Hitachi Virtual Storage Platform G/F350, G/F370, G/F700, G/F900

Site Preparation Guide

This guide provides information about planning and preparing for the installation of Hitachi Virtual Storage Platform F350, F370, F700, F900 all-flash arrays and Hitachi Virtual Storage Platform G350, G370, G700, G900 storage systems.

Contents

Contents

Preface

This guide describes how to plan and prepare for the installation of the Hitachi Virtual Storage Platform F350, F370, F700, and F900 all-flash arrays and Hitachi Virtual Storage Platform G350, G370, G700 and G900 storage systems.

This guide describes how to plan and prepare for the installation of the Hitachi Virtual Storage Platform F350, F370, F700, and F900 all-flash arrays (VSP Fx00 models) and Hitachi Virtual Storage Platform G350, G370, G700 and G900 storage systems (VSP Gx00 models).

Intended audience

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

Readers of this document should be familiar with the following:

- Computing terminology, RAID technology, and optical and Ethernet connectivity.
- Networking concepts, network switch technology, and network cabling.
- Floor load calculations and budgeting power
- The procedures for installing rack-mounted components
- High-speed interconnects for storage systems.

Product version

This document revision applies to VSP F350, F370, F700, F900 and VSP G350, G370, G700, G900 firmware 88-01-0*x*.

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 Vantara Support Connect: https://knowledge.hitachivantara.com/Documents.

Document conventions

This document uses the following storage system terminology conventions:

Convention	Description
VSP Fx00 models	Refers to all of the following models, unless otherwise noted. ▪ Hitachi Virtual Storage Platform F350 ▪ Hitachi Virtual Storage Platform F370 ▪ Hitachi Virtual Storage Platform F700 ▪ Hitachi Virtual Storage Platform F900
VSP Gx00 models	Refers to all of the following models, unless otherwise noted. ▪ Hitachi Virtual Storage Platform G350 ▪ Hitachi Virtual Storage Platform G370 ▪ Hitachi Virtual Storage Platform G700 ▪ Hitachi Virtual Storage Platform G900

This document uses the following typographic conventions:

Convention	Description
Bold	▪ Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: Click **OK**. ▪ Indicates emphasized words in list items.
Italic	▪ Indicates a document title or emphasized words in text. ▪ Indicates a variable, which is a placeholder for actual text provided by the user or for output by the system. Example: `pairdisplay -g group` (For exceptions to this convention for variables, see the entry for angle brackets.)
`Monospace`	Indicates text that is displayed on screen or entered by the user. Example: `pairdisplay -g oradb`

Convention	Description
< > angle brackets	Indicates variables in the following scenarios: ▪ Variables are not clearly separated from the surrounding text or from other variables. Example: `Status-<report-name><file-version>.csv` ▪ Variables in headings.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a | b] indicates that you can choose a, b, or nothing. { a | b } indicates that you must choose either a or b.

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

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

Conventions for storage capacity values

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

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

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

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

Accessing product documentation

Product user documentation is available on Hitachi Vantara Support Connect: https://knowledge.hitachivantara.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 Vantara Support Connect](#) is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to Hitachi Vantara Support Connect for contact information: https://support.hitachivantara.com/en_us/contact-us.html.

[Hitachi Vantara Community](#) is a global online community for Hitachi Vantara customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to [community.hitachivantara.com](#), register, and complete your profile.

Comments

Please send us your comments on this document to doc.comments@hitachivantara.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 Vantara Corporation.

Thank you!

Chapter 1: Installation site considerations

Observe the following site considerations before installing the storage system.

Site planning

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

All planning activities should be scheduled and completed before the equipment is delivered.

The planning process includes:

- Planning hardware configuration, such as system component layout in the rack and drive allocation.
- Planning for specific network topologies, cabling configurations, network switches, and cabling of connected host computers.
- Ensuring all cables for specific controller and drive tray configuration are properly ordered.
- Selecting key personnel to handle the delivery and installation of the system.
- Verifying all electrical service wiring are installed at the predetermined location.

Complete the suggested tasks before receiving and installing the storage system.:

- Prepare a preliminary layout of the installation.
- Review the power and the heating, ventilation, and air-conditioning (HVAC) requirements before ordering any additional support equipment.
- Work with a Hitachi Vantara representative and review the order of storage system and cables are correct.
- Make a final layout of the installation and review the layout with the Hitachi Vantara representative.
- Verify the installation of electrical service wiring at the predetermined location is proper before installing the storage system.
- Verify all additional equipment, such as switches and host computers, is installed and operational.

Hitachi Vantara responsibilities

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

- Assisting you as needed to plan the installation for your specific site and operational configuration.

- Coordinating Hitachi Vantara resources to ensure smooth delivery, installation, and configuration of the units.

Customer responsibilities

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

- Purchase site-planning services from Hitachi Global Services.

- Provide the space, people, and tools for unpacking, installing, and operating the storage system.

- Confirm that the path from where the storage system is delivered to the installation site is large enough to support the storage system. Take into account all ramps, walkways, and elevators and possible obstructions.

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

- Provide adequate power facilities for the storage system. Adequate power is necessary to ensure reliable functioning of electronic equipment and for the safety of the customer's installation. The customer is responsible for procuring, installing, and maintaining adequate power to the equipment.

- Supply the network connections and external cabling required by the storage system.

Delivery space requirements

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

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

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

Climatization

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

Chapter 1: Installation site considerations

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

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

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

Electrostatic discharge

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

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

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

- Verify that all equipment and flooring are grounded. Any charge that might build up would be discharged safely through that common ground.

- Maintain recommended humidity level and airflow rates. Relative humidity above 40% reduces the resistance of items that can generate a charge, making it more difficult to generate an ESD.

- Store spare electric parts in antistatic bags until you are ready to install them. These bags are designed to prevent a charge from building.

- When handling the storage system, wear protective devices like wrist straps, sole grounders, and conductive shoes. These items help to prevent electrostatic charge from building.

- Before working inside your storage system, ground yourself to the storage system enclosure by contact to verify that your personal static charge has been discharged.

Space requirements

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

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

- Is large enough to hold the new storage system and other equipment.

- Provides minimum clearance around the storage system for service access and to verify proper weight distribution on the computer room floor.

- Includes correctly positioned floor cutouts for the storage system's power and data cables.

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

- Structural support columns and other immovable objects

- Walls

- All existing equipment, cabinets, racks, networking equipment, and other systems

- Where the new storage system will be installed

- Floor and electrical cutouts

- Interconnecting cables and power cords, including lengths

- Floor vents

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

- The space required by the equipment

- Service clearance - the floor space required to access the storage system.

- Additional space required to distribute the equipment weight on your computer room's raised floor. The amount of additional space required depends on your floor load rating.

- Additional space required to view the storage system LEDs on the front and rear panels.
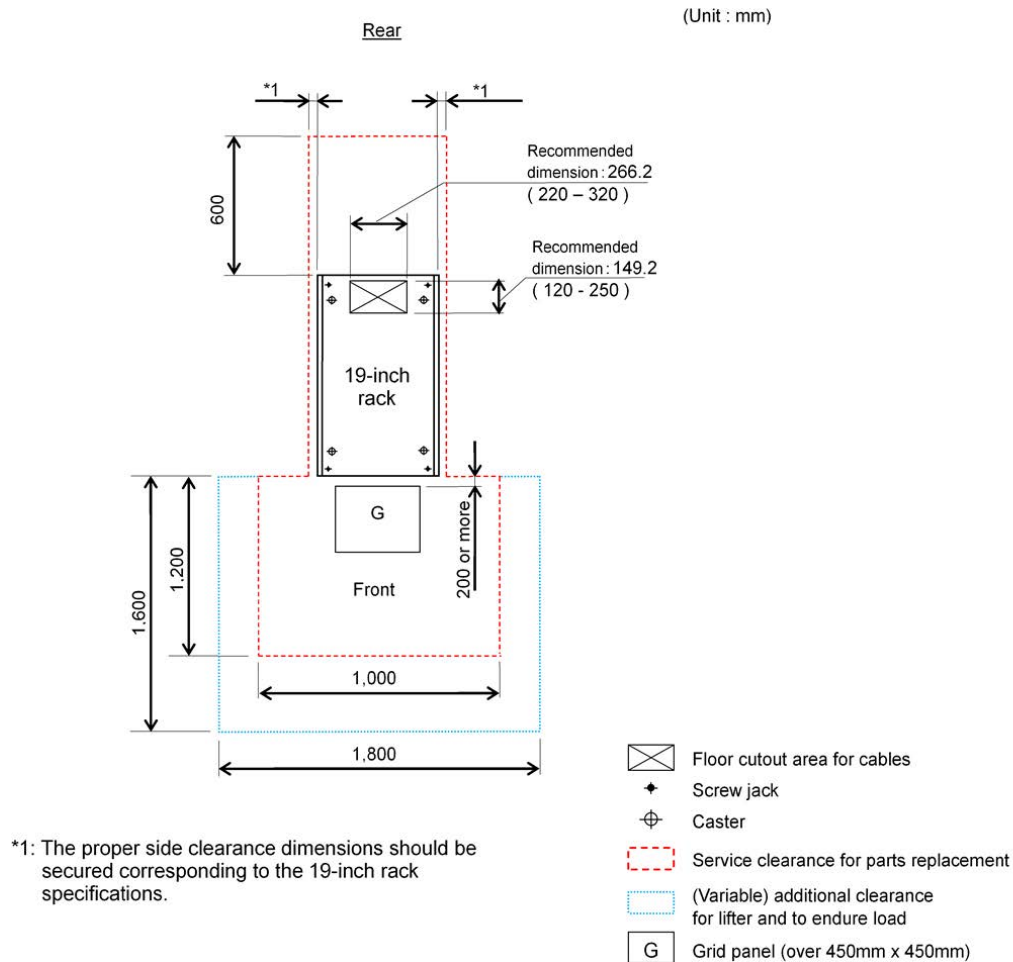
Cable management

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.

Using the BECK tool

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

System requirements

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

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

Drive tray specifications

Model	Drive count	Unit size (U)	Path	Number of drive tray connections				Maximum number of drives[1]	Maximum number of drives per path
				LFF	SFF	FMD	Dense intermix		
VSP G350	SFF: 24	2	1	7	7	N/A	4	264	264
VSP G370	LFF: 12	2	1	11	11	N/A	6	384	384

Chapter 1: Installation site considerations

| Model | Drive count | Unit size (U) | Path | Number of drive tray connections | | | | Maximum number of drives[1] | Maximum number of drives per path |
				LFF	SFF	FMD	Dense intermix		
VSP G700	—	4	2	36	36	36	20	1200	600
VSP G900	—	4	4[2]	24	24	24	24	1440	360
	—	4	8[3]	48	48	48	24	1440	360

Notes:

1. The maximum number of drives may be limited depending on the mounting pattern when LFF, SFF, FMD, or dense intermix drive trays are used together.
2. For a VSP G900, the following values apply when the DKB option is set to OFF.
3. For a VSP G900, the following values apply when the DKB option is set to OFF.

| Model | Drive count | Unit size (U) | Path | Number of FMD drive tray connections | | Maximum number of drives | Maximum number of drives per path |
				DBS	FMD		
VSP F350	SFF: 24	2	1	7	N/A	192	192
VSP F370	SFF: 24	2	1	11	N/A	288	288
VSP F700	—	4	2	36	36	864	432
VSP F900	—	4	4[1]	24	24	1152	288
	—	4	8[2]	48	48	1152	144

Notes:

1. For a VSP F900, the following values apply when the DKB option is set to OFF.
2. For a VSP F900, the following values apply when the DKB option is set to OFF.

Chapter 1: Installation site considerations

Installing the BECK tool

Procedure

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

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

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

Uninstalling the BECK tool

Procedure

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

BECK tool at a glance

Procedure
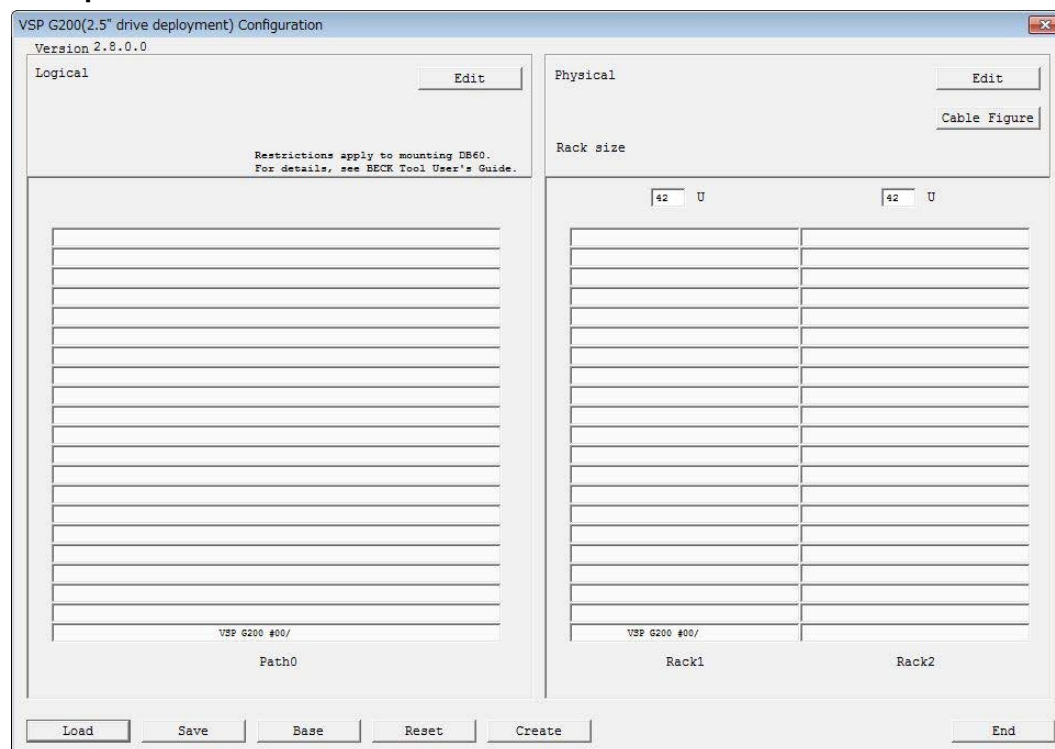
1. Select a language from the **Language** dialog box.

   - English

   - Japanese

2. At the **Array Unit Type** dialog box, click an array unit type or enter a box code of up to 8 alphanumeric characters.

   You can enter the serial unit number and an optional name as the box code. A configuration screen appears that corresponds to the array unit type selected in the **Array Unit Type** dialog box.

3. Create logical and physical configuration figures.

   - Automatically by specifying the number of units.

   - Manually by entering values in supplied fields.

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

Configurations in the configuration file for the BECK tool can also be loaded and saved.
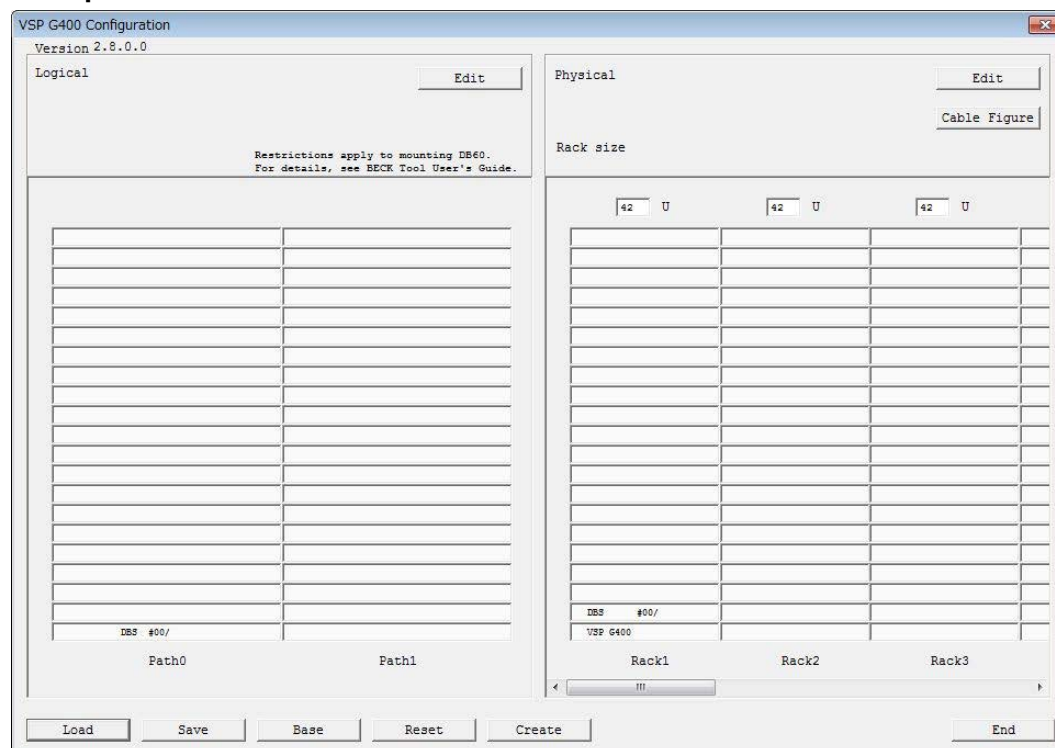
4. A cable figure appears based on the logical and physical configuration figures.

Example of VSP G350/G370 screen

Example of VSP G700 screen

Example of VSP G900 screen

Chapter 1: Installation site considerations
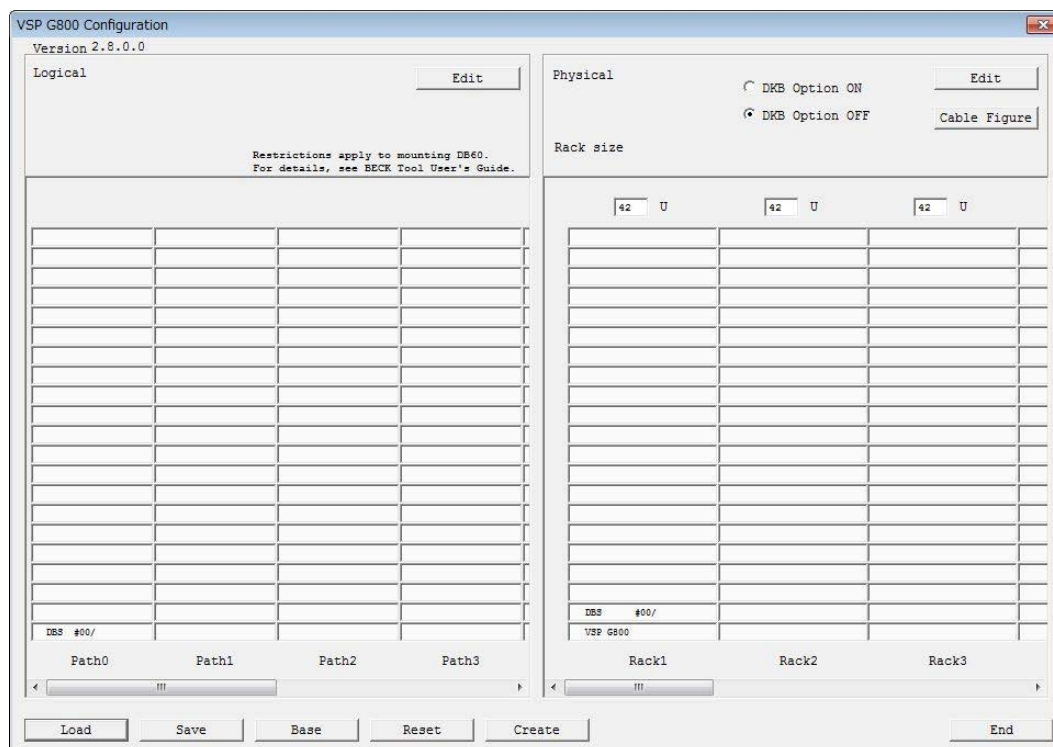
Screen element	Description
Logical	Displays units, unit IDs, and box codes in each path.
Version	Shows the BECK tool version.
Edit button	Click the button to edit the logical configuration figure manually.
Physical	Displays units, unit IDs, and box codes in each rack (up to 2).
Physical	Displays units, unit IDs, and box codes in each rack (up to 10).
Physical	Displays units, unit IDs, and box codes in each rack (up to 10).
Single and Dual buttons	N/A
Edit (Physical)	Lets you edit the physical configuration figure manually.
Cable figure button	Displays the SAS (ENC) cable figure
Rack size	Size of each rack, specified in 0 to 42 U.
End button	Closes the configuration screen.

Chapter 1: Installation site considerations

Screen element	Description
Create button	Creates the configuration edited in the logical and physical configuration figures. Displays units, unit IDs, and box codes in the logical and physical configuration figures.
Reset button	Resets the created configuration (units, unit IDs, and box codes). If you load a simple trace, clicking this button redisplays the configuration screen that was shown after the simple trace was loaded. If loading a configuration information file, the configuration screen displayed after the configuration information file was loaded is redisplayed.
Base button	Displays units and unit IDs in the Logical and Physical configuration figures automatically created after you enter the number of LFF, SFF, FMD, and dense intermix drive trays.
Save button	Saves configuration information to a CSV file.
Load button	Loads configuration information from a CSV file.
DKB Option ON	DKB Option ON is selected in the Configuration screen. The number of back end modules is assumed to be 8 per system. The number is updated after a configuration is created.
DKB Option OFF	DKB Option OFF is selected in the Configuration screen. The number of back end modules is assumed to be 4 per system. By default, the DKB Option OFF is selected. The number is updated after a configuration is created.

Starting the BECK tool

Procedure

1. Store the executable file on your computer's desktop.
2. In the `BECK_Tool_wxyz` folder, run the BECK executable file `BECK_Tool.exe`.

3. At the **Language** dialog box, click a language, and then click **OK**.
   The selected language will be used in the subsequent screens.

4. At the **Array Unit Type** dialog box, perform one of the following steps:

   - Click a storage system from the menu.

   - Enter the system's box code, up to 8 alphanumeric characters, or enter the system's serial unit number and optional name as the box code.

5. Click **OK**.
   The configuration screen appears.

BECK tool configuration screen

The configuration screen consists of Logical and Physical areas:

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

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

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

Creating new configurations

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

Creating a configuration automatically

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

Procedure

1. In the configuration screen, click **Base**.

2. At the **Number of Drive Box** dialog box, change the values shown for the number of drive trays.

3. Click **OK**.
   Using the entered values, the BECK tool generates logical and physical configuration figures. Drive trays are added to a path and rack for each storage system in the following order: FMD, dense intermix drive tray, SFF, and LFF

4. Click **Cable Figure**.
   A cable figure is displayed based on the logical and physical configuration.

Creating a configuration manually

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

Procedure

1. In the logical or physical figure of the configuration screen, click the **Edit** button or left-click the areas of the logical or physical configuration figure.

2. If you clicked **Edit** in the physical figure, the message `May logical configuration figure be initialized?` appears. Click **OK** to remove the message.

3. All the units, unit IDs, and box codes in the logical configuration figure are cleared and the physical configuration figure is highlighted in light green. Right-click an empty box in a rack.
   The clicked box is highlighted in orange and the **Select Box** dialog box opens.

4. In the **Select Box** dialog box, click the desired drive tray.

   ▪ You can optionally enter a box code for the selected drive tray in the Enter box code (optional) field.

5. Click **OK**.
   The selected drive tray appears in the box you clicked in the physical configuration figure.

6. Click **Create**.
   The logical configuration figure is updated based on the changes made. Unit IDs are assigned automatically.

7. Click **Cable Figure**.
   The BECK tool creates and displays a cable figure based on the logical and physical configuration figure.

Editing the logical configuration figure

Procedure

1. In the logical configuration figure, click **Edit**, or click the area in the logical configuration figure.

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

Example

From this screen, you can:

▪ Assign units to a path.

▪ Move and exchange drive trays.

Assigning units to a path

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

▪ Set a unit in an empty box in a path (described below).

▪ Change or delete a drive tray in the path.

▪ Edit storage system controller box codes.

Procedure

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

2. In the **Select Box** dialog box, click the desired drive tray.

   ▪ You can optionally enter the box code for the selected drive tray in the **Enter box code (optional)** box.

3. Click **OK**.
The selected drive tray appears in the box in the logical configuration figure.

Changing or deleting a drive tray in a path

Procedure

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

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

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

Editing box codes for a controller

Procedure

1. In the logical configuration figure, right-click a controller in the path or a box where you want to set a controller (bottom box of the logical configuration figure).

2. The box is highlighted in orange and the **Select Box** dialog box opens, with a controller and box code displayed. If you registered the drive tray, the displayed box code can be edited. If no controller appears in the configuration screen, click **OK** to add a controller to the configuration screen.

3. From here, you can:

   ▪ Assign a unit in an empty box in a path.

   ▪ Change or delete a drive tray in a path.

   ▪ Assign controllers and edit their box codes.

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

Moving and exchanging drive trays

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

Procedure

1. Click an existing drive tray in the path.
   The existing drive tray is highlighted in orange.

2. Click the existing drive tray.

3. Drag the existing drive tray to the destination drive tray.

   An empty tray can be the destination; however you cannot specify a controller and empty trays for controller as the destination.

   Drive trays are exchanged, the box is highlighted in orange, and the unit ID and box code are exchanged accordingly.

4. After moving and exchanging units by dragging and dropping them, click **Cable Figure** to display the cable figure.

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

Editing the physical configuration figure

Procedure

1. In the physical configuration figure, click **Edit** or click the physical configuration figure.

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

3. From this screen, you can:

   - Set rack size.

   - Assign units to a rack or set up an empty rack box.

   - Move and exchange units.

Setting the rack size

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

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

- VSP G350 and VSP G370VSP F350 and VSP F370: 2U

- VSP G700VSP F700: 4U

- VSP G900VSP F900: 4U

Two racks are available to set the rack size.

Ten racks are available to set the rack size.

Use scroll bar to edit rack 4 or more.
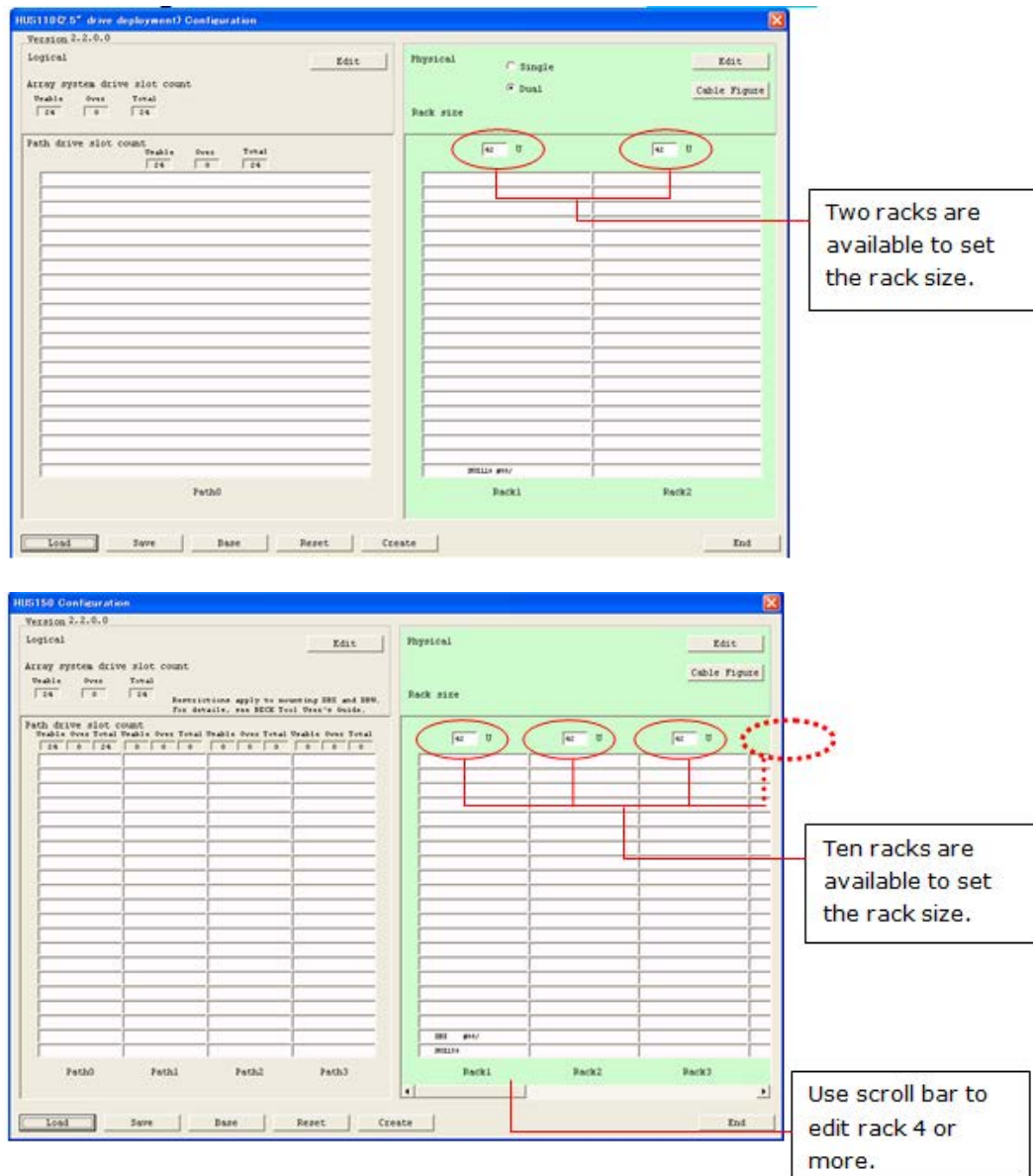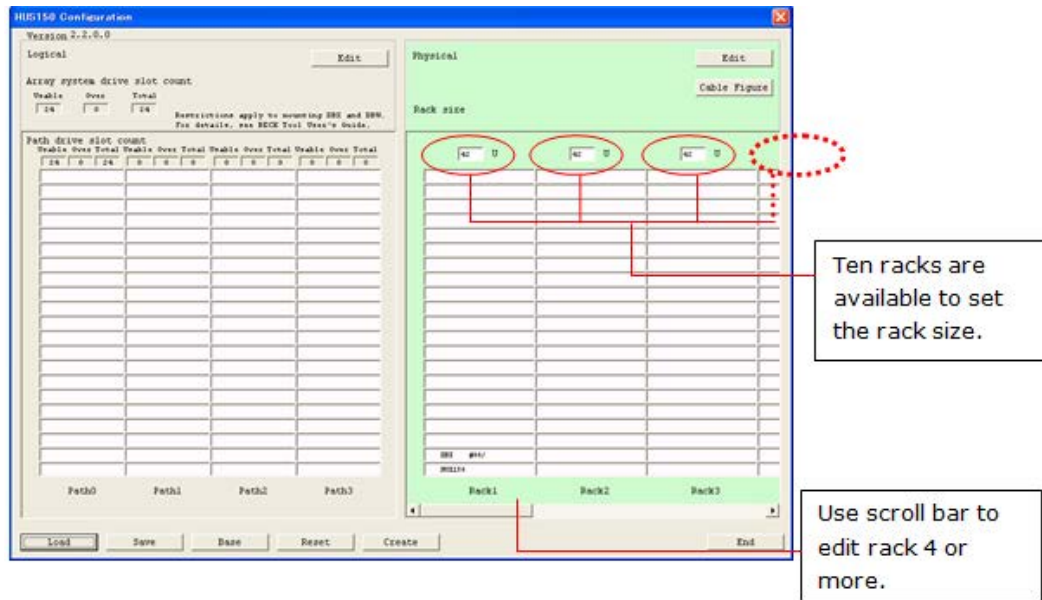
Setting units to a rack or an empty rack box

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

- Set drive tray in an empty rack.
- Change or delete a drive tray.

Setting a drive tray in an empty rack box

Procedure

1. Right-click an empty box for racks when the physical configuration figure can be edited.
   The selected box is highlighted in orange and the **Select Box** dialog box opens.
2. In the **Select Box** dialog box, click the desired drive tray.

   - You can optionally enter a box code for the selected drive tray in the **Enter box code (optional)** field.

3. Click **OK**.
   The selected drive tray appears in the box.

Changing or deleting a drive tray

Procedure

1. Right-click a drive tray in the rack.
2. The selected drive tray is highlighted in orange and the **Select Box** dialog box opens. The button of the drive tray corresponds to the drive box type you selected.

   - If you registered the drive tray, a box code is also displayed.

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

Procedure

1. Right-click a controller in Rack1 or right-click an empty box in the rack area if no controller is displayed.

2. The box is highlighted in orange and the **Select Box** dialog box opens, with the controller and its box code is displayed.

   ▪ If you registered the controller, a box code is displayed and can be edited.

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

   Controller can be added only in Rack 1.

3. From this screen, you can:

   ▪ Set a drive tray in an empty rack box.

   ▪ Change or delete a drive tray.

   ▪ Set a controller or edit its box code.

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

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

Configuration with DKB Option OFF/ON

If you select VSP G900 or VSP F900 as a controller box, the DKB Option OFF and DKB Option ON buttons appear in Physical in the **Configuration** screen.

If **DKB Option OFF** is selected, you can create a configuration with an array whose number of DKBs are 4 DKBs/system. Alternatively, you can select **DKB Option ON** to create a configuration with an array whose number of back end modules are 8 per system.

Button	Configurable path	Maximum number of Drive Box connections
DKB Option OFF (default)	From Path 0 to Path 4	See BECK drive box specifications (on page 15) .
DKB Option ON	From Path 0 to Path 7	See BECK drive box specifications (on page 15) .
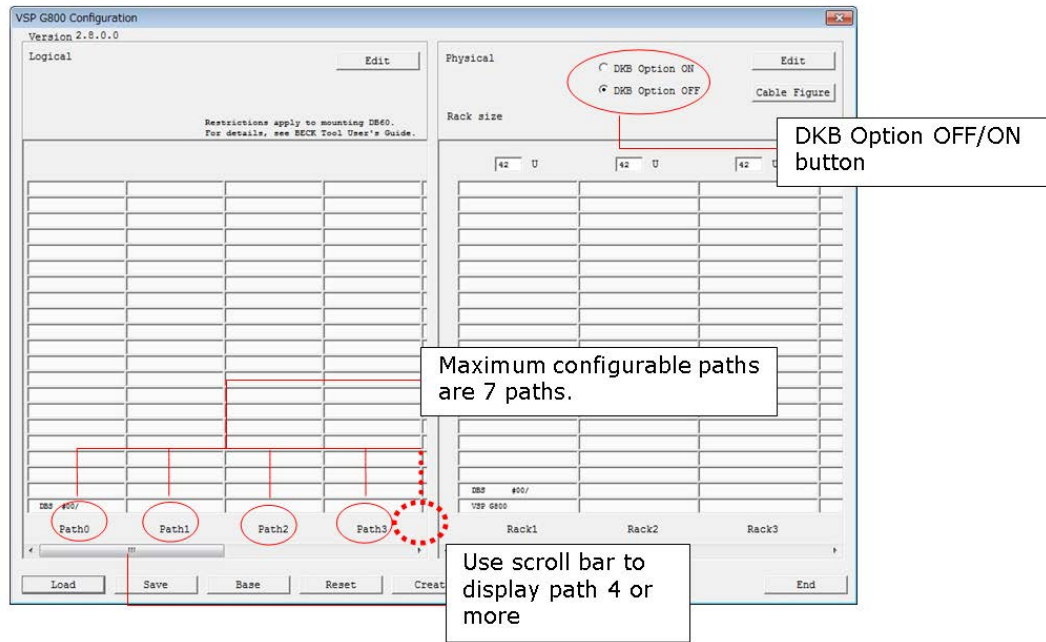
Moving and exchanging units

Procedure

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

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

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

Working with cable figures

The Cable Figure screen shows logical and physical configuration figures.

The total number of racks that can be shown is 2 [U].

The total number of racks that can be shown is 4 [U].

The total number of racks that can be shown is 4 [U].

Sizes

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

- VSP G700 and VSP F700 4U

- VSP G350, VSP G370, VSP F350, and VSP F370 2U

Buttons and fields
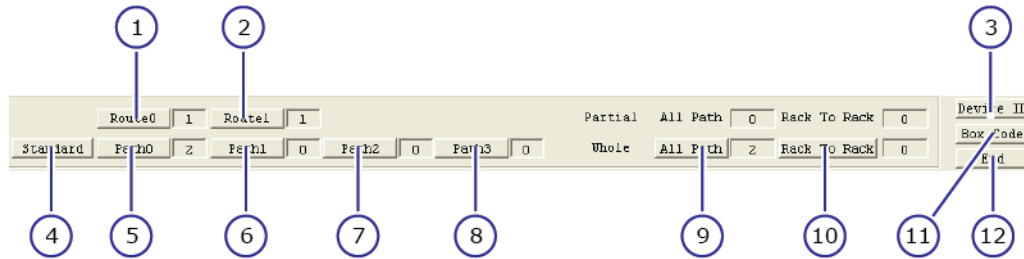
Number	Name	Description
1	Route0	Highlights of SAS (ENC) cables connected to the unit of controller 0.
2	Route 1	Highlights of SAS (ENC) cables connected to the unit of controller 1.
3	unit ID	Shows or hides unit IDs (Default: on).
4	Standard	Clears all highlighted SAS (ENC) cables in the Cable Figure screen.
5	Path0	Hightlights SAS (ENC) cables connected to Path0.
6	Path1	N/A
7	Path2	N/A
8	Path3	N/A
9	All Path	Highlights SAS (ENC) cables connected to all the paths.
10	Rack to Rack	Highlights SAS (ENC) cables connected between racks.

Number	Name	Description
11	Box Code	If box codes are assigned to units, clicking this button shows or hides the box codes.
12	End	Closes the Cable Figure screen.

Working with cable figures

Procedure

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

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

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

Working with cable figures in rack boxes

Procedure

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

Chapter 1: Installation site considerations

Expanding a configuration

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

Procedure

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

   - If the trace file is stored in another directory, select the trace file belonging to the storage destination.

   - If one simple trace file is collected for a storage system, select the trace file of the load target.

   - If the trace file resides in another directory, when one simple trace file is collected in the storage system, select the trace file of the load target.

   - If there are multiple simple trace files, selecting an optional trace file loads the other trace files automatically. If the other simple trace file resides in the same directory, a load error occurs.

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

   A **Rack size** dialog box opens.

6. Enter the size of each rack and click **OK**.

   Default size is 42 U.

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

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

    You can optionally enter the box code for the selected drive tray.
12. Click **OK**.
    The selected drive tray is displayed in the box in the logical configuration figure.

Chapter 1: Installation site considerations

13. Click **Create**.
    Changes made are displayed in the physical configuration figure. Unit IDs are assigned automatically.

14. Click **Cable Figure** to display the cable figure based on the expansion.

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

Simple trace default file name

A simple trace default file uses the following naming convention:

`smpi_trc#_xxxxxxxxxx_YYYYMMDDhhmmss_$%.dat`

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

Saving and loading a configuration file

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

Saving a configuration file

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

Procedure

1. In the configuration screen, click **Save**.
   The **Save As** dialog box opens.

2. In the **Save As** dialog box, select a folder where you want to save the file.

3. Click **Save** to save the file.

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

About the configuration file

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

- If the box code is not entered, the file name consists of the controller box name selected in the **Array Unit Type** dialog box with the extension `.csv`.

- When the box code is entered, the file name consists of the controller box name selected in the **Array Unit Type** dialog box, plus an underscore, plus the box code (up to eight alphanumeric characters), with the extension `.csv`.

Observe the following guidelines when saving a configuration file:

- If you save the configuration information file while editing the configuration in the Logical or Physical configuration figure, the file is saved with the array unit configuration unchanged.

Observe the following guidelines when loading a configuration file:

- If you click Reset after editing a loaded configuration information file, the previous configuration figure screen is recovered.

- If you load the configuration information file that was saved while editing the configuration in the Logical or Physical configuration figure, the array unit configuration displayed in the Logical or Physical configuration figure is unchanged.

Loading a configuration file

Procedure

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

BECK tool messages

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

Chapter 1: Installation site considerations

Message	Corrective action
`DBF has more rack-mountable numbers than allowed`	Re-examine the unit configuration. Display the **Select Box** dialog box and delete the FMD.
`DB60 has more rack-mountable numbers than allowed`	Re-examine the unit configuration. Display the **Select Box** dialog box and delete the dense intermix drive tray.
`The total number of Drive Boxes mountable exceeds its maximum numbers allowed.`	Re-examine the unit configuration. Reduce the total number of drive trays within the limit maximum numbers on the **Select Box** dialog box.
`The number of installable Drive Boxes exceed its maximum numbers allowed.`	Re-examine the unit configuration. Reduce the total number of drive trays within the limit maximum numbers on the **Select Box** dialog box.
`Maximum Drive Boxes count per path was exceeded.`	Re-examine the unit configuration. Specify the drive tray count per path within the upper limit in the **Select Box** dialog box.
`Rack-mountable drive numbers per path are exceeded.`	Re-examine the unit configuration. Reduce the total number of drives per path within the limit of maximum drive numbers on the **Select Box** dialog box.
`Select one or more Drive Boxes.`	In the **Select Box** dialog box, set any input value to more than 1.
`More units are set to path 1 than to path 0.`	In the Logical configuration figure, set the same number of units to path 0 and path 1, or set one more unit to path 0 than path 1.
`More units are set to path 2 than to path 1`	In the Logical configuration figure, set the same number of units to path 1 and path 2, or set one more unit to path 1 than path 2.
`More units are set to path 3 than to path 2.`	In the Logical configuration figure, set the same number of units to path 2 and path 3, or set one more unit to path 2 than path 3.

Chapter 1: Installation site considerations

Message	Corrective action
`Two or more units are set to path 0 than path 1.`	In the Logical configuration figure, set the same number of units to path 0 and path 1, or set one more unit to path 0 than path 1.
`Two or more units are set to path 1 than path 2.`	In the Logical configuration figure, set the same number of units to path 1 and path 2, or set one more unit to path 1 than path 2.
`Two or more units are set to path 2 than path 3.`	In the Logical configuration figure, set the same number of units to path 2 and path 3, or set one more unit to path 2 than path 3.
`Unit of path 0 side skips one or more units.`	In the Logical configuration figure, do not have space between the units in path 0.
`Unit of path 1 side skips one or more units.`	In the Logical configuration figure, do not have space between the units in path 1.
`Unit of path 2 side skips one or more units.`	In the Logical configuration figure, do not have space between the units in path 2.
`Unit of path 3 side skips one or more units.`	In the Logical configuration figure, do not have space between the units in path 2.
`The total size of mounted units exceeds the rack size.`	Re-examine the size of each rack or reallocate the units to fit the allowed size of each rack.
`The Controller Box location cannot be changed.`	The controller location is nontransferable. Do not click there.
`Log file loading has failed.`	▪ Provide sufficient space for storing the trace file. ▪ Check access authorization to the folder. ▪ Check whether another application is trying to access the folder that contains the trace file.
`Log file contains inaccurate information.`	▪ Confirm whether there are trace files other than the input file in the folder. ▪ Trace file may be corrupt. Re-examine the trace file. ▪ Confirm that the trace file is from a VSP G700 or VSP F700.

Chapter 1: Installation site considerations

Message	Corrective action
`Log file contains inaccurate information.`	- Confirm whether there are trace files other than the input file in the folder. - Trace file may be corrupt. Re-examine the trace file. - Confirm that the trace file is from a VSP G900 orVSP F900
`Configuration information file loading has failed.`	- Re-examine the configuration file. - Provide sufficient space for storing the configuration file. - Check access authorization to the folder where the configuration file is located. - Check whether another application is trying to access the folder that contains the configuration file.
`Configuration information file saving has failed.`	- Provide sufficient space for storing the configuration file. - Check the access authorization to the folder where the configuration file is located. - Check whether another application is trying to access the folder that contains the configuration file. - Check whether the configuration exceeds unit connection support specification 360HDD OFF.
`Set the Controller Box.`	Set a controller to the logical or physical configuration figure.
`The rack sides exceeds the maximum value 42.`	Set the rack size to `42` or below.
`The rack size of 1 is insufficient.`	Set the size of rack 1 to 2.
`The rack size of 1 is insufficient.`	Set the size of rack 1 to 4.
`Set the Drive Box.`	Set one or more drive trays.
`Unable to set the Drive Box below the controller.`	Set a drive box above a controller.

Chapter 1: Installation site considerations

Message	Corrective action
`Rack height is insufficient.`	Operate it again at the size shown in the maximum unit size screen.
`Unable to set at the specified location.`	▪ If DBX-A is selected, do not set it to the highest place of maximum path in the logical configuration figure. ▪ If DBX-B is selected, do not set it to the lowest place of the smallest path in the logical configuration figure. ▪ Set a controller only in Rack 1.
`Unable to select because unit exists on right side of the unit.`	▪ Move the unit on the right side of the exchange destination to a different location and then re-execute. ▪ If DBX is specified in the **Select Box** dialog box, be sure the cell on the right side is blank.
`Unable to select because unit exists on left side of the unit.`	Move the unit on the left side of the exchange destination to a different location, and then re-execute.
`Enter box code within 8-alphanumeric characters.`	Enter the box code, up to eight alphanumeric characters.
`Enter box code within 15 alphanumeric characters.`	Enter the box code within 15 alphanumeric characters.
`Install UNLHA32.dll in the Windows system folder.`	Click the Load Log button after storing the file `UNLHA32.DLL` in the Windows system folder.
`ini file has not stored in program folder, or ini file loading has failed.`	▪ Store the INI file in the `BECK_Tool_wxyz` folder. ▪ Exchange the INI file or the `BECK_Tool.exe` file.
`More than on ini files are stored in the program folder.`	Store only one INI file in the `BECK_Tool_wxyz` folder.
`One or more setting values in ini file are incorrect.`	The INI file may be corrupt. Exchange the INI file.
`BECK tool is already running.`	Confirm whether the BECK tool is not running.

Chapter 1: Installation site considerations

Message	Corrective action
`System error has occurred. Exit the tool and execute it once again.`	Unexpected error occurred. Close the BECK tool and then start it again.
`May physical configuration figure be initialized?`	Click OK or Cancel.
`May logical configuration figure be initialized?`	Click OK or Cancel.
`May physical configuration and logical configuration figure be initialized?`	Click OK or Cancel.
`Current configuration figure will be discarded if the screen is closed without saving. Continue to close the screen.`	Click OK or Cancel.
`Specified file already exists. Overwrite?`	Click OK or Cancel.
`Cancel to read Log file?`	Click OK or Cancel.
`Unit is set in path 7 from path 4.`	Set a unit from path 0 to path 3.

Special guidelines

Dense intermix drive tray configuration rules

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

Yellow box in the configuration screen

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

Procedure

1. In the Configuration screen, create a configuration.

2. In the configuration screen, the yellow box shows drive slots that cannot be used.

   The number of drive slots appears at **Over** in **Path drive slot count**. Drive slots that have larger drive numbers in the box cannot be used by the number indicated at **Over**.

   A yellow box appears when there are drive slots that cannot be used in the box. For these cases, we recommend you do not add the box.

Loading a simple trace when Unit A of a DBX is connected last

If you collect a simple trace file when Unit A of a DBX drive tray is connected last in the configuration, Unit B of the DBX in the Logical configuration figure and DBX in the Physical configuration figure are displayed in cyan in the **Configuration** screen. This indicates Unit B is not connected because the unit connected last is Unit A of the DBX, which consists of Unit A and Unit B. You can reference the cable figure where only Unit A of the DBX is connected.

Procedure

1. In the **Array Unit Type** dialog box, click **Load log** to load a simple trace of the configuration, where Unit A of a DBX is connected last.

   After it is loaded, Unit B of the DBX in Logical configuration figure and the DBX in Physical configuration figure are shown in cyan.

   The number of drive slots in Unit B of DBX is not reflected in the **Array system drive slot count** and **Path drive slot count** because Unit B of the DBX is not connected.

2. Click **Cable Figure** to display the cable figure.

   No SAS (ENC) cable is connected to Unit B of the DBX because the Unit A of the DBX is connected last.

   If you collect a simple trace file when Unit A of a DBX drive box is connected last in the configuration, you cannot click **Create** on the configuration screen. When the Logical and Physical configuration figure can be edited, Unit B of a DBX is not displayed in cyan and **Create** can be clicked.

Floor load ratings

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

- Controller
- Drive trays
- Rack
- All associated equipment

To verify adequate load-bearing capacity, plan for the maximum configuration. The following table lists the weight for maximum configurations. The table also applies to third-party racks. The weights below do not include the rack itself, so add the weight of the rack to the values shown below. The maximum allowable weight in the Hitachi rack is 907 kg (2,000 lbs). For more information about racks, see the *Hitachi Universal V2 Rack Reference Guide*.

Table 1 CBSS and physical SVP

Component	Drive trays	Weight
CBSS controller	7 SFF drive trays	565 kg (1245.6 lbs)
	7 LFF drive trays	562 kg (1239.0 lbs)
	7 FMD drive trays	623 kg (1373.4 lbs)
	4 dense intermix drive trays	709 kg (1563.1 lbs)
Physical SVP	N/A	4.5 kg (10 lbs)

Table 2 CBSL and physical SVP

Component	Drive trays	Weight
CBSL	7 SFF drive trays	567 kg (1294.1 lbs)
	7 LFF drive trays	564 kg (1243.4 lbs)
	7 FMD drive trays	625 kg (1377.9 lbs)
	8 dense intermix drive trays	1395 kg (3075.4 lbs)
Physical SVP	N/A	4.5 kg (10 lbs)

Chapter 1: Installation site considerations

Table 3 CBL and physical SVP

Component	Drive trays	Weight
CBL	48 SFF drive trays	2829 kg (6236.9 lbs)
CBL	48 LFF drive trays	2810 kg (6195 lbs)
CBL	48 FMD drive trays	3251 kg 7167.2 lbs
CBL	24 dense intermix drive trays	3717 kg (8194.6 lbs)
Physical SVP	N/A	4.5 kg (10 lbs)

Non-Hitachi rack support

The storage system supports non-Hitachi racks that meet Hitachi specifications.

Observe the following mounting guidelines for non-Hitachi racks:

- The VSP Gx00 models VSP Fx00 models support any 4-post, EIA-310-D compliant rack that has adequate airflow and weight capacity.

- PDUs must be mounted properly to avoid any issues while servicing the storage system. 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 4 Rail kits for VSP Gx00 models 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]

Chapter 1: Installation site considerations

Rail kit	Hitachi Universal V2 Rack	Third-party rack
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:		
1. UNI: Universal rail kit A34V-600-850-UNI.		
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 G series VSP F series storage systems.

**Table 5 Accessories for the Hitachi Universal V2 Rack**

Storage system	Front door	Rear door	Side panels
VSP Gx00 models 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 Gx00 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.
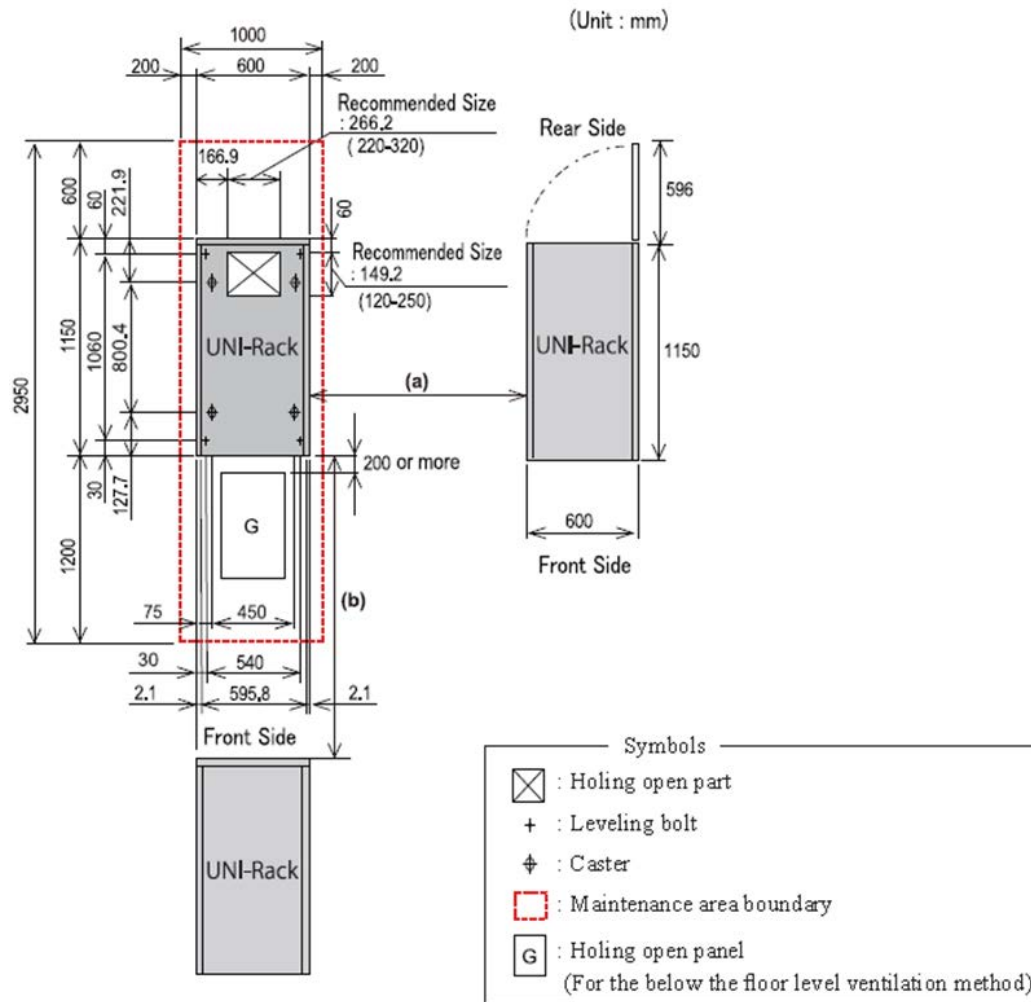
Raised and non-raised floors

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

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

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

▪ Provides efficient cooling.

▪ Makes it easy to accommodate cabling layouts.

▪ Prevents tripping hazards because cables are routed below the raised floor.

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

- The raised floor must be built of noncombustible materials.

- Treat concrete subfloors to prevent them from releasing dust.

- Confirm there is positive air pressure below the raised floor to verify adequate airflow.

- The raised floor clearance must be adequate to accommodate cables. Remove all unused cables from the area below the raised floor to prevent these areas from becoming dust and dirt traps.

- Eliminate sharp edges on floor cutouts to avoid damage to cables.

- Apply sealant to raised-floor cable openings to prevent chilled air from escaping.

- For metallic raised floor structures, it is a safety hazard to expose metal or highly conductive material at ground potential to the walking surface.

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

Floor covering and cutouts

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

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

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

Meeting environmental conditions

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

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

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

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

Maintaining the optimal temperature

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

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

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

Your storage system can tolerate temperature and humidity fluctuations if the specified ranges are followed. Exceeding the maximum temperature and humidity ranges for any period of time, however, can affect storage system performance adversely. To ensure that the ambient temperature near the intake at the front of the storage system does not exceed system specifications, verify that the location where the storage system will be installed has a cooling system that can support all thermal emissions.

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

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

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

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

Earthquake considerations

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

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

Chapter 2: Power requirements

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

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.

Electrical requirements

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

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

- VSP F350 and 370 or G350 and G370: single phase 100-120 VAC or 200-240 VAC
- VSP F700 or F900 and G700 or G900: single phase 200-240 VAC

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

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

Power considerations

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

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

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

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.
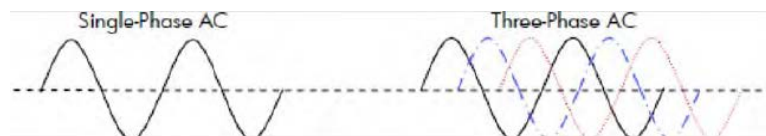
Sources of electrical interference

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

The following table provides examples of electrical interference.

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

Branch circuits

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

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

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

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

Emergency power control

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

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

Appendix A: Site preparation checklist

Verify the availability of each item in the site preparation checklist.

The following tasks might require several weeks to complete:

- Acquiring required power outlets.
- Arranging for an electrician.
- Adding or modifying air conditioning systems.
- Making room alterations to accommodate the storage system.
- Ordering third-party equipment, such as non-Hitachi racks, network switches, and host computers to support the Hitachi VSP storage system.

Checklist questions	Yes	No
Safety		
Is the computer room free of any equipment servicing hazards, such as electrical or data cables that obstruct access?		
Does the computer room have a fire-protection system?		
Computer room space planning		
Does the existing floor plan need to be revised to include the storage system?		
Does the floor plan include the clearance required for the floor's load rating?		
Does the floor plan include adequate space for airflow and servicing needs?		
Computer room infrastructure		

Checklist questions	Yes	No
Is the computer room structurally complete (walls, floor, air conditioning system, and so on)?		
If there is a raised floor, is the floor adequate for the equipment load?		
Is antistatic flooring or mats installed?		
Are there cutouts or channels to route cables?		
Does the room have access to the storage and IP networks?		
Can the temperature be maintained between 50° to 104°F (10° to 40°C)?		
Can the humidity level be maintained between 8% and 80%?		
Is the computer room protected against dust, pollution, and metallic particulate contamination?		
Does the computer room take into account environmental considerations, such as vibration and acoustics?		
Is all equipment not supplied by Hitachi (for example, connectors, receptacles, and network switches) on site and ready for use?		
Computer room electrical requirements		

Checklist questions	Yes	No
Is there a sufficient number of AC outlets for the equipment?		
Are the AC outlets on different lines?		
Does the input voltage correspond to the PDU rack specifications?		
Are the input circuit breakers adequate for equipment loads?		
Are uninterruptible power supplies (UPS) in place?		
Have all sources of electrical interferences been addressed?		
Site access and security		
Does the site enforce access controls (for example, will Hitachi representatives need an escort)?		
Are all floors, stairs, elevators, ramps, or ladders adequate to support the size and weight of the storage system?		
Will the equipment fit through all doors and corridors and in elevators?		
If the site has a loading dock, enter the maximum access height: _____inches or m.		

Hitachi Vantara Corporation