# Hitachi Virtual Storage Platform F400 and F600

**83-04-4x or later**

## Hardware Reference Guide

This guide describes the hardware features and specifications of the Hitachi Virtual Storage Platform F400 and the Hitachi Virtual Storage Platform F600 all-flash arrays.

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# Preface

This guide describes the hardware features and specifications of the Hitachi Virtual Storage Platform F400, F600 all-flash arrays.

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Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide

# Intended audience

This document is intended for customers inquiring about the features and specifications of the VSP Fx00 models.

Readers of this document should be familiar with the following:
- Data processing and RAID storage systems and their basic functions.
- The operating system and web browser software on the system hosting the storage management software.

# Safety and environmental notices

**Equipment warranty**

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

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

**Notice of export controls**

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

**Backup**

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

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

**Disposal**

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

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

**Recycling**

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

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

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

**Ni-MH**

**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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**FDA radiation regulation**

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

**EMI regulation**

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

This product must not be used in residential areas.

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

# Product version

This document revision applies to the following product versions:
- VSP F400, F600 firmware 83-04-4x or later

- Hitachi Storage Virtualization Operating System (SVOS) 7.2 or later
- Hitachi NAS firmware version 13.1 or later

# Release notes

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

# Changes in this revision

- Added new single- and three-phase power distribution units and specifications
- Added third-party rack information

# Document conventions

This document uses the following typographic conventions:

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

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| Convention | Description |
|---|---|
| \| vertical bar | Indicates that you have a choice between two or more options or arguments. Examples: <br><br> [ a \| b ] indicates that you can choose a, b, or nothing. <br><br> { a \| b } indicates that you must choose either a or b. |

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

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

# Conventions for storage capacity values

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

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

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

| Logical capacity unit | Value |
|---|---|
| 1 block | 512 bytes |
| 1 cylinder | Mainframe: 870 KB <br><br> Open-systems: |

| Logical capacity unit | Value |
| --- | --- |
| | • OPEN-V: 960 KB<br>• Others: 720 KB |
| 1 KB | $1,024$ ($2^{10}$) bytes |
| 1 MB | $1,024$ KB or $1,024^2$ bytes |
| 1 GB | $1,024$ MB or $1,024^3$ bytes |
| 1 TB | $1,024$ GB or $1,024^4$ bytes |
| 1 PB | $1,024$ TB or $1,024^5$ bytes |
| 1 EB | $1,024$ PB or $1,024^6$ bytes |

## Accessing product documentation

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

## Getting help

Hitachi Data Systems Support Connect is the destination for technical support of products and solutions sold by Hitachi Data Systems. To contact technical support, log on to Hitachi Data Systems Support Connect for contact information: https://support.hds.com/en_us/contact-us.html.

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## Comments

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

**Thank you!**

# 1

# Hitachi Virtual Storage Platform F400, F600 hardware overview

Hitachi Virtual Storage Platform F400, F600 are modular, rack-mountable, all-flash arrays that deliver high performance, high reliability, and flash-accelerated scalability.

The storage system contain dual controllers, each controller contains its own processor, dual in-line cache memory modules (DIMMs), cache flash memory (CFM), battery, fans and iSCSI and Fibre Channel I/O modules. Each controller also has an Ethernet connection for out-of-band management. If the data path through one controller fails, all data drives remain available to data hosts using a redundant data path through the other controller.

The storage system can be equipped with embedded network-attached storage (NAS) modules. The NAS modules provide file access through CIFS and NFS protocols and block access by using iSCSI protocols.

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

Essential hardware components are implemented with a redundant configuration so that the storage system can remain operational if a component fails. Adding and replacing components, along with firmware upgrades, can be conducted while the storage system is active.

☐  Block configuration

☐  Unified configuration

☐  VSP F400 model

☐  VSP F600 model

- [ ] [Features](#)

- [ ] [Scalability](#)

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# Block configuration

A storage system configured for block-level storage provides the ability to access and provision raw storage volumes using protocols such as Fibre Channel and iSCSI.

A block configuration consists of the following:
- Two controllers
- One or more drive trays
- One 1U service processor server (SVP)

# Unified configuration

A unified configuration includes embedded NAS modules that support file system protocols such as CIFS and NFS and operate across a block-level setup using iSCSI or FC connections.
- Two controllers
- Two NAS modules for file operations and storage
- One or more drive trays for block-level storage
- One 1U block service processor server (SVP)

# VSP F400 model

The VSP F400 is a highly reliable all-flash system that offers high storage capacity with full redundancy to better protect data and manage storage operations.

The storage system consists of a 4U enclosure that includes two controllers and two optional NAS modules to support file operations. Drives are supported using drive trays connected to the controllers.

| Controller | Controller chassis | Controller model | Height |
|---|---|---|---|
| CBLM | DW800-CBL | DW-F800-CTLM | 4U (174.3 mm) |

| Controller | Model number | Description |
|---|---|---|
| NAS | DW-F800-NAS | Optional component for file storage configuration. NAS modules only provide file support. |

| Drive tray | Drive tray model name | Supported drive type | Number of drives supported | Height |
|---|---|---|---|---|
| FMD tray | DW-F800-DBF | 5.25-inch FMD | 12 | 2U (86.2 mm) |
| SFF drive tray | • DW-F800-DBS (power supply, contains BNST)<br>• DW-F800-DBSC | 2.5-inch SFF | 16 | 2U (86.2 mm) |

**High-speed cache memory**

The storage system supports 128 GB of high-speed cache memory. The DIMMs are arranged as 64 GB or 128 GB per controller.

**Flash module drives**

The VSP F400 storage system supports up to 192 flash module drives. The total raw flash capacity is 2,702 TB.

| Model number | Drive type | Drive capacity |
|---|---|---|
| DKC-F810I-1R6FN | FMD DC2 | 1.6 TiB |
| DKC-F810I-3R2FN | FMD DC2 | 3.2 TiB |
| DKC-F810I-6R4FN | FMD DC2 | 6.4 TiB |
| DKC-F810I-7R0FP | FMD HD | 7 TB |
| DKC-F810I-14RFP | FMD HD | 14 TB |

**Solid-state drives**

The VSP F400 storage system supports up to 384 SSDs. The total raw flash capacity is 1,451 TB.

| Model number | Drive type | Drive capacity |
|---|---|---|
| DKC-F810I-1R9MGM | SSD | 1.9 TB |
| DKC-F810I-3R8MGM | SSD | 3.8 TB |

**Interface ports**

Interface ports for attachment to hosts are provided on the front-end modules. The system supports up to 16 front-end modules.

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| Model number | Description | Maximum number of ports supported |
|---|---|---|
| DW-F800-2HS10S | 10-Gbps iSCSI (Optical) front-end module | 28 (NAS modules not installed)<br>12 (NAS modules installed) |
| DW-F800-2HS10B | 10-Gbps iSCSI (Copper) front-end module | 28 (NAS modules not installed)<br>12 (NAS modules installed) |
| DW-F800-4HF8 | 8-Gbps Fibre Channel (4-port) front-end module | 56 (NAS modules not installed)<br>24 (NAS modules installed) |
| DW-F800-2HF16 | 16-Gbps Fibre Channel (2-port) front-end module | 28 (NAS modules not installed)<br>12 (NAS modules installed) |
| DW-F800-4HF32R | 32/16-Gbps Fibre Channel (4-port) front-end module | 56 (NAS modules not installed)<br>24 (NAS modules installed) |

# VSP F600 model

The VSP F600 is a highly reliable all-flash system that offers high storage capacity with full redundancy to better protect data and manage storage operations.

The storage system consists of a 4U enclosure that includes two controllers, two optional NAS modules to support file operations. The drives are supported using drive trays connected to the controllers.

| Controller | Controller chassis | Controller model | Height |
|---|---|---|---|
| CBLM | DW800-CBL | DW-F800-CTLM | 4U (174.3 mm) |

| Controller | Model number | Description |
|---|---|---|
| NAS | DW-F800-NAS | Optional component for file storage configuration. NAS modules only provide file support. |

| Drive tray | Drive tray model name | Supported drive type | Number of drives supported | Height |
|---|---|---|---|---|
| FMD tray | DW-F800-DBF | 5.25-inch FMD | 12 | 2U (86.2 mm) |
| SFF drive tray | • DW-F800-DBS (power supply, contains BNST)<br>• DW-F800-DBSC | 2.5-inch SFF | 24 | 2U (86.2 mm) |

**High-speed cache memory**

The storage system supports 256 GB of high-speed cache memory. The DIMMs are arranged as 64 GB or 128 GB per controller.

**Flash module drives**

The VSP F600 storage system supports up to 288 flash module drives. The total raw flash capacity is 4,053 TB.

| Model number | Drive type | Drive capacity |
|---|---|---|
| DKC-F810I-1R6FN | FMD DC2 | 1.6 TiB |
| DKC-F810I-3R2FN | FMD DC2 | 3.2 TiB |
| DKC-F810I-6R4FN | FMD DC2 | 6.4 TiB |
| DKC-F810I-7R0FP | FMD HD | 7 TB |
| DKC-F810I-14RFP | FMD HD | 14 TB |

**Solid-state drives**

The VSP F600 storage system supports up to 576 SSDs. The total raw flash capacity is 2,177 TB.

| Model number | Drive type | Drive capacity |
|---|---|---|
| DKC-F810I-1R9MGM | SSD | 1.9 TB |
| DKC-F810I-3R8MGM | SSD | 3.8 TB |

**Interface ports**

Interface ports for attachment to hosts are provided on the front-end modules. The system supports up to 16 front-end modules.

| Model number | Description | Maximum number of ports supported |
|---|---|---|
| DW-F800-2HS10S | 10-Gbps iSCSI (Optical) front-end module | 28 (NAS modules not installed)<br>12 (NAS modules installed) |
| DW-F800-2HS10B | 10-Gbps iSCSI (Copper) front-end module | 28 (NAS modules not installed)<br>12 (NAS modules installed) |
| DW-F800-4HF8 | 8-Gbps Fibre Channel (4-port) front-end module | 56 (NAS modules not installed)<br>24 (NAS modules installed) |
| DW-F800-2HF16 | 16-Gbps Fibre Channel (2-port) front-end module | 28 (NAS modules not installed)<br>12 (NAS modules installed) |
| DW-F800-4HF32R | 32/16-Gbps Fibre Channel (4-port) front-end module | 56 (NAS modules not installed)<br>24 (NAS modules installed) |

# Features

The features described in the table are included with VSP F400 and VSP F600.

| Feature | Value |
|---|---|
| Maximum cache memory supported | VSP F400: 128 GB<br><br>VSP F600: 256 GB |
| Maximum number of spare drives | 32 |
| Maximum number of RAID groups | 16 |
| Maximum volume size | 3 TB (4 TB when using the LDEVs of other Storage Systems) |
| Maximum number of volumes per host groups | 2,048 |
| Maximum number of host groups per port | 255 |
| Maximum number of volumes per port | 2,048 |
| Maximum number of volumes per RAID group | 2,048 |
| Maximum number of iSCSI hosts connected through a network switch | 255 |
| Maximum number of Fibre Channel devices connected through a Fibre Channel switch | 255 |

# Scalability

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

## Examples of supported VSP F400 configurations

The following table lists the maximum number of drive trays and drives supported in a system configuration. A *diskless* configuration does not include any drive trays.

| Drive tray | Maximum number of drive trays supported | Maximum number of drives supported |
|---|---|---|
| SFF drive tray | 16 | 384 SSDs |
| FMD tray | 16 | 192 Hitachi Accelerated Flash (HAF) flash module drives |
| FMD2 tray | 1 | 8 DC2 flash module drives + 1 spare |

## Examples of supported VSP F600 configurations

The following table lists the maximum number of drive trays and drives supported in a system configuration. A *diskless* configuration does not include any drive trays.

| Drive tray | Maximum number of drive trays supported | Maximum number of drives supported |
|---|---|---|
| SFF drive tray | 24 | 576 SSDs |
| FMD drive tray | 24 | 288 HAF flash module drives |
| FMD2 drive tray | 2 | 16 DC2 flash module drives + 1 spare |

## Maximum number of mounted drive trays

The following table lists the maximum number of mountable drive trays and mountable drives for each drive type.

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

| VSP F400 controller | Drive trays | Maximum number of trays | Maximum number of drives |
|---|---|---|---|
| CBLM | FMD | 16 | 192 FMDs (HAF) |
| | | 4 | 48 FMDs |
| | FMD | 1 | 8 FMDs + 1 spare (DC2) |
| | SFF | 16 | 384 SSDs |
| **VSP F600 controller** | **Drive trays** | **Maximum number of trays** | **Maximum number of drives** |
| CBLM | FMD | 24 | 288 FMDs (HAF) |
| | | 4 | 48 FMDs |
| | FMD | 2 | 16 FMDs + 1 spare (DC2) |
| | SFF | 24 | 576 SSDs |

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# 2

# Virtual Storage Platform F400, F600 controller

The Virtual Storage Platform F400, F600 models are equipped with dual controllers for communicating with a data host.

Each controller includes the following internal components such as a processor, dual in-line cache memory modules (DIMMs), cache flash memory (CFM), battery, and fans. The controller has an Ethernet connection for out-of-band management using Hitachi Device Manager - Storage Navigator. If the data path through one controller fails, all drives remain available to data hosts using a redundant data path through the other controller. The controller is equipped with LED indicators for monitoring its operating conditions and notifying possible component replacement.

☐ CBLM controller

☐ Host, Network, and Drive Tray Ports and LEDs

# CBLM controller

The CBLM controller includes specific functional LEDs located on the front and rear of controller and power supplies to provide its operating status.

## CBLM with front panel bezel

The following table describes the definitions of the CBLM controller front panel bezel LEDs.



| Number | Item | Description |
|---|---|---|
| 1 | POWER LED | Green: Storage system is powered on.<br><br>Amber: Storage system is receiving power. |
| 2 | READY LED | Green: Normal operation. |
| 3 | WARNING LED | Off: Normal operation.<br><br>Amber: Component requires maintenance.<br><br>Blink: Failure requires maintenance.<br><br>**Note**: When System Option Mode 1097 is set to ON, the WARNING LED does not blink, even if the following failure service information messages (SIM) are issued: 452xxx, 462xxx, 3077xx, 4100xx, and 410100.<br><br>LED might turn off during user maintenance. |
| 4 | ALARM LED | Off: Normal operation. |

| Number | Item | Description |
|---|---|---|
| | | Red: Processor failure (system might be down). Go to the Customer Contact Us page at https://support.hds.com/en_us/contact-us.html. |
| 5 | POWER ON/OFF (main switch) | Powers the storage system. |
| 6 | Lock | Locks and unlocks the front panel bezel by using the supplied key. |

> **Note:** Removing a controller can cause the `POWER`, `READY`, `WARNING`, and `ALARM` LEDs on the front panel to turn off. These LEDs return to the on status after the storage system recovers from the controller replacement.

## CBLM front panel LEDs (without bezel)

The following table describes the definitions of the CBLM controller front panel LEDs.
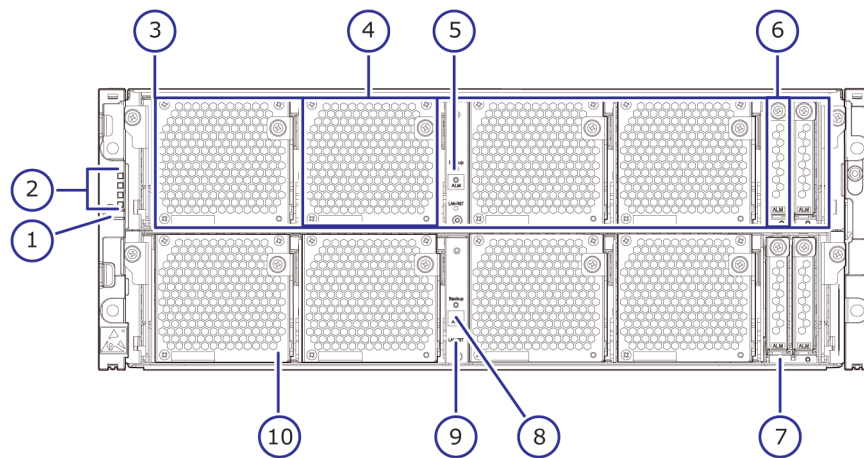


| Number | Item | Description |
|---|---|---|
| 1 | POWER ON/OFF (main switch) | Powers the storage system. |
| 2 | `POWER`, `READY`, `WARNING`, and `ALARM` LEDs | **Note**: When System Option Mode 1097 is set to ON, the WARNING LED does not blink, even if the following failure service information messages (SIM) are issued: 452xxx, 462xxx, 3077xx, 4100xx, and 410100. |
| 3 | Controllers | Controller 1 (bottom) and Controller 2 (top). |

| Number | Item | Description |
|---|---|---|
| 4 | Backup module | N/A |
| 5 | `BACKUP` LED | Green: Power restoration in progress following power outage.<br><br>Fast blink green: Restoring.<br><br>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. |
| 8 | `CTL ALM` LED | Red: Controller can be removed.<br><br>Blink red: Failure with the power supply unit of the controller.<br><br>Amber: LAN reset switch was pressed. |
| 9 | LAN-RST switch | Use only when instructed by customer support. |
| 10 | `STATUS` LED (for BKMF) | Green: Charging of the battery in the backup module is complete.<br><br>Red: Backup module can be removed.<br><br>Blink red one time: Main battery failure.<br><br>Blink red two times: Backup battery failure.<br><br>Blink red three times: Both batteries failed or preventive maintenance replacement of batteries can run.<br><br>Off: Battery is not mounted, battery-mounting failure occurred, or firmware is being upgraded. Off is normal status for configurations without batteries (for example, BKMF-10 and BKMF-20). |

## CBLM rear panel

The following table describes the definitions of the CBLM controller rear panel LEDs.
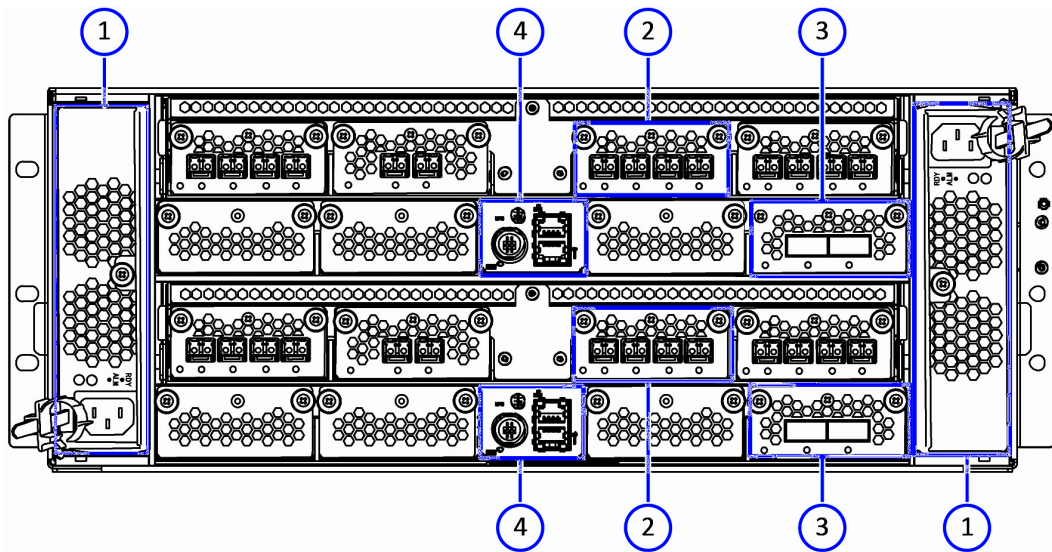
| Number | Item |
|---|---|
| 1 | Power supply unit |
| 2 | Front end module |
| 3 | Back end module |
| 4 | LAN blade |

**Rear view (includes NAS modules)**
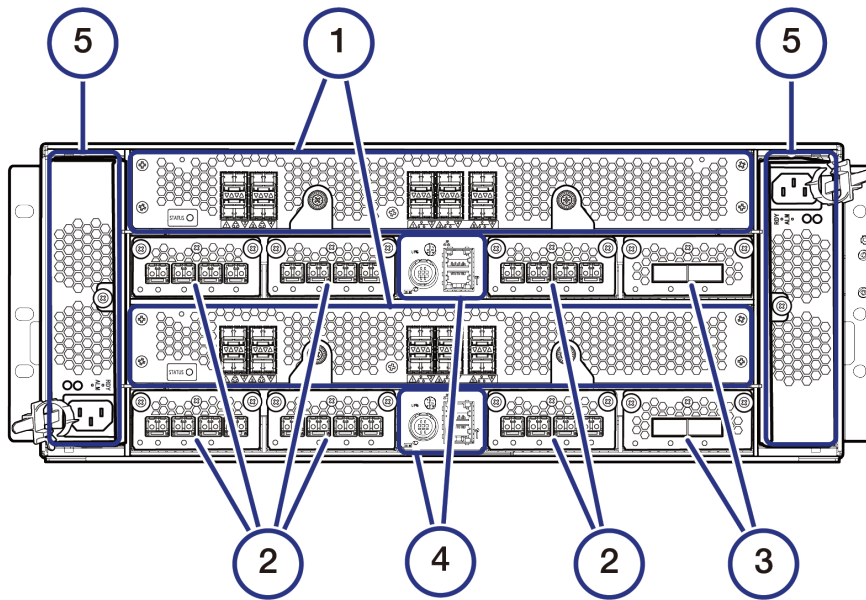
| Number | Item |
|--------|------|
| 1 | NAS module |
| 2 | Front end module |
| 3 | Back end module |
| 4 | LAN blade |
| 5 | Power supply unit |

## CBLM power supply unit LEDs and connectors

The following table lists the definitions of the CBLM power supply unit LEDs and connectors.
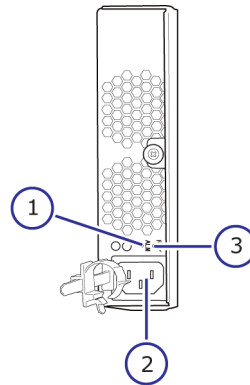


| Number | Item | Description |
|--------|------|-------------|
| 1 | `ALM/RDY` LED | Red: Power supply unit can be replaced. |
| 2 | Receptacle | Connects to the power cable provided with the storage system. |
| 3 | `RDY` LED | Green: Normal operation. |

# Host, Network, and Drive Tray Ports and LEDs

The controllers are equipped with specific interfaces for connecting, powering, configuring, and managing the storage system. The component LEDs display the operating status of the storage system.

## Front end module descriptions

The front end module LEDs display the operating status of the module.

## 10-Gbps iSCSI board LEDs and connectors (optical)
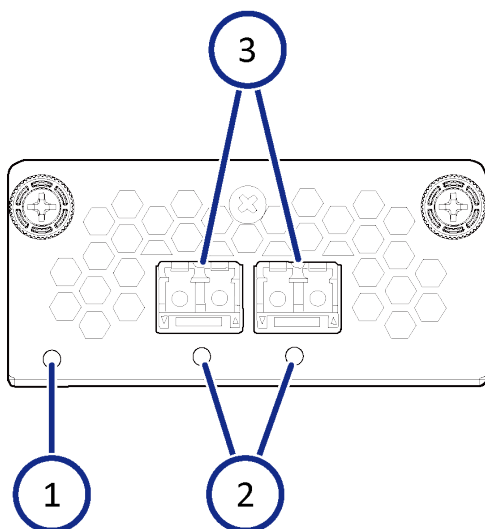
| Number | Item | Description |
|--------|------|-------------|
| 1 | STATUS LED | Green: Front end module is in the power-on state.<br><br>Red: Front end module can be removed safely. |
| 2 | PORT LED | Red: Small form factor pluggable can be removed.<br><br>Blue: Normal link status.<br><br>Blink blue: Front end module is in communication status. |
| 3 | iSCSI connectors | Connect to Ethernet LAN cables. |

## 10-Gbps iSCSI board LEDs and connectors (copper)
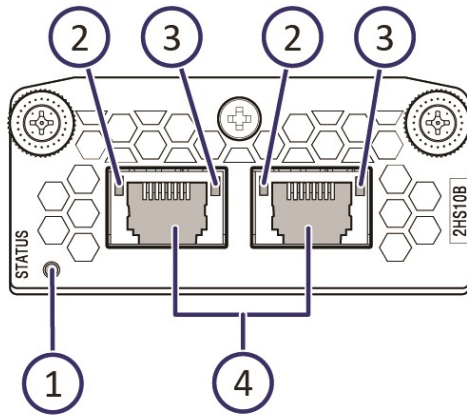
| Number | Item | Description |
|---|---|---|
| 1 | STATUS LED | Green: Front end module is in the power-on state.<br><br>Red: Front end module can be removed safely. |
| 2 | PORT (Link/Speed) LED | Yellow: 1-Gbps link.<br><br>Green: 10-Gbps link.<br><br>Off: No link connection. |
| 3 | PORT LED | Green: Link connection is established.<br><br>Blinking: Communication is in progress.<br><br>Off: No link connection or not ready to communicate. |
| 4 | iSCSI connectors | Connect to Ethernet LAN cables. |

## 8-Gbps, 16-Gbps, or 32-Gbps Fibre Channel (4-port) board LEDs and connectors

Virtual Storage Platform F400, F600 controller
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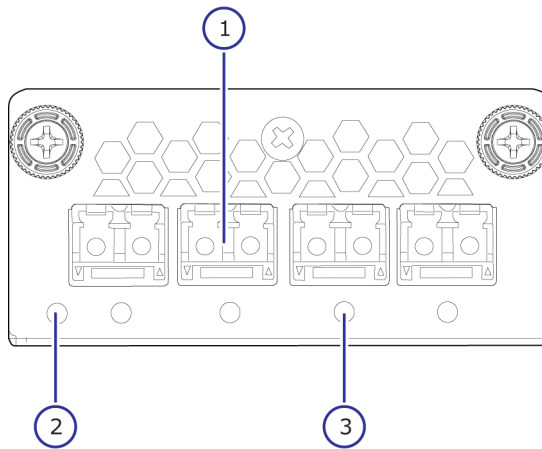
### Table 1  8-Gbps Fibre Channel

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

### Table 2  32-Gbps, 16-Gbps Fibre Channel

| Number | Item | Description |
|---|---|---|
| 1 | Fibre Channel connectors | Connect to Fibre Channel cables. |
| 2 | STATUS LED | Green: Front end module is in power-on state.<br><br>Red: Front end module can be removed safely. |
| 3 | PORT LED | Red: Small form factor pluggable can be removed.<br><br>Blue: Normal link status at 16-Gbps (16-Gbps).<br><br>Blue: Normal link status at 32-Gbps (32-Gbps). |

| Number | Item | Description |
|---|---|---|
|  |  | Green: Normal link status at 4-Gbps or 8-Gbps (16-Gbps). |
|  |  | Green: Normal link status at 8-Gbps or 16-Gbps (32-Gbps). |

**Port assignments**

| CHB number | 8-Gbps, 16-Gbps, or 32-Gbps Fibre Channel Ports (left to right) | | | |
|---|---|---|---|---|
|  | Port 1 | Port 2 | Port 3 | Port 4 |
| CHB-1A | 1A | 3A | 5A | 7A |
| CHB-1B | 1B | 3B | 5B | 7B |
| CHB-1C | 1C | 3C | 5C | 7C |
| CHB-1D | 1D | 3D | 5D | 7D |
| CHB-1E | 1E | 3E | 5E | 7E |
| CHB-1F | 1F | 3F | 5F | 7F |
| CHB-1G | 1G | 3G | 5G | 7G |
| CHB-1H | 1H | 3H | 5H | 7H |
| CHB-2A | 2A | 4A | 6A | 8A |
| CHB-2B | 2B | 4B | 6B | 8B |
| CHB-2C | 2C | 4C | 6C | 8C |
| CHB-2D | 2D | 4D | 6D | 8D |
| CHB-2E | 2E | 4E | 6E | 8E |
| CHB-2F | 2F | 4F | 6F | 8F |
| CHB-2G | 2G | 4G | 6G | 8G |
| CHB-2H | 2H | 4H | 6H | 8H |

## 16-Gbps Fibre Channel (2-port) board LEDs and connectors

| Number | Item | Description |
|---|---|---|
| 1 | `STATUS` LED | Green: Front end module is in the power-on state.<br><br>Red: Front end module can be removed safely. |
| 2 | `PORT` LED | Red: Small form factor pluggable can be removed.<br><br>Blue: Normal link status at 16-Gbps.<br><br>Green: Normal link status at 4-Gbps or 8-Gbps. |
| 3 | Fibre Channel connectors | Connect to Fibre Channel cables. |

**Port assignments**

| CHB number | 16-Gbps Fibre Channel Ports (left to right) | |
|---|---|---|
| | Port 1 | Port 2 |
| CHB-1A | 1A | 3A |
| CHB-1B | 1B | 3B |
| CHB-1C | 1C | 3C |
| CHB-1D | 1D | 3D |
| CHB-1E | 1E | 3E |
| CHB-1F | 1F | 3F |
| CHB-1G | 1G | 3G |
| CHB-1H | 1H | 3H |
| CHB-2A | 2A | 4A |
| CHB-2B | 2B | 4B |
| CHB-2C | 2C | 4C |
| CHB-2D | 2D | 4D |
| CHB-2E | 2E | 4E |
| CHB-2F | 2F | 4F |
| CHB-2G | 2G | 4G |
| CHB-2H | 2H | 4H |

# LAN blade LEDs and connectors
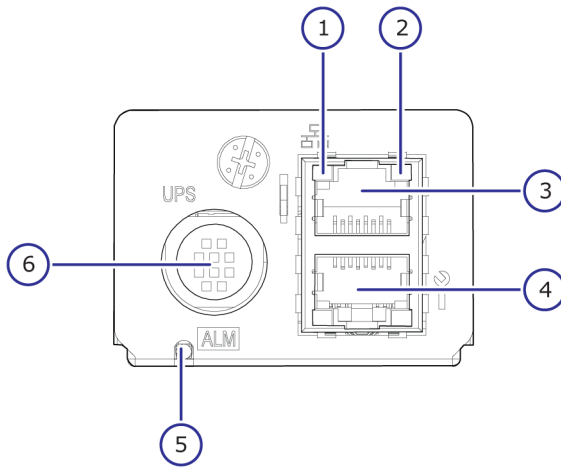
| Number | Item | Description |
|---|---|---|
| 1 | `ACT` LED | Green: Data is being transferred. |
| 2 | `LINK` LED | Green: Link status is normal. |
| 3 | LAN 2 | LAN port used by the user. |
| 4 | LAN 1 | Maintenance LAN port used by service personnel. |
| 5 | `LAN ALARM` LED | Red: LAN blade can be removed. |
| 6 | Uninterruptible power supply (UPS) port | N/A |

## Back end module LEDs and connectors

The back end module LEDs display the operating status of the module.
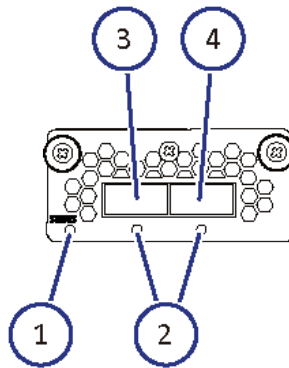
| Number | Item | Description |
|---|---|---|
| 1 | `STATUS` LED | Green: Back end module is in the power-on state.<br><br>Red: Back end module can be removed safely. |
| 2 | `Port` LED | Blue: Link status is normal. |
| 3 | PATH 0 connector | Connect to a drive tray. |
| 4 | PATH 1 connector | Connects to a drive tray. |

Virtual Storage Platform F400, F600 controller
Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide

# 3

# Storage system drive trays

The drive trays contain drives, power supplies, fans, and status LEDs. Each drive tray provides interfaces for connecting to controllers and other drive trays. The all-flash storage arrays have various fixed storage capacity configurations with FMD DC2 flash storage devices. To deliver consistent low latency host response times and highest IOP performance across all host connection ports, conventional HDDs are not included or configurable with all-flash arrays.

☐ Flash module drive (FMD) tray

# Flash module drive (FMD) tray

## FMD with front panel bezel
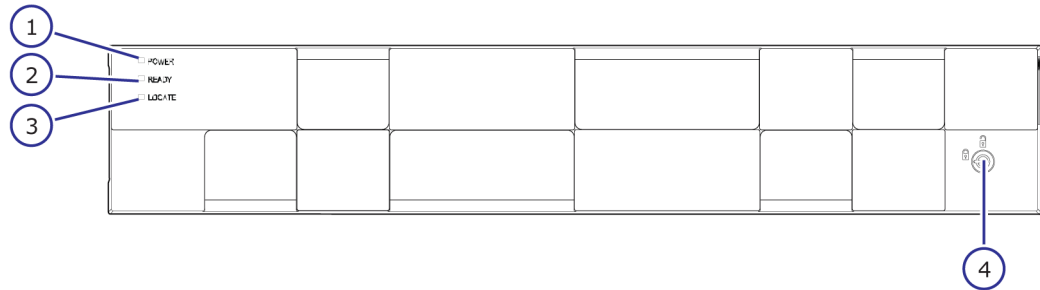


| Number | Item | Description |
|---|---|---|
| 1 | POWER LED | Green: Drive tray is powered on. |
| 2 | READY LED | Green: Drive tray is operational. |
| 3 | LOCATE LED | Amber:<br>• Indicates the location of the chassis.<br>• Can be turned on or turned off by the maintenance utility. |
| 4 | Lock | Locks and unlocks the front panel bezel by using the supplied key. |

## FMD front panel without bezel

| Number | Item | Description |
|---|---|---|
| 1, 2 | ACT LED | Green: Normal operation. |
| | | Blink: Drive is being accessed. |
| | | Slow blink:<br><br>• <br>• DKC-F810I-1R6FN/3R2FN/6R4FN: Flash module drive built-in capacitor is charged. If the storage system is turned on, the LED stops blinking when the capacitor is finished charging (approximately two minutes).<br><br>**Note**: ACT indicator is only printed on some types of FMDs. |
| | ALM LED | Red: Drive stopped due to a failure and can be replaced.<br><br>**Note**: ACT indicator is only printed on some types of FMDs. |
| 3 | POWER, READY, and LOCATE LEDs | Green: Drive tray is powered on. |
| | | Green: Drive tray is operational. |
| | | Amber:<br>• Indicates the location of the chassis. |

| Number | Item | Description |
|---|---|---|
| | | • Can be turned on or turned off by the maintenance utility. |
| 4 | Flash module drives | Twelve flash module drives. Slots are organized the following way: 9, 10, 11 6, 7, 8 3, 4, 5 0, 1, 2 |

## FMD rear panel
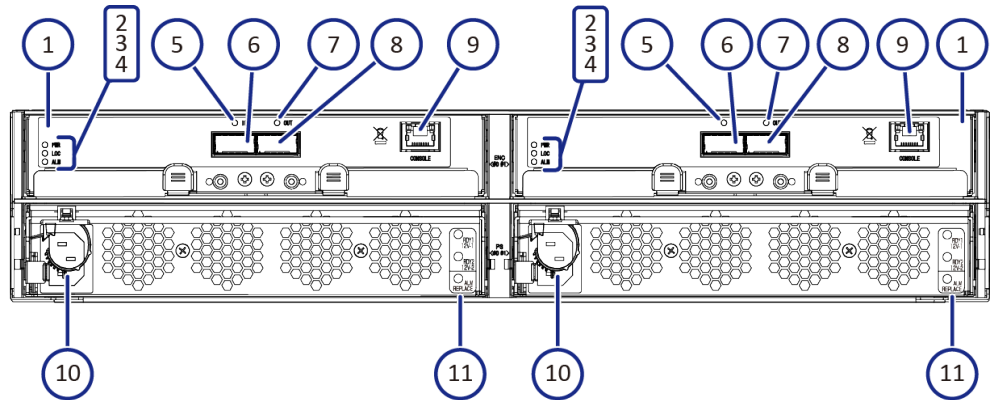


| Number | Item | Description |
|---|---|---|
| 1 | ENC | N/A |
| 2 | POWER LED | Green: ENC is in the power-on state. |
| 3 | LOCATE LED | Amber: • Indicates the location of the chassis. • Can be turned on or turned off by the maintenance utility. |
| 4 | ALARM LED | Red: ENC can be replaced. |
| 5 | PATH (IN) LED | Blue: IN side port is linked up. |
| 6 | PATH (IN) connector | Connects to a controller or drive tray. |
| 7 | PATH (OUT) LED | Blue: OUT side port is linked up. |

| Number | Item | Description |
|--------|------|-------------|
| 8 | `PATH (OUT)` connector | Connect to a drive tray. |
| 9 | Console | This port is reserved. |
| 10 | Receptacle | Connects to the power cable provided with the storage system. |
| 11 | Three LEDS, top to bottom:<br>`RDY` LED | Green: Power supply unit is operating normally. |
| | `AC IN` LED | Green: Power supply unit is operating normally. |
| | `ALM REPLACE` LED | Red: Power supply unit can be replaced. |

Storage system drive trays
Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide

# 4

# Host port expansion chassis

The host port expansion chassis contains various interconnect adapters that connect a host system to storage and other network devices. The interconnect adapters include PCIe boards, iSCSI and FC cards. For more information, contact customer support.

☐ Host port expansion chassis front panel bezel LEDs

☐ PCIe switchboard

☐ Host port expansion chassis fan

☐ PCIe cable connector

☐ Host port expansion chassis power supply

# Host port expansion chassis front panel bezel LEDs
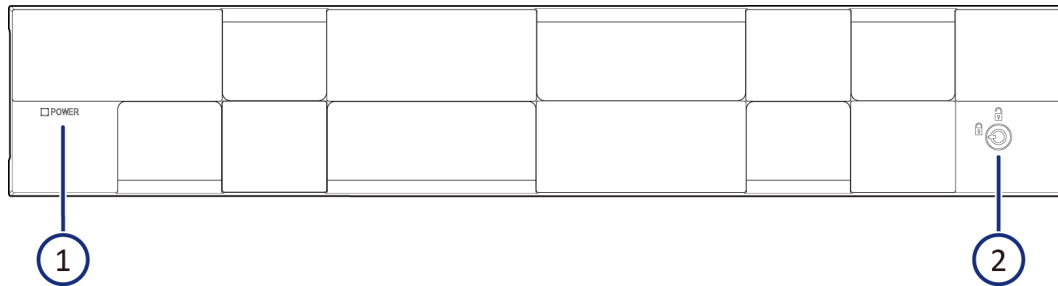


| Number | Item | Description |
|---|---|---|
| 1 | POWER LED | Green: Host port expansion is turned on.<br><br>Amber: PCIe module is turned on.<br><br>Off: PCIe module is turned off. |
| 2 | Safety lock | Lock or unlock the front bezel. |

# PCIe switchboard
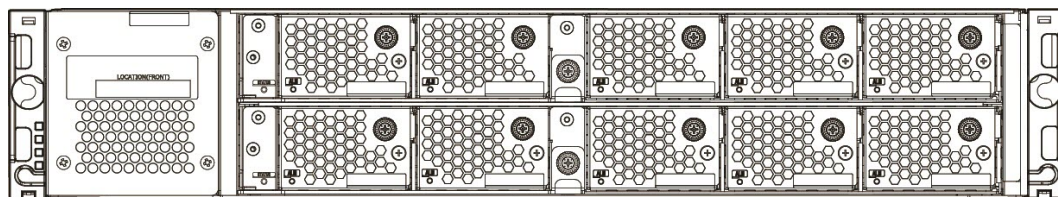


Front view of Expansion Chassis
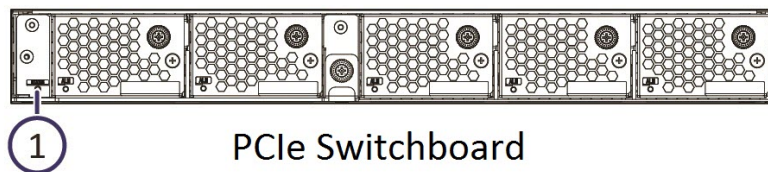


PCIe Switchboard

| Number | Item | Description |
|---|---|---|
| 1 | STATUS LED | Green: PCIe switchboard is powered on.<br>Red: PCIe switchboard can be replaced safely.<br><br>Off: PCIe switchboard is powered off. |

# Host port expansion chassis fan
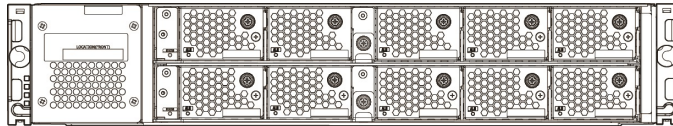


Front View of Expansion Chassis
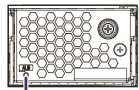


① Expansion Chassis Fan

| Number | Item | Description |
|---|---|---|
| 1 | ALM LED | Red: Fan failure has occurred.<br>Off: Normal operation. |

# PCIe cable connector
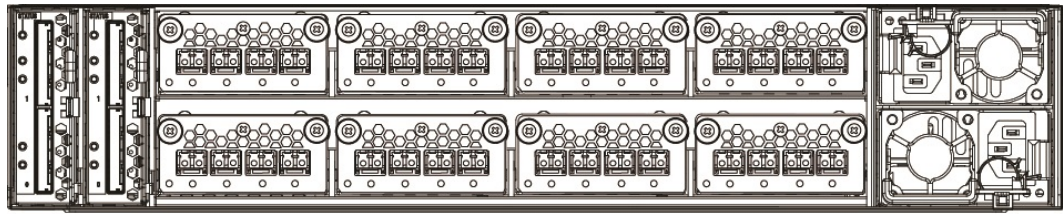
Rear View of Expansion Chassis
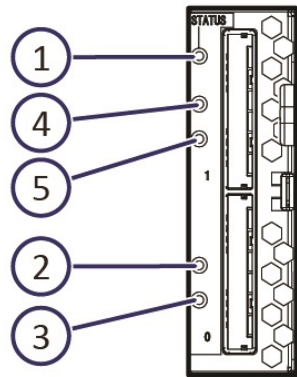


PCIe Cable Connector

| Number | Item | Description |
|---|---|---|
| 1 | STATUS LED | Green: PCIe cable connector is powered on.<br><br>Red: PCIe cable connector can be replaced safely.<br><br>Off: PCIe cable connector is powered off. |
| 2 | Link Basic LED | Green: Basic PCIe Gen-3.0 (8-Gbps) is linked up normally.<br><br>Off: Basic PCIe is not linked up (PCIe cable might not be connected). If a cable is connected, it can be removed safely. |
| 3 | InAct Basic LED | Amber: Basic PCIe status changed from link up to link down and cables. Cables can be removed safely.<br><br>Off: Basic PCIe is normal or not set. |
| 4 | Link Option LED | Green: Option PCIe Gen-3.0 (8-Gbps) is linked up normally.<br><br>Off: Option PCIe is not linked up (PCIe cable might not be |

| Number | Item | Description |
|---|---|---|
| | | connected). If a cable is connected, it can be removed safely. |
| 5 | `InAct Option` LED | Amber: Option PCIe status changed from link up to link down and cables. Cables can be removed safely.<br><br>Off: Option PCIe is normal or not set. |

# Host port expansion chassis power supply
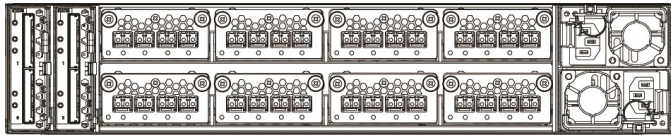


Rear **View** of the Expansion Chassis
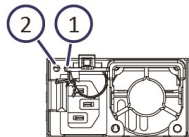


Expansion Chassis Power Supply 2
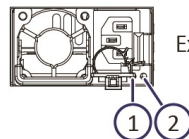


Expansion Chassis Power Supply 1

| Number | Item | Description |
|---|---|---|
| 1 | `ALM/RDY` LED | Red: Host port expansion chassis power supply can be replaced safely.<br><br>Green: Normal operation. |
| 2 | `AC IN` LED | Blue: AC input is normal. |

Host port expansion chassis

Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide

**5**

# NAS module

The NAS module provides communication ports to support file system protocols in a block- or file-system configuration.

☐ NAS Module Ports and LEDs

# NAS Module Ports and LEDs
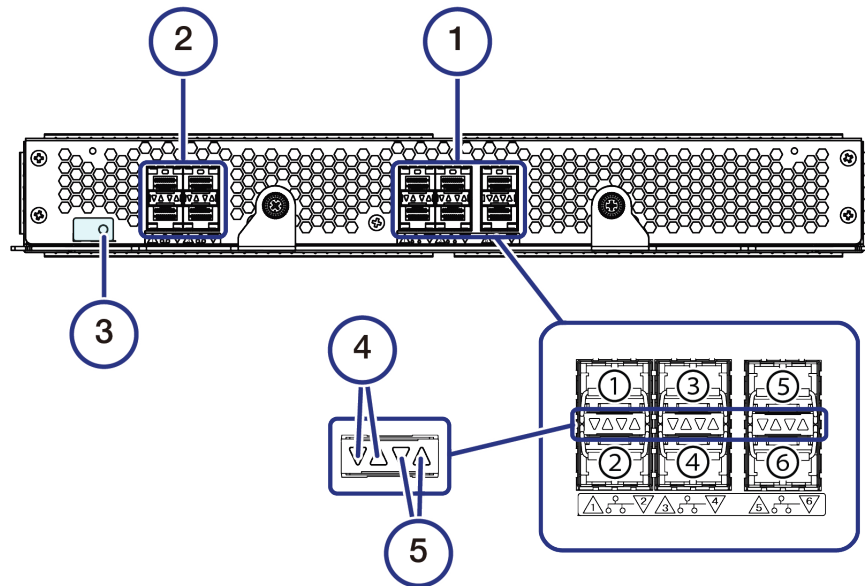


| Legend | Name | Color | Description |
|--------|------|-------|-------------|
| 1 | `User LAN` port | - | This is used with the file level access.<br><br>**1.** Target group 1<br>**2.** Target group 2<br>**3.** Target group 3<br>**4.** Target group 4<br>**5.** Target group 5<br>**6.** Target group 6 |
| 2 | `Cluster` port | - | Reserved for future use |
| 3 | `Status` LED | Green | NAS modules are functioning normally. |
| | | Red | NAS modules can be removed. |
| 4 | `Link` LED | Blue | Displays link status. |
| 5 | `Fail` LED | Red | A failure has occurred. |

# 6

# VSP service processor server

The VSP Fx00 models include a separate, dedicated 1U service processor (SVP) to host an element manager (Storage Navigator). The SVP (model number 3919435.P) operates independently from the CPU of the storage system and operating system, and provides out-of-band configuration and management of the storage system. The SVP also monitors and collects performance data for key components of the storage system to enable diagnostic testing and analysis for customer support.

The SVP is available as:

- A physical 1U management server provided by Hitachi Data Systems that runs Windows Embedded Standard 7.
- A software application that runs Windows 7 Professional x64 Service Pack 1 (64-bit) on a customer-supplied server hardware, a VMware ESXi host, or Linux KVM host.
- A software application that runs Microsoft Hyper-V Windows Server 2012 R2 on a customer-supplied server hardware running one of the following 64-bit operating systems:
  - Windows 10 Professional
  - Windows 10 Enterprise
  - Windows Server 2012
  - Windows Server 2012 R2

☐ [Service processor description](#)

☐ [SVP front panel](#)

☐ [SVP rear panel](#)

☐ [Service processor hardware specifications](#)

Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide

# Service processor description

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 IP network of the user.
- One port connects to a user-supplied management console PC.

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

Three of the four RJ-45 ports (which 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.

In the unlikely event you cannot connect to the SVP using the default IP address, use the following emergency login: `http://<default SVP IP address>/dev/storage/<model number><system serial number>/emergency.do`. For example:

| Storage system model number | Storage system serial number | URL |
| --- | --- | --- |
| 8320004 | 456789 | http://192.168.0.15/dev/storage/8320004456789/emergency.do |
| 8340004 | 456789 | http://192.168.0.15/dev/storage/8340004456789/emergency.do |
| 8360004 | 456789 | http://192.168.0.15/dev/storage/8360004456789/emergency.do |

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.

# SVP front panel

The front panel of the physical SVP is equipped with LEDs, a reset button, and a power button.

Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide
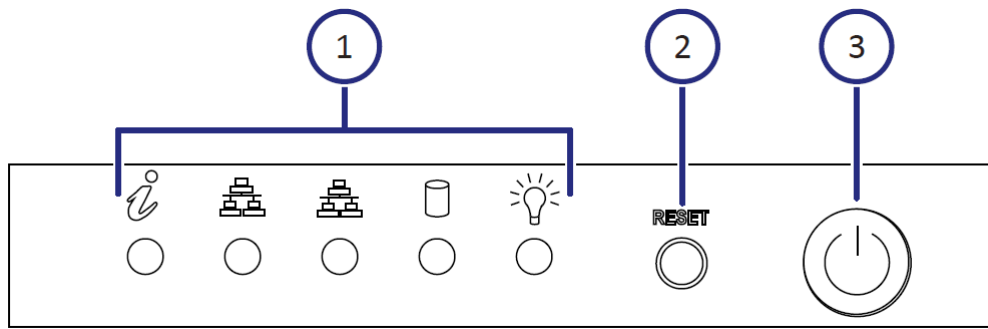
| Number | Description |
|---|---|
| 1 | LEDs. From left to right, the LEDs are:<br>• BMC Heartbeat<br>• LAN card 2<br>• LAN card 1<br>• Hard drive<br>• System standby power |
| 2 | Reset button. |
| 3 | Power button. Applies power to or removes power from the SVP. |

## SVP rear panel

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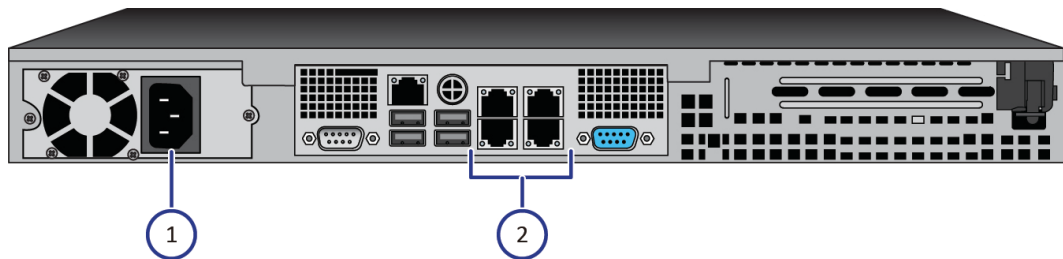


| Number | Description |
|---|---|
| 1 | Power socket. Attach the power cable supplied with the SVP. |
| 2 | Four LAN ports arranged as follows:<br><br>LAN3 LAN4<br><br>LAN1 LAN2 |

| Number | Description |
|---|---|
| | These ports connect to your IP network, the management console PC, and the user LAN port on each storage system controller. |

> **Note:** After the Initial Startup Wizard is run, the SVP can be used in non-bridge mode. In this mode, the cables can be removed from SVP ports LAN3 and LAN4 and attached to switches. For more information, contact customer support.

# Service processor hardware specifications

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

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

| Item | Specification |
|---|---|
| Dimensions | Height: 1.7 inches (43 mm) |
| | Width: 17.2 inches (437 mm) |
| | Depth: 14.5 inches (369 mm) |
| | Weight: 14 lbs (6.4 kg) |
| Processor | Celeron G1820 2.7-GHz 2M, 2C, 2T |
| | • Cores: 2 |
| | • Instruction set: 64-bit |
| | • SmartCache: 2 MB |
| | • Maximum memory size: 32 GB |
| | • Memory types: DDR3-1333, DDR3L-1333 @ 1.5V |
| Memory | 8-GB RAM DDR3 |
| Hard drive | 2 TB |
| Network interface card | x4 ports (on-board NIC) + |
| | x1 IPMI (BMC) port |
| Fans | 2 x 4-cm 4-pin PWM fans |
| Operating system | Windows Embedded Standard 7 |

**7**

# Maintaining the storage system

Ongoing proper maintenance of the storage system maintains the reliability of the storage system and its constant availability to all hosts connected to it.

For more complex maintenance activities, contact customer support.

☐ [Storing the storage system](#)

☐ [Powering off the storage system](#)

# 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.

# Powering off the storage system

**Procedure**

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

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

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

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

# Mechanical specifications for VSP F400, F600

The storage system mechanical specifications are described for VSP F400, F600 .

☐ [VSP F400 and VSP F600 mechanical specifications](#)

# VSP F400 and VSP F600 mechanical specifications

### Controller

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

### Drive trays

| Quantity | Component | Description |
|---|---|---|
| 1 | FMD tray | A drive tray that supports flash module drives and consists of an ENC and AC-DC power supplies equipped with built-in cooling fans. |

### NAS module

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

### Drive size

| Component | Specification |
|---|---|
| Flash Module Drive (flash module drive tray) | 5.74 x 14.44 x 0.78 inches (146 x 366.8 x 19.8 mm) |

### Data capacity (GB)

| Component | Specification |
|---|---|
| Flash Module Drive (flash module drive tray) | 1759.21, 3518.43 , 7036.87, 14073.74 GB |

## Maximum mountable quantity

| Component | Specification |
|---|---|
| Maximum number of flash module drives (VSP Fx00 models) | VSP F400: 8 +1 spare drive<br>VSP F600 16 + 1 spare drive |

## Battery specifications

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

## Host interface

| Item | Component | Specification |
|---|---|---|
| Interface type | Fibre Channel optical | 8-Gbps, 16-Gbps, 32-Gbps |
| | iSCSI optical | 10-Gbps |
| | iSCSI copper | 10-Gbps |
| | NAS module | 10-Gbps (Fibre Channel optical) |
| Data transfer speed (maximum speed for transfer to host) | Fibre Channel optical | 800-Mbps (Fibre Channel) |
| | | 1600-Mbps (Fibre Channel) |
| | | 3200-Mbps (Fibre Channel) |
| | iSCSI optical | 10-Gbps (iSCSI optical) |
| | iSCSI copper | 10-Gbps (iSCSI copper) |
| | NAS module (Fibre Channel) | 1000 Mbs |
| Number of ports | 8-Gbps Fibre Channel optical | 64 |
| | 16-Gbps Fibre Channel optical (2-port) | 32 |
| | 16-Gbps Fibre Channel optical (4-port) | 64 |
| | 32-Gbps Fibre Channel optical (4-port) | 64 |
| | 10-Gbps optical iSCSI | 32 |
| | 10-Gbps copper iSCSI | 32 |
| Number of ports (NAS Module not installed) | 8-Gbps Fibre Channel optical | 56 |
| | 16-Gbps Fibre Channel optical (2-port) | 28 |

| Item | Component | Specification |
|---|---|---|
| | 16-Gbps Fibre Channel optical (4-port) | 56 |
| | 32-Gbps Fibre Channel optical (4-port) | 56 |
| | 10-Gbps optical iSCSI | 28 |
| | 10-Gbps copper iSCSI | 28 |
| Number of ports (NAS Module installed) | 8-Gbps Fibre Channel optical | 24 |
| | 16-Gbps Fibre Channel optical (2-port) | 12 |
| | 16-Gbps Fibre Channel optical (4-port) | 24 |
| | 32-Gbps Fibre Channel optical (4-port) | 24 |
| | 10-Gbps optical iSCSI | 12 |
| | 10-Gbps copper iSCSI | 12 |
| | 10-Gbps Fibre Channel optical | 12 |
| Transferred block size | | 512 bytes |
| Maximum number of hosts using a Fibre Channel switch | | 255 |
| Maximum number of hosts using a network switch | | 255 |

## RAID specifications

D: Data drive, P: Parity drive.

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

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

| Item | Specification |
|---|---|
| Maximum number of RAID groups | VSP F400:160<br><br>VSP F600:240 |
| Maximum volume size | 3 TB (or 4 TB when using the LDEVs of other storage systems) |
| Maximum volumes/host groups and iSCSI targets | 2048 |

| Item | Specification |
|---|---|
| Maximum number of volumes per RAID group | 2048 |

## Shared memory and data assurance

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

## Start-up time

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

## Chassis size

| Component | Specification (WxDxH) |
|---|---|
| CBLM | 19.01 x 35.10 x 6.86 inches (483 x 891.7 x 174.3 mm) |

## Mass

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

| Component | Specification |
|---|---|
| CBLM | 187.39 pounds (85 kg) |

## Required height

| Component | Specification |
|---|---|
| CBLM | 4 U |

## Cache specifications

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

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

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

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

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

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

## Insulation performance

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

Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide

# B

# Electrical specifications for VSP F400, F600

The electrical specifications are described for the storage systems.

☐ Electrical specifications

# Electrical specifications

| Item | Controller | Drive tray |
|---|---|---|
| Frequency (Hz) | 50/60 ±1 | |
| Number of phases, cabling | Single-phase with protective grounding | |
| Steady-state current 100V/200V[1], [2] | CBLM: 4.0x2 | FMD drive tray: 2.6x2/1.3x2 |
| Current rating of breaker/fuse (A) | 16.0 (each electrical) | |
| Heat value (normal) (kJ/h) | CBLM: 2160 or less | FMD drive tray: 1520 or less <br><br> FMD drive tray: 1520 or less |
| Steady-state power (VA/W)[3] | CBLM: 1600/1560 or less | FMD drive tray: 520/490 or less |
| Power consumption (VA/W) | CBLM: 640/600 or less | FMD drive tray: 440/420 or less |

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

# Environmental specifications for VSP F400, F600

The environmental specifications are described for the storage systems.

☐ [Environmental specifications](#)

# Environmental specifications

**Temperature**

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

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

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

**Humidity**

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

**Vibration**

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

| State | m/s$^2$ |
|---|---|
| Transport (packed) | 5.0 or less |

## Impact

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

## Altitude

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

## Atmosphere

Avoid areas exposed to corrosive gas and salty air.

## Acoustic Noise

| State | Controller | FMD | |
|---|---|---|---|
| Operating | 60 dB (Environmental temperature 32°C or less)[1] | 60 dB (Environmental temperature 32°C or less)[1], [2], [3] | |
| Non-operating | 55 dB (Environmental temperature 32°C or less)[1], [2], [3], [4] 55 dB | | |
| **Notes:** | | | |
| 1. The system's internal temperature controls the rotating speed of the fan module. Therefore, this standard value might be exceeded if the maximum load continues under high-temperature environment or if a failure occurs in the system.<br>2. Sound pressure level (LA) changes from 66 dB or 75 dB, according to the ambient temperature, drive configuration, and operating status. Maximum volume can reach 79 dB during maintenance procedure for a failed ENC or power supply. | | | |

| State | Controller | FMD | |
|---|---|---|---|

**3.** Acoustic power level (LwA) measured by the ISO 7779 standard is 7.2 B. This value changes from 7.2 B to 8.1 B, according to the ambient temperature, drive configuration, and operating status.

# D

# iSCSI standards and specifications

The following tables describe the standards and specifications for using iSCSI in a hosting environment.

☐ iSCSI standards

☐ iSCSI specifications

# iSCSI standards

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

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

# iSCSI specifications

| Item | Specification | Comments |
|------|---------------|----------|
| iSCSI target function | Supported | N/A |
| iSCSI target function | Supported | TrueCopy® only |
| iSCSI ports | 2 per interface board | VSP Fx00 models: Maximum 24 per iSCSI system |
| Connection methods | Direct and switch connections | |
| Host connections | 255 (maximum per iSCSI port) | With Linux software initiator, the maximum number decreases. |
| Path failover | HDLM[1] | Supports Microsoft MPIO (Multi Path I/O) |
| Link | 10 Gbps SFP+ | N/A |
| Transfer speed | 10 Gbps | N/A |
| Connector type | LC | N/A |
| Cable | Optical OM3, OM2 MMF cable | N/A |
| Network switch | L2 or L3 switch | Should comply with IEEE802.3ae |

| Item | Specification | Comments |
|---|---|---|
| Switch cascading | Maximum: 5 switches or fewer | Minimum number of cascading switches is recommended. |
| MAC address | Per port (fixed value) | Factory setting: World Wide Unique value. Cannot be changed. |
| Maximum transfer unit (MTU) | 1,500, 4,500, 9,000 bytes (Ethernet frame) | Jumbo frame, MTU size greater than 1500 |
| Link aggregation | Not supported | N/A |
| Tagged VLAN | Supported | N/A |
| IPv4 | Supported | N/A |
| IPv6 | Supported | Note the following precautions:<br>• When iSCSI Port IPv6 is set to Enabled, if the IPv6 global address is set to automatic, the address is determined by acquiring a prefix from an IPv6 router.<br><br>• If the IPv6 router does not exist in the network, the address cannot be determined. As a result, an iSCSI connection might be delayed. When an iSCSI Port IPv6 is set to Enabled, verify the IPv6 router is connected to the same network, and then set IPv6 global address automatically. |
| Subnet mask | Supported | N/A |
| Gateway address | Supported | N/A |
| DHCP | N/A | N/A |
| DNS | N/A | N/A |
| Ping (ICMP ECHO) Transmit, Receive | Supported | N/A |
| IPsec[2] | N/A | N/A |
| TCP port number | 3260 | Changeable among 1 to 65,535. Observe the following if changing values:<br>• The setting of the corresponding host should also be changed to log in the new port number.<br>• The new port number might conflict with other network communication or be |

| Item | Specification | Comments |
|---|---|---|
| | | filtered on some network equipment, preventing the storage system from communicating through the new port number. |
| iSCSI name | Both iqn[3] and eui[4] types are supported | The unique iqn value is automatically set when a target is made. iSCSI name is configurable. |
| Error recovery level | 0 (zero) | Error recovery by retrying from host. Does not support Level 1 and Level 2. |
| Header digest | Supported | Detects header error or data error with iSCSI communication. The storage system follows the host's digest setting. If digest is enabled, the performance degrades. The amount of the degradation depends on factors such as host performance of host and transaction pattern. |
| Data digest | Supported | |
| Maximum iSCSI connections at one time | 255 per iSCSI port | N/A |
| CHAP | Supported | Authentication: login request is sent properly from host to storage. CHAP is not supported during discovery session. |
| Mutual (2-way) CHAP | Supported (not available if connected to Linux software initiator) | Authentication: login request is sent properly from host to storage. |
| CHAP user registration | Max 512 users per iSCSI port | N/A |
| iSNS | Supported | With iSNS (name service), a host can discover a target without knowing the target's IP address. |

**Note:**

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

# E

# Replacement parts

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

☐  [Battery unit](#)

# Battery unit

**Replacement period**

Three years.

**Treatment**

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

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

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

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# Data and power cables

The storage system supports a variety of data and power cables for specific hosting environments.

☐ Fibre Channel cables

☐ iSCSI cables

☐ Managing data cables

☐ AC power cables

# Fibre Channel cables

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

- If you connect a storage system to a FC host adapter through a switch, set <u>Fabric = ON</u> and set to <u>Point-to-Point</u>.
- If you connect a storage system directly to FC host adapter with the following fabric topology:
  - For 2, 4 or 8 Gbps, set the storage port to <u>Fabric = OFF</u> and <u>Connection Type FC-AL</u> (Fibre Channel Arbitrated Loop).
  - For 16 or 32 Gbps, set the storage port to <u>Fabric = OFF</u> and <u>Connection Type P-to-P</u> (Point-to-Point).

For the 8-Gbps Fibre Channel ports, the combinations between data-transfer speeds and connection types are as follows:

| Connection type | Data transfer speeds for 8-Gbps ports | | | |
|---|---|---|---|---|
| | 2 Gbps | 4 Gbps | 8 Gbps | Auto |
| FC-AL | Available | Available | Available | Available (default) |
| P-to-P | Available | Available | Available | Available |
| Fabric | Available | Available | Available | Available |

For the 16-Gbps Fibre Channel ports and for 16-Gbps SFP added to the 4-port FC 32-Gbps package, the combinations between data-transfer speeds and connection types are as follows:

| Connection type | Data transfer speeds for 16-Gbps ports/SFPs | | | | | |
|---|---|---|---|---|---|---|
| | 2 Gbps | 4 Gbps | 8 Gbps | 16 Gbps | 32 Gbps | Auto |
| FC-AL | No available | Available | Available | Not available | Not available | Available[1] |
| P-to-P | No available | Available | Available | Available | Not available | Available (default[2]) |
| Fabric | Available | Available | Available | Available | Not available | Available |

**Notes:**
1. If this combination is specified, the maximum transfer speed automatically specified is 8 Gbps.
2. If this default value is set, Fabric is set to ON automatically.

📄 **Note:** To connect to the server by the 16-Gbps direct connection, the Fabric Emulation function of the Hitachi host adapter is required.

For the direct connection using the Fabric Emulation function, set the Fabric setting of the Fibre Channel port of the Storage System to ON.

For the 32-Gbps SFP added to the 4-port FC 32-Gbps package, the combinations between data-transfer speeds and connection types are as follows:

| Connection type | Data transfer speeds for 32-Gbps ports | | | | | |
|---|---|---|---|---|---|---|
| | 2 Gbps | 4 Gbps | 8 Gbps | 16 Gbps | 32 Gbps | Auto |
| FC-AL | No available | No available | Available | Not available | Not available | Available[1] |
| P-to-P | No available | No available | Available | Available | Available | Available (default[2]) |
| Fabric | Available | Available | Available | Available | Available | Available |
| **Notes:** <br> 1. If this combination is specified, the maximum transfer speed automatically specified is 8 Gbps. <br> 2. If this default value is set, Fabric is set to ON automatically. | | | | | | |

**Note:** The five Hitachi FC HBAs also have an alternate option of Fabric Emulation. When the HBA is configured to use this mode, treat it as an attached switch and set the storage port to Fabric = On and Connection Type = P-to-P.

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

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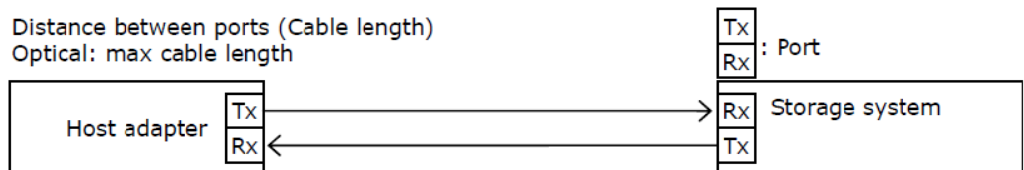
(a) Direct Connection
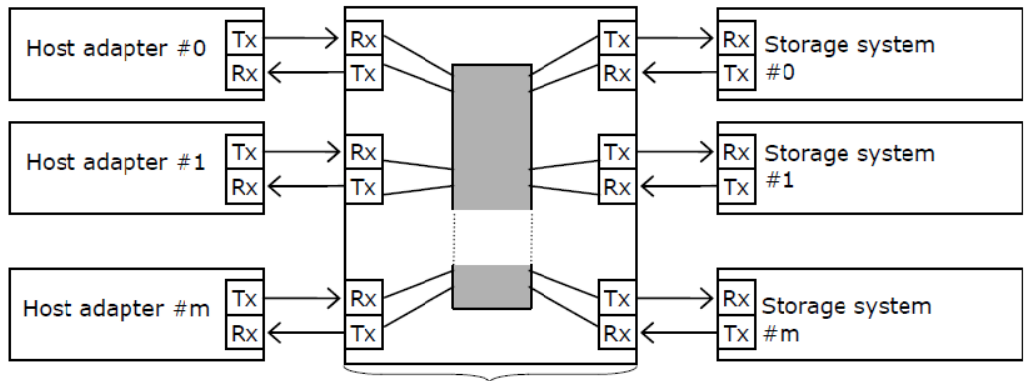
(b) Fibre Channel Switch Connection

| Data transfer rate | Maximum length of cable | | | |
| | Multimode cable | | | Single mode cable |
| | OM2 | OM3 | OM4 | |
|---|---|---|---|---|
| 2 Gbps | 984.25 ft (300 m) | 1640.4 ft (500 m) | — | 3280.8 ft (10 km) |
| 4 Gbps | 493 ft (150 m) | 1246.72 ft (380 m) | 1312.3 ft (400 m) | |
| 8 Gbps | 164.04 ft (50 m) | 493 ft (150 m) | 623.36 ft (190 m) | |
| 16 Gbps | 114.8 ft (35 m) | 328.08 ft (100 m) | 410.1 ft (125 m) | — |
| 32 Gbps | 65.62 ft (20 m) | 229.7 ft (70 m) | 328.08 ft (100 m) | — |

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

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

Data and power cables
Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide

| Cable type | Interface | Cable mode name | Nominal | | |
| --- | --- | --- | --- | --- | --- |
| | | | Cable | Connector | |
| | | | | One side | Other side |
| LC-LC cable (longwave) | | DXLC-2PS-SPC-xxM-SMC 10/125-2SR | 9/125 µm Singlemode Wavelength: 1300 nm | | |

The following figure shows the connector used for optical interfaces.
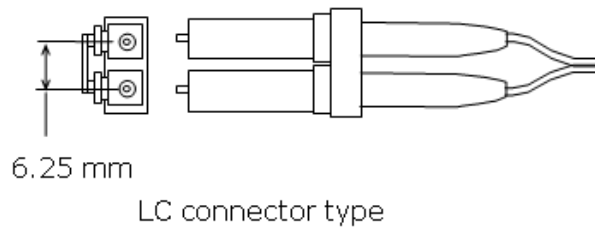


6.25 mm

LC connector type

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

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



6.25 mm

Tx: Transmitter
Rx: Receiver

Tx   Rx

LC connector type
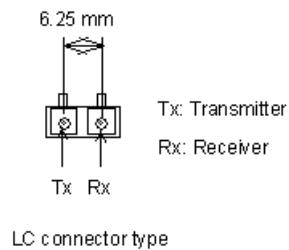
# iSCSI cables

When constructing an iSCSI system with a direct connection or switch connection, consider the following:

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

## Cable specifications for iSCSI optical interface

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

The following figure shows the connector used for optical interfaces.
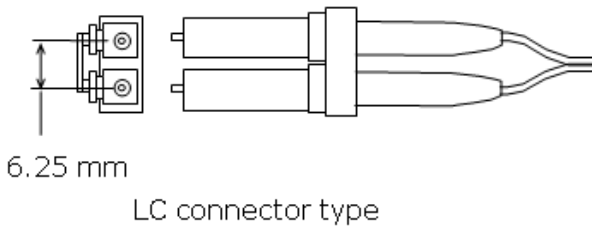


6.25 mm

LC connector type

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

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



6.25 mm

Tx: Transmitter
Rx: Receiver

Tx  Rx

LC connector type
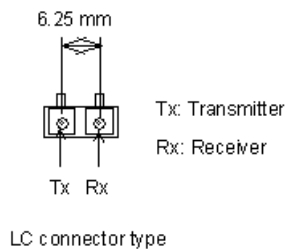
**Cable specifications for 10 Gbps iSCSI copper interface**

| Cable type | Maximum cable connection length | Data transfer | Transmission band | Cable | Connector |
|---|---|---|---|---|---|
| Category 5e or 6a LAN cable | 100 m | 1 Gbps | 1000BASE-T | STP ( use an STP cable that suppresses radio noise) | RJ-45 |
| Category 6a LAN cable | 50 m | 10 Gbps | 10GBASE-T | STP ( use an STP cable that suppresses radio noise) | RJ-45 |

The following figure shows a 10 Gbps iSCSI cable.
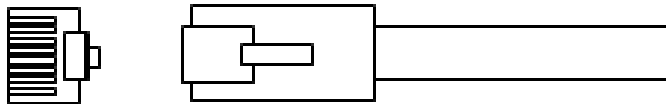
# Managing data cables

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

**Observing bend radius values**

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

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

**Protecting cables**

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

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

**Cabling full-width modules**

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

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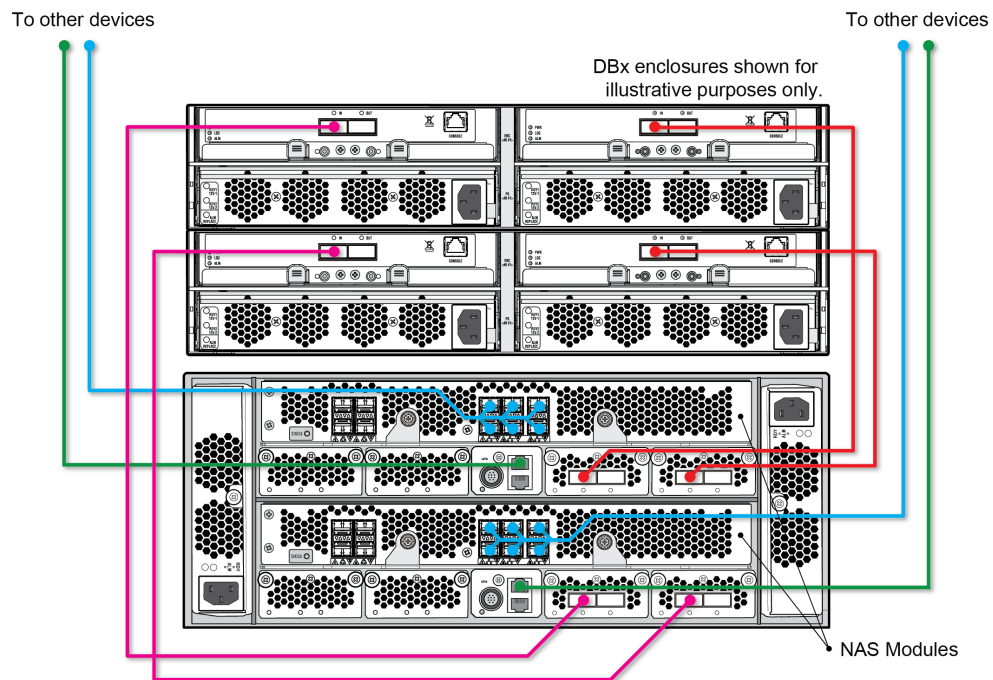
**Ensuring adequate airflow**

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

**Preparing for future maintenance**

Design your cable infrastructure to accommodate future work on the storage system. Give thought to future tasks that will be performed on the storage system, such as locating specific pathways or connections, isolating a fault, or adding or removing components.
- Purchase colored cables or apply colored tags.
- Label both ends of every cable to denote the port to which it connects.

# AC power cables

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

## Power cable assemblies

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

Hitachi power cables consist of three parts:
- **Plug:** Male connector for insertion into the AC outlet providing power. The physical design and layout of the plug's contact meet a specific standard.
- **Cord:** Main section of insulated wires of varying length, whose thickness is determined by its current rating.
- **Receptacle:** Female connector to which the equipment attaches. The physical design and layout of the receptacle's contacts meet a specific standard. Common standards are the IEC C13 receptacle for loads up to 10 amperes (A) and the IEC C19 receptacle for loads up to 15 A.
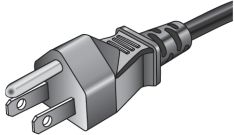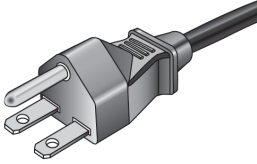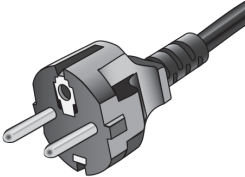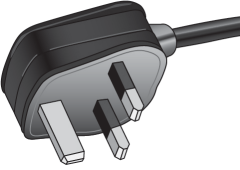
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1    2    3    4    5    6    7    8

9    10    11    12    13    14
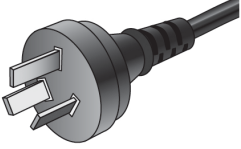
| Number | Country or region | Voltage rating (VAC) | Current rating (amperes) | Plug type |
|---|---|---|---|---|
| 1[1] | North America | 100-127 | 15 | NEMA 5-15P |
| | Brazil | 200-240 | 10, 20 | NEMA 5-15P |
| | Japan | 100-127 | 12 | JIS C8303 |
| | Taiwan | 100-127 | 12, 16 | CNS 690 |
| 2 | North America | 100-127 | 20 | NEMA 5-20P |
| 3 | North America | 200-240 | 20 | NEMA L6-20P |
| 3 | North America | 200-240 | 30 | NEMA L6-30P |
| 4[2] | North America | 200-240 | 30 | NEMA L15-30P |
| 5[3] | Hong Kong | 200-240 | 13 | BS-1363 |
| | Singapore | 200-240 | 13 | BS-1363 |
| 6 | Chile | 200-240 | 10, 16 | CEI 23-50 |
| | Italy | 200-240 | 10, 16 | CEI 23-50 |
| 7 | Argentina | 200-240 | 10, 15 | IRAM 2073 |
| | Australia | 200-240 | 10, 15 | AS-3112 |
| | China | 200-240 | 10, 16 | GB-1002 |
| | New Zealand | 200-240 | 10, 15 | AS-3112 |
| 8 | Denmark | 200-240 | 10 | DK 2-5 |
| | Israel | 200-240 | 10, 16 | SI-32 |
| 9[4] | Europe | 200-240 | CEE 7, 7 | |
| 10[5] | India | 200-240 | 6, 16 | IS-1293 |
| | South Africa | 200-240 | 10, 16 | SABS-164 |
| 11 | Switzerland | 200-240 | 10 | SEV 1011 |
| 12[6] | International | 200-240 | 20 | IEC 309 |
| 13[7] | United Kingdom | 200-240 | 13 | BS-1363 |
| | International | 200-240 | 20 | IEC 309 |
| 14[8] | International | 200-240 | 30 | IEC 309 |

**Notes:**
1. Also used for 200-240 VAC applications in Korea and Philippines.
2. Three-phase AC.
3. Also Malaysia and Ireland.
4. Also known as "Schuko" connector and used in Austria, Belgium, Finland, France, Germany, Greece, Hungary, Indonesia, Netherlands, Norway, Poland, Portugal, Russia, Spain, and Sweden.

| Number | Country or region | Voltage rating (VAC) | Current rating (amperes) | Plug type |
|---|---|---|---|---|
| **5.** Supersedes type BS 546. | | | | |
| **6.** 3-wire (two-phase and earth). Physical variations (connector size and color) indicate amperage rating. Used in Switzerland for a true 16 A application. | | | | |
| **7.** 4-wire (three-phase and earth). Physical variations (connector size and color) indicate amperage rating. | | | | |
| **8.** 5-wire (three-phase, earth and neutral). Physical variations (connector size and color) indicate amperage rating. | | | | |

## AC connections

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

| Description | Receptacle (male end) | Input rating | Reference standards |
|---|---|---|---|
| NEMA 5-15P | | 100V-120V (standard attachment) | 1 ANSI C73.11<br>2 NEMA 5-15P<br><br>3 IEC 83 |
| NEMA L6-20P | | 200V-240V | 1 ANSI C73.11<br>2 NEMA 6-15P<br><br>3 IEC 83 |
| CEE 7/7 | | 200V-240V | 4 CEE (7) II, IV, VII<br>3 IEC 83 |
| BS-1363 | | 200V-240V | 5 BS 1365<br>3IEC 83 |

| Description | Receptacle (male end) | Input rating | Reference standards |
| --- | --- | --- | --- |
| | | | |
| AS-3112 | | 200V-240V | 6 AS C112 |

## Power cable usage guidelines

Hitachi storage systems are intended for rack installation and ship with power cords. Installation and service requirements may require additional cords and cables to be ordered. The type of power cable required by a given installation is determined primarily by the:

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

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

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

## Three-phase power considerations for racks

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

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

handling capabilities of three-phase distribution can result in more efficient and less costly installations that require fewer AC cables and PDUs.



## Cable management

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

## Cable retention

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

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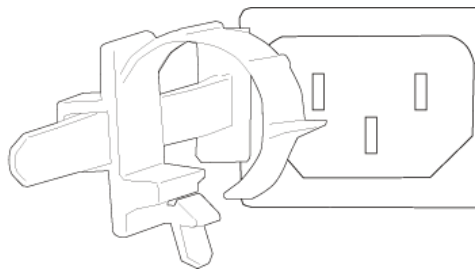
# **Port address mapping**

☐ [Port address mapping](#)

# Port address mapping

Each fibre channel port has a default port address (AL_PA) of EF. You do not have to change this value because the storage system port can connect to the host bus adapter (HBA) with the current setting.

If you want to change the AL_PA value, however, select a value from the following table.

If you use a value that is not in the following table or is already used by the HBA, the host might not be able to recognize the VOL. If this problem or other problems occur, revert to the default value of EF.

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

# Third-party racks

All VSP F series storage systems can be installed into third-party racks.

The following describes the requirements and guidelines for installing the storage system into a third-party rack.

☐ [Third-party rack support for VSP Fx00 models](#)

☐ [Hitachi Universal V2 Rack rail kits](#)

☐ [Hitachi Universal V2 Rack accessories](#)

☐ [Third-party rack support for DB60 dense intermix drive trays](#)

# Third-party rack support for VSP Fx00 models

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

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

# Hitachi Universal V2 Rack rail kits

Use rail kits to mount the Hitachi Virtual Storage Platform family storage system in a Hitachi Universal V2 Rack.

The following tables list the rail kit information for the specified storage systems.

**Table 3  Rail kits for VSP Fx00 models**

| Rail kit | Hitachi Universal V2 Rack | Third-party rack |
|---|---|---|
| Controller | UNI[1] | UNI[1] |
| DBS, DBL, and DBF drive trays | CGR[2] | UNI[1] |
| DB60 dense intermix drive tray | Use the rail kit supplied with the DB60 dense intermix drive tray. | |
| SVP server | Use the rail kit supplied with the SVP server. | |
| **Notes**: <br> **1.**  UNI: Universal rail kit A34V-600-850-UNI. <br> **2.**  CGR: Corner guide rail kit A3BF-HK-GL-740-1. | | |

# Hitachi Universal V2 Rack accessories

The following table provides rack accessory information for VSP F series storage systems.

**Table 4  Accessories for the Hitachi Universal V2 Rack**

| Storage system | Front door | Rear door | Side panels |
|---|---|---|---|
| VSP Fx00 models | Optional, must be ordered separately (A3BF-DR). | Included with rack | Not included with rack, must be ordered separately. A quantity of two must be ordered per rack (A3BF-Z-PAN-1200). |

# Third-party rack support for DB60 dense intermix drive trays

Due to the size and weight of the DB60 dense intermix drive trays used with VSP Fx00 models, pay close special attention when mounted in third-party racks.

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

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

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(Unit : mm)

Symbols

⊠ : Holing open part

+ : Leveling bolt

⊕ : Caster

[⬚] : Maintenance area boundary

G : Holing open panel
(For the below the floor level ventilation method)

Third-party racks

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# *7*

# Hitachi Universal V2 Rack power distribution units

The Hitachi Universal V2 Rack is equipped with specific power distribution units (PDU) for Americas, APAC, and EMEA regions. The PDUs can provide electrical power to the storage system in a single-phase or three-phase configuration.

⚠️ **Caution:**
- Before installing third-party devices into the rack, check the electrical current draw of each device. Verify the electrical specifications and allowable current load on each PDU before plugging the device into the PDU.
- Balance the electrical current load between available PDUs.

☐ [Americas single-phase PDU 1P30A-8C13-3C19UL.P](#)

☐ [Americas single-phase PDU 1P30A-15C13-3C19UL.P](#)

☐ [Americas three-phase PDU 3P30A-8C13-3C19UL.P](#)

☐ [Americas three-phase PDU 3P30A-15C13-3C19UL.P](#)

☐ [Americas three-phase PDU 3P30A-24C13-6C19UL.P](#)

☐ [APAC and EMEA single-phase PDU 1P32A-9C13-3C19CE.P](#)

☐ [APAC and EMEA single-phase PDU 1P32A-18C13-3C19CE.P](#)

☐ [APAC and EMEA three-phase PDU 3P16A-9C13-3C19CE.P](#)

☐ [APAC and EMEA three-phase PDU 3P16A-15C13-3C19CE.P](#)

☐ [APAC and EMEA three-phase PDU 3P32A-24C13-6C19CE.P](#)

# Americas single-phase PDU 1P30A-8C13-3C19UL.P

The following figure and table describes the specifications of the PDU.
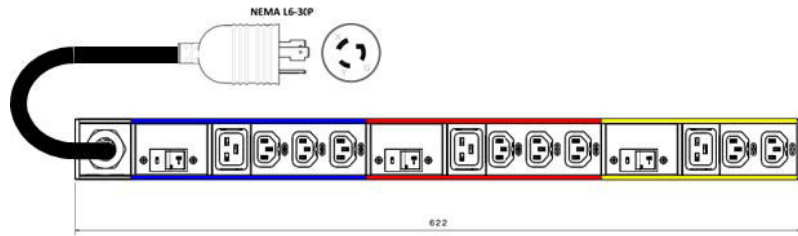


**Figure 1  Americas PDU for the Hitachi Universal V2 Rack (Single-phase PDU 1P30A-8C13-3C19UL.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 1P30A-8C13-3C19UL.P | Americas | Single | • 208V, 30A (24A rated) 60Hz<br>• 8 IEC C13 + 3 IEC C19 sockets<br>• NEMA L6-30P input power plug<br>• 4.5 m (14.76 feet) cable |

# Americas single-phase PDU 1P30A-15C13-3C19UL.P

The following figure and table describes the specifications of the PDU.
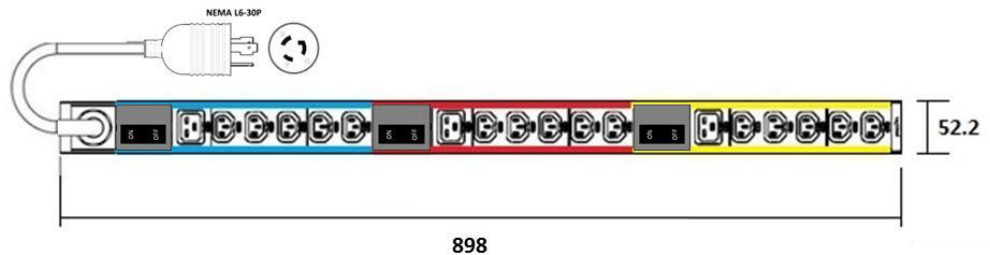


**Figure 2  Americas PDU for the Hitachi Universal V2 Rack (Single-phase PDU 1P30A-15C13-3C19UL.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 1P30A-15C13-3C19UL.P | Americas | Single | • 208V, 30A (24A rated) 60Hz |

| Part Number | Region | Phase | Description |
|---|---|---|---|
|  |  |  | • 15 IEC C13 + 3 IEC C19 sockets<br>• NEMA L6-30P input power plug<br>• 4.5 m (14.76 feet) cable |

## Americas three-phase PDU 3P30A-8C13-3C19UL.P

The following figure and table describes the specifications of the PDU.
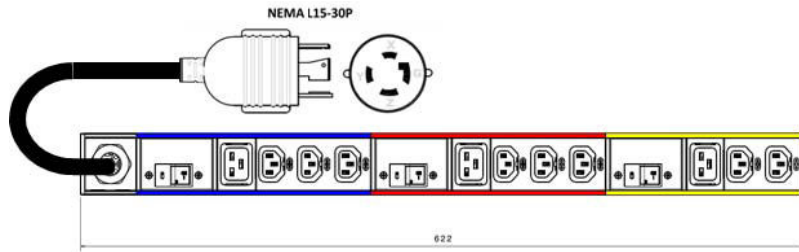


**Figure 3  Americas PDU for the Hitachi Universal V2 Rack (Three-phase PDU 3P30A-8C13-3C19UL.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 3P30A-8C13-3C19UL.P | Americas | Three | • 208V 3P, 30A (24A rated) 60Hz<br>• 8 IEC C13 + 3 IEC C19 sockets<br>• NEMA L15-30P input power plug<br>• 4.5 m (14.76 feet) cable |

## Americas three-phase PDU 3P30A-15C13-3C19UL.P

The following figure and table describes the specifications of the PDU.

**Figure 4  Americas PDU for the Hitachi Universal V2 Rack (Three-phase PDU 3P30A-15C13-3C19UL.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 3P30A-15C13-3C19UL.P | Americas | Three | • 208V 3P, 30A (24A rated) 60Hz<br>• 15 IEC C13 + 3 IEC C19 sockets<br>• NEMA L15-30P input power plug<br>• 4.5 m (14.76 feet) cable |

## Americas three-phase PDU 3P30A-24C13-6C19UL.P

The following figure and table describes the specifications of the PDU.
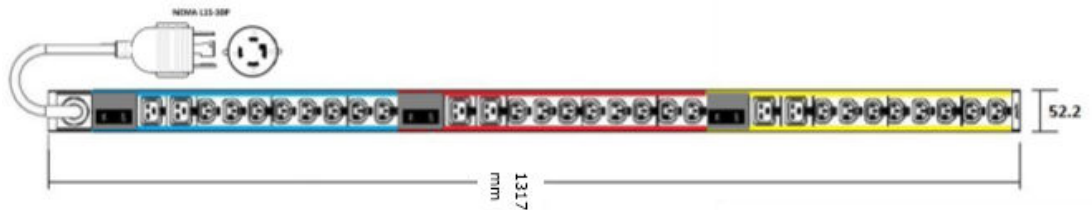


**Figure 5  Americas PDU for the Hitachi Universal V2 Rack (Three-phase PDU 3P30A-24C13-6C19UL.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 3P30A-24C13-6C19UL.P | Americas | Three | • 208V 3P, 30A (24A rated) 60Hz<br>• 24 IEC C13 + 6 IEC C19 sockets<br>• NEMA L15-30P input power plug<br>• 4.5 m (14.76 feet) cable |

Hitachi Universal V2 Rack power distribution units
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# APAC and EMEA single-phase PDU 1P32A-9C13-3C19CE.P

The following figure and table describes the specifications of the PDU.
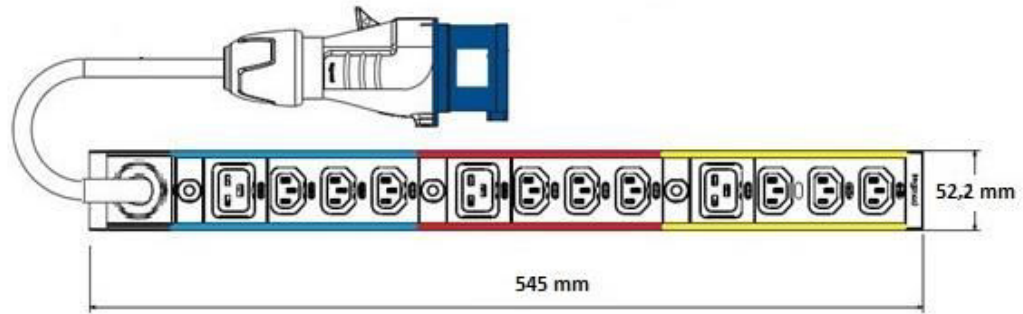


**Figure 6  APAC and EMEA PDU for the Hitachi Universal V2 Rack (Single-phase 1P32A-9C13-3C19CE.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 1P32A-9C13-3C19CE.P | APAC and EMEA | Single | • 230V max. 32A 50Hz / 60Hz<br>• 9 IEC C13 + 3 IEC C19 sockets<br>• IEC309 Blue 2P + E input power plug<br>• 4.5 m (14.76 feet) cable |

# APAC and EMEA single-phase PDU 1P32A-18C13-3C19CE.P

The following figure and table describes the specifications of the PDU.
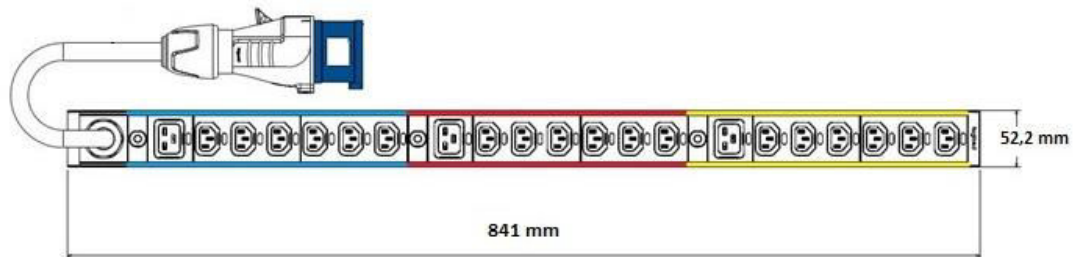


**Figure 7  APAC and EMEA PDU for the Hitachi Universal V2 Rack (Single-phase 1P32A-18C13-3C19CE.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 1P32A-18C13-3C19CE.P | APAC and EMEA | Single | • 230V max. 32A 50Hz / 60Hz<br>• 18 IEC C13 + 3 IEC C19 sockets<br>• IEC309 Blue 2P + E input power plug<br>• 4.5 m (14.76 feet) cable |

## APAC and EMEA three-phase PDU 3P16A-9C13-3C19CE.P

The following figure and table describes the specifications of the PDU.
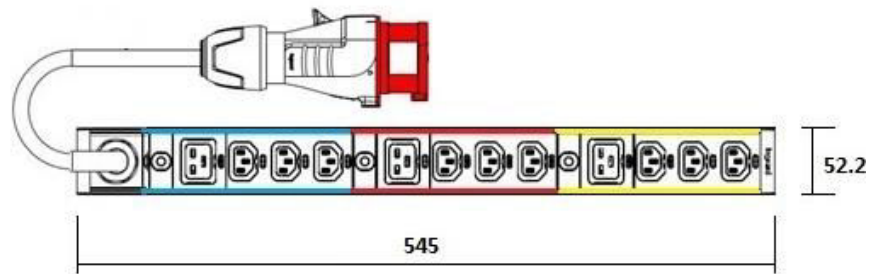


**Figure 8  APAC and EMEA PDU for the Hitachi Universal V2 Rack (Three-phase 3P16A-9C13-3C19CE.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 3P16A-9C13-3C19CE.P | APAC and EMEA | Three | • 400V max. 3x 16A 50Hz / 60Hz<br>• 9 IEC C13 + 3 IEC C19 sockets<br>• IEC309 Red 3P + N + E input power plug<br>• 4.5 m (14.76 feet) cable |

## APAC and EMEA three-phase PDU 3P16A-15C13-3C19CE.P

The following figure and table describes the specifications of the PDU.
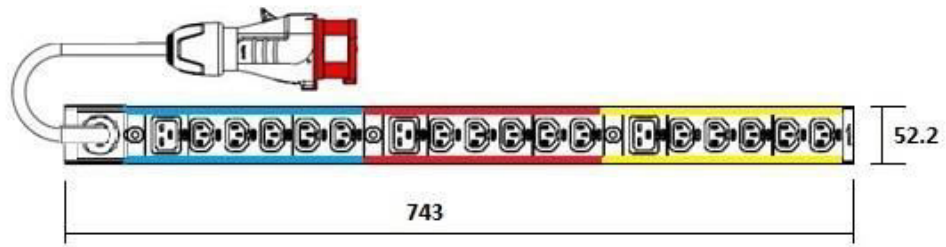
**Figure 9  APAC and EMEA PDU for the Hitachi Universal V2 Rack (Three-phase 3P16A-15C13-3C19CE.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 3P16A-15C13-3C19CE.P | APAC and EMEA | Three | • 400V max. 3x 16A 50Hz / 60Hz<br>• 15 IEC C13 + 3 IEC C19 sockets<br>• IEC309 Red 3P + N + E input power plug<br>• 4.5 m (14.76 feet) cable |

## APAC and EMEA three-phase PDU 3P32A-24C13-6C19CE.P

The following figure and table describes the specifications of the PDU.
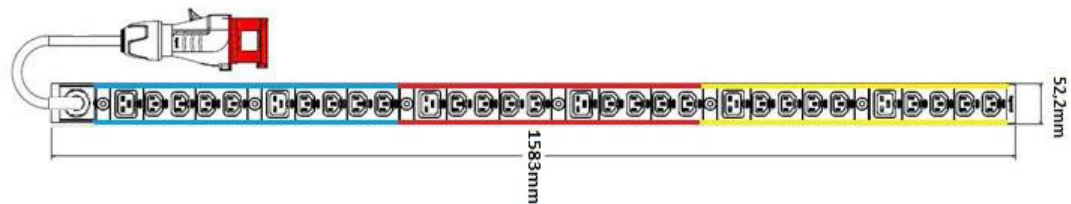


**Figure 10  APAC and EMEA PDU for the Hitachi Universal V2 Rack (Three-phase 3P32A-24C13-6C19CE.P)**

| Part Number | Region | Phase | Description |
|---|---|---|---|
| 3P32A-24C13-6C19CE.P | APAC and EMEA | Three | • 400V max. 3x 32A 50Hz / 60Hz<br>• 24 IEC C13 + 6 IEC C19 sockets<br>• IEC309 Red 3P + N + E input power plug<br>• 4.5 m (14.76 feet) cable |

# Regulatory compliance

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

**Table 5  Country Specifications and Certifications**

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

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

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