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Hitachi Virtual Storage Platform G200, G400, G600

Service Guide

Hitachi Data Systems

FE-94HM8027-00

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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.

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.

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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.

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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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Contents

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

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General safety guidelines

Before starting maintenance:

- Maintenance must be performed by trained and qualified engineers only.
- The safety guidelines and procedures in this manual must be read and followed.
- In this manual and on the storage system, hazard warnings are provided to aid you in preventing or reducing the risk of death, personal injury, or product damage. Understand and follow these hazard warnings fully.
- If 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.

Audience and qualifications

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

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

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

- Is familiar with high-speed interconnects for modular storage systems.

Product version

This document revision applies to Hitachi Virtual Storage Platform G200, G400, G600 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.
| 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
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!

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Verifying component failures

This chapter describes how to use the maintenance utility to confirm component failures.

- Replaceable parts
- Identifying hardware faults

Replaceable parts

The following list shows the components that you can replace on site for the storage systems.

Note: For the dense intermix drive tray, the only user-replacement procedure supported by Hitachi is installing or replacing disk drives.

- Drive (replacing drives on the flash module drive tray is not supported)
- Battery
- Fan for CBSS or CBSL
- Power supply unit
- Controller
- Cache memory
- Front end module
- Small Form-Factor Pluggable
- Back end module for CBLM or CBLH
- ENC
- SAS cable
- Cache Flash Memory
- LAN blade
- Backup Module (BKM) for CBSS or CBSL
- Backup Module (BKMF) for CBLM or CBLH

Identifying hardware faults

There are several ways the storage system can alert you to failures:

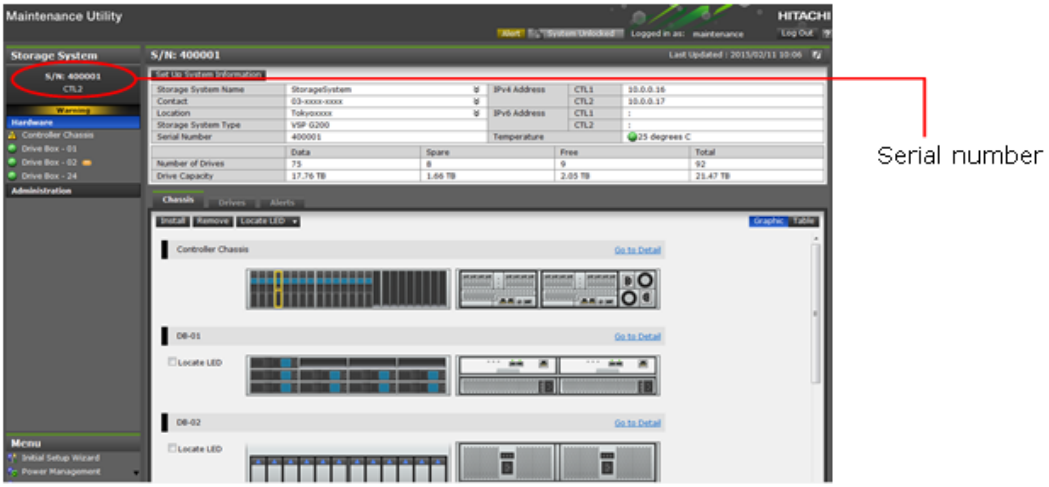
- When notified about an error by email, the maintenance utility, or the Simple Management Network Protocol (SMNP).
- When a failure is indicated by storage system LED (for example, `WARNING` or `ALARM` LED goes on or `READY` LED does not go on).

To identify a failed part and recover the storage system:

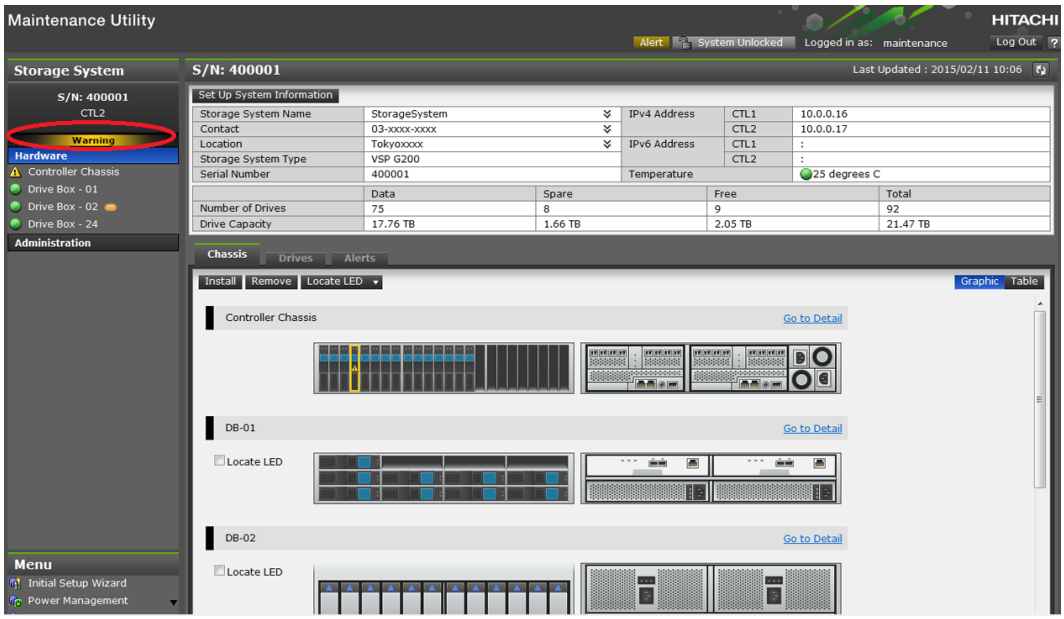
Procedure

1. Check the serial number of the storage system referenced in the email notification or SNMP alert.
2. Start the maintenance utility (see Starting the maintenance utility).

3. In the **Maintenance Utility** window, check the serial number of the storage system where the error was reported.



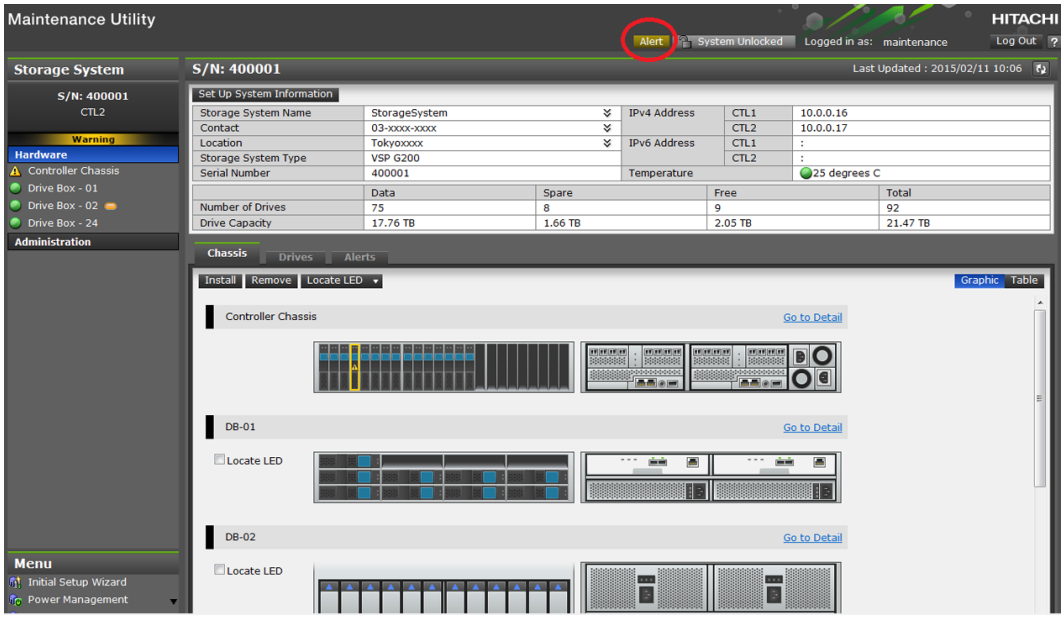
4. In the left pane of the **Maintenance Utility** window (circled in the figure below), check the **Status** of the storage system.



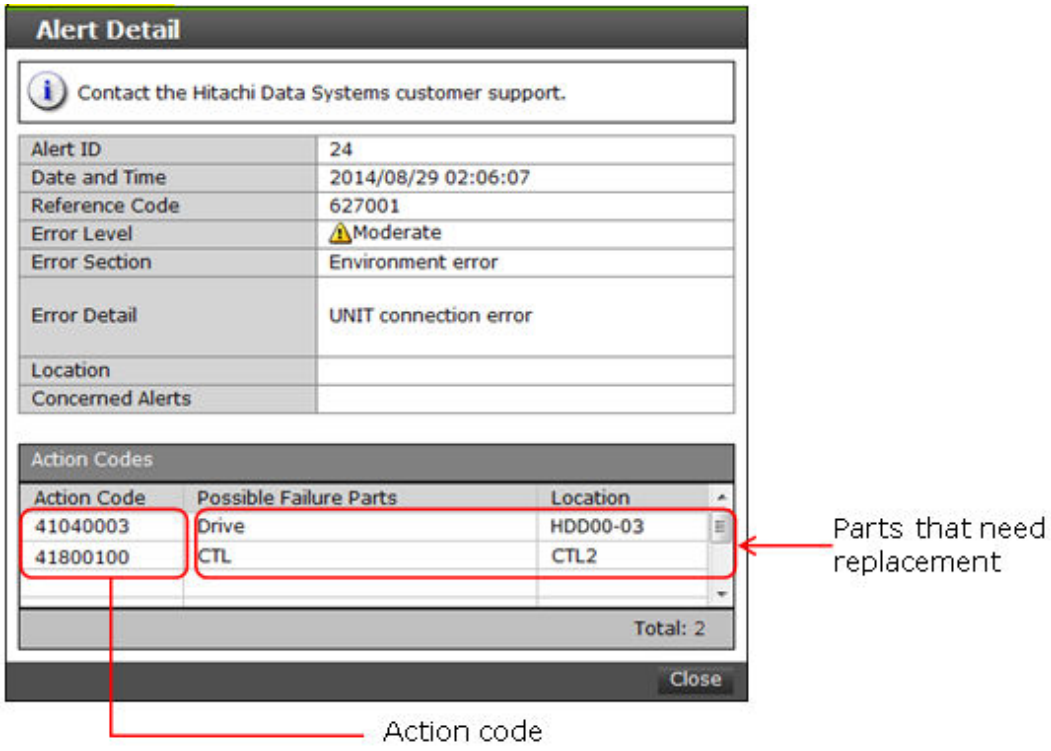
Status	Description	Navigation area
Failed	The storage system might be down.	
Warning	The part status might have a Blocked, Failed, or Warning status.	
Information	Check the status of unimplemented SIMs, regardless of part status.	
Ready	All parts have a normal status.	
Power-on in progress	Power-on is in progress.	

Status	Description	Navigation area
Power-off in progress	Power-off is in progress.	Power-off in progress
(Other than shown above)	Power-off status	Unknown

5. At the top-right of the **Maintenance Utility** window, click **Alert**. The window switches to the **Alerts** tab.

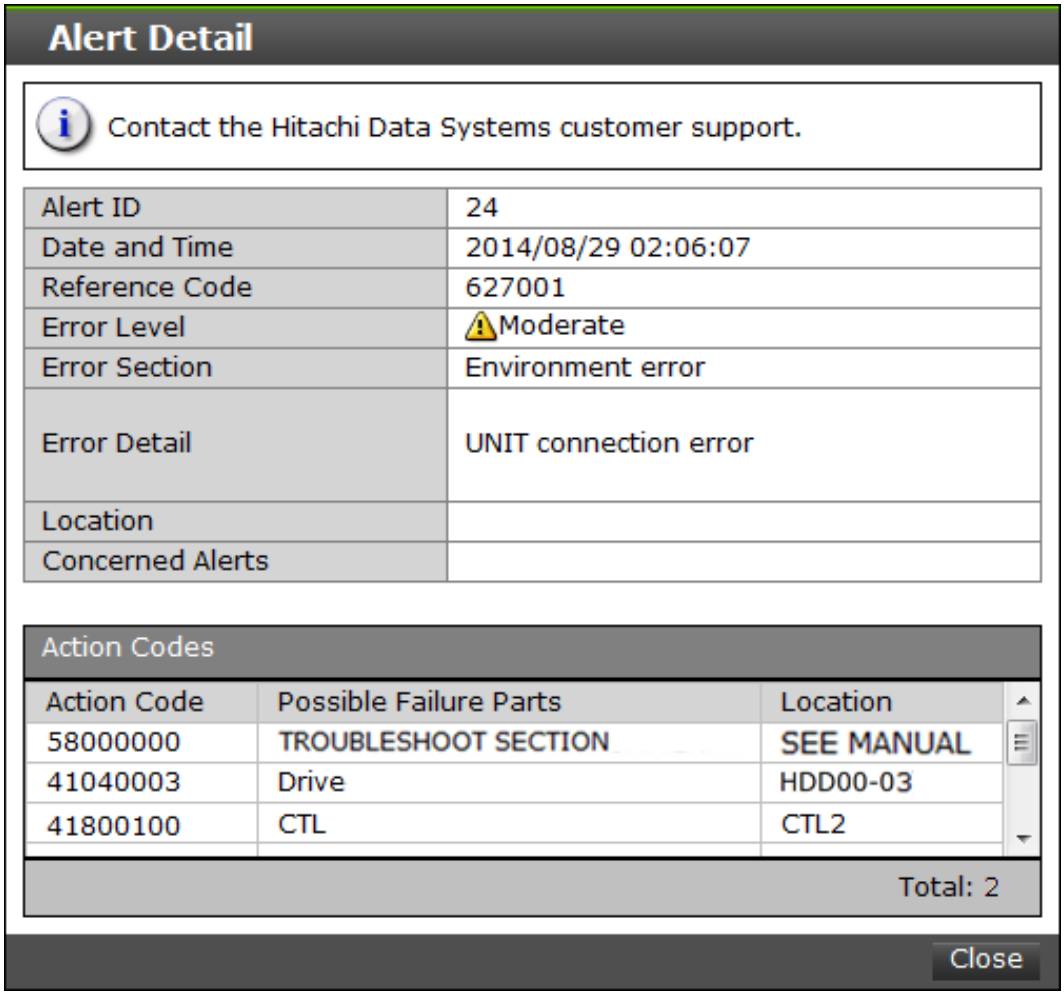


6. Click the **Alert ID**.
   The **Alert Detail** window shows the failed part that must be replaced.



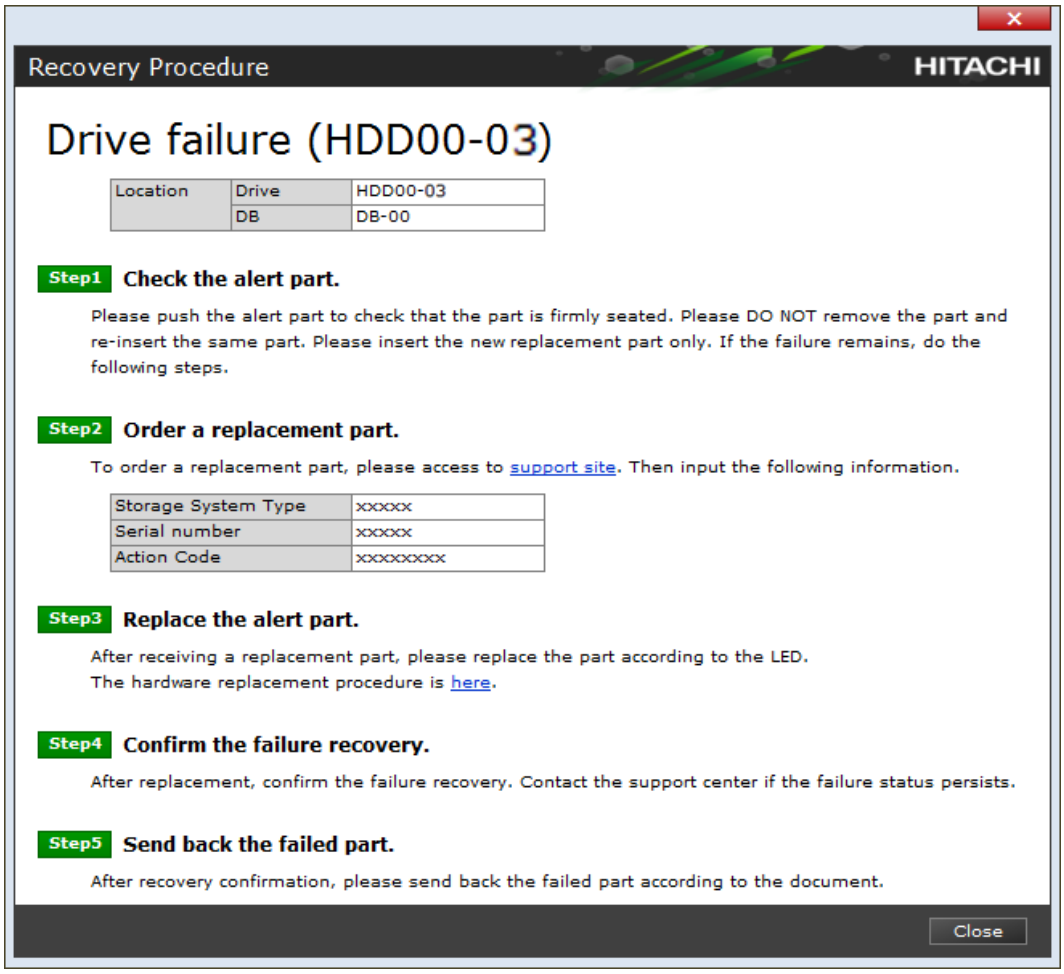
7. Click **Action Code** to confirm the replacement procedure.

Note: If **SEE MANUAL** appears under **Location** in the **Alert Detail** window, contact the HDS Portal to have an authorized person make the repair: https://portal.hds.com.



8. When the **Recovery Procedure** window appears, check the failed part and order a replacement for that part.

   The following window shows an example of a drive failure



In this example:

- **Drive** = location of the drive in the drive tray.
- **DB** = number of the drive tray.

The following table describes the possible status conditions.

Status	Description
Normal	Normal status.
Warning	A part failed or is being affected by a failure somewhere else in the storage system. The status changes to **Normal** after the part is replaced.

Failed	A part failed.
Blocked	A part has become blocked. Use the maintenance utility to identify the problem and replace the part if necessary.
Not fix	**SFP Status-limited** Undetermined status.
Warning (Port n failed)	**Drive Status-limited** Drive port *n* is in a failed status.
Copying n % (TYPE to DRIVE)	**Drive Status-limited** Copying is in progress. • *n* = copy-progress rate. • *TYPE*= **Correction copy**, **Copy back**, **Dynamic sparing**, or **Drive copy**. • *DRIVE* = copy destination drive location. If the drive is a copy destination drive in **Correction copy**, **DRIVE** appears as **this Drive**.) If multiple copy statuses exist, a line break is added to every copy status line, and then the information is displayed.
Copying n % (TYPE from DRIVE)	**Drive Status-limited** Copying is in progress. • *n* = copy-progress rate. • *TYPE* = **Copy back**, **Dynamic sparing**, or **Drive copy**. • *DRIVE* = copy source drive location If multiple copy statuses exist, a line break is added to every copy status line, and then the information is displayed.
Pending (TYPE to DRIVE)	**Drive Status-limited** Copying is in a suspended status. • *TYPE* = **Correction copy**, **Copy back**, **Dynamic sparing**, or **Drive copy**. • *DRIVE* = copy destination drive location. If the drive is a copy destination drive in **Correction copy**, DRIVE appears as **this Drive**.) If multiple copy statuses exist, a line break is added to every copy status line, and then the information is displayed.
Pending (TYPE from DRIVE)	**Drive Status-limited** Copying is in a suspended status. • *TYPE* = **Copy back**, **Dynamic sparing**, or **Drive copy**. • *DRIVE* = copy source drive location If multiple copy statuses exist, a line break is added to every copy status line, and then the information is displayed.

Copy incomplete	**Drive Status-limited** Data-copy operation is not complete.
Reserved	**Drive Status-limited** Spare drive has an usable status.

2

Hardware description

This chapter provides a tour of the storage system hardware.

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

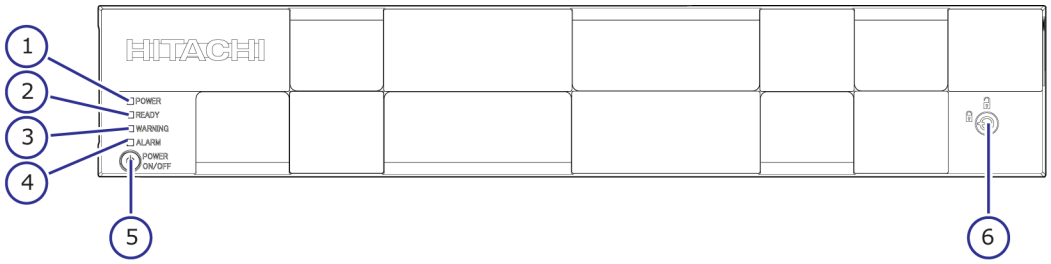
Storage system controllers

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

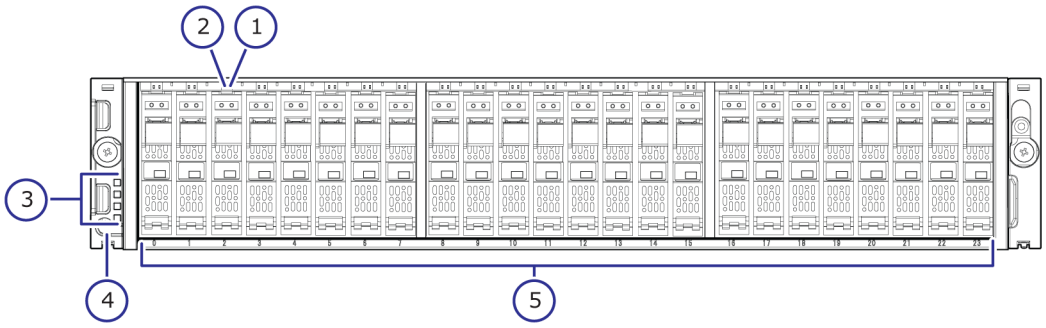
CBSS with front panel bezel



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.

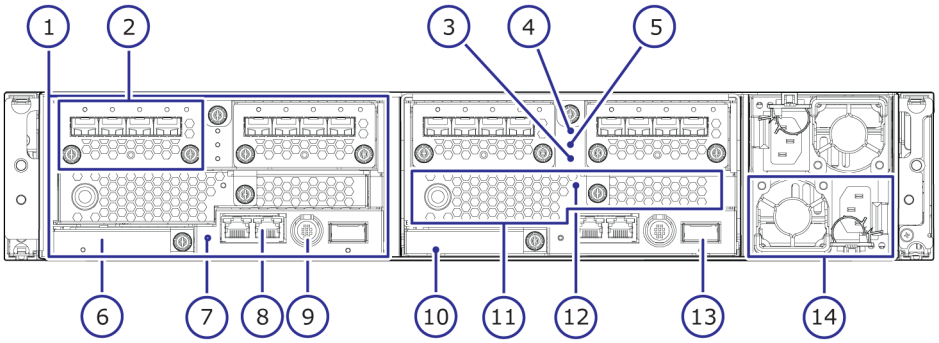
Note: Removing a controller can cause the POWER, READY, WARNING, and ALARM LEDs on the front panel to go off. These LEDs return to their on state after the storage system recovers from the controller replacement.

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

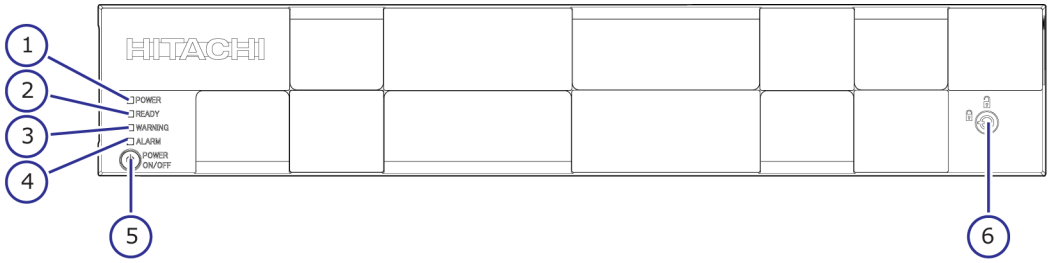


Number	Item	Description
1	Controllers	Controller 1 (left) and Controller 2 (right).
2	Front end module	N/A
3	CTL ALM LED	Red: controller can be removed safely. Blink red: failure with the controller's power supply unit. Amber: LAN reset switch was pressed.
4	BACKUP STTS LED	Green: power restoration in 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

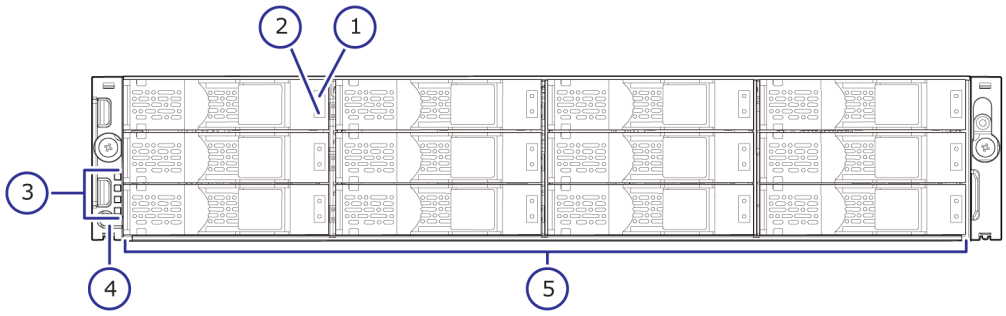
CBSL with front panel bezel



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.

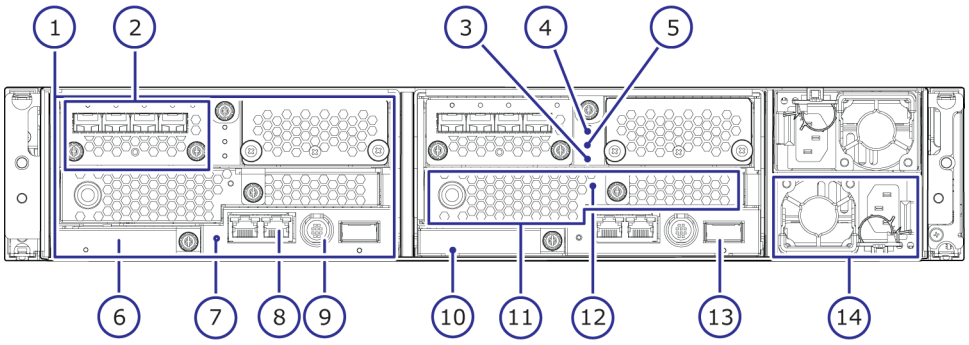
Note: Removing a controller can cause the POWER, READY, WARNING, and ALARM LEDs on the front panel to go off. These LEDs return to their on state after the storage system recovers from the controller replacement.

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

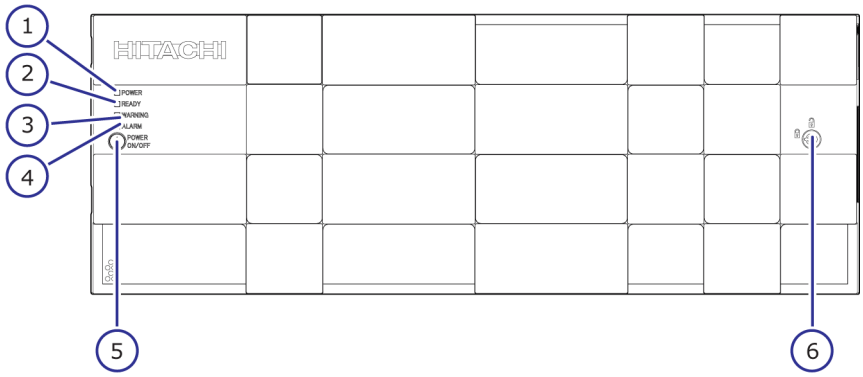


Number	Item	Description
1	Controllers	Controller 1 (left) and Controller 2 (right).
2	Front end module	N/A
3	CTL ALM LED	Red: controller can be removed safely. Blink red: failure with the controller's power supply unit. Amber: LAN reset switch was pressed.
4	BACKUP STTS LED	Green: power restoration in 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

CBLM controller

CBLM with front panel bezel

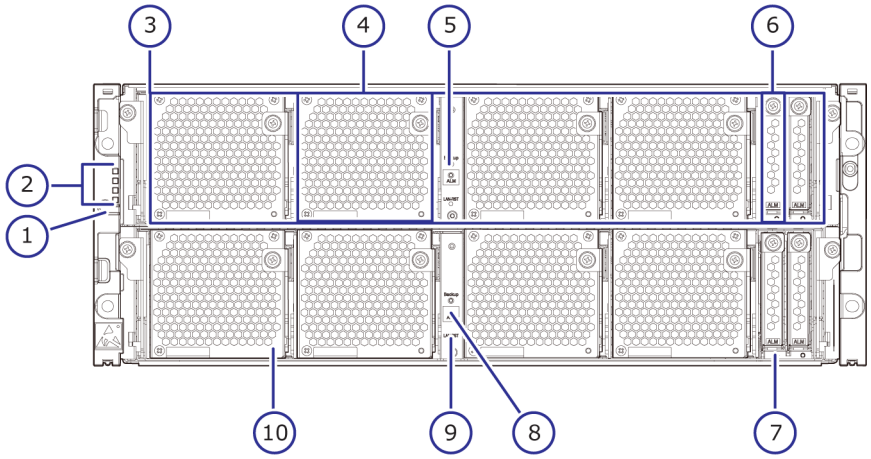


Number	Item	Description
1	POWER LED	Green: storage system is powered on. Amber: storage system is receiving power.
2	READY LED	Green: normal operation.

Number	Item	Description
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.

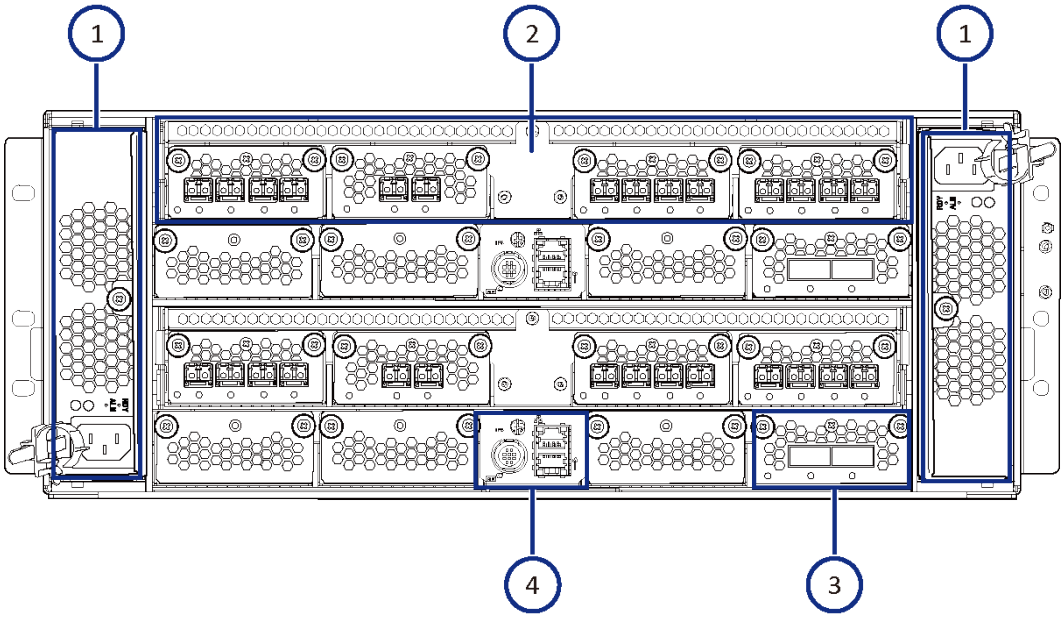
CBLM front panel without bezel



Number	Item	Description
1	POWER ON/OFF (main switch)	Powers the storage system.
2	POWER, READY, WARNING, ALARM LEDs	See previous table.

Number	Item	Description
3	Controllers	Controller 1 (top) and Controller 2 (bottom).
4	Backup module	N/A
5	BACKUP	Green: power restoration in progress following power outage. Fast blink green: restoring. Slow blink green: restoring or sequential shutdown in progress.
6	Cache flash memory	N/A
7	ALM LED (for cache flash memory)	Red: cache flash memory can be removed safely.
8	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.
9	LAN-RST switch	Use only when instructed by Hitachi Support.
10	STATUS LED (for BKMF)	Green: charging of the battery in the backup module is complete. Red: backup module can be removed safely. Blink red one time: main battery failure. Blink red two times: backup battery failure. Blink red three times: both batteries failed or preventive maintenance replacement of batteries can be performed. Off: battery is not mounted, battery-mounting failure occurred, or firmware is being upgraded. Off is normal status for configurations with no batteries (for example, BKMF-10 and BKMF-20).

CBLM rear panel



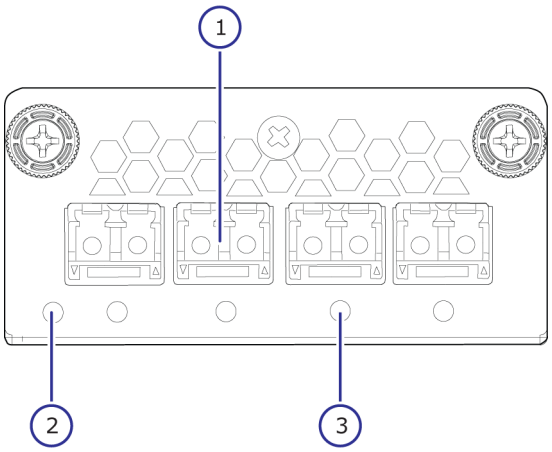
Number	Item
1	Power supply unit
2	Front end module
3	Back end module
4	LAN blade

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.

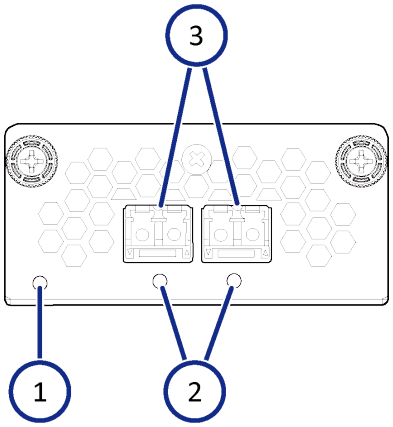
Front end module descriptions

8 Gbps Fibre Channel board LEDs and connectors



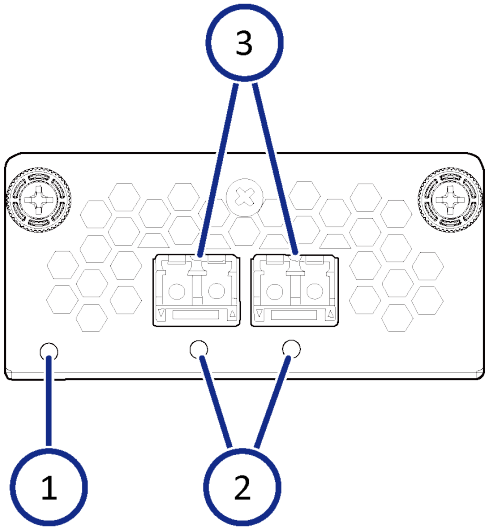
Number	Item	Description
1	Fibre Channel connectors	Connect to Fibre Channel cables.
2	STATUS LED	Green: front end module is in power-on state. Red: front end module can be removed safely.
3	PORT LED	Red: small form-factor pluggable can be removed safely. Blue: normal link status at 8 Gbps. Green: normal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

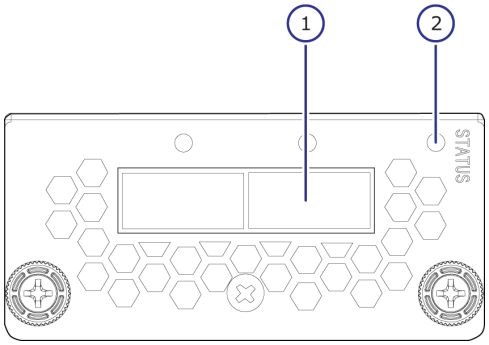
10 Gbps iSCSI board LEDs and connectors



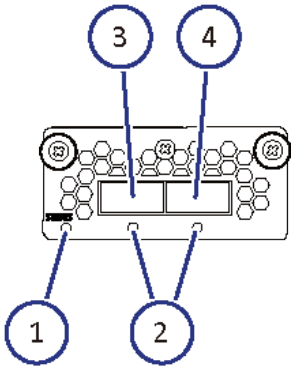
Number	Item	Description
1	STATUS LED	Green: front end module is in the power-on state. Red: front end module can be removed safely.
2	PORT LED	Red: small form-factor pluggable can be removed safely. Blue: normal link status.

Number	Item	Description
		Blink blue: front end module is in communication status.
3	iSCSI connectors	Connect to Ethernet LAN cables.

Back end module LEDs and connectors



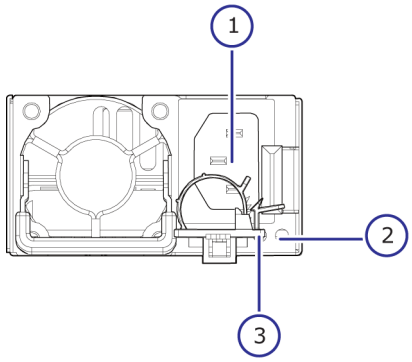
Number	Item	Description
1	PATH 1 connector	Connect to a drive tray.
2	PORT LED	Blue: normal link status.



Number	Item	Description
1	STATUS LED	Green: back end module is in the power-on state. Red: back end module can be removed safely.

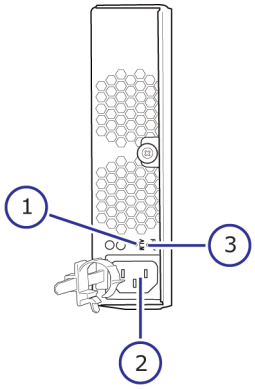
Number	Item	Description
2	Port LED	Blue: link status is normal.
3	PATH 0 connector	Connect to a drive tray.
4	PATH 1 connector	Connects to a drive tray.

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.

Power supply unit LEDs and connectors



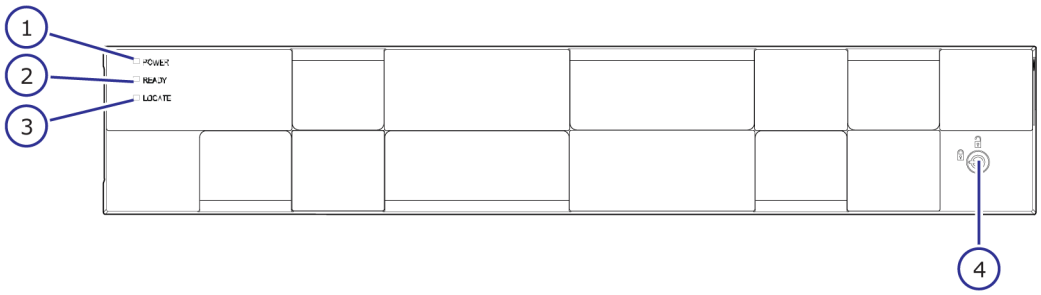
Number	Item	Description
1	ALM/RDY LED	Red: power supply unit can be removed safely.
2	Receptacle	Connect to the power cable supplied with the storage system.
3	RDY LED	Green: normal operation.

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.

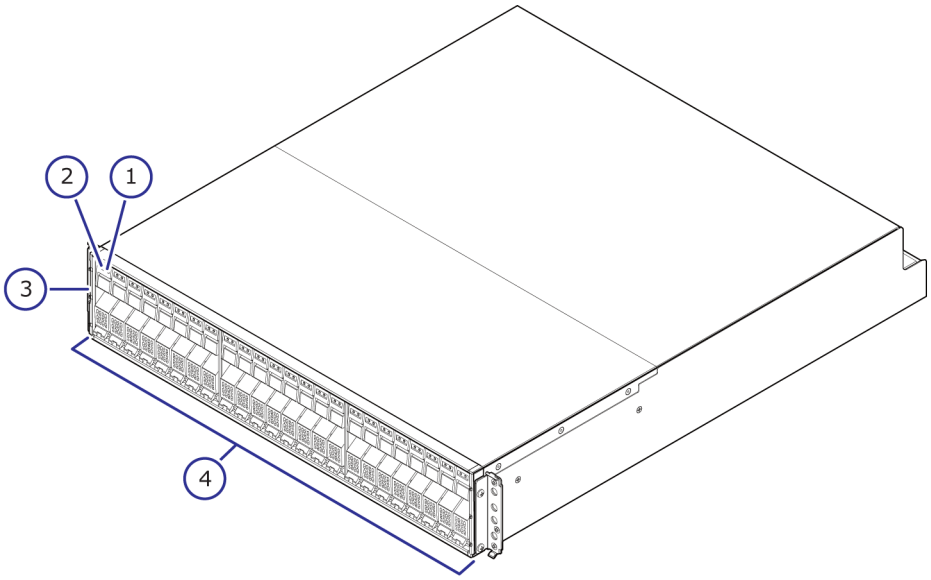
Small form factor (SFF) drive tray

SFF with front panel bezel



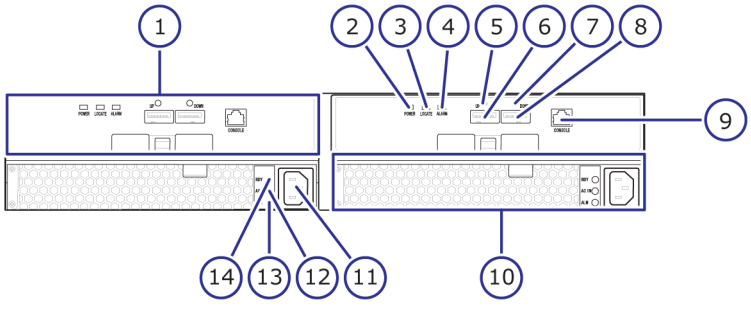
Number	Item	Description
1	POWER LED	Green: Drive tray is powered on.
2	READY LED	Green: Drive tray is operational.
3	LOCATE LED	Amber: Nonfatal error. Storage system can remain operating. This LED can also go ON to identify the drive tray being added.
4	Lock	Locks and unlocks the front panel bezel using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

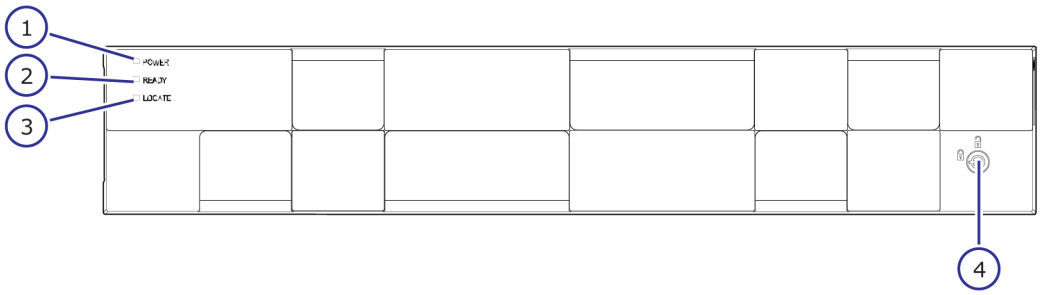
SFF rear panel



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

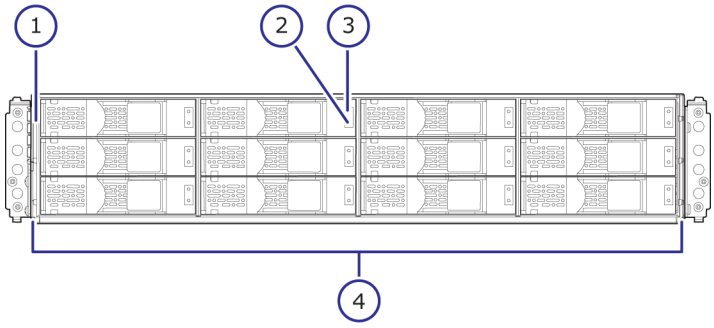
LFF with front panel bezel



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

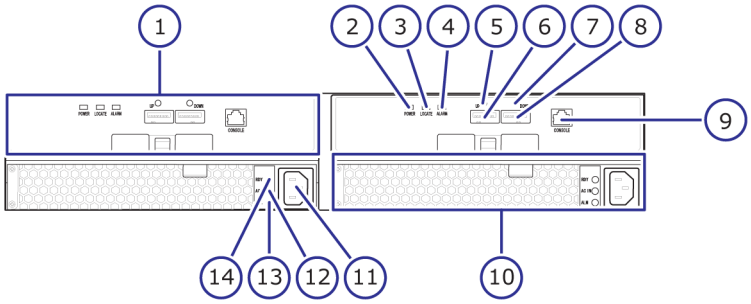
Number	Item	Description
2	READY LED	Green: Drive tray is operational.
3	LOCATE LED	Amber: Nonfatal error. Storage system can remain operating. This LED can also go ON to identify the drive tray being added.
4	Lock	Locks and unlocks the front panel bezel using the supplied key.

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

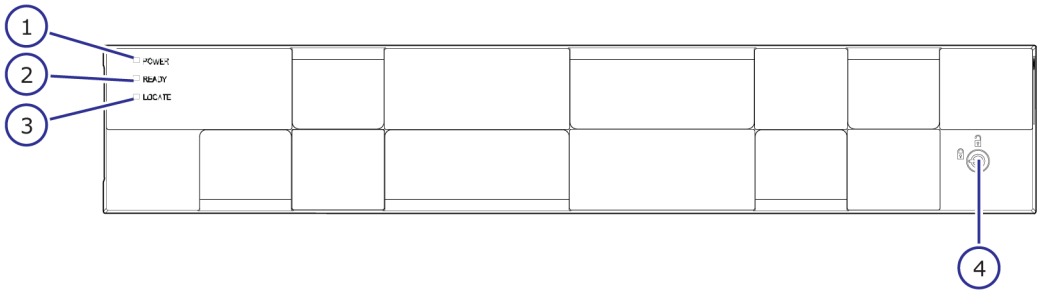
LFF rear panel



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.

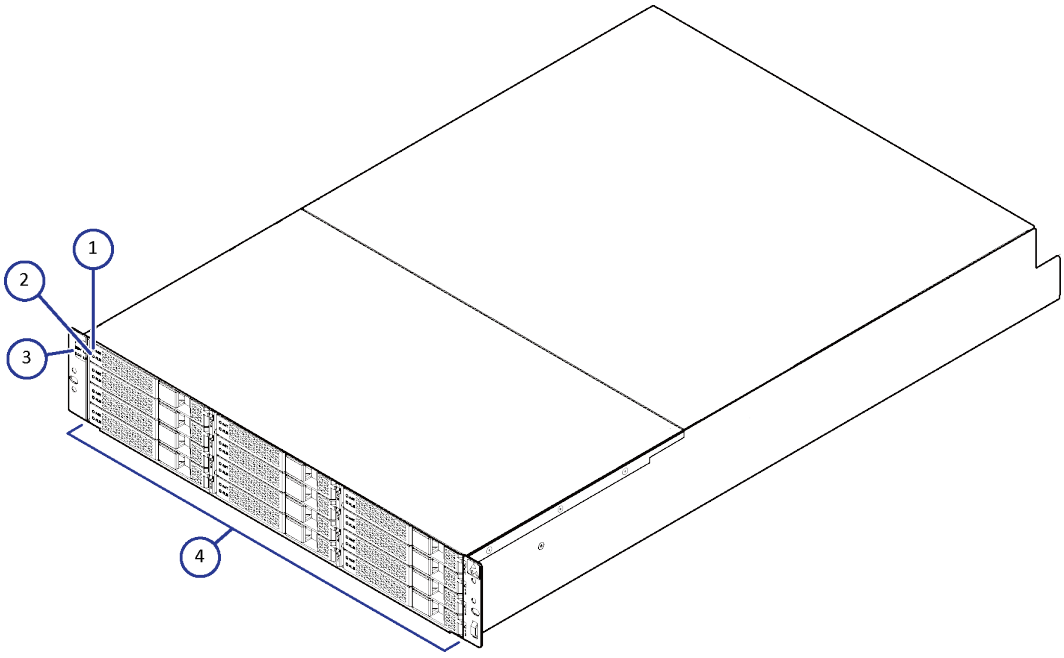
Flash module drive (FMD) tray

FMD with front panel bezel



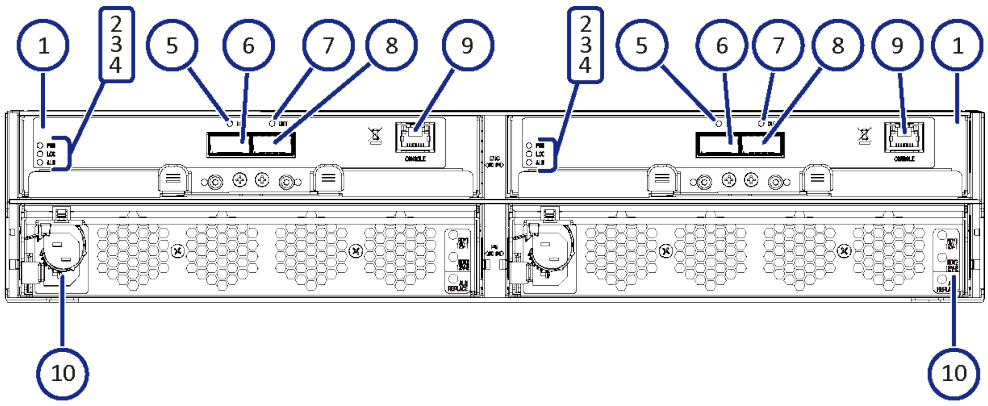
Number	Item	Description
1	POWER LED	Green: Drive tray is powered on.
2	READY LED	Green: Drive tray is operational.
3	LOCATE LED	Amber: can be forced on using the maintenance utility when adding drive trays.
4	Lock	Locks and unlocks the front panel bezel using the supplied key.

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

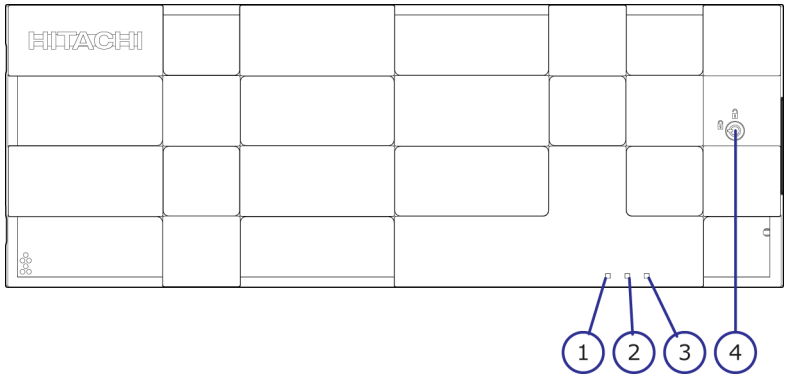


Number	Item	Description
1	ENC	N/A
2	POWER LED	Green: ENC is in the power-on state.
3	LOCATE LED	Amber: Shows the ENC when adding drive trays.
4	ALARM LED	Red: ENC can be removed safely.
5	PATH (IN) LED	Blue: IN side port is linked up.
6	PATH (IN) connector	Connect to a controller or drive tray.

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.

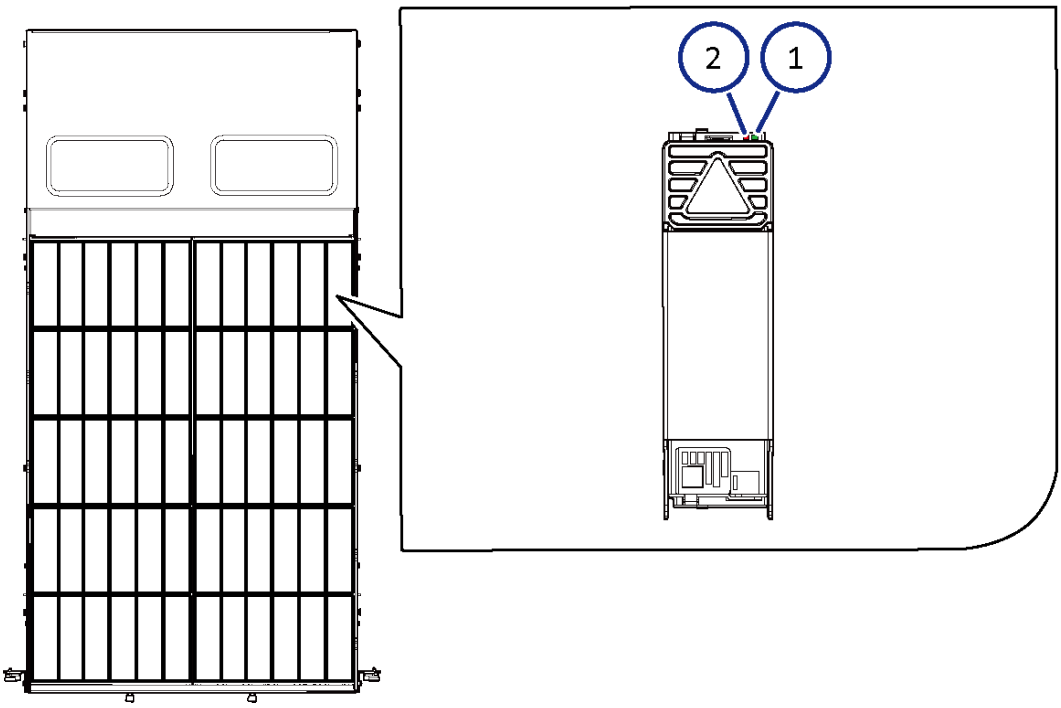
Dense intermix drive tray

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

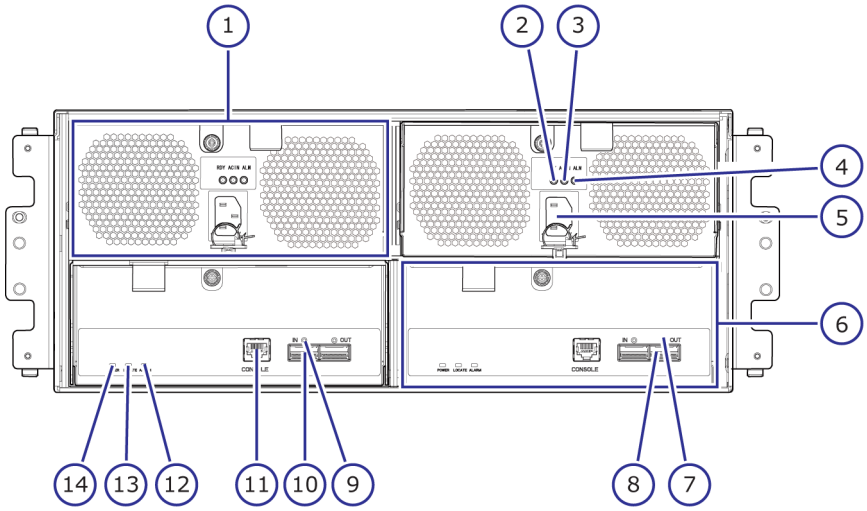


Number	Item	Description
1	ACT	Green: normal operation. Blink green: drive is being accessed.
2	ALM LED	Red: drive stopped due to a failure and can be removed safely.

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.

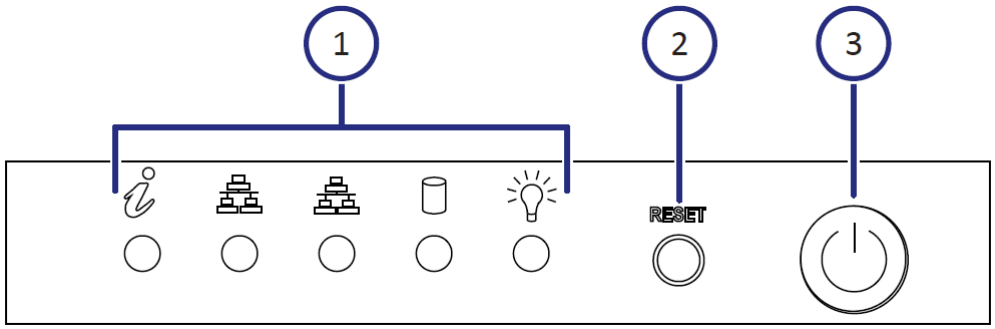
Three of the four RJ-45 ports (the ones that connect to the controllers and the IP network) are configured as a bridge. The SVP can be addressed using the default IP address 192.168.0.15.

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.

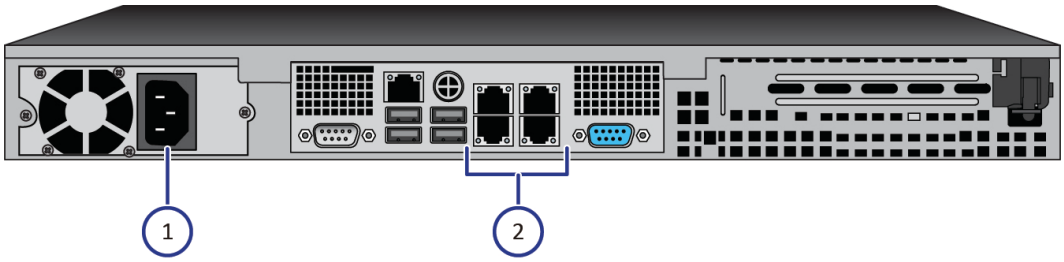


Number	Description
1	LEDs. From left to right, the LEDs are:

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

Replacing components

This chapter describes the steps to take before replacing a component. It also describes how to check that the system has recovered after replacing components.

Electrostatic discharge precautions

Static electricity can damage the storage system's static-sensitive components. To prevent damage, follow these precautions:

When performing the service procedures in this document, observe the following electrostatic discharge (ESD) precautions:

- Wear an antistatic wrist strap at all times when handling any field-replaceable unit (FRU). Clip the end of the wrist strap to exposed metal on frame. For convenience, a wrist strap is supplied with the storage system. Do not remove the wrist strap until the removal or replacement procedure has been completed.
- Before handling any FRU, discharge any static electricity by touching a grounded surface. Grounded surfaces include static-dissipating mats (already grounded) or grounded workstations.
- Remove all plastic, vinyl, and foam material from the work area.
- Do not remove a FRU from its antistatic protective bag until you are ready to install it.
- Handle any card FRU only by its edges and avoid touching the components or circuitry.
- Do not slide a FRU over any surface.
- Limit body movement (which builds up static electricity) during the removal and replacement of a FRU.
- To avoid electric shock when performing a "hot replacement" of a part, do not wear metallic accessories or a watch and avoid touching "live" parts of the storage system with a screwdriver or similar tools.

Unpacking replacement components

Unpack replacement components in a dry location that is not exposed to moisture, direct sunlight, dust, and temperature extremes. If the part to be added has been exposed to high or low temperature during transport, the part might not operate properly.

Follow appropriate power on and power off work procedures

If a replacement procedure requires power off and power on steps, follow the steps carefully to ensure the security of data.

After powering off the storage system, remove the power cables from the two power supply units on the storage system.

Safety considerations

Observe the following guidelines to ensure safety when replacing parts. Failure to follow these guidelines could result in bodily injury or damage to the chassis or components.

- Use the host to back up user data on the storage system before replacing components.
- When performing any installation, comply with all local health and safety requirements.
- Wear protective footwear when moving storage system hardware.
- Do not wear loose clothing that could get caught in the chassis or mounting hardware. Fasten ties and scarves and roll up sleeves.
- Wear safety glasses when working under conditions that are hazardous to your eyes.
- Keep walkways clear of tools, cables, and parts to prevent them from being stepped on or causing people to trip and fall.
- Do not work on the equipment or disconnect cables during a thunderstorm, when wearing a wool sweater or other heavy wool clothing, or when power is applied.
- Always turn off the storage system and unplug all data and power cables before lifting the storage system.
- Keep floors dry to prevent slips and falls.
- Do not use ungrounded power cables.
- Use only the power cables supplied with this product. Do not use power cables from other products. Otherwise, unexpected failures or accidents can occur.
- If you encounter unusual odors, heat generation, or smoke emission, shut off power to the equipment and inform the appropriate personnel Leaving such conditions unattended can cause electric shock or fire.
- Keep the area clean and dust-free when replacing components.
- Do not block or cover the openings of the storage system hardware. Never place a unit near a radiator or heat register. Failure to follow these guidelines can cause overheating and affect the unit’s reliability.
- After a component has been replaced, secure the chassis cover to the storage system. The chassis is designed to let cooling air flow effectively within it. An open chassis allows air leaks that might interrupt and redirect the flow of cooling air from internal components.
- Do not make mechanical or electrical modifications or repairs to the equipment. Such actions can cause an electric shock or cause the storage system to malfunction. Hitachi is not responsible for regulatory compliance of a modified Hitachi product.
- When removing cables, hold the cable connector and leave enough slack in the cables, so they do not bend to a diameter of less than 76 mm (3") or a

radius less than 38 mm (1.5") when extended and do not become pinched when retracted.

Guidelines to follow when replacing a component

Observe the following guidelines when replacing a component.

- Use only the replacement parts specified in this guide.
- Do not perform maintenance when the storage system is being started, Wait for the READY LED on the controller to go on before performing maintenance.
- If you replace a drive, controller, cache memory, front end module, backup module, back end module, ENC, fan, or power supply unit while the storage system power is turned on:
  - Wait at least 20 seconds after the failed part was removed before installing the new part.
  - Complete the replacement within 10 minutes. Otherwise, the system might power off due to an abnormal rise in temperature.

  If a power supply unit and another component fail at the same time, replace the power supply unit first, and then replace the other failed component. Otherwise, the system might power off due to an abnormal rise in temperature.
- If a fan on the controller fails at the same time when another component fails, replace the fan first, and then replace the other failed component. Otherwise, the system might power off due to an abnormal rise in temperature.
- Insert replacement parts quickly. Otherwise, the recovery might fail.
- If only the main switch power is off, power is provided by the basic supply. Do not leave components removed from the storage system for long periods of time, as this can trigger a power supply alarm.
- If the replacement part has a cover over one or more connectors, replace the cover of the connector part that is going to be used.

Guidelines to follow after replacing a component

Observe the following guidelines after replacing a component in the Hitachi storage system.

- When restarting the storage system, wait for the amber POWER LED to go ON, and then turn off the main switch. Wait at least one minute before turning on the main switch.
- After you replace components, close all the external storage system covers.

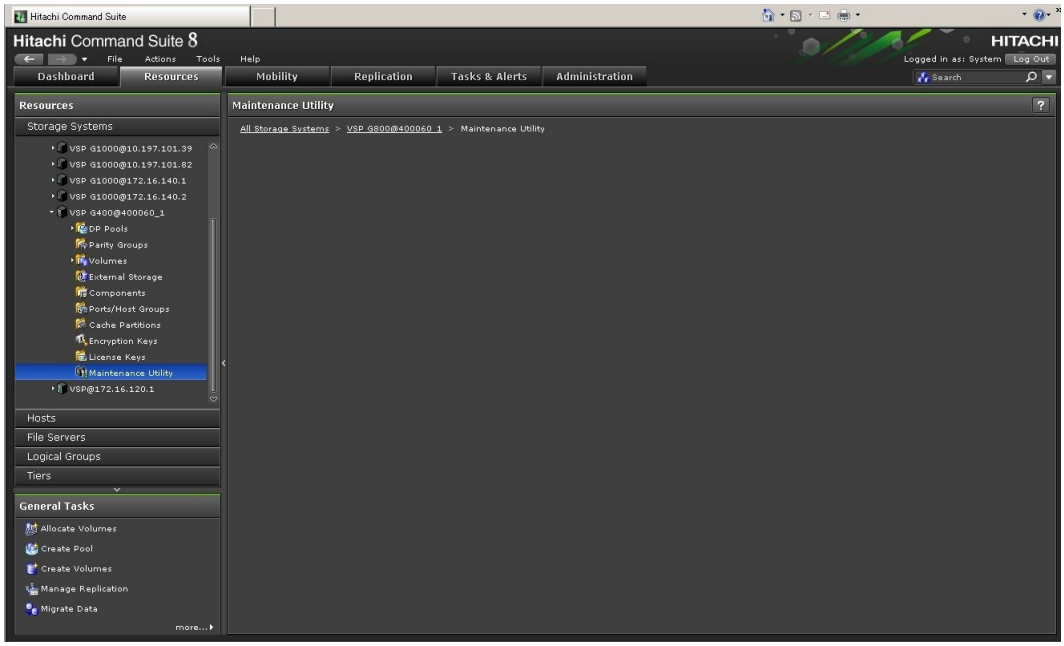
Starting the maintenance utiility

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

Starting the maintenance utility from Hitachi Command Suite

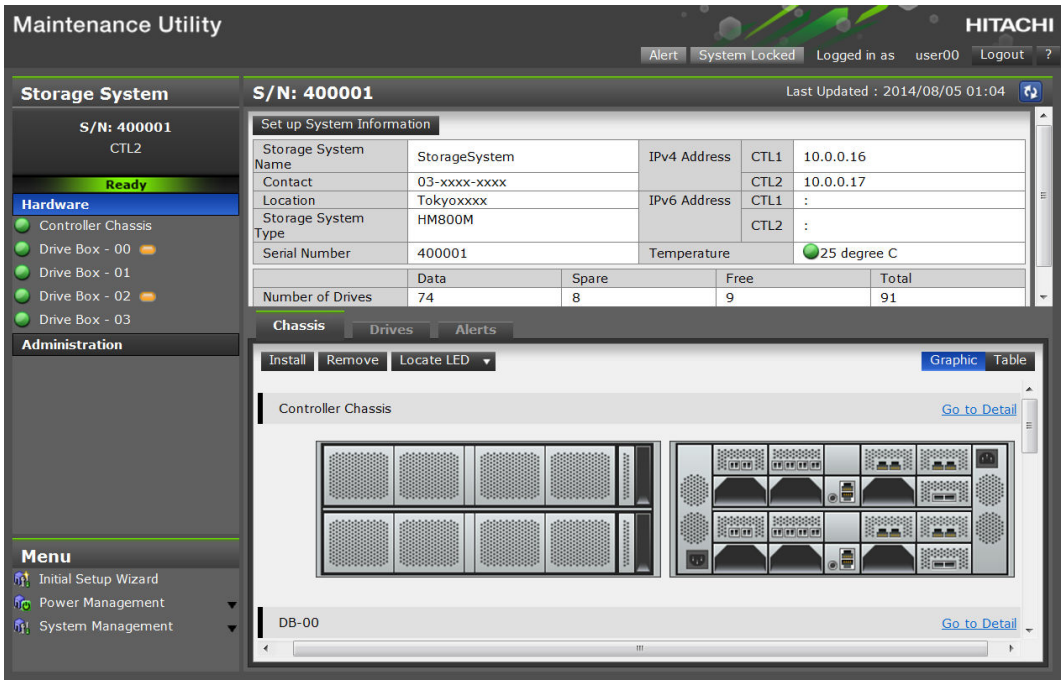
Procedure

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.

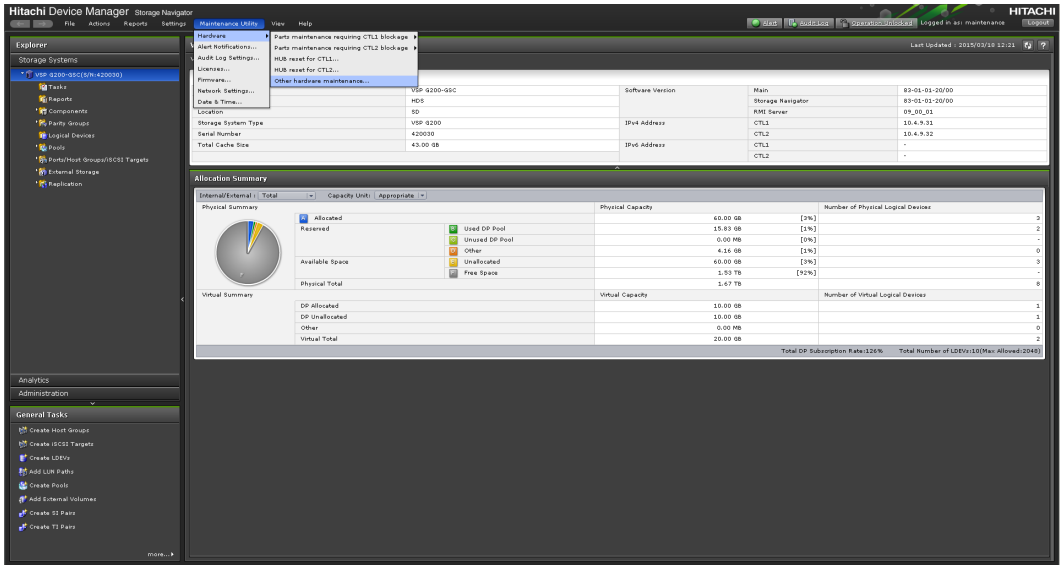


Starting the maintenance utility from Hitachi Device Manager - Storage Navigator

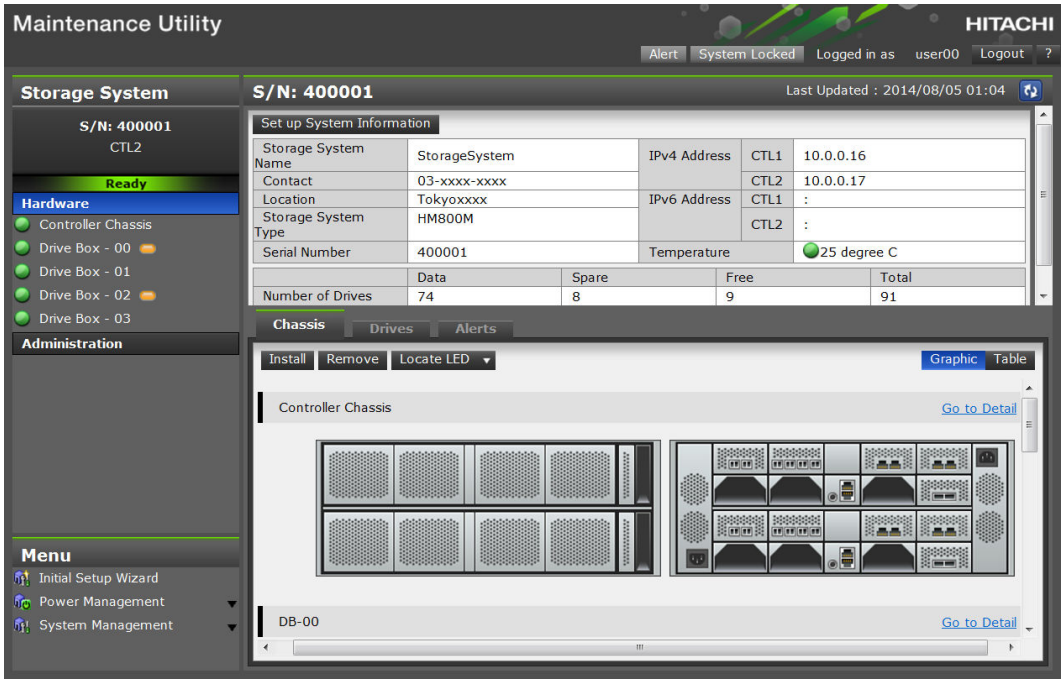
Procedure

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)**.



Replacement parts

The following table lists information about replacement parts for Hitachi Virtual Storage Platform storage systems. If a replacement part is valid for certain models only, those models are shown in parentheses.

Part name	Part number	Model	Status of host and storage system	
			I/O from the host	No I/O from the host
200-GB, MLC, 12-Gbps, 2.5-inch flash drive	5559263-A	DKC-F810I-200MEM	YES	YES
300-GB, 15kmin^{-1}, 6-Gbps, SAS, 2.5-inch (contains BNST)	5552785-A	DKC-F810I-300KCM	YES	YES
300-GB, 15kmin^{-1}, 6-Gbps, SAS, 2.5-inch	5552785-P	DKC-F810I-300KCMC	YES	YES
400-GB, MLC, 12-Gbps,, 2.5-inch flash drive	5559016-A	DKC-F810I-400MEM	YES	YES
600-GB, 10kmin^{-1}, 6-Gbps, SAS, 2.5-inch (contains BNST)	5552786-A	DKC-F810I-600JCM	YES	YES
600-GB, 10kmin^{-1}, 6-Gbps, SAS, 2.5-inch	5552786-P	DKC-F810I-600JCMC	YES	YES
600-GB, 15kmin^{-1}, 12-Gbps, SAS, 2.5-inch	5559498-A	DKC-F810I-600KGM	YES	YES
1.2-TB, 10kmin^{-1}, 6-Gbps, SAS, 2.5-inch (contains BNST)	5552789-A	DKC-F810I-1R2JCMC	YES	YES
1.2-TB, 10kmin^{-1}, 6-Gbps, SAS, 2.5-inch	5552789-P	DKC-F810I-1R2JCMC	YES	YES
400-GB, MLC, 12-Gbps, 3.5-inch flash drive	5559090-A	DKC-F810I-400M6M	YES	YES
1.2-TB, 10kmin^{-1}, 6-Gbps, SAS, 3.5-inch (contains BNST)	5559116-A	DKC-F810I-1R2J5M	YES	YES
1.2-TB, 10kmin^{-1}, 6-Gbps, SAS, 3.5-inch	5559116-P	DKC-F810I-1R2J5MC	YES	YES
4-TB, 7200min^{-1}, 6-Gbps, SAS7.2K, 3.5-inch (contains BNST)	5552784-A	DKC-F810I-4R0H3M	YES	YES
4-TB, 7200min^{-1}, 6-Gbps, SAS7.2K, 3.5-inch	5552784-P	DKC-F810I-4R0H3MC	YES	YES

Part name	Part number	Model	Status of host and storage system	
			I/O from the host	No I/O from the host
6-TB, 7200min^{-1}, 12-Gbps, SAS7.2K, 3.5-inch	5560075-A	DKC-F810I-6R0H9M	YES	YES
Battery (VSP G400, G600)				
CBLM and CBLH	3289081-A	DW-F800-BAT	YES	YES
Fan			YES	YES
CBSS and CBSL	3290738-A	N/A	YES	YES
Power Supply Unit				
CBSS and CBSL	3290737-A	N/A	YES	YES
CBLM and CBLH	3289056-A	N/A	YES	YES
DW-F800-DBS and DW-F800-DBL (contains BNST)	3290647-A	N/A	YES	YES
DW-F800-DBSC and DW-F800-DBLC	3290647-P			
FMD drive tray	3286659-A	N/A	YES	YES
Controller				
CBSS and CBSL	3290733-A	DW-F800-CTLS	YES	YES
CBLM	3289039-A	DW-F800-CTLM	YES	YES
Cache Memory				
8 GB	3290718-A	DKC-F810I-CM8G	YES	YES
16 GB	5552764-A	DKC-F810I-CM16G	YES	YES
Front End Modules				
8 Gbps Fibre Channel	3289046-A	DW-F800-4HF8	YES	YES
16 Gbps Fibre Channel	3289047-A	DW-F800-2HF16	YES	YES
10 Gbps SFP iSCSI	3289048-A	DW-F800-2HS10S	YES	YES
Small Form Factor Pluggable				
Optical module (8 Gbps LongWave)	5556750-A	DKC-F810I-1PL8	YES	YES
Optical module (8 Gbps ShortWave)	5557409-A	DKC-F810I-1PS8	YES	YES
Optical module (16 Gbps LongWave)	5552782-A	DKC-F810I-1PL16	YES	YES

Part name	Part number	Model	Status of host and storage system	
			I/O from the host	No I/O from the host
Optical module (16 Gbps ShortWave)	5552781-A	DKC-F810I-1PS16	YES	YES
Disk Board				
CBLM and CBLH	3289045-A	DW-F800-BS12G	YES	YES
	3289094-A	DW-F800-BS12GE	YES	YES
ENC				
SFF and LFF drive trays	3290646-A	N/A	YES	YES
FMD drive tray	3286658-A	N/A	YES	YES
SAS Cables				
1 m SAS cable including two omega clips	3290630-A	DW-F800-SCQ1	YES	YES
1.5 m SAS cable including two omega clips	3290631-A	DW-F800-SCQ1F	YES	YES
3 m SAS cable including two omega clips	3290632-A	DW-F800-SCQ3	YES	YES
5 m SAS cable including two omega clips	3290633-A	DW-F800-SCQ5	YES	YES
10 m SAS optical cable	3290666-A	DW-F800-SCQ10A	YES	YES
30 m SAS optical cable	3290667-A	DW-F800-SCQ30A	YES	YES
100 m SAS optical cable	3290723-A	DW-F800-SCQ1HA	YES	YES
Cache Flash Memory (CFM)				
CFM (VSP G200)	3290736-A	DW-F800-BM10	YES	YES
CFM	3289043-A	DW-F800-BM20	YES	YES
CFM	3289043-B	DW-F800-BM30	YES	YES
LAN Blade				
LAN Board (VSP G400, 600, and 800)	3289044-A	N/A	YES	YES
Backup Module (BKM)				
CBSS and CBSL	3290735-A	N/A	YES	YES
CBLM and CBLH	3289036-A	N/A	YES	YES
SVP				

Part name	Part number	Model	Status of host and storage system	
			I/O from the host	No I/O from the host
Service Processor	3919435.P	N/A	YES	YES

Removing and replacing the front bezel

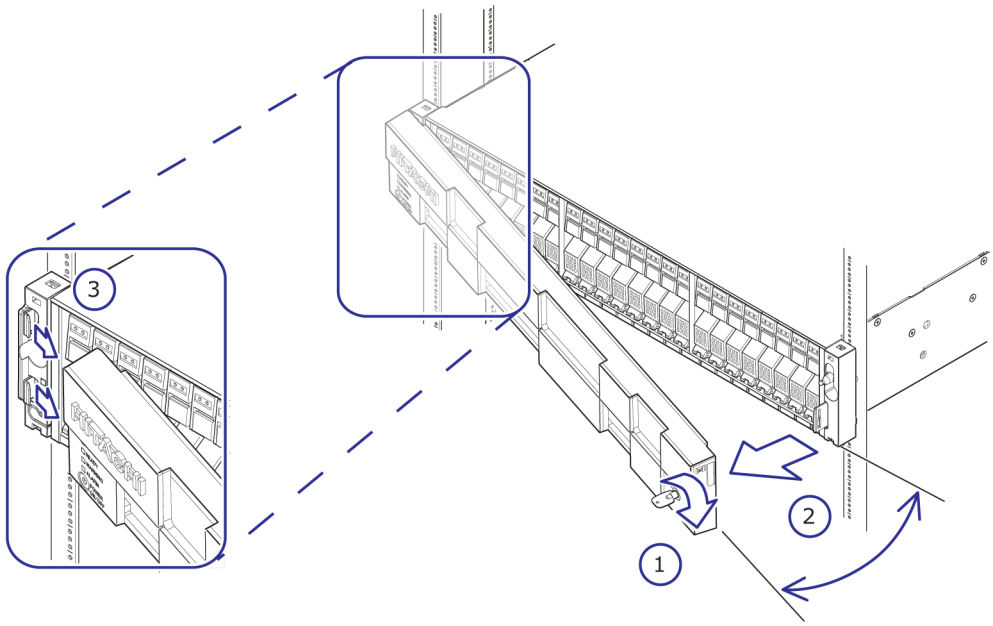
To gain access to a storage system, remove the front bezel. After replacing the component, replace the front bezel.

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.

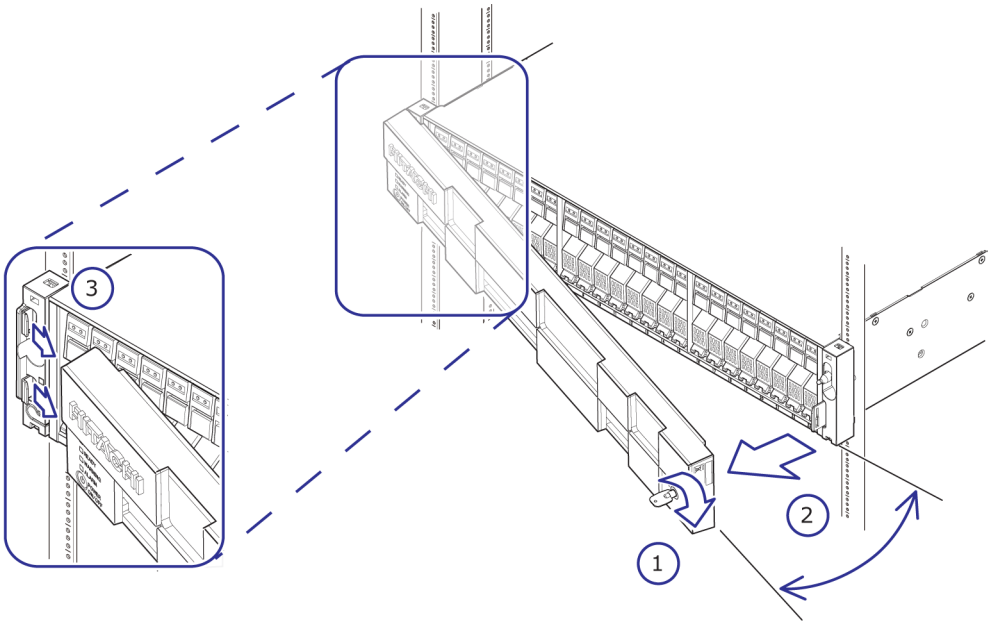
Replacing the front bezel for a CBSS or CBSL controller

To replace the front bezel:

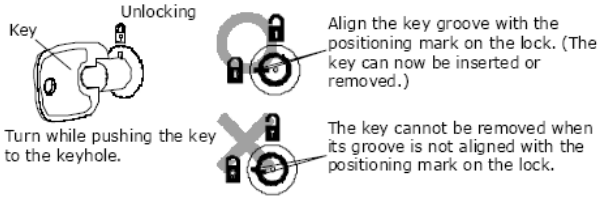
Procedure

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 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, be sure it is inserted completely into the lock. Otherwise, you can damage the key.



When removing the key after locking the front bezel, align its groove with the positioning mark on the lock. Otherwise, you can damage the lock.

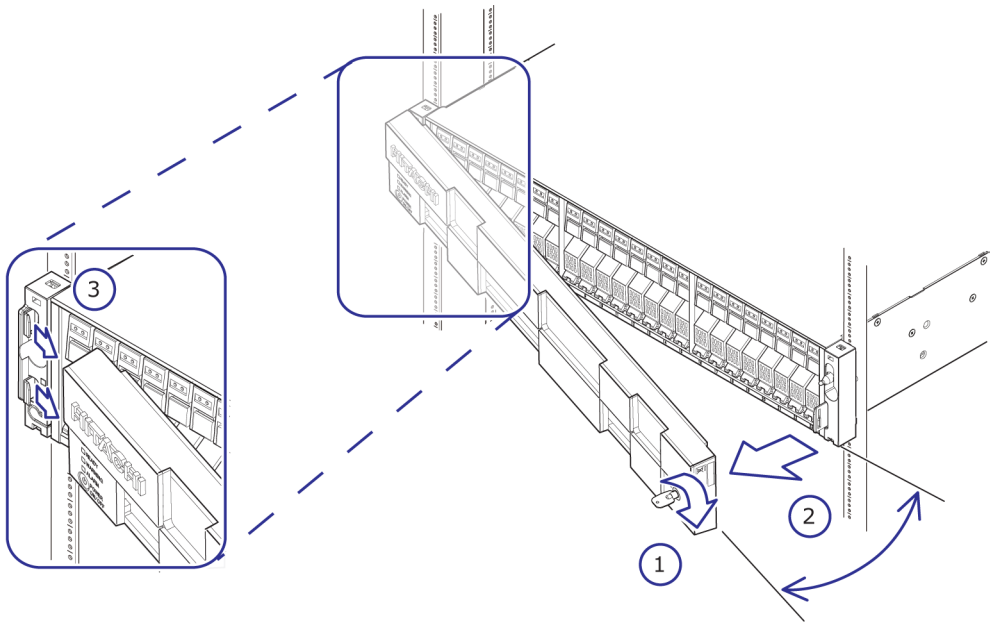
Removing the front bezel from SFF, LFF, and FMD drive trays

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.

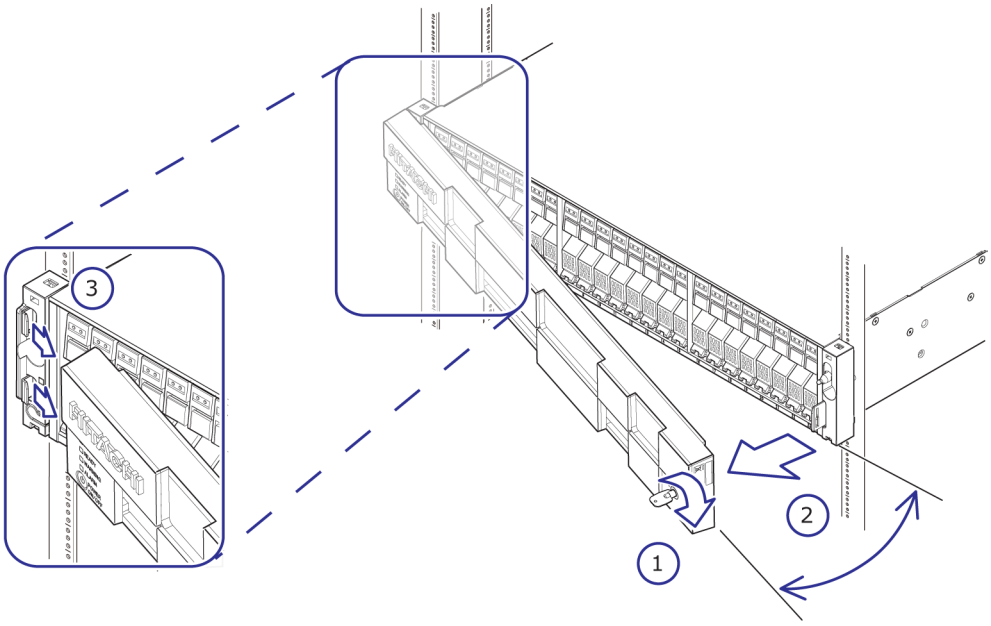
Replacing the front bezel from a SFF, LFF, or FMD drive tray

To replace the front bezel:

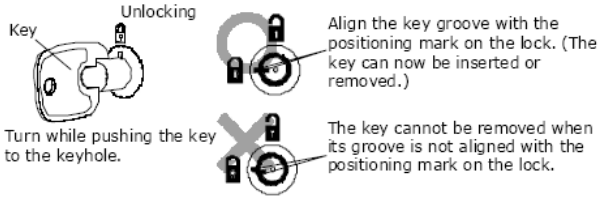
Procedure

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 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, be sure it is inserted completely into the lock. Otherwise, you can damage the key.



When removing the key after locking the front bezel, align its groove with the positioning mark on the lock. Otherwise, you can damage the lock.

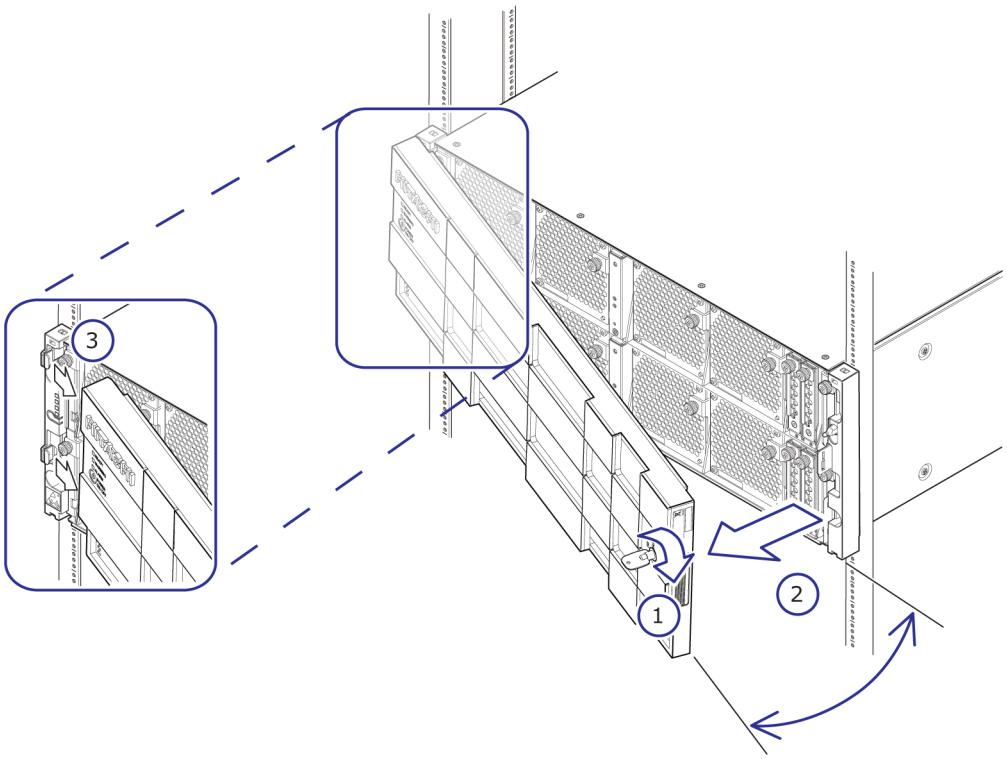
Remove the front bezel from a CBLM or CBLH controller

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.

Replacing the front bezel

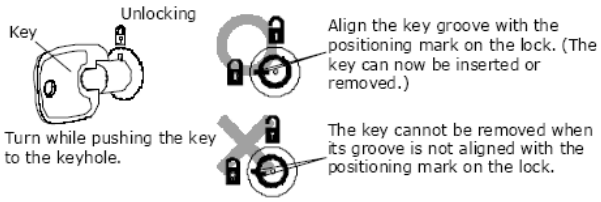
To replace the front bezel:

Procedure

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

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



   When removing the key after locking the front bezel, align its groove with the positioning mark on the lock. Otherwise, you can damage the lock.

Attaching the front bezel to a dense intermix drive tray

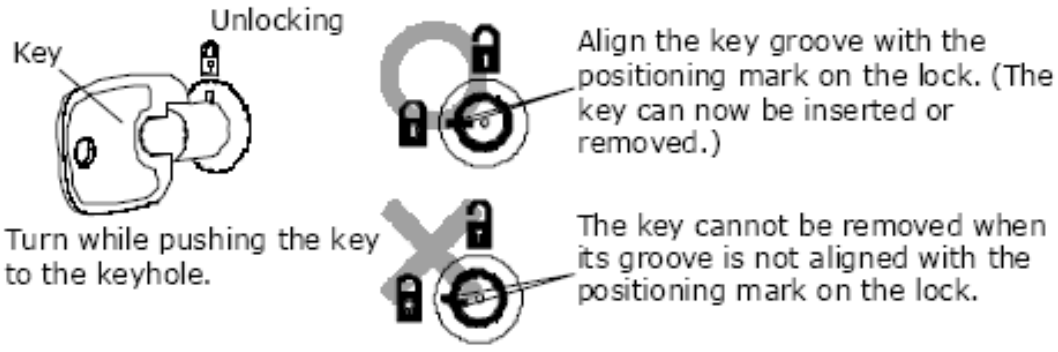
Procedure

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:

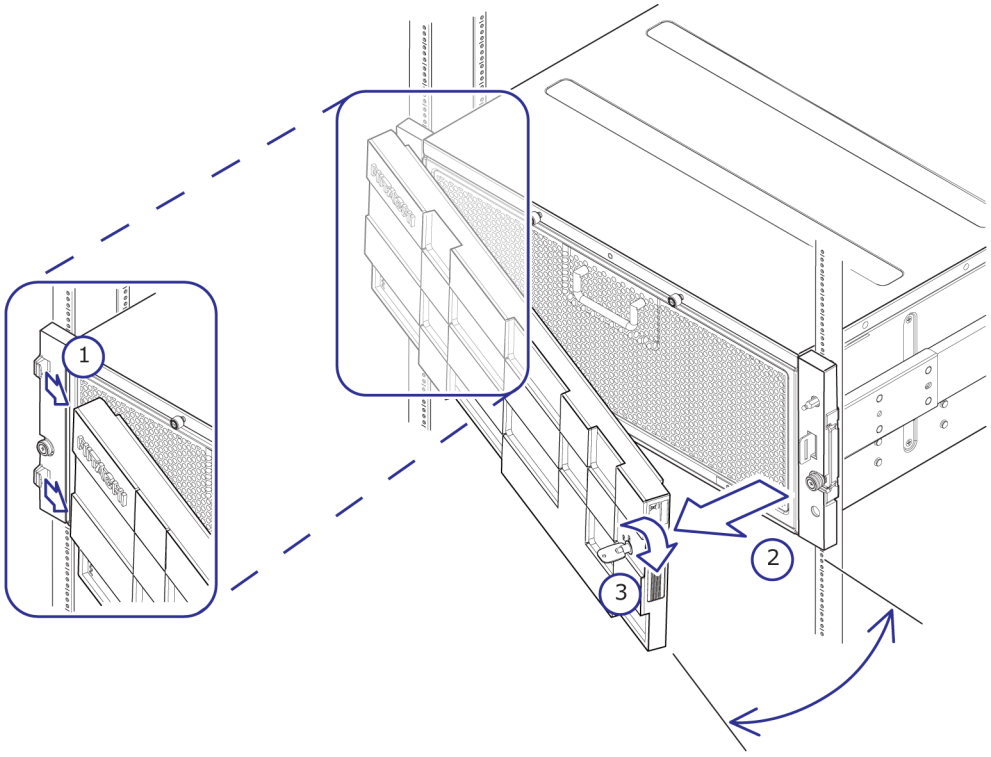
- Do not remove multiple dense intermix drive trays at one time.
- After removing the dense intermix drive tray, do not place objects on it or use it as working space.

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.

Checking recovery after replacing components

After you replace one or more components, check to verify that the storage system has recovered.

Procedure

1. In the **Maintenance Utility** window, click **Refresh**.
2. Confirm that the status of the replaced components is `Normal`.

4

Replacing a drive

Before replacing a drive, read the precautions and understand the procedure for your drive type.

- ☐ Checking a drive
- ☐ Blocking the drive
- ☐ Replacing a drive for a CBSS or SFF drive tray
- ☐ Replacing a drive for a CBSL or LFF drive tray
- ☐ Replacing a drive for a flash module drive tray
- ☐ Replacing a drive for the dense intermix drive tray
- ☐ Checking the drive status

Checking a drive

Procedure

1. Start the maintenance utility.
2. Click **Hardware > Controller Chassis** or **Hardware > Drive Box**.
3. Click the **Drives** tab.
4. Confirm that the status of the drive to be replaced is `Warning`, `Failed`, `Blocked`, `Copy incomplete`, or `Reserved`.

5. Click **Refresh**.
6. If the red `ALM` LED on the failed drive is off:
   - In the **Drives** tab, check which drive is blocked, and then click **Block** in the **Block Drives** window.
   - When prompted about whether you want to perform sparing, click **Yes**.
   - Remove the front bezel and confirm the number of the slot in which the failed drive is installed.
   - Click **Close**.
   - Replace the drive.
7. If the red `ALM` LED on the failed drive is on:
   - Remove the front bezel and confirm the number of the slot in which the failed drive is installed.

- Replace the drive.

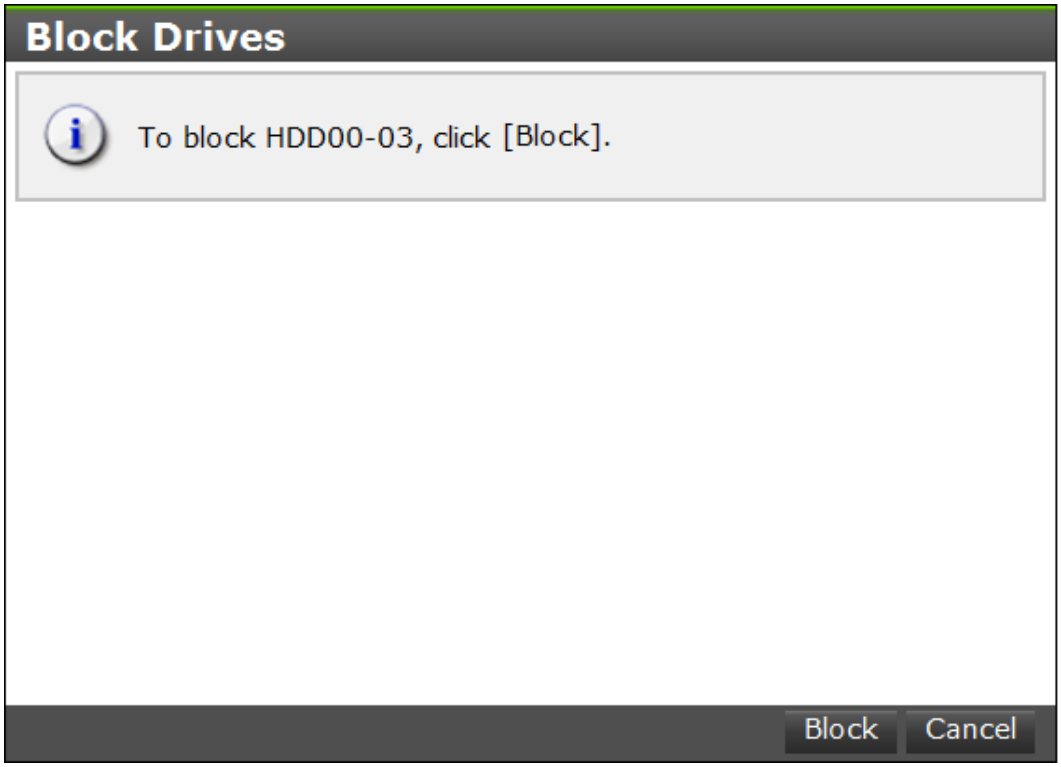
Blocking the drive

Prerequisites

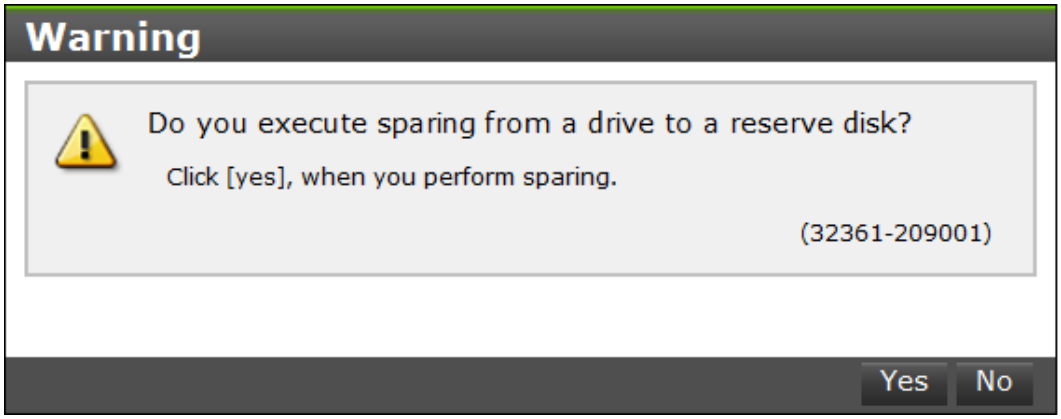
Check the drive in the maintenance utility.

Procedure

1. Select the drive to be replaced, and then click **Block**.
2. When the **Block Drives** window appears, confirm that the drive shown in the window is the one to be replaced, and then click **Block**.



3. If the following warning appears, click **Yes**.



4. Confirm that the drive is blocked, and then click **Close**.

Replacing a drive for a CBSS or SFF drive tray

Facing the front of the chassis, drive numbering in a chassis is #0 to #23, from left to 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.
- The red ALM LED for the drive to be replaced is on.

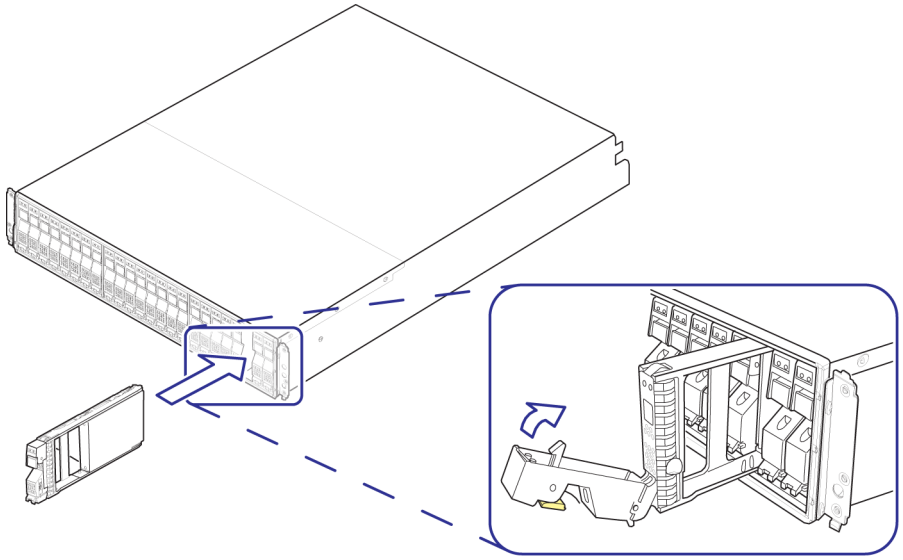
Procedure

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 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 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. Gently pull the handle of the drive toward you to make sure the drive is installed securely.
8. Confirm that the red `ALM` LED is off at the new drive.
9. In the maintenance utility, click **Hardware > Controller Chassis** or **Hardware > Drive Box**.
10. Click the **Drives** tab.
11. 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.
12. Attach the front bezel.

Replacing a drive for a CBSL or 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.

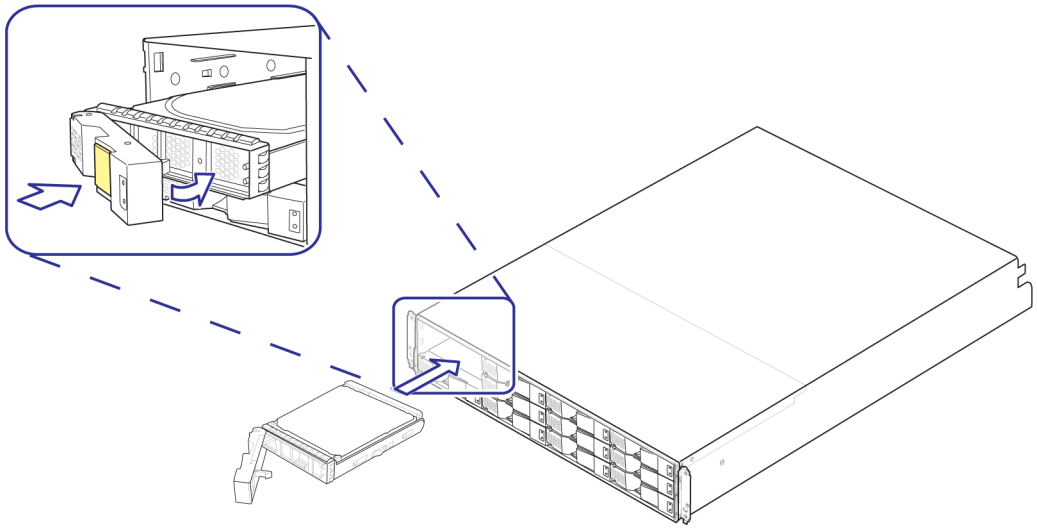
- The red ALM LED for the drive to be replaced is on.

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 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 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. In the maintenance utility, click **Hardware > Controller Chassis** or **Hardware > Drive Box**.
8. Click the **Drives** tab.
9. 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.
10. Confirm that the red ALM LED is off at the new drive.
11. Attach the front bezel.

Replacing a drive for a flash module drive tray

Drive replacement for this drive tray is not supported.

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

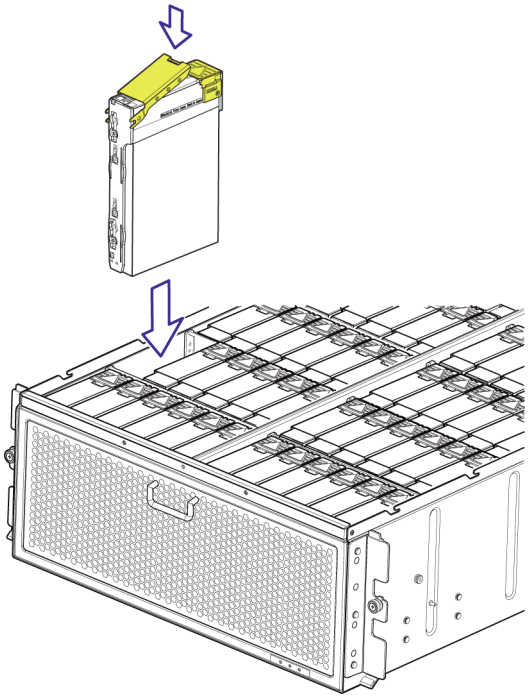
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.
- The red ALM LED for the drive to be replaced is on.

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.

Checking the drive status

Procedure

1. In the maintenance utility, click **Hardware > Controller Chassis** or **Hardware > Drive Box**.
2. Click the **Drives** tab.
3. Confirm that the status of the replacement drive is **Normal**.

   Observe the following guidelines:
   - If you replaced a drive without blocking it, click **Refresh** at the top-right of the **Maintenance Utility** window to update the window, and then check the status of the replaced drive.

- When replacing a drive after saving data to a spare drive, the drive status changes to **Normal** after performing the copy-back operation. This operation can take up to 12 hours to perform, depending on the configuration and drive capacity
- If the drive status is **Copy incomplete**, the correction-copy operation cannot be performed because a copy-processing operation is being performed in the parity group to which the target drive belongs. Complete the other copy-processing operation, and then replace the drive.
- If the drive status is **Reserved**, the copy-back operation cannot be performed because more than one copy-processing operation is being performed in the parity group to which the copy-back source drive of the target drive belongs. Complete the other copy-processing operation, and then replace the drive.
- If the copy-back operation is set to disabled, this operation will not be performed.

5

Replacing a battery

Hitachi Virtual Storage Platform G400, G600 systems have replaceable batteries. Before replacing a battery on these storage systems, read the precautions and understand the procedure for your battery.

- Checking the battery
- Replacing the battery

Checking the battery

Prerequisites

- Storage system power is turned on.
- The red STATUS LED for the backup module containing the battery to be replaced is blinking.
- The power supply is operating normally.

Procedure

1. Start the maintenance utility.
2. In the **Maintenance Utility** window, click **Hardware > Controller Chassis**.
3. In the **Controller Chassis** window, click the **BKMFs** tab.
4. Confirm that the status of the battery to be replaced is `Warning`.

Replacing the battery

The blink pattern of the red STATUS LED indicates which battery needs replacement.

- **One blink::** Replace the standard battery.

- **Two blinks::** Replace the optional battery.
- **Three blinks::** Replace both the standard and optional batteries.

Prerequisites

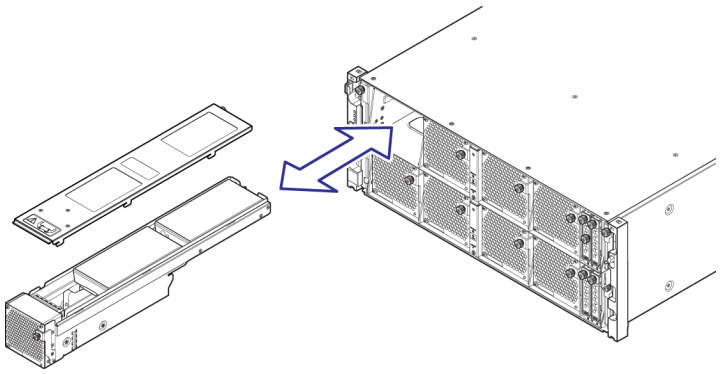
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.
- The red STATUS LED for the backup module containing the battery to be replaced is blinking.
- Use the maintenance utility to check the battery.

Procedure

1. Loosen the blue screw that secures the BKMF whose red STATUS LED is blinking.
2. Open the lever to pull out and remove the BKMF with both hands.
3. Find the BKMF whose red STATUS LED is blinking, and then loosen the blue screw that secures that BKMF.
4. Slide the top panel of the BKMF and remove it.
5. Hold the latch of the cable connector of the battery to be replaced and remove the connector from the socket.
6. Remove the battery to be replaced.
7. Install a new battery in the BKMF and route cables along the groove of the BKMF.

   If replacing one battery, install the replacement battery at the front (fan) side of the system. The battery clicks into place when installed securely in the slot. Route cables with minimum bending.
8. Connect the cable connector to the socket. You will hear a click when the connection is secure.
9. Replace the BKMF top panel by sliding it and then attaching it.
10. Tighten the blue screw on the rear side of the BKMF.
11. With the lever of the BKMF opened, hold the BKMF with both hands and insert it straight into the slot.

12. Close the lever of the BKMF, and tighten the blue screw.



13. Check that the green STATUS LED on the BKMF is blinking.
14. In the **Maintenance Utility** window, click **Hardware > Controller Chassis**.
15. Click the **BKMF** tab.
16. Confirm that the status of the replacement battery is Normal.
17. Log out and close the **Maintenance Utility** window.

6

Replacing a fan

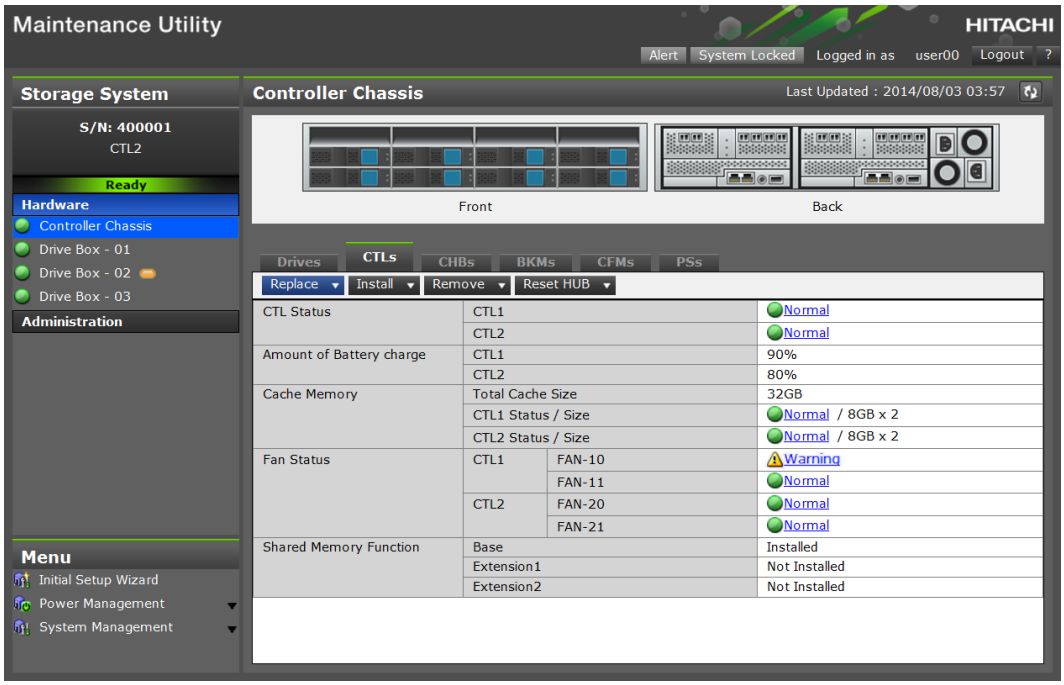
Before replacing a fan, read the precautions and understand the procedure for your fan.

- ☐ Blocking the controller
- ☐ Replacing a fan
- ☐ Restoring a fan

Blocking the controller

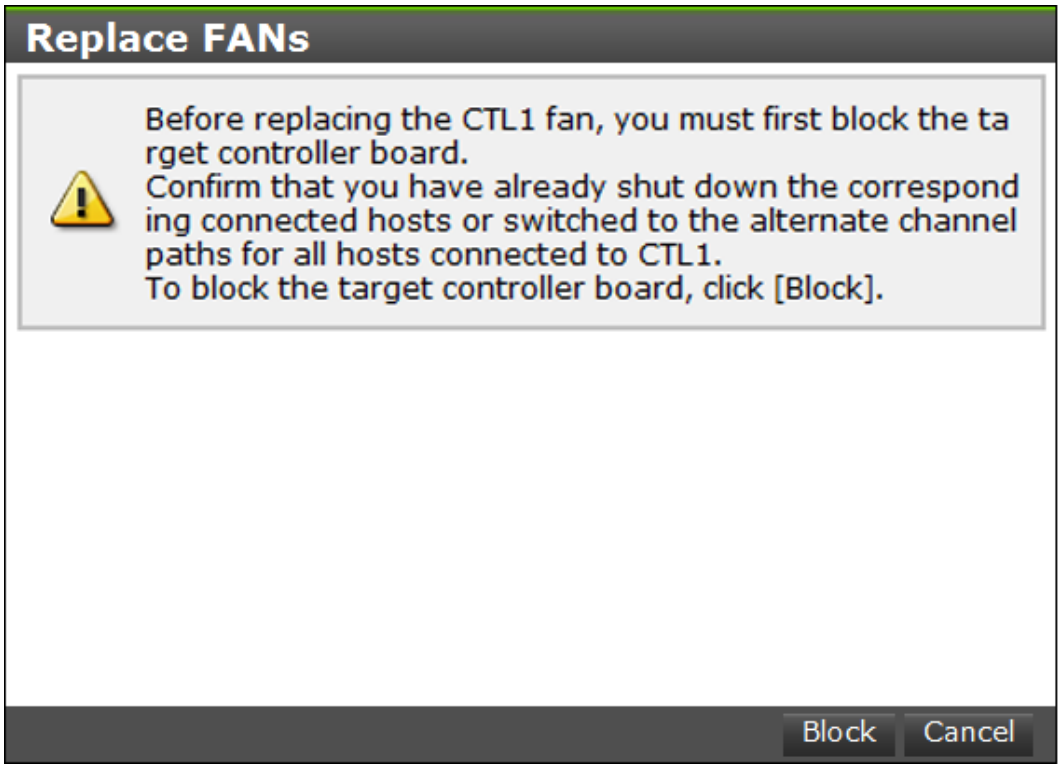
Procedure

1. Use the amber `CTL WARN` LED to identify the failed fan that needs to be replaced:
   - If the LED blinks 1 time, replace fan 0.
   - If the LED blinks 2 times, replace fan 1.
2. Start the maintenance utility.
3. Click **Hardware > Controller Chassis**.
4. In the **Controller Chassis** window, click the **CTLs** tab.
5. Confirm that the status of the controller to be replaced is `Warning`.

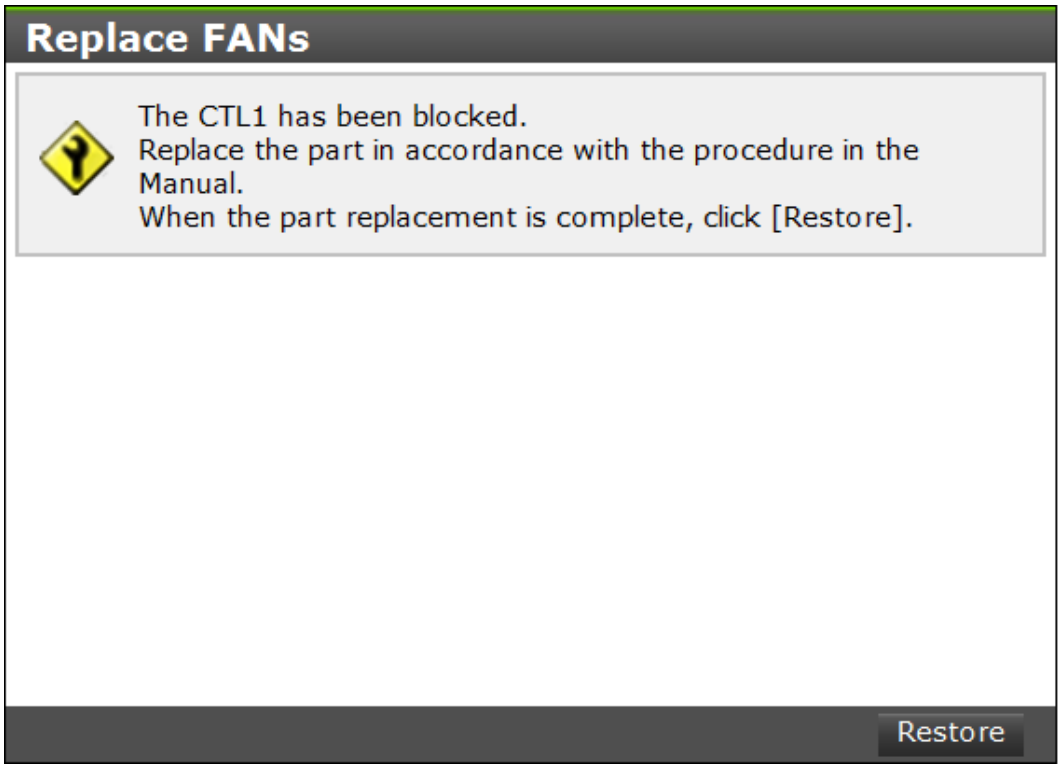


6. Click the **Replace** list, and select the controller that contains the cache memory you want to replace.

7. When the **Replace FANs** window appears, verify that the fan shown in the window is the one to be replaced, and then click **Block**.



8. Check that the controller is blocked and becomes ready for replacing. Leave the **Replace FANs** window open, but do not click the **Restore** button.



Replacing a fan

Caution: Storage system fans rotate at high speed. Exercise extreme caution to avoid getting anything caught in the fan and to prevent injury.

Caution: A short-circuit can cause a fire. Never insert metal or other objects into the cable connector; otherwise, a short-circuit can occur.

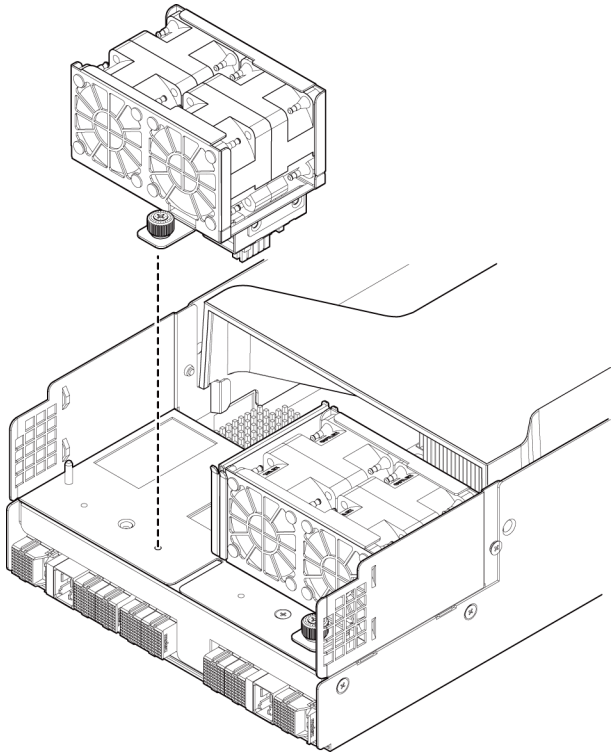
Prerequisites

- 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.
- A fan is installed in the controller.
- Storage system power is turned on.
- The amber `CTL WARN` LED is blinking one or two times rapidly (one blink = replace fan 0, two blinks = replace fan 1).
- Use the maintenance utility to block the controller.

Note: Storage system fans rotate at high speed. Exercise extreme caution to avoid getting anything caught in the fan and to prevent injury.

Procedure

1. Remove all optical and SAS cables connected to the controller.
2. Loosen the blue screw that secures the controller, and then open the lever.
3. Hold the controller with both hands, and then pull it gently and remove it.
4. Loosen the blue screw that secures the fan.
5. Lift the fan and remove it from the connector.
6. Install the new fan into the connector of the controller.



7. Tighten the blue screw to secure the fan.
8. Check that the controller connector is in good condition (not deformed or damaged).
9. With the right and left controller levers open completely, insert the controller into the slot of the Controller.
10. Push the controller in all the way, and then close the right and left levers completely.
11. Tighten the blue screw to secure the controller.

12. Connect all the optical and SAS cables that you removed from the controller.

Postrequisites

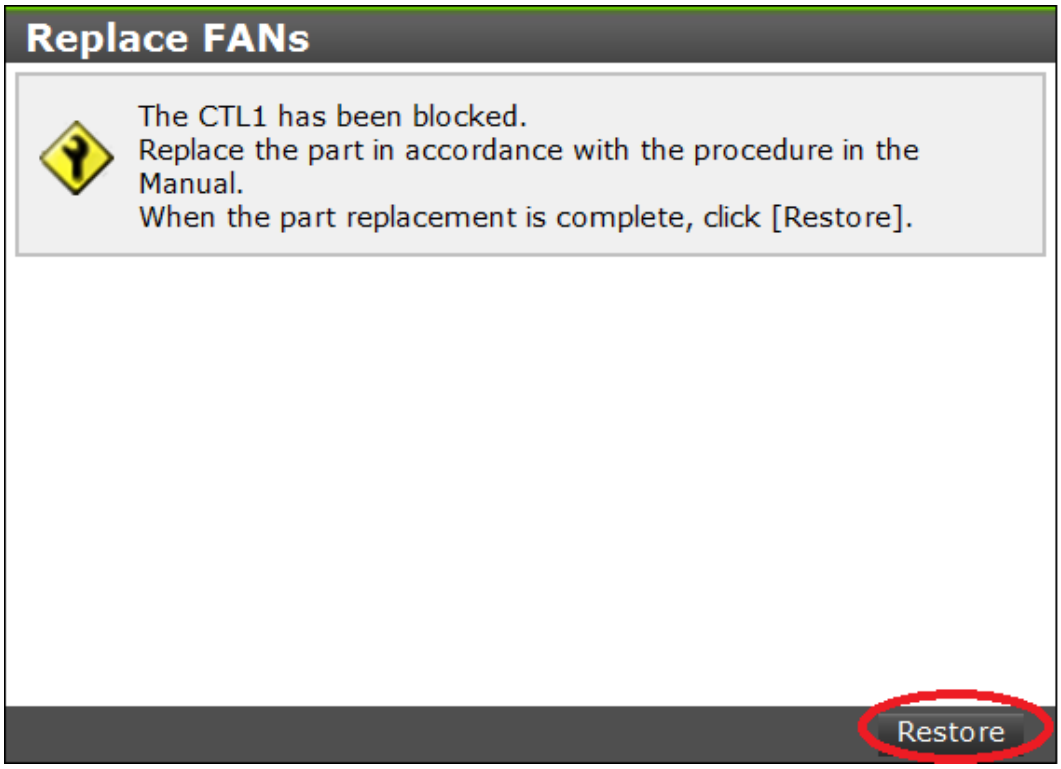
- Use the maintenance utility to restore (unblock) the controller.

Restoring a fan

Procedure

1. In the **Replace FANs** 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. Confirm that the amber `CTL WARN` LED is off at the fan.
4. In the **BKMFs** tab, click **Refresh** at the top-right of the window and confirm that the fan status is `Normal`.

5. Log out and close the **Maintenance Utility** window.

7

Replacing a power supply

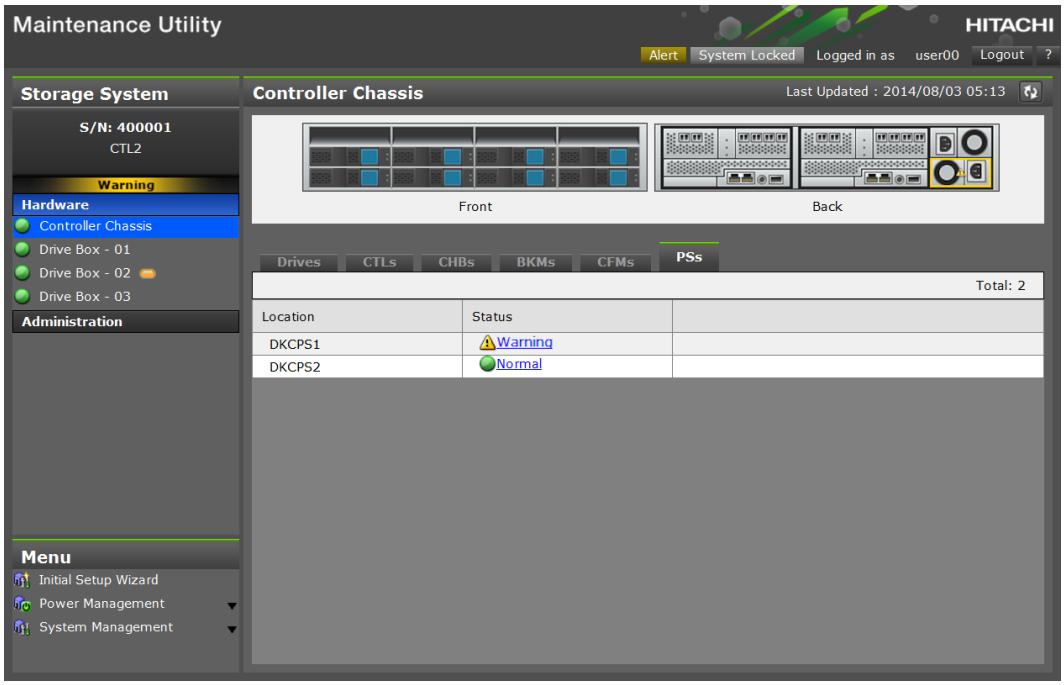
Before replacing a power supply, read the precautions and understand the procedure for your power supply.

The following topics are covered in this chapter:

Checking the power supply

Procedure

1. Start the maintenance utility.
2. Click **Hardware > Controller Chassis** or **Hardware > Drive Box**.
3. In the **Controller Chassis** window, click the **PSs** tab.
4. Confirm that the status of the power supply to be replaced is `Warning`.



Replacing a power supply for a CBSS or CBSL

Caution: Be sure to replace the faulty power supply. If you replace the operational power supply, the system will go down.

Caution: A short-circuit can cause a fire. Never insert metal or other objects into the cable connector; otherwise, a short-circuit can occur.

Note: Power supply unit #1 and power supply unit #2 are installed in opposite directions.

Prerequisites

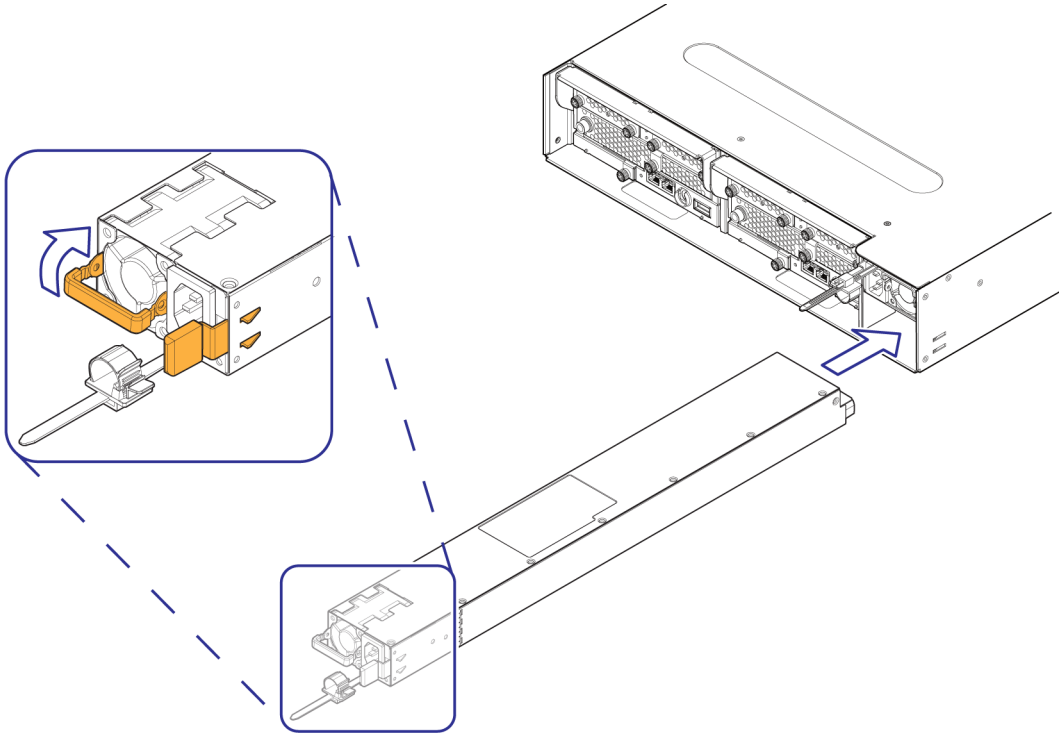
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.
- The red ALM/RDY LED for the power supply to be replaced is on.

Note: If the red ALM/RDY LED is on at both power supplies, do not perform this procedure. Contact the HDS Support Portal at https://portal.hds.com.

Procedure

1. Disconnect the power cable from the power supply to be replaced. Remove the cable holder to disconnect the power cable from the power supply.
2. Hold up the latch on the cable holder of the power supply to release the lock, and then slide the cable holder forward.
3. Pull the lever open while pressing the latch on the power supply inward with right thumb.

   When the lever is completely opened, the power supply moves forward.



4. Pull out and remove it while holding the body of the power supply with both hands.
5. Insert the new power supply into the slot.

6. Wait at least 20 seconds, and then push the power supply until the latch clicks. If the latch does not click, reorient the power supply, and then reinsert it into the slot.
7. Connect the power cable to the power supply, and then secure the cable with the cable holder.
8. Confirm that the red ALM/RDY LED is off at the power supply and the green ALM/RDY LED is on.

   If the red ALM/RDY LED does not go off after more than 30 minutes following replacement of the power supply, remove the power supply, wait at least 30 seconds, and then reinstall it.

Replacing a power supply for a CBLM or CBLH

Caution: Be sure to replace the faulty power supply. If you replace the operational power supply, the system will go down.

Caution: A short-circuit can cause a fire. Never insert metal or other objects into the cable connector; otherwise, a short-circuit can occur.

Note: Power supply unit #1 and power supply unit #2 are installed in opposite directions.

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 power supply unit to be replaced is on.

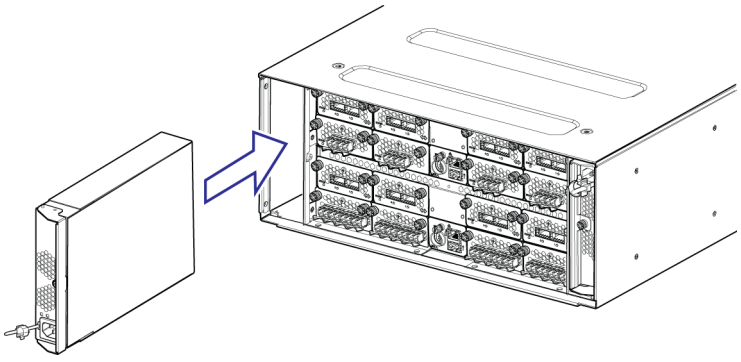
Note: If the red ALM LED is on at both power supplies, do not perform this procedure. Contact the HDS Support Portal at https://portal.hds.com.

Procedure

1. Disconnect the power cable from the power supply to be replaced. Remove the cable holder to disconnect the power cable from the power supply.
2. Using a Phillips screwdriver, loosen the blue screw that secures the power supply.
3. Open the lever to remove the power supply.

   When the lever is completely opened, the power supply moves forward.

4. Hold the power supply with both hands, and then pull it gently and remove it.



5. Hold up the latch on the cable holder of the new power supply to release the lock, and then slide the cable holder forward.
6. With the lever opened completely, insert the new power supply into the slot. Wait at least 20 seconds, and then insert the power supply all the way into the slot. If the power supply does not install all the way into the slot, reorient the power supply, and then reinsert it into the slot.
7. Close the lever completely.
8. Using a Phillips screwdriver, tighten the blue screw to secure the power supply.
9. Connect the power cable to the power supply, and then secure the cable using the cable holder.
10. Confirm that the red ALM LED is off at the power supply and the green RDY LED is on.

    If the red ALM LED does not go off after more than 30 minutes following replacement of the power supply, remove the power supply, wait at least 30 seconds, and then reinstall it.

Replacing a power supply for SFF and LFF drive trays

Caution: Be sure to replace the faulty power supply. If you replace the operational power supply, the system will go down.

Caution: A short-circuit can cause a fire. Never insert metal or other objects into the cable connector; otherwise, a short-circuit can occur.

Note: Power supply unit #1 and power supply unit #2 are installed in opposite directions.

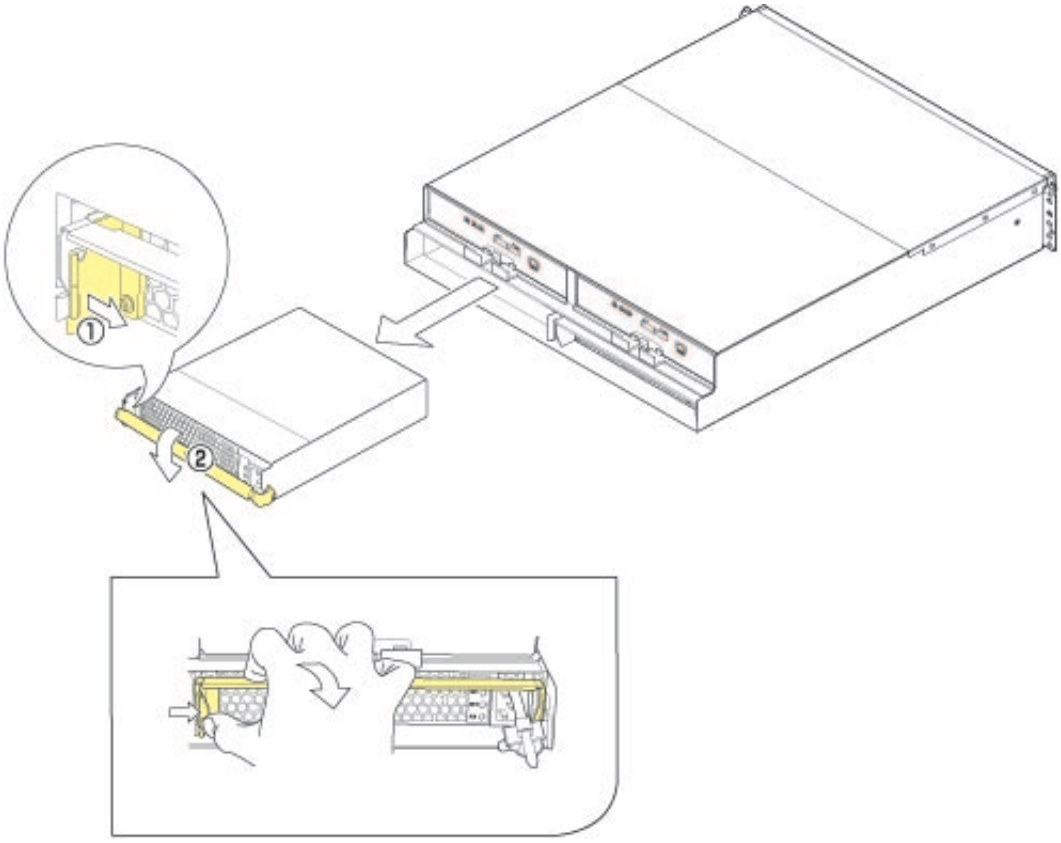
Prerequisites

- 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 power supply unit to be replaced is on.

Note: If the red ALM LED is on at both power supplies, do not perform this procedure. Contact the HDS Support Portal at https://portal.hds.com.

Procedure

1. Disconnect the power cable from the power supply to be replaced. Remove the cable holder to disconnect the power cable from the power supply.
2. Pull the lever open while pressing the latch on the power supply inward with your right thumb. When the lever is completely opened, the power supply moves forward.



3. Hold the power supply with both hands, and then pull it gently and remove it.

4. With the lever opened completely, insert the new power supply into the slot.

   Wait at least 20 seconds, and then insert the power supply all the way into the slot.
5. Close the lever completely and secure the power supply. If the lever cannot be moved, reorient the power supply, and then reinsert it into the slot.
6. Connect the power cable to the power supply, and then secure the cable using the cable holder.
7. Confirm that the red ALM LED is off at the power supply and the green RDY LED is on.

   If the red ALM LED does not go off after more than 30 minutes following replacement of the power supply, remove the power supply, wait at least 30 seconds, and then reinstall it.

Replacing a power supply for a FMD drive tray

Caution: Be sure to replace the faulty power supply. If you replace the operational power supply, the system will go down.

Caution: A short-circuit can cause a fire. Never insert metal or other objects into the cable connector; otherwise, a short-circuit can occur.

Note: Power supply unit #1 and power supply unit #2 are installed in opposite directions.

Prerequisites

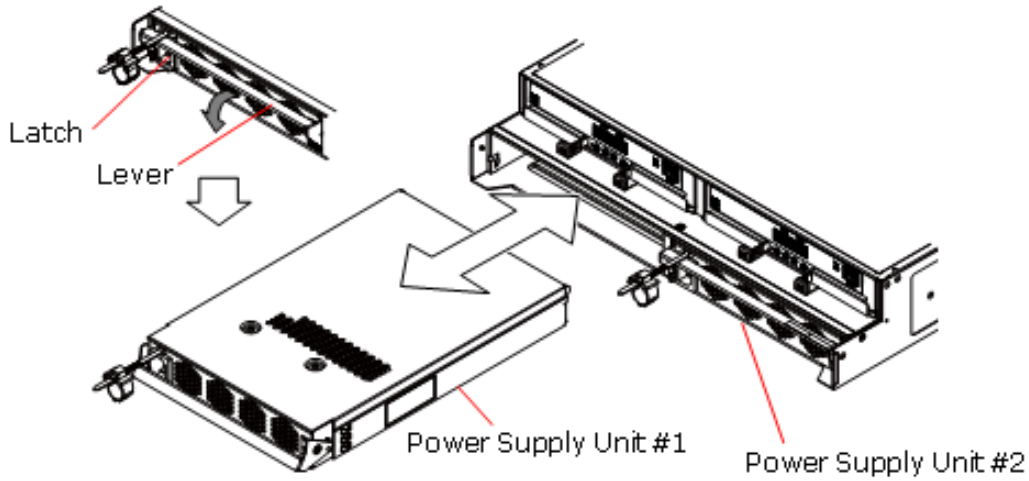
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.
- The red ALM LED for the power supply unit to be replaced is on.

Note: If the red ALM LED is on at both power supplies, do not perform this procedure. Contact the HDS Support Portal at https://portal.hds.com.

Procedure

1. Disconnect the power cable from the power supply to be replaced. Remove the cable holder to disconnect the power cable from the power supply.

2. Pull the lever open while pressing the latch on the power supply inward with your right thumb. When the lever is completely opened, the power supply moves forward.



3. Hold the power supply with both hands, and then pull it gently and remove it.
4. With the lever opened completely, insert the new power supply into the slot. Wait at least 20 seconds, and then insert the power supply all the way into the slot.
5. Close the lever completely and secure the power supply. If the lever cannot be moved, reorient the power supply, and then reinsert it into the slot.
6. Connect the power cable to the power supply, and then secure the cable using the cable holder.
7. Confirm that the red `ALM` LED is off at the power supply and the green `RDY` LED is on.

   If the red `ALM` LED does not go off after more than 30 minutes following replacement of the power supply, remove the power supply, wait at least 30 seconds, and then reinstall it.

Confirming the power supply unit status

Procedure

1. Click **Hardware > Controller Chassis** or **Hardware > Drive Box**.
2. In the **Controller Chassis** window, click the **PSs** tab.
3. In the **PSs** tab in the **Maintenance Utility** window, confirm that the status of the power supply unit changed to `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.

8

Replacing a controller

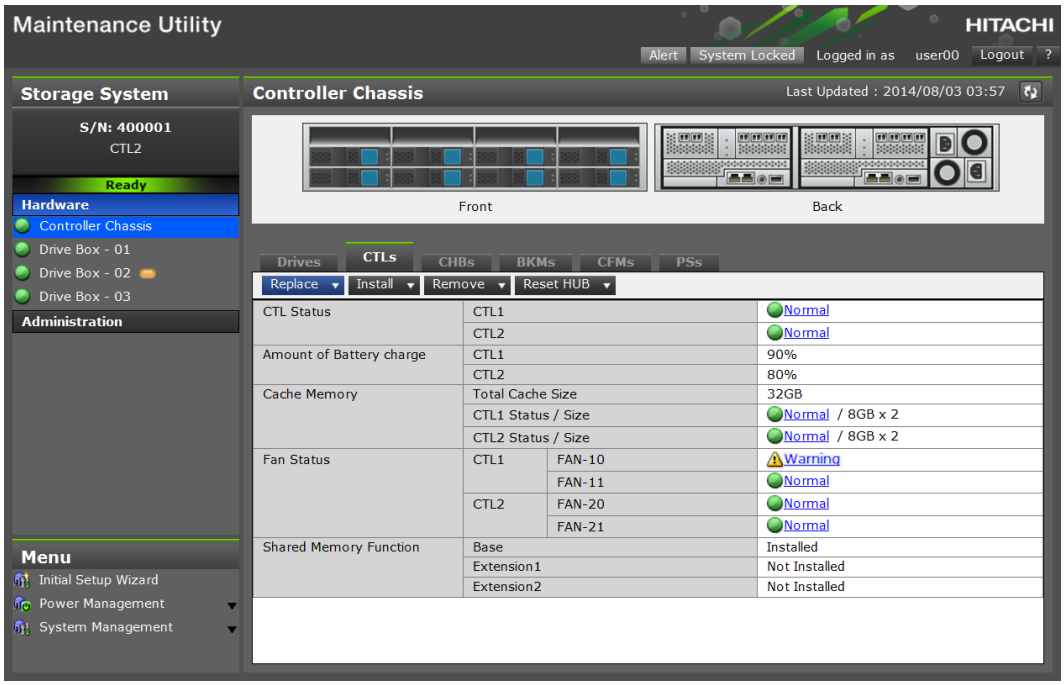
Before replacing a controller, read the precautions and understand the procedure for your controller.

The following topics are covered in this chapter:

Blocking the controller

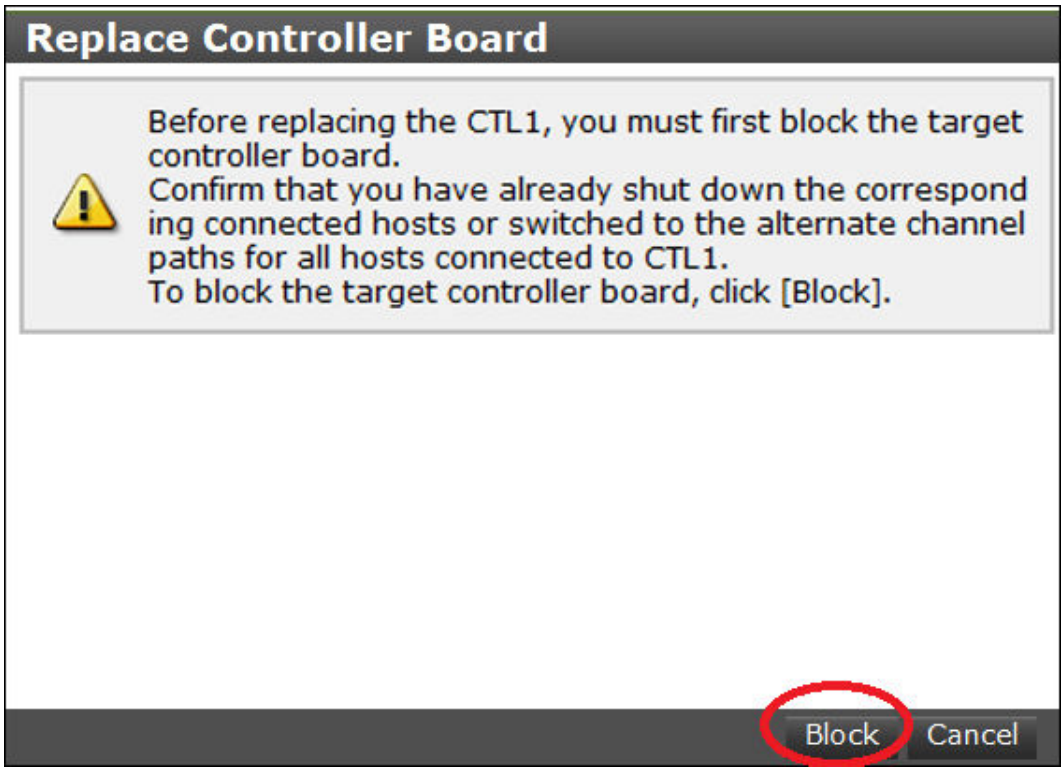
Procedure

1. Start the maintenance utility.
2. Click **Hardware > Controller Chassis**.
3. In the **Controller Chassis** window, click the **CTLs** tab.
4. Confirm that the status of the controller to be replaced is `Warning`.



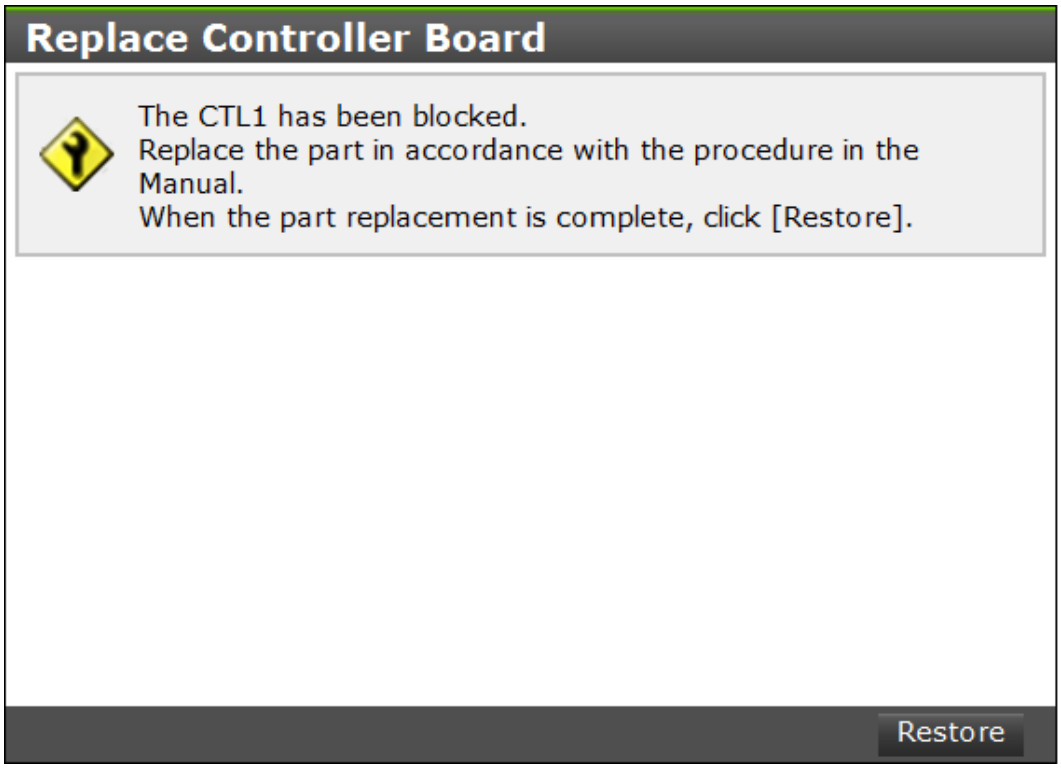
5. Click the **Replace** list, and select the controller that contains the cache memory you want to replace.

6. When the **Replace Controller Board** window appears, verify that the controller shown in the window is the one to be replaced, and then click **Block**.



7. If prompted that the target controller is in the normal status, click **OK** to proceed.

8. Check that the controller is blocked and becomes ready for replacing. Leave the **Replace Controller Board** window open, but do not click the **Restore** button.



Replacing a controller for a CBSS or CBSL controller

When you replace a CBSS or CBSL controller, you will have to install the following components on the new controller:

- Fan
- Cache memory
- Front end module
- Cache flash memory
- Backup module

Removing the controller

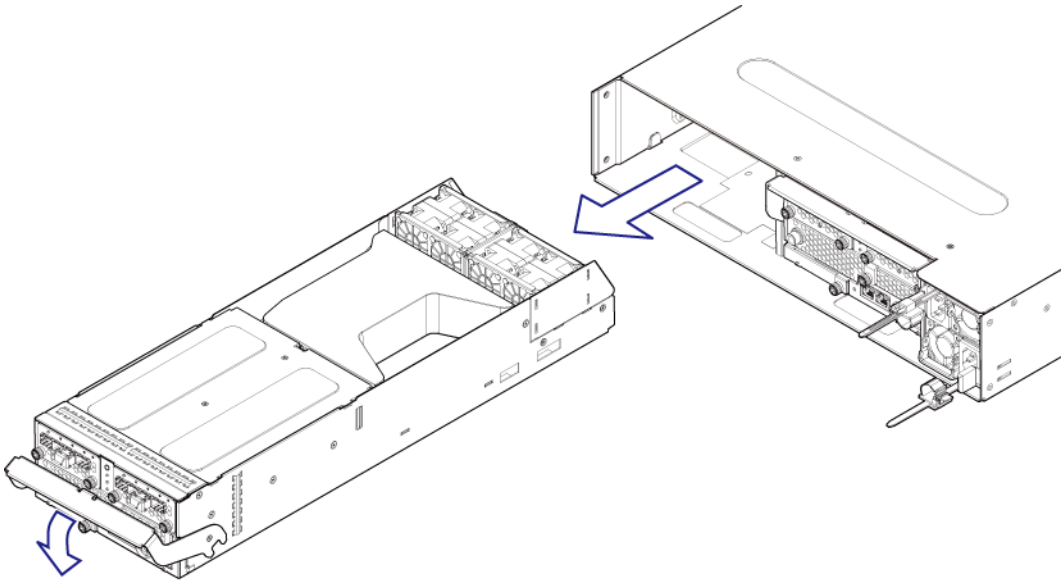
Prerequisites

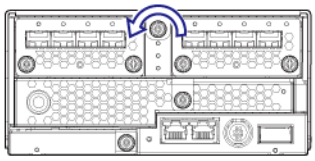
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Use the maintenance utility to block the controller.
- Storage system power is turned on.

- The red `CTL ALARM` LED for the controller to be replaced is on.

Procedure

1. Remove all cables connected to the controller.
2. Loosen the blue screw that secures the controller, and then open the lever.





3. Hold the controller with both hands, and then pull it gently in a straight direction and remove it.

   Keep the controller straight to avoid jostling the components above and below it.
4. Install the fan, cache memory, front end module, and CFM on the new controller.

Postrequisites

- Install the controller.
- Use the maintenance utility to restore (unblock) the controller.

Removing and installing the fan

Caution: Storage system fans rotate at high speed. Exercise extreme caution to avoid getting anything caught in the fan and to prevent injury.

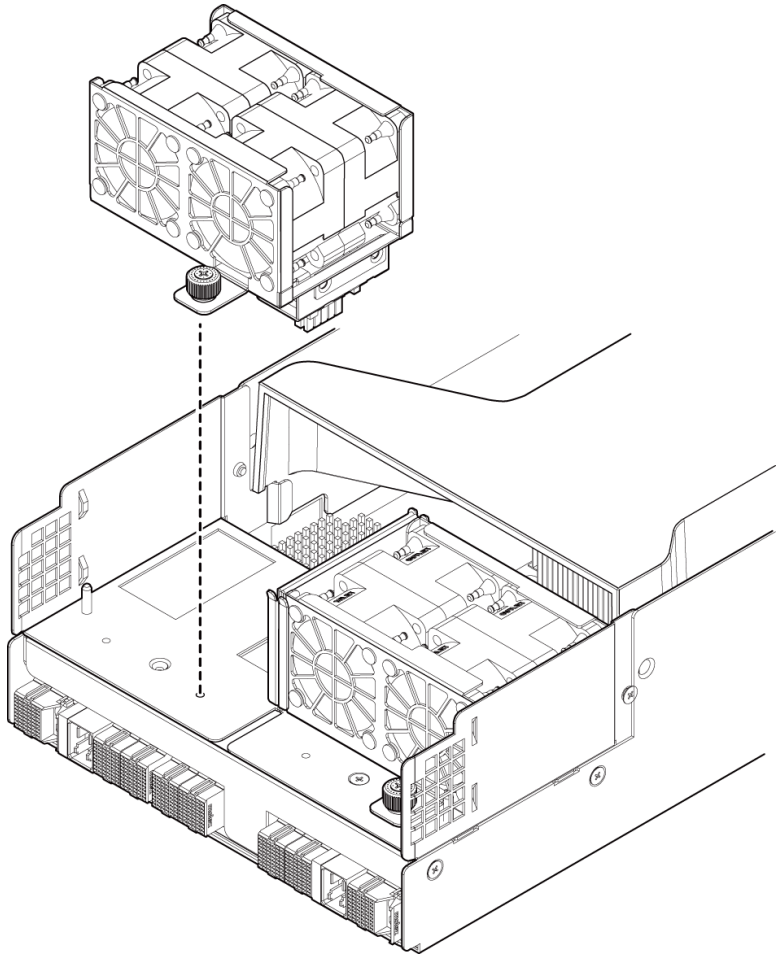
Prerequisites

- 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.
- The controller must be removed from the storage system.

Procedure

1. Loosen the blue screw that secures the fan.
2. Lift the fan and remove it from the connector.
3. Install the fan into the connector of the new controller.

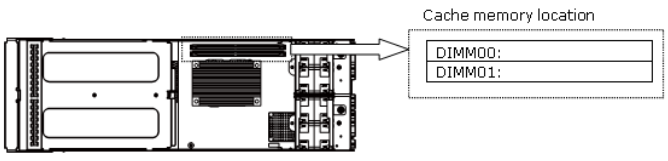
4. Tighten the blue screw to secure the fan.



Removing and installing cache memory

Prerequisites

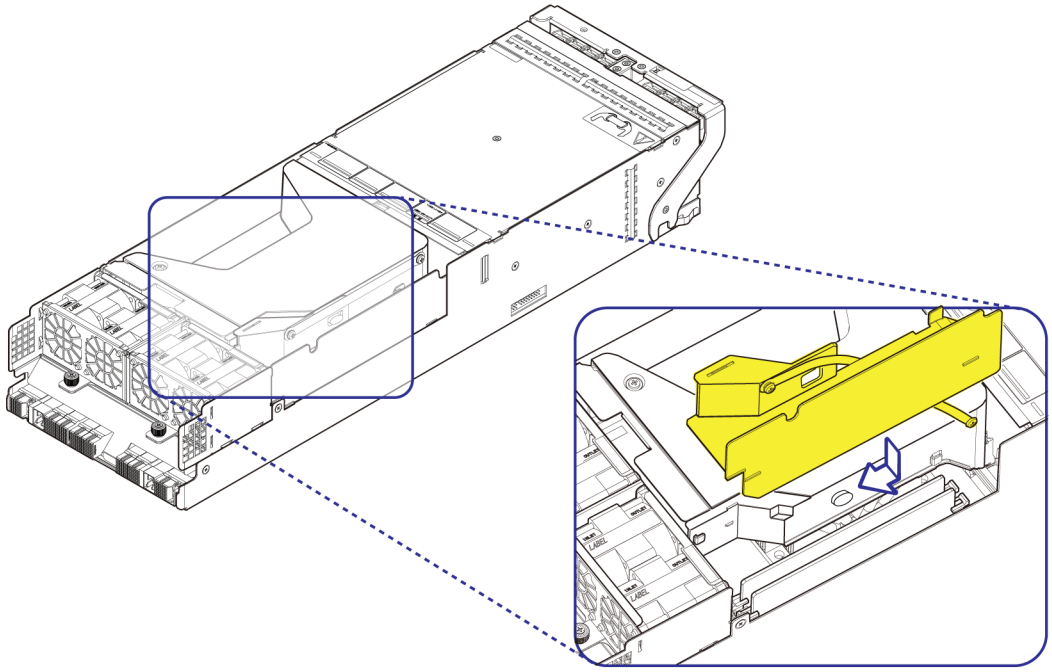
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.



Procedure

1. 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.
2. Lift the DIMM cover gently to remove it.

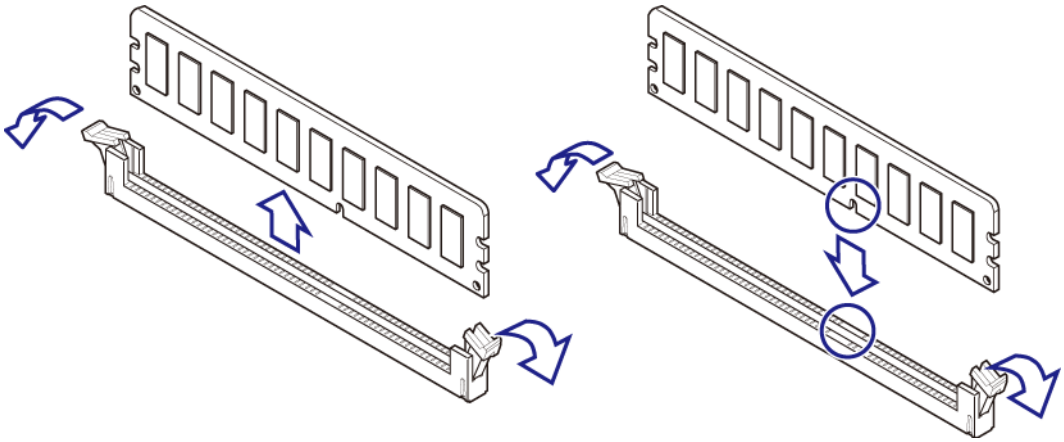
Note: The DIMM cover has a band that can be damaged easily. Exercise care when removing the DIMM cover.



3. Pull the lever outward.

4. 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.



5. Align the notch on the cache memory board with the projection inside the slot.
6. Holding both ends of the cache memory, insert it into the socket.
7. Confirm that the lever is securing the cache memory.
8. 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.

Postrequisites

- Install the controller.
- Use the maintenance utility to restore (unblock) the controller.

Removing and installing 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 controller.
- Remove the controller.

Procedure

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

3. Using the blue screw, pull out the front end module in a straight direction and remove.
4. Connect the optical cable to the new front end module.
5. Insert the front end module into the slot of the new controller.
6. Push the front end module all the way into the slot.
7. Tighten the two blue screws to secure the front end module.

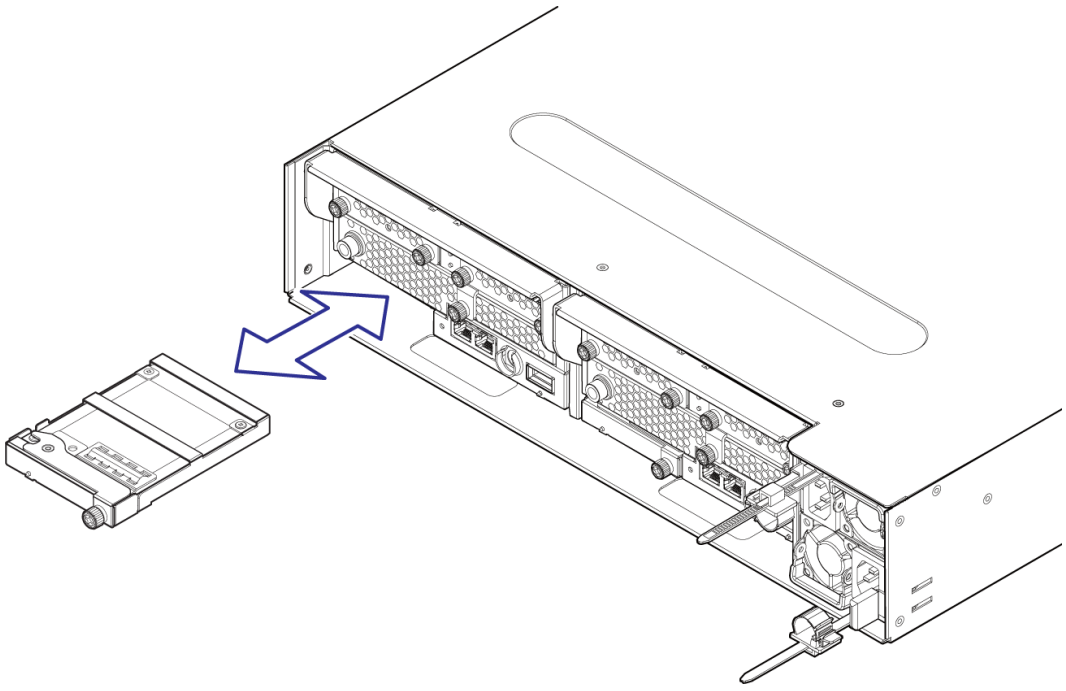
Removing and installing cache flash memory

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 controller.
- The controller must be removed from the storage system.

Procedure

1. Loosen the blue screw that secures the cache flash memory (CFM).
2. Open the lever.
3. Using both hands, hold the body of the CFM and remove it.



4. With the lever opened completely, insert the CFM into the slot.
5. Push the CFM all the way into the slot.
6. Close the lever completely.

7. Tighten the blue screw to secure the CFM.

Postrequisites

- Once all parts are installed on the controller, install it in the storage system.
- Use the maintenance utility to restore (unblock) the controller.

Removing and installing the backup 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.
- The controller must be removed from the storage system.

Procedure

1. Loosen the blue screw that secures the backup module.
2. Open the lever, and then use both hands to remove the backup module.
3. With the backup module lever opened, insert the backup module into the slot of the new controller.
4. Close the backup module lever and tighten the blue screw.

Installing a controller

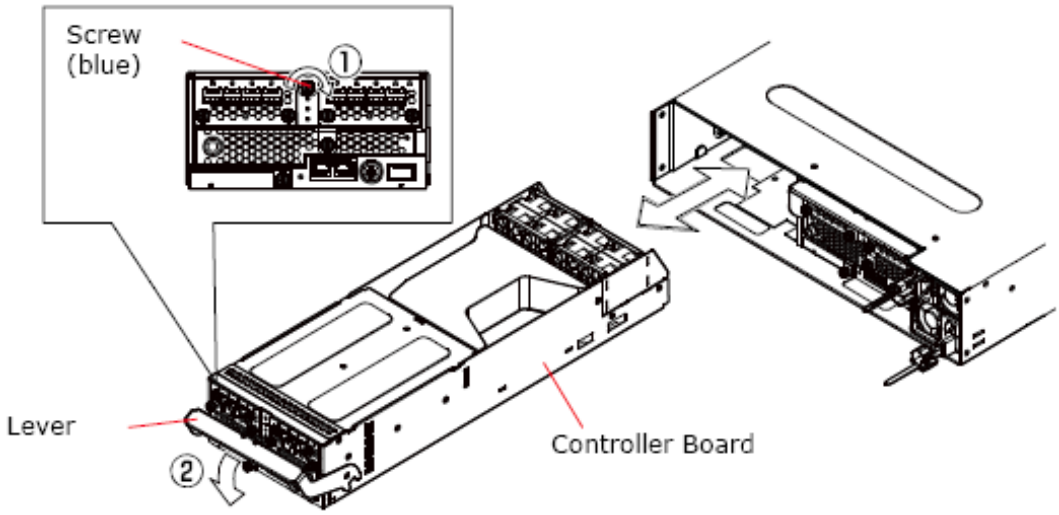
Prerequisites

- 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.
- Complete the installation of all components from the old controller.

Procedure

1. With the right and left levers of the new controller open completely, insert it into the slot of CBSS or CBSL.

2. Push the controller all the way into the slot until the right and left levers close completely.



3. Tighten the blue screw to secure the controller.
4. Confirm that the red CTL ALM LED on the controller is off.
5. Connect all the cables you removed.

Replacing a CBLM or CBLH controller

When you replace a CBLM or CBLH controller, you will have to install the following components on the new controller:

- Cache memory
- Cache flash memory
- Backup module

You must remove the backup module first, and then remove the controller.

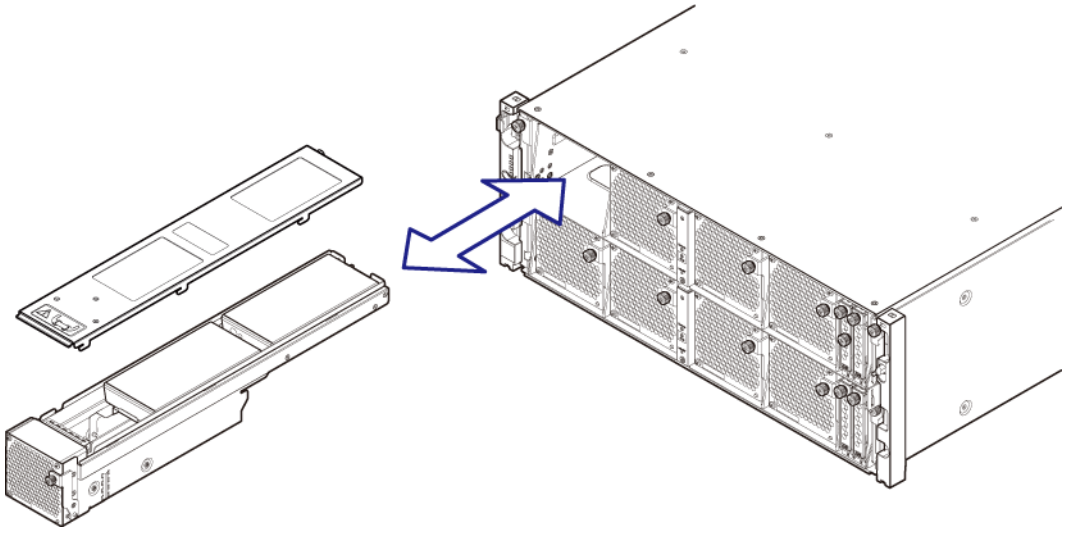
Removing a CBLM or CBLH controller

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.
- Use the maintenance utility to block the controller.
- The red CTL ALARM LED for the controller to be replaced is on.

Procedure

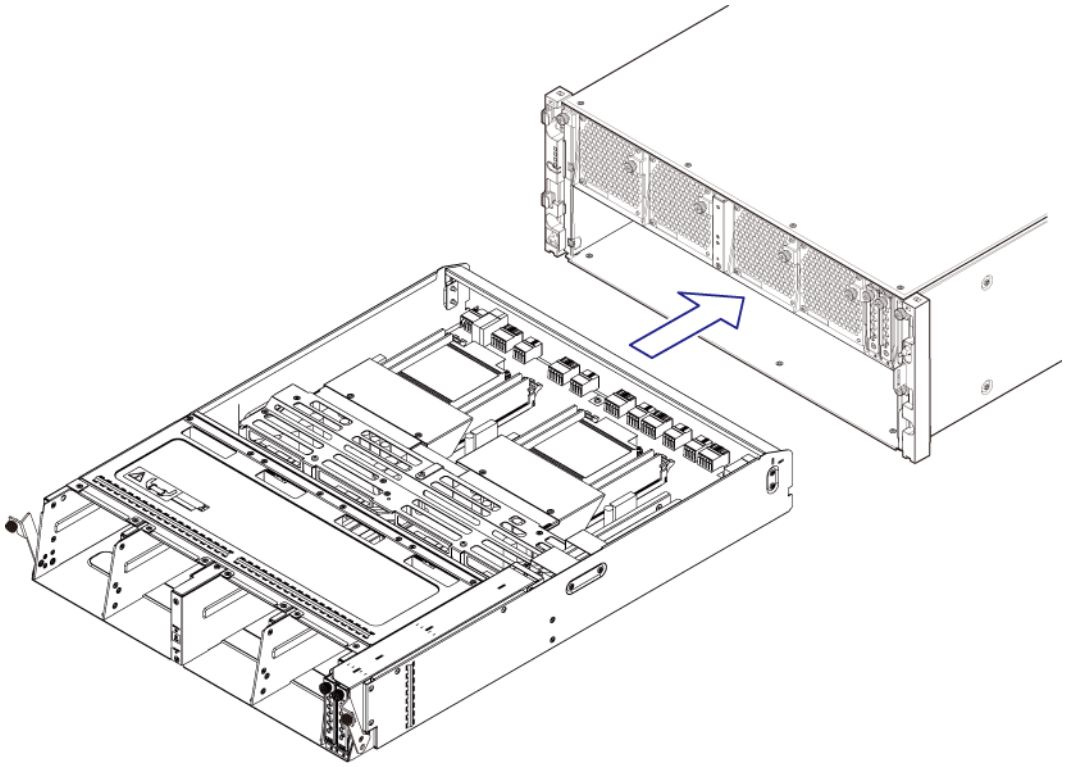
1. Loosen the right and left blue screws on the lever of the controller in the front of the CBLM or CBLH controller, and then open the lever.
2. Loosen the blue screw securing the Backup Module (BKMF).
3. Pull out and remove the BKMF.



4. Remove all four BKMF modules installed in the controller.
5. Loosen the blue right and left screws on the lever of the controller, and then open the lever.

6. With the lever opened completely, hold the controller with both hands, and then pull it gently and remove it.

   Keep the controller straight to avoid jostling the components above and below it.



Postrequisites

- Install the backup module (BKMF) in the new controller.
- Install the cache memory on the new controller.
- Install the cache flash memory on the new controller.
- Use the maintenance utility to restore (unblock) the controller.

Note: If the POWER/READY/WARNING/ALARM LED on the front of the CBLM/CBLH goes off after removing the controller, check the status of the storage system in the **Maintenance Utility** window, and then continue the replacement work. After restoring the controller (described later), confirm that the LED goes on.

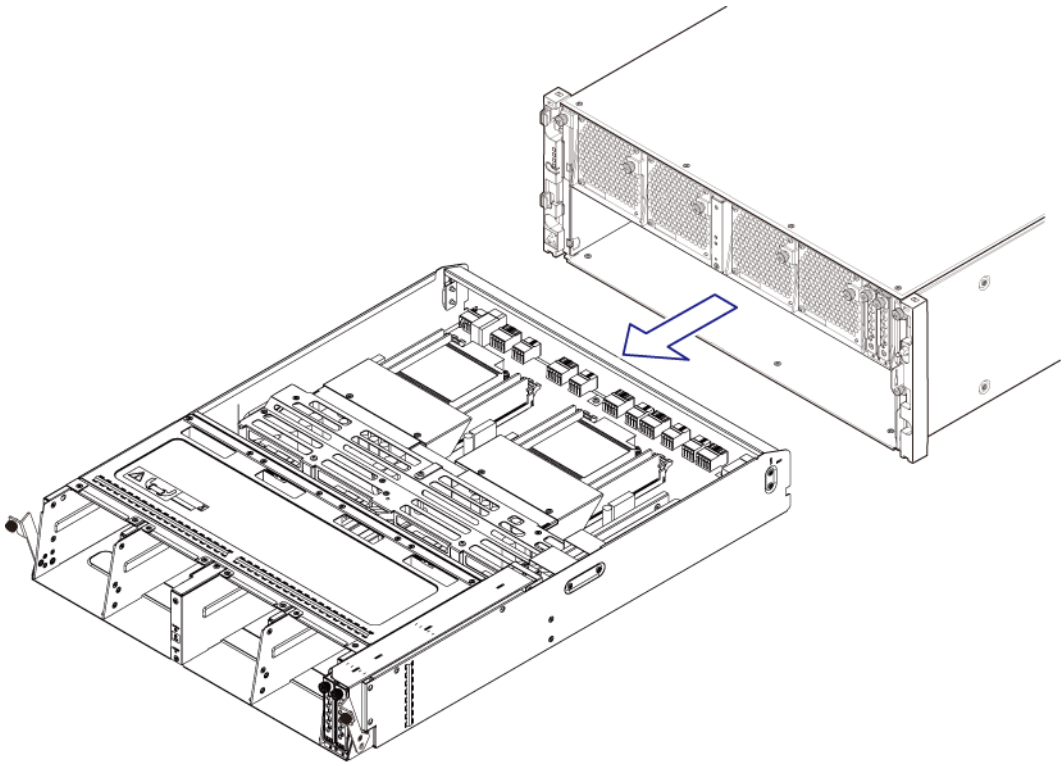
Removing and installing cache memory

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.
- The controller is removed from the storage system.

Procedure

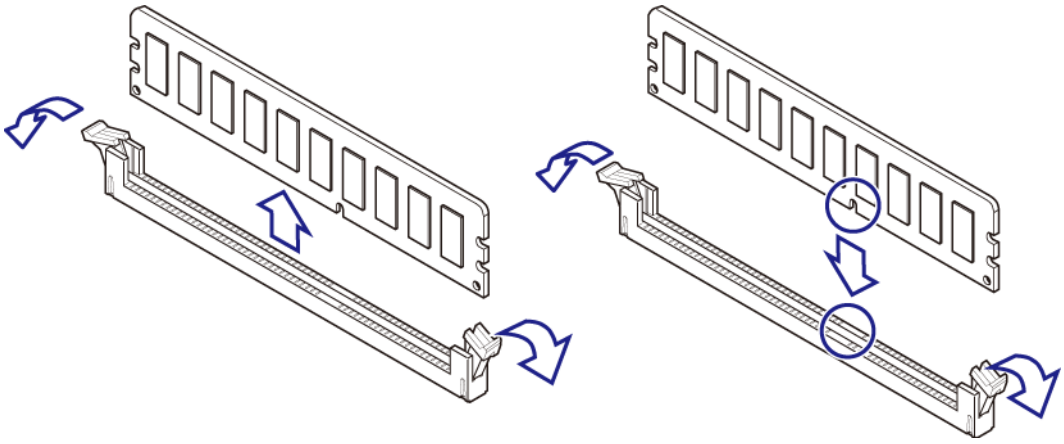
1. Open the air guide.

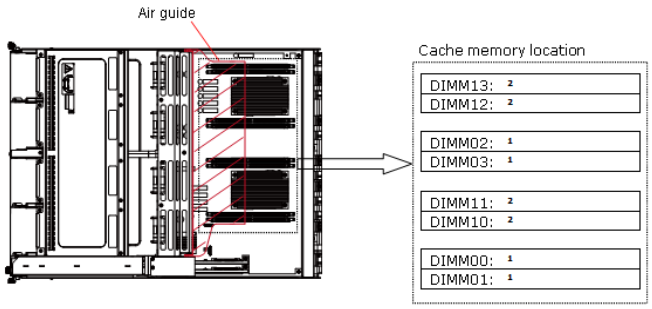


2. Pull the lever outward.

3. Holding both ends of the cache memory, 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.





Note: DIMMs are installed in sets of four. There are two groups of cache memory DIMM slots: `CMG0` and `CMG1`. Populate the `CMGO` slots first, and then populate the `CMG1` slots if necessary.

4. Align the notch on the cache memory board with the projection inside the slot.
5. Holding both ends of the cache memory, insert it into the socket of the new controller.
6. Check that the lever is securing the cache memory.
7. Close the air guide.

Postrequisites

- Once all components are installed on the controller, install the controller in the storage system.
- Use the maintenance utility to restore (unblock) the controller.

Removing and installing cache flash memory for a CBLM or CBLH controller

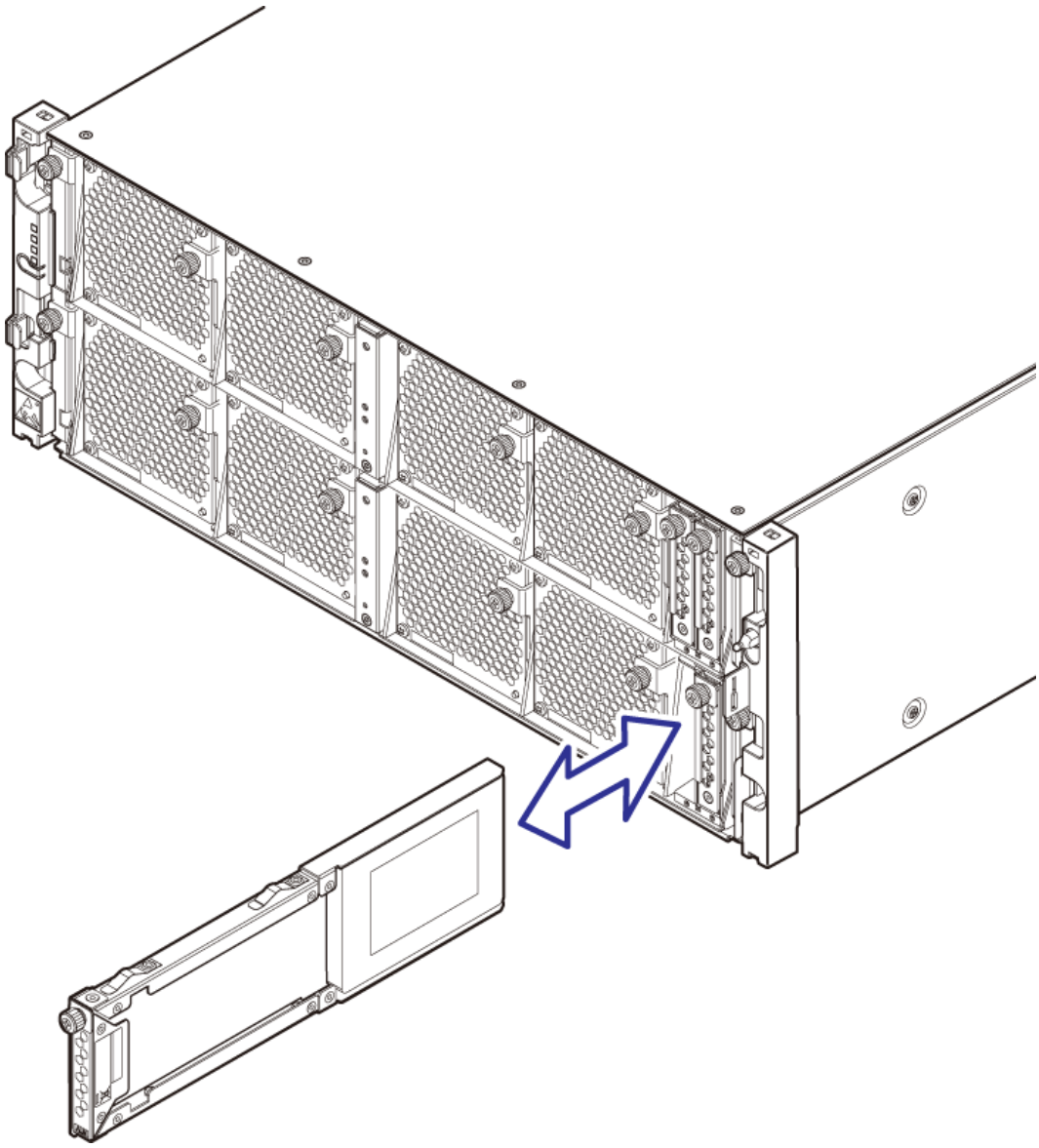
Prerequisites

- 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.
- The controller must be removed from the storage system.

Procedure

1. Loosen the blue screw that secures the cache flash memory (CFM).
2. Open the lever.

3. Using both hands, hold the body of the CFM and remove it.



4. With the lever opened completely, insert the CFM into the slot.
5. Push the CFM all the way into the slot.
6. Tighten the blue screw to secure the CFM.

Postrequisites

- Once all parts are installed on the controller, install it in the storage system.
- Use the maintenance utility to restore (unblock) the controller.

Installing a controller in a CBLM or CBLH controller

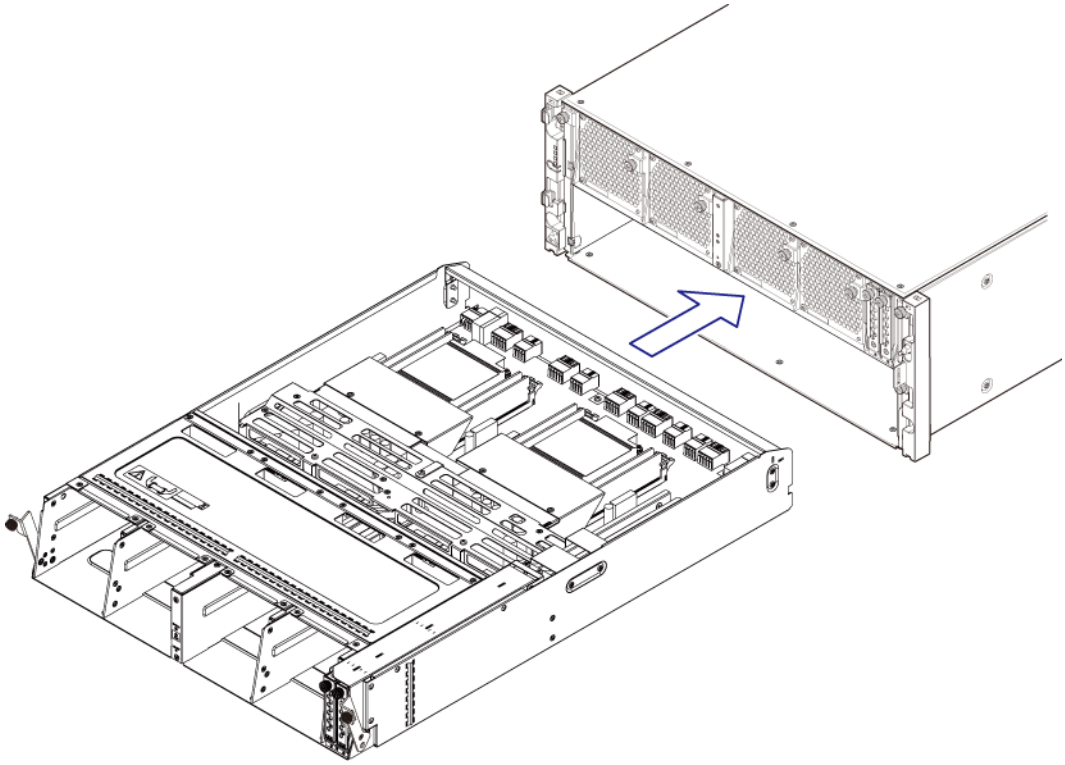
Prerequisites

- 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.

Procedure

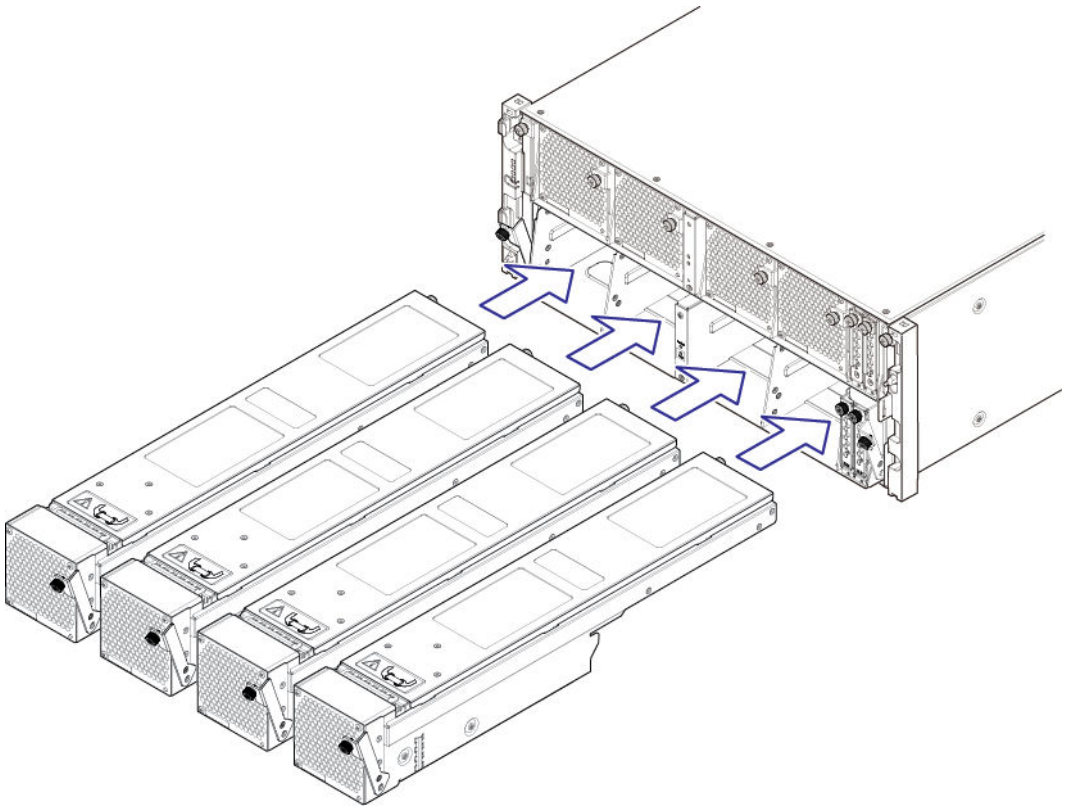
1. With the right and left levers on the new controller opened completely, insert the controller into the slot of the CBLM or CBLH chassis.

   Hold the controller with both hands and move it in a straight direction.



2. With the lever closed on the BKMF you removed, tighten the blue screw to secure the BKMF.

3. Install the four BKMFs on the controller.



4. Push the controller in all the way.
   The right and left covers close completely.
5. Tighten the blue screw to secure the controller.
6. Confirm that the red `CTL ALM` LED on the new controller is off.
7. Attach the front bezel.

Postrequisites

- Use the maintenance utility to restore (unblock) the controller.

Restoring a controller

Procedure

1. At the **Replace Controller Board** 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 the status of the new controller you replaced is `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.

9

Replacing cache memory

Before replacing cache memory, read the precautions and understand the procedure for your cache memory.

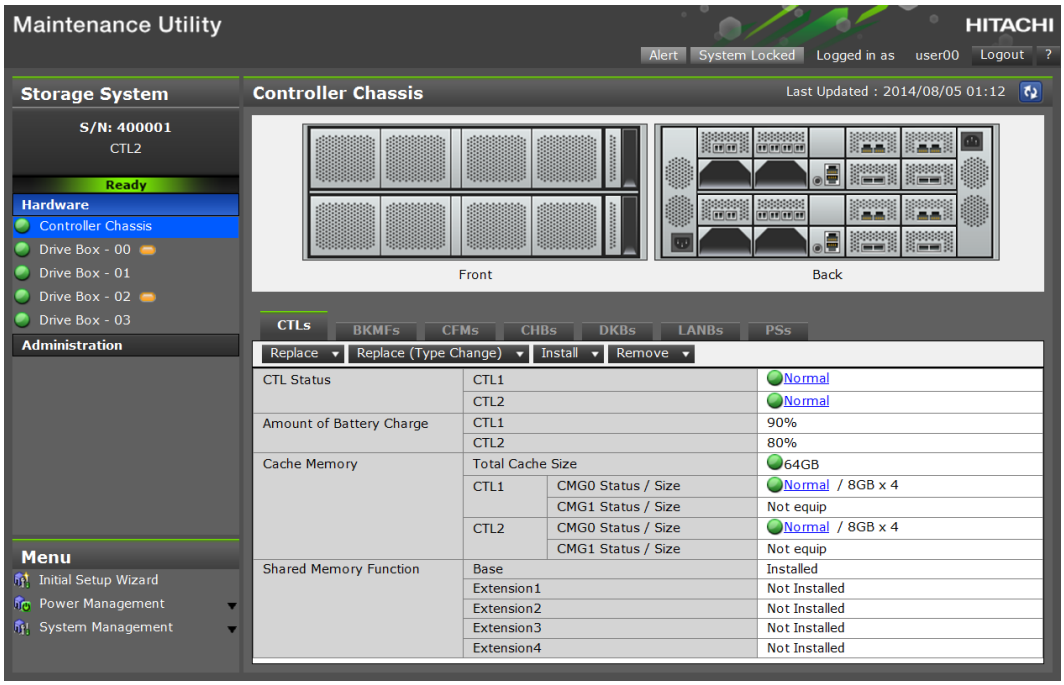
The following topics are covered in this chapter:

Checking cache memory

Procedure

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

3. Click the **CTLs** tab.

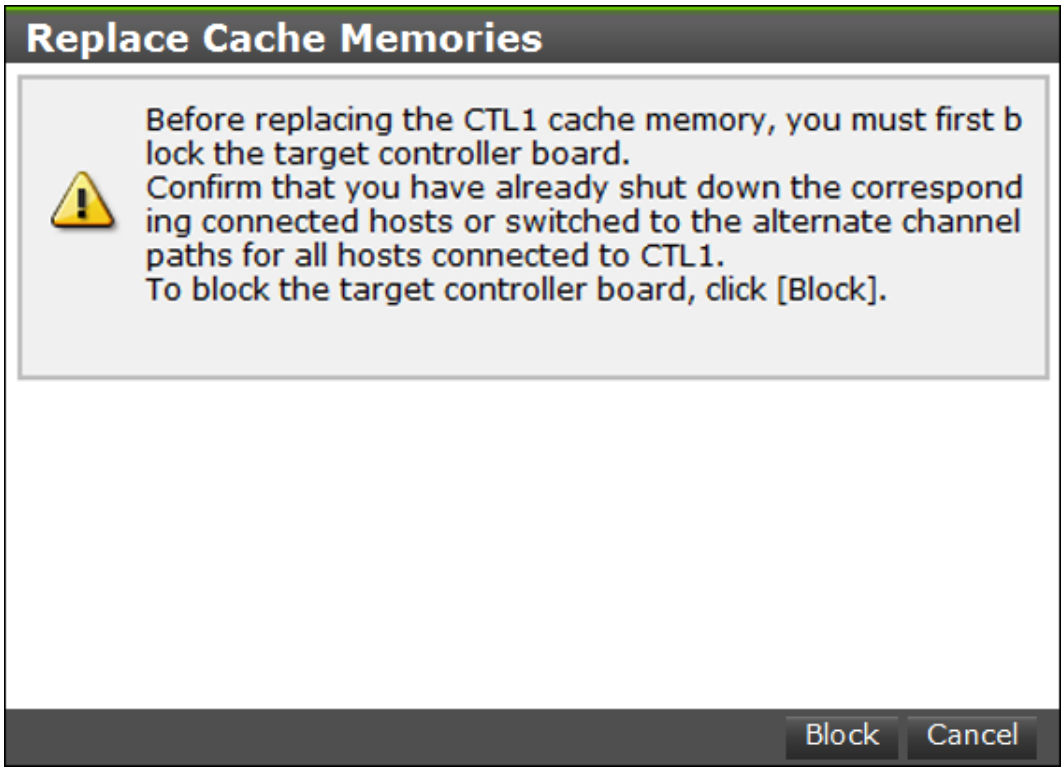


4. Confirm that the status of the cache memory to be replaced is `Warning`.
5. Click **Close**.

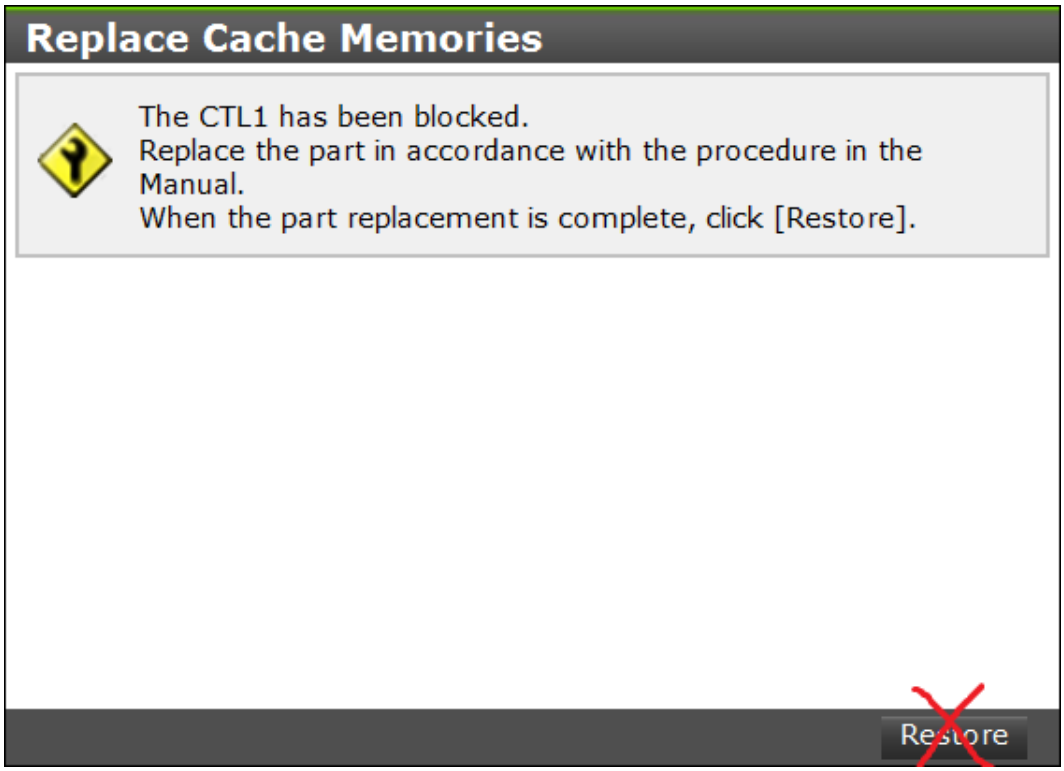
Replacing cache memory for a CBLM or CBLH controller

Procedure

1. Start the maintenance utility.
2. Click **Hardware > Controller Chassis**.
3. In the **Controller Chassis** window, click the **CTLs** tab.
4. Confirm that the component you want to replace has the status `Warning` or `Failed`.
5. Click the **Replace** list, and select the controller that contains the cache memory you want to replace.
6. Click **Block**.



7. Check that the controller is blocked and becomes ready for replacing. Leave the Replace Cache Memories window open, but do not click the **Restore** button.



Replacing cache memory for a CBSS or CBSL controller

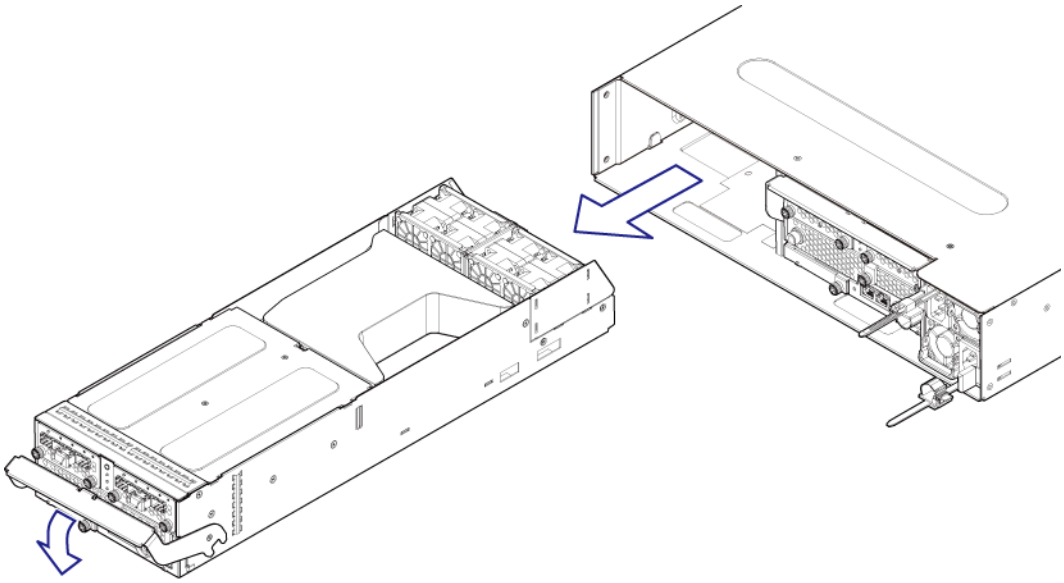
Prerequisites

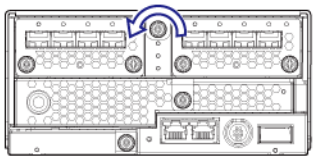
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Use the maintenance utility to block the controller.
- Storage system power is turned on.
- The red `CTL ALARM` LED for the controller containing the cache memory to be replaced is on.

Procedure

1. Remove all cables connected to the controller.
2. Loosen the blue screw that secures the controller and open the lever.

3. Hold the controller with both hands, and then gently remove it. Keep the controller straight to avoid touching the components above and below it.

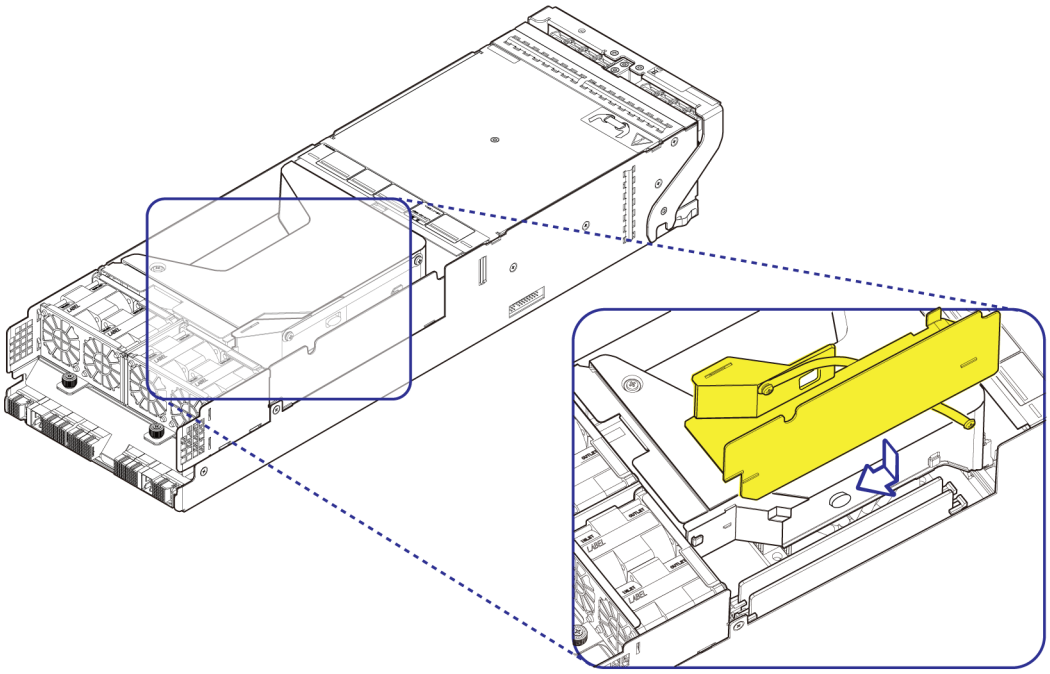




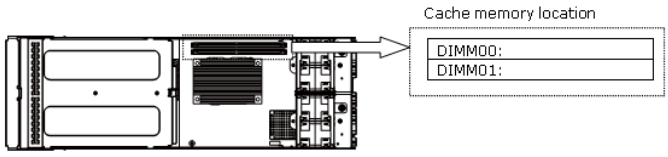
4. Press the button near the dual in-line memory module (DIMM) cover, slide the cover in the direction of the arrow.

5. Lift and remove the DIMM cover from the hooks on either side.

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



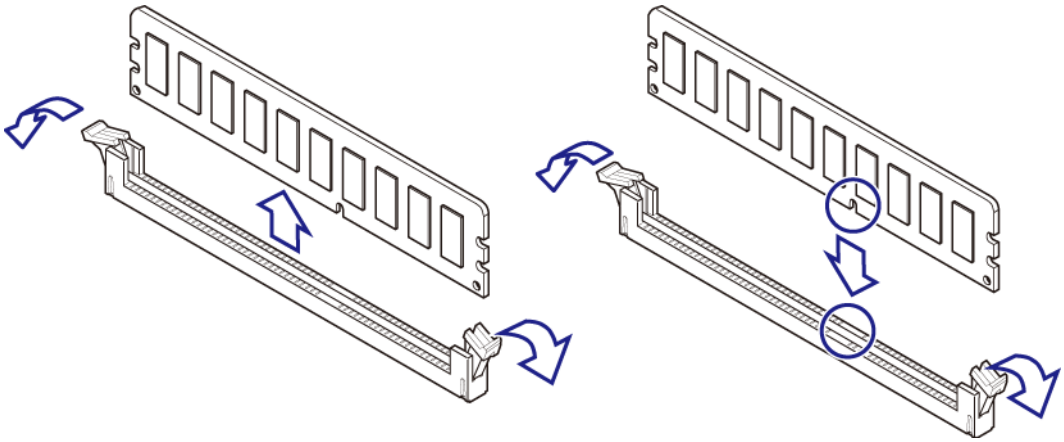
6. Note the cache memory locations.



7. Pull the lever outward.

8. Hold both ends of the cache memory by the fingers, and then gently remove the cache memory from the socket.

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



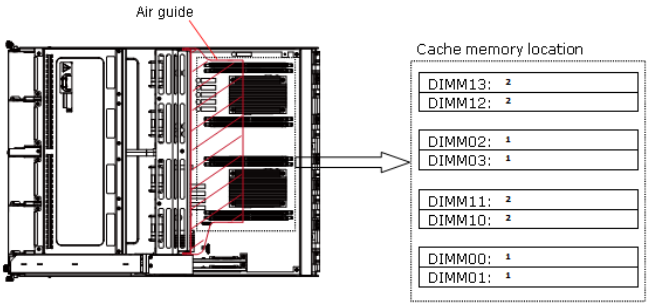
9. Alight the notch on the cache memory board with the projection inside the slot.
10. Holding both ends of the cache memory, insert it into the socket of the new controller.
11. Check that the lever is securing the cache memory.
12. To install the DIMM cover, slide it in the direction of the arrow. Confirm that the DIMM cover is secured by the two hooks on either side.
13. Check that the connector of the controller is not damaged, deformed, or dusty.
14. With the right and left levers on the controller opened completely, insert it into the slot of CBSS or CBSL controller.
15. Push the controller in all the way. The right and left levers close completely.
16. Tighten the blue screw to secure the controller.
17. Connect all cables removed from the controller.
18. Confirm that the red `CTL ALM` LED on the controller in which the cache memory was installed goes off.

Postrequisites

- Use the maintenance utility to restore (unblock) the controller.

Replacing cache memory for a CBLM or CBLH controller

When replacing cache memory on a CBLM or CBLH controller, remove the backup module first, and then remove the controller. A single CBLM or CBLH controller weighs approximately 42 pounds (19 kg).



Note: DIMMs are installed in sets of four. There are two groups of cache memory DIMM slots: `CMG0` and `CMG1`. Populate the `CMGO` slots first, and then populate the `CMG1` slots if necessary.

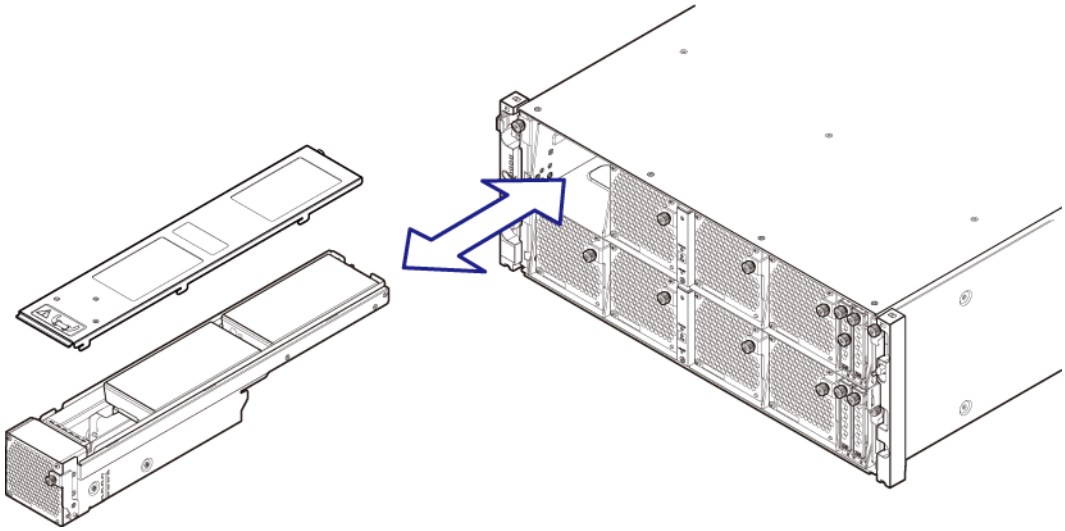
Prerequisites

- 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 controller.
- Storage system power is turned on.
- The red `CTL ALARM` LED for the controller containing the cache memory to be replaced is on.

Procedure

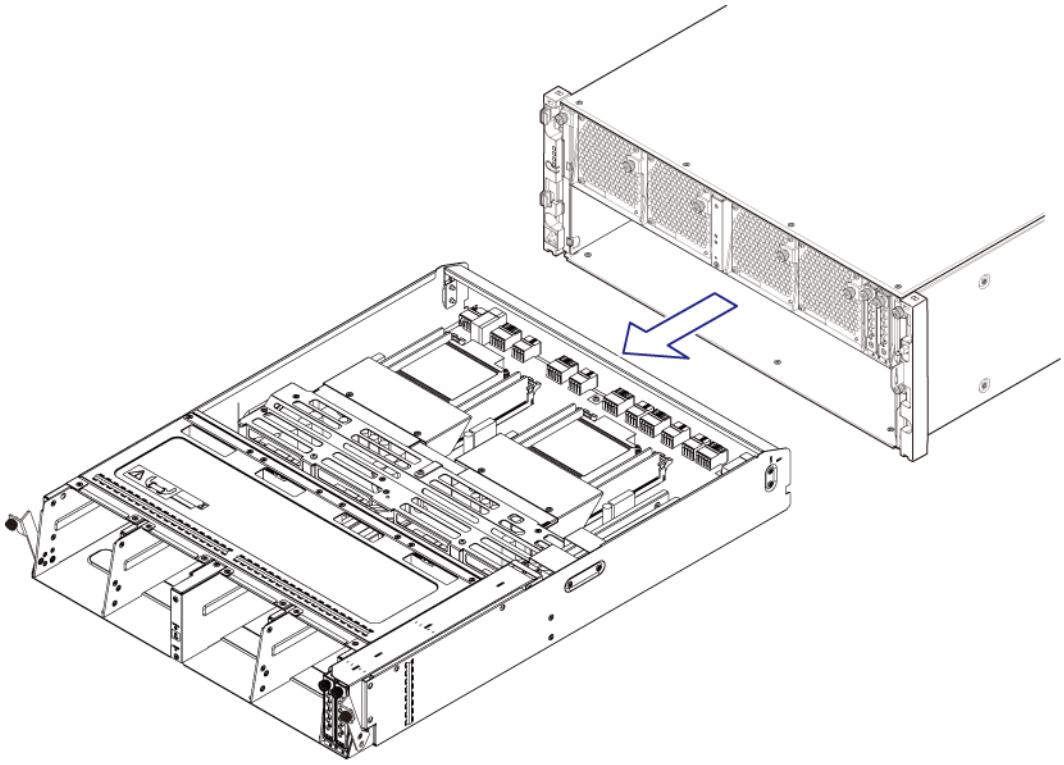
1. Remove the front bezel.
2. Loosen the blue left and right screws on the lever of the controller to add the cache memory in the front of the CBLM or CBLH and open the lever.
3. Loosen the blue screw securing the backup module.

4. With the lever opened, pull out and remove the backup module.



5. Remove all four backup modules installed in the controller.
6. Loosen the blue right and left screws on the lever of the controller, and then open the lever.

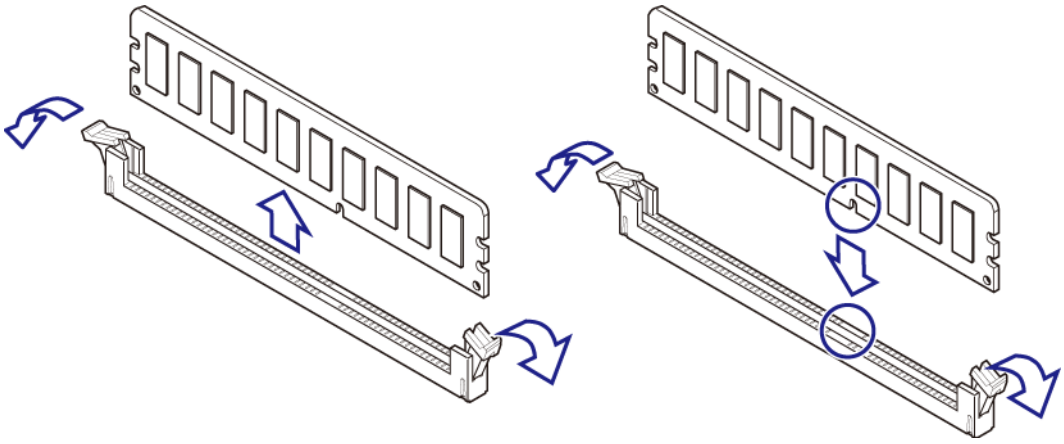
7. Hold the controller with both hands and gently remove it. Keep the controller straight to avoid touching the components above and below it.



8. Open the air guide.
9. Pull the lever outward.

10. 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.



11. Align the notch on the cache memory board with the projection inside the slot.
12. Holding both ends of the cache memory, insert it into the socket.
13. Confirm that the lever is securing the cache memory.
14. Close the air guide.
15. Confirm that the connector of the controller is not damaged, deformed, or dusty.
16. With the right and left levers of the controller opened completely, insert it into the slot of the controller.
17. Push the controller in all the way.

    The right and left levers close completely.
18. Tighten the blue screw to secure the controller.
19. With the lever on the backup module open, insert the backup module into the slot.
20. With the backup module lever closed, tighten the blue screw to secure it.
21. Install the four backup modules on the controller.
22. Push the controller all the way into the slot until the right and left levers close completely.
23. Tighten the blue screw to secure the controller.
24. Confirm that the red `CTL ALM` LED on the controller in which the cache memory was installed goes off.

Postrequisites

- Use the maintenance utility to restore (unblock) 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.

10

Replacing a front end module

Before replacing a front end module, read the precautions and understand the procedure for your front end module.

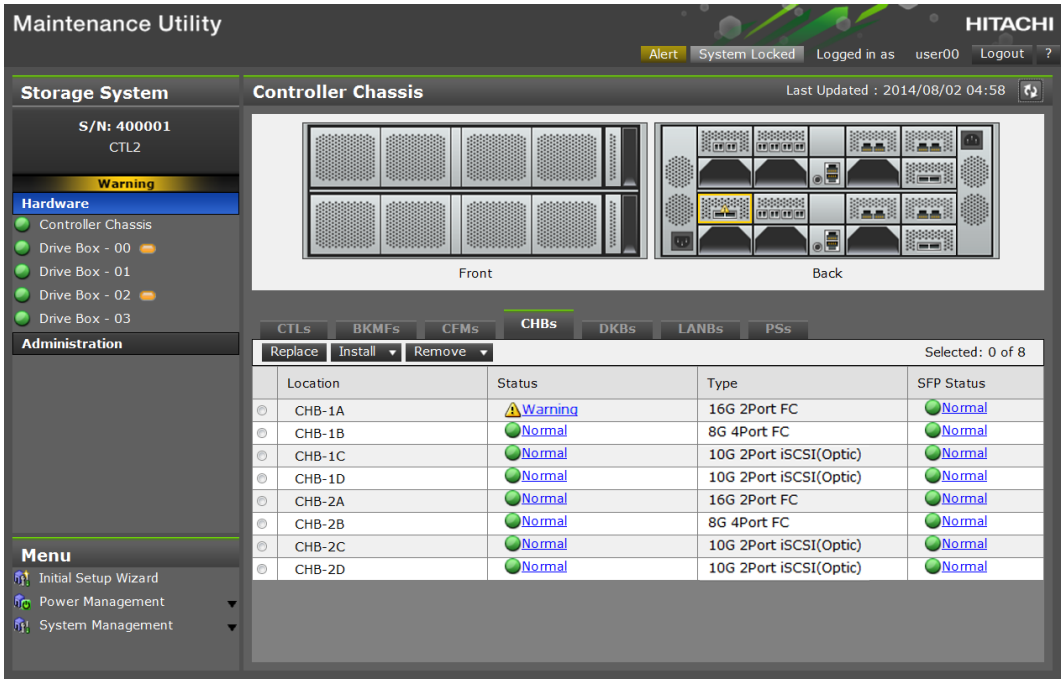
Controller 1 and Controller 2 must have the same number of front end modules installed. For example, if you install a second front end module to Controller 1, you must also install a new front end module to Controller 2. You cannot add a front end module to one controller without adding a front end module to the other controller.

- Blocking a front end module
- Adding a front end module
- Restoring a front end module

Blocking a front end module

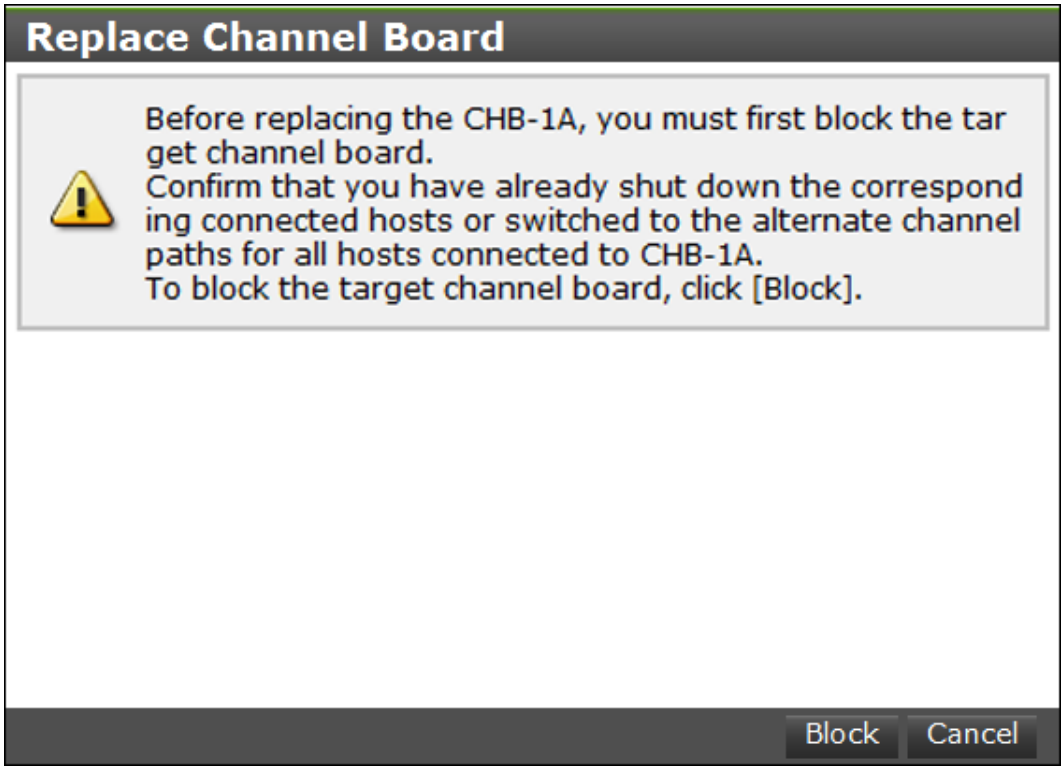
Procedure

1. Start the maintenance utility.
2. In the **Maintenance Utility** window, click **Hardware > Controller Chassis**.
3. Click the **CHBs** tab.
4. Confirm that the status of the front end module to be replaced is `Warning`.



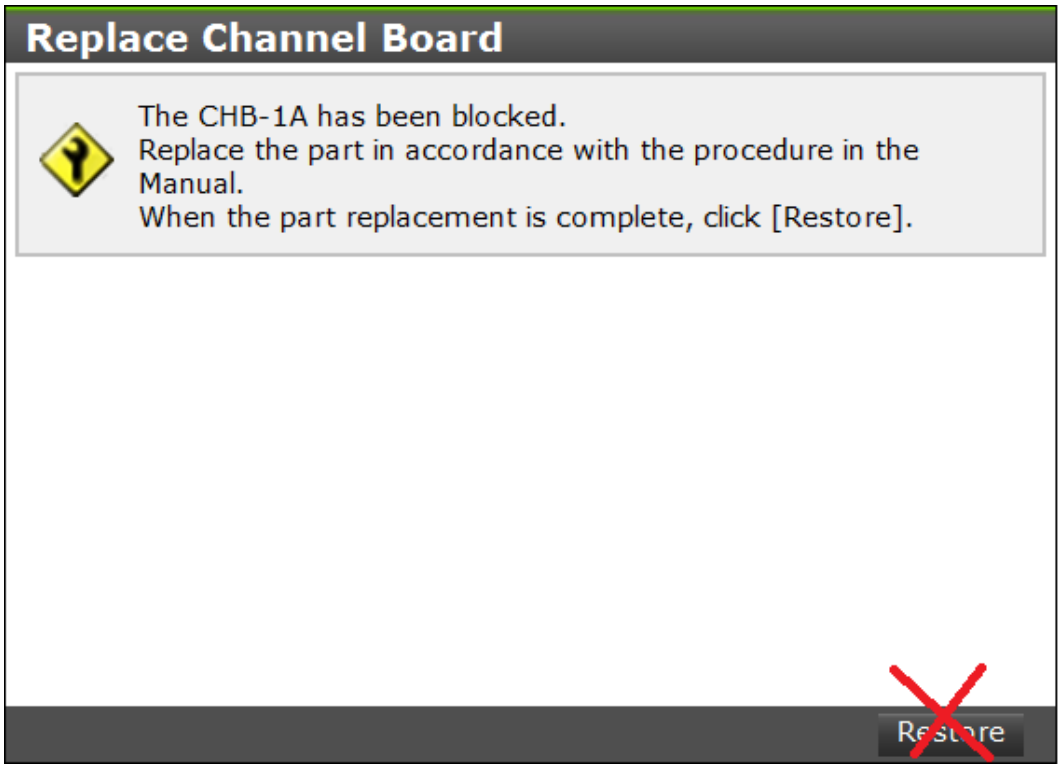
5. Click the front end module to be replaced, and then click **Replace**.

6. Click **Block**.



7. Verify that the front end module is blocked and is ready for replacing.

8. Leave the **Replace Channel Board** window open, but do not click **Restore**.



Adding a front end module

Prerequisites

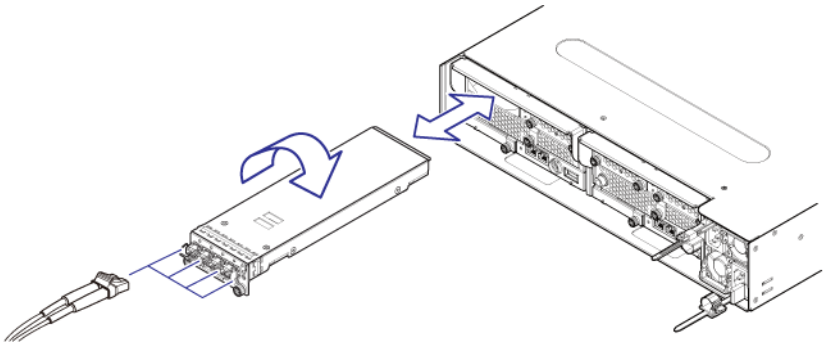
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Use the maintenance utility to block the front end module.
- Storage system power is turned on.

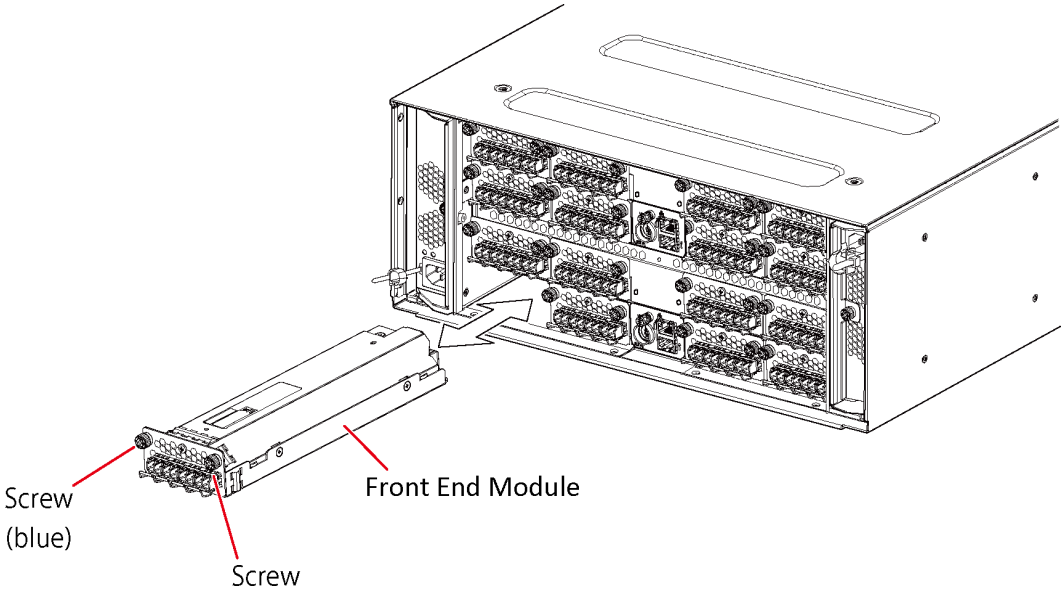
Procedure

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.

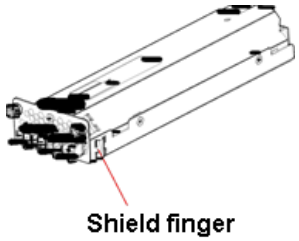
   When removing the front end module, hold the blue screw and keep the front end module straight avoid jostling the components above and below it.





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.

Restoring a front end module

Procedure

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

   Note: It can take up to 20 minutes for the controller to recover. 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 the **CHBs** tab in the **Controller Chassis** window.
4. Confirm that the status of the new front end module is `Normal`.

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

11

Replacing a small form-factor pluggable (SFP)

Before replacing a small form-factor pluggable (SFP) port, read the precautions and understand the procedure for your SFP.

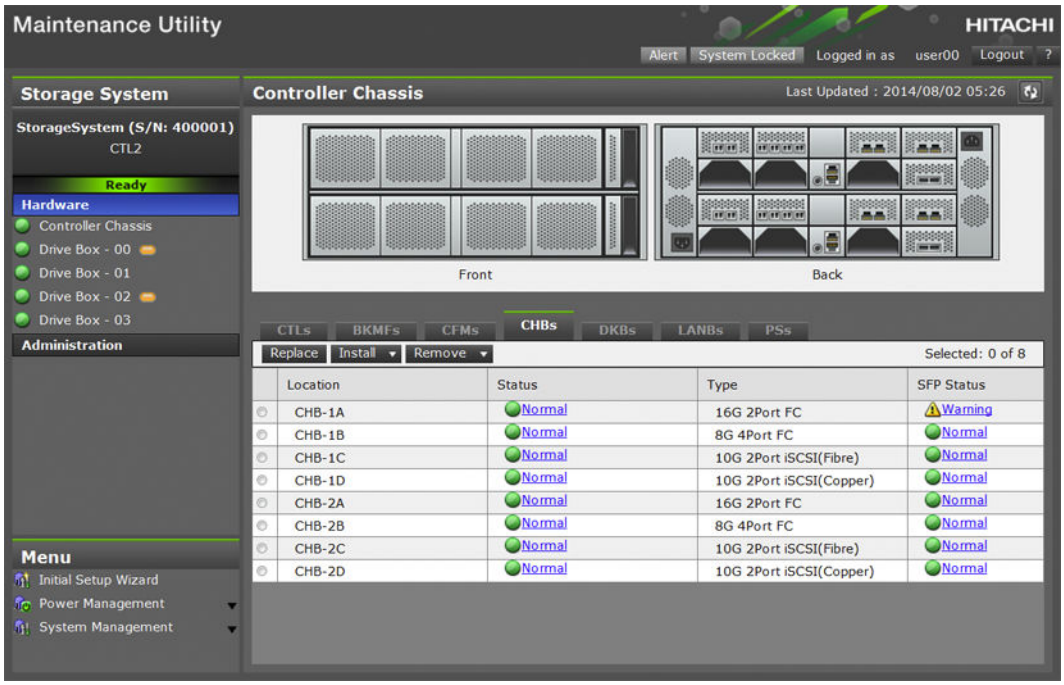
Note: SFP ports also have been referred to as a mini-GigaBit or (GBIC) ports. However, this term has been made obsolete by SFP.

- Checking an SFP
- Replacing an SFP

Checking an SFP

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. Confirm that the status of the SFP to be replaced is `Warning`.



5. In the **SFP Status** column, click the warning to display a pop-up window with SFP port ID, status, and type information.
6. Replace the SFP. Do not click **Close** at this time.

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.

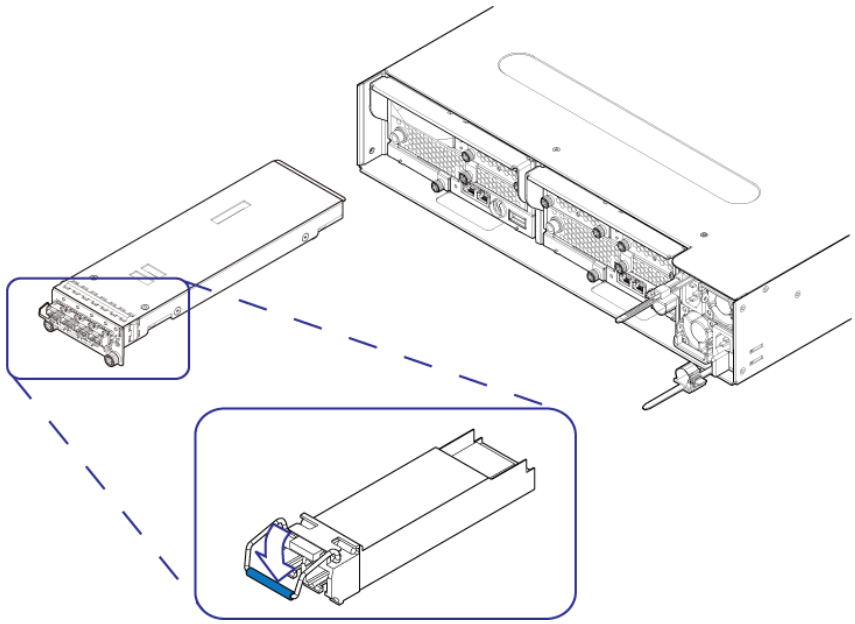
Prerequisites

- 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.

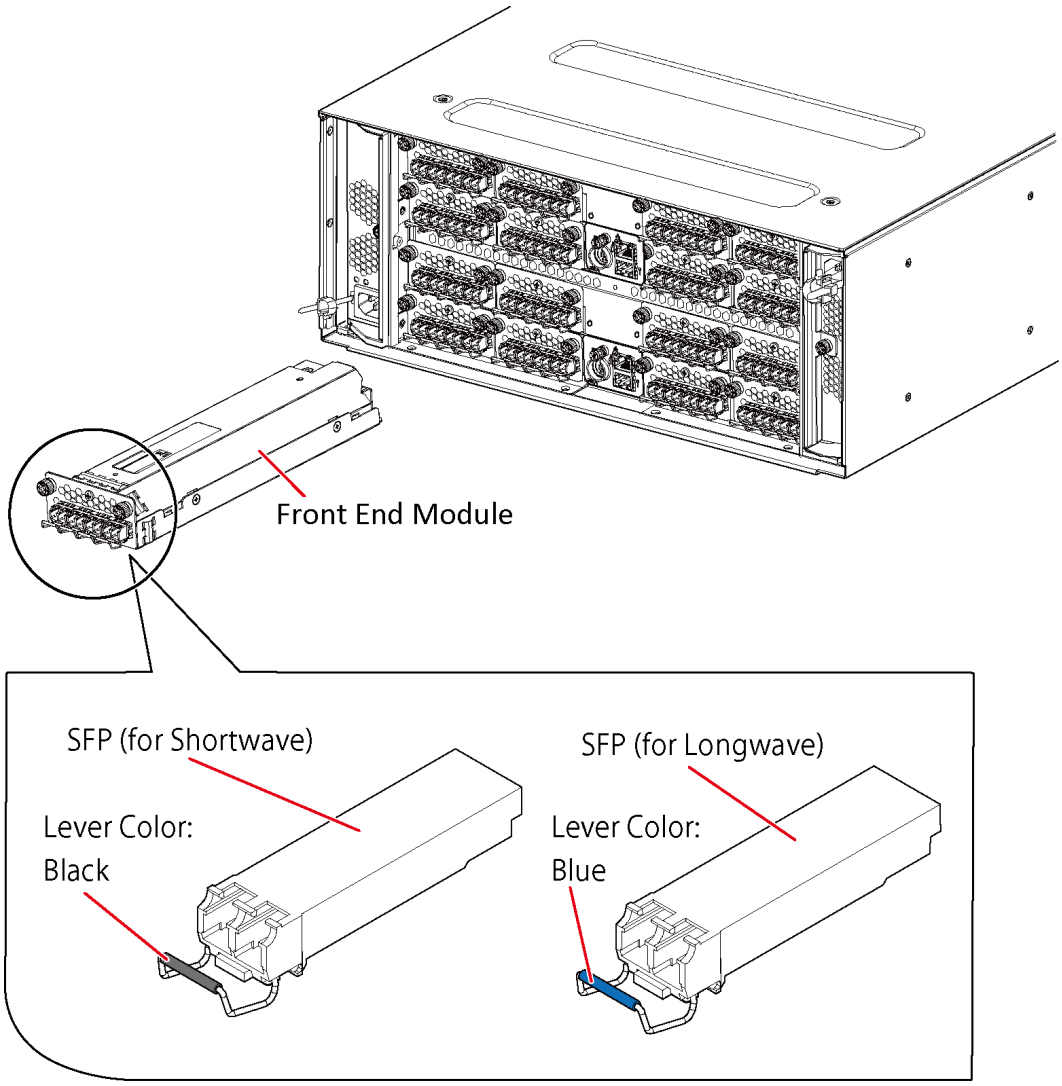
Procedure

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.

12

Replacing an ENC

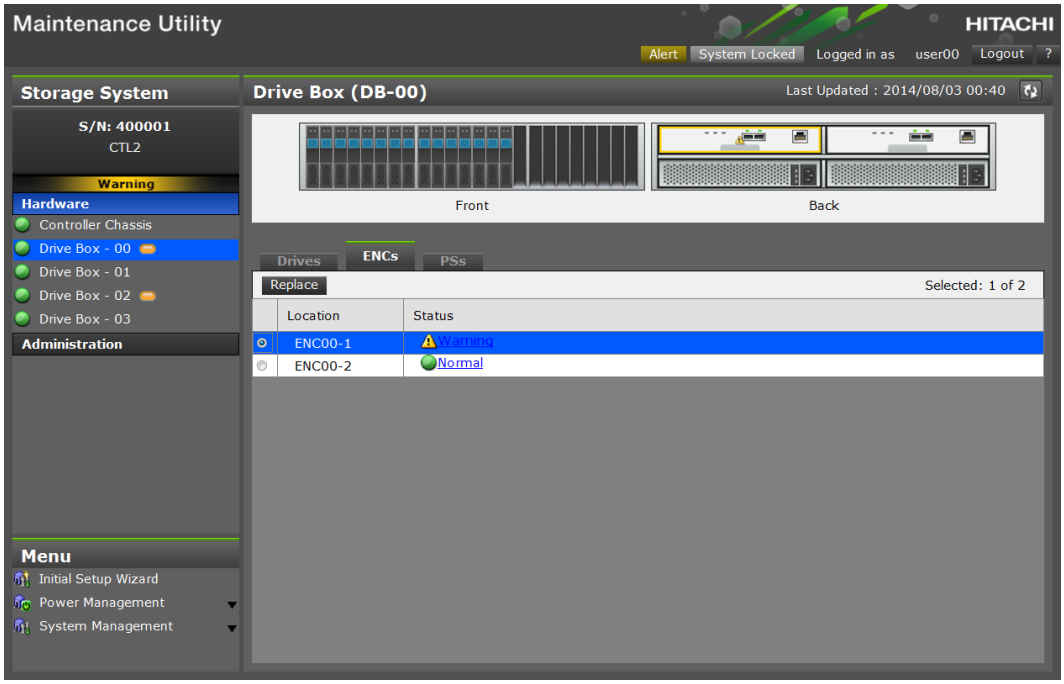
Before replacing an ENC, read the precautions and understand the procedure for your ENC.

- ☐ Blocking an ENC
- ☐ Replacing the ENC for SFF and LFF drive trays
- ☐ Replacing the ENC for a FMD drive tray
- ☐ Restoring an ENC

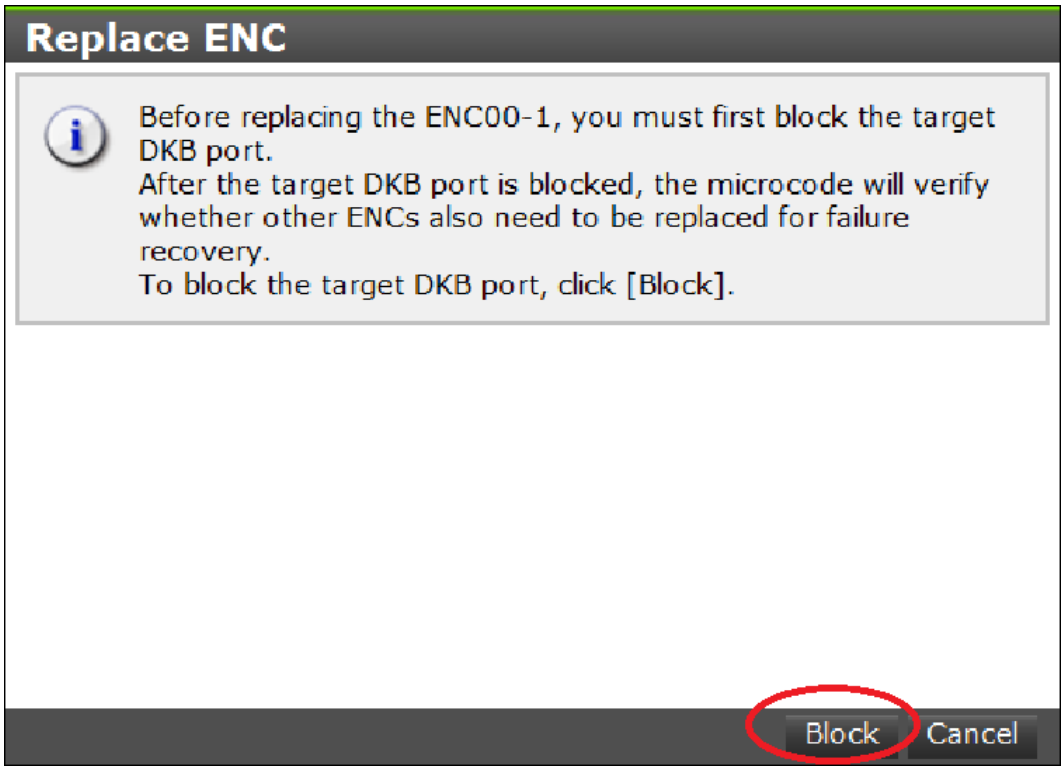
Blocking an ENC

Procedure

1. Start the maintenance utility.
2. Click **Hardware > Drive Box**.
3. In the **Drive Box** window, click the **ENCs** tab.
4. Confirm that the status of the ENC to be replaced is `Warning`.
5. Click the ENC to be replaced, and then click **Replace**.

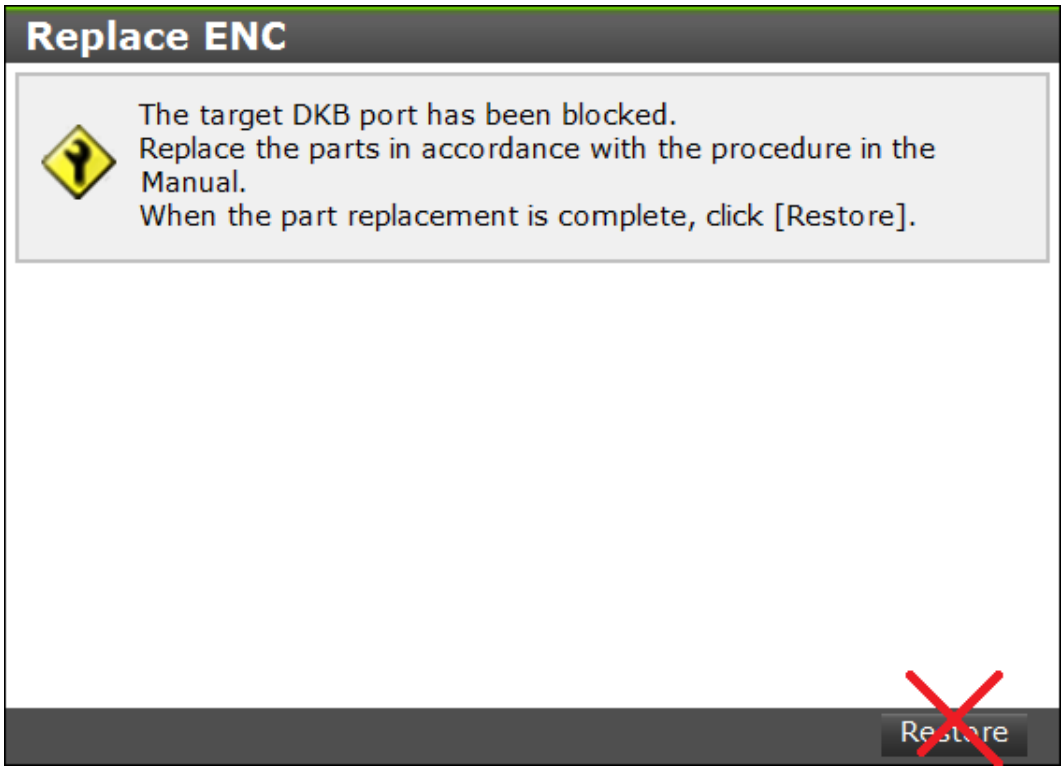


6. When the **Replace ENC** window appears, confirm that the ENC shown in the window is the one to be replaced.



7. Click **Block**.
8. Verify that the ENC is blocked and is ready for replacing.

9. Leave the **Replace ENC** window open, but do not click the **Restore** button.



Replacing the ENC for SFF and LFF drive trays

Do not touch the ENC connector because it is fragile. Check that the ENC connector is in good shape and is not deformed, damaged, or dusty before installing the ENC.

Note: Be sure to replace the faulty ENC. If you replace the operational ENC, the system will go down.

Caution: A short-circuit can cause a fire. Never insert metal or other objects into the cable connector; otherwise, a short-circuit can occur.

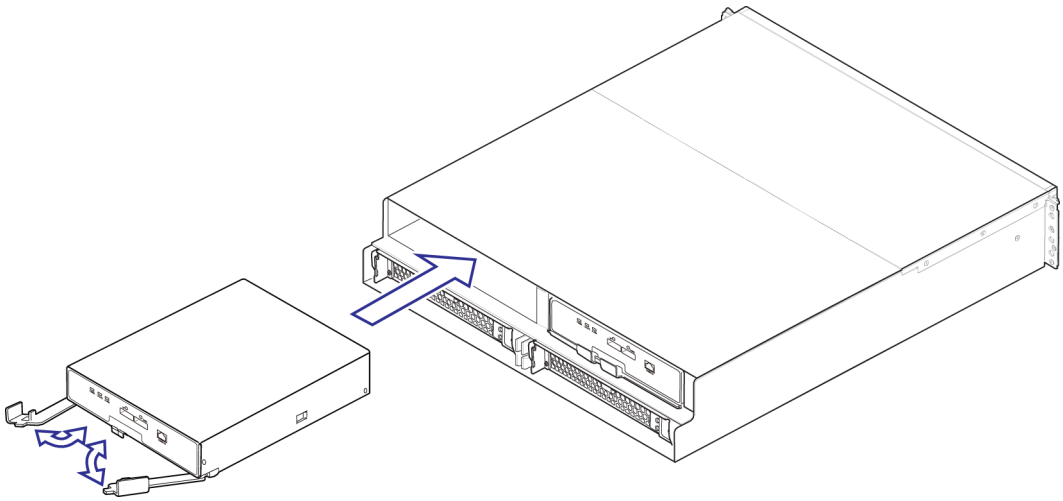
Prerequisites

- 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.
- Use the maintenance utility to block the ENC.

- The red ALARM LED for the ENC to be replaced is on.

Procedure

1. Disconnect the SAS cable from the ENC to be replaced.
2. Open toward you the right and left levers that secure the ENC.
   When the levers are completely opened, the ENC moves forward.
3. Hold the ENC with both hands, and then pull it gently and remove it.
4. Open completely the right and left levers of the new ENC.
5. Insert the ENC into the slot, and then push the right and left levers toward the ENC until the levers open slightly.



6. Confirm that the red ALARM LED on the new ENC is off.
7. Connect the SAS cable to the new ENC.

Postrequisites

- Use the maintenance utility to restore (unblock) the ENC.

Replacing the ENC for a FMD drive tray

Do not touch the ENC connector because it is fragile. Check that the ENC connector is in good shape and is not deformed, damaged, or dusty before installing the ENC.

Note: Be sure to replace the faulty ENC. If you replace the operational ENC, the system will go down.

Caution: A short-circuit can cause a fire. Never insert metal or other objects into the cable connector; otherwise, a short-circuit can occur.

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.
- Use the maintenance utility to block the ENC.
- The red `ALARM` LED for the ENC to be replaced is on.

Procedure

1. Disconnect the SAS cable from the ENC to be replaced.
2. Open toward you the right and left levers that secure the ENC.

   When the levers are completely opened, the ENC moves forward.
3. Hold the ENC with both hands, and then pull it gently and remove it.
4. Open completely the right and left levers of the new ENC.
5. Insert the ENC into the slot, and then push the right and left levers toward the ENC until the levers open slightly.
6. Confirm that the red `ALARM` LED on the new ENC is off.
7. Connect the SAS cable to the new ENC.

Restoring an ENC

Procedure

1. At the **Replace ENC** window, click **Restore**.
   A progress bar shows the replacement status.
2. When the progress bar goes away and the completion message appears, click **Close**.
3. Click the **ENCs** tab in the **Drive Box** window and confirm that the status of the new ENC is `Normal`.

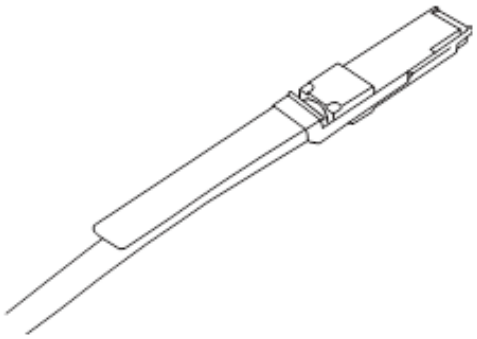
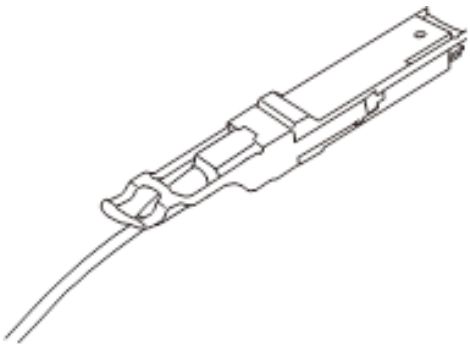
   If necessary, click **Refresh** at the top-right of the window to update the status of the window.
4. Log out and close the **Maintenance Utility** window.

13

Replacing a SAS cable

Before replacing a SAS cable, read the precautions and understand the procedure for your SAS cable.

SAS cables come in the following shapes:

Model Name	Shape
DW-F800-SCQ1 DW-F800-SCQ1F DW-F800-SCQ3 DW-F800-SCQ5	
DW-F800-SCQ10A DW-F800-SCQ30A DW-F800-SCQ1H	

- Block the connected chassis and replace the SAS cables.

- For SAS cable DW-F800-SCQ1HA, replace the SAS adapter first. If recovery fails even after replacing the SAS adapter, replace the cable.
- The cable thickness and connector shape depend on the model name of the SAS cable.

☐ Replacing SAS cables connected to a CBSS or CBSL controller

☐ Replacing SAS cables connected to a CBLM or CBLH controller

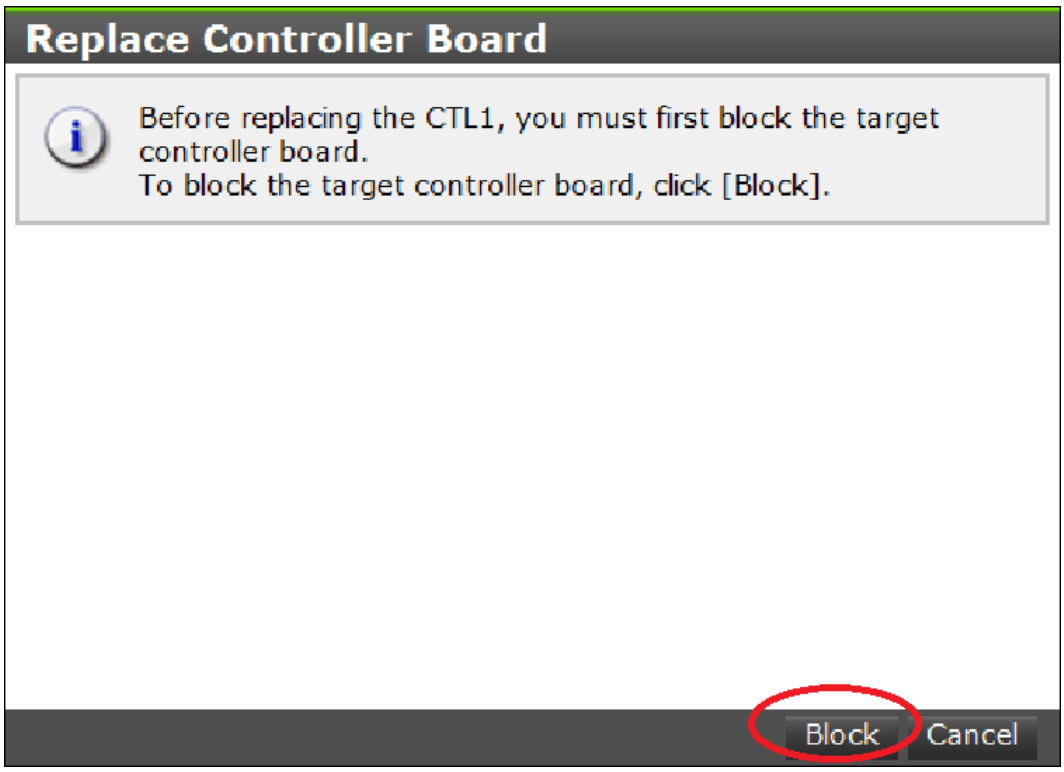
☐ Replacing SAS cables on a drive tray

Replacing SAS cables connected to a CBSS or CBSL controller

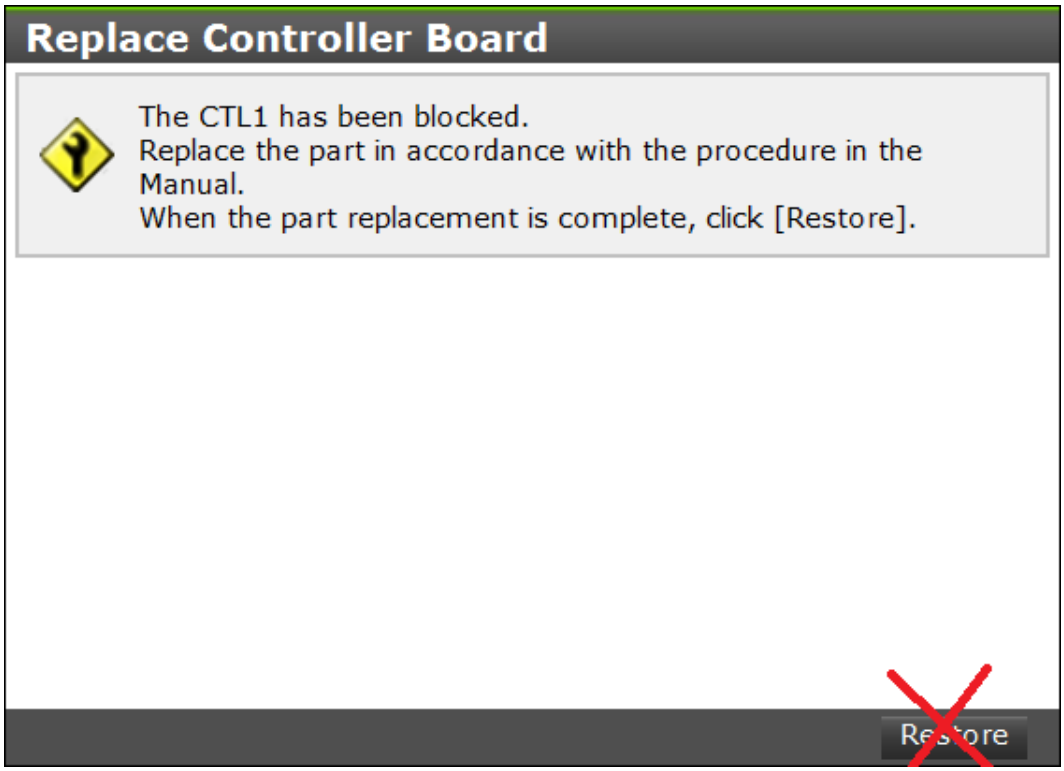
Replacing SAS cables for a CBSS or CBSL controller requires you to block a controller before replacing the cables.

Procedure

1. Start the maintenance utility.
2. In the **Maintenance Utility** window, **Hardware --> Controller Chassis**.
3. Click the **CTLs** tab. Check the status of the controller, and then click the **Replace** list and select the controller whose SAS cable you want to replace.
4. After checking that the appropriate controller has been selected, click **Block**.
5. When the **Replace Controller Board** window appears, verify that the controller shown in the window is the one whose SAS cables are to be replaced, and then click **Block**.



6. Check that the controller is blocked and becomes ready for replacing the SAS cables. Leave the **Replace Controller Board** window open, but do not click the **Restore** button.

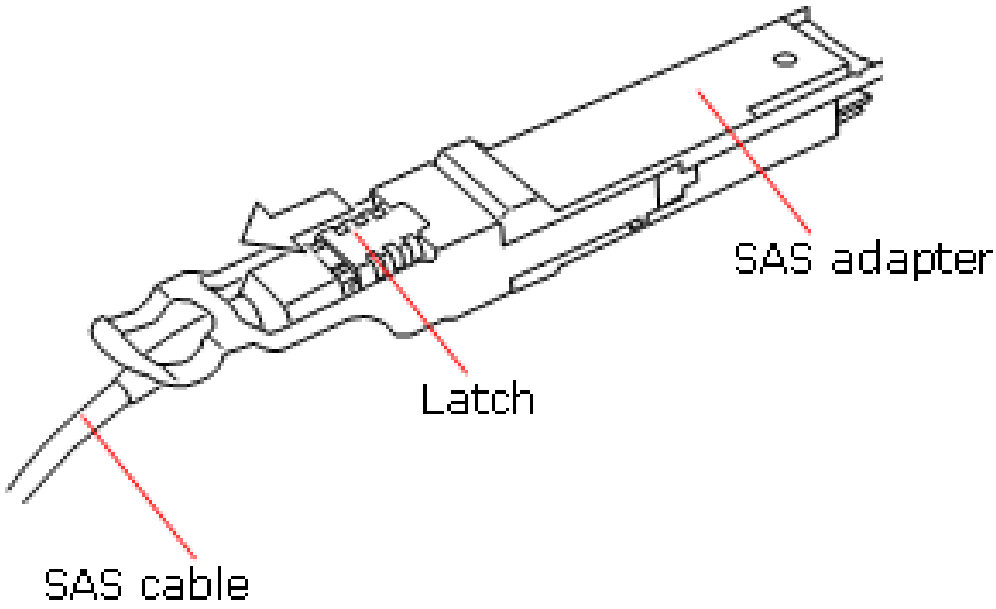


7. Confirm that the red `CTL ALM` LED on the controller is on.
8. Release the routing of the SAS cable connected to the CBSS or CBSL.
9. Remove the SAS cable from the back end module on the CBSS or CBSL.
10. Remove the SAS cable from the ENC on the drive tray connected to the CBSS or CBSL.

11. For SAS cable DW-F800-SCQ1HA:

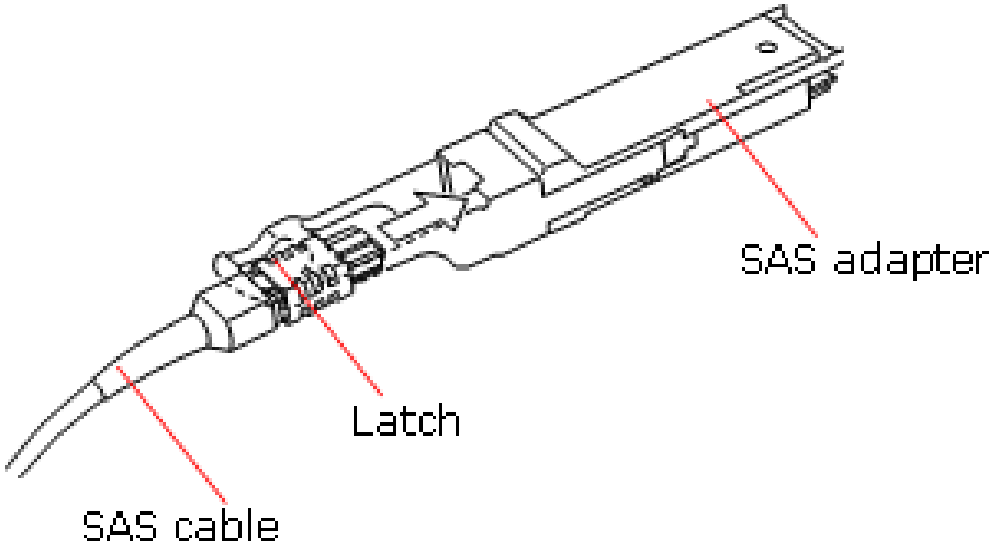
a. Remove the cable from the SAS adapters you want to replace.

b. Pull the latch of the cables and remove them from the SAS adapters.



12. Connect new SAS cables to the back end module on the CBSS or CBSL and to the ENC of the drive tray connected to the CBSS or CBSL.

Note: When connecting the SAS cable DW-F800-SCQ1HA to a SAS adapter, be sure the cable latch clicks and that the cables are connected securely to the SAS adapter.



13. Confirm that the red `STATUS` LED for the back end module is off.
14. Route the cables appropriately.

Note: When connecting the DW-F800-SCQ1HA SAS adapter, you do not have to route the SAS cable.

15. At the **Replace Controller Board** 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.

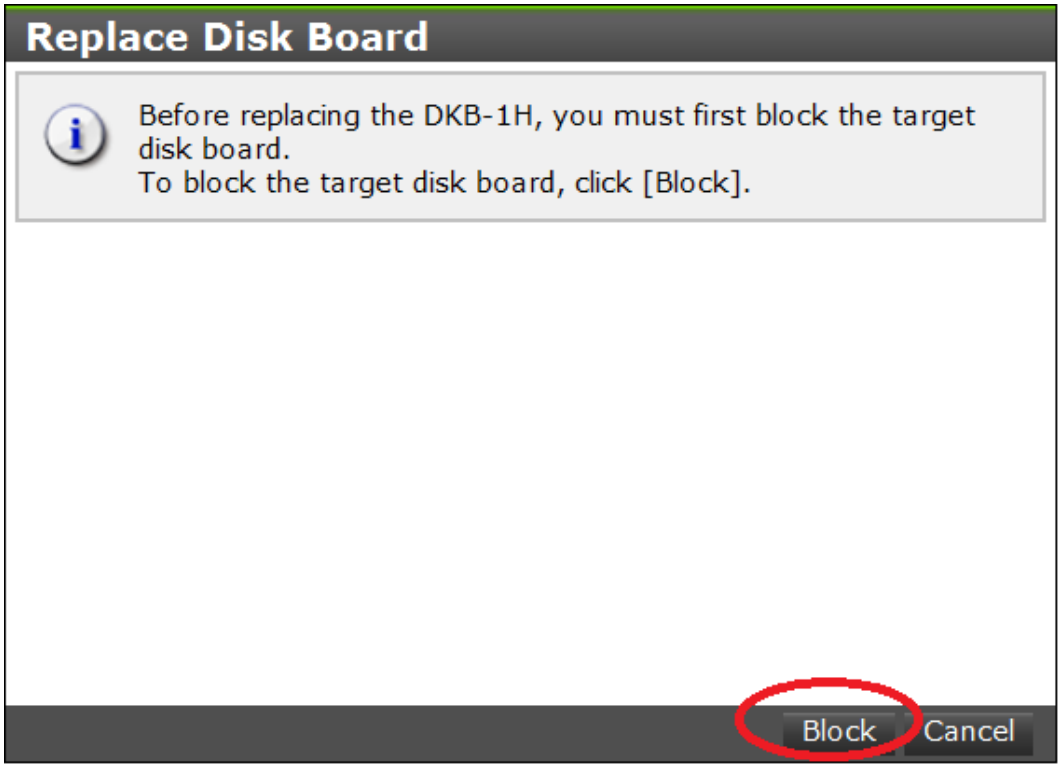
16. When the progress bar goes away and the completion message appears, click **Close**.
17. Click the **CTLs** tab, and then check that the controller whose SAS cable you replaced is `Normal`.
18. Log out and close the **Maintenance Utility** window.

Replacing SAS cables connected to a CBLM or CBLH controller

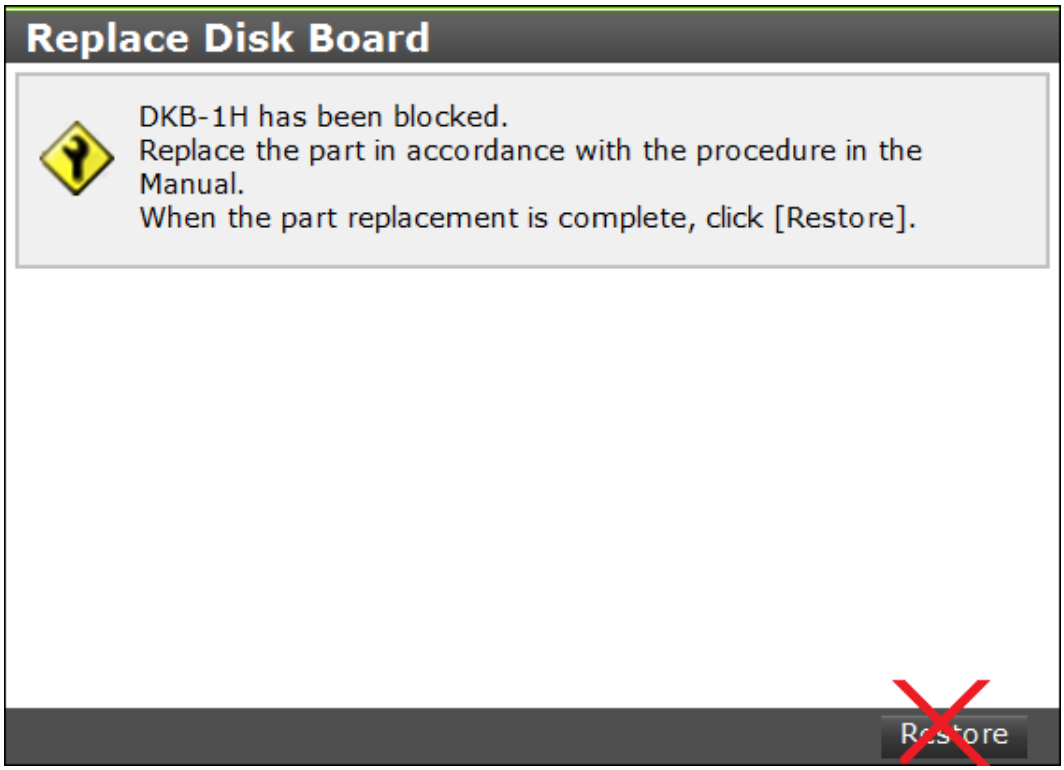
Replacing SAS cables for a CBLM or CBLH controller requires you to block a back end module before replacing the cables.

Procedure

1. Start the maintenance utility.
2. In the **Maintenance Utility** window, click **Hardware --> Controller Chassis**.
3. Click the **DKBs** tab. Check the status of the back end module, and then click the **Replace** list and select the back end module whose SAS cable you want to replace.
4. After checking that the appropriate back end module has been selected, click **Block**.
5. When the **Replace Disk Board** window appears, verify that the back end module shown in the window is the one whose SAS cables are to be replaced, and then click **Block**.



6. Leave the **Replace Disk Board** window open, but do not click the **Restore** button.

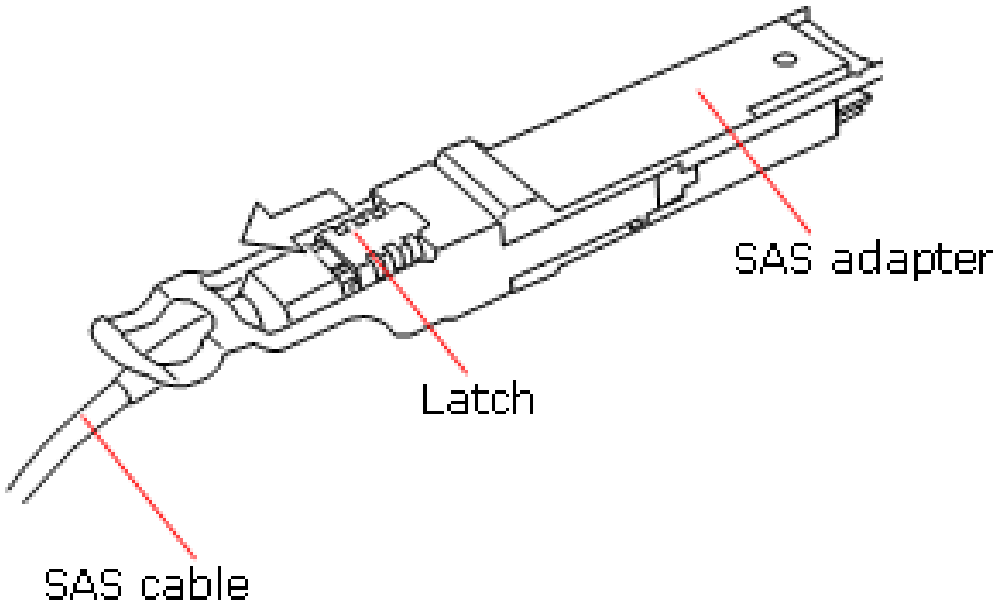


7. Confirm that the red STATUS LED on the back end module whose SAS cable you want to replace is on.
8. Unroute the SAS cable connected to the CBLM or CBLH.

Note: When replacing the SAS adapter for DW-F800-SCQ1HA, you do not have to release the routing of the SAS cable.

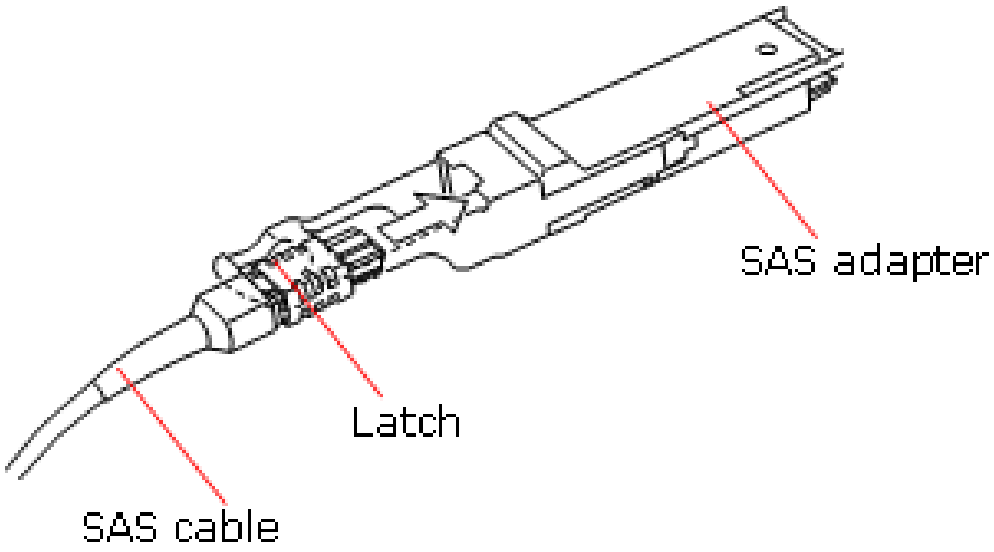
9. Remove the SAS cable from the back end module on the CBLM or CBLH.
10. Remove the SAS cable from the ENC on the drive tray connected to the CBLM or CBLH.

11. For SAS cable DW-F800-SCQ1HA:
    a. Remove the cable from the SAS adapters you want to replace.
    b. Pull the latch of the cables and remove them from the SAS adapters.



12. Connect new SAS cables to the back end module on the CBLM/CBLH and to the ENC of the drive tray connected to the CBLM/CBLH.
13. Confirm that the red STATUS LED for the back end module is off.

14. Connect the new SAS cables to the back end module on the CBLM or CBLH and to the ENC of the drive tray connected to the CBLM or CBLH.



15. Connect the cables to the SAS adapters. When replacing the SAS adapter for SAS cable DW-F800-SCQ1HA, install the cable into a new SAS adapter, and then connect it to the ENC.

> **Note:** When connecting the SAS cable DW-F800-SCQ1HA, be sure the cable latch clicks and the cables are connected securely to the SAS adapters.

16. Route the cables appropriately.
17. At the **Replace Disk Board** window, click **Restore**.
    A progress bar shows the replacement status.
18. When the progress bar goes away and the completion message appears, click **Close**.
19. Click the **DKBs** tab, and then check that the back end module whose SAS cable to replaced is `Normal`.
20. Log out and close the **Maintenance Utility** window.

Replacing SAS cables on a drive tray

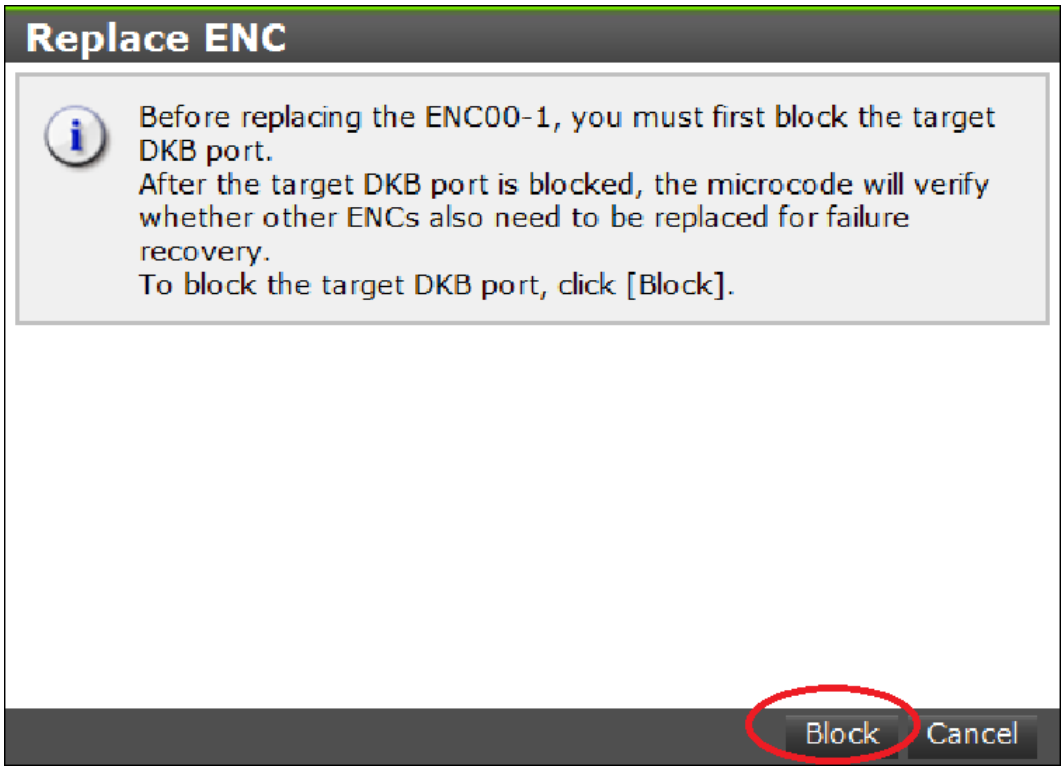
Replacing SAS cables for a drive tray requires you to block an ENC before replacing the cables.

The following procedure describes how to replace SAS cables connected to a drive tray. 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.

Procedure

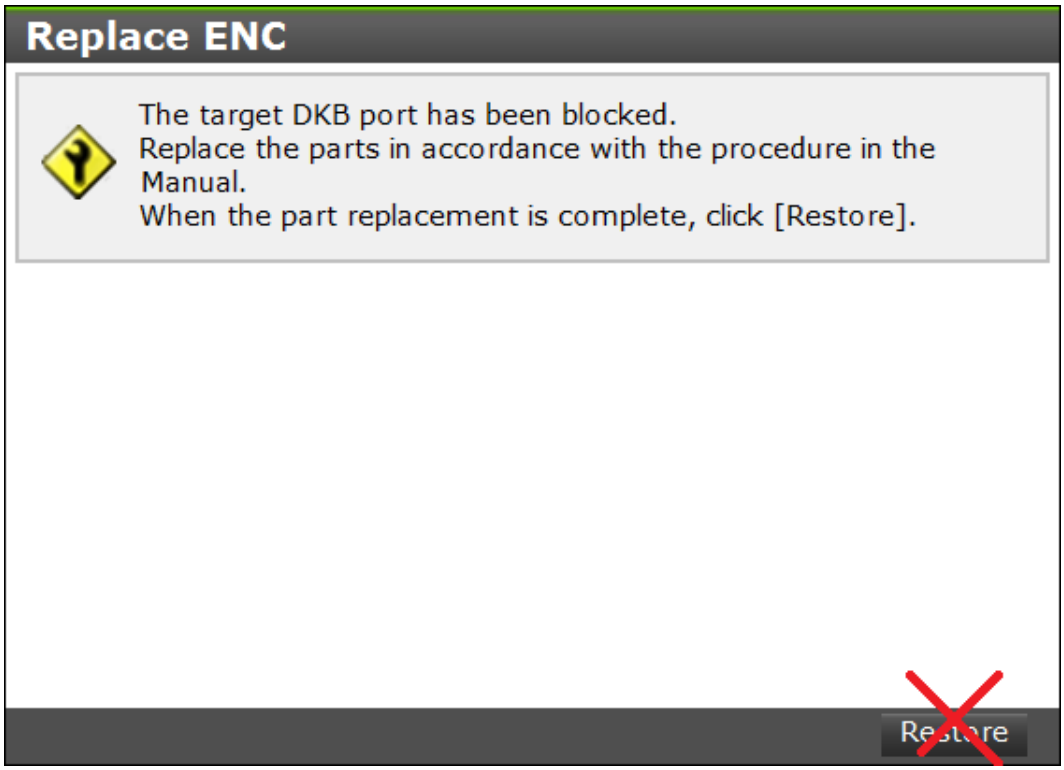
1. Start the maintenance utility.
2. Click **Hardware > Drive Box**.
3. In the **Drive Box** window, click the **ENCs** tab.
4. Click the ENC whose SAS cable you want to replace, and then click **Replace**.

5. When the **Replace ENC** window appears, confirm that the ENC shown in the window is the one to be replaced.



6. Click **Block**.
7. Verify that the appropriate ENC is blocked.

8. Leave the **Replace ENC** window open, but do not click the **Restore** button.

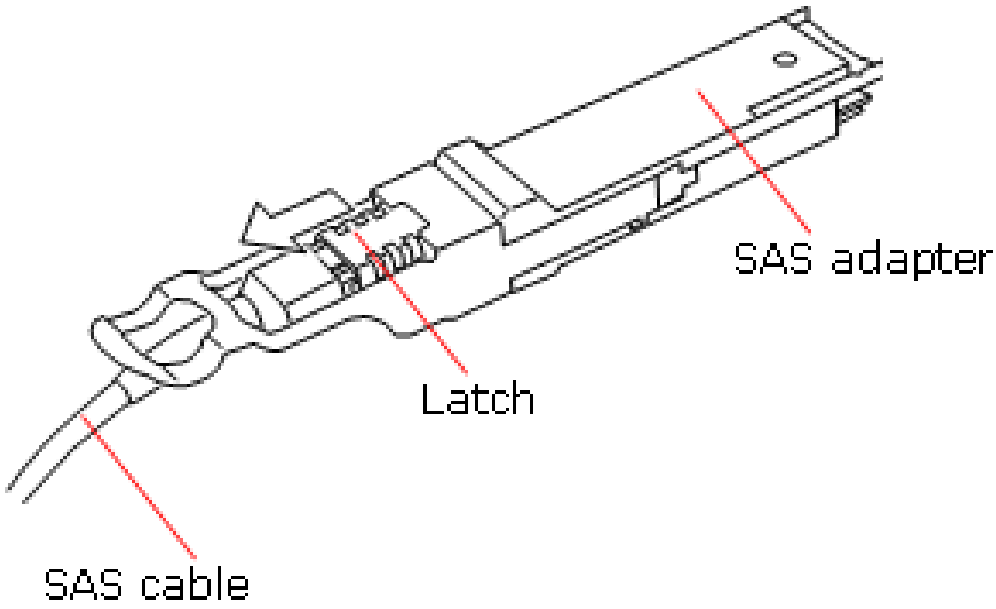


9. Confirm that the red ALARM LED on the ENC whose SAS cable you want to replace is on.
10. Unroute the SAS cable connected to the drive tray.

Note: For SAS cable DW-F800-SCQ1HA, you do not have to unroute the cable.

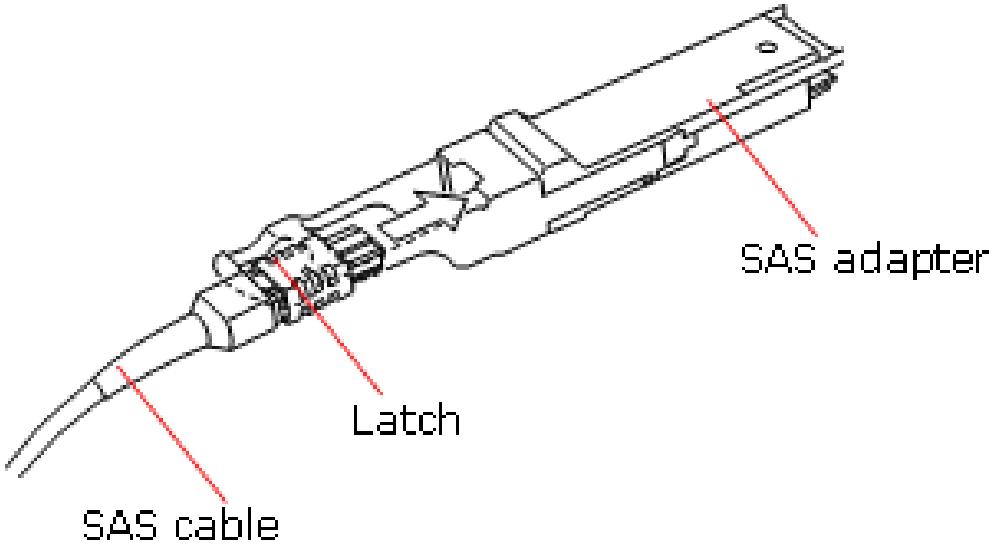
11. Remove the SAS cable from the ENC on the drive tray and from the ENC on a drive tray connected to another drive tray.

12. For SAS cable DW-F800-SCQ1HA:
    a. Remove the cable from the SAS adapters you want to replace.
    b. Pull the latch of the cables and remove them from the SAS adapters.



13. Connect new SAS cables to the ENC on the drive tray(s).

Note: When connecting the SAS cable DW-F800-SCQ1HA, be sure the cable latch clicks and that the cables are connected securely to the SAS adapters.



14. Confirm that the red `ALARM` LED for the ENC is off.
15. Route the cables appropriately.
16. At the **Replace ENC** window, click **Restore**.
    A progress bar shows the replacement status.
17. When the progress bar goes away and the completion message appears, click **Close**.
18. Click the **ENCs** tab, and then check that the ENC whose SAS cable to replaced is `Normal`.
19. Log out and close the **Maintenance Utility** window.

14

Replacing cache flash memory

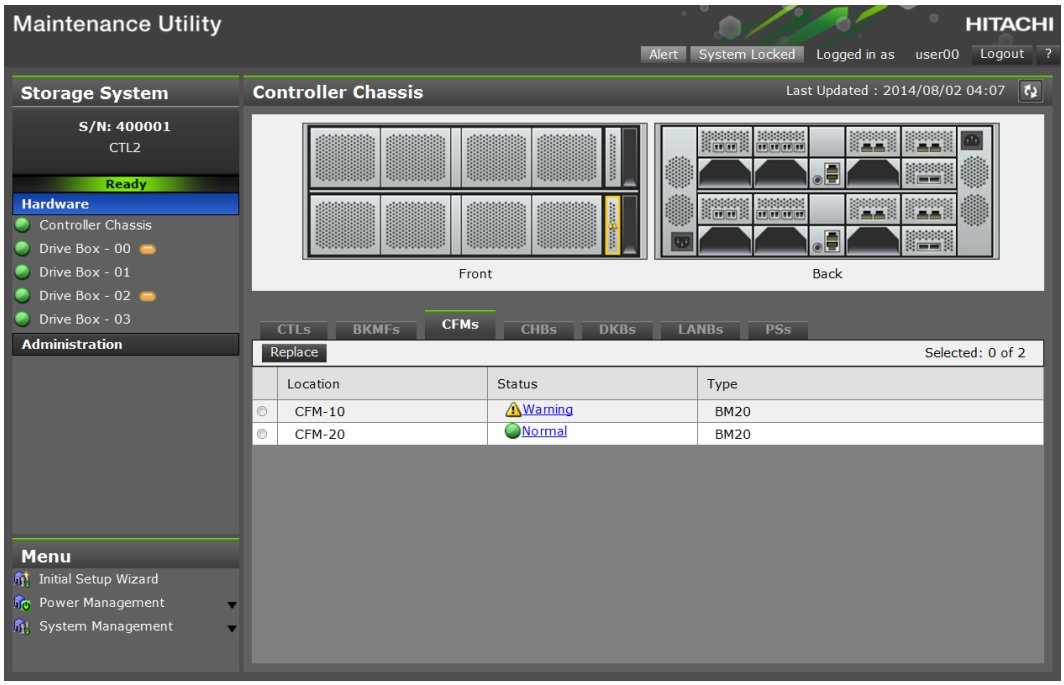
Before replacing cache flash memory (CFM), read the precautions and understand the procedure for your CFM.

- Blocking the CFM
- Replacing the CFM
- Restoring a CFM

Blocking the CFM

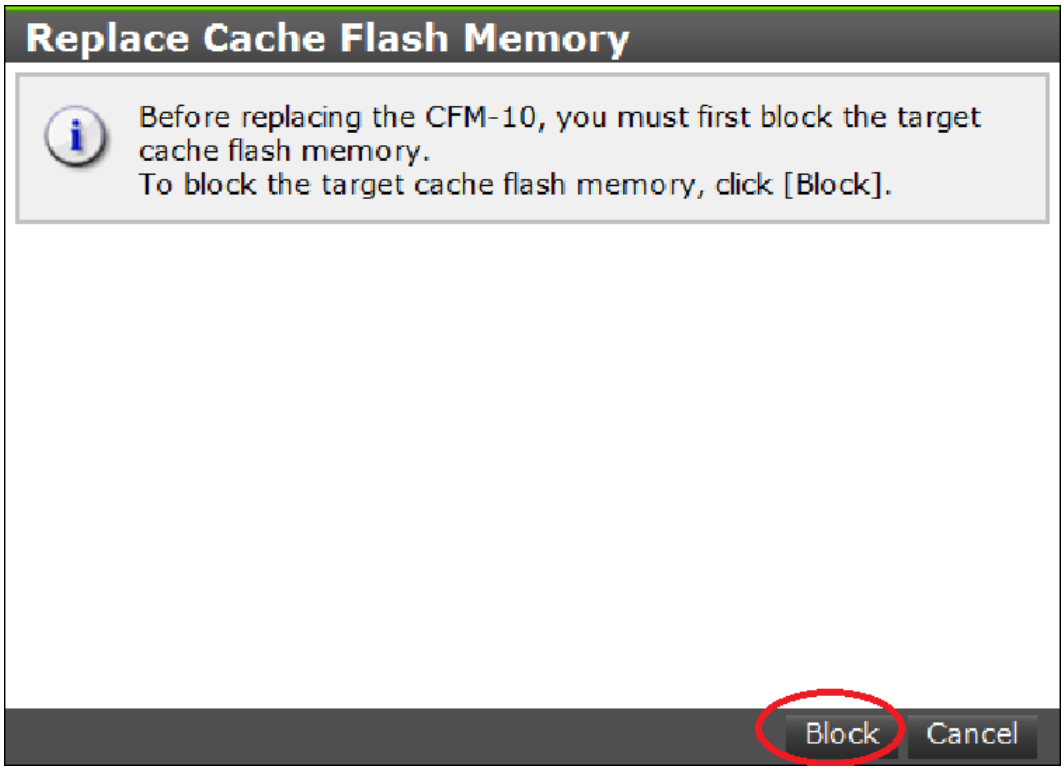
Procedure

1. Start the maintenance utility.
2. Click **Hardware > Controller Chassis**.
3. In the **Controller Chassis** window, click the **CFMs** tab.
4. Confirm that the status of the CFM to be replaced is `Warning`.



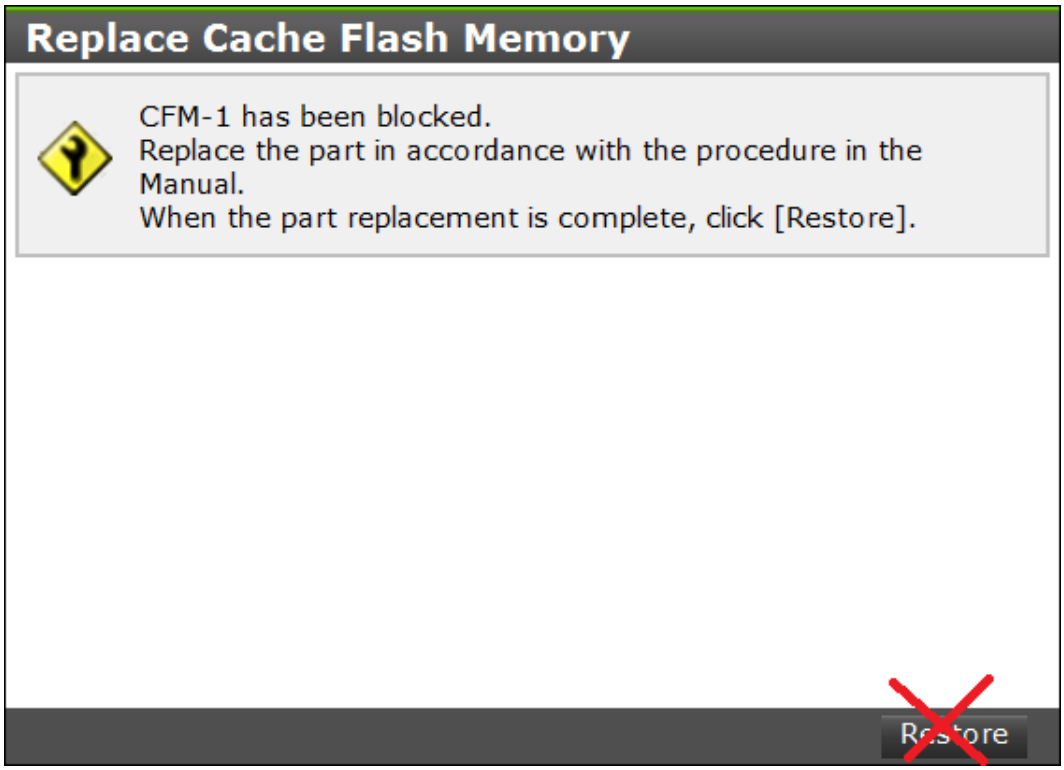
5. Click the CFM to be replaced, and then click **Replace**.

6. When the **Replace Cache Flash Memory** window appears, confirm that the CFM shown in the window is the one to be replaced, and then click**Block**.



7. Click **Block**.
8. Verify that the CFM is blocked and is ready for replacing.

9. Leave the **Replace Cache Flash Memory** window open, but do not click the **Restore** button.



Replacing the CFM

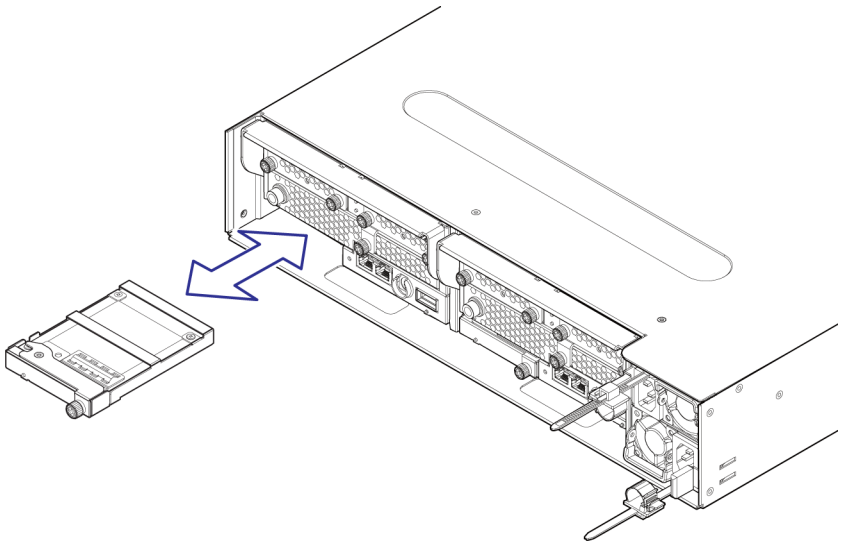
Prerequisites

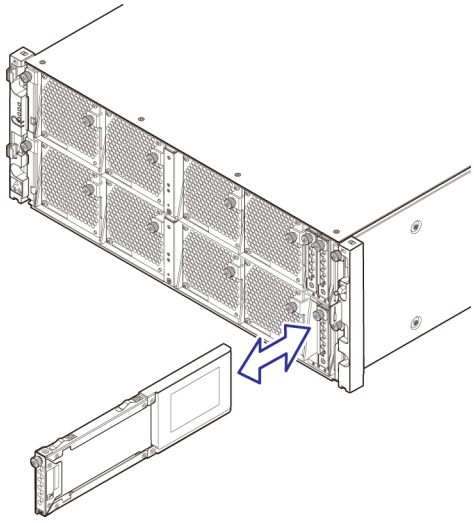
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.
- Use the maintenance utility to block the CFM.
- The red STATUS LED for the CFM to be replaced is on.
- The red ALARM LED (CBSS/CBSL) or ALM LED (CBLM/CBLH) on the cache flash memory (CFM) to be replaced is on.

Procedure

1. Loosen the blue screw securing the CFM.
2. Open the lever

3. Hold the CFM with both hands, and then pull it gently and remove it.





4. With the lever opened completely, insert the new CFM all the way into the slot.
5. Close the lever completely, and tighten the blue screw to secure the CFM.
6. Confirm that the red ALARM or ALM LED on the CFM is off.

Postrequisites

- Use the maintenance utility to restore (unblock) the CFM.

Restoring a CFM

In the maintenance utility:

Procedure

1. In the **Replace Cache Flash Memory** window, click **Restore.**
   A progress bar shows the replacement status.
2. When the progress bar goes away and the completion message appears, click**Close**.
3. Click the **CFMs** tab in the **Controller Chassis** window.
4. Verify that the status of the new CFM is `Normal`.

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

15

Replacing a LAN blade

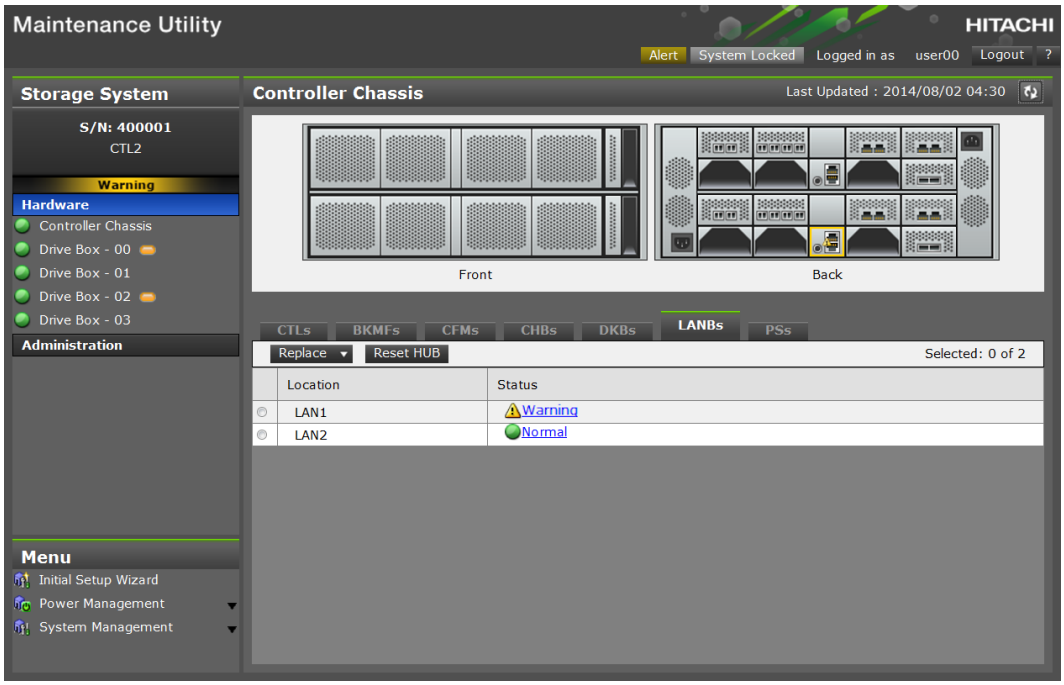
Before replacing a LAN blade, read the precautions and understand the procedure for your LAN blade.

- ☐ Blocking the controller
- ☐ Replacing the LAN blade
- ☐ Restoring the LAN blade

Blocking the controller

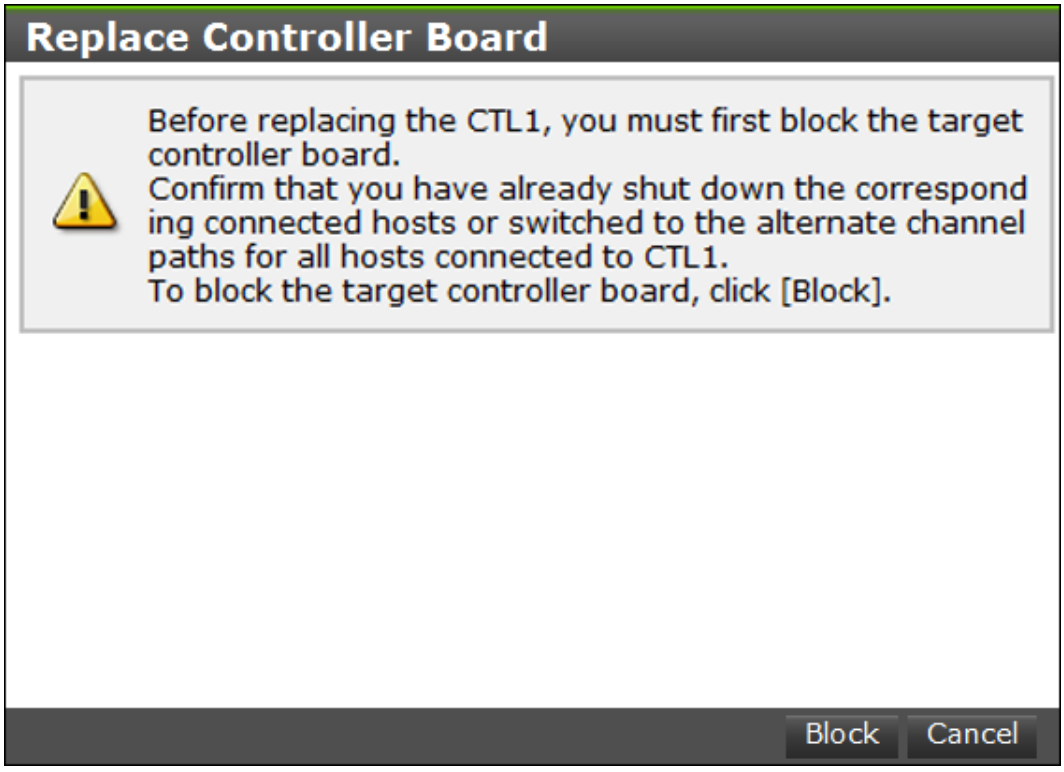
Procedure

1. Start the maintenance utility.
2. Click **Hardware > Controller Chassis**.
3. In the **Controller Chassis** window, click the **LANBs** tab.
4. Confirm that the status of the LAN blade to be replaced is `Warning`.



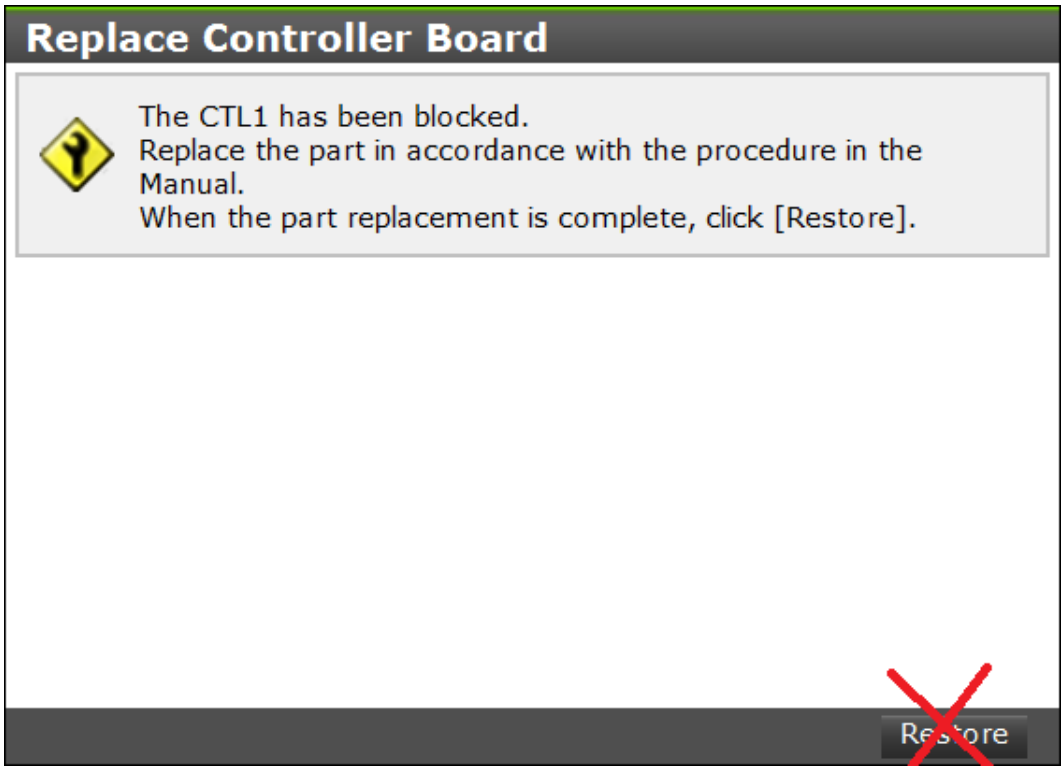
5. Click the **CTLs** tab.
6. Click the **Replace** list and select the controller that contains the LAN blade to be replaced.
7. When the **Replace Controller Board** window appears, confirm that the controller shown in the window is the one that contains the LAN blade to be replaced.

8. Click **Block**.



9. Confirm that the controller is blocked.

10. Leave the **Replace Controller Board** window open, but do not click the **Restore** button.



11. Confirm that the red `CTL ALM` LED on the controller is on.

Replacing the LAN blade

Prerequisites

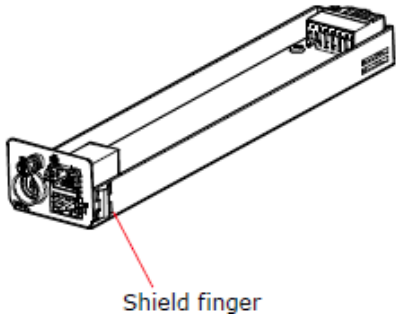
- Wear a wrist strap connected to the storage system to prevent part failures caused by static electricity. Do not remove the wrist strap until you finish the procedure.
- Storage system power is turned on.
- Use the maintenance utility to block the LAN blade.
- The red `CTL ALM` LED on the CBLM or CBLH controller is on.

Procedure

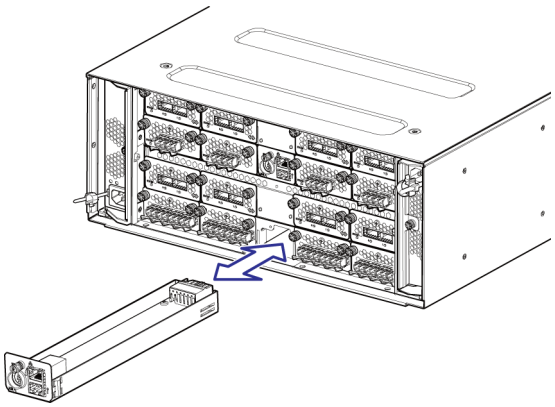
1. Remove the LAN cable from the user LAN port.
2. Release the controller:
   a. Loosen the blue right and left screws on the lever of the controller to be replaced.

b. Open the lever.

3. Loosen the blue screw that secures the LAN blade.
4. Using both hands, pull out and remove the LAN blade.
5. Insert the new LAN blade into the slot, just before the "shield finger."



6. Gently push the new LAN blade all the way into the slot.
7. Tighten the blue screw to secure the LAN blade.



8. Secure the controller.
   a. Push in the controller all the way until the right and left levers close completely.
   b. Tighten the blue screw and secure the controller.
9. Confirm that the red `CTL ALM` LED on the controller is off.
10. Connect the LAN cable you removed to the user LAN port.

Postrequisites

- Use the maintenance utility to restore (unblock) the LAN blade.

Restoring the LAN blade

In the maintenance utility:

Procedure

1. In the **Replace Controller Board** 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 the **LANBs** tab in the **Controller Chassis** window and confirm that the status of the new LAN blade is `Normal`.

   If necessary, click **Refresh** at the top-right of the window to update the status in the window.
4. Confirm that the red `CTL ALM` LED is off at the controller that contains new LAN blade.
5. Log out and close the **Maintenance Utility** window.

16

Replacing a backup module

Before replacing a backup module, read the precautions and understand the procedure for the backup module.

- ☐ Replacing a BKM
- ☐ Replacing a BKMF

Replacing a BKM

The following sections describe how to replace a BKM backup module.

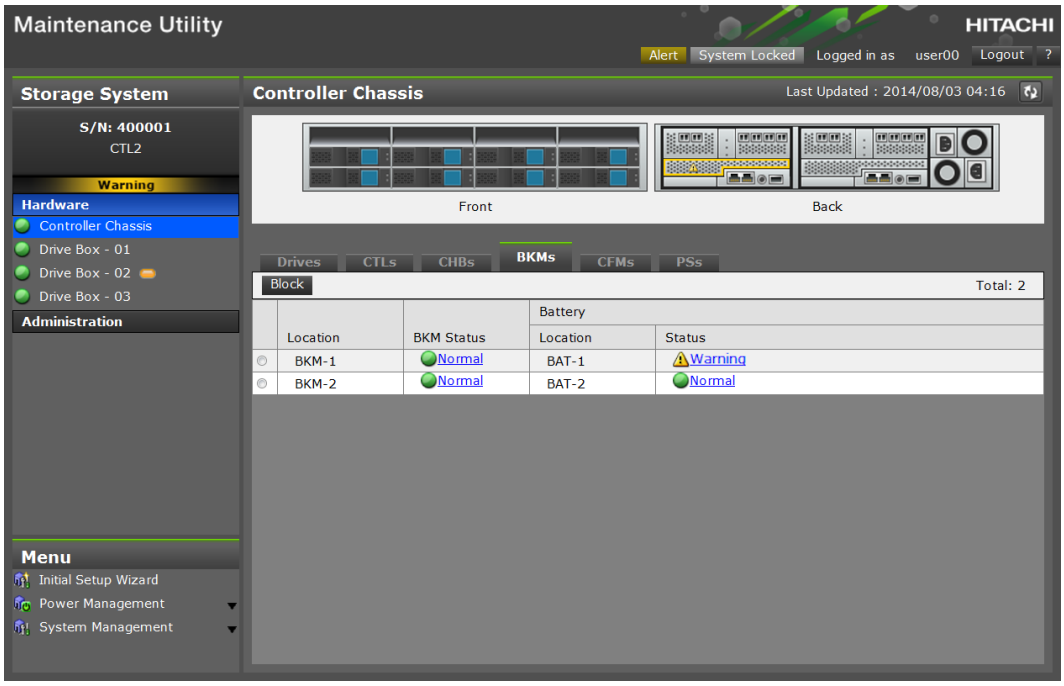
Checking the BKM backup module

Prerequisites

- A backup module is installed in the backup module enclosure.
- Storage system power is turned on.
- The red STATUS LED on the backup module to be replaced is on.
- Use the Detail Dump tool to collect the storage system information.

Procedure

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



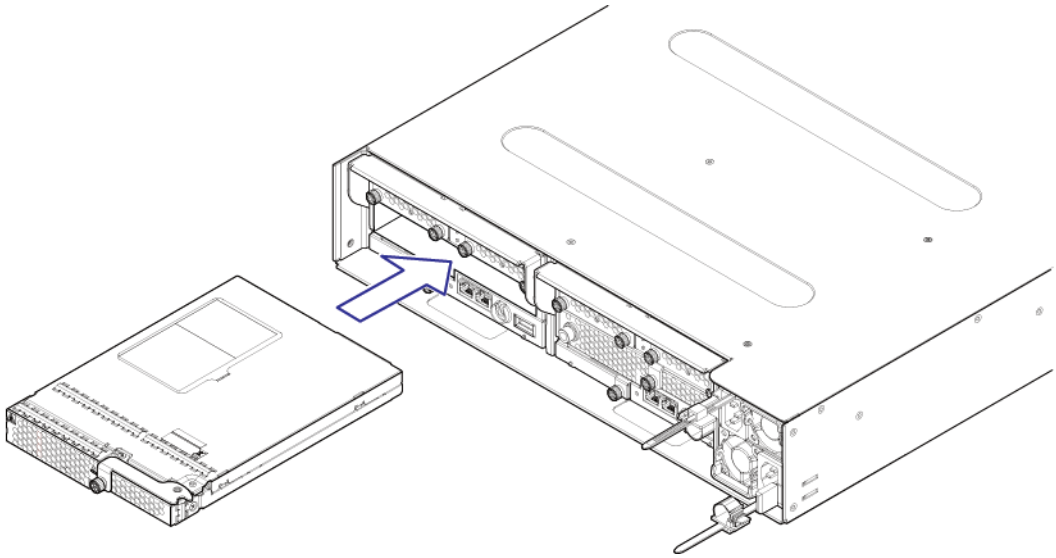
4. Confirm that the status of the backup module to be replaced is `Warning`.

Replacing the BKM backup module

Use the following procedure to replace the BKM backup module.

Procedure

1. Loosen the blue screw that secures the BKM.
2. Open the lever forward.
3. Using both hands, hold the body of the BKM, and then pull out and remove the BKM.
4. With the lever of the BKM opened forward, insert the new BKM into the slot.



5. Push the BKM all the way into the slot.
6. Close the lever and tighten the blue screw to secure the BKM.
7. Confirm that the green `STATUS` LED on the BKM is blinking.
8. In the **BKMS** tab of the maintenance utility, check that the status of the BKM you replaced is `Normal`.
9. Log out and close the **Maintenance Utility** window

Replacing a BKMF

The following sections describe how to replace a BKMF backup module.

Blocking a BKMF

Prerequisites

- A backup module is installed in the backup module enclosure.
- Storage system power is turned on.
- The red `STATUS` LED on the backup module to be replaced is on.
- Use the Detail Dump tool to collect the storage system information.

Procedure

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

4. Confirm that the status of the backup module to be replaced is `Warning`.

Replacing the BKMF backup 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.
- Storage system power is turned on.
- The red `STATUS` LED on the backup module to be replaced is on.
- Use the Detail Dump tool to collect the storage system information.
- Use the maintenance utility to verify the backup module status.

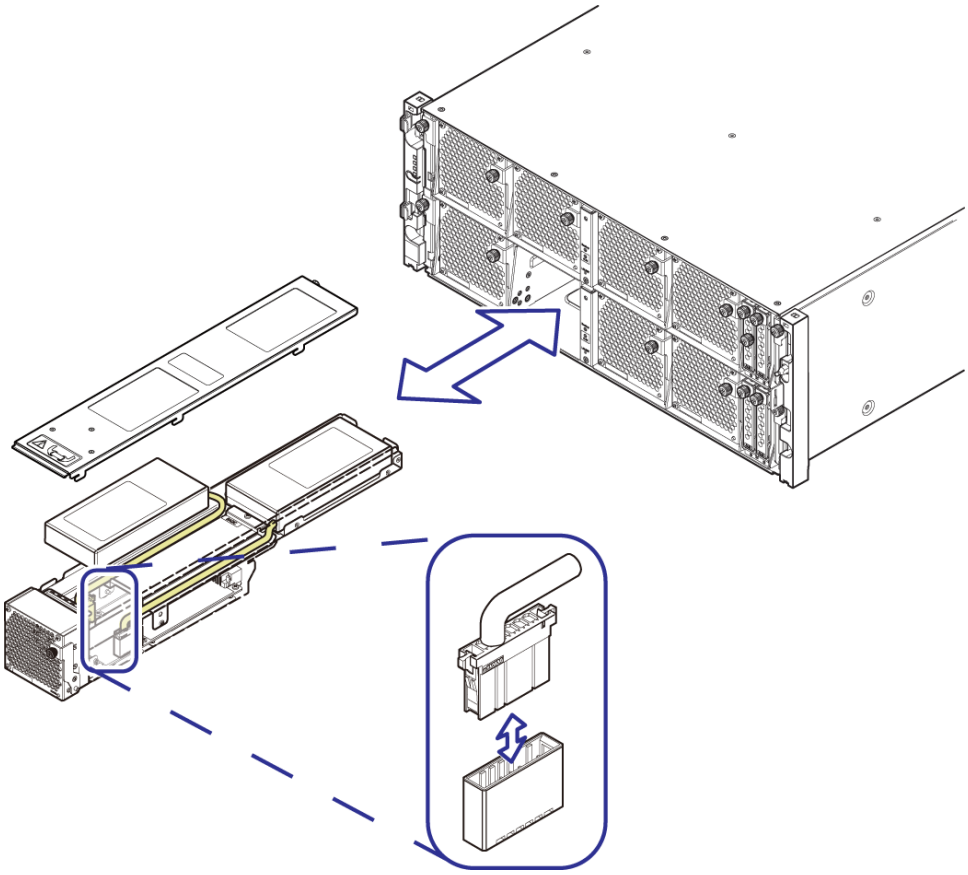
Procedure

1. Loosen the blue screw that secures the backup module.
2. Open the lever forward.
3. Open the lever.
4. Hold the backup module with both hands, and then pull it out and remove it.

5. Hold the latch of the cable connector of the battery to be installed in the backup module and remove the connector from the socket.
6. Remove all batteries that are installed.

   A maximum of two batteries can be installed.
7. Loosen the blue screw on the rear side of the new backup module.
8. Slide the top panel of the new backup module and remove it.
9. In the new backup module, install all batteries you removed and route the cables along the groove of the backup module.

   If you removed one battery, install the battery in the front (fan side) of the storage system. Route the cables to avoid bending the cables.
10. Connect the cable connector to the socket.
11. Slide the top panel of the backup module and attach it.
12. Tighten the blue screw on the rear panel of the backup module.
13. With the lever of the backup module opened forward, insert the new backup module into the slot.



14. Push all the way into the slot.
15. Close the lever and tighten the blue screw to secure the backup module.
16. Confirm that the green STATUS LED on the BKMF is blinking.

17. In the **BKMFs** tab of the maintenance utility, check that the status of the backup module you replaced is `Normal`.

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

17

General maintenance

This chapter provides general maintenance procedures.

- Periodic maintenance
- Cleaning the storage system
- Inspecting fans
- Replacing the battery
- Checking for loose or damaged cables or connectors
- Restarting the storage system
- Storing the storage system

Periodic maintenance

The following table describes the periodic maintenance procedures you can perform to extend the life of your storage system. Inspect and clean the storage system regularly according to the operation environment.

Maintenance	Interval	Approximate time to perform procedure
Clean the storage system	Once a year	5 minutes
Inspect the fan	Once a year	5 minutes
Replace the battery	Every 3 years	10 minutes

Cleaning the storage system

When cleaning the storage system, check whether the system's air vents are clogged by dust. If they are clogged, remove the dust with a vacuum cleaner or wipe the dust using a dry cloth.

Keep the front bezel and rear panel clean. Otherwise, storage system ventilation deteriorates and the inside temperature might rise, causing a failure or fire.

Do not move the storage system during cleaning.

Procedure

1. Clean the outside of the front bezel.
2. Insert the key in the front bezel and turn in the direction shown by the arrow to unlatch the bezel.

Caution: Attach or remove the front bezel carefully to avoid pinching your fingers. Do not touch "live parts;" otherwise, you can receive an electric shock.

3. Remove the front bezel.
4. Clean the internal surfaces of the front bezel.
5. Attach the front bezel.
6. Turn the key in the direction shown by the allow to latch the front bezel.
7. Clean the external surfaces of the rack.

Inspecting fans

Inspect the fans when storage system power is turned on.

Caution: Storage system fans rotate at high speed. Exercise extreme caution to avoid getting anything caught in the fan and to prevent injury.

Procedure

1. Gain access to the inside of the rack.
2. Open the front bezel of the storage system.
3. Confirm that the storage system fans are rotating
4. Close the front bezel, and then close the rack.

Replacing the battery

Each controller contains a sealed battery that provides backup power to cache memory. You must replace the battery every three years.

Note: Do not disassemble the battery; otherwise, you could get burned or receive a shock.

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.

Checking for loose or damaged cables or connectors

It is good practice to check cables for damage on a periodic basis. Confirm that all cables and cable connectors are in good condition and connected securely to the appropriate interfaces.

Restarting the storage system

Before restarting the storage system, wait at least one minute with the main switch off (amber POWER LED is off).

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.

18

Troubleshooting

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

- General troubleshooting
- Troubleshooting Hitachi Device Manager - Storage Navigator
- Dump tool
- Troubleshooting the maintenance utility
- Checking alerts
- Turning the storage system on or off using the maintenance utility
- Using LEDs to diagnose problems

General troubleshooting

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.

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 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.

Message ID	Description	Recovery Action
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.

Forcing browser refreshes of the Maintenance Utility window

If images in the **Maintenance Utility** window do not appear properly, refresh your web browser.

To refresh your web browser:

Procedure

1. If the maintenance utility is open, log out.
2. Press the `Ctrl` key and `F5` key at the same time to force a refresh.

Maintenance Utility window hangs

The maintenance utility provides a locking feature you can use in case the window freezes (or "hangs").

In the unlikely event that the **Maintenance Utility** window "hangs" during normal operation:

Procedure

1. Check the network connection between the SVP and the storage system.

2. Log out of the SVP, and then log in again.
3. When the `System Locked` message appears, click **System Locked** to unlock the system.

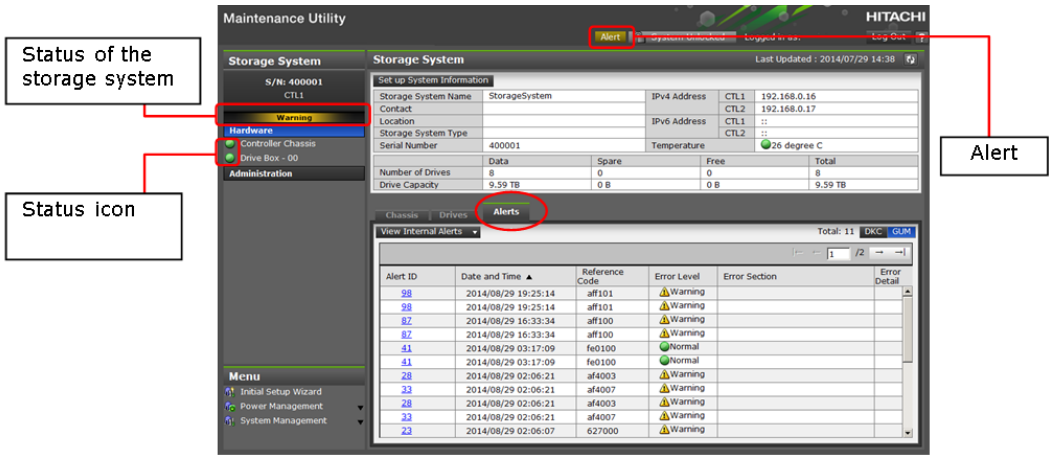
Checking alerts

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.

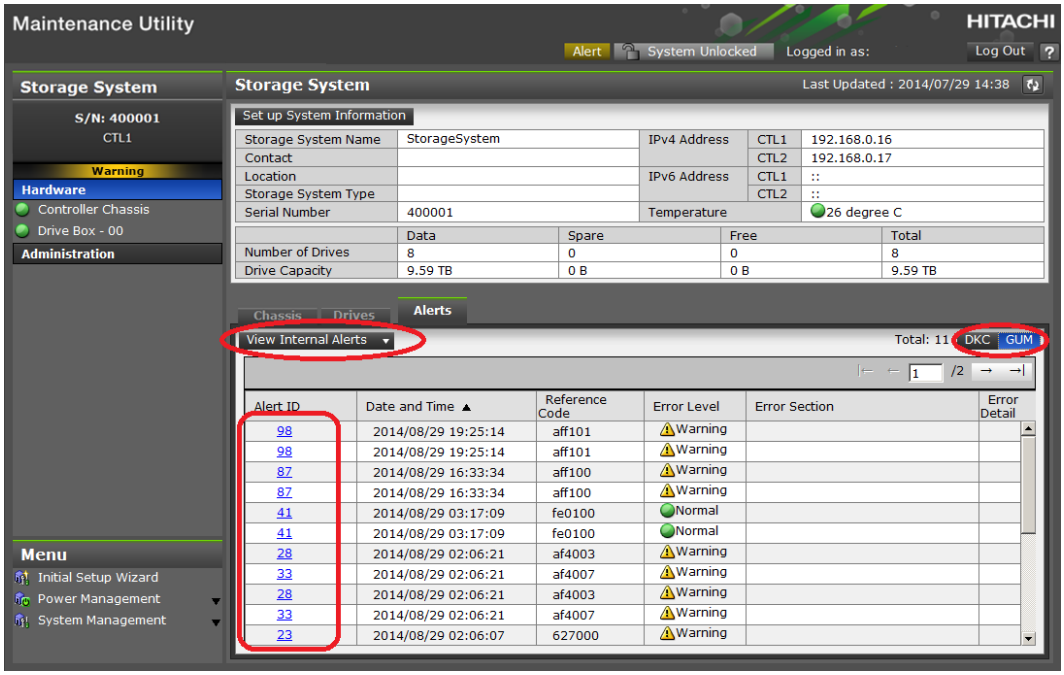
2. In the header area, click **Alert**.
   The **Alerts** tab appears.



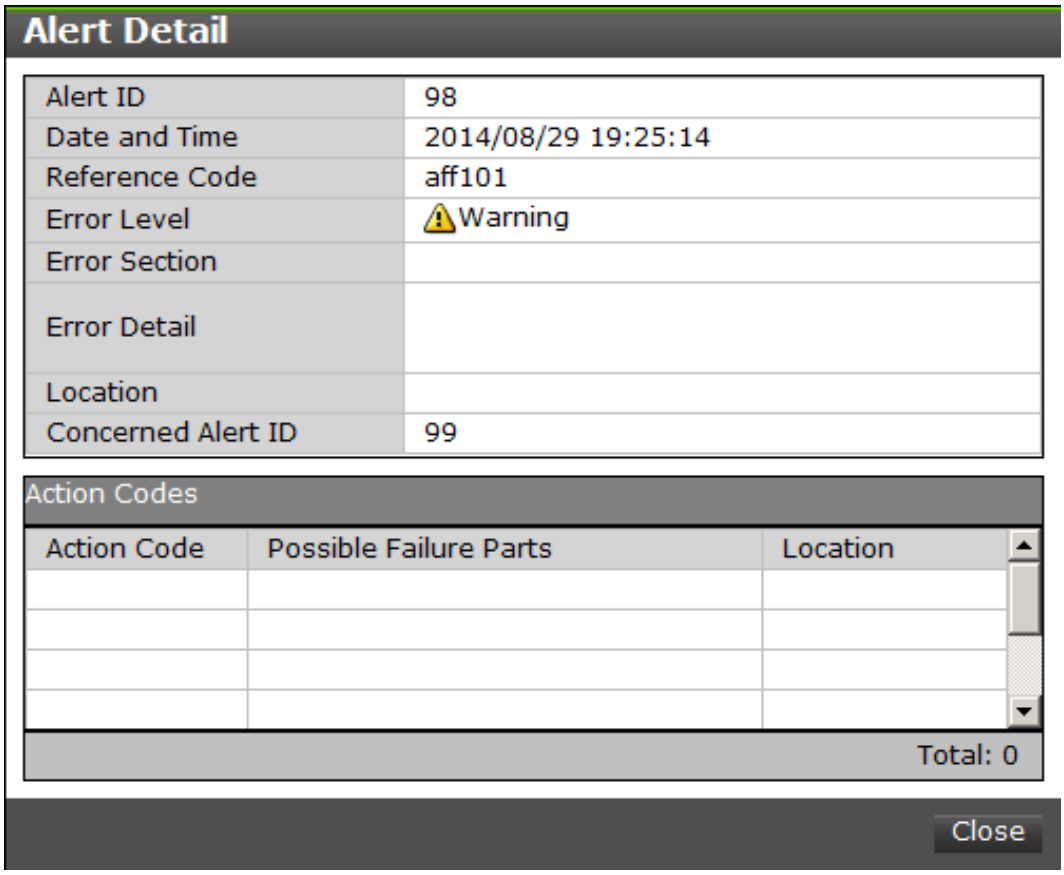
Status	Description	Navigation area	Alert color
Failed	The storage system might be down.	Failed	Red
Warning	A part has a Blocked, Failed, or Warning status.	Warning	Amber
Information	Alert does not have a SIM defined for it.	Information	Amber
Ready	All parts have a normal status.	Ready	Green
Power-on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



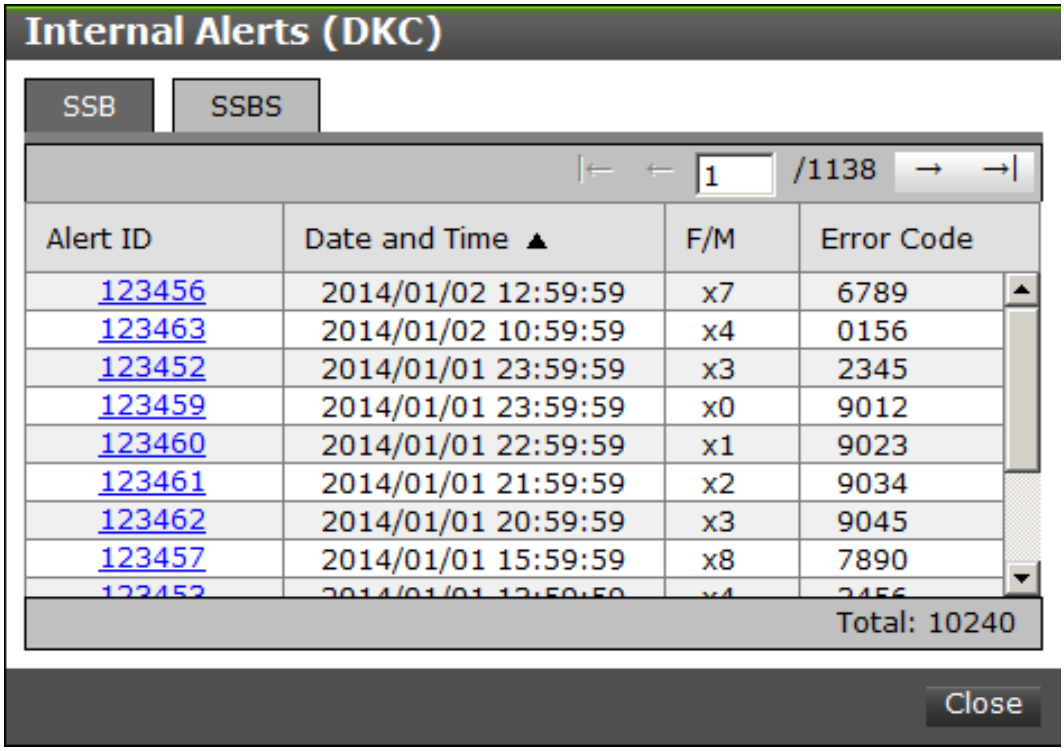
4. Under the **Alert ID** column, click an entry.
   The **Alert Detail** window appears.



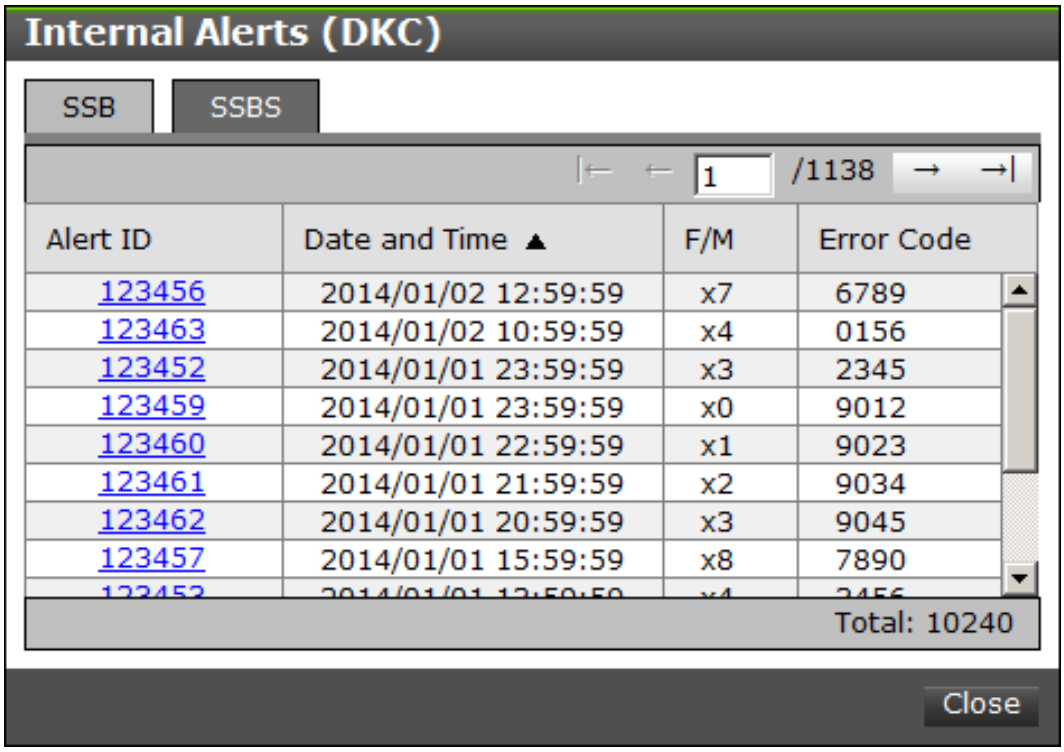
5. To check the internal alert, click **Internal Alerts (DKC)** or **Internal Alerts (GUM)** from the **View Internal Alerts** list. Click an entry under **Alert ID**.

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

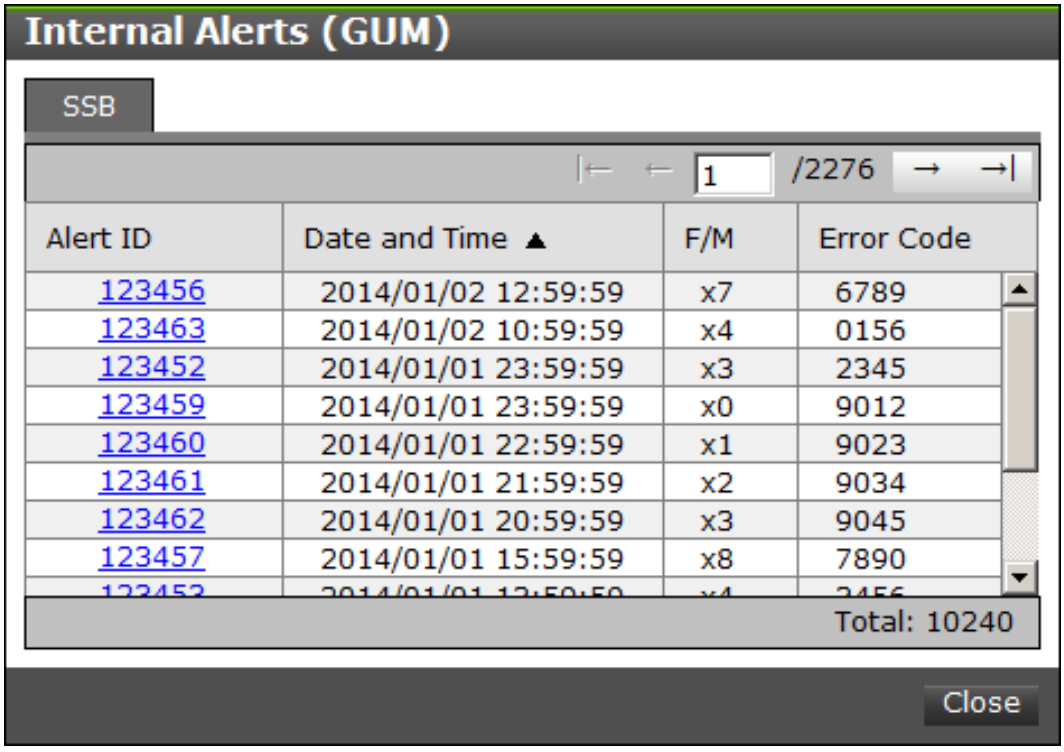
SSB Tab in the Internal Alerts (DKC) Window



SSBs Tab in the Internal Alerts (DKC) Window



Internal Alerts (GUM) Window



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**.

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.

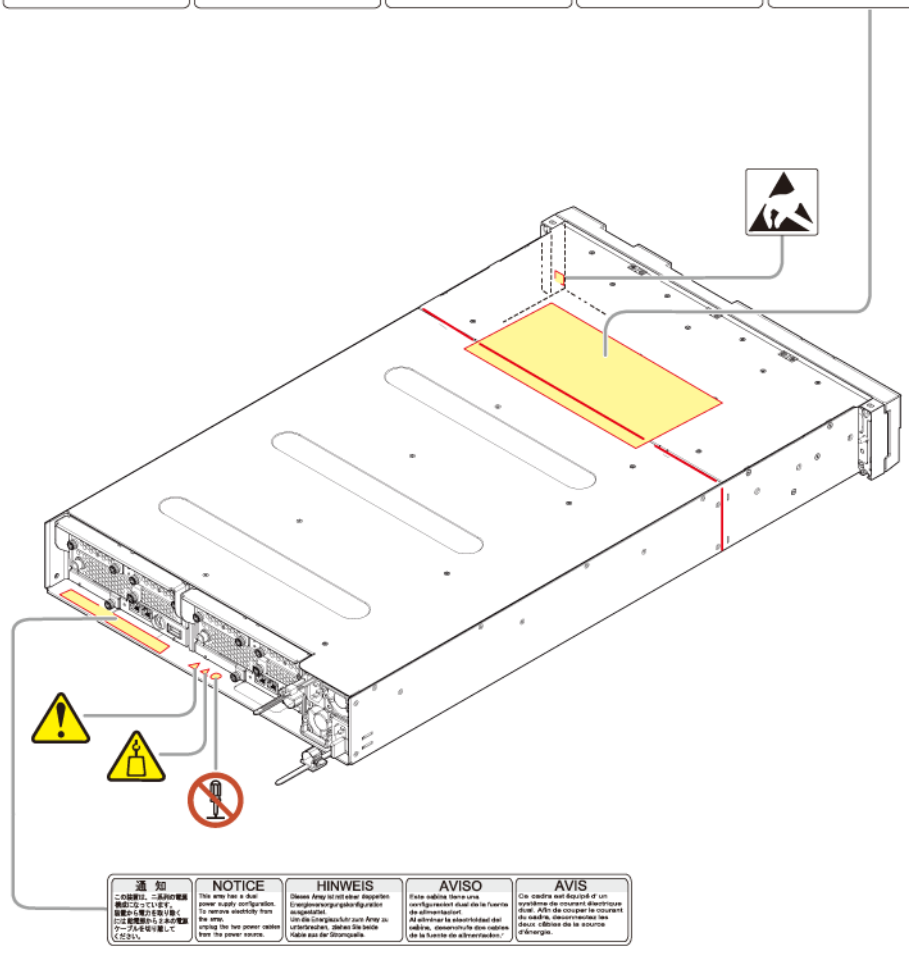
A

Warning labels on the storage system

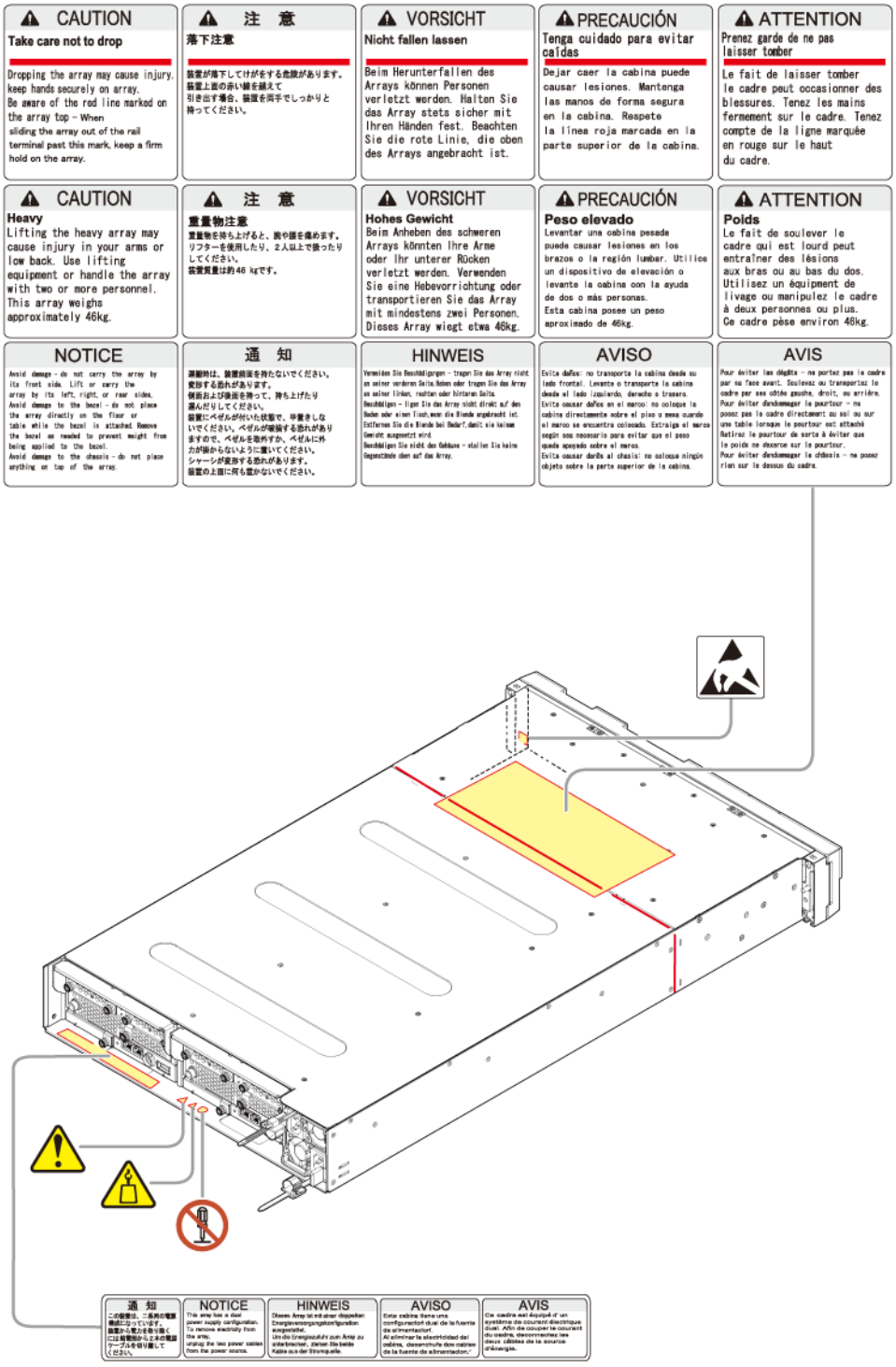
- ☐ CBLM power supply
- ☐ Power supply for small and large form factor drive trays
- ☐ Flash module drive tray power supply
- ☐ Dense intermix drive tray power supply
- ☐ Front end module (Fibre Channel/iSCSI)
- ☐ Back end module
- ☐ ENC for small and large form factor drive trays
- ☐ ENC for a dense intermix drive tray
- ☐ CMA (used to secure dense intermix drive tray)
- ☐ Battery

CBSS controller

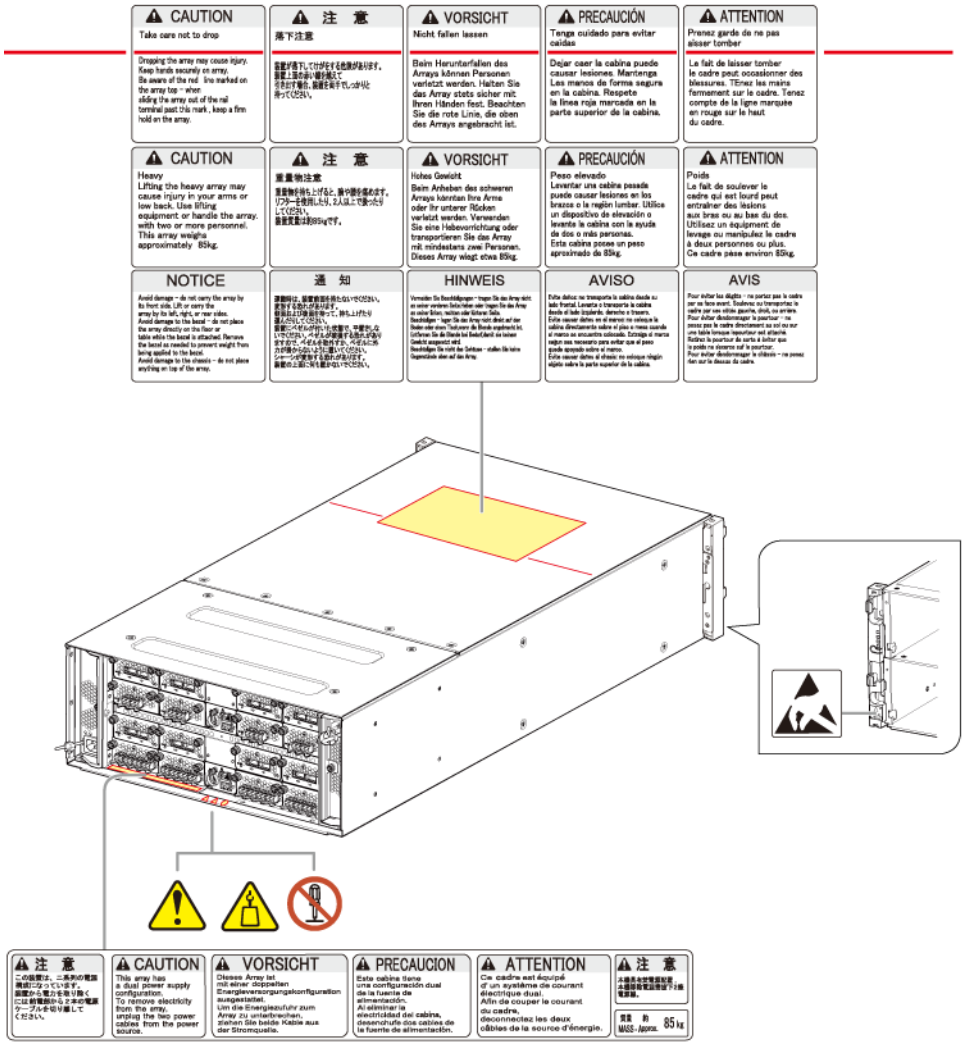
CAUTION	注　意	VORSICHT	PRECAUCIÓN	ATTENTION
Take care not to drop Dropping the array may cause injury. keep hands securely on array. Be aware of the red line marked on the array top – When sliding the array out of the rail terminal past this mark, keep a firm hold on the array.	**落下注意** 装置が落下してけがをする危険があります。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	**注　意**	**VORSICHT**	**PRECAUCIÓN**	**ATTENTION**
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.	**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。	**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.	**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.	**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	**通　知**	**HINWEIS**	**AVISO**	**AVIS**
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.	通路時は、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。	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.	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.	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.



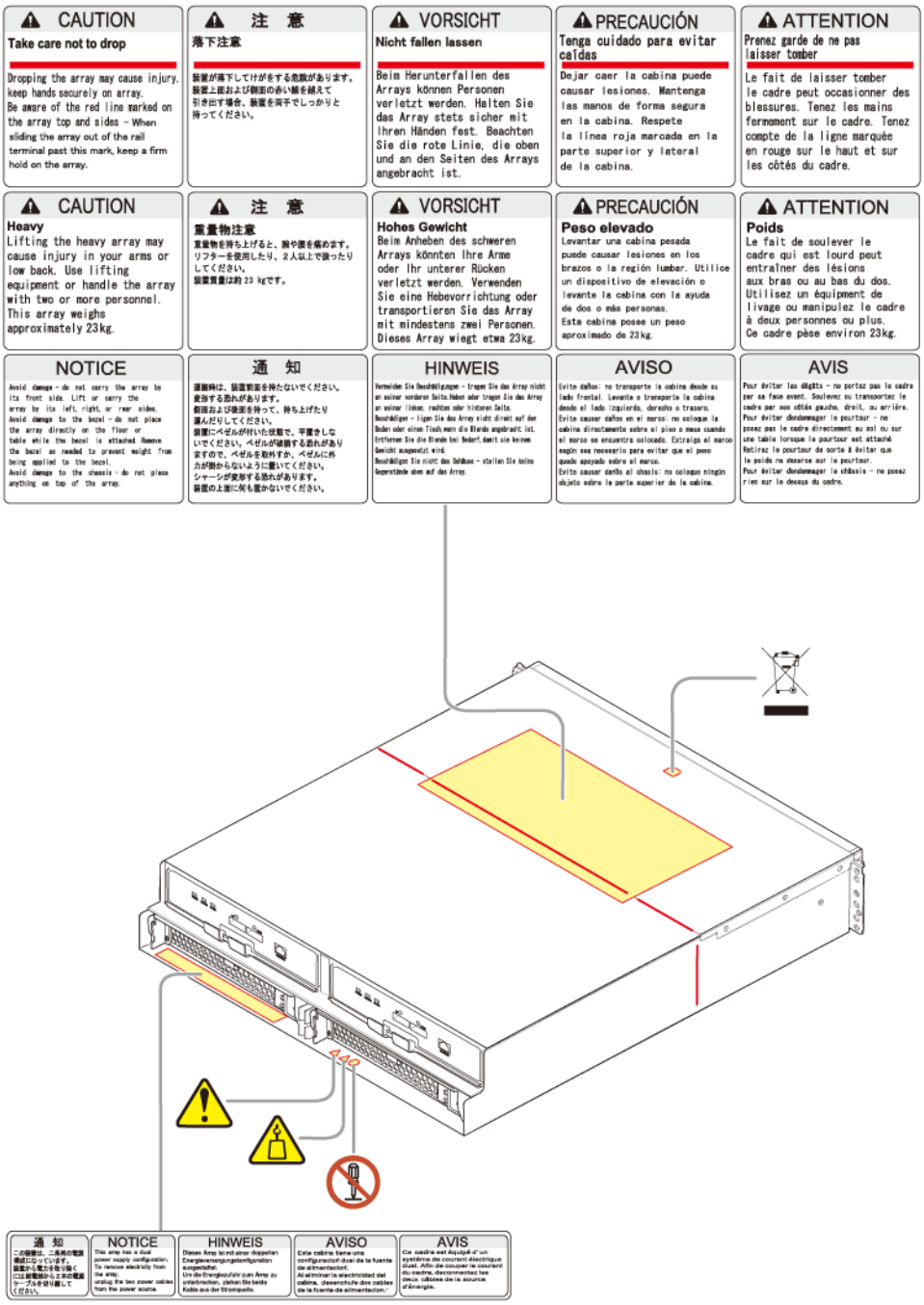
CBSL controller



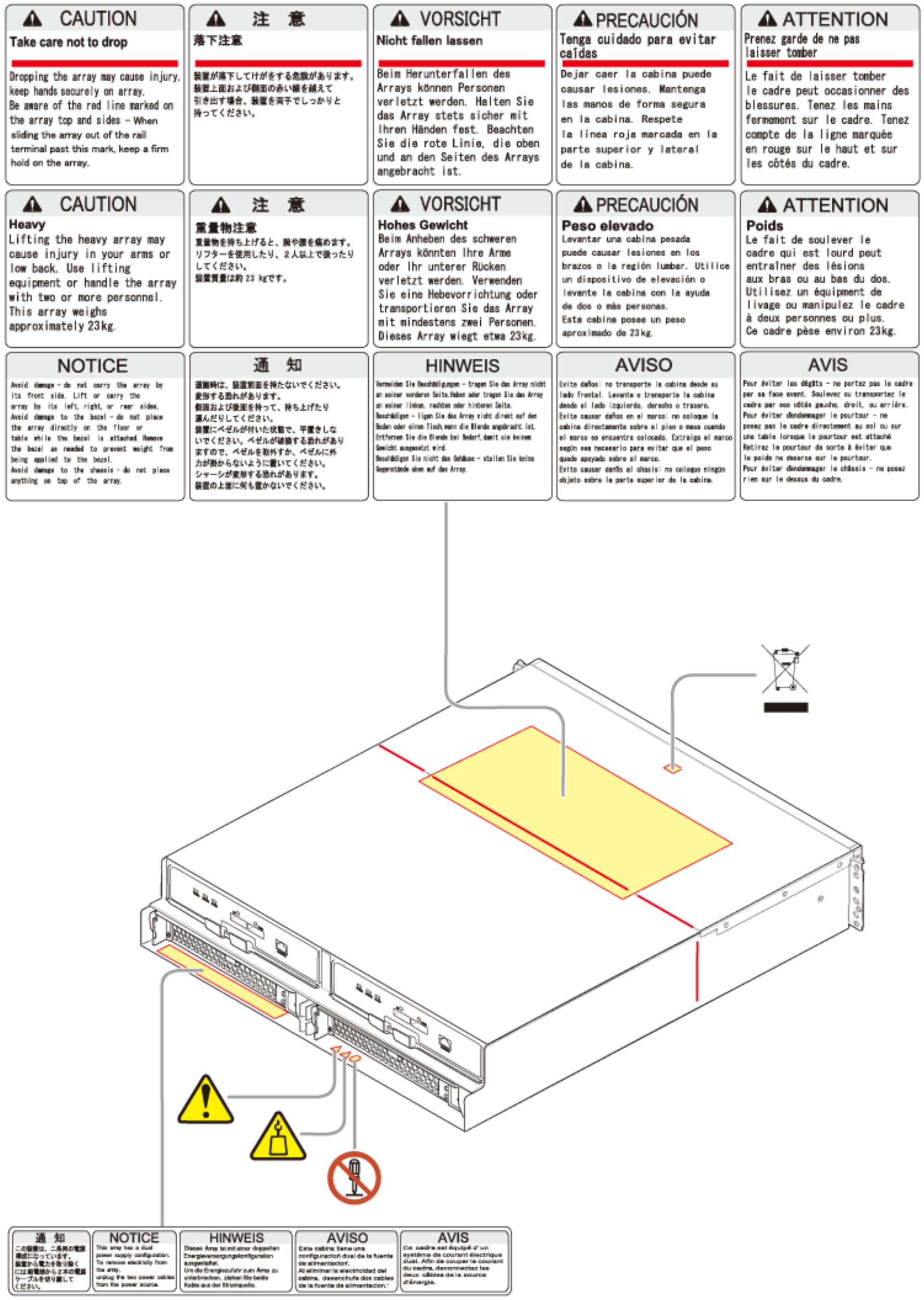
CBLM controller



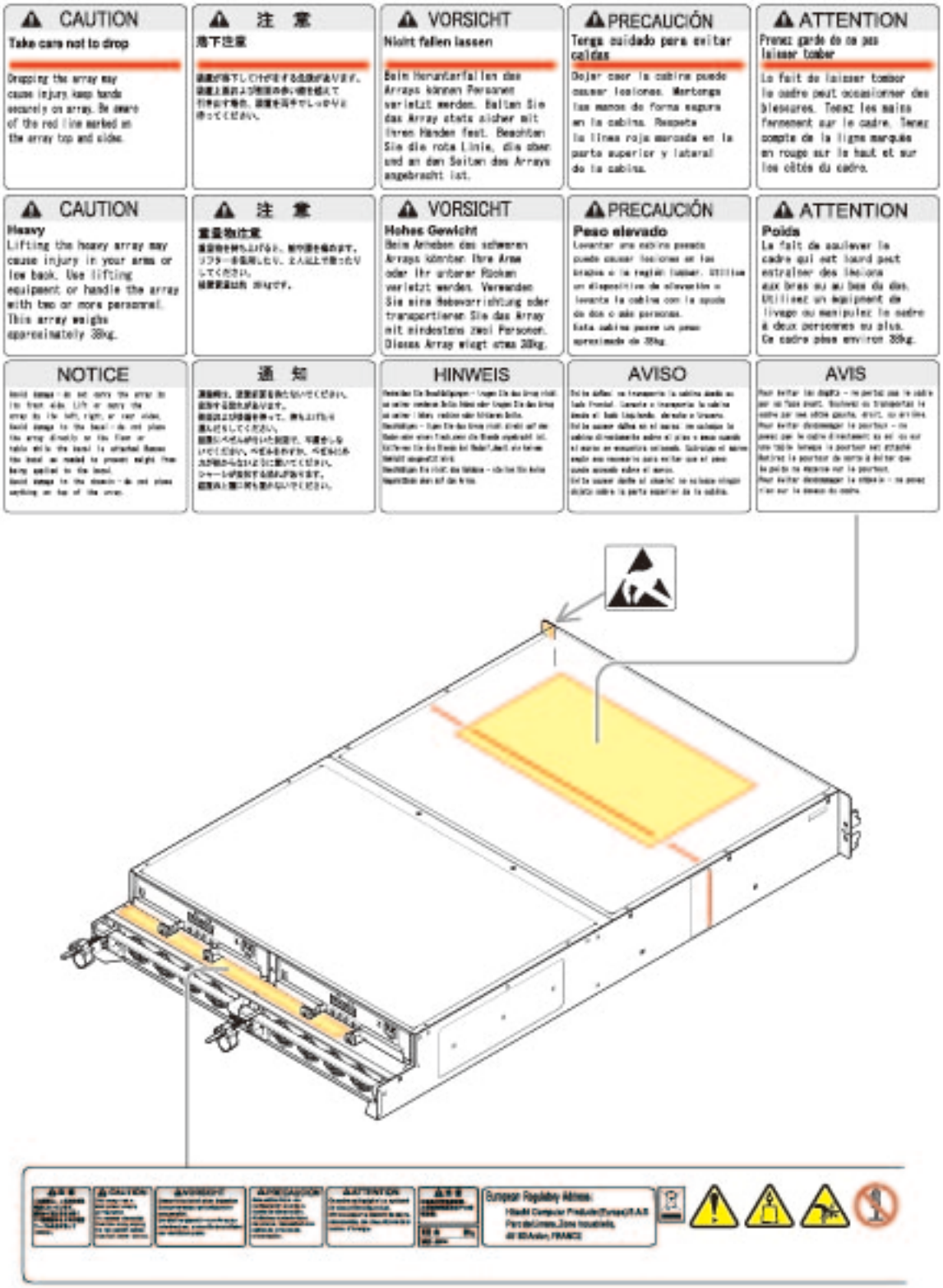
Small form factor drive tray



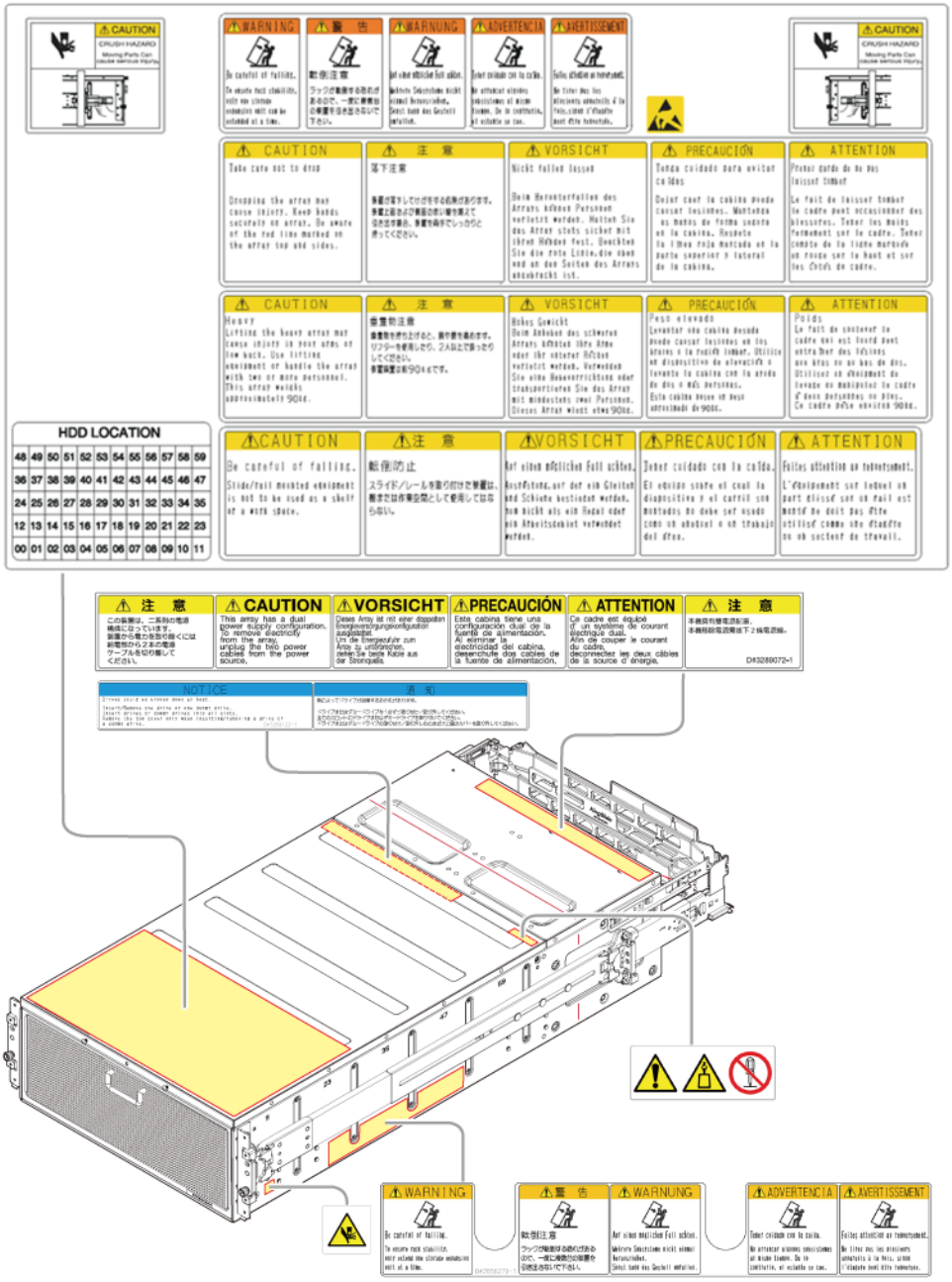
Large form factor drive tray


CAUTION
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 and sides - When sliding the array out of the rail terminal past this mark, keep a firm hold on the array.
注　意
落下注意
装置が落下してけがをする危険があります。
装置上面および側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。
VORSICHT
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 und an den Seiten des Arrays angebracht ist.
PRECAUCIÓN
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 y lateral de la cabina.
ATTENTION
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 et sur les côtés 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 23kg.
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 23 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 23kg.
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 23kg.
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 23kg.
NOTICE
通　知
HINWEIS
AVISO
AVIS
通　知
NOTICE
HINWEIS
AVISO
AVIS

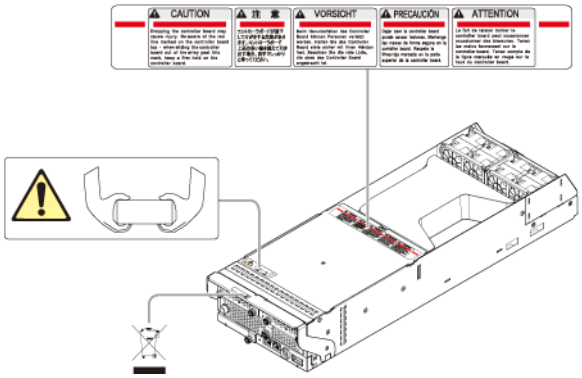
Flash module drive tray



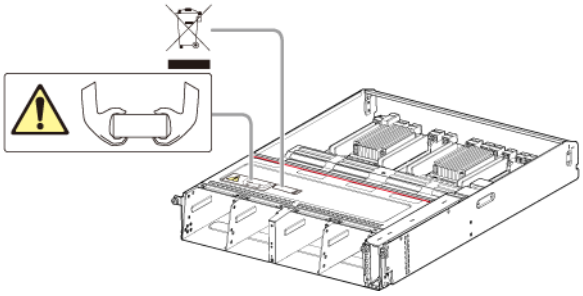
Dense intermix drive tray



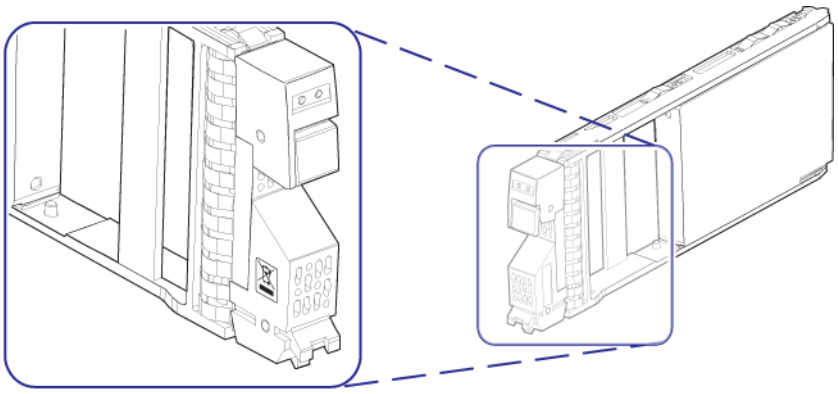
CBSS/CBSL controller



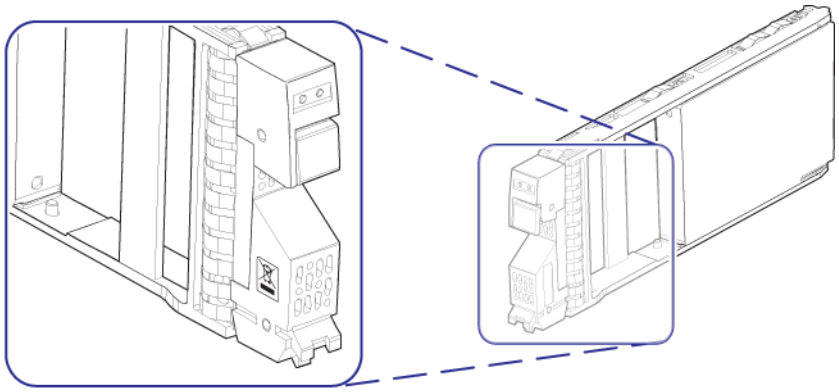
CBLM controller



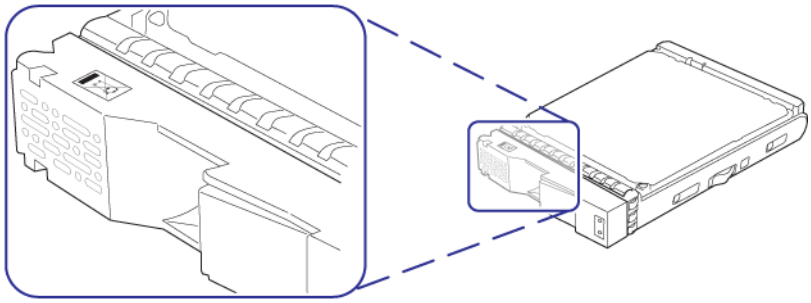
Drive for a CBSS/small form factor drive tray



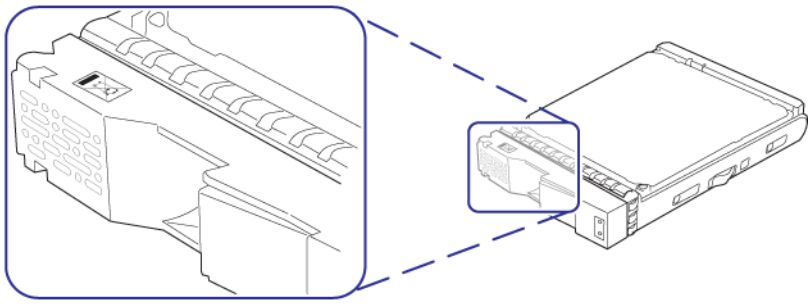
Drive for a small form factor drive tray



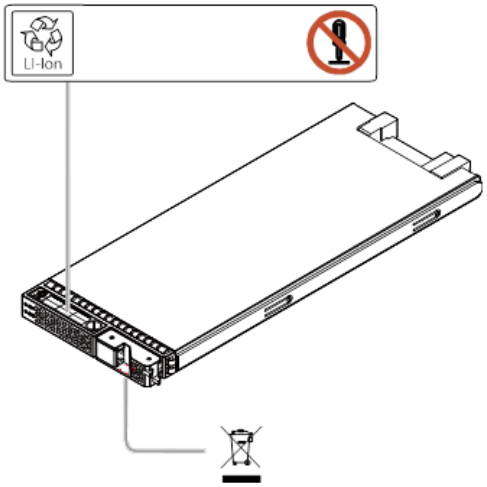
Drive for a CBSL/large form factor drive tray



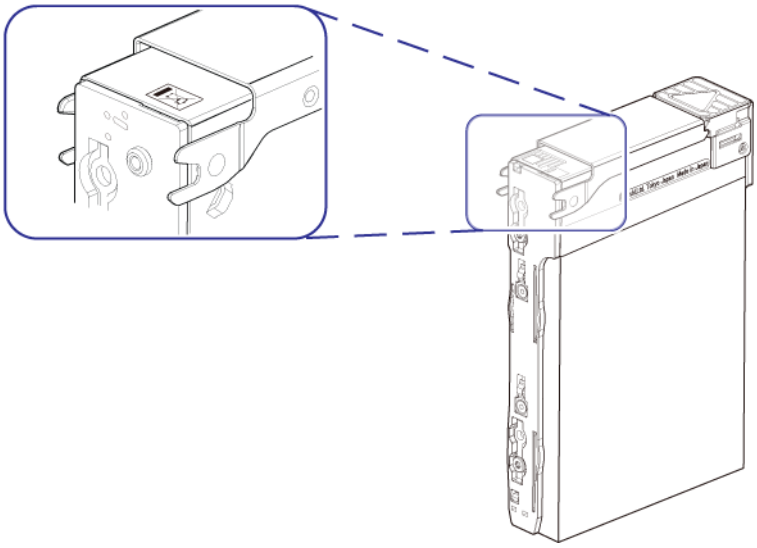
Drive for a large form factor drive tray



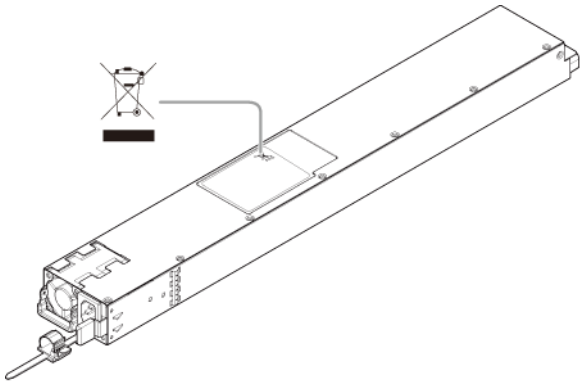
Drive for a flash module drive tray



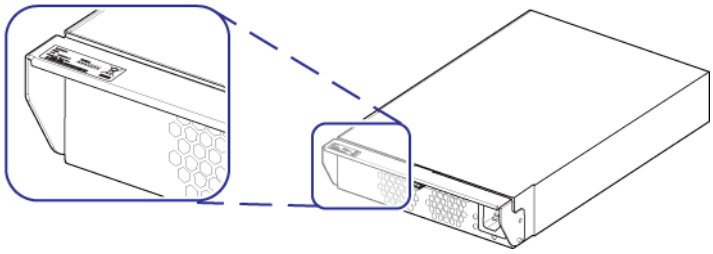
Drive for a dense intermix drive tray



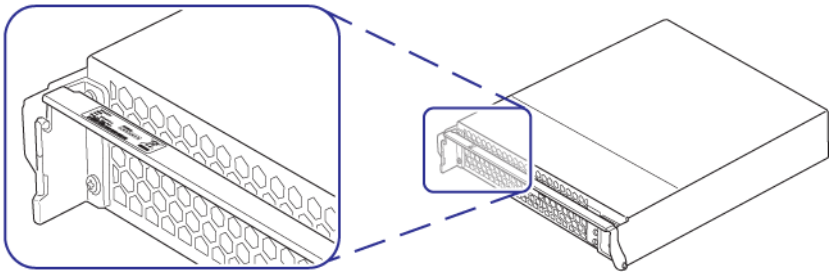
CBSS/CBSL power unit



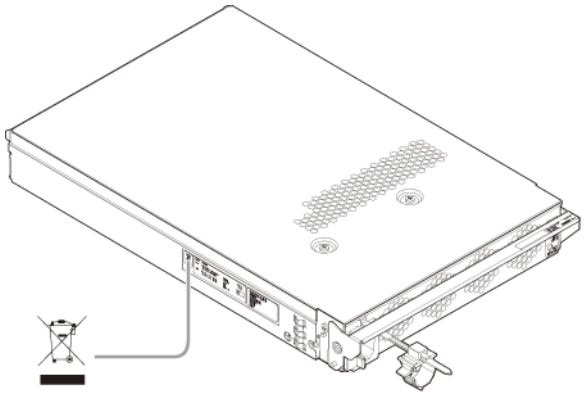
CBLM power supply



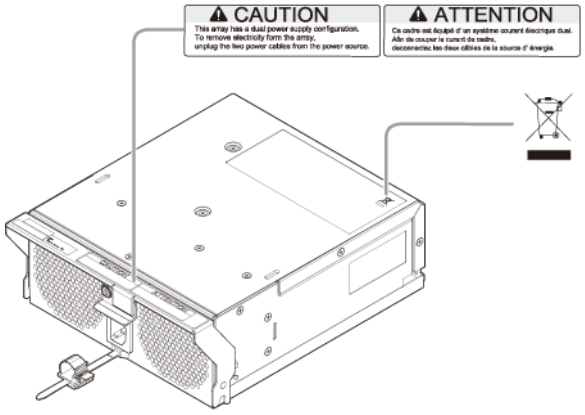
Power supply for small and large form factor drive trays



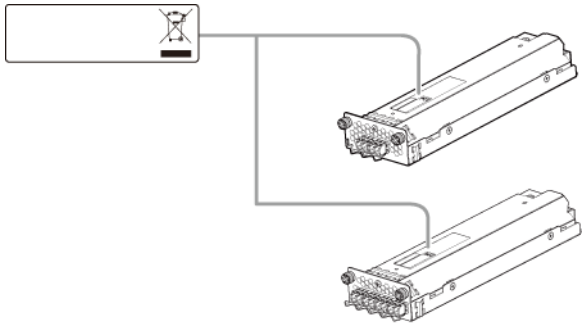
Flash module drive tray power supply



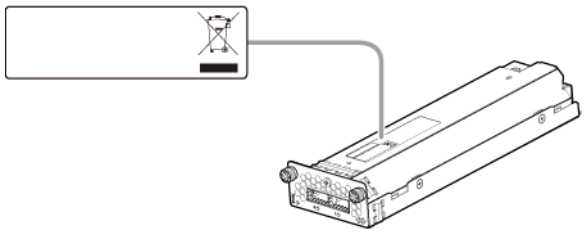
Dense intermix drive tray power supply



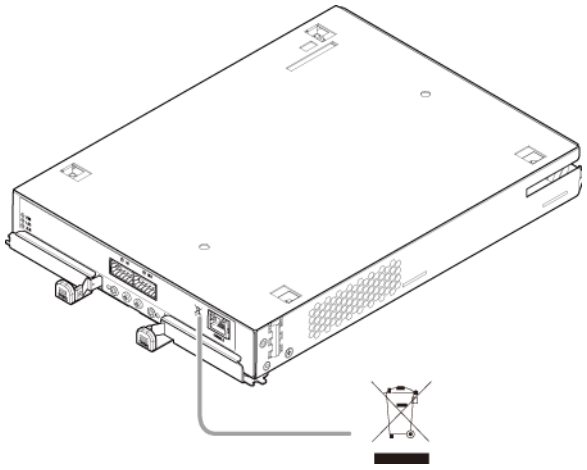
Front end module (Fibre Channel/iSCSI)



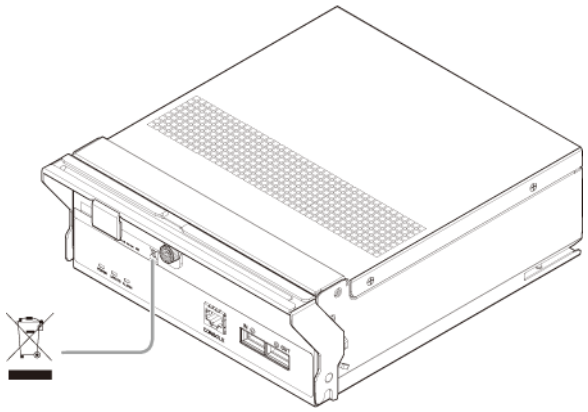
Back end module



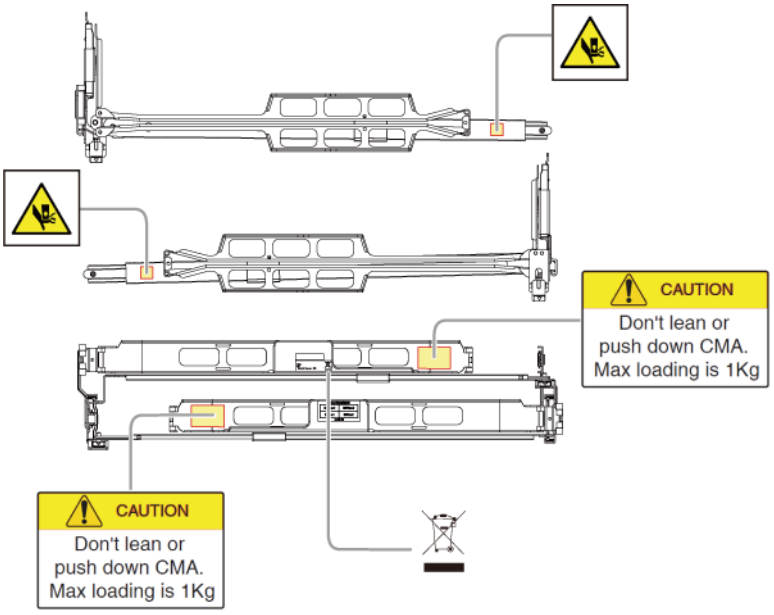
ENC for small and large form factor drive trays



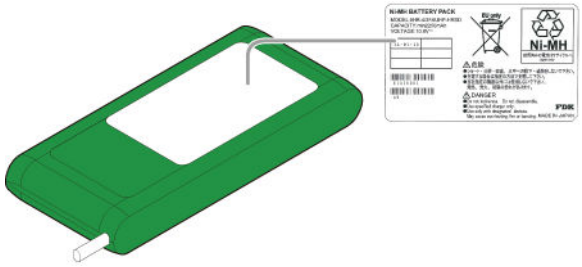
ENC for a dense intermix drive tray



CMA (used to secure dense intermix drive tray)



Battery


Ni-MH

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