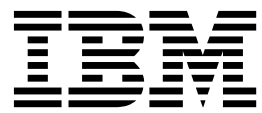


IBM Storwize V5000 Gen2

Quick Installation Guide



Note

Before using this information and the product it supports, read the following information:

- The general information in “Notices” on page 51
- The information in the “Safety and environmental notices” on page ix
- The information in the *IBM Environmental Notices and User Guide* (provided on a DVD)

This edition applies to IBM Storwize V5000 and is valid until replaced by new editions.

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Safety and environmental notices

Review the safety notices, environmental notices, and electronic emission notices for IBM® Storwize® V5000 Gen2 before you install and use the product.

Suitability for telecommunication environment: This product is not intended to connect directly or indirectly by any means whatsoever to interfaces of public telecommunications networks.

Here are examples of a caution and a danger notice:

CAUTION:

A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)

DANGER

A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)
--

To find the translated text for a caution or danger notice:

1. Look for the identification number at the end of each caution notice or each danger notice. In the preceding examples, the numbers (C001) and (D002) are the identification numbers.
2. Locate the *IBM Systems Safety Notices* with the user publications that were provided with the Storwize V5000 Gen2 hardware.
3. Find the matching identification number in the *IBM System Storage Storwize V5000 Gen2 Safety Notices*. Then, review the topics concerning the safety notices to ensure that you are in compliance.
4. Optionally, read the multilingual safety instructions on the Storwize V5000 Gen2 website. Go to www.ibm.com/storage/support/storwize/v5000, search for Storwize V5000 Gen2, and click the documentation link.

Safety notices and labels

Review the safety notices and safety information labels before using this product.

To view a PDF file, you need Adobe Acrobat Reader. You can download it at no charge from the Adobe website:

www.adobe.com/support/downloads/main.html

IBM Systems Safety Notices

This publication contains the safety notices for the IBM Systems products in English and other languages. Anyone who plans, installs, operates, or services the system must be familiar with and understand the safety notices. Read the related safety notices before you begin work.

Note: The *IBM System Safety Notices* document is organized into two sections. The danger and caution notices without labels are organized alphabetically by language

in the “Danger and caution notices by language” section. The danger and caution notices that are accompanied with a label are organized by label reference number in the “Labels” section.

Note: You can find and download the current *IBM System Safety Notices* by searching for Publication number **G229-9054** in the IBM Publications Center.

The following notices and statements are used in IBM documents. They are listed in order of decreasing severity of potential hazards.

Danger notice definition

A special note that emphasizes a situation that is potentially lethal or extremely hazardous to people.

Caution notice definition

A special note that emphasizes a situation that is potentially hazardous to people because of some existing condition, or to a potentially dangerous situation that might develop because of some unsafe practice.

Note: In addition to these notices, labels might be attached to the product to warn of potential hazards.

Finding translated notices

Each safety notice contains an identification number. You can use this identification number to check the safety notice in each language.

To find the translated text for a caution or danger notice:

1. In the product documentation, look for the identification number at the end of each caution notice or each danger notice. In the following examples, the numbers (D002) and (C001) are the identification numbers.

DANGER

A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)

CAUTION:

A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)

2. After you download the *IBM System Safety Notices* document, open it.
3. Under the language, find the matching identification number. Review the topics about the safety notices to ensure that you are in compliance.

Note: This product was designed, tested, and manufactured to comply with IEC 60950-1, and where required, to relevant national standards that are based on IEC 60950-1.

Caution notices for the Storwize V5000 Gen2

Ensure that you understand the caution notices for Storwize V5000 Gen2 .

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

CAUTION:

The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not: Throw or immerse into water, heat to more than 100°C (212°F), repair or disassemble. (C003)

CAUTION:

Removing components from the upper positions in the rack cabinet improves rack stability during a relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building.

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions.
 - Remove all devices in the 32U position and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
 - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off the pallet and bolt the rack cabinet to the pallet.

(R002)

CAUTION:

- Rack is not intended to serve as an enclosure and does not provide any degrees of protection required of enclosures.
- It is intended that equipment installed within this rack will have its own enclosure. (R005).

CAUTION:

Tighten the stabilizer brackets until they are flush against the rack. (R006)

CAUTION:

Use safe practices when lifting. (R007)

CAUTION:

Do not place any object on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf. (R008)

CAUTION:

If the rack is designed to be coupled to another rack only the same model rack should be coupled together with another same model rack. (R009)

Danger notices for Storwize V5000 Gen2

Ensure that you are familiar with the danger notices for Storwize V5000 Gen2 .

Use the reference numbers in parentheses at the end of each notice, such as (C003) for example, to find the matching translated notice in *IBM Systems Safety Notices*.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- If IBM supplied a power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cords to the outlets.
 5. Turn on the devices.
- Sharp edges, corners and joints might be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

DANGER

Heavy equipment—personal injury or equipment damage might result if mishandled. (D006)

DANGER

Racks with a total weight of > 227 kg (500 lb.), Use Only Professional Movers! (R003)

DANGER

Do not transport the rack via fork truck unless it is properly packaged, secured on top of the supplied pallet. (R004)

DANGER



Main Protective Earth (Ground):

This symbol is marked on the frame of the rack.

The PROTECTIVE EARTHING CONDUCTORS should be terminated at that point. A recognized or certified closed loop connector (ring terminal) should be used and secured to the frame with a lock washer using a bolt or stud. The connector should be properly sized to be suitable for the bolt or stud, the locking washer, the rating for the conducting wire used, and the considered rating of the breaker. The intent is to ensure the frame is electrically bonded to the PROTECTIVE EARTHING CONDUCTORS. The hole that the bolt or stud goes into where the terminal conductor and the lock washer contact should be free of any non-conductive material to allow for metal to metal contact. All PROTECTIVE EARTHING CONDUCTORS should terminate at this main protective earthing terminal or at points marked with . (R010)

Special caution and safety notices

This information describes special safety notices that apply to the Storwize V5000. These notices are in addition to the standard safety notices supplied and address specific issues relevant to the equipment provided.

General safety

When you service the Storwize V5000, follow general safety guidelines.

Use the following general rules to ensure safety to yourself and others.

- Observe good housekeeping in the area where the devices are kept during and after maintenance.
- Follow the guidelines when lifting any heavy object:
 1. Ensure that you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 18 kg (40 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes a hazard or makes the equipment unsafe.

- Before you start the device, ensure that other personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the unit.
- Keep your tool case away from walk areas so that other people cannot trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a device. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconducting clip, approximately 8 cm (3 in.) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Remember: Metal objects are good electrical conductors.

- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly after you have finished servicing the unit.

Handling static-sensitive devices

Ensure that you understand how to handle devices that are sensitive to static electricity.

Attention: Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static-protective bags until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its antistatic bag, touch it to an unpainted metal part of the system unit for at least two seconds. (This action removes static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your Storwize V5000 Gen2, without putting it down. If it is necessary to put the device down, place it onto its static-protective bag. (If your device is an adapter, place it component-side up.) Do not place the device onto the cover of the Storwize V5000 Gen2 or onto a metal table.
- Take additional care when you handle devices during cold weather. Indoor humidity tends to decrease in cold weather, causing an increase in static electricity.

Environmental notices

This information contains all of the required environmental notices for IBM Systems products in English and other languages.

The *IBM Systems Environmental Notices* (<http://ibm.co/1fBgWFI>) information includes statements on limitations, product information, product recycling and disposal, battery information, flat panel display, refrigeration and water-cooling systems, external power supplies, and safety data sheets.

About this guide

This publication provides information that helps you install and initialize IBM Storwize V5000 Gen2 systems.

Who should use this guide

This guide is intended for installers of Storwize V5000 Gen2 systems.

Before configuring your system, ensure that you follow the procedures as listed. Be sure to gather IP addresses that you will need before you begin the installation.

Storwize V5000 Gen2 library and related publications

Product manuals, other publications, and websites contain information that relates to Storwize V5000 Gen2.

IBM Knowledge Center for Storwize V5000 Gen2

The information collection in the IBM Knowledge Center contains all of the information that is required to install, configure, and manage the system. The information collection in the IBM Knowledge Center is updated between product releases to provide the most current documentation. The information collection is available at the following website:

http://pic.dhe.ibm.com/infocenter/storwize/v5000_ic/index.jsp

Storwize V5000 Gen2 library

Unless otherwise noted, the publications in the library are available in Adobe portable document format (PDF) from a website.

www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss

Click **Search for publications** to find the online publications you are interested in, and then view or download the publication by clicking the appropriate item.

Table 1 lists websites where you can find help, services, and more information.

Table 1. IBM websites for help, services, and information

Website	Address
Directory of worldwide contacts	http://www.ibm.com/planetwide
Support for Storwize V5000 (2077 or 2078)	www.ibm.com/storage/support/storwize/v5000
Support for IBM System Storage® and IBM TotalStorage products	www.ibm.com/storage/support/

Each of the PDF publications in the Table 2 on page xviii library is also available in the IBM Knowledge Center by clicking the number in the “Order number” column:

Table 2. Storwize V5000 Gen2 library

Title	Description	Order number
<i>IBM Storwize V5000 Gen2 Quick Installation Guide</i>	The guide provides instructions for unpacking your order and installing your system. The first chapter describes how to verify your order, identify hardware components, and meet environmental requirements. The second chapter describes how to install the hardware and attach data cables and power cords. The last chapter describes how to access the management GUI to initially configure your system.	GC27-8581
<i>IBM Storwize V5010 Installation Poster</i>	The installation poster provides an illustrated sequence of steps for installing the enclosures in a rack and beginning the setup process for a Storwize V5010 system.	GC27-8597
<i>IBM Storwize V5020 Installation Poster</i>	The installation poster provides an illustrated sequence of steps for installing the enclosures in a rack and beginning the setup process for a Storwize V5020 system.	GC27-8598
<i>IBM Storwize V5030 Installation Poster</i>	The installation poster provides an illustrated sequence of steps for installing the enclosures in a rack and beginning the setup process for a Storwize V5030 system.	GC27-8599
<i>IBM Systems Safety Notices</i>	The guide contains translated caution and danger statements. Each caution and danger statement in the Storwize V5000 Gen2 documentation has a number that you can use to locate the corresponding statement in your language in the <i>IBM Systems Safety Notices</i> document.	G229-9054
<i>IBM Storwize V5000 Gen2 Read First Flyer</i>	This document introduces the major components of the Storwize V5000 Gen2 system and describes how to get started with the <i>IBM Storwize V5000 Gen2 Quick Installation Guide</i> .	GI13-2860
<i>IBM Statement of Limited Warranty (2078)</i>	This multilingual document provides information about the IBM warranty for machine type 2078.	Part number: 00AK322
<i>IBM License Agreement for Machine Code</i>	This multilingual guide contains the License Agreement for Machine Code for the Storwize V5000 Gen2 product.	SC28-6872 (contains Z125-5468)

IBM documentation and related websites

Table 3 lists websites that provide publications and other information about the Storwize V5000 Gen2 or related products or technologies. The IBM Redbooks® publications provide positioning and value guidance, installation and implementation experiences, solution scenarios, and step-by-step procedures for various products.

Table 3. IBM documentation and related websites

Website	Address
IBM Publications Center	www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss
IBM Redbooks publications	www.redbooks.ibm.com/

Related accessibility information

To view a PDF file, you need Adobe Reader, which can be downloaded from the Adobe website:

www.adobe.com/support/downloads/main.html

How to order IBM publications

The IBM Publications Center is a worldwide central repository for IBM product publications and marketing material.

The IBM Publications Center offers customized search functions to help you find the publications that you need. Some publications are available for you to view or download at no charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM Publications Center through the following website:

www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss

Related websites

The following websites provide information about Storwize V5000 Gen2 or related products or technologies.

Type of information	Website
Storwize V5000 Gen2 support	www.ibm.com/storage/support/storwize/v5000
Technical support for IBM storage products	www.ibm.com/storage/support/
IBM Electronic Support registration	www.ibm.com/support/electronicssupport

Sending your comments

Your feedback is important in helping to provide the most accurate and highest quality information.

To submit any comments about this book or any other Storwize V5000 Gen2 documentation, send your comments by email to starpubs@us.ibm.com. Include the following information in your email:

- Publication title
- Publication form number
- Page, table, or illustration numbers that you are commenting on
- A detailed description of any information that should be changed

How to get information, help, and technical assistance

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

Information

IBM maintains pages on the web where you can get information about IBM products and fee services, product implementation and usage assistance, break and fix service support, and the latest technical information. For more information, refer to Table 4.

Table 4. IBM websites for help, services, and information

Website	Address
Directory of worldwide contacts	http://www.ibm.com/planetwide
Support for Storwize V5000 (2077 or 2078)	www.ibm.com/storage/support/storwize/v5000
Support for IBM System Storage and IBM TotalStorage products	www.ibm.com/storage/support/

Note: Available services, telephone numbers, and web links are subject to change without notice.

Help and service

Before calling for support, be sure to have your IBM Customer Number available. If you are in the US or Canada, you can call 1 (800) IBM SERV for help and service. From other parts of the world, see <http://www.ibm.com/planetwide> for the number that you can call.

When calling from the US or Canada, choose the **storage** option. The agent decides where to route your call, to either storage software or storage hardware, depending on the nature of your problem.

If you call from somewhere other than the US or Canada, you must choose the **hardware** option when calling for assistance. When calling IBM for service regarding the product, follow these guidelines for the **hardware** :

Software option

Identify the Storwize V5000 Gen2 product as your product and supply your customer number as proof of purchase. The customer number is a 7-digit number (0000000 to 9999999) assigned by IBM when the product is purchased. Your customer number should be located on the customer information worksheet or on the invoice from your storage purchase. If asked for an operating system, use **Storage**.

Hardware option

Provide the serial number and appropriate 4-digit machine type. For Storwize V5000, the machine type is 2077 or 2078.

In the US and Canada, hardware service and support can be extended to 24x7 on the same day. The base warranty is 9x5 on the next business day.

Getting help online

You can find information about products, solutions, partners, and support on the IBM website.

To find up-to-date information about products, services, and partners, visit the IBM website at www.ibm.com/storage/support/storwize/v5000.

Before you call

Make sure that you have taken steps to try to solve the problem yourself before you call.

Some suggestions for resolving the problem before calling IBM Support include:

- Check all cables to make sure that they are connected.
- Check all power switches to make sure that the system and optional devices are turned on.
- Use the troubleshooting information in your system documentation. The troubleshooting section of the information center contains procedures to help you diagnose problems.
- Go to the IBM Support website at www.ibm.com/storage/support/storwize/v5000 to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Using the documentation

Information about your IBM storage system is available in the documentation that comes with the product.

That documentation includes printed documents, online documents, readme files, and help files in addition to the information center. See the troubleshooting information for diagnostic instructions. The troubleshooting procedure might require you to download updated device drivers or software. IBM maintains pages on the web where you can get the latest technical information and download device drivers and updates. To access these pages, go to www.ibm.com/storage/support/storwize/v5000 and follow the instructions. Also, some documents are available through the IBM Publications Center.

Sign up for the Support Line Offering

If you have questions about how to use and configure the machine, sign up for the IBM Support Line offering to get a professional answer.

The maintenance supplied with the system provides support when there is a problem with a hardware component or a fault in the system machine code. At times, you might need expert advice about using a function provided by the system or about how to configure the system. Purchasing the IBM Support Line offering gives you access to this professional advice while deploying your system, and in the future.

Contact your local IBM sales representative or your support group for availability and purchase information.

Chapter 1. Before you begin the installation

Before you can begin installing your system, you must unpack and verify your order and make other preparations.

The *Quick Installation Guide* contains a set of instructions to help you unpack and install your system. The guide is divided into three chapters.

1. The steps in Chapter 1, “Before you begin the installation” (the chapter you are now reading) involve verifying your order, becoming familiar with the hardware component terminology, and ensuring that you have met the environmental requirements.
2. The steps in Chapter 2, “Installing the Storwize V5000 Gen2 hardware,” on page 19 involve installing the hardware and attaching the data cables and power cords.
3. Chapter 3, “Configuring the system,” on page 41 helps you create your configuration file and access the management GUI. The management GUI guides you through the initial configuration process.

Important information:

- This guide presumes that you have read the planning information regarding your physical environment that is available from the IBM Knowledge Center for Storwize V5000 Gen2.
- Ensure that any cables that you are supplying are available for installation.

Table 5 lists the steps for each scenario.

Table 5. Steps for different installation scenarios for Storwize V5000 Gen2 systems

New system		Existing system	
Control enclosure only	Control enclosure and one or more expansion enclosures	Adding expansion enclosures	Adding a control enclosure and expansion enclosures (Storwize V5030 only)
“Reviewing your packing slip” on page 5	“Reviewing your packing slip” on page 5	“Reviewing your packing slip” on page 5	“Reviewing your packing slip” on page 5
“Identify the hardware components” on page 7	“Identify the hardware components” on page 7	“Identify the hardware components” on page 7	“Identify the hardware components” on page 7
“Verify environmental requirements” on page 16	“Verify environmental requirements” on page 16	“Verify environmental requirements” on page 16	“Verify environmental requirements” on page 16
“Review enclosure location guidelines” on page 16	“Review enclosure location guidelines” on page 16	“Review enclosure location guidelines” on page 16	“Review enclosure location guidelines” on page 16
“Installing support rails for Storwize V5000 Gen2 systems” on page 19	“Installing support rails for Storwize V5000 Gen2 systems” on page 19	“Installing support rails for Storwize V5000 Gen2 systems” on page 19 ¹	“Installing support rails for Storwize V5000 Gen2 systems” on page 19 ²
“Installing enclosures for Storwize V5000 Gen2 systems” on page 23	“Installing enclosures for Storwize V5000 Gen2 systems” on page 23	“Installing enclosures for Storwize V5000 Gen2 systems” on page 23 ¹	“Installing enclosures for Storwize V5000 Gen2 systems” on page 23 ²
“Connecting Ethernet cables to node canisters” on page 30	“Connecting SAS cables to Storwize V5000 Gen2 expansion enclosures” on page 24	“Connecting SAS cables to Storwize V5000 Gen2 expansion enclosures” on page 24 ¹	“Connecting SAS cables to Storwize V5000 Gen2 expansion enclosures” on page 24 ¹

Table 5. Steps for different installation scenarios for Storwize V5000 Gen2 systems (continued)

New system		Existing system	
Control enclosure only	Control enclosure and one or more expansion enclosures	Adding expansion enclosures	Adding a control enclosure and expansion enclosures (Storwize V5030 only)
“Connecting Fibre Channel cables to a Fibre Channel host interface adapter” on page 35 “Connecting Fibre Channel cables to a 10 Gbps iSCSI-FCoE 4-port host interface adapter” on page 33	“Connecting Ethernet cables to node canisters” on page 30	“Powering on the system” on page 39¹	“Connecting Ethernet cables to node canisters” on page 30²
“Powering on the system” on page 39	“Connecting Ethernet cables to node canisters” on page 30	“Adding an expansion enclosure to an existing system” on page 45	“Connecting Fibre Channel cables to a Fibre Channel host interface adapter” on page 35
Chapter 3, “Configuring the system,” on page 41	“Powering on the system” on page 39		“Powering on the system” on page 39
	Chapter 3, “Configuring the system,” on page 41		“Adding a control enclosure to an existing Storwize V5030 system” on page 46
¹Complete these steps for each expansion enclosure that you add. ²Complete these steps for each control enclosure and expansion enclosure that you add.			

Be familiar with the following information

- See “Caution notices for the Storwize V5000 Gen2” on page x and “Danger notices for Storwize V5000 Gen2” on page xii for a summary of the situations that can be potentially hazardous to you. Before installing, read and understand the following caution and danger statements.

- Use safe practices when lifting. The fully populated enclosure weighs about 26 kg (57 lbs). At least two people are required to lift and install the enclosure into the rack or to remove an enclosure from the rack. The fully populated enclosure weighs about 37 kg (82 lbs). At least three people are required to lift and install the enclosure into the rack or to remove an enclosure from the rack.

CAUTION:
Use safe practices when lifting.

		
18-32 kg (39.7-70.5 lbs)	32-55 kg (70.5-121.2 lbs)	≥ 55 kg (≥121.2 lbs)

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(27)
 Also keep in mind that a rack full of equipment is extremely heavy.

DANGER: Heavy equipment–personal injury or equipment damage might result if mishandled. (D006)

- The following general precautions should be observed, even though the power-on steps differ slightly from the directions that you will follow for this product:

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- If IBM supplied a power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cords to the outlets.
 5. Turn on the devices.
- Sharp edges, corners and joints might be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

Tools needed

A flat-blade screwdriver with a 7 mm (1/4 inch) head is the only tool needed for installation.

Reviewing your packing slip

After you open your shipment, you must verify the contents against the packing slip.

In each box, locate the packing slip. Verify that the items listed in the packing slip match what is in the box, and that any optional items that you ordered are included in the list. Your shipment might contain extra items, depending on the order.

Note: If you purchased your equipment through a reseller, some of the options might be preinstalled. Contact your supplier for details.

Use the following checklist to check off the items in your order as you verify that they are included in your shipment.

- • Table 6 summarizes the machine types and models of the Storwize V5000 Gen2 control enclosures.

Table 6. Storwize V5000 Gen2 control enclosures

IBM Storwize V5000 Gen2 Model	Machine type / model	Warranty	Description
IBM Storwize V5010	2077-112	1 year	12-slot Control enclosure for 3.5-inch drives
	2077-124	1 year	24-slot Control enclosure for 3.5-inch drives
	2078-112	3 years	12-slot Control enclosure for 2.5-inch drives
	2078-124	3 years	24-slot Control enclosure for 2.5-inch drives
IBM Storwize V5020	2077-212	1 year	12-slot Control enclosure for 3.5-inch drives
	2077-224	1 year	24-slot Control enclosure for 3.5-inch drives
	2078-212	3 years	12-slot Control enclosure for 2.5-inch drives
	2078-224	3 years	24-slot Control enclosure for 2.5-inch drives
IBM Storwize V5030	2077-312	1 year	12-slot Control enclosure for 3.5-inch drives
	2077-324	1 year	24-slot Control enclosure for 3.5-inch drives
	2078-312	3 years	12-slot Control enclosure for 2.5-inch drives
	2078-324	3 years	24-slot Control enclosure for 2.5-inch drives

- • All Storwize V5000 Gen2 systems support the expansion enclosures that are listed in Table 7 on page 6.

Table 7. Storwize V5000 Gen2 expansion enclosures

IBM Storwize V5000 Gen2 Model	Machine type / model	Warranty	Description
• Storwize V5010 • Storwize V5020 • Storwize V5030	2077-12F	1 year	12-slot Expansion enclosure for 3.5-inch drives
	2077-24F	1 year	24-slot Expansion enclosure for 3.5-inch drives
	2078-12F	3 years	12-slot Expansion enclosure for 2.5-inch drives
	2078-24F	3 years	24-slot Expansion enclosure for 2.5-inch drives

- ___ • Rack-mounting hardware kit:
 - ___ – Two rails (right and left assembly)
 - ___ – Two rail springs
 - ___ – Two sets of rail-mount screws and alternative rail-mount pins (large and small) for non-IBM racks
- ___ • Two power cords for connection to rack-mounted power distribution units
- ___ • Drive bay blanking plates (installed in the enclosure)

Options applicable to control enclosures

- ___ • Cache memory upgrade (16 GB for Storwize V5020 and 32 GB for Storwize V5030)
- ___ • Fibre Channel cables
- ___ • SAS cables
- ___ • Drives
- ___ • Power cords for connection to wall sockets
- ___ • Four-port 16 Gbps Fibre Channel HBA
- ___ • Four-port 10 Gbps Ethernet Adapter (iSCSI, FCoE)
- ___ • Four-port 12 Gbps SAS HBA
- ___ • Four-port 1 Gbps Ethernet Adapter (iSCSI)
- ___ • DC power supply (if applicable to the feature number ordered)

Options applicable to expansion enclosures

- ___ • Expansion enclosure attachment cables
- ___ • Drives
- ___ • DC power supply (if applicable to the feature number ordered)
- ___ • Power cords for connection to wall sockets

Identify the hardware components

The following graphics identify the hardware components and port locations for the control enclosure and expansion enclosure on Storwize V5000 Gen2 systems.

Control enclosure components

The following figures show the rear view of the control enclosures on Storwize V5000 Gen2 systems. The location of the power supply units and node canisters are also shown.

Figure 1 shows the Storwize V5010 control enclosure.

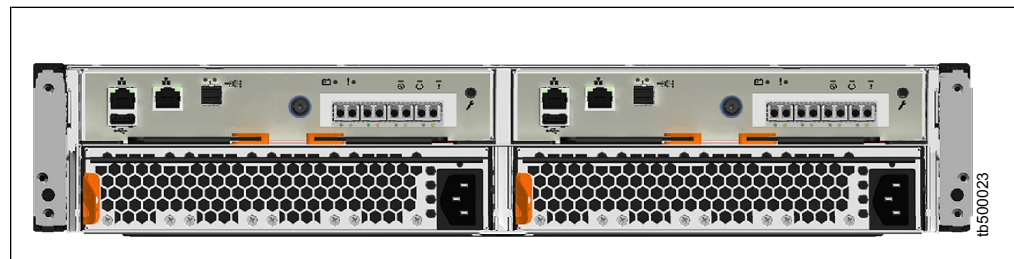


Figure 1. Storwize V5010 control enclosure

Figure 2 shows a rear view of the Storwize V5020 node.

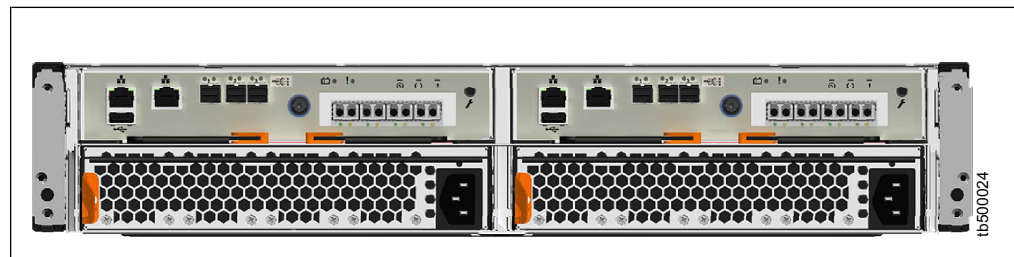


Figure 2. Storwize V5020 control enclosure

Figure 3 shows a rear view of the Storwize V5030 node.

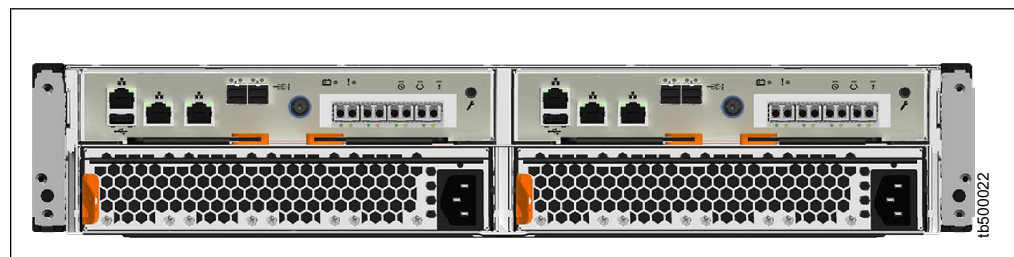


Figure 3. Storwize V5030 control enclosure

Data ports

The following figures show the rear view of the control enclosures on Storwize V5000 Gen2 systems. The location of the ports are shown.

- **1** Technician port
- **1** Ethernet port 1
- **2** Ethernet port 2

- **2/T** Ethernet port 2/Technician port
- **3** SAS ports

Figure 4 shows the Storwize V5010 control enclosure.

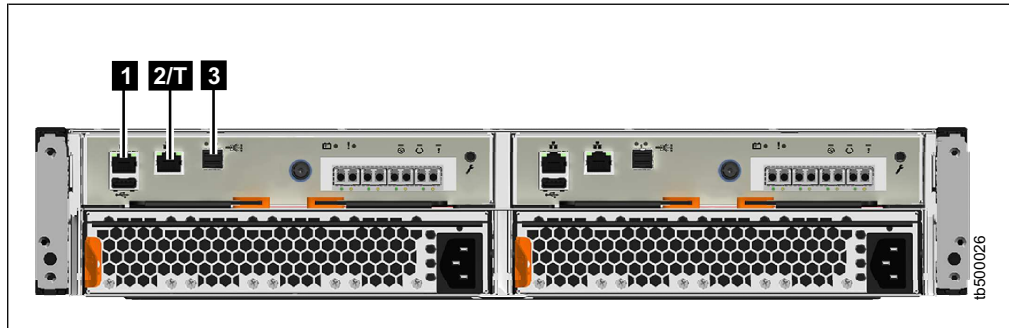


Figure 4. Data ports on the rear of the Storwize V5010 control enclosure

Figure 5 shows the data ports on the back of the Storwize V5020 node.

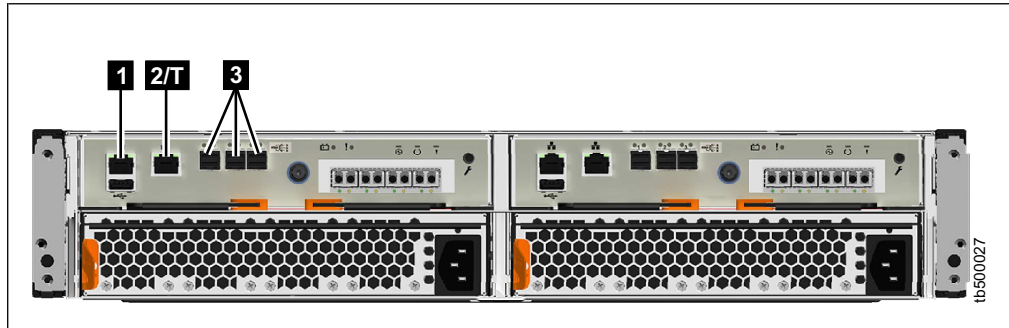


Figure 5. Data ports on the rear of the Storwize V5020 control enclosure

Figure 6 shows the data ports on the back of a Storwize V5030 node.

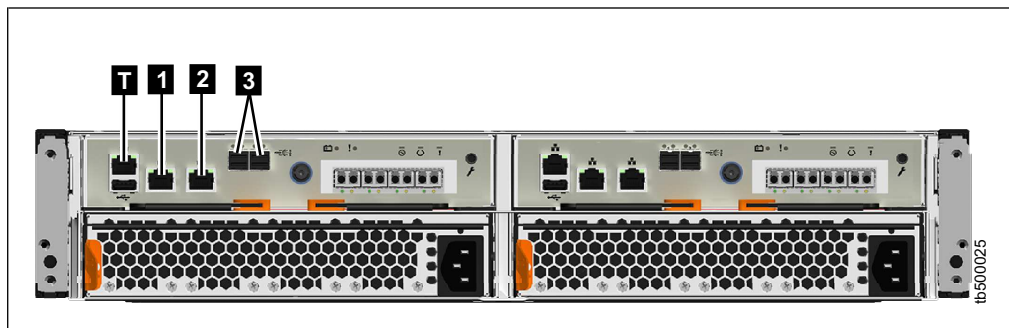


Figure 6. Data ports on the rear of the Storwize V5030 control enclosure

Expansion enclosure components

Figure 7 shows the location of the power supply units and expansion canisters.

- **1** Expansion canisters
- **2** Power supply units

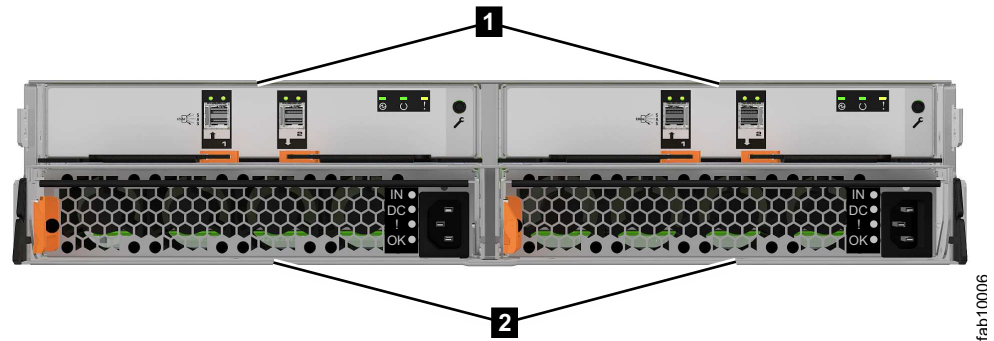


Figure 7. Rear view of a Storwize V5000 Gen2 expansion enclosure

Figure 8 shows the LEDs and SAS port locations from the rear view of an expansion canister.

- **1** LEDs
- **2** SAS ports

Each canister has two SAS ports that are numbered 1 on the left and 2 on the right. Port 1 is used to connect to a SAS expansion port on a node canister or port 2 of another expansion canister.

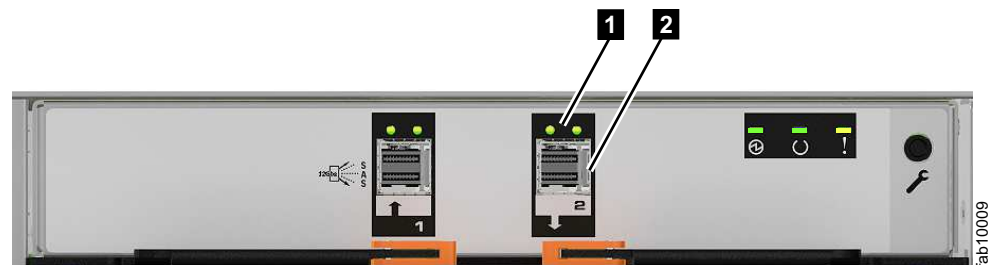


Figure 8. SAS ports and LEDs in rear view of a Storwize V5000 Gen2 expansion canister

Support rails and enclosures

Storwize V5000 Gen2 systems use the same rails and enclosures for both control and expansion enclosures. All Storwize V5000 Gen2 models use the same expansion enclosure.

- The ledge on the inside of each rail supports the entire length of an enclosure.
- The enclosure support rails capture the left and right rear edges of an inserted enclosure. This prevents the installed enclosure bouncing when the rack is subjected to quake or vibration.
- The enclosure support rails adjust to fit racks from 595 mm to 755 mm deep, measured between the front and rear rack rails.

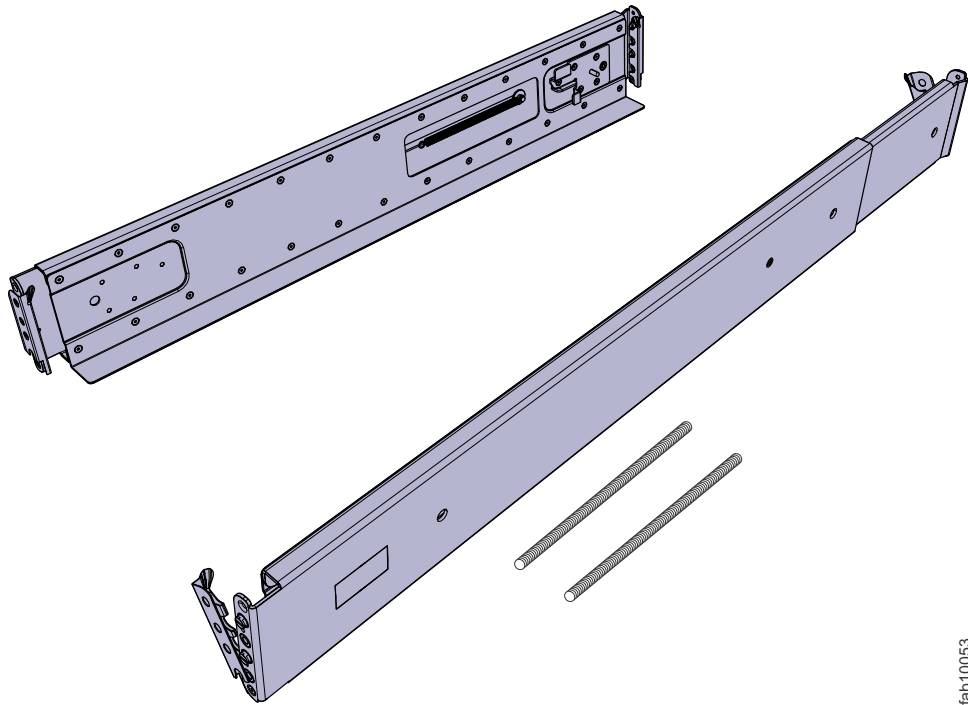


Figure 9. Enclosure support rails on Storwize V5000 Gen2

Direct current power supply units

When feature code AHPB is used, a direct current (DC) power supply can be installed in a Storwize V5000 Gen2 enclosure.

This section describes the additional information you need to know when using the DC power models.

DANGER



Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- If IBM supplied a power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

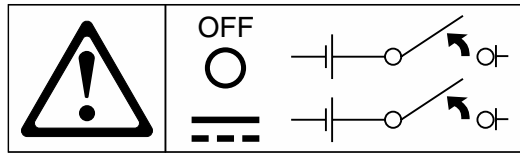
1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cords to the outlets.
 5. Turn on the devices.
- Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.
- (D005)

Statement 19:



CAUTION: The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one

connection to DC power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the DC power input terminals.



Statement 34:



CAUTION: To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel in a restricted-access location, as defined by the NEC and IEC 60950-1, First Edition, The Standard for Safety of Information Technology Equipment.
- Connect the equipment to a properly grounded safety extra low voltage (SELV) source. A SELV source is a secondary circuit that is designed so that normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).
- Incorporate a readily available approved and rated disconnect device in the field wiring.
- See the specifications in the product documentation for the required circuit-breaker rating for branch circuit overcurrent protection.
- Use copper wire conductors only. See the specifications in the product documentation for the required wire size.
- See the specifications in the product documentation for the required torque values for the wiring-terminal screws.

Note: In Statement 34 above:

- Replace IEC 60950-1, First Edition with IEC 60950-1, Second Edition Amendment 1.
- The required circuit breaker rating is 20 amps.

DC power supply unit connectors and indicators

Each Storwize V5000 Gen2 enclosure can contain two DC power supply units. Each power supply unit can provide power to the whole enclosure.

The power supply units have the components that are shown in Figure 10 on page 13.

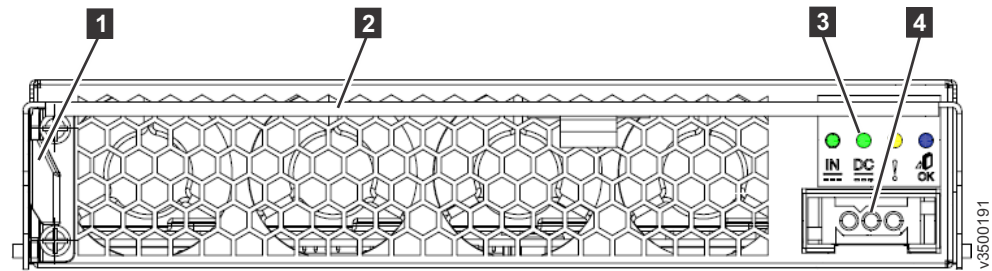


Figure 10. DC power supply unit connectors and indicators

- **1** Release tab
- **2** Handle
- **3** Power supply LED indicators
- **4** DC power cable connector

Each power supply also contains fans that cool the enclosure. Cool air is drawn in through the front of the enclosure. The air passes over the drives, node canisters, and power supplies. The warmed air is ejected through the rear of each power supply. For optimal cooling, do not obstruct the airflow and ensure that all enclosure components or fillers are installed while the system is operational.

DC power supply LED indicators

Each power supply unit has four LED indicators. Table 8 summarizes their possible values and meaning.

The LEDs have a comparable meaning to the LEDs on the AC power supply. Problem diagnosis and service procedures are the same. For details, see “Powering on the system” on page 39.

Table 8. DC power supply LED indicators

Name	Label	Color	State	Description
Input status		Green	OFF	No input power detected.
			ON	DC input power detected.
Output status		Green	OFF	PSU is not providing DC output power.
			ON	PSU is providing DC output power.
Fault		Amber	OFF	No fault detected.
			ON	PSU fault was detected.
			BLINK	PSU is being identified. A fault might have been detected.
(None)		Blue	N/A	Not used.

Connecting a DC power supply to a DC power source

A Storwize V5000 Gen2 enclosure that is DC powered contains two DC power supply units (PSUs). Each unit must be connected to a suitable -48V DC power source. To provide redundancy in a power circuit failure, connect the two PSUs to different DC power sources.

Use the supplied cables to connect the DC PSUs to the power sources. Use only the IBM supplied DC power cable (IBM part number 00AR087) to connect the unit to a DC power source.

Each PSU cable must be protected by a 20A circuit breaker. These instructions assume that the circuit breaker is separate from the DC power distribution unit. Refer to the DC power distribution unit documentation and the circuit breaker documentation for details. Follow the instructions that are given there for connecting the circuit breaker to the power distribution unit and for connecting the DC power cable to the circuit breaker.

One end of the cable ends in a plug that fits the DC PSU. At the other end of the cable, each individual wire ends with a 6 mm diameter ring terminal that is designed to fit an M6 stud. Provide adequate strain relief after you attach the ring terminals to the power source. Table 9 lists the wire colors.

Table 9. DC cable wire color coding

Color	Function
Blue	Return
Green / Yellow	Ground
Brown	-48V

The DC power cable is 4 m long. Connect it to the DC power source before you connect it to the PSU. The PSU does not have a power switch, so its outputs and the enclosure become live as soon as power is connected.

The supplied power must meet the input requirements that are listed in Table 10.

Table 10. DC power supply input requirements

Requirement	Min	Max
Voltage (V DC)	-48	-60
Instantaneous (V DC for < 1 second)	-36	-75
Inrush current at initial turn on (-48V DC)	34 A	
Out of spec time before power off is signaled	5 ms	

The connection to the DC power source must be made by trained service personnel. Ensure that the connection is made in accordance with all the requirements of the equipment that is being used.

The DC power cable must be totally contained in a single rack and must not extend outside the rack to another rack.

If it is necessary to replace the ring terminals with a different connector, choose a suitably sized and rated UL-listed connector that is appropriate for the wire gauge and available current. Install the ring terminals according to the instructions provided by the manufacturer.

Direct current power replaceable units

The DC power supply model has two replaceable units.

Table 11. Direct current power replaceable units

Description	FRU part number	Customer replaced
Direct current power supply	00AR231	Y
Direct current power cable	00AR087	Y

The procedure to remove and replace the DC power supply unit is the same as the AC power supply procedure.

When replacing the DC power cable, follow the instructions for disconnecting cables from the DC power distribution unit.

Verify environmental requirements

The environmental and electrical requirements for the physical site must be met to ensure that your system works reliably.

Before installing a Storwize V5000 Gen2 system, you must verify that adequate space in a suitable rack is available. You must also ensure that the requirements for power and environmental conditions are met.

This guide assumes that you have completed the physical planning for the environment of your system. If you have not done the environmental planning for your system, see the “Storwize V5000 Gen2 physical installation planning” topic in the IBM Knowledge Center for Storwize V5000 Gen2.

Review enclosure location guidelines

Before you install the enclosures, you must be familiar with these enclosure location guidelines.

Installing a control enclosure only

If you are installing a control enclosure only, follow these guidelines.

- Position the enclosure in the rack so that you can easily view it and access it for servicing.
- Locate the enclosure low enough for the rack to remain stable.
- Ensure that you provide a way for two or more people to install and remove the enclosure.

Installing a control enclosure and one or more expansion enclosures

If you are installing a control enclosure plus one or more expansion enclosures, follow these guidelines.

- Each Storwize V5000 enclosure to be installed requires 2U of rack space.
- Each assembled enclosure weighs more than 18 kg. Provide sufficient space at the front of the rack for two persons to carry the enclosure safely.
- Install all enclosures that constitute one system in contiguous positions in a rack. Place the control enclosure in the middle of the rack.
- Storwize V5010 and Storwize V5020 control enclosures systems can support up to 10 expansion enclosures on one chain. Storwize V5030 systems can support two chains and each chain can support up to 10 expansions enclosures.
- If a rack is to be only partially filled, install the enclosures low enough for the rack to remain stable and enable easy access to the enclosures for servicing.

Adding an expansion enclosure chain to an existing system

If you are adding an expansion enclosure chain to an existing Storwize V5030 system, follow these guidelines.

- You do not need to power off the system. You can add an expansion enclosure while the system is operational.
- Add the first expansion enclosure directly below the control enclosure.
- Add the second expansion enclosure directly above the control enclosure.
- Add the third expansion enclosure directly below the first.

- Add the fourth expansion directly above the second, and so on.

Chapter 2. Installing the Storwize V5000 Gen2 hardware

After verifying that you have all of the hardware components that you require, you can install them.

You have completed the initial steps of verifying the shipping contents and becoming familiar with the hardware components. You have verified that the power and environmental requirements are met and have planned the location of the enclosures. You are now ready to begin installing the hardware components and connecting the data cables and power cords.

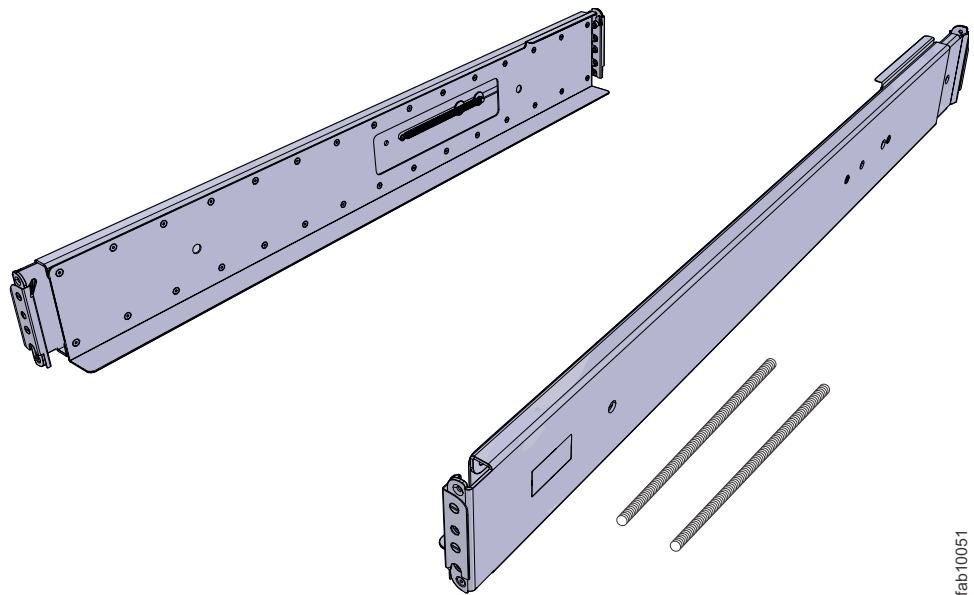
Installing support rails for Storwize V5000 Gen2 systems

Storwize V5000 Gen2 systems use the same rails for control and expansion enclosures. Before you install a control or expansion enclosure, you must first install the support rails for it.

Procedure

To install the support rails for an enclosure, complete the following steps.

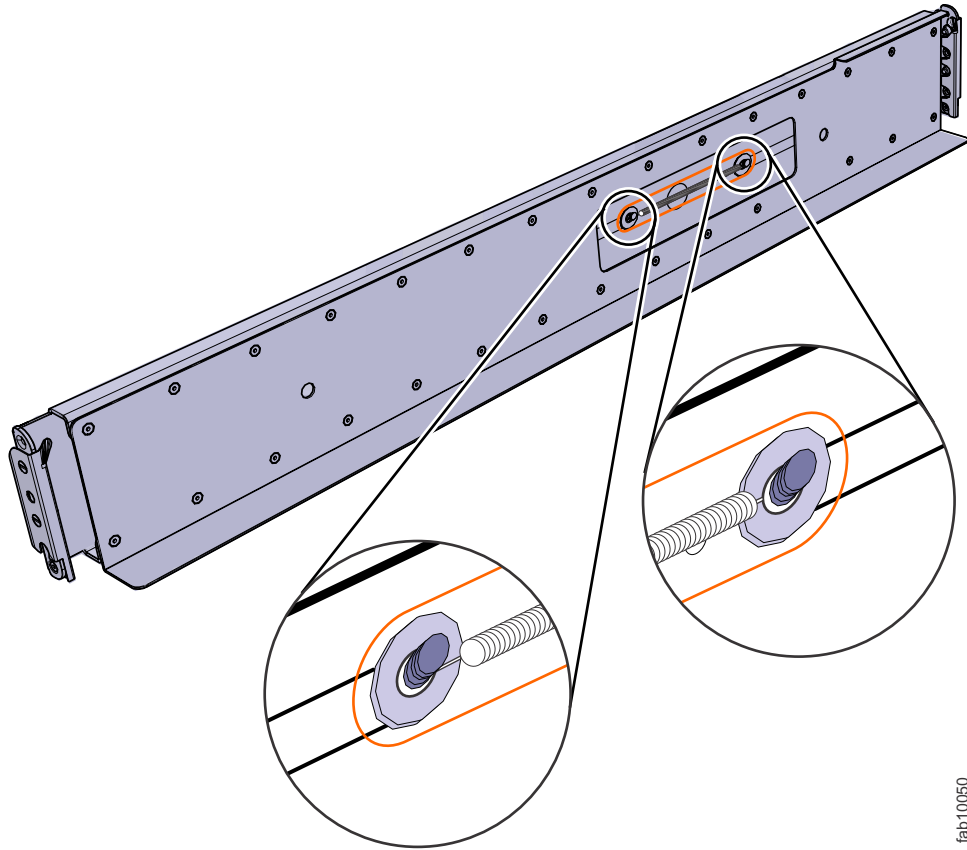
1. Locate the control enclosure rails (Figure 11). The rail assembly consists of two rails that must be installed in the rack cabinet.



fab10051

Figure 11. Control enclosure support rails

2. Install a spring on each rail.
 - a. Extend the rail to its full length.
 - b. Push one looped end of a spring over one stud on the inside of the rail. (See Figure 12 on page 20.)
 - c. Stretch the spring slightly and push the other looped end of the spring onto the other stud on the inside of the rail.



fab10050

Figure 12. Installing the rail spring

3. Working at the front of the rack cabinet, identify the two standard rack units (2U) of space in the rack into which you want to install the support rails.
Figure 13 on page 21 shows two rack units with the front mounting holes identified.

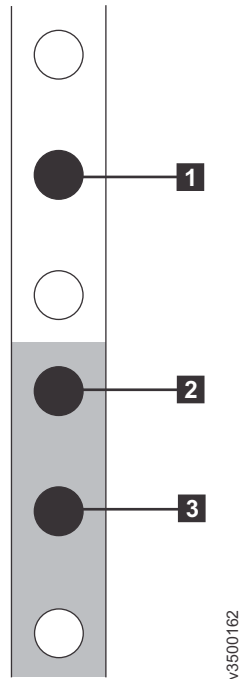


Figure 13. Hole locations in the front of the rack

- **1** Upper rail-mounting bracket pin
 - **2** Lower rail-mounting bracket pin
 - **3** Rack mounting screw hole
4. Ensure that the appropriate bracket pins are installed in the front and rear bracket of each rail. Each rail comes with four medium pins preinstalled (two in the front bracket and two in the rear bracket). Large and small pins are provided separately. Use the pins that are appropriate for the mounting holes in your rack (see Table 12).

Table 12. Selecting bracket pins for your rack

Mounting holes	Bracket pins
Round, unthreaded	Use the preinstalled medium pins.
Round, threaded	Unscrew the medium pins and replace with the smaller pins supplied with the rails.
Square	Unscrew the medium pins and replace with the large pins supplied with the rails.

5. At each end of the rail, grasp the tab and pull *firmly* to open the hinge bracket. (See Figure 14 on page 22.)

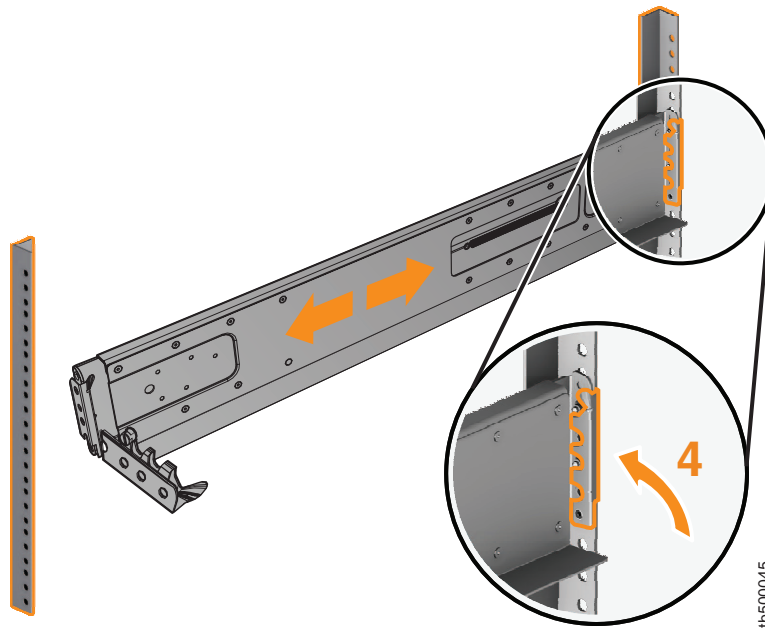


Figure 14. Opening the hinge brackets

6. Align the holes in the rail bracket with the holes on the front and rear rack cabinet flanges. Ensure that the rails are aligned on the inside of the rack cabinet.
7. On the rear of the rail, press the two bracket pins into the holes in the rack flanges.
8. Close the rear hinge bracket to secure the rail to the rack cabinet flange. (See Figure 15.)

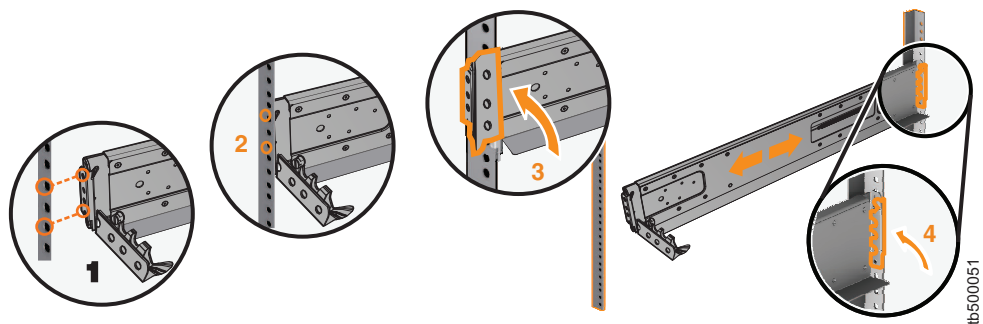


Figure 15. Closing the hinge brackets

9. On the front of the rail, press the two bracket pins into the holes in the rack flanges.
10. Close the front hinge bracket to secure the rail to the rack cabinet flange. Figure 15 shows an example.
11. Secure the rear of the rail to the rear rack flange with an M5 screw.
12. Repeat the steps to secure the opposite rail to the rack cabinet.
13. Repeat the procedure to install rails for each additional control enclosure.

Installing enclosures for Storwize V5000 Gen2 systems

Following your enclosure location plan, install the control enclosure (and optionally, one or more expansion enclosures).

About this task

CAUTION:

- To lift and install the enclosure into the rack requires at least two people.
- To lift a control enclosure with drives installed requires at least three people.
- Load the rack from the bottom up to ensure rack stability. Empty the rack from the top down.

Procedure

To install an enclosure, complete the following steps.

1. On either side of the drive assemblies, remove the enclosure end caps by grasping the handle and pulling the bottom of the end cap free, then clearing the tab on the top of the enclosure. (See Figure 16.)

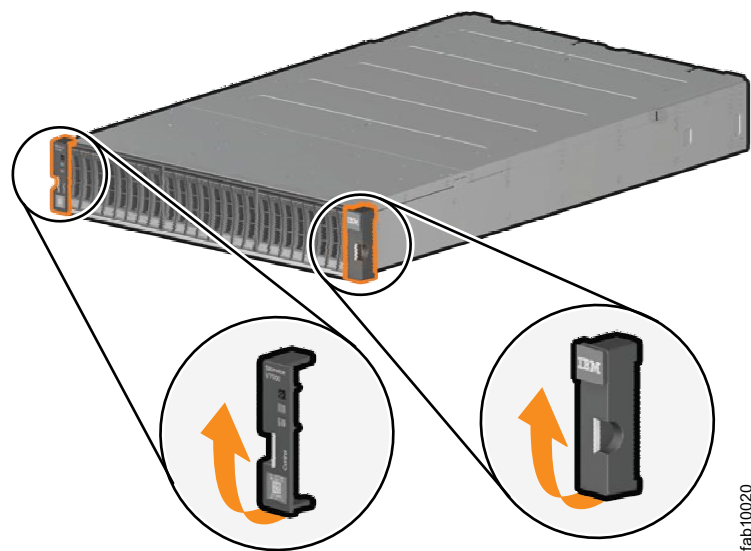
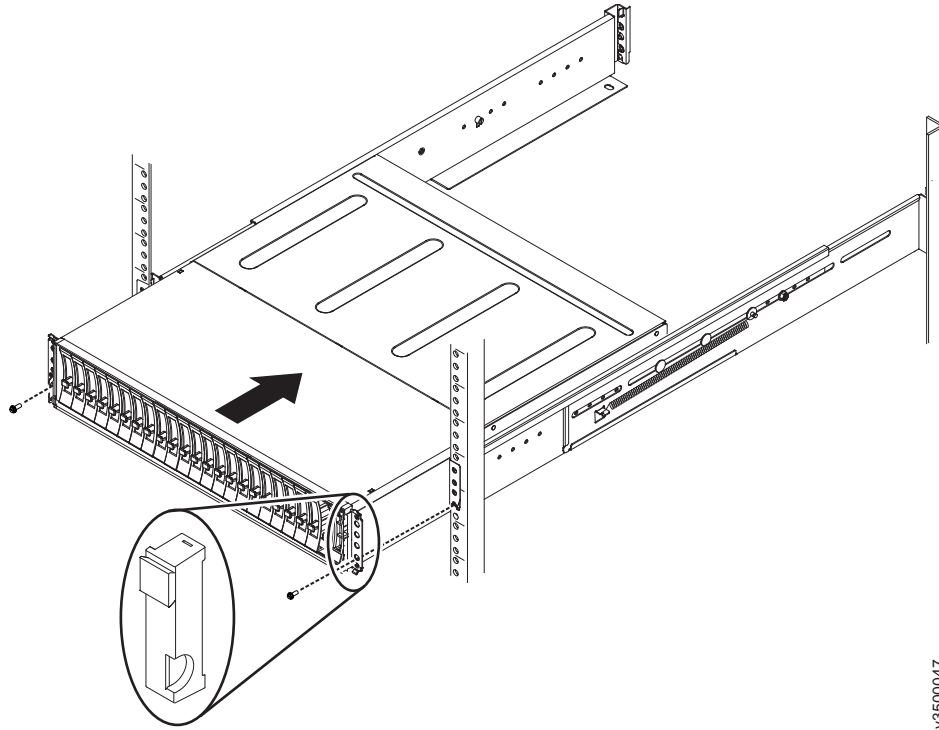


Figure 16. Removing enclosure end caps

2. Align the enclosure with the front of the rack cabinet.
3. Carefully slide the enclosure into the rack along the rails until the enclosure is fully inserted (see Figure 17 on page 24).

Note: The rails are not designed to hold an enclosure that is partially inserted. The enclosure must always be in a fully inserted position.



V3500047

Figure 17. Inserting the enclosure

4. Secure the enclosure with a screw in the rack mounting screw hole.
5. Reinstall the left and right end caps. (See Figure 17.) The left end cap has indicator windows that align with the status LEDs (light-emitting diodes) on the edge of the enclosure.
 - a. Ensure that the serial number of the end cap matches the serial number on the rear of the enclosure.
 - b. Fit the slot on the top of the end cap over the tab on the chassis flange.
 - c. Rotate the end cap down until it snaps into place.
 - d. Ensure that the inside surface of the end cap is flush with the chassis.

Connecting SAS cables to Storwize V5000 Gen2 expansion enclosures

If you have installed expansion enclosures, you must connect them to a Storwize V5000 Gen2 control enclosure.

About this task

This task applies if you are installing one or more expansion enclosures.

The number of SAS chains and enclosures varies per each type of system, as shown in Table 13 on page 25.

Table 13. Summary of SAS chains and enclosures

System	Expansion ports	Number of SAS chains supported	Control enclosures per system	Expansion enclosures per chain	Maximum Number of Enclosures
Storwize V5010 and Storwize V5020	Port 1 only	1	1	10	11
Storwize V5030	Port 1 and Port 2	2	1	10	21

Each set of expansion enclosures is connected together sequentially through the IN and OUT SAS ports, forming a chain with a control enclosure at the end of the chain.

Note: When connecting SAS cables between enclosures, you must follow a list of guidelines to ensure that your configuration is valid. Do not begin connecting the cables until you have read “SAS cabling guidelines” on page 29.

Procedure

To install the cables, complete the following steps.

1. Using the supplied SAS cables, connect the control enclosure to the expansion enclosure at rack position 1, as shown in the following figures.
 - a. Connect SAS port 1 of the left node canister in the control enclosure to SAS port 1 of the left expansion canister in the first expansion enclosure.
 - b. Connect SAS port 1 of the right node canister in the control enclosure to SAS port 1 of the right expansion canister in the first expansion enclosure.

Figure 18 on page 26 shows how to connect SAS cables on a Storwize V5010 system.

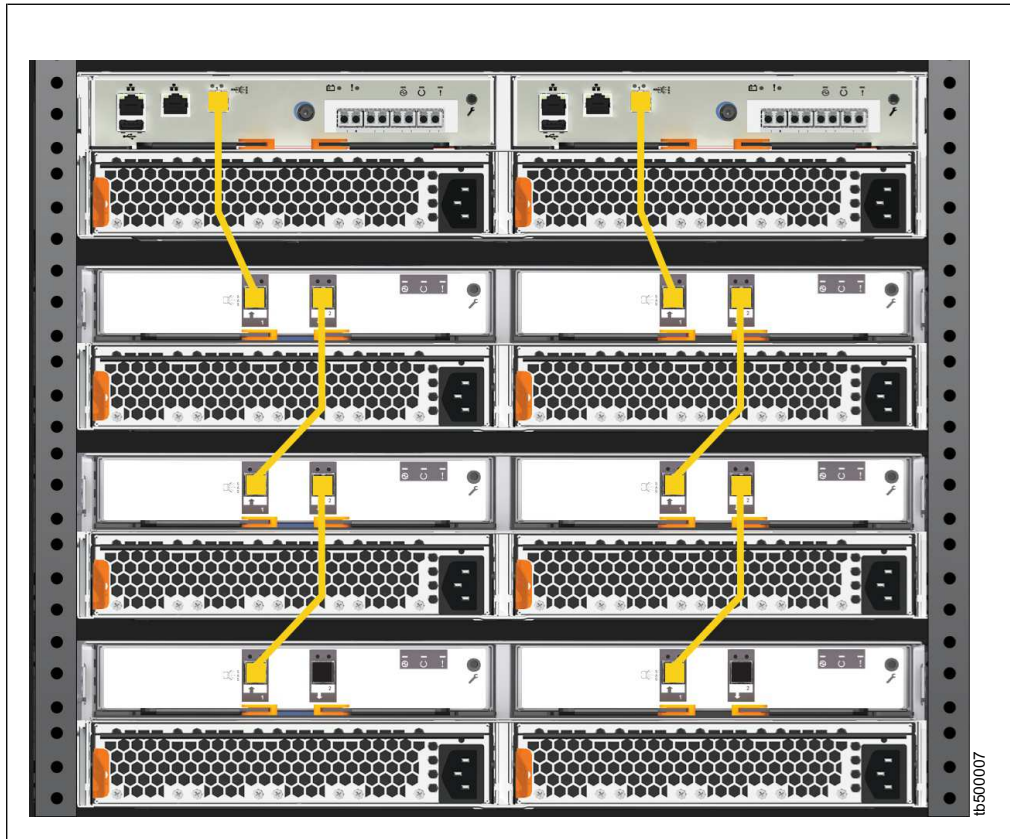


Figure 18. Connecting the SAS cables to a Storwize V5010 system

Figure 19 on page 27 shows how to connect SAS cables on a Storwize V5020 system.

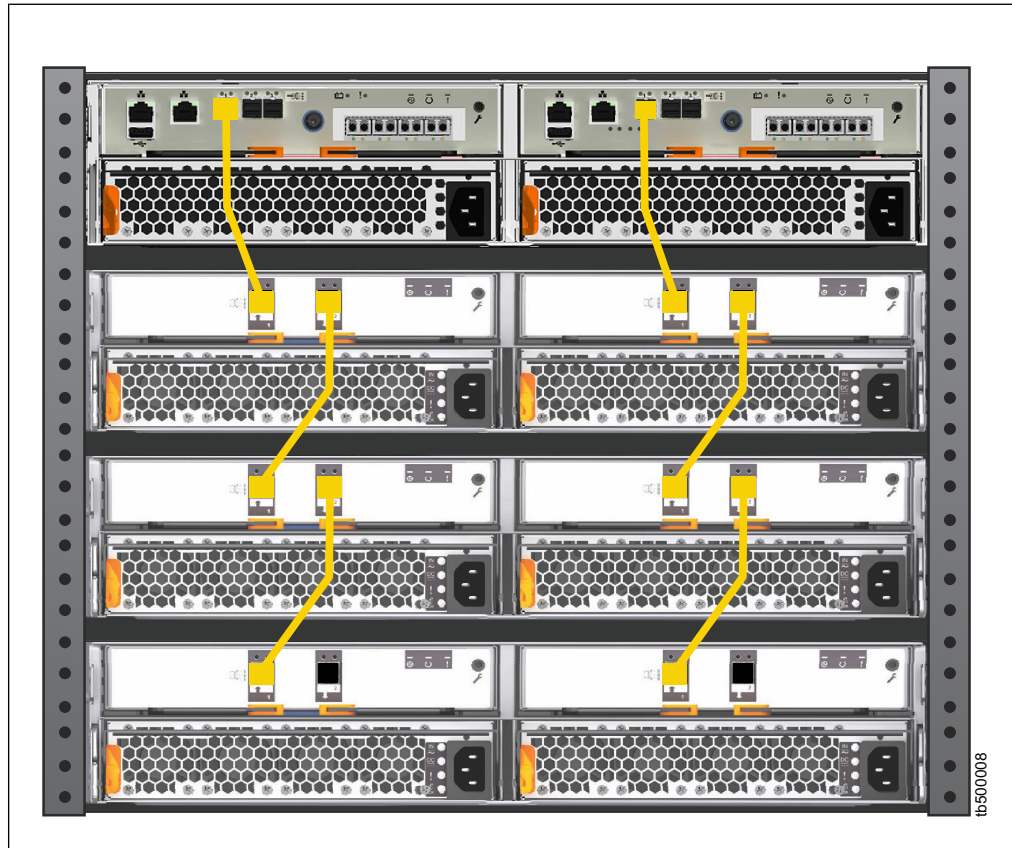


Figure 19. Connecting the SAS cables to a Storwize V5020 system

Figure 20 on page 28 shows how to connect SAS cables on a Storwize V5030 system. In this figure, two expansion chains are connected to the Storwize V5030 system.

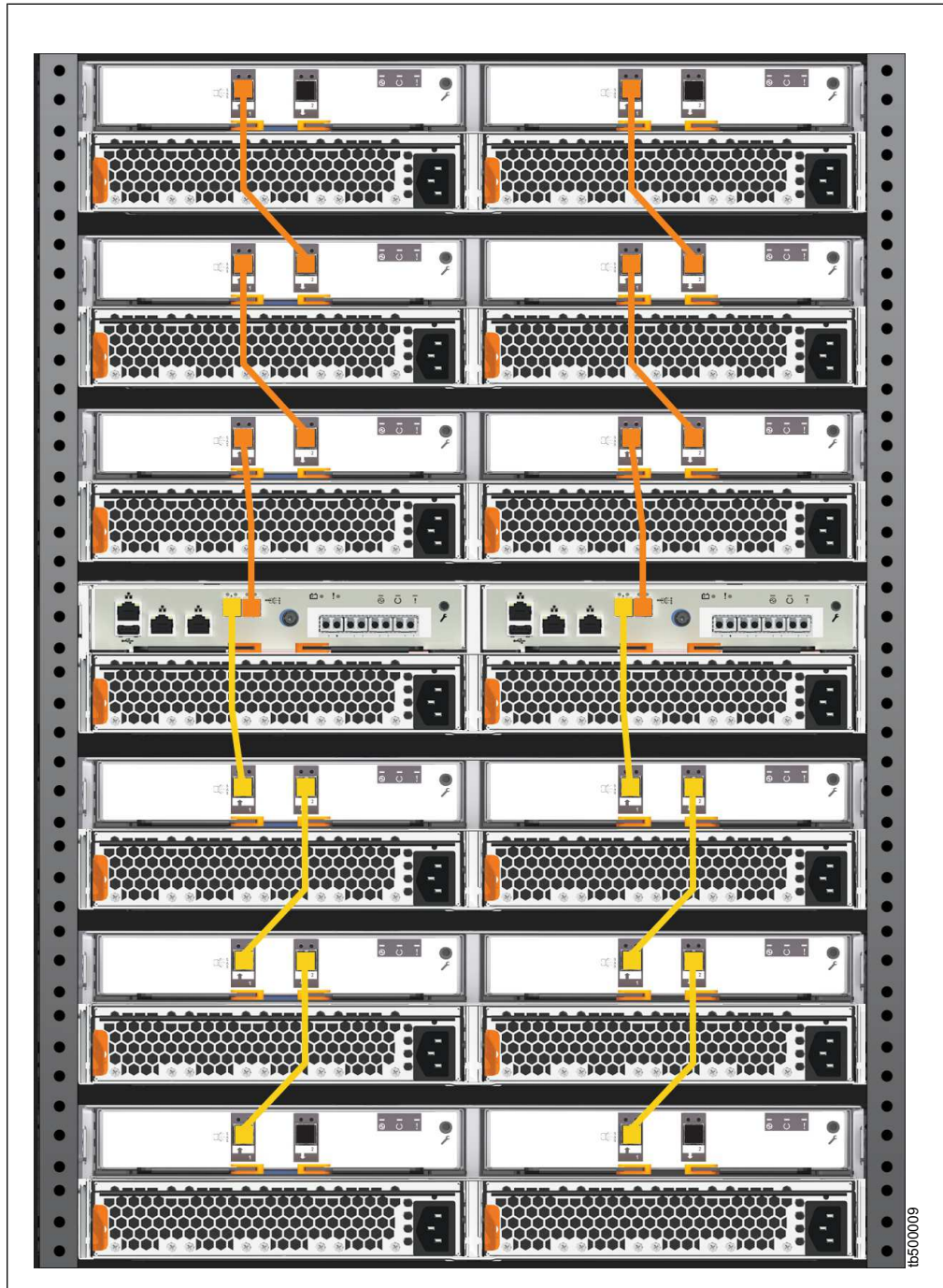


Figure 20. Connecting the SAS cables to a Storwize V5030 system

2. To add a second expansion chain to the Storwize V5030 control enclosure, use the supplied SAS cables to connect the control enclosure to the expansion enclosure at rack position 2, as shown in Figure 20.

Note: Storwize V5010 and Storwize V5020 systems support only one expansion chain.

- a. Connect SAS port 2 of the left node canister in the control enclosure to SAS port 1 of the left expansion canister in the second expansion enclosure.

- b. Connect SAS port 2 of the right node canister in the control enclosure to SAS port 1 of the right expansion canister in the second expansion enclosure.
3. If more expansion enclosures are installed, connect each one to the previous expansion enclosure in a chain; use two Mini SAS HD to Mini SAS HD cables, as shown in Figure 20 on page 28.
4. If two control enclosures are installed (Storwize V5030 only), repeat this cabling procedure on the second control enclosure and its expansion enclosures.

SAS cabling guidelines

When connecting SAS cables between enclosures, you must follow a list of guidelines to ensure that your configuration is valid.

Orienting the connector

When inserting SAS cables, make sure the connector (Figure 21) is oriented correctly.

- The orientation of the connector must match the orientation of the port before you push the connector into the port. The cable connector and socket are keyed, and it is important that you have proper alignment of the keys when the cable is inserted.
- The blue pull tab must be **below** the connector.
- Insert the connector **gently** until it clicks into place. If you feel resistance, the connector is probably oriented the wrong way. Do **not** force it.
- When inserted correctly, the connector can only be removed by pulling the tab.
- When both ends of a SAS cable are inserted correctly, the green link LEDs next to the connected SAS ports are lit.

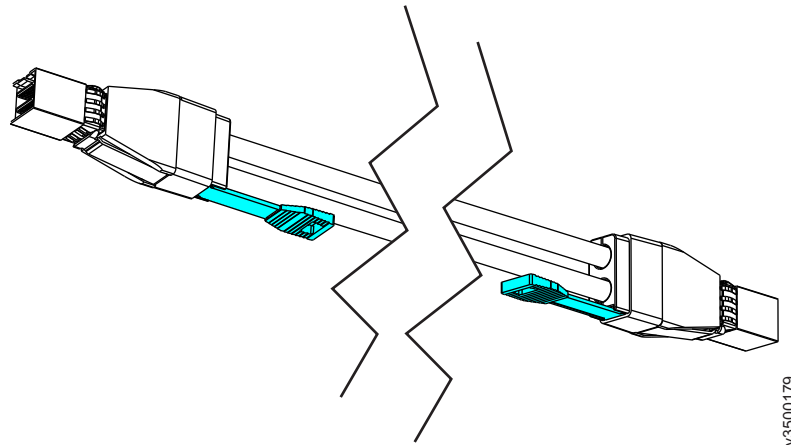


Figure 21. SAS cable connectors

Connecting SAS cables

- No more than 10 expansion enclosures can be chained to SAS port 1 of a Storwize V5010, Storwize V5020, or Storwize V5030 node canister. The expansion enclosures in this chain should be installed below the control enclosure.
- For Storwize V5030 systems only, no more than 10 expansion enclosures can be chained to SAS port 2 of a node canister. The expansion enclosures in this chain should be installed above the control enclosure.

- No cable can be connected between a port on a left canister and a port on a right canister.
- A cable must not be connected between ports in the same enclosure.
- A connected port on the node canister must connect to a single port on an expansion canister. Cables that split the connector out into separate physical connections are not supported.
- Attach cables serially between enclosures; do not skip an enclosure.
- The last enclosure in a chain must not have cables in port 2 of canister 1 and port 2 of canister 2.
- Ensure that cables are installed in an orderly way to reduce the risk of cable damage when replaceable units are removed or inserted.

Refer to “Connecting SAS cables to Storwize V5000 Gen2 expansion enclosures” on page 24 for examples of SAS cable connections on each Storwize V5000 Gen2 system.

Connecting Ethernet cables to node canisters

The control enclosures on Storwize V5000 Gen2 systems have several Ethernet ports on the rear of each node canister. The ports provide access to system management facilities and can also provide iSCSI connectivity. The number of ports and their initial function differ across each of the Storwize V5000 Gen2 systems.

Procedure

To install the Ethernet cables, complete the following steps.

1. If you have a Storwize V5010 or Storwize V5020 system, complete the following steps.
 - a. Identify the location and function of the Ethernet ports on your system; refer to Figure 22 on page 31 and Figure 23 on page 31.
 - Port 1 can be used to provide Ethernet connections; in the figures, port 1 is identified by the green cable.
 - Port 2 serves as the technician port when the system is initially set up or when service is needed. In the figures, port 2 is identified by the blue cable. After the system initializes, port 2 can also be used for iSCSI connectivity or IP replication.

Note: Do not connect port 2 to a network switch until the system initialization or service is complete. After the system initializes, the technician port is automatically disabled and port 2 can be used for Ethernet connectivity. However, when port 2 is used to perform system service, you must first enter the **satask chserviceip -techport disable** command to disable the technician port. You can then use port 2 to provide additional Ethernet connectivity.

- b. Connect Ethernet port 1 of each node canister in the system to the IP network that will provide a connection to the system management interfaces.

Figure 22 on page 31 shows the Ethernet cabling and the ports on the back of a Storwize V5010 system.

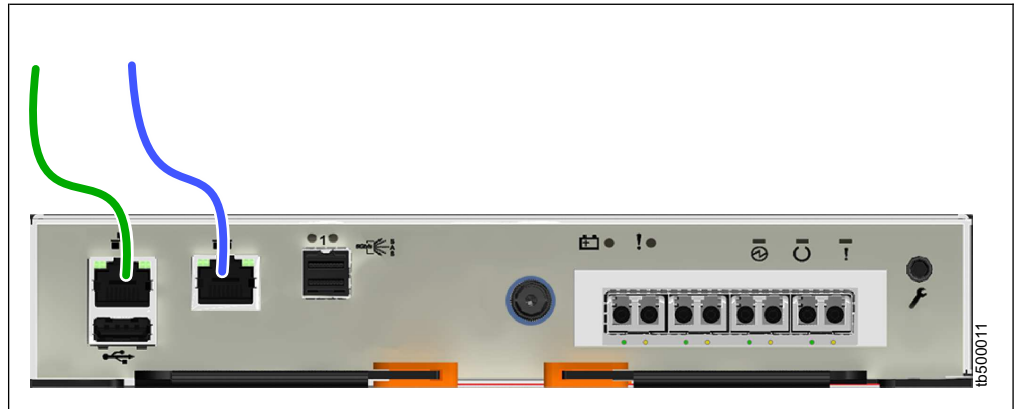


Figure 22. Connecting the Ethernet cables to a Storwize V5010 system

Figure 23 shows the Ethernet cabling and the ports on the back of a Storwize V5020 system.

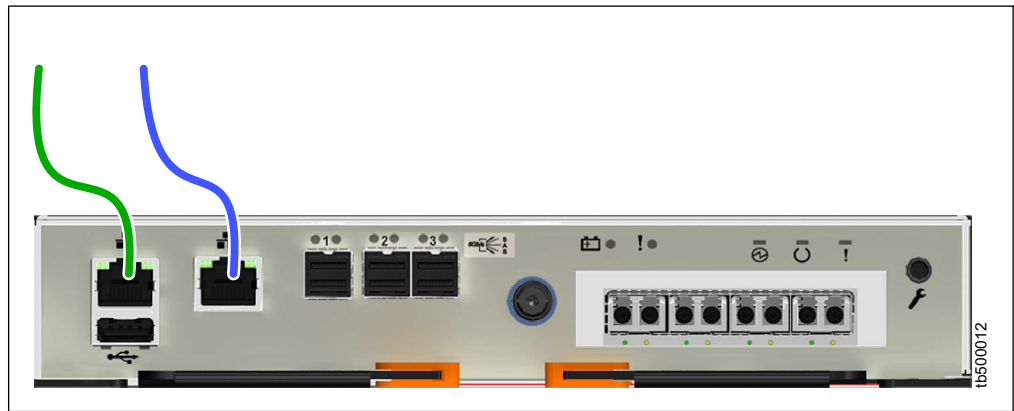


Figure 23. Connecting the Ethernet cables to a Storwize V5020 system

- c. Optionally, connect Ethernet port 2 of each node canister in the system to a second IP network, as shown by the blue cable connection in Figure 22 and Figure 23. This second port can be used to provide a redundant connection to the system management interfaces; it can also be used for iSCSI connectivity to the system by hosts on the network.

Note: On Storwize V5010 and Storwize V5020 systems, the second Ethernet port is also used as the technician port. Do not connect Ethernet port 2 to the SAN until the management GUI setup wizard completes on each system and the cluster is created. If you have to service your system, disconnect port 2 from the SAN before you enable port 2 to be the technician port again.

2. If you have a Storwize V5030 system, complete the following steps.
 - a. Identify the location and function of the Ethernet ports on your system; refer to Figure 24 on page 32.
 - The technician port should only be used to initialize or service the system. In Figure 24 on page 32, the technician port is identified by the green cable.

Note: Never use the technician port to provide an Ethernet connection to the system. Do not connect the Ethernet technician port to a network

switch. The technician port must only be directly connected to a personal computer when initializing a system or servicing a node.

- Ethernet port 1 can be used to provide Ethernet connections. In the figure, port 1 is identified by the blue cable.
 - Ethernet port 2 can optionally be used to provide additional Ethernet connections. In the figure, port 2 is identified by the red cable. Port 2 can also be used for iSCSI connectivity or IP replication.
- b. Connect Ethernet port 1 of each Storwize V5030 node canister in the system to the IP network that will provide a connection to the system management interfaces. Figure 24 shows the port locations and Ethernet cabling on a Storwize V5030 node canister.

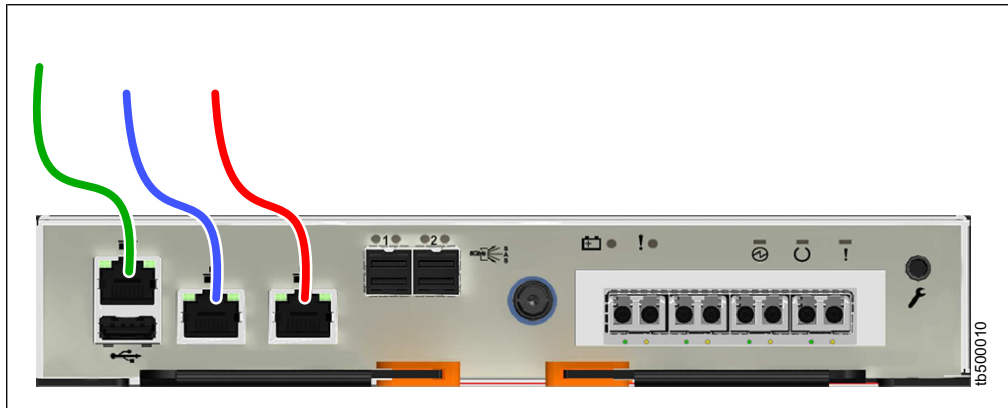


Figure 24. Connecting the Ethernet cables to a Storwize V5030 system

- c. Optionally, connect Ethernet port 2 of each node canister in the system to a second IP network, as shown by the red cable connection in Figure 24. Port 2 can provide a redundant connection to the system management interfaces. Port 2 can also be used for iSCSI connectivity to the system by hosts on the network. If more than one control enclosure is present in the system, ensure that port 2 of every node canister is connected to the same network to provide access if the configuration node fails.

Connecting Ethernet cables to 1 Gbps iSCSI 4-port host interface adapters

If you installed an optional 1 Gbps iSCSI 4-port host interface adapter, you can use Ethernet cables to connect the system to your Ethernet SAN.

About this task

Each Storwize V5000 Gen2 system has two Ethernet ports, port 1 and port 2, that are built into the canister. When a 4-port Ethernet host interface adapter is installed, the port number starts at 3.

Note: The Ethernet cables are connected in pairs. Both canisters must have the same number of cables connected.

Procedure

To install the cables, complete the following steps.

1. Identify the correct pair of Ethernet cables for the Ethernet ports labeled 3 in the left canister and the right canister.
2. Connect the appropriate cable to each port.
3. For each additional pair of Ethernet ports in the right and left canisters, identify the correct pair of cables and connect them.

Results

Figure 25 shows the Ethernet ports on a node canister, as seen from the back of a Storwize V5010 system.

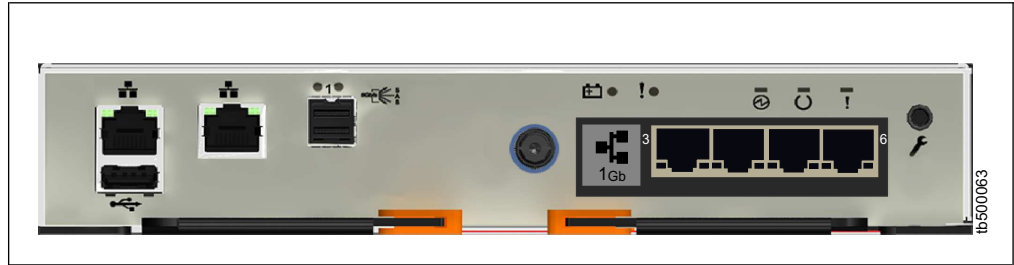


Figure 25. Example of a Storwize V5010 system with a 4-port Ethernet host interface adapter

Connecting Fibre Channel cables to a 10 Gbps iSCSI-FCoE 4-port host interface adapter

If 10 Gbps iSCSI-FCoE 4-port host interface adapters are installed on your Storwize V5000 Gen2 system, you can use Fibre Channel cables to connect them to your 10 Gbps Ethernet or FCoE SAN.

About this task

The Fibre Channel cables are connected in pairs. Both canisters must have the same number of cables connected.

Procedure

To install the cables, complete the following steps.

If optional 4-port 10 Gbps Ethernet host interface adapters are installed in the node canisters, connect each port to the network that will provide connectivity to that port. To provide redundant connectivity, connect both node canisters in a control enclosure to the same networks.

Results

Figure 26 on page 34 shows an example Storwize V5010 configuration that uses 10 Gbps iSCSI-FCoE 4-port host interface adapters.

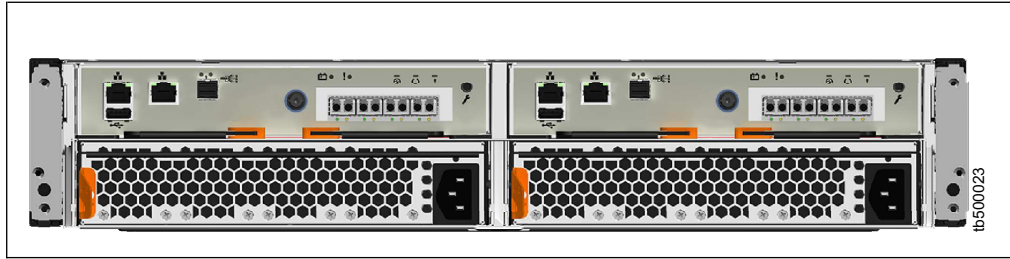


Figure 26. Example Storwize V5010 configuration with 10 Gbps iSCSI-FCoE 4-port host interface adapters

Figure 27 shows an example of a Storwize V5020 configuration that uses 10 Gbps iSCSI-FCoE 4-port host interface adapters.

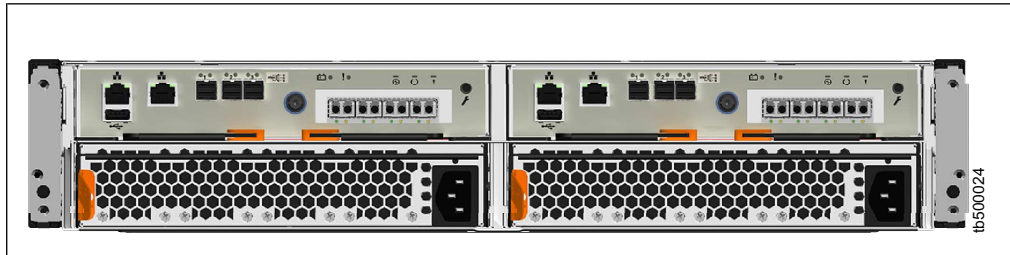


Figure 27. Example Storwize V5020 configuration with 10 Gbps iSCSI-FCoE 4-port host interface adapters

Figure 28 shows an example of a Storwize V5030 configuration that uses 10 Gbps iSCSI-FCoE 4-port host interface adapters.

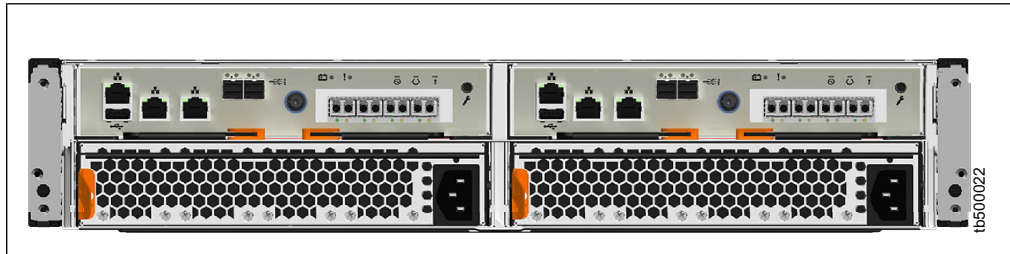


Figure 28. Example Storwize V5030 configuration with 10 Gbps iSCSI-FCoE 4-port host interface adapters

Connecting Fibre Channel cables to a Fibre Channel host interface adapter

If your Storwize V5000 Gen2 system has 16 Gbps Fibre Channel 4-port host interface adapters installed, you can use Fibre Channel cables to connect them to your Fibre Channel SAN.

Procedure

To install the cables, complete the following steps.

1. Connect the required number of Fibre Channel cables. Refer to the “Planning” section of the IBM Knowledge Center for instructions on determining the number of cables required.

Note: Both canisters must have the same number of cables connected.

Figure 29 shows an example Storwize V5020 system with two Fibre Channel cables connected to each canister.

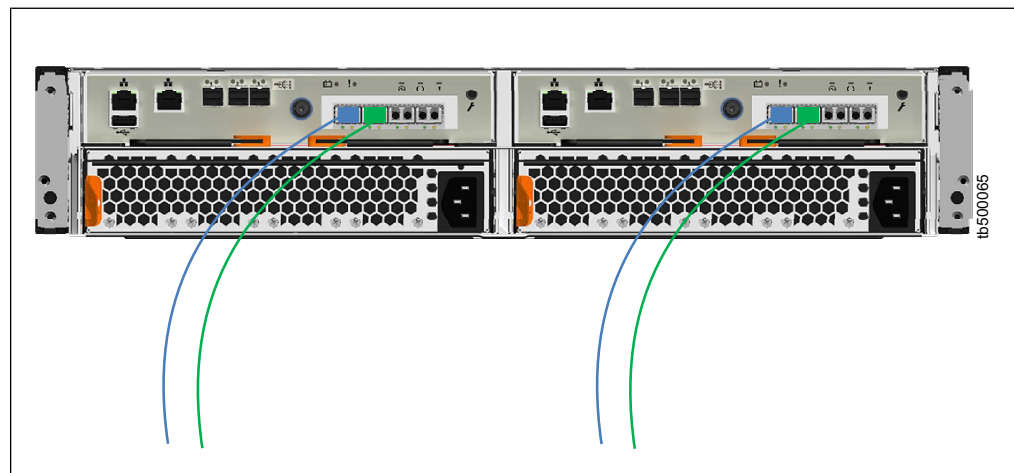


Figure 29. Example Storwize V5000 Gen2 configuration with two Fibre Channel cables per canister

2. If you want to connect additional Fibre Channel cables, make sure to connect the same number of cables to each canister. Figure 30 on page 36 shows an example Storwize V5020 configuration with four Fibre Channel cables connected to each canister.

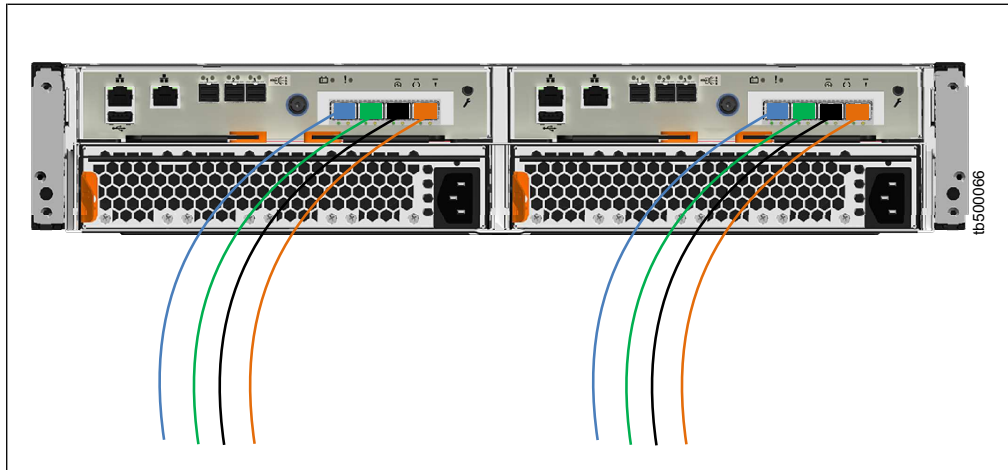


Figure 30. Example Storwize V5020 configuration with four Fibre Channel cables per canister

3. If a control enclosure is already installed, you can optionally add Fibre Channel connections between all the control enclosures.
 - This involves both the physical installation of the cables and configuring the correct zoning on the Fibre Channel switches.
 - Configure the network so that every node canister has at least two connections to every node canister in a different control enclosure.
 - You must configure the network before you attempt to add a control enclosure to an existing system.

Connecting a control enclosure to a host with onboard SAS connectors

When installing a control enclosure, you can connect it to a host with SAS cables. On Storwize V5020 systems, you can use the 12 Gbps onboard host SAS ports or an optional 4-port 12 Gbps SAS host interface adapter. Onboard SAS host ports are not available on Storwize V5010 or Storwize V5030 systems.

About this task

Two types of SAS cables are used for host attachment, depending on the requirements of the host.

- Mini SAS HD to Mini SAS HD (Figure 31 on page 37)

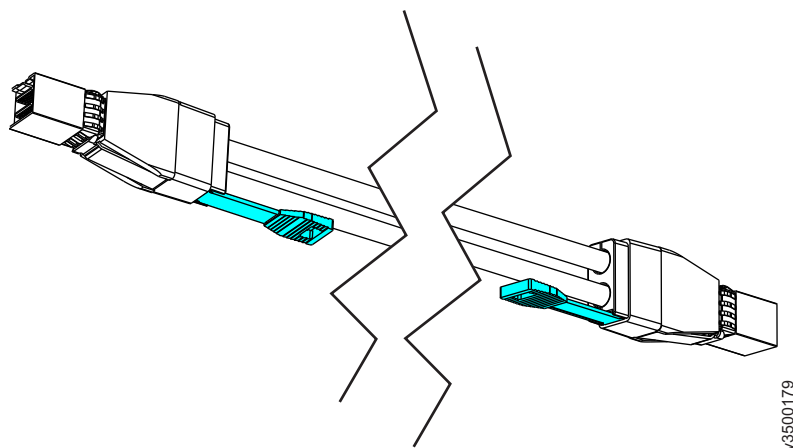


Figure 31. Mini SAS HD to Mini SAS HD cable

- Mini SAS HD to Mini SAS (Figure 32)

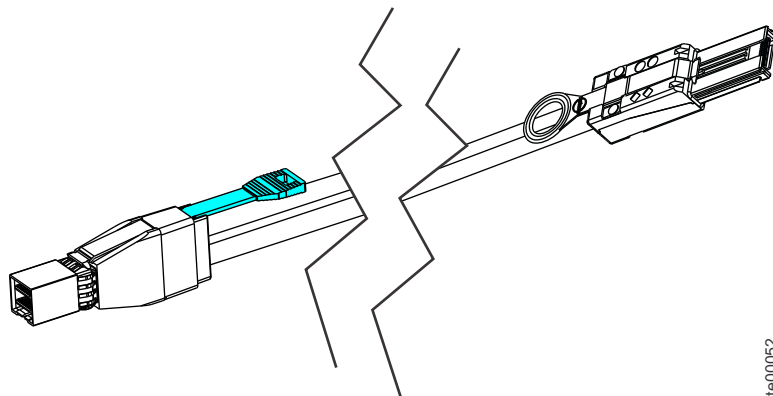


Figure 32. Mini SAS HD to Mini SAS cable

Note: When inserting SAS cables, make sure that the connector is oriented correctly.

- When connecting to the SAS ports on the left side of the node canister, the blue pull tab must be **below** the connector.
- Insert the connector **gently** until it clicks into place. If you feel resistance, the connector is probably oriented the wrong way. Do **not** force it.
- When inserted correctly, the connector can only be removed by pulling the tab.

Procedure

To install the cables, complete the following steps.

1. Connect the required number of SAS cables. Refer to the “Planning” section of the IBM Knowledge Center for instructions on determining the number of cables required.

Note: When connecting to the SAS ports on the left side of the node canister, each host must be connected to **both** canisters. Both canisters must have the **same** number of cables connected.

2. Arrange the cables to provide access to the hardware.

- **USB ports.** USB port access is required when you use a USB flash drive to configure the system.
- **The enclosures themselves.** Access is required to the hardware for servicing and for safely removing and replacing components using two or more people.

Results

Figure 33 shows the location of the onboard 12 Gbps SAS ports on a Storwize V5020 system. In this example, the optional 4 port 12 Gbps SAS host adapter is also installed.

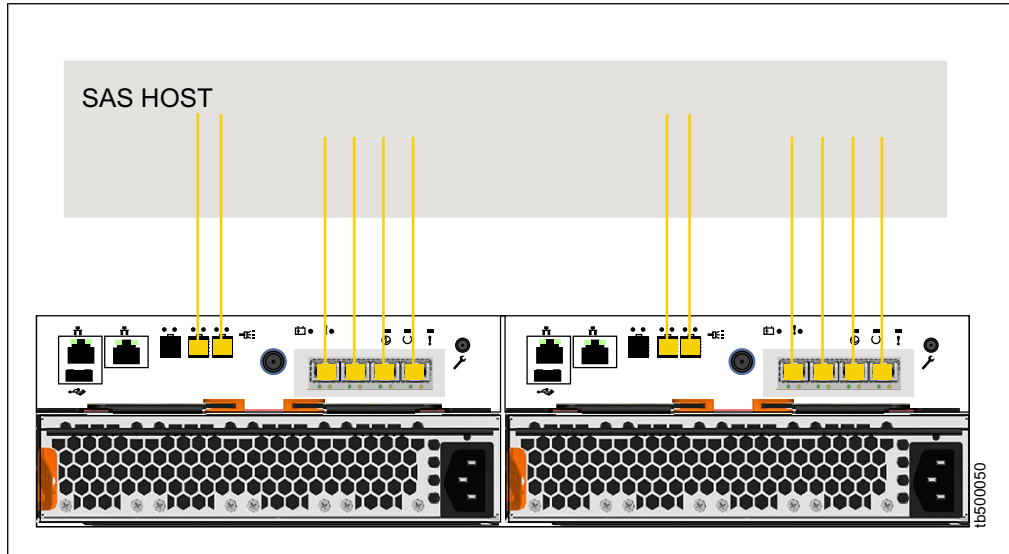


Figure 33. Location of available SAS ports on a Storwize V5020 system

Powering on the system

After you install all hardware components, you must power on the system and check its status.

About this task

Attention: Do not power on the system with any open bays or slots.

- Every unused drive bay must be occupied by a filler panel.
- Filler panels must be installed in all empty host interface adapter slots.

Open bays or slots disrupt the internal air flow, causing the drives to receive insufficient cooling.

Procedure

To power on the system, complete the following steps.

1. Power on all expansion enclosures. Use the supplied power cords to connect both power supply units of the enclosure to their power sources. If the power sources have circuit breakers or switches, ensure that they are turned on. The enclosure does not have power switches. Repeat this step for each expansion enclosure in the system.

Note: Each enclosure has two power supply units. To provide power failure redundancy, connect the two power cords to separate power circuits.

2. From the rear of the expansion enclosure, check the LEDs on each expansion canister (see Figure 34).

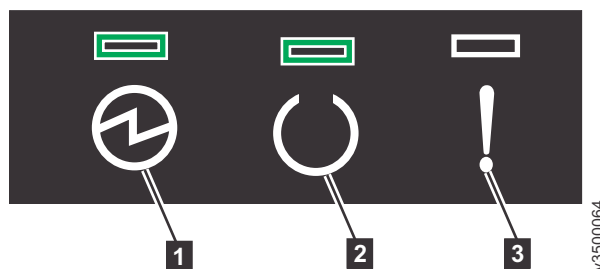


Figure 34. Expansion canister LEDs

- 1** Power
- 2** Status
- 3** Fault

The canister is ready with no critical errors when **Power** is illuminated, **Status** is on, and **Fault** is off. If a canister is *not* ready, refer to the “Procedure: Understanding the system status using the LEDs” topic in “Troubleshooting”.

3. Wait for all expansion canisters to finish powering on.
4. Power on the control enclosure. Use the supplied power cords to connect both power supply units of the enclosure to their power sources. If the power sources have circuit breakers or switches, ensure that they are turned on. The enclosure does not have power switches.

Note: Each enclosure has two power supply units. To provide power failure redundancy, connect the two power cords to separate power circuits.

5. From the rear of the control enclosure, check the LEDs on each node canister (see Figure 35).

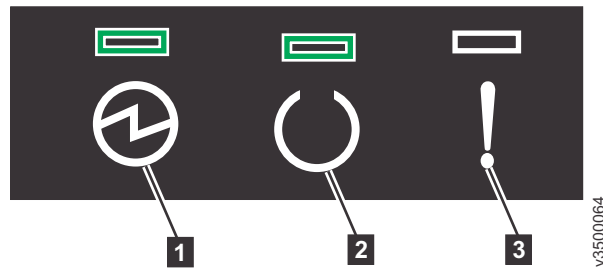


Figure 35. Node canister LEDs

- 1 Power
- 2 Status
- 3 Fault

The canister is ready with no critical errors when **Power** is illuminated, **Status** is flashing, and **Fault** is off. If a canister is *not* ready, refer to the “Procedure: Understanding the system status using the LEDs” topic in “Troubleshooting”.

Chapter 3. Configuring the system

After initializing the system, you will use the Storwize management GUI to complete the configuration procedures.

- The management GUI requires a supported web browser (see “Checking your web browser settings for the management GUI”).
- To configure a new system, you will log on to the management GUI with the default user name and password (see “User name and password for system initialization”).

Checking your web browser settings for the management GUI

To access the management GUI, you must ensure that your web browser is supported and has the appropriate settings enabled.

Before you begin

The management GUI supports the following web browsers:

- Mozilla Firefox 41
- Mozilla Firefox Extended Support Release (ESR) 38
- Microsoft Internet Explorer (IE) 11 and Microsoft Edge
- Google Chrome 46

IBM supports higher versions of the browsers if the vendors do not remove or disable function that the product relies upon. For browser levels higher than the versions that are certified with the product, customer support accepts usage-related and defect-related service requests. If the support center cannot re-create the issue, support might request the client to re-create the problem on a certified browser version. Defects are not accepted for cosmetic differences between browsers or browser versions that do not affect the functional behavior of the product. If a problem is identified in the product, defects are accepted. If a problem is identified with the browser, IBM might investigate potential solutions or work-arounds that the client can implement until a permanent solution becomes available.

Procedure

To configure your web browser, follow these steps:

1. Enable JavaScript for your web browser.

For Mozilla Firefox, JavaScript is enabled by default and requires no additional configuration.

For Microsoft Internet Explorer (IE) running on Microsoft Windows 7:

- a. In Internet Explorer, click **Tools > Internet Options**.
- b. Click **Security Settings**.
- c. Click **Internet** to choose the Internet zone.
- d. Click **Custom Level**.
- e. Scroll down to the **Scripting** section, and then in **Active Scripting**, click **Enable**.
- f. Click **OK** to close **Security Settings**.
- g. Click **Yes** to confirm the change for the zone.

h. Click **OK** to close **Internet Options**.

i. Refresh your browser.

For Microsoft Internet Explorer (IE) running on Microsoft Windows Server 2008:

a. In Internet Explorer, click **Tools > Internet Options**.

b. Click **Security**.

c. Click **Trusted sites**.

d. On the **Trusted sites** dialog, verify that the web address for the management GUI is correct and click **Add**.

e. Verify that the correct web address was added to the **Trusted sites** dialog.

f. Click **Close** on the **Trusted sites** dialog.

g. Click **OK**.

h. Refresh your browser.

For Google Chrome:

a. On the menu bar in the Google Chrome browser window, click **Settings**.

b. Click **Show advanced settings**.

c. In the **Privacy** section, click **Content settings**.

d. In the **JavaScript** section, select **Allow all sites to run JavaScript**.

e. Click **OK**.

f. Refresh your browser.

2. Enable cookies in your web browser.

For Mozilla Firefox:

a. On the menu bar in the Firefox browser window, click **Tools > Options**.

b. On the Options window, select **Privacy**.

c. Set "Firefox will" to **Use custom settings for history**.

d. Select **Accept cookies from sites** to enable cookies.

e. Click **OK**.

f. Refresh the browser.

For Microsoft Internet Explorer:

a. In Internet Explorer, click **Tools > Internet Options**.

b. Click **Privacy**. Under **Settings**, move the slider to the bottom to allow all cookies.

c. Click **OK**.

d. Refresh your browser.

For Google Chrome:

a. On the menu bar in the Google Chrome browser window, click **Settings**.

b. Click **Show advanced settings**.

c. In the **Privacy** section, click **Content settings**.

d. In the **Cookies** section, select **Allow local data to be set**.

e. Click **OK**.

f. Refresh your browser.

3. Enable file download on IE 10 and 11 running on Windows 2012.

a. In Internet Explorer, click **Tools > Internet Options**.

b. On the Internet Options window, select the **Security** tab.

c. On the **Security** tab, click the **Internet zone**.

- d. Click **Custom level** to customize the security level for this zone.
- e. Scroll down to **Downloads** and select **Enable** under File download.
- f. Click **OK**.
- g. Click **Yes** to confirm.
- h. Click **OK** to close the Internet Options.
4. Enable scripts to disable or replace context menus. (Mozilla Firefox only).
For Mozilla Firefox:
 - a. On the menu bar in the Firefox browser window, click **Tools > Options**.
 - b. On the Options window, select **Content**.
 - c. Click **Advanced** by the **Enable JavaScript** setting.
 - d. Select **Disable or replace context menus**.
 - e. Click **OK** to close the Advanced window.
 - f. Click **OK** to close the Options window.
 - g. Refresh your browser.
5. Enable TLS 1.1/1.2 (Microsoft Internet Explorer 9 and 10 only).
For Microsoft Internet Explorer:
 - a. Open Internet Explorer.
 - b. Select **Tools > Internet Options**.
 - c. Select the **Advanced** tab.
 - d. Scroll to the **Security** section.
 - e. Check the **Use TLS 1.1** and **Use TLS 1.2** checkboxes.

Note: IE 11 and later enable TLS 1.1/1.2 by default.

User name and password for system initialization

During the initialization procedure, you need to log in to the management GUI for the Storwize V5000 Gen2 system.

The default user name and password for the management GUI are listed in Table 14.

Table 14. Default user name and password for the management GUI

User name	Password
superuser	passw0rd

Note: The 0 character in the password is the number zero, not the letter O.

Initializing the system by using the technician port

To initialize a new system, you must connect a personal computer to the technician port on the rear of a node canister and run the initialization tool.

Before you begin

You require the following items:

- A supported browser that is installed on the personal computer
- An Ethernet cable to connect the personal computer to the technician port

Attention: Do not connect the technician port to a switch. If a switch is detected, the technician port connection might shut down, causing a 746 node error.

Procedure

To initialize the system, complete the following steps.

1. Ensure that the system is powered on, as described in “Powering on the system” on page 39.
2. Configure an Ethernet port on the personal computer to enable Dynamic Host Configuration Protocol (DHCP) configuration of its IP address and DNS settings.

If you do not have DHCP, you must manually configure the personal computer. Specify the static IPv4 address 192.168.0.2, subnet mask 255.255.255.0, gateway 192.168.0.1, and DNS 192.168.0.1.

3. Locate the Ethernet port that is labeled T on the rear of the node canister.
On Storwize V5010 and Storwize V5020 systems, the second port on the 1 Gbps Ethernet card is also used as the technician port. Figure 36 and Figure 37 show the location of the technician port (**T**) on each model.

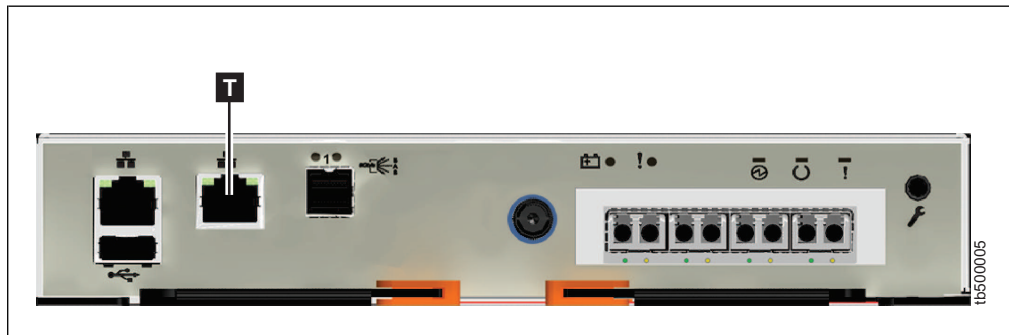


Figure 36. Storwize V5010 technician port

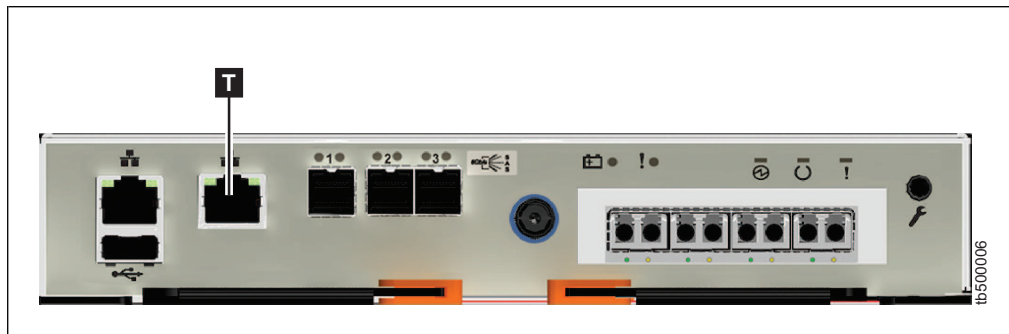


Figure 37. Storwize V5020 technician port

Storwize V5030 systems have a dedicated technician port. Figure 38 on page 45 shows the location of the port (**T**).

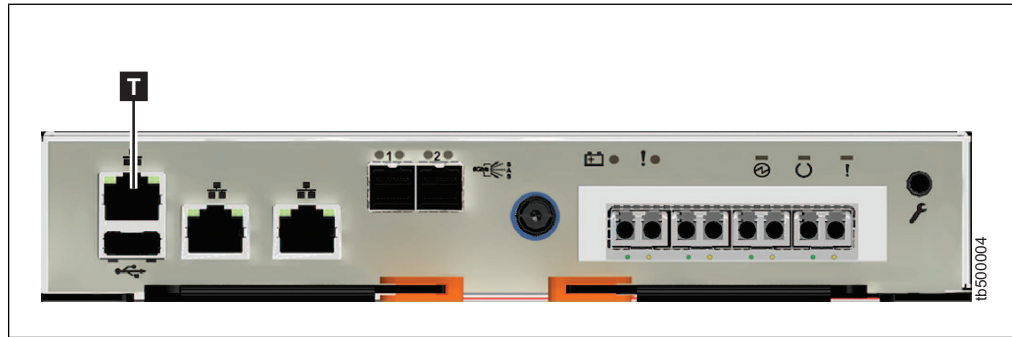


Figure 38. Storwize V5030 technician port

4. Connect an Ethernet cable between the port of the personal computer that is configured in step 2 on page 44 and the technician port. After the connection is made, the system will automatically configure the IP and DNS settings for the personal computer if DHCP is available. If it is not available, the system will use the values you provided in step 2 on page 44.
5. After the Ethernet port of the personal computer is connected, open a supported browser and browse to address <http://install>. (If you do not have DHCP, open a supported browser and go to the following static IP address 192.168.0.1.) The browser is automatically directed to the initialization tool.
6. Follow the instructions that are presented by the initialization tool to configure the system with a name and management IP address.
7. If you experience a problem during the process due to a change in system states, wait 5 - 10 seconds. Then, either reopen the SSH connection or reload the service assistant.
8. After you complete the initialization process, disconnect the cable between the personal computer and the technician port.

What to do next

The system can now be reached by opening a supported web browser and pointing it to http://management_IP_address.

Adding an expansion enclosure to an existing system

When you add an expansion enclosure to an existing system, you must use the Storwize management GUI to update the system configuration.

About this task

The management GUI requires a supported web browser (see “Checking your web browser settings for the management GUI” on page 41).

Procedure

To add an expansion enclosure to your system, complete the following steps.

1. Install support rails for the new enclosure.
2. Install the new enclosure in the rack.
3. Connect the expansion enclosure attachment cables.
4. Connect the power cables and wait for the SAS light-emitting diodes (LEDs) to illuminate.
5. Start the management GUI.

6. Go to **Monitoring > System**.
7. On the System page, select **Actions > Add Enclosures**.
8. Continue to follow the on-screen instructions.

Adding a control enclosure to an existing Storwize V5030 system

A Storwize V5030 system may cluster with another Storwize V5030 system or with a Storwize V5000 system. To add a second control enclosure to an existing Storwize V5030 system, you must first install it in the rack. Then, you must connect it to the system through a zone in the SAN.

About this task

The management GUI requires a supported web browser (see “Checking your web browser settings for the management GUI” on page 41).

Note: You cannot cluster a second control enclosure with a Storwize V5010 or Storwize V5020 system.

Procedure

To add a second control enclosure to an existing Storwize V5030 system, complete the following steps.

1. Install support rails for the new enclosure.
2. Install the new enclosure in the rack.
3. Connect the canisters to the storage area network.
4. Configure the zoning on the SAN switches. The correct zoning provides a way for the Fibre Channel or FCoE ports to connect to each other.
5. Start the management GUI.
6. Go to **Monitoring > System**.
7. On the System page, select **Actions > Add Enclosures**.
8. Continue to follow the on-screen instructions.

Appendix A. Accessibility features for IBM Storwize V5000

Accessibility features help users who have a disability, such as restricted mobility or limited vision, to use information technology products successfully.

Accessibility features

These are the major accessibility features for the Storwize V5000:

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. HTML documents have been tested using JAWS version 15.0.
- This product uses standard Windows navigation keys.
- Interfaces are commonly used by screen readers.
- Industry-standard devices, ports, and connectors.

The Storwize V5000 online documentation and its related publications are accessibility-enabled. The accessibility features of the online documentation are described in Viewing information in the information center .

Keyboard navigation

You can use keys or key combinations to perform operations and initiate menu actions that can also be done through mouse actions. You can navigate the Storwize V5000 online documentation from the keyboard by using the shortcut keys for your browser or screen-reader software. See your browser or screen-reader software Help for a list of shortcut keys that it supports.

IBM and accessibility

See the IBM Human Ability and Accessibility Center for more information about the commitment that IBM has to accessibility.

Appendix B. Where to find the Statement of Limited Warranty

The Statement of Limited Warranty is available in both hardcopy format and in the Storwize V5000 information center.

The Statement of Limited Warranty is shipped (in hardcopy form) with your product. It can also be ordered from IBM (see Table 2 on page xviii for the part number).

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This explains the Federal Communications Commission's (FCC's) statement.

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This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conform à la norme NMB-003 du Canada.

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International Business Machines Corp.
New Orchard Road
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914-499-1900

European community contact:

IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 (0) 800 225 5423 or +49 (0) 180 331 3233
Email: halloibm@de.ibm.com

Germany Electromagnetic Compatibility Directive

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Technical Regulations, Abteilung M372
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VCCI-A

Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

(一社) 電子情報技術産業会 高調波電流抑制対策実施
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This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

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rusemi

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