool creates and displays a cable figure based on the logical and physical configuration figure.

Editing the logical configuration figure

Procedure

1. In the logical configuration figure, click **Edit**, or click the area in the logical configuration figure.
2. When the message `May physical configuration figure be initialized?` appears, click **OK** to remove the message.
   All the units, unit IDs, and box codes in the physical configuration figure are cleared, and the logical configuration figure is highlighted in light green.

From this screen, you can:

- Assign units to a path.
- Move and exchange drive trays.

Assigning units to a path

When you assign units to a path in the logical configuration figure, you can:

- Set a unit in an empty box in a path (described below).
- Change or delete a drive tray in the path.
- Edit storage system controller box codes.

Setting a unit in an empty box in a path

Procedure

1. Right-click an empty box in a path when the logical configuration figure can be edited.
   The clicked box is highlighted in orange and the **Select Box** dialog box appears.

2. In the **Select Box** dialog box, click the desired drive tray.
   - You can optionally enter the box code for the selected drive tray in the **Enter box code (optional)** box.
3. Click **OK**.
   The selected drive tray appears in the box in the logical configuration figure.

Changing or deleting a drive tray in a path

Procedure

1. Right-click a drive tray in the path.

   If you change the type of drive tray type, the existing drive tray is changed or deleted. You can also edit the box code.

   The selected drive tray is highlighted in orange and the **Select Box** dialog box appears. The **Select Box** dialog box shows the selected drive tray. A box code is also displayed if you registered the system. If you change the Drive Box type, the existing Drive Box is changed or deleted. You can also edit the **Box Code**.

Editing box codes for a controller (VSP G200 only)

Procedure

1. In the logical configuration figure, right-click a controller in the path or a box where you want to set a controller (bottom box of the logical configuration figure).
2. The box is highlighted in orange and the **Select Box** dialog box appears, with a controller and box code displayed. If you registered the drive tray, the displayed box code can be edited. If no controller appears in the configuration screen, click **OK** to add a controller to the configuration screen.
3. From here, you can:
   - Assign a unit in an empty box in a path.
   - Change or delete a drive tray in a path.
   - Assign controllers and edit their box codes.



Note: If you click **Cable Figure** after creating configuration figures, the cable figure appears. You can also display the cable figure by clicking **Cable Figure** without first creating configuration figures.

Moving and exchanging drive trays

When editing the logical configuration figure, you can move and exchange units by dragging and dropping them in the logical configuration figure in ascending order in paths.

Procedure

1. Click an existing drive tray in the path.
   The existing drive tray is highlighted in orange.
2. Click the existing drive tray.
3. Drag the existing drive tray to the destination drive tray.
   An empty tray can be the destination; however you cannot specify a controller and empty trays for controller as the destination.
   Drive trays are exchanged, the box is highlighted in orange, and the unit ID and box code are exchanged accordingly.
4. After moving and exchanging units by dragging and dropping them, click **Cable Figure** to display the cable figure.



Note: Cable Figure also lets you display the cable figure without first creating configuration figures.

Editing the physical configuration figure

Procedure

1. In the physical configuration figure, click **Edit** or click the physical configuration figure.
2. When the message `May logical configuration figure be initialized?` appears, click **OK** to remove the message.
   All the units, unit IDs, and box codes in the logical configuration figure are cleared. The physical configured figure is highlighted in green.
3. From this screen, you can:
   - Set rack size.
   - Assign units to a rack or set up an empty rack box.
   - Move and exchange units.

Setting the rack size

You can specify the rack size in the physical configuration figure. Rack sizes are specified in 0 to 42 U. The default setting is 42 U. You can also set the rack size when you are not editing the physical configuration figure.

The following sizes are represented by a box in the physical configuration:

- **VSP G400 and G600:** 4[U]

- **VSP G200:** 2 [U]
- **LFF, SFF, and FMD drive trays:** 2 [U]
- **Dense intermix drive tray:** 4 [U]
- **Empty:** 2 [U]

Setting units to a rack or an empty rack box

Setting units to a rack or an empty rack box in Physical, you can:

- Set drive tray in an empty rack.
- Change or delete a drive tray.
- Edit a controller box code.

Setting a drive tray in an empty rack box

Procedure

1. Right-click an empty box for racks when the physical configuration figure can be edited.
   The selected box is highlighted in orange and the **Select Box** dialog box appears.
2. In the **Select Box** dialog box, click the desired drive tray.
   - You can optionally enter a box code for the selected drive tray in the **Enter box code (optional)** field.
3. Click **OK**.
   The selected drive tray appears in the box.

Changing or deleting a drive tray

Procedure

1. Right-click a drive tray in the rack.
2. The selected drive tray is highlighted in orange and **Select Box** dialog box appears. The button of the drive tray corresponds to the drive box type you selected.
   - If you registered the drive tray, a box code is also displayed.
   - If you change the drive tray type, the drive tray is changed or deleted. You can also edit the box code.

Setting a controller or editing its box code

Procedure

1. Right-click a controller in Rack1 or right-click an empty box in the rack area if no controller is displayed.
2. The box is highlighted in orange and the **Select Box** dialog box appears, with the controller and its box code is displayed.
   - If you registered the controller, a box code is displayed and can be edited.

- If the configuration screen does not display a controller , click **OK** to add a controller to the configuration screen.

Controller can be added only in Rack 1.

3. From this screen, you can:
   - Set a drive tray in an empty rack box.
   - Change or delete a drive tray.
   - Set a controller or edit its box code.

   If you click **Cable Figure** after creating configuration figures, the cable figure is displayed. You cannot add a drive tray below the controller.



Tip: Cable Figure also lets you display the cable figure without first creating configuration figures.

Moving and exchanging units

Procedure

1. Click an existing drive tray in the rack.
   The existing drive tray is highlighted in orange.
2. Drag the existing drive tray to the destination drive tray.

   An empty tray can be the destination, but you cannot specify a controller and empty trays for the controller as the destination. You can also drag one to an empty tray or a controller in Rack 1 only.

   Drive trays are exchanged, the box is highlighted in orange, and the unit ID and the box codes are exchanged accordingly.
3. After moving and exchanging units by dragging and dropping them, click **Cable Figure** to display the cable figure. You can also display it by clicking **Cable Figure** without creating the configuration figure. You cannot add drive trays below the controller.

Working with cable figures

The Cable Figure screen shows logical and physical configuration figures.

The total number of racks that can be shown are:

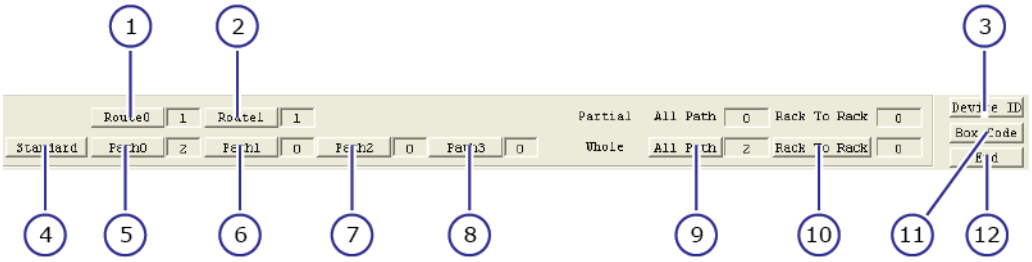
- **VSPG400 or G600:** 10
- **VSP G200:** 3

Sizes

The following sizes are represented by a box for a rack in the **Cable Figure** screen.

- **VSP G400 or G600:** 4 [U]
- **VSP G200:** 2 [U]

Buttons and fields



Number	Name	Description
1	Route0	Highlights of SAS (ENC) cables connected to the unit of controller 0.
2	Route 1	Highlights of SAS (ENC) cables connected to the unit of controller 1.
3	unit ID	Shows or hides unit IDs (Default: on).
4	Standard	Clears all highlighted SAS (ENC) cables in the Cable Figure screen.
5	Path0	Hightlights SAS (ENC) cables connected to Path0.
6	Path1	N/A
7	Path2	N/A
8	Path3	N/A
9	All Path	Highlights SAS (ENC) cables connected to all the paths.
10	Rack to Rack	Highlights SAS (ENC) cables connected between racks.
11	Box Code	If box codes are assigned to units, clicking this button shows or hides the box codes.
12	End	Closes the Cable Figure screen.

Working with cable figures

Procedure

1. Click **Standard** to remove highlights from the SAS (ENC) cables.

2. Click **Path0** to highlight SAS (ENC) cables of the unit connected to Path0.
3. Click **All Path** to highlight SAS (ENC) cables connected to all paths.
4. Click **Rack to Rack** to highlight the SAS (ENC) cables connected between racks.
5. Click **Route0** to highlight the SAS (ENC) cables of the unit connected to the controller0.
6. Click **Route1** to highlight the SAS (ENC) cables of the unit connected to controller1.
7. Click **Device ID** to display unit IDs.

   Use this toggle button to show or hide unit IDs. The box code can be used regardless of this setting.
8. If the box codes are registered, click **Box Code** to display the box codes.

   Use this toggle button to show or hide box codes. You can use the **Device ID** button regardless of whether box codes are shown or hidden.
9. If both the **Device ID** and **Box Code** are on, unit IDs and their box codes are displayed.
10. Click **End** to close the **Cable Figure** screen.

Working with cable figures in rack boxes

Procedure

1. Click a drive box in a rack box.
2. The selected unit is highlighted in orange and the units connected to the selected unit are displayed in white. SAS (ENC) cables connected to the selected unit are highlighted. **All Path of Partial** indicates the number of SAS (ENC) cables connected to the selected unit. **Rack to Rack** indicates the number of SAS (ENC) cables connected to the selected unit spanning between racks.

Expanding a configuration

Using the BECK tool, you can expand a configuration by loading a simple trace (refer to the *Hardware Service Guide*). To load simple traces, place the `UNLHA32.DLL` file in the Windows system folder.

Procedure

1. Store the executable file on your computer's desktop.
2. In the `BECK_Tool_wxyz` folder, run the BECK executable file `BECK_Tool.exe`.
3. At the **Language** dialog box, click a language, and then click **OK**. The selected language will be used in the subsequent screens.
4. At the **Array Unit Type** dialog box, click the **Load Log** button.

5. In the **Open** dialog box, select the simple trace file (*.dat file format).
   - If the trace file is stored in another directory, select the trace file belonging to the storage destination.
   - If one simple trace file is collected for a storage system, select the trace file of the load target.
   - If the trace file resides in another directory, when one simple trace file is collected in the storage system, select the trace file of the load target.
   - If there are multiple simple trace files, selecting an optional trace file loads the other trace files automatically. If the other simple trace file resides in the same directory, a load error occurs.

   Note: The trace file can be renamed, but its contents must not be changed.

   A **Rack size** dialog box appears.
6. Enter the size of each rack and click **OK**.

   Default size is 42 U.

   If the simple trace loads successfully, the existing configuration appears in the logical and physical configuration figures, along with the unit IDs and box codes.
7. Expand the existing configuration.
8. Edit the logical or physical configuration figure in the configuration screen.

   Click **Edit** in the logical configuration figure or click in the logical configuration figure.
9. At the message `May physical configuration figure be initialized?`, click **OK**.
   All the units, unit IDs, and box codes in the physical configuration figure are cleared and the logical configuration figure is highlighted in light green.
10. Right-click an empty box in a path.
    The selected box is highlighted in orange and the **Select Box** dialog box appears.
11. In the **Select Box** dialog box, click the desired drive tray.

    You can optionally enter the box code for the selected drive tray.
12. Click **OK**.
    The selected drive tray is displayed in the box in the logical configuration figure.
13. Click **Create**.
    Changes made are displayed in the physical configuration figure. Unit IDs are assigned automatically.
14. Click **Cable Figure** to display the cable figure based on the expansion.

Note: If you click **Reset** after editing the loaded configuration, the **Configuration** screen refreshes immediately.

Simple trace default file name

A simple trace default file uses the following naming convention:

`smpi_trc#_`**`xxxxxxxxxx`**`_YYYYMMDDhhmmss_$%.dat`

Part	Description
#	Controller number for trace target (0 or 1)
xxxxxxxxxx	Serial unit number
YYYMMDDhhmmss	Trace collecting start time (year, month, date, hour, minute, second)
$	Trace file serial number (0, 1, 2, ...)
%	Trace file split discriminator: • **S:** start file • **C:** center file • **E:** end file

Saving and loading a configuration file

Using the BECK tool, you can save the configuration as a CSV file. After you save a configuration file, you can load it when you want to use the data contained in the file.

Saving a configuration file

If you save the configuration information while editing the configuration, the file is saved with the array unit configuration unchanged.

Procedure

1. In the configuration screen, click **Save**.
   The **Save As** dialog box appears.
2. In the **Save As** dialog box, select a folder where you want to save the file.
3. Click **Save** to save the file.

   The contents in the Configuration screen are saved in csv format.

About the configuration file

The configuration information is stored with the following default file name:

- If the box code is not entered, the file name consists of the controller box name selected in the **Array Unit Type** dialog box with the extension `.csv`.
- When the box code is entered, the file name consists of the controller box name selected in the **Array Unit Type** dialog box, plus an underscore, plus the box code (up to eight alphanumeric characters), with the extension `.csv`.

Observe the following guidelines when saving a configuration file:
- If you save the configuration information file while editing the configuration in the Logical or Physical configuration figure, the file is saved with the array unit configuration unchanged.

Observe the following guidelines when loading a configuration file:
- If you click Reset after editing a loaded configuration information file, the previous configuration figure screen is recovered.
- If you load the configuration information file that was saved while editing the configuration in the Logical or Physical configuration figure, the array unit configuration displayed in the Logical or Physical configuration figure is unchanged.

Loading a configuration file

Procedure

1. In the configuration screen, click **Load**.
   The **Open** dialog box appears.
2. In the **Open** dialog box, go to the folder that contains the configuration file you want to load.
3. Click the configuration file, and then click **Open**.
   The configuration information contained in the file is displayed in the BECK tool.

BECK tool messages

Message	Corrective action
`DBL has more rack-mountable numbers than allowed.`	Re-examine the unit configuration. Display the **Select Box** dialog box and delete the LFF.
`DBS has more rack-mountable numbers than allowed`	Re-examine the unit configuration. Display the **Select Box** dialog box and delete the SFF.
`DBF has more rack-mountable numbers than allowed`	Re-examine the unit configuration. Display the **Select Box** dialog box and delete the FMD.

Message	Corrective action
DB60 has more rack-mountable numbers than allowed	Re-examine the unit configuration. Display the **Select Box** dialog box and delete the dense intermix drive tray.
The total number of Drive Boxes mountable exceeds its maximum numbers allowed.	Re-examine the unit configuration. Reduce the total number of drive trays within the limit maximum numbers on the **Select Box** dialog box.
The number of installable Drive Boxes exceed its maximum numbers allowed.	Re-examine the unit configuration. Reduce the total number of drive trays within the limit maximum numbers on the **Select Box** dialog box.
Maximum Drive Boxes count per path was exceeded.	Re-examine the unit configuration. Specify the drive tray count per path within the upper limit in the **Select Box** dialog box.
Rack-mountable drive numbers per path are exceeded.	Re-examine the unit configuration. Reduce the total number of drives per path within the limit of maximum drive numbers on the **Select Box** dialog box.
Select one or more Drive Boxes.	In the **Select Box** dialog box, set any input value to more than 1.
More units are set to path 1 than to path 0.	In the Logical configuration figure, set the same number of units to path 0 and path 1, or set one more unit to path 0 than path 1.
More units are set to path 2 than to path 1	In the Logical configuration figure, set the same number of units to path 1 and path 2, or set one more unit to path 1 than path 2.
More units are set to path 3 than to path 2.	In the Logical configuration figure, set the same number of units to path 2 and path 3, or set one more unit to path 2 than path 3.
Two or more units are set to path 0 than path 1.	In the Logical configuration figure, set the same number of units to path 0 and path 1, or set one more unit to path 0 than path 1.
Two or more units are set to path 1 than path 2.	In the Logical configuration figure, set the same number of units to path 1 and path 2, or set one more unit to path 1 than path 2.
Two or more units are set to path 2 than path 3.	In the Logical configuration figure, set the same number of units to path 2 and path 3, or set one more unit to path 2 than path 3.
Unit of path 0 side skips one or more units.	In the Logical configuration figure, do not have space between the units in path 0.
Unit of path 1 side skips one or more units.	In the Logical configuration figure, do not have space between the units in path 1.
Unit of path 2 side skips one or more units.	In the Logical configuration figure, do not have space between the units in path 2.

Message	Corrective action
Unit of path 3 side skips one or more units.	In the Logical configuration figure, do not have space between the units in path 2.
The total size of mounted units exceeds the rack size.	Re-examine the size of each rack or reallocate the units to fit the allowed size of each rack.
The Controller Box location cannot be changed.	The controller location is nontransferable. Do not click there.
Log file loading has failed.	• Provide sufficient space for storing the trace file. • Check access authorization to the folder. • Check whether another application is trying to access the folder that contains the trace file.
Log file contains inaccurate information.	• Confirm whether there are trace files other than the input file in the folder. • Trace file may be corrupt. Re-examine the trace file. • Confirm that the trace file is from a Hitachi Virtual Storage Platform G200, G400, G600.
Configuration information file loading has failed.	• Re-examine the configuration file. • Provide sufficient space for storing the configuration file. • Check access authorization to the folder where the configuration file is located. • Check whether another application is trying to access the folder that contains the configuration file.
Configuration information file saving has failed.	• Provide sufficient space for storing the configuration file. • Check the access authorization to the folder where the configuration file is located. • Check whether another application is trying to access the folder that contains the configuration file. • Check whether the configuration exceeds unit connection support specification 360HDD OFF.
Set the Controller Box.	Set a controller to the logical or physical configuration figure.
The rack sides exceeds the maximum value 42.	Set the rack size to 42 or below.
The rack size of 1 is insufficient.	Set the size of Rack 1 as follows: • **VSP G400, 600:** 4 • **VSP G200:** 2
Set the Drive Box.	Set one or more drive trays.
Unable to set the Drive Box below the controller.	Set a drive box above a controller.
Rack height is insufficient.	Operate it again at the size shown in the maximum unit size screen.

Message	Corrective action
Unable to set at the specified location.	• If DBX-A is selected, do not set it to the highest place of maximum path in the logical configuration figure. • If DBX-B is selected, do not set it to the lowest place of the smallest path in the logical configuration figure. • Set a controller only in Rack 1.
Unable to select because unit exists on right side of the unit.	• Move the unit on the right side of the exchange destination to a different location and then re-execute. • If DBX is specified in the **Select Box** dialog box, be sure the cell on the right side is blank.
Unable to select because unit exists on left side of the unit.	Move the unit on the left side of the exchange destination to a different location, and then re-execute.
Enter box code within 8-alphanumeric characters.	Enter the box code, up to eight alphanumeric characters.
Enter box code within 15 alphanumeric characters.	Enter the box code within 15 alphanumeric characters.
Install UNLHA32.dll in the Windows system folder.	Click the Load Log button after storing the file UNLHA32.DLL in the Windows system folder.
ini file has not stored in program folder, or ini file loading has failed.	• Store the INI file in the BECK_Tool_*wxyz* folder. • Exchange the INI file or the BECK_Tool.exe file.
More than on ini files are stored in the program folder.	Store only one INI file in the BECK_Tool_*wxyz* folder.
One or more setting values in ini file are incorrect.	The INI file may be corrupt. Exchange the INI file.
BECK tool is already running.	Confirm whether the BECK tool is not running.
System error has occurred. Exit the tool and execute it once again.	Unexpected error occurred. Close the BECK tool and then start it again.
May physical configuration figure be initialized?	Click OK or Cancel.
May logical configuration figure be initialized?	Click OK or Cancel.
May physical configuration and logical configuration figure be initialized?	Click OK or Cancel.
Current configuration figure will be discarded if the screen is closed without saving. Continue to close the screen.	Click OK or Cancel.
Specified file already exists. Overwrite?	Click OK or Cancel.
Cancel to read Log file?	Click OK or Cancel.

Special guidelines

Dense intermix drive tray configuration rules

When setting a dense intermix drive tray in a rack, the rack size must be between 3U and 26U.

Yellow box in the configuration screen

A yellow box displayed in the Physical or Logical configuration figure of the **Configuration** screen indicates drive slots in the box cannot be used by the number indicated at Over in Array system drive slot count / Path drive slot count. Drive slots that have larger drive numbers in the box cannot be used by the number indicated at Over. If you see these boxes:

Procedure

1. In the Configuration screen, create a configuration.
2. In the configuration screen, the yellow box shows drive slots that cannot be used.

   The number of drive slots appears at **Over** in **Path drive slot count**. Drive slots that have larger drive numbers in the box cannot be used by the number indicated at **Over**.

   A yellow box appears when there are drive slots that cannot be used in the box. For these cases, we recommend you do not add the box.

Loading a simple trace when Unit A of a DBX is connected last

If you collect a simple trace file when Unit A of a DBX drive tray is connected last in the configuration, Unit B of the DBX in the Logical configuration figure and DBX in the Physical configuration figure are displayed in cyan in the **Configuration** screen. This indicates Unit B is not connected because the unit connected last is Unit A of the DBX, which consists of Unit A and Unit B. You can reference the cable figure where only Unit A of the DBX is connected.

Procedure

1. In the **Array Unit Type** dialog box, click **Load log** to load a simple trace of the configuration, where Unit A of a DBX is connected last.

   After it is loaded, Unit B of the DBX in Logical configuration figure and the DBX in Physical configuration figure are shown in cyan.

   The number of drive slots in Unit B of DBX is not reflected in the **Array system drive slot count** and **Path drive slot count** because Unit B of the DBX is not connected.
2. Click **Cable Figure** to display the cable figure.

No SAS (ENC) cable is connected to Unit B of the DBX because the Unit A of the DBX is connected last.

If you collect a simple trace file when Unit A of a DBX drive box is connected last in the configuration, you cannot click **Create** on the configuration screen. When the Logical and Physical configuration figure can be edited, Unit B of a DBX is not displayed in cyan and **Create** can be clicked.

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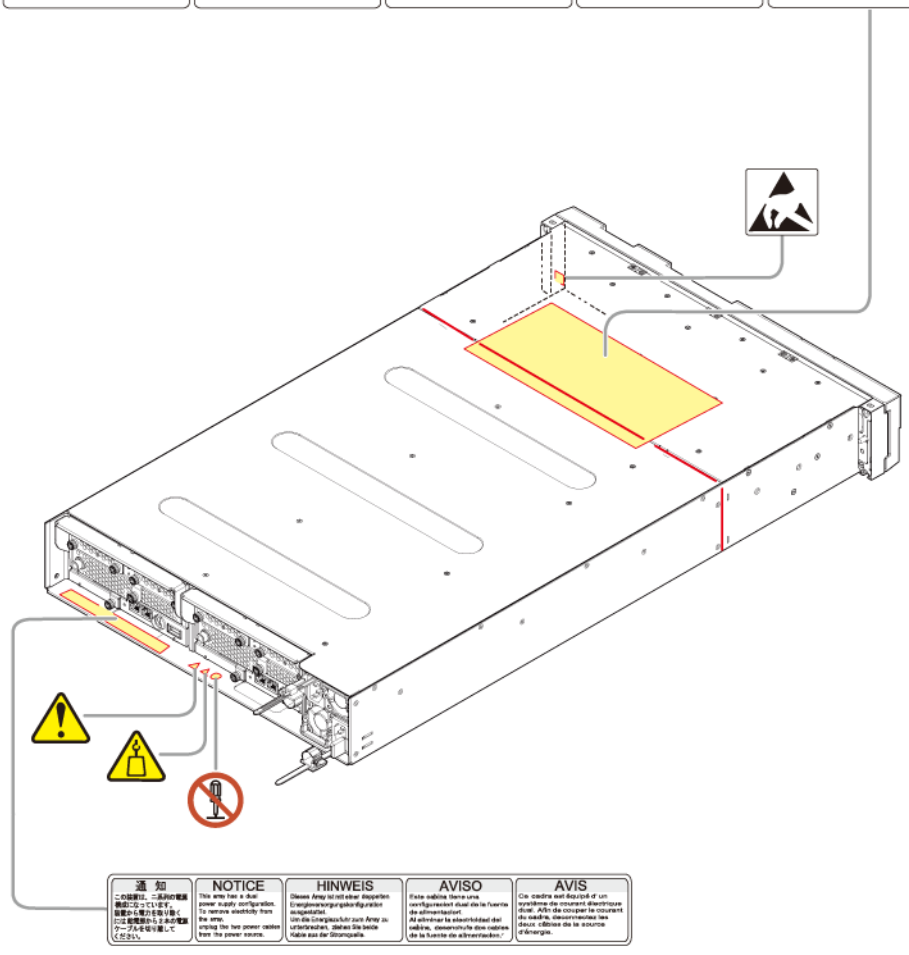
Warning labels on the storage system

- CBSS controller
- CBSL controller
- Small form factor drive tray
- Large form factor drive tray
- Flash module drive tray
- Dense intermix drive tray
- CBSS/CBSL controller
- Drive for a CBSS/small form factor drive tray
- Drive for a CBSL/large form factor drive tray
- Drive for a flash module drive tray
- Drive for a dense intermix drive tray
- CBSS/CBSL power unit
- Power supply for small and large form factor drive trays
- Flash module drive tray power supply
- Dense intermix drive tray power supply
- Front end module (Fibre Channel/iSCSI)

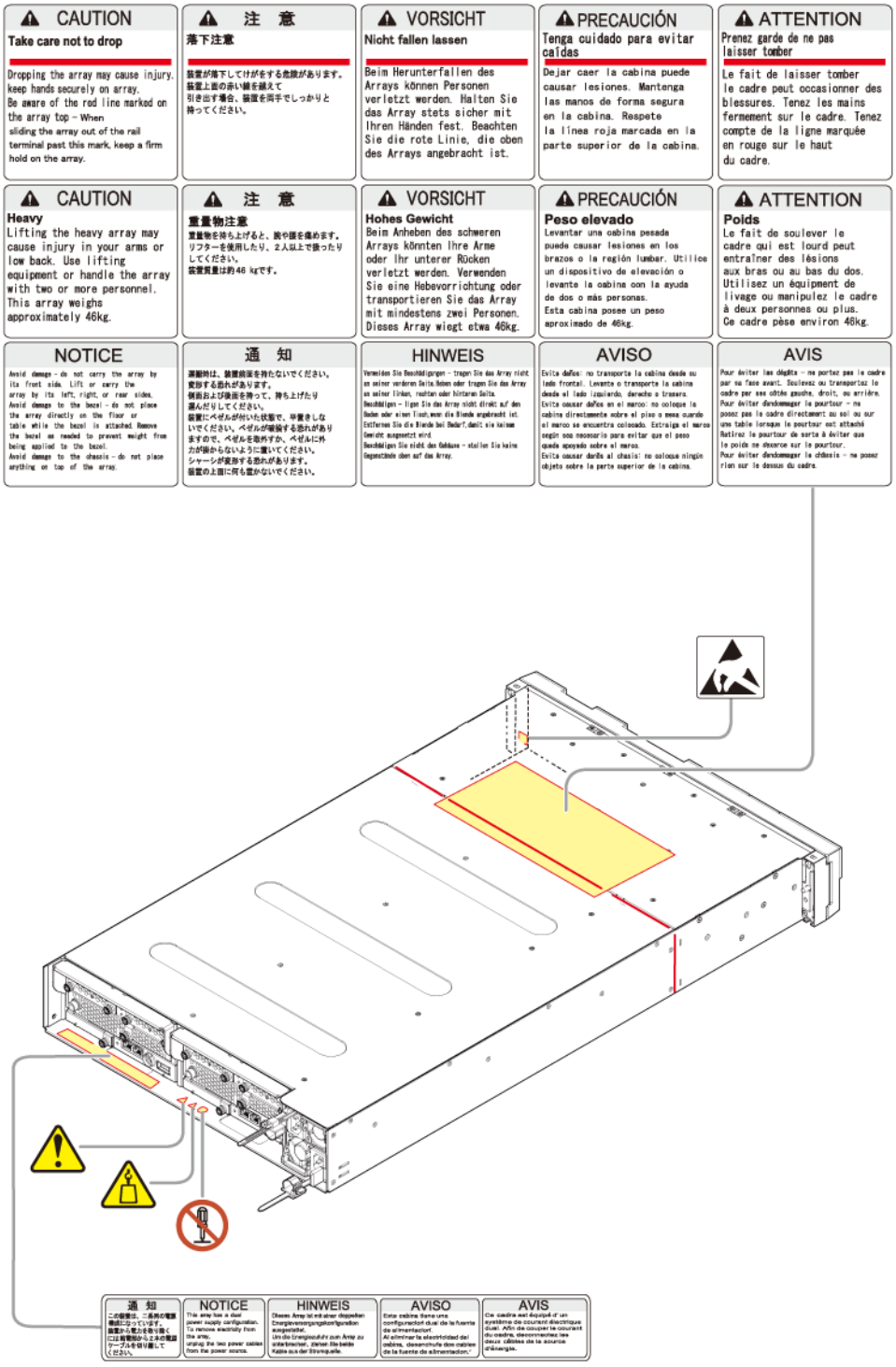
- Back end module
- ENC for small and large form factor drive trays
- ENC for a dense intermix drive tray
- CMA (used to secure dense intermix drive tray)
- Battery

CBSS controller

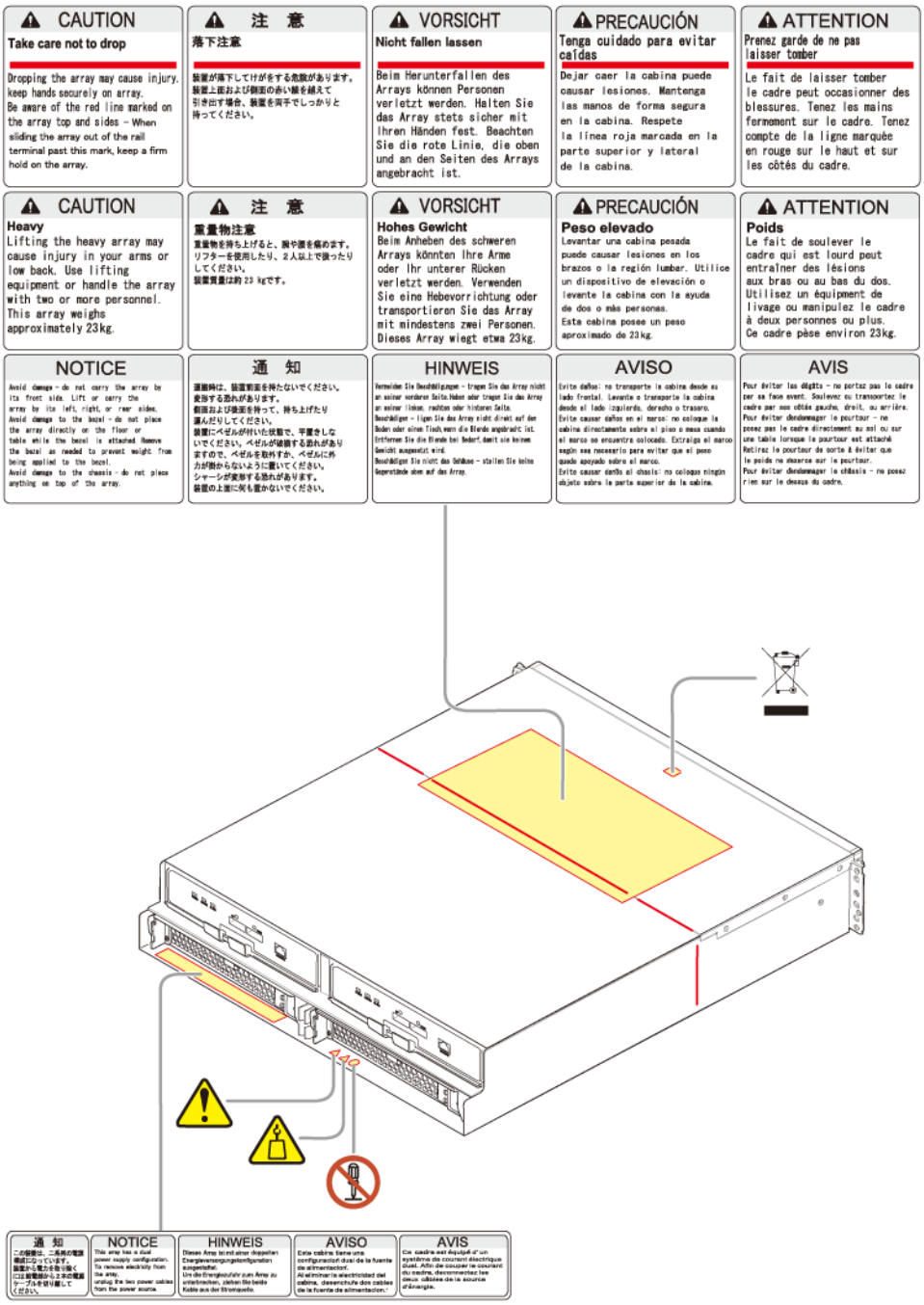
CAUTION	注　意	VORSICHT	PRECAUCIÓN	ATTENTION
Take care not to drop Dropping the array may cause injury. keep hands securely on array. Be aware of the red line marked on the array top – When sliding the array out of the rail terminal past this mark, keep a firm hold on the array.	**落下注意** 装置が落下してけがをする危険があります。装置上面の赤い線を越えて引き出す場合、装置を両手でしっかりと持ってください。	**Nicht fallen lassen** Beim Herunterfallen des Arrays können Personen verletzt werden. Halten Sie das Array stets sicher mit Ihren Händen fest. Beachten Sie die rote Linie, die oben des Arrays angebracht ist.	**Tenga cuidado para evitar caídas** Dejar caer la cabina puede causar lesiones. Mantenga las manos de forma segura en la cabina. Respete la línea roja marcada en la parte superior de la cabina.	**Prenez garde de ne pas laisser tomber** Le fait de laisser tomber le cadre peut occasionner des blessures. Tenez les mains fermement sur le cadre. Tenez compte de la ligne marquée en rouge sur le haut du cadre.
CAUTION **Heavy** Lifting the heavy array may cause injury in your arms or low back. Use lifting equipment or handle the array with two or more personnel. This array weighs approximately 46kg.	**注　意** **重量物注意** 重量物を持ち上げると、腕や腰を痛めます。リフターを使用したり、2人以上で扱ったりしてください。 装置質量は約46 kgです。	**VORSICHT** **Hohes Gewicht** Beim Anheben des schweren Arrays könnten Ihre Arme oder Ihr unterer Rücken verletzt werden. Verwenden Sie eine Hebevorrichtung oder transportieren Sie das Array mit mindestens zwei Personen. Dieses Array wiegt etwa 46kg.	**PRECAUCIÓN** **Peso elevado** Levantar una cabina pesada puede causar lesiones en los brazos o la región lumbar. Utilice un dispositivo de elevación o levante la cabina con la ayuda de dos o más personas. Esta cabina posee un peso aproximado de 46kg.	**ATTENTION** **Poids** Le fait de soulever le cadre qui est lourd peut entraîner des lésions aux bras ou au bas du dos. Utilisez un équipment de livage ou manipulez le cadre à deux personnes ou plus. Ce cadre pèse environ 46kg.
NOTICE Avoid damage – do not carry the array by its front side. Lift or carry the array by its left, right, or rear sides. Avoid damage to the bezel – do not place the array directly on the floor or table while the bezel is attached. Remove the bezel as needed to prevent weight from being applied to the bezel. Avoid damage to the chassis – do not place anything on top of the array.	**通　知** 運搬時は、装置前面を持たないでください。変形する恐れがあります。 側面および後面を持って、持ち上げたり運んだりしてください。 装置にベゼルが付いた状態で、平置きしないでください。ベゼルが破損する恐れがありますので、ベゼルを取外すか、ベゼルに外力が掛からないように置いてください。 シャーシが変形する恐れがあります。 装置の上面に何も置かないでください。	**HINWEIS** Vermeiden Sie Beschädigungen – tragen Sie das Array nicht an seiner vorderen Seite. Heben oder tragen Sie das Array an seiner linken, rechten oder hinteren Seite. Beschädigen – legen Sie das Array nicht direkt auf den Boden oder einen Tisch, wenn die Blende angebracht ist. Entfernen Sie die Blende bei Bedarf, damit sie keinem Gewicht ausgesetzt wird. Beschädigen Sie nicht das Gehäuse – stellen Sie keine Gegenstände oben auf das Array.	**AVISO** Evite daños: no transporte la cabina desde su lado frontal. Levante o transporte la cabina desde el lado izquierdo, derecho o trasero. Evite causar daños en el marco: no coloque la cabina directamente sobre el piso o mesa cuando el marco se encuentra colocado. Extraiga el marco según sea necesario para evitar que el peso quede apoyado sobre el marco. Evite causar daños al chasis: no coloque ningún objeto sobre la parte superior de la cabina.	**AVIS** Pour éviter les dégâts – ne portez pas le cadre par sa face avant. Soulevez ou transportez le cadre par ses côtés gauche, droit, ou arrière. Pour éviter dendommager le pourtour – ne posez pas le cadre directement au sol ou sur une table lorsque le pourtour est attaché Retirez le pourtour de sorte à éviter que le poids ne stexerce sur le pourtour. Pour éviter dendommager le châssis – ne posez rien sur le dessus du cadre.



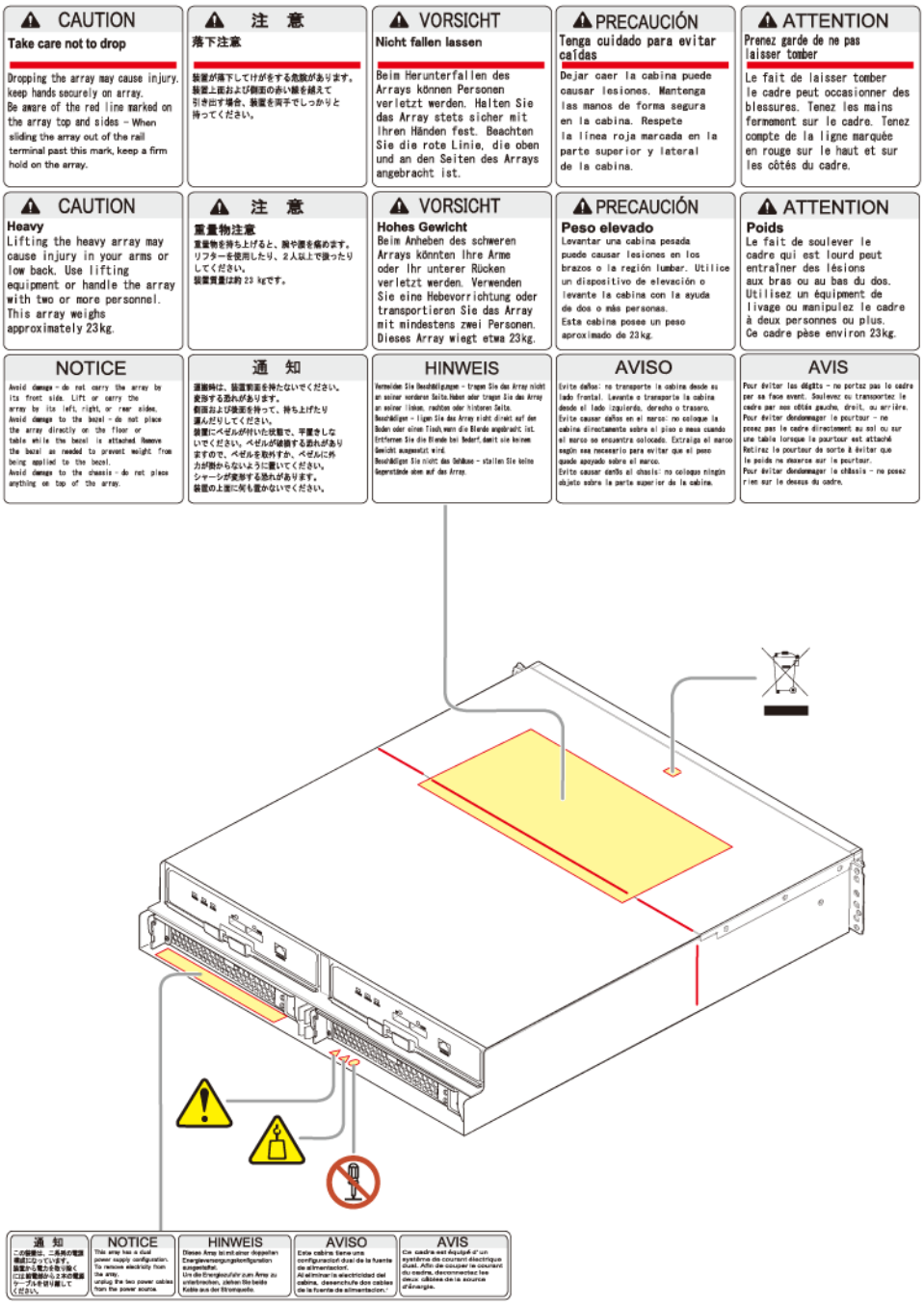
CBSL controller



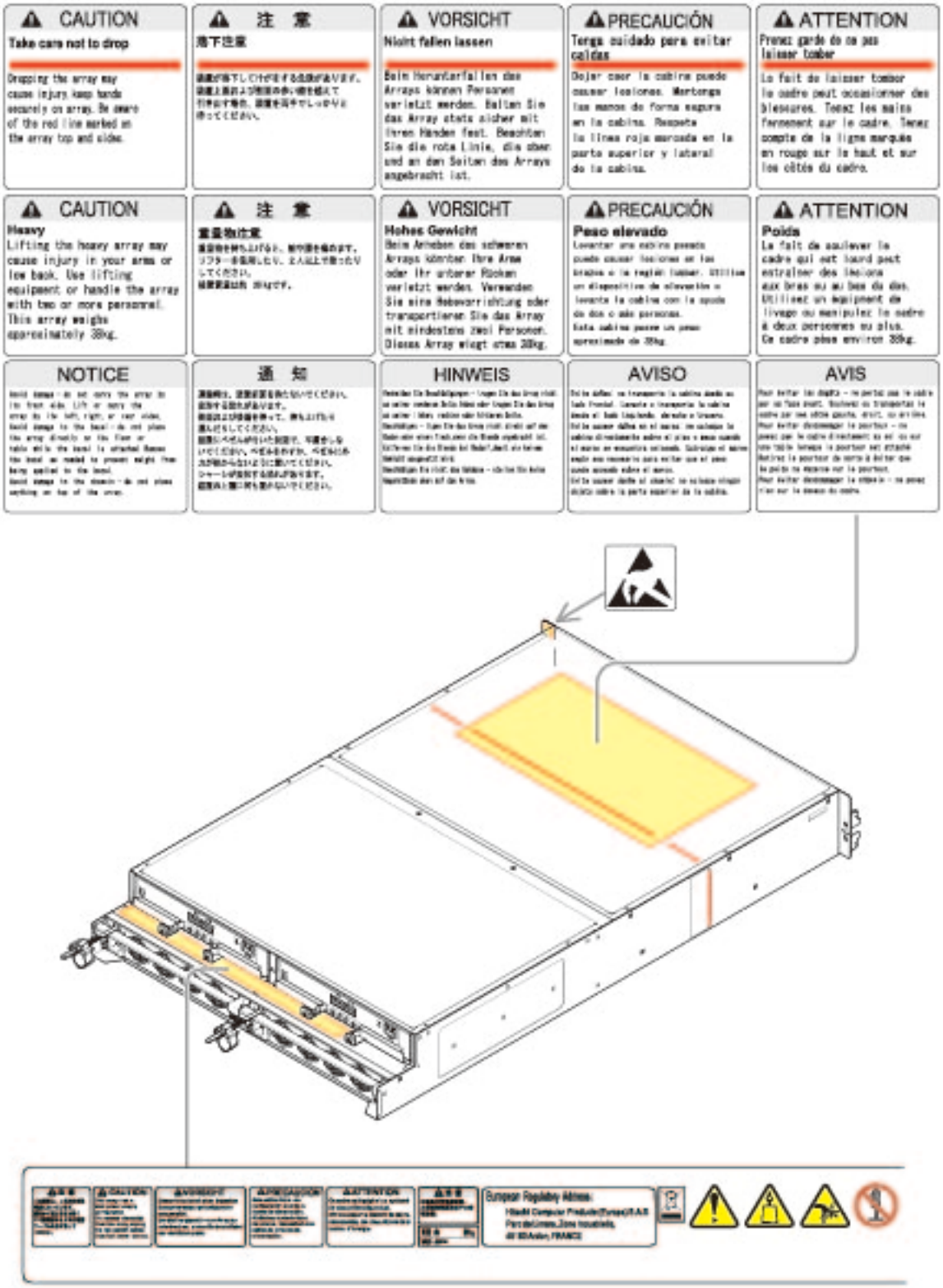
Small form factor drive tray



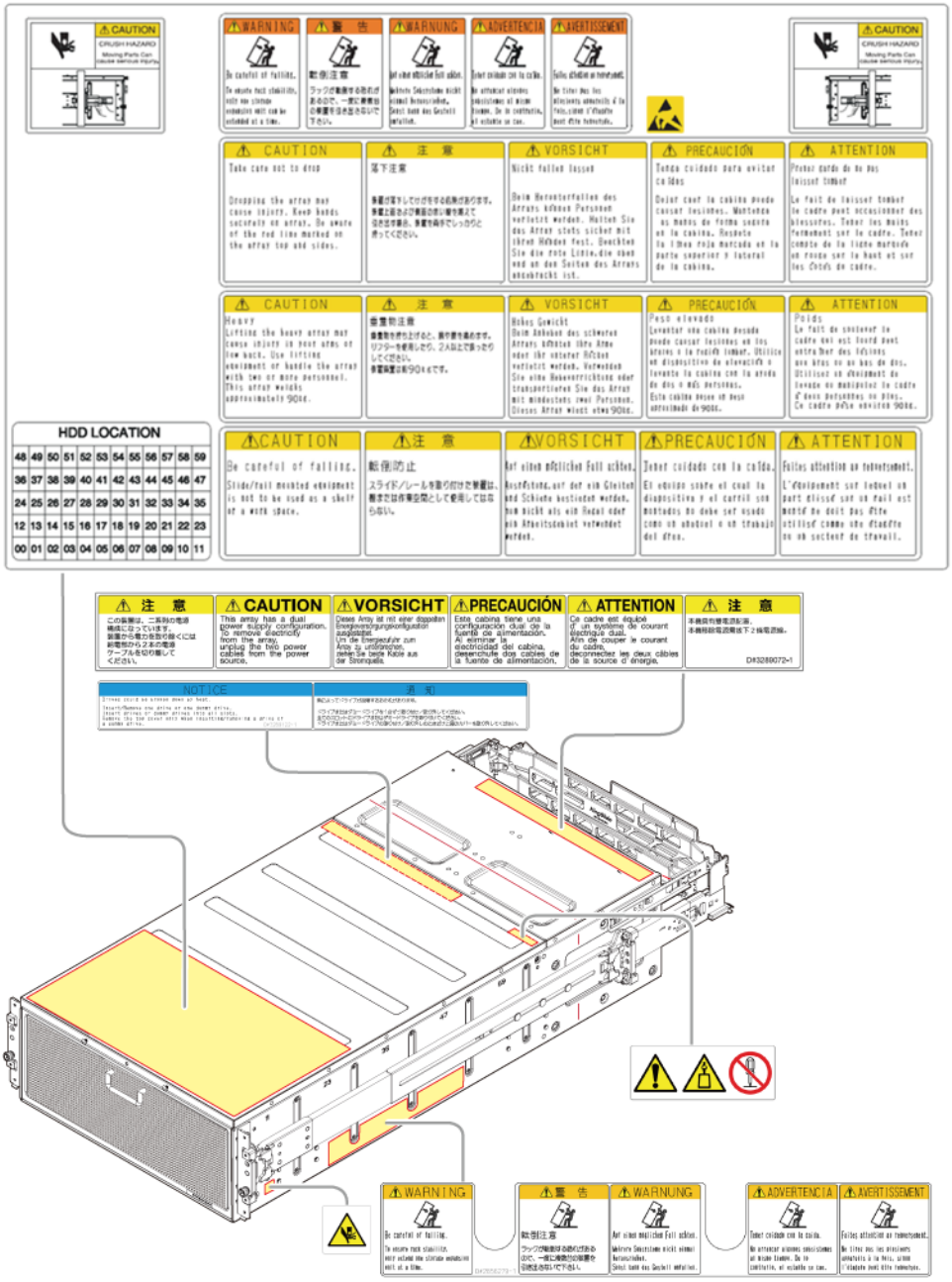
Large form factor drive tray



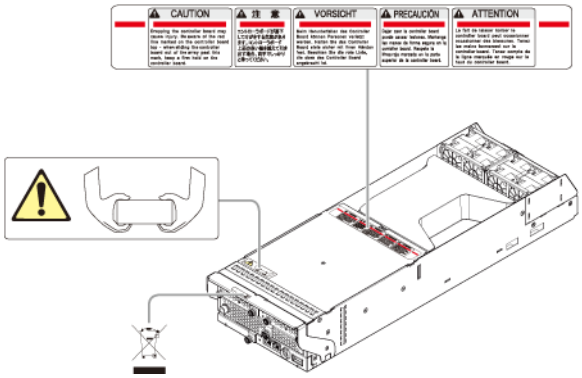
Flash module drive tray



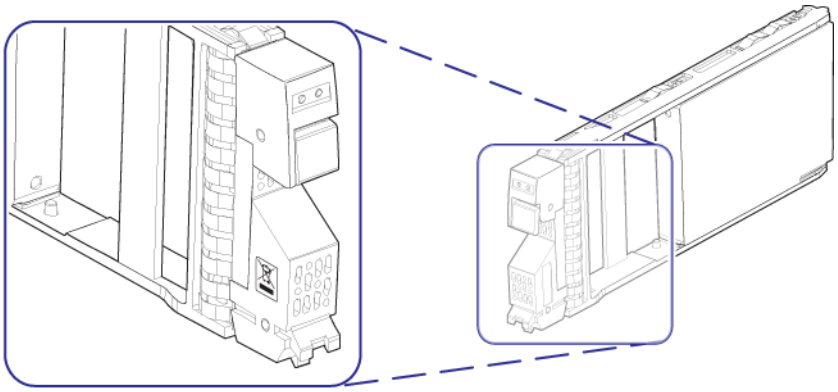
Dense intermix drive tray



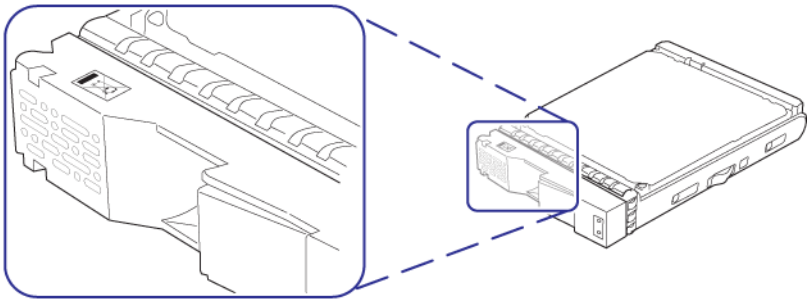
CBSS/CBSL controller



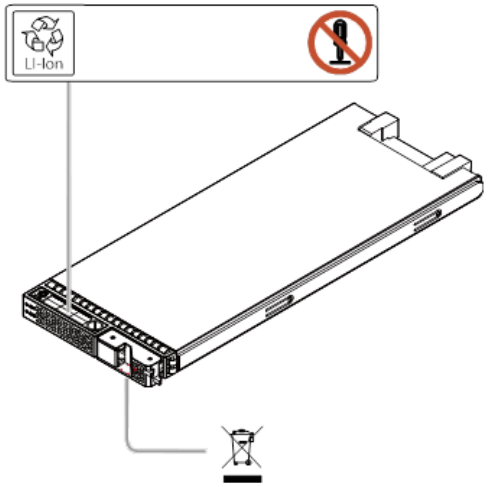
Drive for a CBSS/small form factor drive tray



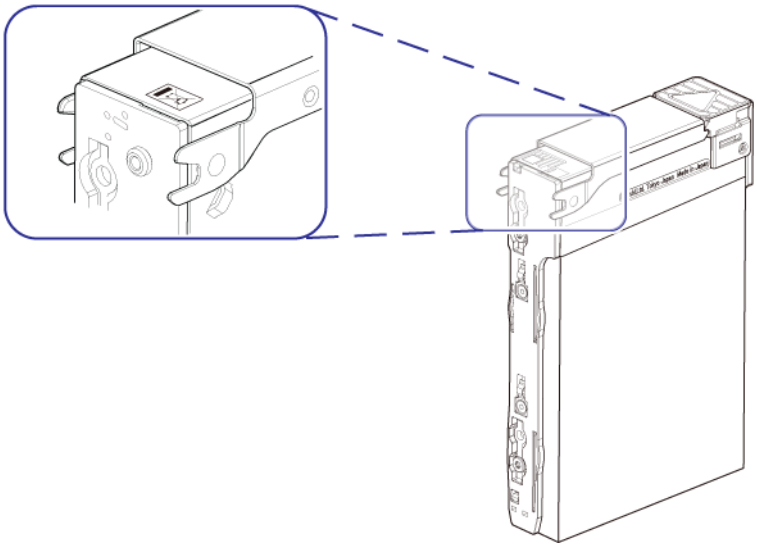
Drive for a CBSL/large form factor drive tray



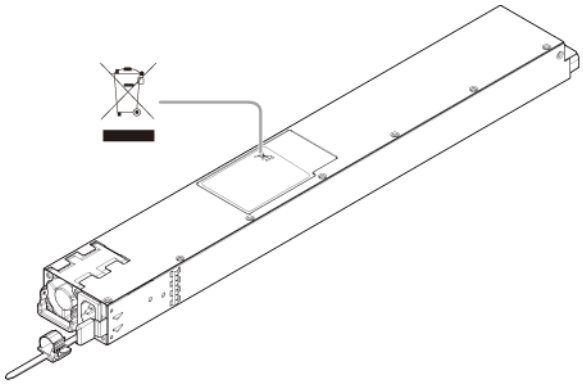
Drive for a flash module drive tray



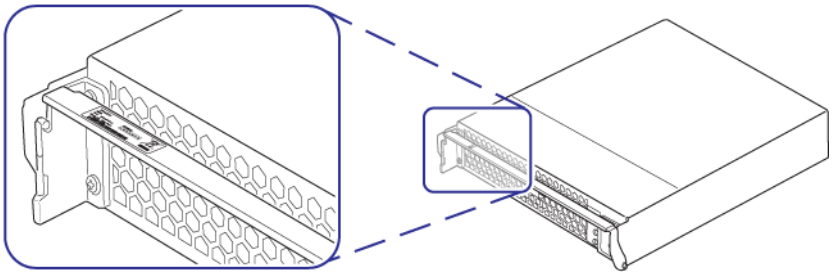
Drive for a dense intermix drive tray



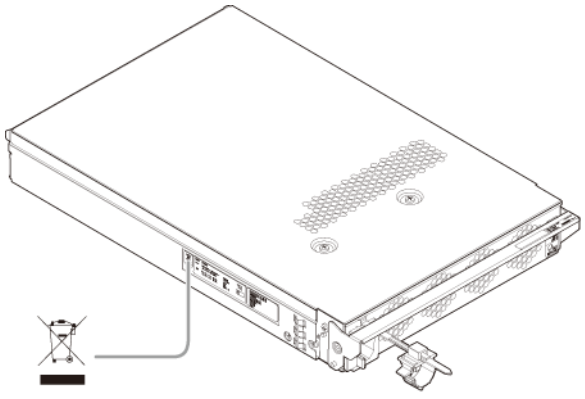
CBSS/CBSL power unit



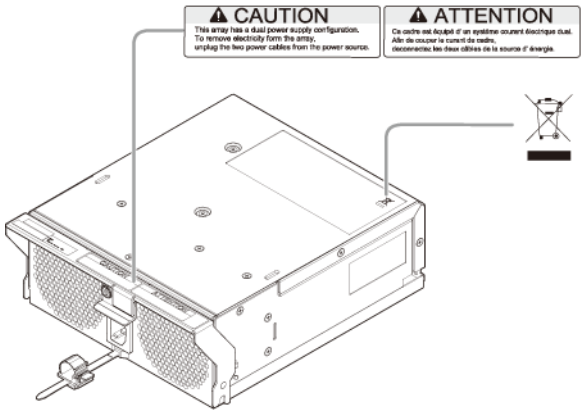
Power supply for small and large form factor drive trays



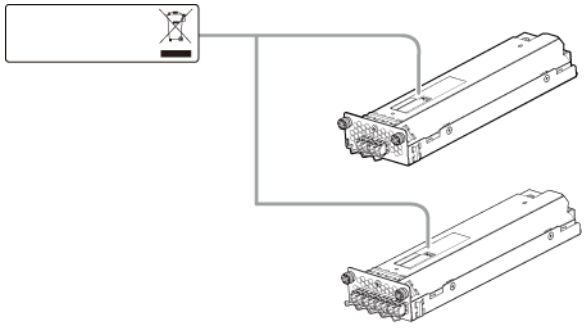
Flash module drive tray power supply



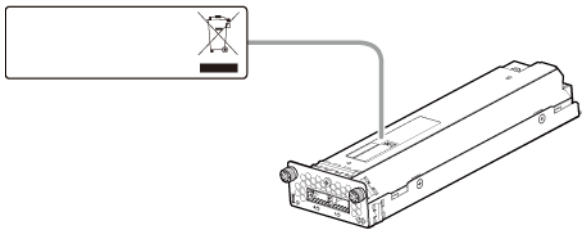
Dense intermix drive tray power supply



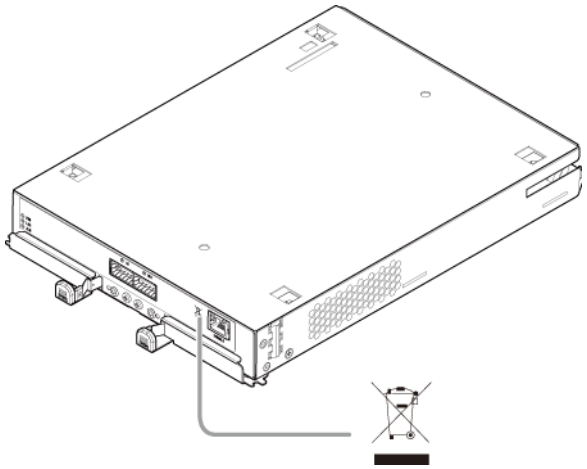
Front end module (Fibre Channel/iSCSI)



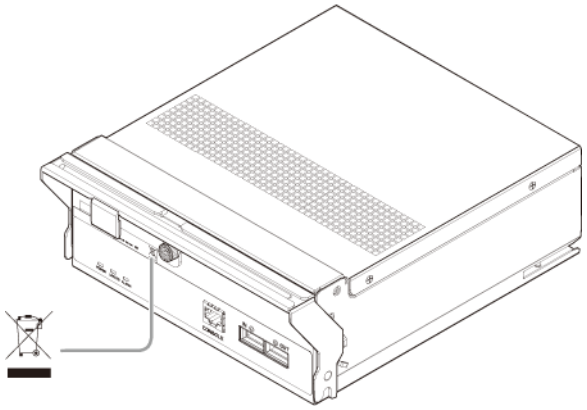
Back end module



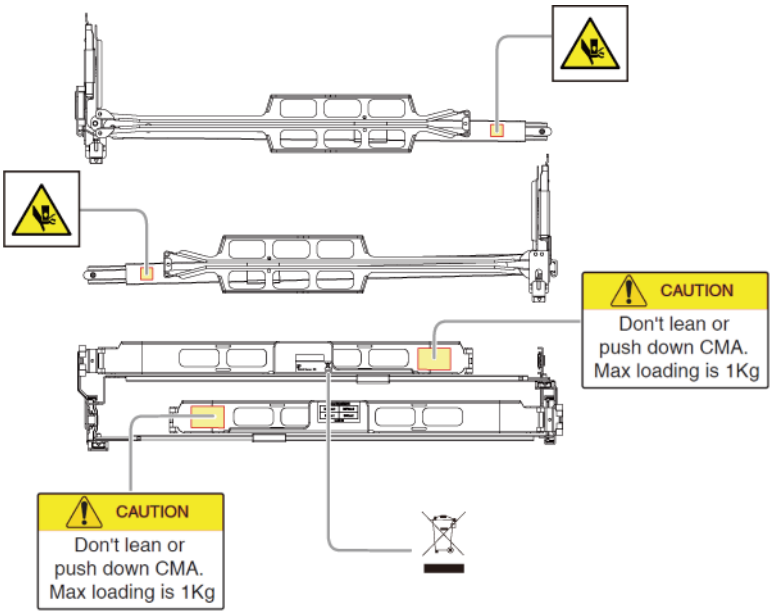
ENC for small and large form factor drive trays



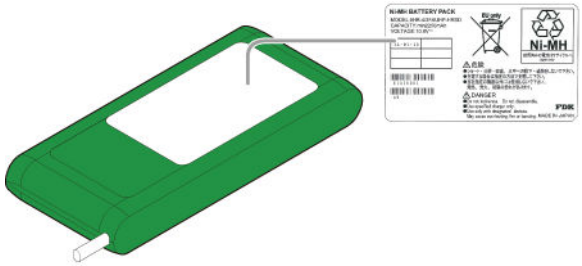
ENC for a dense intermix drive tray



CMA (used to secure dense intermix drive tray)


CAUTION
Don't lean or
push down CMA.
Max loading is 1Kg
CAUTION
Don't lean or
push down CMA.
Max loading is 1Kg

Battery


Ni-MH

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