IBM Storwize V7000

Gen3 Quick Installation Guide for MTM 2076-724, 2076-U7B, 2076-12F, 2076-24F, and 2076-92F

Note

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

- The general information in "Notices" on page 165
- The information in the "Safety and environmental notices" on page xix
- The information in the *IBM Environmental Notices and User Guide* (provided on a DVD)

This edition applies to version 8, release 2, modification 1 and to all subsequent modifications until otherwise indicated in new editions.

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Compliance standards

Note: This product was designed, tested, manufactured, and certified for safe operation. It complies with IEC 60950-1 and/or IEC 62368-1 and where required, to relevant national differences/deviations (NDs) to these IEC base standards. This includes, but is not limited to: EN (European Norms including all Amendments under the Low Voltage Directive), UL/CSA (North America bi-national harmonized and marked per accredited NRTL agency listings), and other such derivative certifications according to corporate determinations and latest regional publication compliance standardized requirements.

- Regulatory Model ID (RMID, for control system base platform): FBIII
- RMID (for 2U expansion option unit): ESLS
- RMID (for 5U expansion option unit): 5U-92

(Relevant Machine Type - Models (MT-Ms) may also be used to supplement identification (ID) for worldwide (WW) co-compliance filings or registrations with regulatory bodies.)

Safety and environmental notices

Review all safety notices, environmental notices, and electronic emission notices 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.

To find the translated text for a caution or danger notice, complete the following steps.

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

   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)
2. Locate the *IBM Storwize V7000 Safety Notices* with the user publications that were provided with your system hardware.
3. Find the matching identification number in the *IBM Storwize V7000 Safety Notices*. Then, review the topics about the safety notices to ensure that you are in compliance.
4. (Optional) Read the multilingual safety instructions on the system website.
   a. Go to www.ibm.com/support
   b. Search for " Storwize® V7000 "
   c. Click the documentation link.

Safety notices and labels

Review the safety notices and safety information labels before you use 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.

Notes:

- 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.
- 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.

Caution notices for the system

Ensure that you understand the caution notices for the system.

Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM Storwize V7000 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:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C011)

CAUTION: To avoid personal injury, before lifting this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)

CAUTION: Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the machine covers, unless instructed otherwise in the installation and configuration procedures. (26)

CAUTION: CAUTION regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers). Read and completely understand the contents of LIFT TOOL operator's manual before using.
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's website.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads. (C048, part 1 of 2)

- **Do not operate while under the influence of drugs or alcohol.**
- **Do not support ladder against LIFT TOOL.**
- **Tipping hazard. Do not push or lean against load with raised platform.**
- **Do not use as a personnel lifting platform or step. No riders.**
- **Do not stand on any part of lift. Not a step.**
- **Do not climb on mast.**
- **Do not operate a damaged or malfunctioning LIFT TOOL machine.**
- **Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.**
- **No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.**
- **Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.**
- **Do not leave LIFT TOOL machine unattended with an elevated load.**
- **Watch and keep hands, fingers, and clothing clear when equipment is in motion.**
- **Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.**
- **A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048, part 2 of 2)**

CAUTION:

High levels of acoustical noise are (or could be under certain circumstances) present.

Use approved hearing protection and/ or provide mitigation or limit exposure. (L018)

CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- (For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- (For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

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)

Danger notices for the system

Ensure that you are familiar with the danger notices for your system.

Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM Storwize V7000 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: DANGER: Serious injury or death can occur if loaded lift tool falls over or if a heavy load falls off the lift tool. Always completely lower the lift tool load plate and properly secure the load on the lift tool before moving or using the lift tool to lift or move an object. (D010)

DANGER: Observe the following precautions when working on or around your IT rack system:

- Heavy equipment–personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to

ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)

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 system. These notices are in addition to the standard safety notices that are supplied; they address specific issues that are relevant to the equipment provided.

General safety

When you service the system, you must follow these 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 2 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 system, 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 system 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 the required environmental notices for IBM Systems products in English and other languages.

The *IBM Systems Environmental Notices* 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 the system.

Unless otherwise stated, references to 2076-724 are assumed to include 2076-U7B.

Who should use this guide

This guide is intended for installers of the system.

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.

Publications and related libraries

Product manuals, other publications, and websites that contain information that is related to your system are available.

IBM Knowledge Center for Storwize V7000

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:

Knowledge Center

IBM websites for help, services, and information

Table 1 on page xxvii 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 V7000 (2076)	www.ibm.com/support
IBM Redbooks® publications	www.redbooks.ibm.com/

Publications in the Knowledge Center

Each PDF publication in the library is available in the IBM Knowledge Center by clicking the title in the "Link to PDF" column:

Table 2. Storwize V7000 library		
Title	**Description**	**Link to PDF file**
IBM Storwize V7000 Gen3 Quick Installation Guide	These guides provide detailed instructions for unpacking your order and installing your system. The first chapter describes verifying your order, becoming familiar with the hardware components, and meeting environmental requirements. The second chapter describes installing the hardware and attaching data cables and power cords. The third chapter describes accessing the management GUI to initially configure your system.	Quick Installation Guide [PDF]
IBM Storwize V7000 Gen2 and Gen2+ Quick Installation Guide		Quick Installation Guide [PDF]
IBM Spectrum Virtualize Software Command-Line Interface User's Guide *For IBM Spectrum Virtualize as Software Only, IBM Spectrum Virtualize for Public Cloud, IBM SAN Volume Controller, IBM Storwize V7000, IBM Storwize V5000, IBM Storwize V5000E, IBM Storwize V5100, IBM FlashSystem V9000, and IBM FlashSystem 9100*	The guide describes the commands that you can use from the Storwize V7000 command-line interface (CLI).	Command-Line Interface User's Guide [PDF]

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

Related websites

The following websites provide information about the system, related products, or technologies.

Type of information	Website
Technical support for IBM products	www.ibm.com/support
IBM Electronic Support registration	www-01.ibm.com/support/electronicsupport/

Sending your comments

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

To submit any comments, send your comments by email to ibmkc@us.ibm.com. Include the following information in your email:

- Exact publication title and version.
- Page, table, or illustration numbers that you are commenting on.
- A detailed description of any information that needs to be changed.

How to get information, help, and technical assistance

If you need help, service, technical assistance, or want more information about IBM products, you can 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 3 on page xxix.

Table 3. IBM websites for help, services, and information

Website	Address
IBM home page	http://www.ibm.com
Directory of worldwide contacts	http://www.ibm.com/planetwide
Support for products	www.ibm.com/support

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

Help and service

Before you call 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 you call 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 **software** or **hardware** option when you call for assistance. Choose the **software** option if you are uncertain if the problem involves the Storwize V7000 software or hardware. Choose the **hardware** option only if you are certain the problem solely involves the Storwize V7000 hardware. When you call IBM to service the product, follow these guidelines for the **software** and **hardware** option:

Software option
: Identify the Storwize V7000 product as your product and supply your customer number as proof of purchase. The customer number is a 7-digit number (0000000 - 9999999) assigned by IBM when the product is purchased. Your customer number might be 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 V7000 , the machine type is 2076 .

In the US and Canada, hardware service and support can be extended to 24 x 7 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/support.

Before you call

Make sure that you take steps to try to solve the problem yourself before you call. Some suggestions for resolving the problem before you call 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 IBM Knowledge Center contains procedures to help you diagnose problems.
- Go to the IBM Support website at www.ibm.com/support 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 Knowledge 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 this information, go to www.ibm.com/support 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 that is 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 that is provided by the system or about how to configure the system. Purchasing the IBM Support Line offering gives you access to this professional advice for 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 chapters and appendixes.

1. The steps in Chapter 1, “Before you begin the installation,” on page 1 (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 system hardware,” on page 11 involve installing the hardware and attaching the data cables and power cords.
3. Chapter 3, “Configuring the system,” on page 135 helps you create your configuration file and access the management GUI. The management GUI guides you through the initial configuration process.
4. Chapter 4, “Adding an expansion enclosure to an existing system,” on page 141 describes how to add an expansion enclosure to an existing system by using the management GUI to update the system configuration.
5. Chapter 5, “Adding a control enclosure to an existing system ,” on page 143 describes how to add a control enclosure to an existing system, beginning with installing the control enclosure in the rack and then connecting it to the system through a zone in the SAN.
6. Appendix A, “Accessibility features for the system,” on page 145 is an appendix that describes IBM's commitment to accessibility for all customers.
7. Appendix B, “Where to find the Statement of Limited Warranty,” on page 147 is an appendix that describes where to find Warranty information.
8. Appendix C, “Control enclosure requirements,” on page 149 is an appendix that describes the environmental requirements that you must meet to install and operate a Storwize V7000 2076-724 or Storwize V5100 2077-424 control enclosure.
9. Appendix D, “SAS expansion enclosure requirements,” on page 157 is an appendix that describes the environmental requirements that you must meet to install and operate a 2U Storwize 2076-12F or Storwize 2076-24F expansion enclosure, or a 5U 2076-92F expansion enclosure. The examples for a 2U enclosure are for the 2076-24F.

Important information:

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

Installation scenarios

Depending on your order, this documentation steps you through setting up your system for the following scenarios:

- **Setting up a new system that consists of a control enclosure only.** In this case, you are not installing any expansion enclosures.
- **Setting up a new system that consists of a control enclosure and one or more expansion enclosures.**
- **Adding an expansion enclosure to an existing system.** In this case, you initially installed a control enclosure (and, optionally, one or more expansion enclosures). You want to add an expansion enclosure to your existing system. You do not need to power off the system. You can add an expansion enclosure while the system is operational.

- **Adding a control enclosure (either by itself or with one or more expansion enclosures) to an existing system.** You do not need to power off the system. You can add a control enclosure while the system is operational.
- **Setting up a new system that consists of more than one control enclosure.** Install the first control enclosure and then the required expansion enclosures. For each additional control enclosure, complete the setup as if you were adding it to an existing system.

Table 4 on page 2 lists the steps for each scenario.

Table 4. Steps for different installation scenarios

New system (control enclosure only)	New system (control enclosure and one or more expansion enclosures)	Adding expansion enclosures to an existing system	Adding control enclosures and expansion enclosures to an existing system
"Reviewing your packing slip" on page 4	"Reviewing your packing slip" on page 4	"Reviewing your packing slip" on page 4	"Reviewing your packing slip" on page 4
"Identifying the hardware components" on page 6	"Identifying the hardware components" on page 6	"Identifying the hardware components" on page 6	"Identifying the hardware components" on page 6
"Verify environmental requirements" on page 9	"Verify environmental requirements" on page 9	"Verify environmental requirements" on page 9	"Verify environmental requirements" on page 9
"Review enclosure location guidelines" on page 10	"Review enclosure location guidelines" on page 10	"Review enclosure location guidelines" on page 10	"Review enclosure location guidelines" on page 10
"Installing support rails for the Storwize V7000 2076-724 and 2076-U7B control enclosures " on page 13	"Installing support rails for the Storwize V7000 2076-724 and 2076-U7B control enclosures " on page 13 "Installing support rails for 2U expansion enclosures " on page 18	"Installing support rails for 2U expansion enclosures " on page 18[1] "Installing or replacing the support rails: 2076-92F " on page 26	"Installing support rails for the Storwize V7000 2076-724 and 2076-U7B control enclosures " on page 13 "Installing support rails for 2U expansion enclosures " on page 18[2]
"Installing a Storwize V7000 2076-724 control enclosure" on page 15	"Installing a Storwize V7000 2076-724 control enclosure" on page 15	"Installing an optional 5U SAS expansion enclosure" on page 29[1]	"Installing a Storwize V7000 2076-724 control enclosure" on page 15[2]
	"Installing an optional 2U SAS expansion enclosure " on page 22	"Installing an optional 2U SAS expansion enclosure " on page 22	"Installing an optional 2U SAS expansion enclosure " on page 22
	"Connecting optional SAS expansion enclosures to the Storwize V7000 2076-724 or 2076-U7B control enclosure " on page 124	"Connecting optional SAS expansion enclosures to the Storwize V7000 2076-724 or 2076-U7B control enclosure " on page 124[1]	"Connecting optional SAS expansion enclosures to the Storwize V7000 2076-724 or 2076-U7B control enclosure " on page 124[1]

Table 4. Steps for different installation scenarios (continued)			
New system (control enclosure only)	**New system (control enclosure and one or more expansion enclosures)**	**Adding expansion enclosures to an existing system**	**Adding control enclosures and expansion enclosures to an existing system**
"Connecting Ethernet cables to the node canisters" on page 122	"Connecting Ethernet cables to the node canisters" on page 122		"Connecting Ethernet cables to the node canisters" on page 122[2]
"Connecting Fibre Channel cables to the control enclosure" on page 123	"Connecting Fibre Channel cables to the control enclosure" on page 123		"Connecting Fibre Channel cables to the control enclosure" on page 123[2]
"Powering on the system" on page 133	"Powering on the system" on page 133	"Powering on the system" on page 133	"Powering on the system" on page 133
Chapter 3, "Configuring the system," on page 135	Chapter 3, "Configuring the system," on page 135	"Installing an optional 2U SAS expansion enclosure " on page 22	"Installing a Storwize V7000 2076-724 control enclosure" on page 15
[1]Complete these steps for each expansion enclosure that you add. [2]Complete these steps for each control enclosure and expansion enclosure that you add.			

Be familiar with the following information

- See "Caution notices for the system" on page xx and "Danger notices for the system " on page xxiii 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 45 kg (99 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.

  (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 that are 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.

__ • Control enclosure or expansion enclosures :

Table 5. V7000 Gen3 control and expansion enclosures		
Machine type / model	**Warranty**	**Description**
2076-724	3 years	IBM Storwize V7000 Gen3 NVMe Control Enclosure
2076-U7B	3 years	IBM Storwize V7000 Gen3 NVMe Control Enclosure
2076-12F	3 years	IBM Storwize V7000 12-slot Expansion Enclosure for 3.5-inch drives
2076-24F	3 years	IBM Storwize V7000 24-slot Expansion Enclosure for 2.5-inch drives
2076-92F	3 years	IBM Storwize V7000 92-slot Expansion Enclosure for 3.5-inch drives

__ • Rack-mounting hardware kit:

  __ – Two rails (right and left assembly)

  __ – Two sets of rail-mount screws for non-IBM racks

__ • Two power cords for connection to rack-mounted power distribution units

__ • Drive bay blanking plates (installed in the enclosure)

__ • Publications package

Options applicable to control enclosures

Note: All options other than cables are preinstalled.

__ • Cache memory sequential upgrades to enhance 128 GB base system memory (8 x 16 GB DIMMs in 48 DIMM slots):

  – 256 GB total system memory – adds 8 x 16GB DIMMs

  – 384 GB total system memory – (requires 256 GB total memory option and) adds 8 x 16 GB DIMMs

  – 1152 GB total system memory – (requires 256 GB total memory option, 384 GB total memory option and) adds 24 x 32 GB DIMMs

__ • From 0-2 of the following host interface adapter options in any combination for the two available card slots:

  – Four-port 16 Gbps Fibre Channel that supports NVMe over Fabrics (NVMe-oF) with two small form-factor pluggable (SFP) transceivers installed

  – Two- port 25 Gbps Ethernet iWARP with iSER support that is NVMe-oF ready when the software supports it

  – Two- port 25 Gbps Ethernet RoCE with iSER support that is NVMe-oF ready when the software supports it

__ • Fibre Channel cables

__ • SAS cables

__ • Drive options for the 24 available drive bays:

  – Self-compressing, self-encrypting 2.5-inch NVMe-attached IBM FlashCore Modules with the following storage capacities: 4.8 TB, 9.6 TB, and 19.2 TB.

  – Industry-standard 2.5-inch NVMe-attached SSD drive options with the following storage capacities: 1.92 TB, 3.84 TB, 7.68 TB, and 15.36 TB.

__ • Power cords for connection to wall sockets

Options applicable to expansion enclosures

Note: All options other than cables are preinstalled.

__ • Expansion enclosure attachment cables

__ • Drives

__ • Power cords for connection to wall sockets

Identifying the hardware components

The following graphics identify hardware components and port locations for the control enclosures and expansion enclosures of the system.

Control enclosure components

The Storwize V7000 2076-724 control enclosure contains two node canisters. A label on the control enclosure identifies each node canister and power supply unit (PSU). As Figure 1 on page 6 shows, node canister 1 is on top and node canister 2 is on the bottom. Because the node canisters are inverted, the location of the ports and the port numbers are oriented differently on each node canister. It is important to remember this orientation when you install adapters and cables.

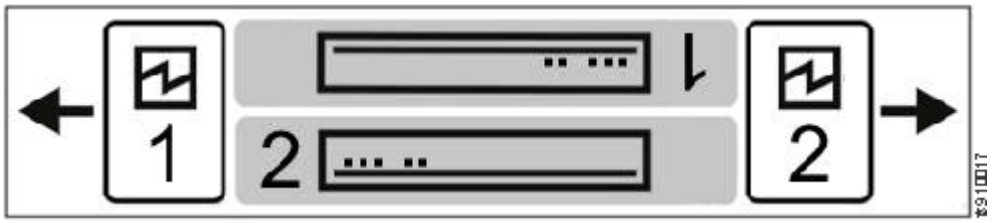


Figure 1. Label showing the orientation of the node canisters and PSUs

For example, Figure 2 on page 6 shows the top node canister. On this canister, the PCIe slot and port numbering goes from right to left. PCIe adapter slot 1 contains a 4-port 16 Gbps Fibre Channel adapter, PCIe slot 2 contains a 2-port 25 Gbps iWarp Ethernet adapter, and PCIe slot 3 contains a 4-port 12 Gbps SAS adapter. The onboard Ethernet and USB ports are also shown.

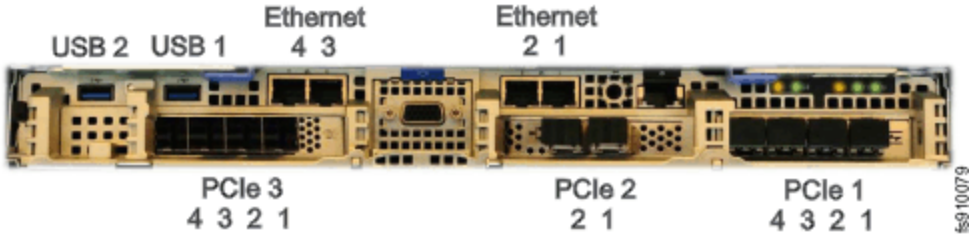


Figure 2. Orientation of ports on node canister 1

Figure 3 on page 6 shows the bottom node canister. This node canister has the same type and number of adapters installed. However, on the bottom canister, the PCI slot and port numbers go from left to right.

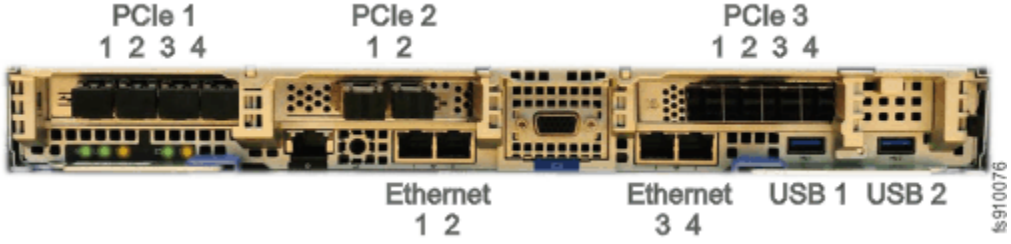


Figure 3. Orientation of ports on node canister 2

Data ports

Four 10 Gb Ethernet ports on each node canister provide system management connections and iSCSI host connectivity. A separate technician port provides access to initialization and service assistant functions. Table 6 on page 7 describes each port.

Table 6. Summary of onboard Ethernet ports

On board Ethernet Port	Speed	Function
1	10 Gbps	Management IP, Service IP, Host I/O
2	10 Gbps	Secondary Management IP, Host I/O
3	10 Gbps	Host I/O
4	10 Gbps	Host I/O
T	1 Gbps	Technician Port - DHCP/DNS for direct attach service management

Control enclosure support rails

The left and right control enclosure support rails are designed specifically for installation of a control enclosure.

- The ledge on the inside of the rails supports the entire length of a control enclosure.
- At the rear end of the control enclosure support rail, the top edge curves over to capture the top edge of an inserted control enclosure. This prevents the installed control enclosure bouncing when the rack is subjected to quake or vibration.
- The control enclosure support rails adjust to fit racks from 685 mm to 765 mm deep, measured between the front and rear rack rails.

Expansion enclosure components

Figure 4 on page 7 shows the location of the power supply units and expansion canisters.

- 1 Expansion canisters
- 2 Power supply units

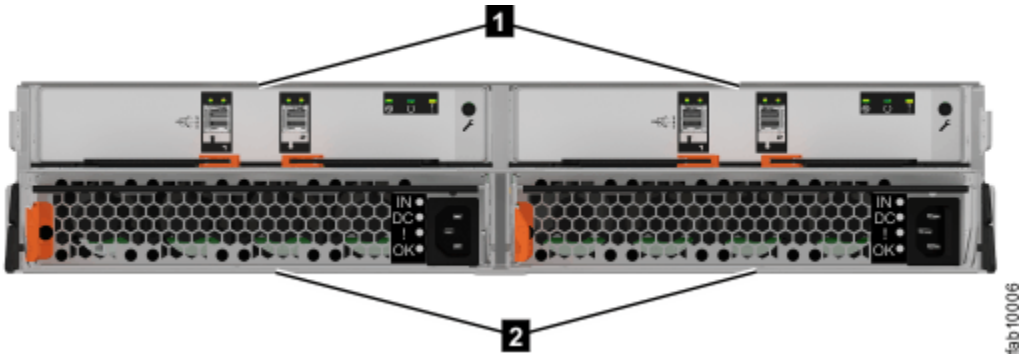


Figure 4. Rear view of a 2076-724 expansion enclosure

Figure 5 on page 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.

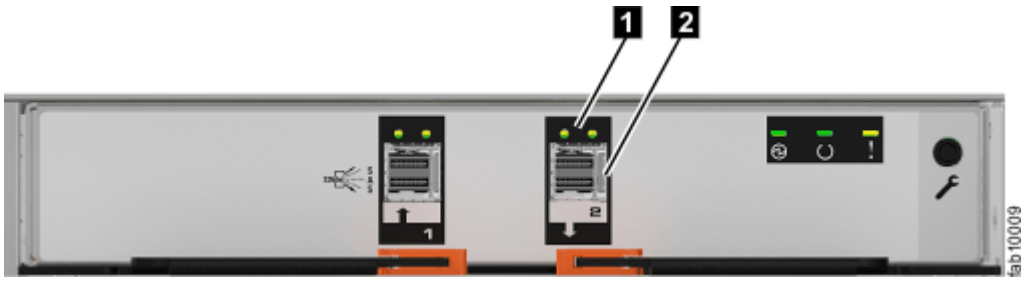


Figure 5. SAS ports and LEDs in rear view of an expansion canister for 2076-724

Expansion enclosure support rails

The left and right expansion enclosure support rails (Figure 6 on page 8) are designed specifically for installation of an expansion enclosure.

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

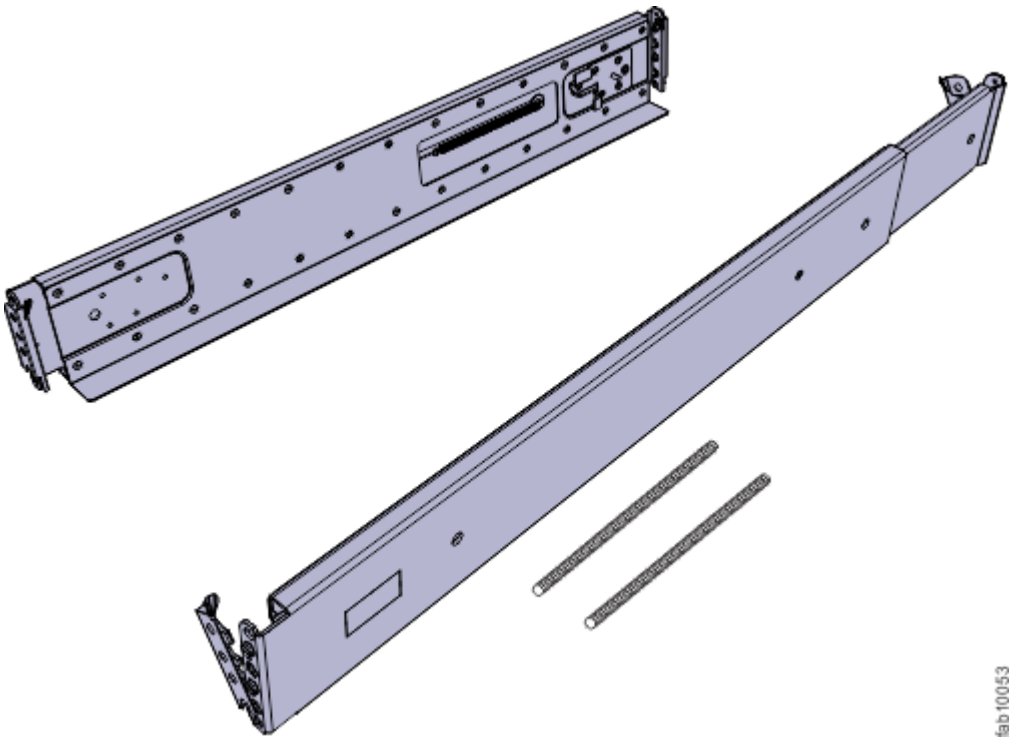


Figure 6. Expansion enclosure support rails

Identifying Storwize V7000 2076-724 node canisters

The Storwize V7000 2076-724 node canisters include hardware changes that significantly differ from earlier model node canisters. The differences help distinguish the types of node canisters. The main difference is that Storwize V7000 2076-724 node canisters are not side by side in the control enclosure,

but each is the full width (minus the width of both power supplies) and half the height of the control enclosure, sitting one above the other in an inverted orientation.

Figure 7 on page 9 shows the canister release levers extended to either remove or replace the bottom of the two node canisters in a Storwize V7000 2076-724 control enclosure. The inverted (upside down) upper node canister is also shown in the illustration.

Figure 7. Rear of the Storwize V7000 2076-724 enclosure

Other differences between Storwize V7000 2076-724 control enclosures and earlier control enclosures are numerous:

- New Intel CPU platform: dual Intel Skylake 8 core 1.7GHz processors with 32 Hyperthreads per node canister
- Removable Trusted Platform Module (TPM)
- From 4 to 24 DDR4 (288p socket) DIMMs in 24 DIMM slots in each node canister, supported as base memory and cumulative, sequential upgrades:
  - 64 GB per node canister as 4 x 16 GB DIMMs (default base installation)
  - 128 GB per node canister as 8 x 16 GB DIMMs (the first upgrade of 64 GB raises the cumulative total to 128 GB total memory per canister)
  - 192 GB per node canister as 12 x 16 GB DIMMs (the second upgrade of 64 GB raises the cumulative total to 192 GB total memory per canister)
  - 576 GB per node canister as 12 x 16 GB DIMMs and 12 x 32 GB DIMMs (the third upgrade of 384 GB raises the cumulative total to 576 GB total memory per canister)

    Note: The control enclosure has two canisters. To reach the system total cache of 1,152 GB, multiply the above figure of 576 GB by two.

For other differences, see the system overview in the Knowledge Center.

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 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 " physical installation planning" topic in the IBM Knowledge Center for the product.

If your system contains more than one control enclosure, configure a Fibre Channel switch for correct zoning between control enclosures for best results. See the configuring topics in the KnowledgeCenter that contain information about zoning rules and zoning details.

To verify that your environment can support Storwize V7000 2076-724, see Appendix C, “Control enclosure requirements,” on page 149.

To verify that your environment can support expansion enclosures for Storwize V7000 2076-724, see Appendix D, “SAS expansion enclosure requirements,” on page 157.

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.

A fully assembled enclosure, containing drives, node canisters, power supplies units, and all possible features weighs approximately 45 kg (99 lb), requiring three people to lift. For installation by a single person, reduce the system down to manageable components by removing the drives from the front of the enclosure and node canisters and power supply units from the rear of the enclosure before you attempt to move 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.

- A system can support up to 1056 drives that are installed into control and expansion enclosures. Each enclosure requires 2U of rack space.
- Each assembled enclosure weighs more than 36 kg. Provide sufficient space at the front of the rack for three persons to carry the enclosure safely.
- Each system can consist of up to four control enclosures. Each control enclosure can be connected to up to 20 expansion enclosures (two SAS chains of up to 10 expansion enclosures each).
- For best performance, divide the total number of expansion enclosures to be installed among the control enclosures in the system.
- Where expansion enclosures are to be installed, distribute them evenly into rack space above and below the control enclosure to which they are to connect. Do not leave gaps between the enclosures. Such placement aids cabling and serviceability.
- Leave space in the rack for future expansion enclosures, but otherwise install all enclosures that constitute one system in adjacent or nearby rack space.
- 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 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 system hardware

This information covers the system hardware installation and initial setup of the Storwize V7000 2076-724 control enclosure.

Installation overview

The installation and initial configuration of your system is your responsibility, following the plan that you created using the planning information in the Knowledge Center.

Hardware installation tasks that you must complete

To install the Storwize V7000 2076-724 hardware, you must complete the following tasks:

Important: You must complete the planning tasks and have completed worksheets so that you can proceed with installing and initializing your system.

1. You must unpack and install the Storwize V7000 2076-724 control enclosures and any optional SAS expansion enclosures in the rack.
2. Referring to the worksheets that you created, you must complete the cabling.

   Note:

   If you intend to add the Storwize V7000 2076-724 to an existing system, you simply install the Storwize V7000 2076-724 control enclosure, because the existing system is already initialized.

Initial setup tasks that you must complete

After the hardware is installed, connect a workstation to the technician port of one of the node canisters in the Storwize V7000 2076-724 control enclosure and complete the following tasks:

1. Configure the system with a name and management and service IP addresses.

   Note:

   If you intend to add the Storwize V7000 2076-724 to an existing system, you simply install the Storwize V7000 2076-724 control enclosure, because the existing system is already initialized.
2. Log in to the control enclosure using the management GUI, and complete the system setup wizard using information from the worksheets you created.

First customer tasks

After you complete the service setup process, you can log in to the Storwize V7000 2076-724 control enclosure and complete the following tasks using the customer setup wizard:

1. Change the system password.
2. Set the date and time.
3. Create I/O groups (if applicable).
4. Confirm the Call Home settings that you entered during the installation.
5. Configure licensed functions.
6. Create storage pools.

At the completion of the setup wizard, the setup wizard creates storage arrays and assigns the MDisks to the storage pools.

After the installation and initial configuration of the hardware is complete, IBM strongly recommends that you check to see whether a later level of firmware and software is available and update to that level.

Unpacking the Storwize V7000 2076-724 control enclosure

Before you unpack the Storwize V7000 2076-724 control enclosure, ensure that you review and follow all related instructions.

Before you begin

The control enclosure and related parts are shipped in a single box, containing the following:

- Control enclosure with the following components preinstalled:
  - Two node canisters with adapters, SFPs, and memory feature codes preinstalled
  - Two power supplies and two power interposers
  - A combination of 24 drives and drive blanks

    The specific number of drives and drive blanks will vary, depending on the number of drives that were specified in the product order. For example, if 12 drives were ordered, they will be preinstalled in the control enclosure along with 12 drive blanks. All drive bays must contain a drive or a drive blank.
- Rail kit including left and right rails, eight securing screws, and eight locating pins
- Two power cables
- Optional OM3 fiber cables

Note: You will need a box knife to unpack the control enclosure.

About this task

CAUTION: To lift the assembled enclosure requires three persons unless suitable lifting equipment is available or the enclosure is unpacked and dismantled as described in the procedure.

Procedure

1. Cut the box tape and open the lid of the shipping carton.
2. Remove the rail kit box and set it aside in a safe location.
3. Lift the front and rear foam packing pieces from the carton.
4. Remove the four corner reinforcement pieces from the carton.
5. Using the box knife, carefully cut the four corners of the carton from top to bottom.
6. Fold the sides and back of the carton down to uncover the rear of the control enclosure.

   If necessary, carefully cut along the lower fold line of the sides and remove them.
7. Carefully cut the raised section of the foam packing away from the rear of the enclosure.
8. Carefully cut open the bag covering the rear of the enclosure.
9. Remove the left power supply unit (PSU) from the enclosure.
10. Record the last six digits of the serial number on the back of the power supply, and then set the power supply aside.
11. Remove the right PSU, record its serial number, and set it aside.
12. Remove the upper node canister from the enclosure.
13. Record the serial number on the canister release handle, and then set the canister aside.
14. Remove the lower node canister, record its serial number, and set it aside.
15. Carefully cut the raised section of the foam packing away from the front of the enclosure.
16. Remove the drives from the front of the enclosure.
17. Lift the enclosure from the shipping carton.

Installing support rails for the Storwize V7000 2076-724 and 2076-U7B control enclosures

Before you install the control enclosure into the rack, you must first install the support rails for it.

Procedure

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

1. Locate the control enclosure rails, as shown in Figure 8 on page 13.
   The rail assembly consists of two rails that must be installed in the rack cabinet.

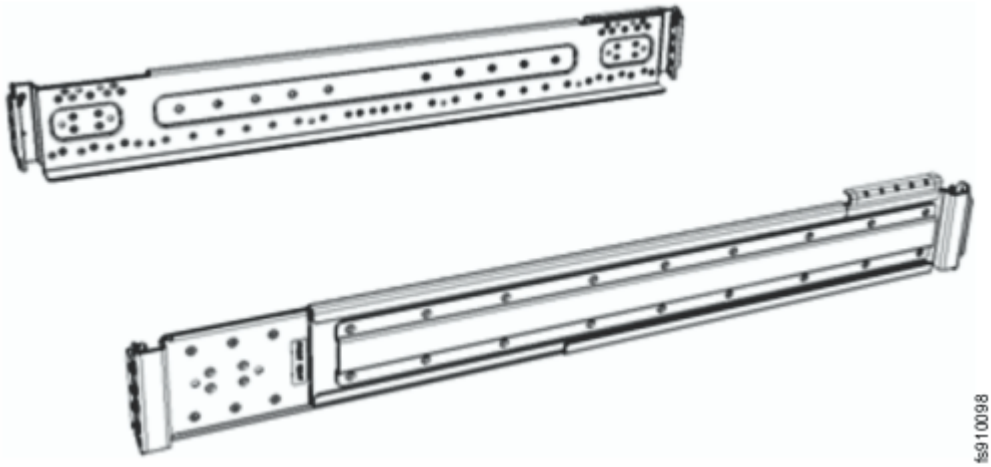


Figure 8. Control enclosure support rails

2. 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 9 on page 13 shows two rack units with the front mounting holes identified.

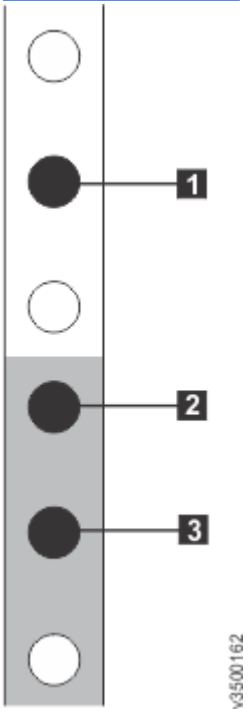


Figure 9. Hole locations in the front of the rack

- 1 Upper rail-mounting bracket pin

- 2 Lower rail-mounting bracket pin
- 3 Rack mounting screw hole

3. 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 pins are provided separately. Use the pins that are appropriate for the mounting holes in your rack, as described in Table 7 on page 14.

Table 7. Selecting bracket pins for your rack

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

4. At each end of the rail, grasp the tab 1 and pull *firmly* to open the hinge bracket.

   See Figure 10 on page 14.

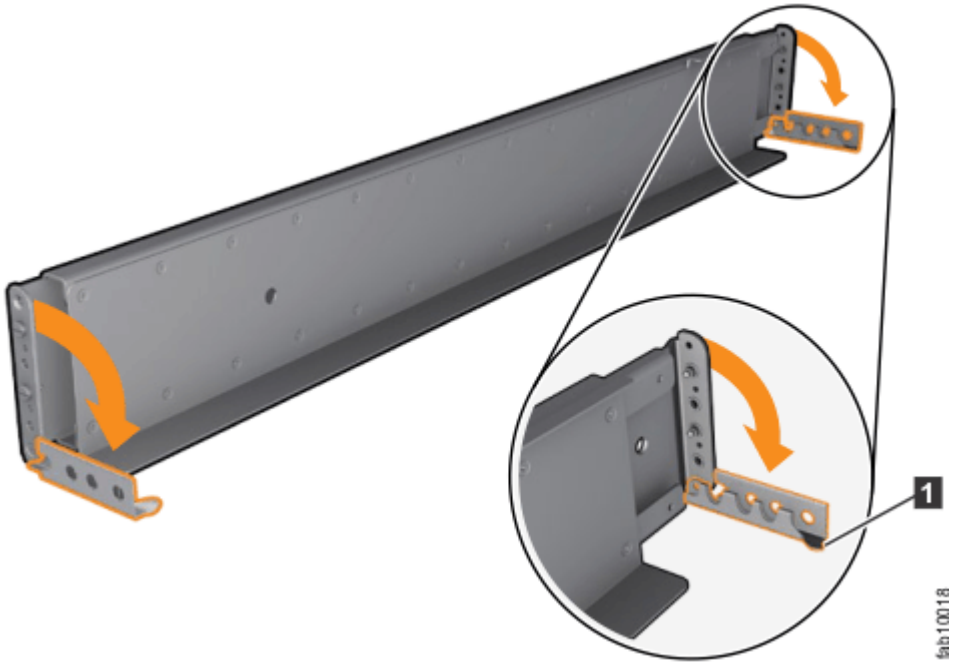


Figure 10. Opening the hinge brackets

5. 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.

6. On the rear of the rail, press the two bracket pins into the holes in the rack flanges.
7. Close the rear hinge bracket to secure the rail to the rack cabinet flange.

   See Figure 11 on page 15 .

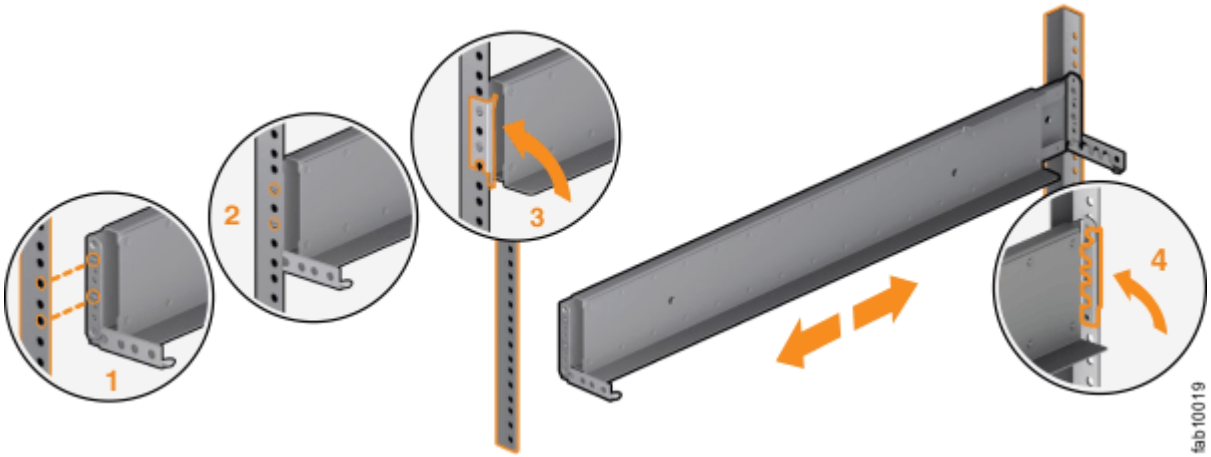


Figure 11. Closing the hinge brackets

8. On the front of the rail, press the two bracket pins into the holes in the rack flanges.
9. Close the front hinge bracket to secure the rail to the rack cabinet flange.
   See Figure 11 on page 15.
10. Secure the rear of the rail to the rear rack flange with two black M5 screws.
11. Repeat the steps to secure the opposite rail to the rack cabinet.
12. Repeat the procedure to install rails for each additional control enclosure.

Installing a Storwize V7000 2076-724 control enclosure

Following your enclosure location plan, install each control enclosure.

About this task

The installation procedure applies equally to control enclosures and expansion enclosures.

- Lifting a control enclosure requires at least three people.
- Lifting a 2U expansion enclosure requires at least two people. Lifting a 5U expansion enclosure requires at least three people or a lifting device.
- Each control enclosure must be installed only on the control enclosure rails provided with the enclosure.
- Each expansion enclosure must be installed only on the expansion enclosure rails provided with the enclosure.

CAUTION:

- To lift a control enclosure requires at least three people.
- Install a control enclosure only onto the control enclosure rails supplied with the enclosure.
- 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 12 on page 16.

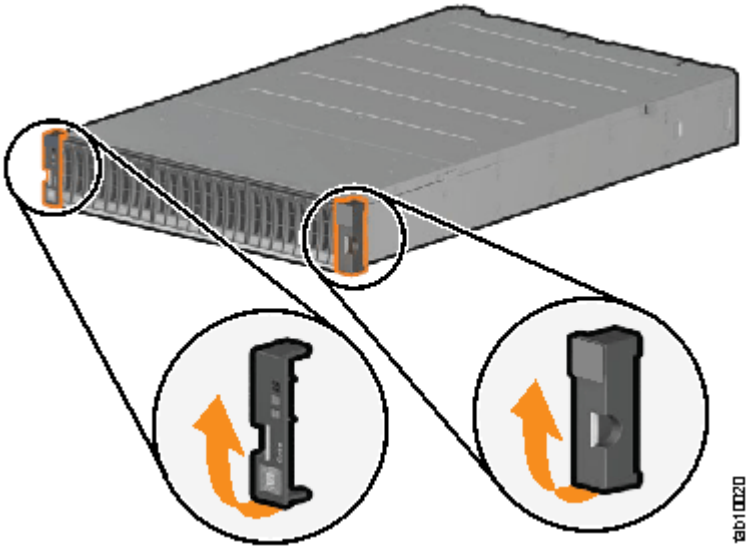


Figure 12. Removing enclosure end caps

2. Align the enclosure with the front of the rack cabinet.
3. Slide the enclosure into the rack along the rails until the enclosure is fully inserted. See Figure 13 on page 16.

   Note: The rails are not designed to hold an enclosure that is partially inserted. The enclosure must always be in a fully inserted position. Control enclosures must be installed only on the supplied control enclosure rails.

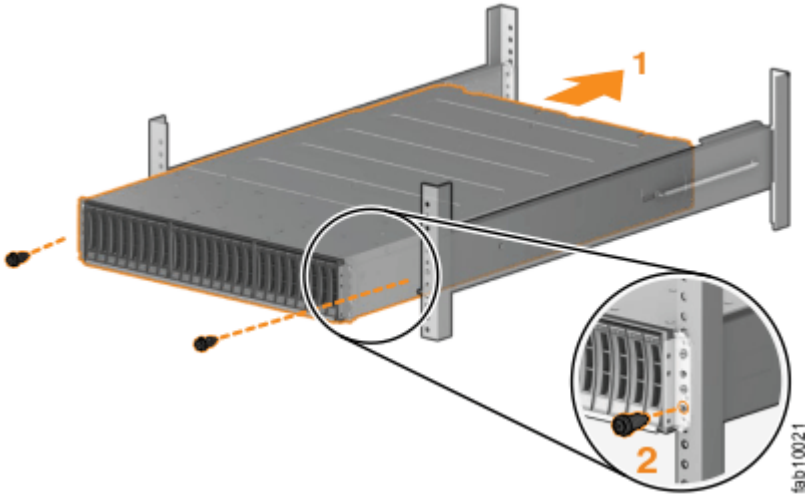


Figure 13. Inserting the enclosure

4. Secure the enclosure with screws in the rack mounting screw holes on each side of the enclosure. See Figure 14 on page 16.

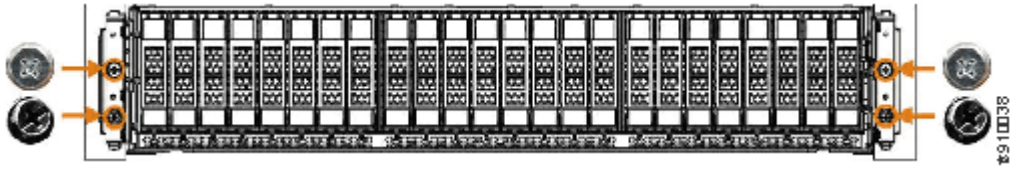


Figure 14. Securing the front of the enclosure

5. Reinstall the left and right end caps.

See Figure 15 on page 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 on the left end cap matches the serial number on the left flange ("ear") on the front of the enclosure.

b) Fit the slot on the top of the end cap over the tab on the 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 flange.

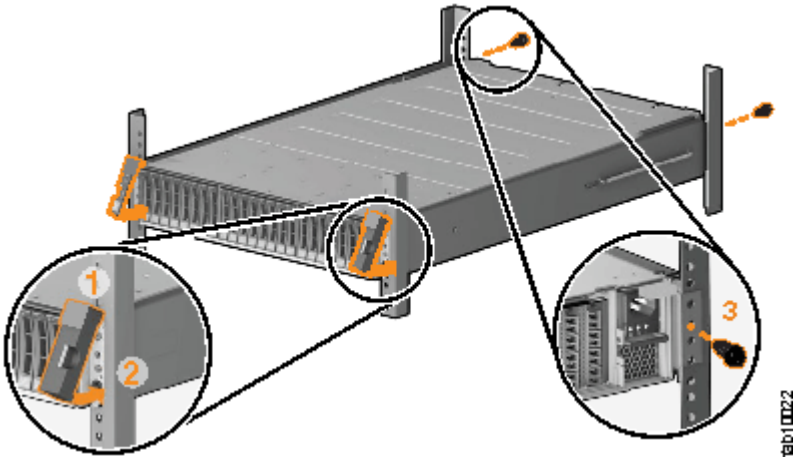


Figure 15. Reinstalling enclosure end caps

Unpacking a 2U expansion enclosure

Before you unpack the optional 2U expansion enclosure, ensure that you review and follow all related instructions.

Before you begin

The expansion enclosure and related parts are included in a single box that contains the following items:

- Expansion enclosure with the following components preinstalled:
  - Two power supplies
  - Drives and drive blanks
- Rail kit, which includes left and right rails, and related hardware
- Two power cables

Note: You will need a box knife to unpack the expansion enclosure.

About this task

CAUTION: To lift the assembled enclosure requires three persons unless suitable lifting equipment is available or the enclosure is unpacked and dismantled as described in the procedure.

Procedure

1. Cut the box tape and open the lid of the shipping carton.
2. Remove the rail kit box and set it aside in a safe location.
3. Lift the front and back foam packing pieces from the carton.
4. Remove the four corner reinforcement pieces from the carton.
5. Using the box knife, carefully cut the four corners of the carton from top to bottom.

6. Fold the sides and back of the carton down to uncover the front of the expansion enclosure.
   If necessary, carefully cut along the lower fold lines and remove each of the sides.
7. Carefully cut the foam packing away from the front of the enclosure.
8. Carefully cut open the bag that covers the front of the enclosure.
9. Remove the leftmost drive or drive filler. Note it's location (and its serial number, if it is a drive) and set it aside.
10. Repeat until all drives or drive fillers are removed from the enclosure.
11. Lift the enclosure from the shipping carton. Note that the rear half of the enclosure is heavier than the front half.

    Note: With the drives removed, the enclosure weighs approximately 17 kg (37 lb).

Installing support rails for 2U expansion enclosures

Before you install 2U expansion enclosures, you must first install support rails.

Procedure

To install the support rails, complete the following steps.

1. Locate the expansion enclosure rails (Figure 16 on page 18).
   The rail assembly consists of two rails that must be installed in the rack cabinet.

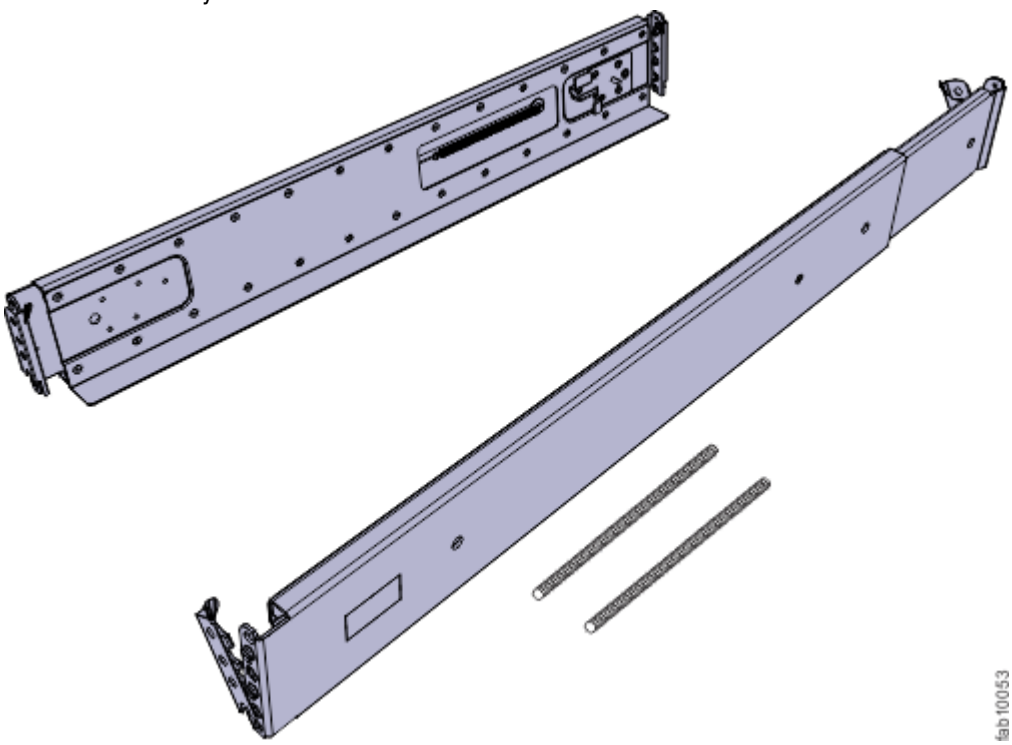


Figure 16. Expansion enclosure support rails

2. Locate the hardware that is used to install the rails, including two rail springs, two sets of eight bracket pins, and two M5 screws.
   Set the hardware aside for use later in the installation process.
3. 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 17 on page 19.)

      Note: Some models of rail have the studs on the outside of the rail.

c) Stretch the spring slightly and push the other looped end of the spring onto the other stud on the inside of the rail.

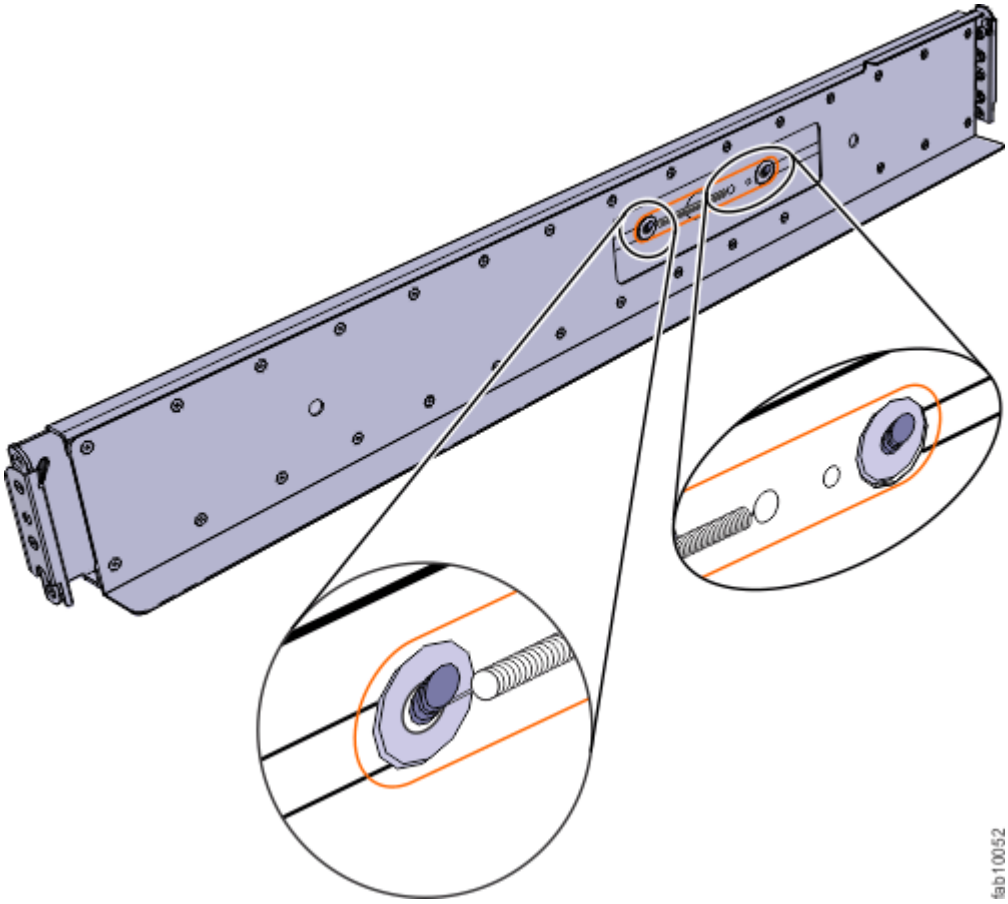


Figure 17. Installing the rail spring

4. 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 18 on page 20 shows two rack units with the front mounting holes identified.

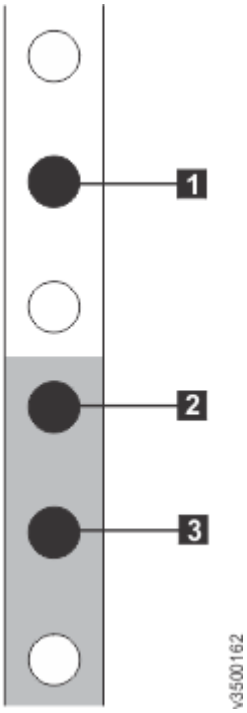


Figure 18. Hole locations in the front of the rack

- 1 Upper rail mounting bracket pin
- 2 Lower rail mounting bracket pin
- 3 Rack mounting screw hole

5. 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 8 on page 20.

Table 8. 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 that are supplied with the rails.
Square	Unscrew the medium pins and replace with the large pins that are supplied with the rails.

6. At each end of the rail, grasp the tab 1 and pull *firmly* to open the hinge bracket (see Figure 19 on page 21).

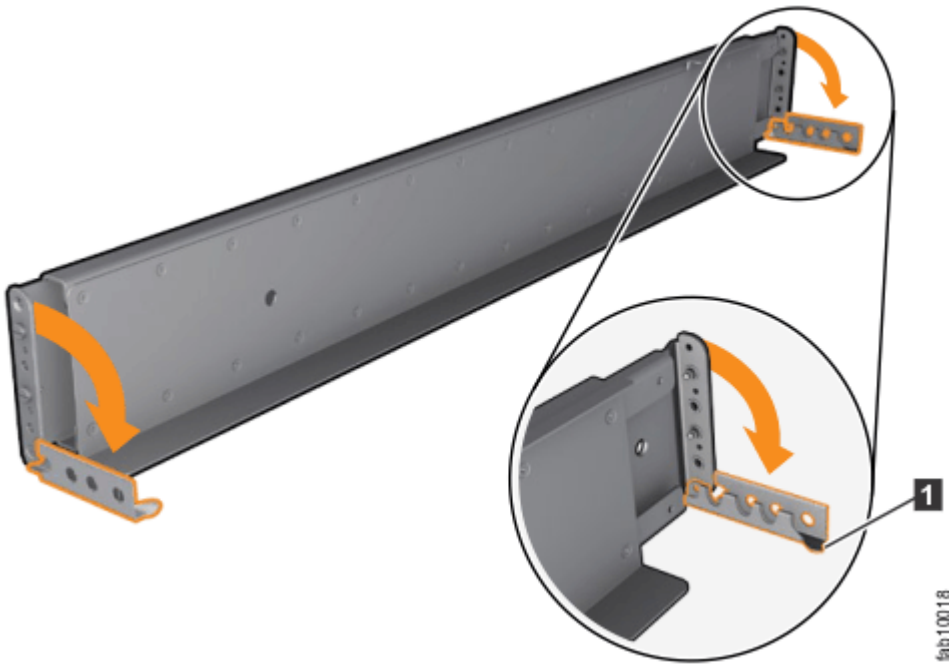


Figure 19. Opening the hinge brackets

7. 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.
8. On the rear of the rail, press the two bracket pins into the holes in the rack flanges.
9. Close the rear hinge bracket to secure the rail to the rack cabinet flange.
   (See Figure 20 on page 21.)

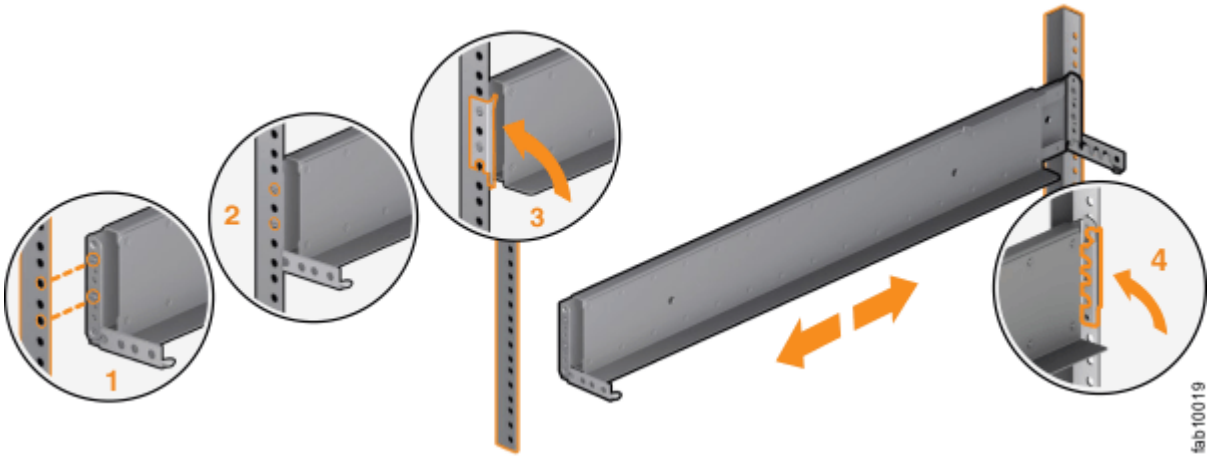


Figure 20. Closing the hinge brackets

10. On the front of the rail, press the two bracket pins into the holes in the rack flanges.
11. Close the front hinge bracket to secure the rail to the rack cabinet flange.
    See Figure 20 on page 21.
12. Secure the rear of the rail to the rear rack flange with an M5 screw that is provided with the rack kit.
13. Repeat the steps to secure the opposite rail to the rack cabinet.
14. Repeat the procedure to install rails for each additional expansion enclosure.

Installing an optional 2U SAS expansion enclosure

The 2U SAS expansion enclosures are installed in the same rack as the control enclosure.

About this task

CAUTION:

- To lift and install the 2U SAS expansion enclosure into the rack requires at least two people.
- Install a 2U SAS expansion enclosure only onto the rails that are supplied with the enclosure.
- Load the rack from the bottom up to ensure rack stability. Empty the rack from the top down.

Procedure

To install an optional 2U SAS expansion enclosure, complete the following steps.

1. Remove the two 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 21 on page 22.

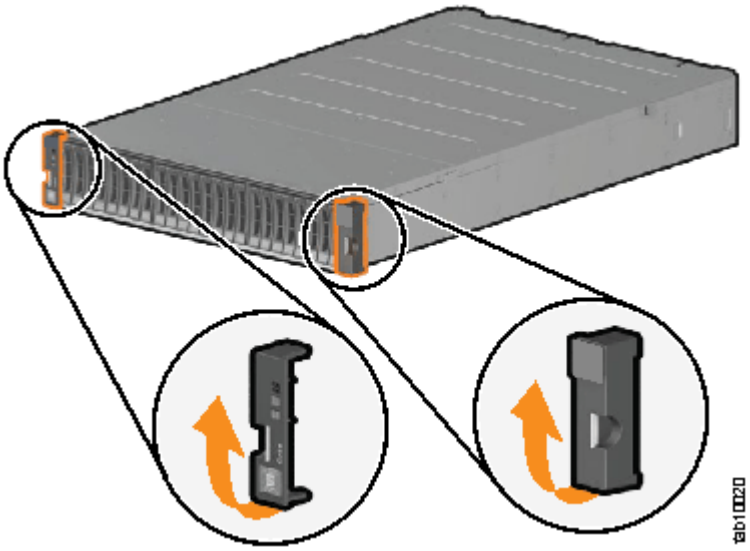


Figure 21. Removing enclosure end caps

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 22 on page 23.

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

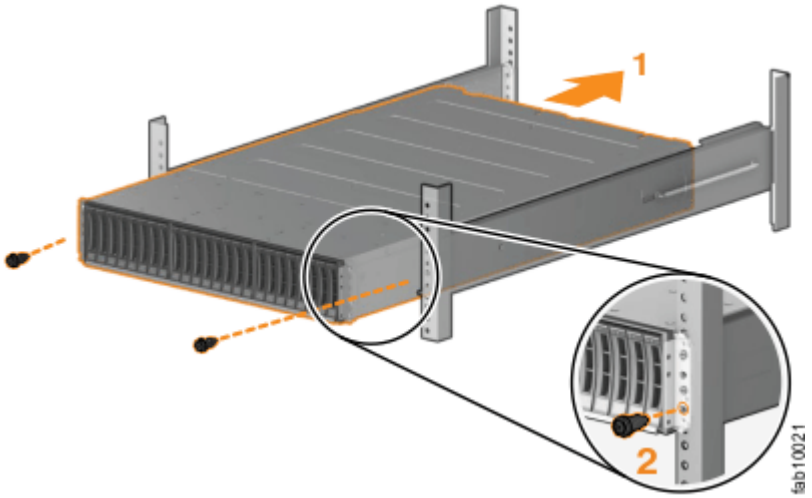


Figure 22. Inserting the enclosure

4. Secure the enclosure with screws in the rack mounting screw holes.

   (See Figure 22 on page 23 and Figure 23 on page 23.)

5. Reinstall the left and right end caps.

   See Figure 23 on page 23. 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.

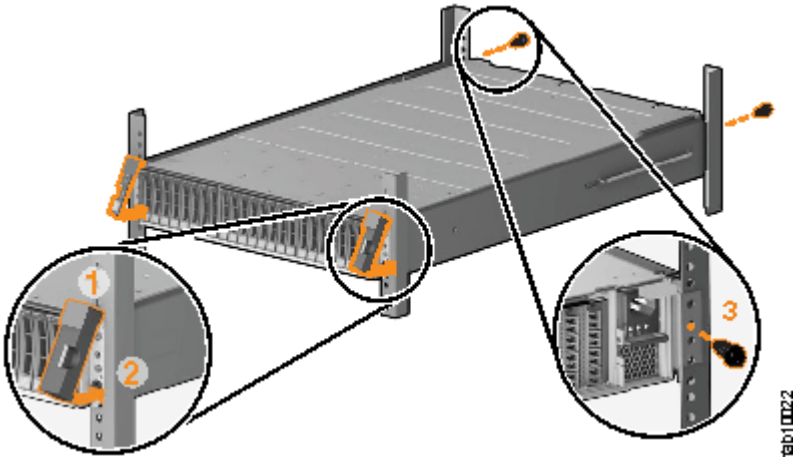


Figure 23. Reinstalling enclosure end caps

6. If you are installing additional 2U SAS expansion enclosures, repeat the previous steps to complete the installation.

Unpacking an optional 5U expansion enclosure

Before you unpack an optional 5U expansion enclosure, ensure that you review and follow all related instructions and safety notices.

Before you begin

CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C011)

CAUTION: To avoid personal injury, before you lift this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)

Important: Before you unpack, move, install, or service the 2076-92F expansion enclosure and its parts, always complete the following tasks:

- Read and follow the safety notices and instructions, as described in "Safety notices and considerations: 2076-92F " on page 29.
- Read and follow the guidelines that are described in "Weight considerations: 5U SAS expansion enclosure" on page 34.
- Ensure that a suitably rated mechanical lift is available to support the weight of the expansion enclosure when it is inserted into the rack for installation.

About this task

The 2076-92F expansion enclosure and most parts are shipped together in one large box. A tray on top of the enclosure contains the front fascia (1U and 4U pieces), the cable management arm (CMA), and the slide rail kit. Figure 24 on page 24 shows how the enclosure is packaged for shipment.

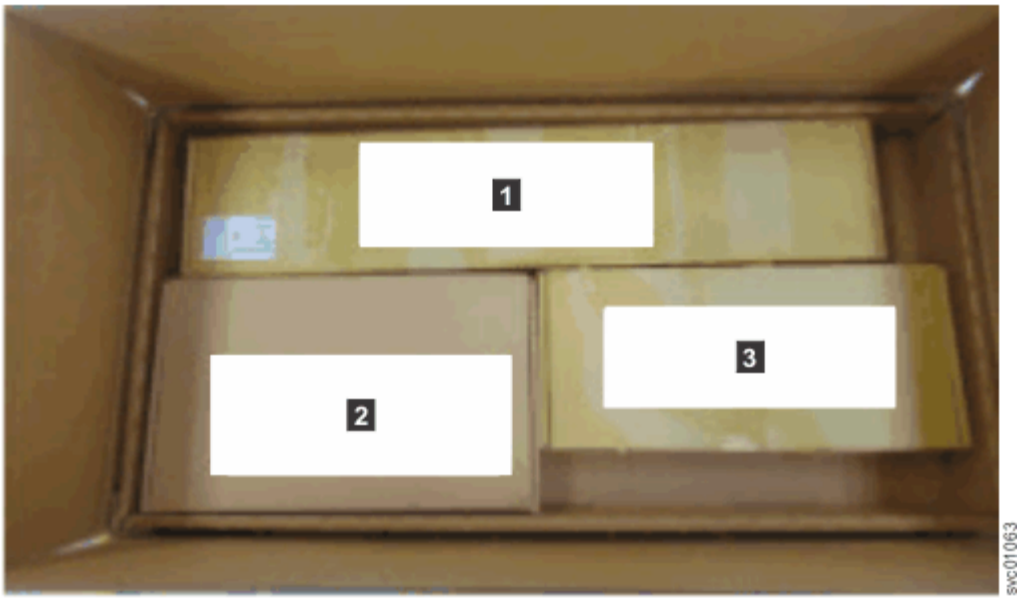


Figure 24. Tray containing expansion enclosure parts

1 Slide rail kit
2 Cable management arm
3 Fascia

Note: Drives are not included in installation package for the enclosure; they are provided in a separate package.

Procedure

1. Remove the cardboard tray that contains the slide rails, cable management arm, and fascia from cardboard box in which the expansion enclosure was shipped.
2. Remove the foam end pieces from the top of the 2076-92F expansion enclosure.
3. Cut the corners of the shipping box and fold them down to uncover the sides and faces of the expansion enclosure, as shown in Figure 25 on page 25.

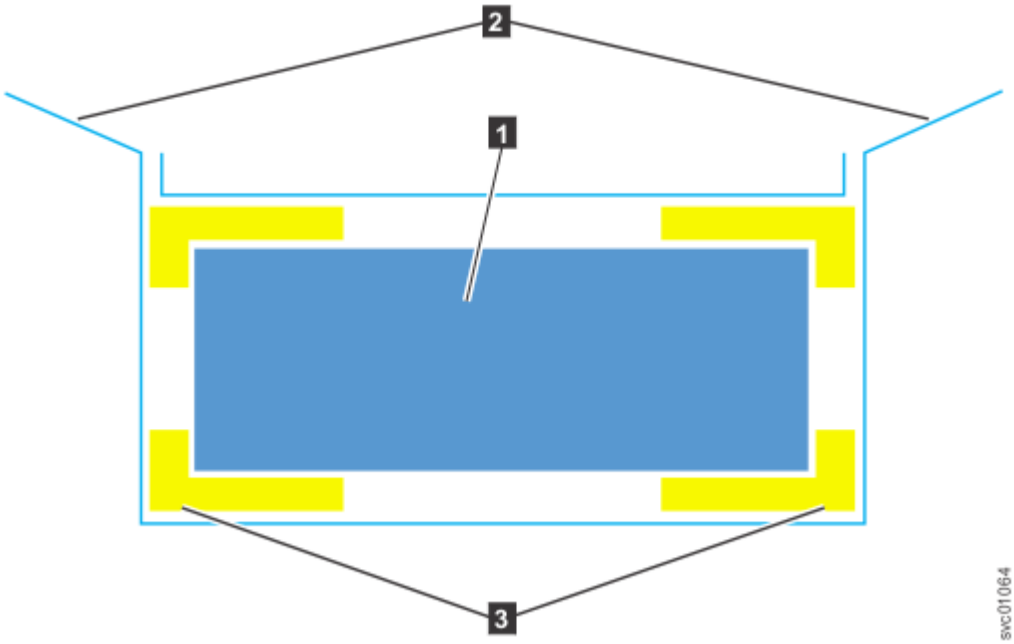


Figure 25. Packaging materials

1 Enclosure
2 Top of shipping box, folded back
3 Foam protectors

4. With four or more persons, push the expansion enclosure sideways onto an adjacent flat bed lift. Keep the remaining foam block protectors attached to the enclosure.
5. Remove the support rail kit from the box in which it was shipped (1, as shown in Figure 24 on page 24).
6. Remove the 4U and 1U fascia from the boxes in which they were shipped, as shown in Figure 26 on page 26.

Figure 26. Packaging for fascia

1 4U fascia (front)
2 1U fascia (power supply units)

7. Remove the cable management arm assembly from its packaging (2 in Figure 24 on page 24).

Installing or replacing the support rails: 2076-92F

You must install the support rails before you can install a 2076-92F expansion enclosure in a rack.

Procedure

1. Locate the hardware that is used to install the rails, including the M4xL6 and M5xL13 screws.
   Set the hardware, which is shown in Figure 27 on page 26, aside for use later in the installation process.

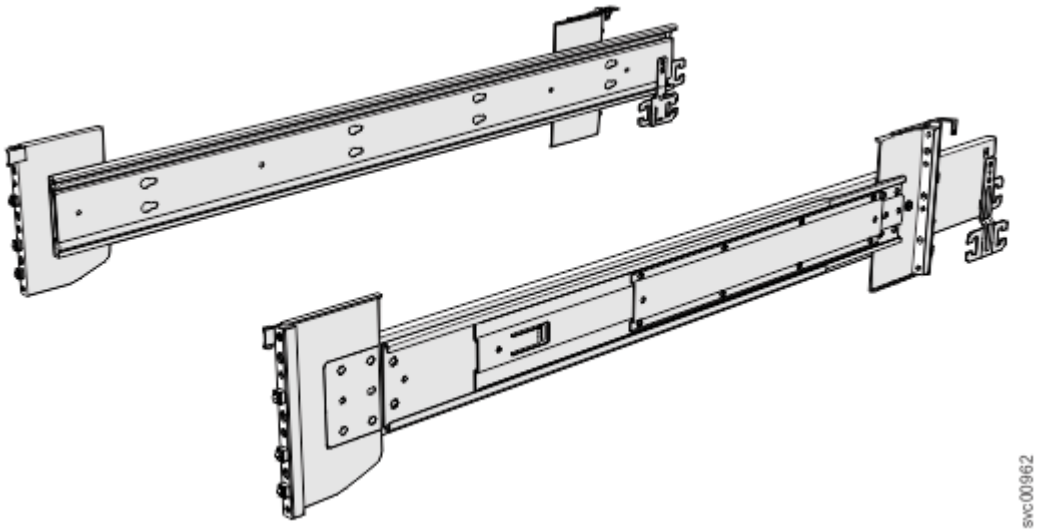


Figure 27. Support rails

2. Select an available 5U space in your rack to install the expansion enclosure.

Important notes:

- When you select a rack location, ensure that the enclosure and its parts are easily accessible. Allow enough space for the lid to be easily removed and for internal components, such as drives and secondary expansion modules, to be serviced.
- When all components and drives are installed, the expansion enclosure is heavy. Install the support rails and enclosure at the lowest available position. Do not install the rails and enclosure above position U25 in the rack.

3. Remove the inner member of the rail. Push the tab (a) and slide the middle rail member back, as shown in Figure 28 on page 27.

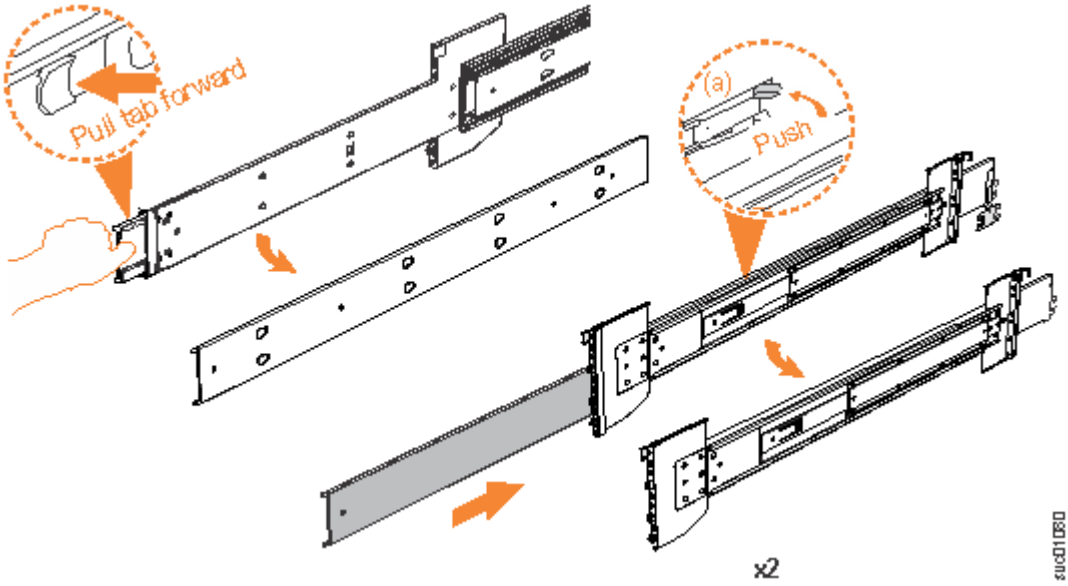


Figure 28. Detaching the inner rail section

4. Use four M4 screws to attach the inner rail to the side of the enclosure. Figure 29 on page 27 shows the screw locations.

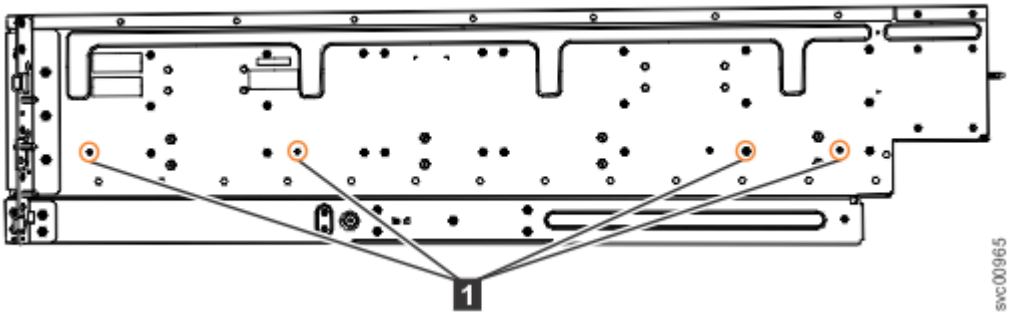


Figure 29. Screw locations to attach the inner rail to the enclosure

5. Install the inner section of the rail onto each side of the expansion enclosure, as shown in Figure 30 on page 28.

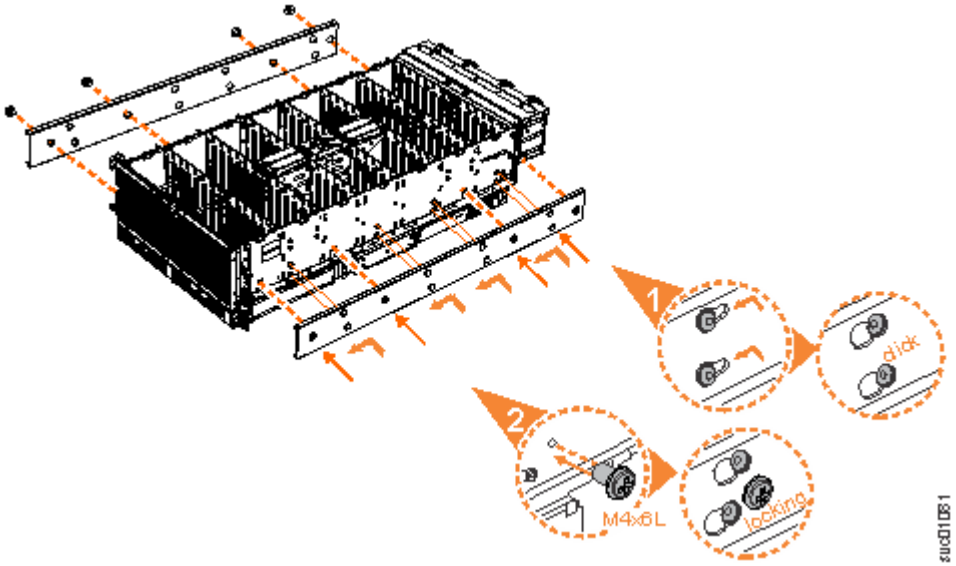


Figure 30. Attaching the inner rail section to the enclosure

6. Use the M5 screws to install the outer rail member and bracket assembly to the rack, as shown in Figure 31 on page 28.

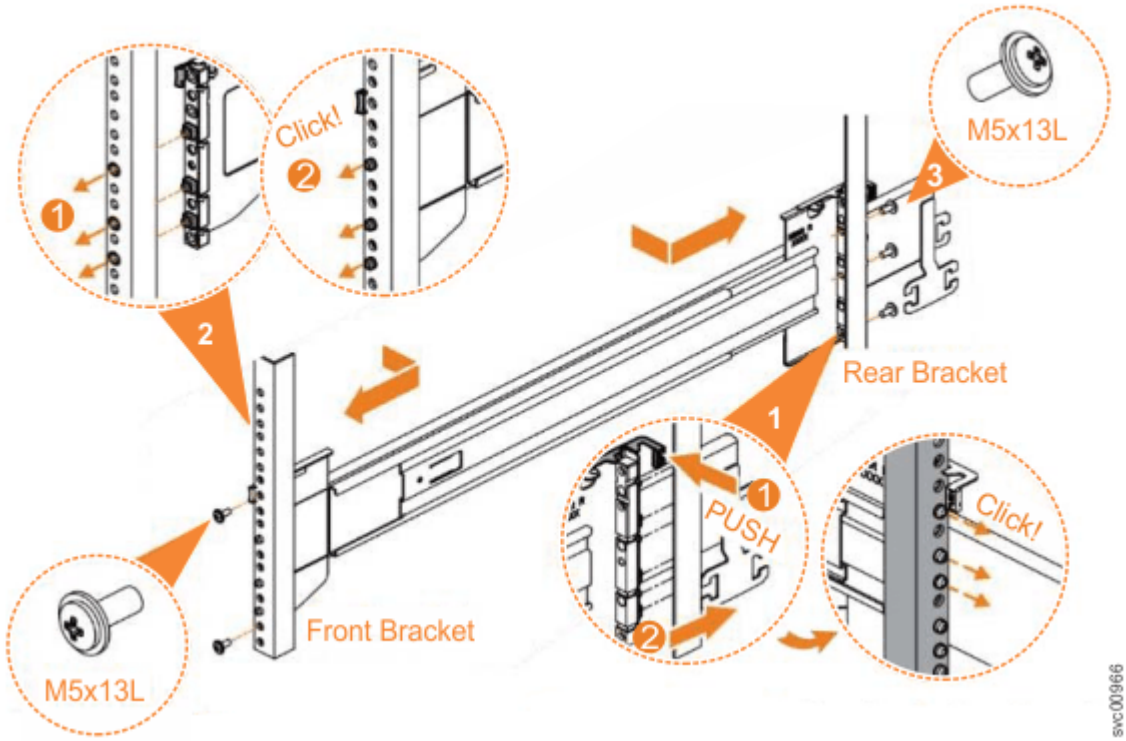


Figure 31. Installing the rail assembly to the rack frame

For example, Figure 32 on page 29 shows the front of the rail that is attached to the frame.

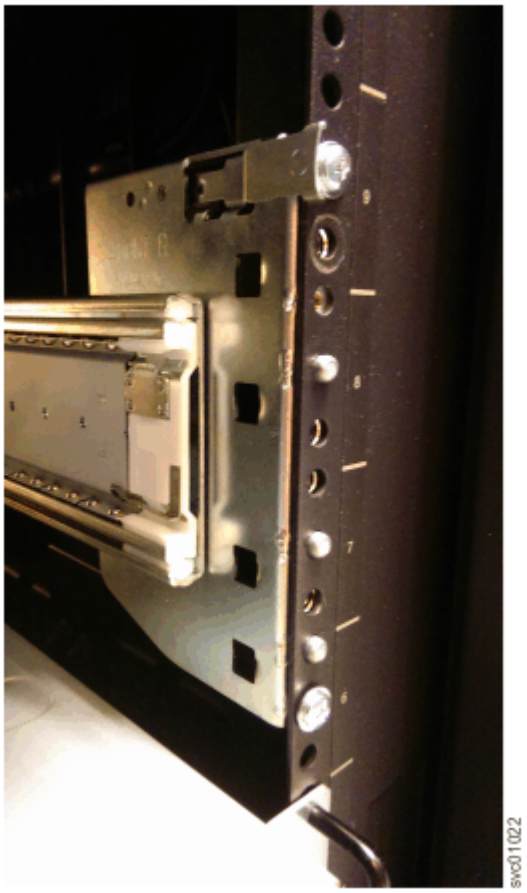


Figure 32. Example of the required rack space

7. Repeat steps “5” on page 27 through “6” on page 28 to install the opposite rail.
8. Install the expansion enclosure in the rack, as described in “Installing or replacing an expansion enclosure in a rack: 2076-92F ” on page 50.

Installing an optional 5U SAS expansion enclosure

Before you install the optional 5U SAS expansion enclosure, review the following guidelines:

The 2076-92F expansion encolsure is supported on Storwize V7000 2076-724 systems that have Spectrum Virtualize 8.2.0 or later with the latest fix packs. If the system is not running that level of software, do not connect it to a 2076-92F enclosure.

Safety notices and considerations: 2076-92F

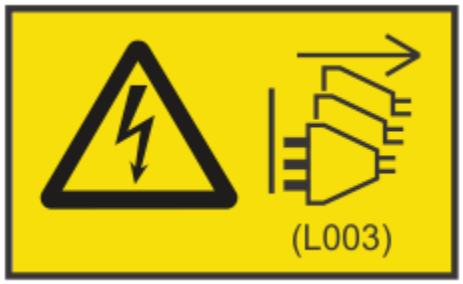
Before you install, service, or move the expansion enclosure, always read and follow the safety notices and guidelines.

Safety notices

Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM Storwize V7000 Safety Notices*.

DANGER: DANGER: Serious injury or death can occur if loaded lift tool falls over or if a heavy load falls off the lift tool. Always completely lower the lift tool load plate and properly secure the load on the lift tool before moving or using the lift tool to lift or move an object. (D010)

DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)



or

DANGER:

Hazardous voltage present. Voltages present constitute a shock hazard, which can cause severe injury or death. (L004)

CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)

DANGER:

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**

- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)**

CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- (For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- (For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

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)

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)

CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C011)

CAUTION: To avoid personal injury, before lifting this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)

CAUTION: CAUTION regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers). Read and completely understand the contents of LIFT TOOL operator's manual before using.
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's website.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads. (C048, part 1 of 2)

- **Do not operate while under the influence of drugs or alcohol.**
- **Do not support ladder against LIFT TOOL.**
- **Tipping hazard. Do not push or lean against load with raised platform.**
- **Do not use as a personnel lifting platform or step. No riders.**
- **Do not stand on any part of lift. Not a step.**
- **Do not climb on mast.**
- **Do not operate a damaged or malfunctioning LIFT TOOL machine.**
- **Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.**
- **No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.**
- **Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.**
- **Do not leave LIFT TOOL machine unattended with an elevated load.**
- **Watch and keep hands, fingers, and clothing clear when equipment is in motion.**
- **Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.**
- **A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048, part 2 of 2)**

CAUTION: If the System slide rails are installed above EIA location 29U, the [ServerLIFT®] tool (or other qualified lift tool) must be used as a safety precaution for servicing. Position the lift tool platform slightly below the bottom of the System drawer to account for the slight downward flex when the drawer is extended out fully on its slides. Then gently raise the lift tool platform to stably contact the bottom of the drawer, minding not to over force it as it could put upward stress to the slide rails. A service-qualified ladder may have to be used to reach or properly work around the System at such heights. While using a ladder, do not lean on or against the system drawer or lift tool during service, and follow safe practices. (C051)

Weight considerations: 5U SAS expansion enclosure

Before you install, move, or perform service on a 5U SAS expansion enclosure, you must be prepared to handle the weight of the enclosure and its parts.

Safety notices and considerations

Important: Always read and follow the safety notices and instructions before you install, move, or service the expansion enclosure and its parts. See “Safety notices and considerations: 2076-92F ” on page 29 for information.

- Do not exceed the specified maximum load of the rack where the enclosure is to be installed.
- Do not exceed any load limit of the building and flooring where the enclosure is to be installed.
- Always use a suitably rated mechanical lift or four persons when you are performing any of the following tasks:
  - Removing the expansion enclosure from its packing material
  - Lifting and installing the expansion enclosure in the rack for the first time
  - Reinstalling the expansion enclosure after you complete a service task (for example, replacing the enclosure FRU).

- At least three persons are required to move the enclosure while it is in the rack (if you are moving the enclosure off the rails). Even after the drives, power supply units, secondary expander modules, canisters, fans, and top cover are removed, the enclosure weighs approximately 43 kg (95 lbs).
- To maximize rack stability, always install the expansion enclosure in the lowest possible position in the rack.

Weight of expansion enclosure parts

Table 9 on page 35 summarizes the weight and quantity of the parts (FRUs) that are shipped with the 5U expansion enclosure.

Table 9. Weight of expansion enclosure parts

FRU description	Weight per unit		Quantity shipped	Total weight	
	kg	lbs		kg	lb
Enclosure FRU	42.5	93.696	1	42.500	93.696
Rail kit	9.231	20.351	1	9.231	20.351
Front fascia (4U front cover)	0.303	0.668	1	0.303	0.668
Display panel assembly	0.020	0.044	1	0.020	0.044
PSU fascia (1U cover)	0.010	0.022	1	0.010	0.022
Power supply unit (PSU)	3.335	7.352	2	6.670	14.705
Secondary expansion module	0.826	1.821	2	1.652	3.642
Fan module	0.890	1.962	4	3.560	7.848
Expansion canister	1.588	3.501	2	3.176	7.002
Cable management arm (lower and upper arms)	1.373	3.027	1	1.373	3.027
Top cover	3.720	8.201	1	3.720	8.201
Fan interface board	0.118	0.260	1	0.236	0.260

Weight of expansion enclosure SAS drives

The SAS drives are shipped in a separate package from the 5U expansion enclosure. The enclosure can support up to 92 SAS drives; however, the quantity varies depending on the number of drives ordered.

Table 10 on page 36 summarizes the weights of the SAS drives that are supported in the 5U expansion enclosure. Storwize V7000 Gen2+ systems that are running software level 7.8 can support the 5U expansion enclosure.

Table 10. Weight of expansion enclosure drives			
FRU description	**FRU part number**	**Approximate weight per unit**	
		kg	**lb**
600 GB 15 K 2.5-inch hard disk drive	01LJ061	0.304	0.670
1.2 TB 10 K 2.5-inch hard disk drive	01LJ062	0.304	0.670
1.8 TB 10 K 2.5-inch hard disk drive	01LJ063	0.304	0.670
6 TB 7.2 K 3.5-inch Near-Line SAS hard disk drive	01LJ064	0.876	1.931
8 TB 7.2 K 3.5-inch Near-Line SAS hard disk drive	01LJ065	0.876	1.931
10 TB 7.2 K 3.5-inch Near-Line SAS hard disk drive	01LJ066	0.876	1.931
1.6 TB 2.5-inch tier 0 flash drive	01LJ067	0.224	0.494
3.2 TB 2.5-inch tier 0 flash drive	01LJ068	0.224	0.494
1.92 TB 2.5-inch tier 1 flash drive	01LJ069	0.224	0.494
3.84 TB 2.5-inch tier 1 flash drive	01LJ070	0.224	0.494
7.6 8 TB 2.5-inch tier 1 flash drive	01LJ071	0.224	0.494
15.36 TB 2.5-inch tier 1 flash drive	01LJ072	0.224	0.494

Weight increases as FRUs are installed

The 5U expansion enclosure supports up to 92 SAS drives. As Table 11 on page 36 shows, substantial weight is added to the enclosure when all drives are installed.

Table 11. Weight of an enclosure with 92 SAS drives					
FRU description	**Approximate weigh per unit**		**Maximum supported**	**Approximate extra weight**	
	kg	**lb**		**kg**	**lb**
2.5-inch tier 0 flash drive 2.5-inch tier 1 flash drive	0.224	0.494	92	20.608	45.433
2.5-inch hard disk drive	0.304	0.670	92	27.968	61.659

Table 11. Weight of an enclosure with 92 SAS drives (continued)					
FRU description	**Approximate weigh per unit**		**Maximum supported**	**Approximate extra weight**	
	kg	**lb**		**kg**	**lb**
3.5-inch Near-Line SAS hard disk drive	0.876	1.931	92	80.592	177.675

As you install or replace FRUs, the overall weight of the expansion enclosure increases. For example, Table 12 on page 37 shows the weight progression as different combinations of FRUs are installed.

Table 12. Enclosure weight as FRUs are installed			
Enclosure assembly		**Approximate weight**	
FRUs installed	**FRUs not installed**	**kg**	**lb**
• Enclosure (01LJ607 or 01LJ112)	• Secondary expansion modules • Fascia (1U and 4U) • PSUs • Expansion canisters • Fan modules • Fan interface board • Display assembly • Drives • Cover	42.5	93.7
• Enclosure (01LJ607 or 01LJ112) • Secondary expansion modules	• Fascia (1U and 4U) • PSUs • Expansion canisters • Fan modules • Fan interface board • Display assembly • Drives • Cover	44.3	97.7
• Enclosure (01LJ607 or 01LJ112) • Secondary expansion modules • Fascia (1U and 4U) • PSUs • Expansion canisters • Fan modules • Fan interface board • Display assembly	• Drives • Cover	58	127.9

Table 12. Enclosure weight as FRUs are installed (continued)

Enclosure assembly		Approximate weight	
FRUs installed	**FRUs not installed**	**kg**	**lb**
Note: The following FRUs are installed when the enclosure is initially shipped. • Enclosure (01LJ607 or 01LJ112) • Secondary expansion modules • PSUs • Expansion canisters • Fan modules • Fan interface board • Display assembly • Cover	• Fascia (1U and 4U) • Drives	61.5	135.4
• Enclosure (01LJ607 or 01LJ112) • Secondary expansion modules • Fascia (1U and 4U) • PSUs • Expansion canisters • Fan modules • Fan interface boards • 92 2.5-inch tier 1 flash drives	• Cover	78.6	173.3
• Enclosure (01LJ607 or 01LJ112) • Secondary expansion modules • Fascia • PSUs • Expansion canisters • Fan modules • Fan interface board • 92 2.5-inch hard disk drives	• Cover	86	189.6

Table 12. Enclosure weight as FRUs are installed (continued)			
Enclosure assembly		**Approximate weight**	
FRUs installed	**FRUs not installed**	**kg**	**lb**
• Enclosure (01LJ607 or 01LJ112) • Secondary expansion modules • Fascia • PSUs • Expansion canisters • Fan modules • Fan interface board • 92 3.5-inch Near-Line SAS hard disk drives	• Cover	138.6	305.6

Conversely, the overall weight of the expansion enclosure is reduced as you remove parts. However, even with parts removed, the 5U expansion enclosure is heavy. Depending on the number of parts that remain, you might need four persons or a mechanical lift to support the weight of the expansion enclosure.

Identify the hardware components: 2076-92F

You should become familiar with the external components of the 2076-92F expansion enclosure.

Components on the front of the enclosure

Figure 33 on page 39 shows the front of the 2076-92F expansion enclosure. In the figure, all parts are installed in the enclosure.

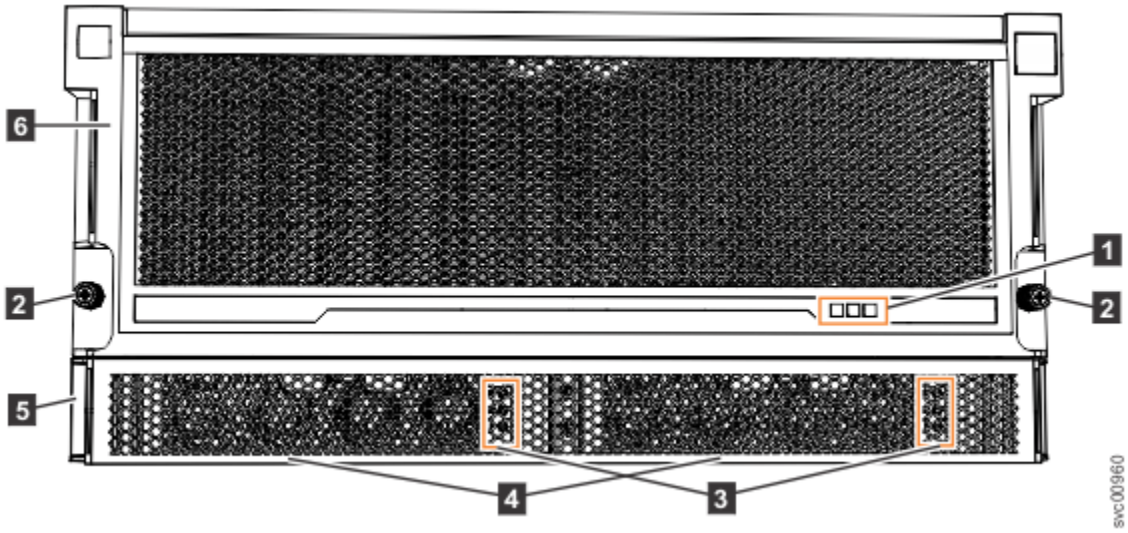


Figure 33. Features on the front of the 2076-92F expansion enclosure

1 Display panel indicators
2 Rack retention thumb screws
3 Power supply unit indicators
4 Power supply units (PSUs)
5 PSU fascia (1U)

6 Front fascia (4U)

However, as Figure 34 on page 40 shows, the 4U and 1U fascias are packaged separately. You must attach them to the front of the 2076-92F expansion enclosure as part of the initial installation process.

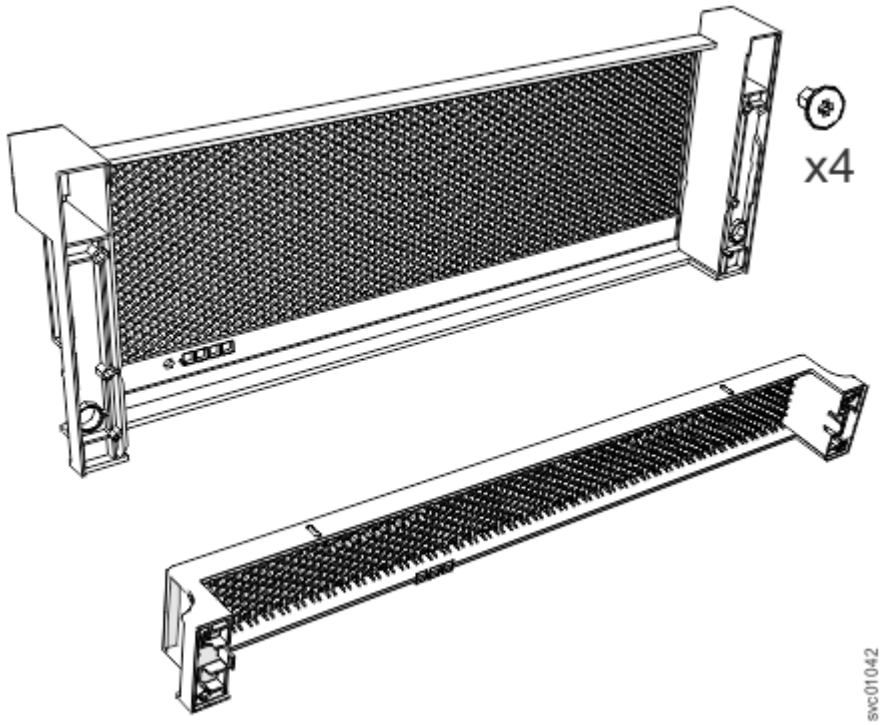


Figure 34. Front fascia of the 2076-92F expansion enclosure

Components on the rear of the enclosure

Figure 35 on page 40 shows the components on the rear of the 2076-92F expansion enclosure. Four fan modules and two expansion enclosures are accessible from the back of the enclosure.

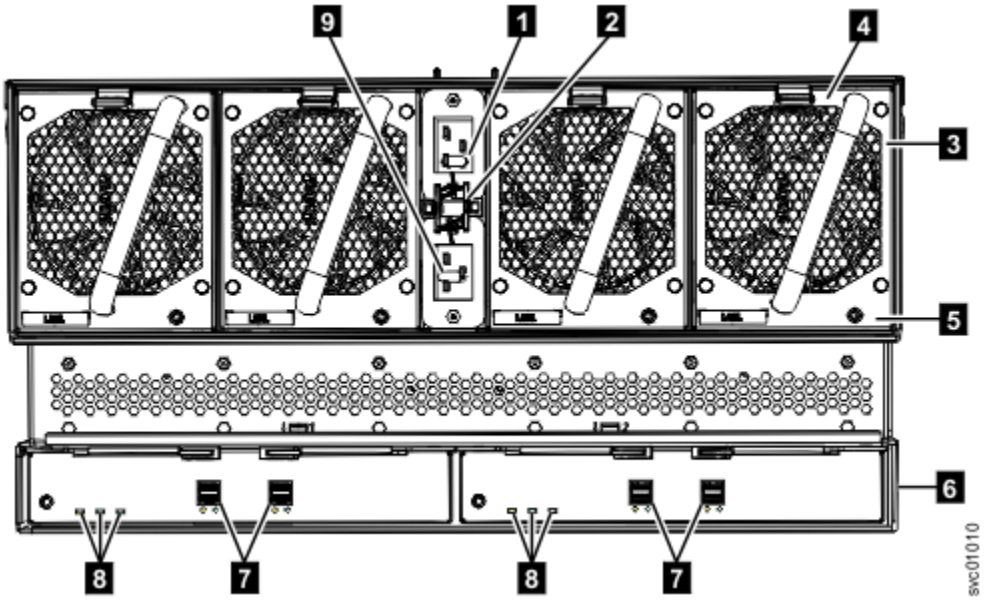


Figure 35. Features on the rear of the 2076-92F expansion enclosure

1 Power cable connector for PSU 2

2 Power cable retention clamps
3 Fan module
4 Fan release latch
5 Fan fault indicator
6 Expansion canister
7 SAS ports and indicators
8 Expansion canister indicators
9 Power cable connector for PSU 1

Support rails

Figure 36 on page 41 shows the support rails for the expansion enclosure. The support rails are packaged separately from the expansion enclosure.

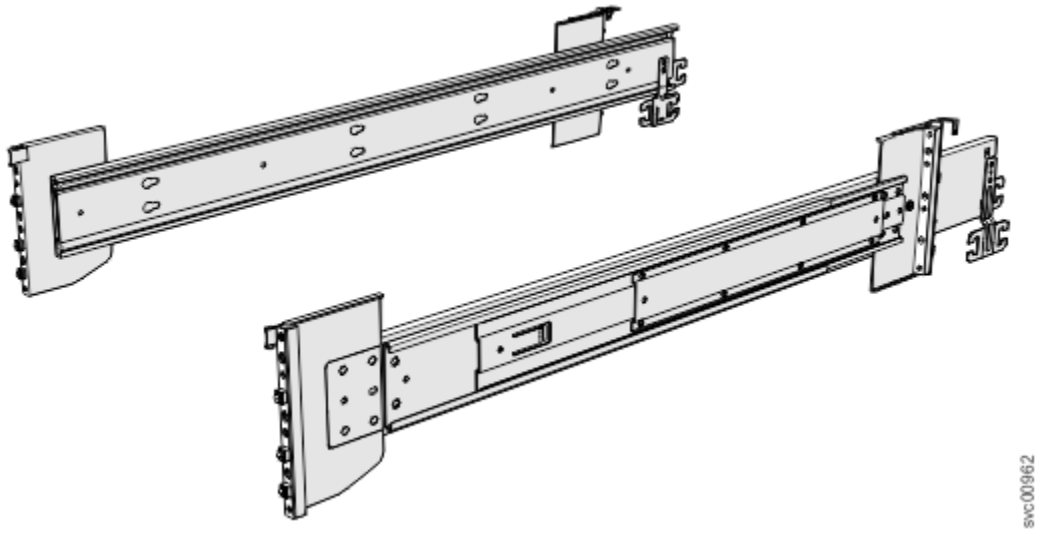


Figure 36. 2076-92F support rails

Cable management arm

The cable management arm (CMA), which consists of an upper and lower assembly, are packaged separately from the expansion enclosure. As Figure 37 on page 42 shows, each CMA assembly is attached to the rear end of the support rails.

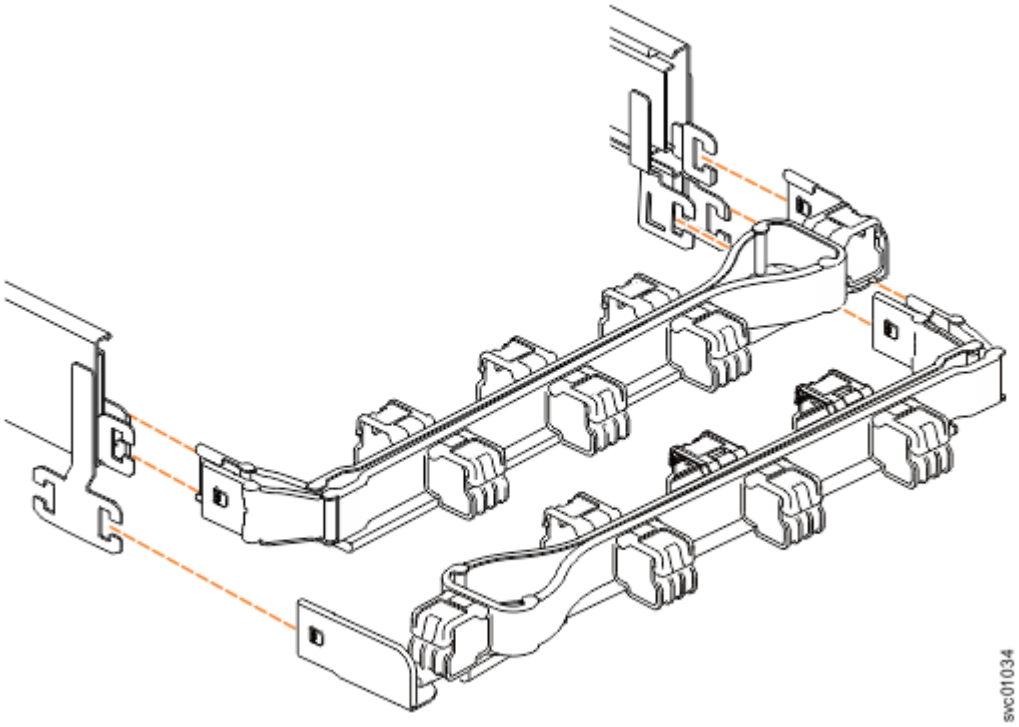


Figure 37. 2076-92F CMA assemblies

Unpacking and installing the enclosure: 2076-92F

Before you unpack and install the 2076-92F expansion enclosure, ensure that you review and follow the installation checklist and safety notices.

Before you begin

CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C011)

CAUTION: To avoid personal injury, before lifting this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)

Important: Before you unpack, move, install, or service the 2076-92F expansion enclosure and its parts, always complete the following tasks:

- Read and follow the safety notices and instructions, as described in “Safety notices and considerations: 2076-92F ” on page 29.
- Read and follow the guidelines that are described in “Weight considerations: 5U SAS expansion enclosure” on page 34.
- Ensure that a suitably rated mechanical lift is available to support the weight of the expansion enclosure as it inserted into the rack for installation.

About this task

The 2076-92F expansion enclosure and most parts are shipped together in one large box. A tray on the top of the enclosure contains the front fascia (1U and 4U pieces), the cable management arm (CMA), and the slide rail kit; you must install these parts. Figure 38 on page 43 shows how the enclosure is packaged for shipment.

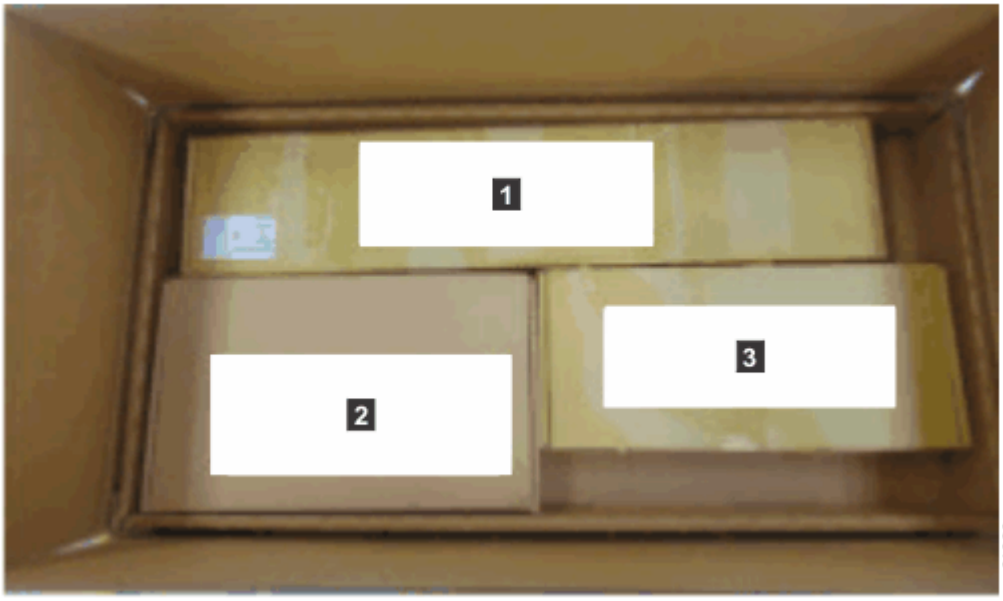


Figure 38. Tray containing expansion enclosure parts

1. Slide rail kit
2. Cable management arm
3. Fascia

Other parts, such as the cover, secondary expander modules, and fans, are installed in the enclosure. However, due to weight considerations, you must remove some parts and then reinstall them as part of the initial installation process.

Note: Drives are not included in installation package for the enclosure; they are provided in a separate package.

Procedure

1. Remove the cardboard tray that contains the slide rails, cable management arm, and fascia from cardboard box in which the expansion enclosure was shipped.
2. Remove the foam end pieces from the top of the 2076-92F expansion enclosure.
3. Cut the corners of the shipping box and fold them down to uncover the sides and faces of the expansion enclosure, as shown in Figure 39 on page 44.

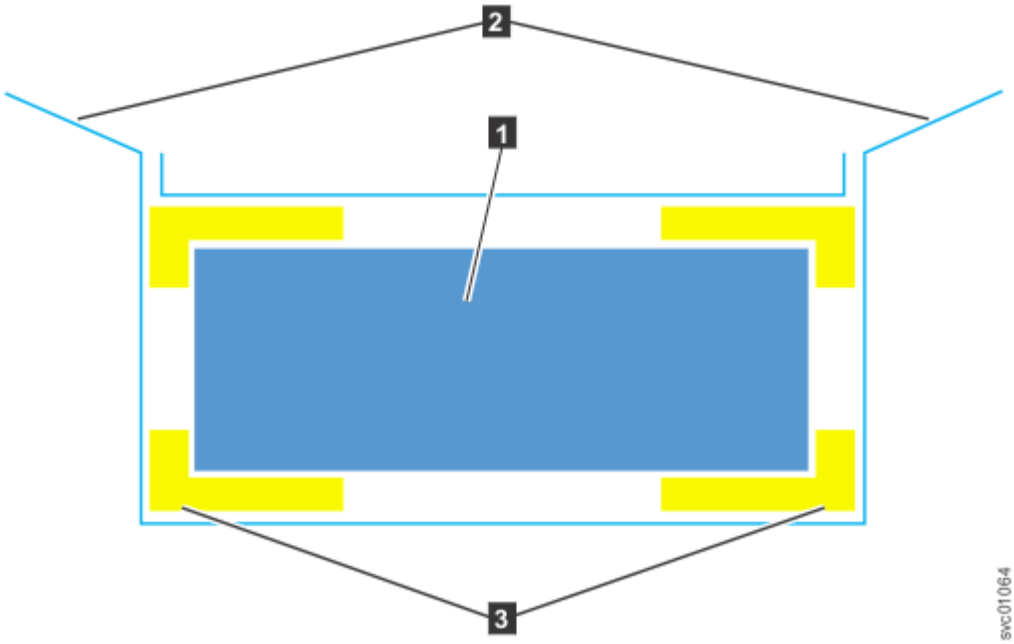


Figure 39. Packaging materials

1 Enclosure
2 Top of shipping box, folded back.
3 Foam protectors

4. Remove the top cover, as described in “Removing the top cover: 2076-92F ” on page 45.
5. With two or more persons, push the expansion enclosure sideways onto an adjacent flat bed lift. Keep the remaining foam block protectors attached to the enclosure.
6. Remove the support rail kit from the box in which it was shipped (1, as shown in Figure 38 on page 43).
7. Separate the inner section of the support rails and attach them to each side of the expansion enclosure, as described in steps “3” on page 27 through “5” on page 27 in “Installing or replacing the support rails: 2076-92F ” on page 26.
8. Attach the remaining sections of the support rails to the rack, as described in step “6” on page 28 in “Installing or replacing the support rails: 2076-92F ” on page 26.
9. Move the mechanical lift to the front of the rack. Align the inner section of the rails with the mid section of the rails that are extending from the rack.
10. On each side, push the inner section and middle section of the rails together until they click and will no longer separate, as described in step “1” on page 50 in “Installing or replacing an expansion enclosure in a rack: 2076-92F ” on page 50.
11. Remove the 4U and 1U fascia from the boxes in which they were shipped, as shown in Figure 40 on page 45.

Figure 40. Packaging for fascia

1 4U fascia (front)
2 1U fascia (power supply units)

12. Attach the 4U and 1U fascia to the front of the enclosure, as described in “Installing or replacing the fascia: 2076-92F ” on page 69.
13. Install the drives, as described in “Installing or replacing a drive: 2076-92F ” on page 62.
14. Replace the top cover, as described in “Installing or replacing the top cover: 2076-92F ” on page 61.
15. Lower the mechanical lift so that you can remove the remaining foam blocks away from the expansion enclosure.
16. Slide the latch on the side of each rail and push the expansion enclosure securely into the rack, as described in steps “3” on page 51 through “5” on page 51 in “Installing or replacing an expansion enclosure in a rack: 2076-92F ” on page 50.
17. Remove the cable management arm assembly from its packaging (2 in Figure 38 on page 43).
18. Attach the cable management arm, as described in “Installing or replacing the cable-management arm: 2076-92F ” on page 57.
19. Connect the SAS cables, as described in “Removing and installing a SAS cable: 2076-92F ” on page 75.
20. Connect the power cables.

Removing the top cover: 2076-92F

To complete some service tasks, you might need to remove the top cover from a 2076-92F expansion enclosure.

Before you begin

Important: You can remove the cover without powering off the expansion enclosure. However, to maintain operating temperature, replace the cover within 15 minutes of its removal. When the cover is removed, the reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

Procedure

1. Slide the release latch (1) in the direction that is shown in Figure 41 on page 46.

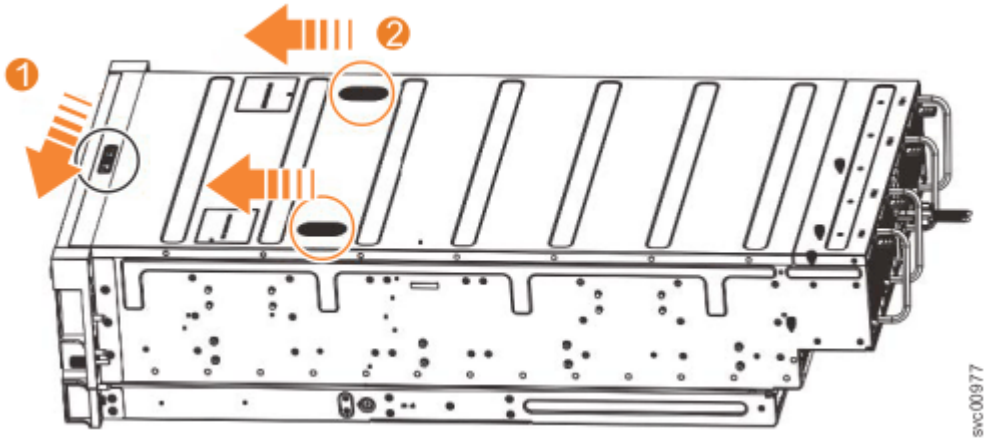


Figure 41. Releasing the 2076-92F cover

2. Slide the cover toward the front of the expansion enclosure (2), as shown in Figure 41 on page 46.
3. Carefully lift the cover up, as shown in Figure 42 on page 46.

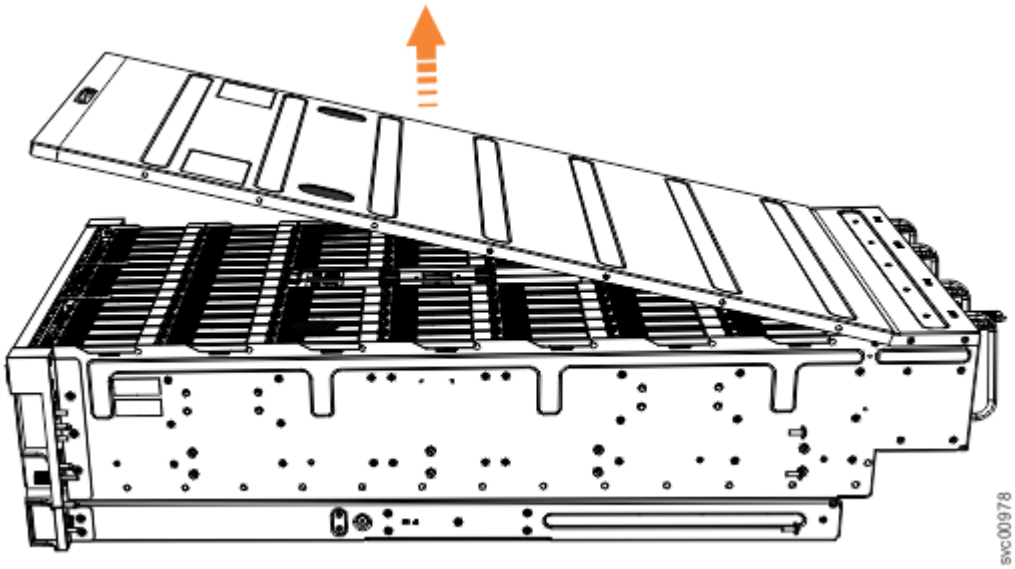


Figure 42. Removing the 2076-92F cover

4. Place the cover in a safe location.

Replace the cover

5. To reinstall the cover, or replace it with one from FRU stock, follow the procedure in “Installing or replacing the top cover: 2076-92F ” on page 61.

Installing or replacing the support rails: 2076-92F

You must install the support rails before you can install a 2076-92F expansion enclosure in a rack.

Procedure

1. Locate the hardware that is used to install the rails, including the M4xL6 and M5xL13 screws.

   Set the hardware, which is shown in Figure 43 on page 47, aside for use later in the installation process.

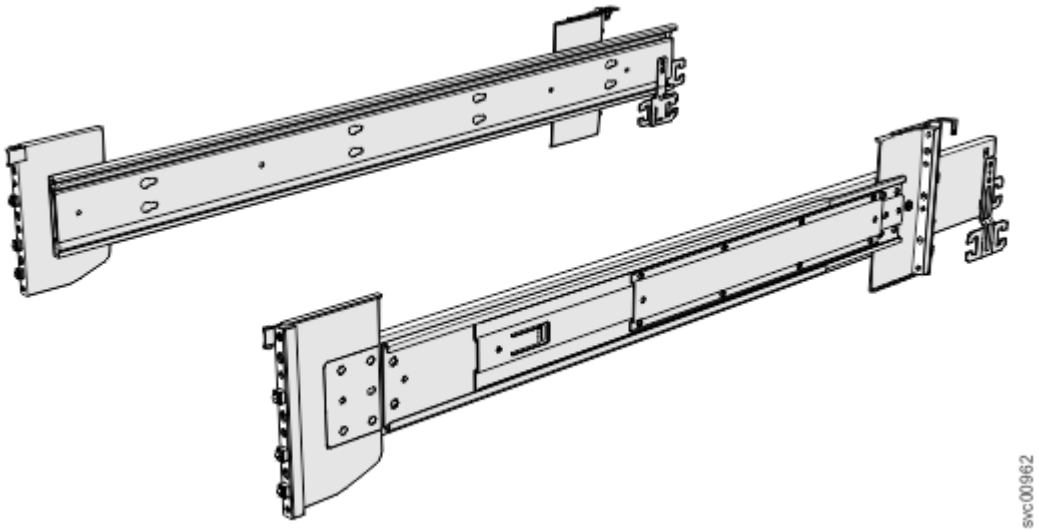


Figure 43. Support rails

2. Select an available 5U space in your rack to install the expansion enclosure.

   Important notes:

   - When you select a rack location, ensure that the enclosure and its parts are easily accessible. Allow enough space for the lid to be easily removed and for internal components, such as drives and secondary expansion modules, to be serviced.
   - When all components and drives are installed, the expansion enclosure is heavy. Install the support rails and enclosure at the lowest available position. Do not install the rails and enclosure above position U25 in the rack.

3. Remove the inner member of the rail. Push the tab (a) and slide the middle rail member back, as shown in Figure 44 on page 47.

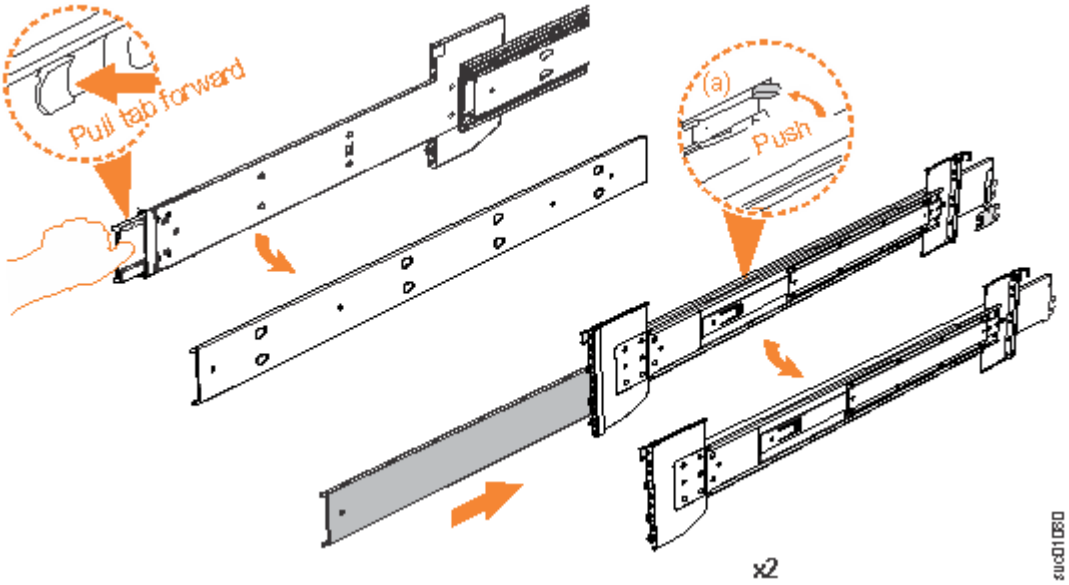


Figure 44. Detaching the inner rail section

4. Use four M4 screws to attach the inner rail to the side of the enclosure. Figure 45 on page 48 shows the screw locations.

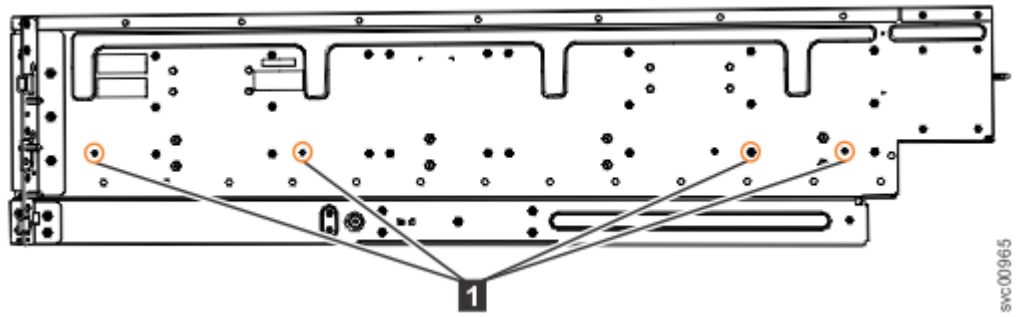


Figure 45. Screw locations to attach the inner rail to the enclosure

5. Install the inner section of the rail onto each side of the expansion enclosure, as shown in Figure 46 on page 48.

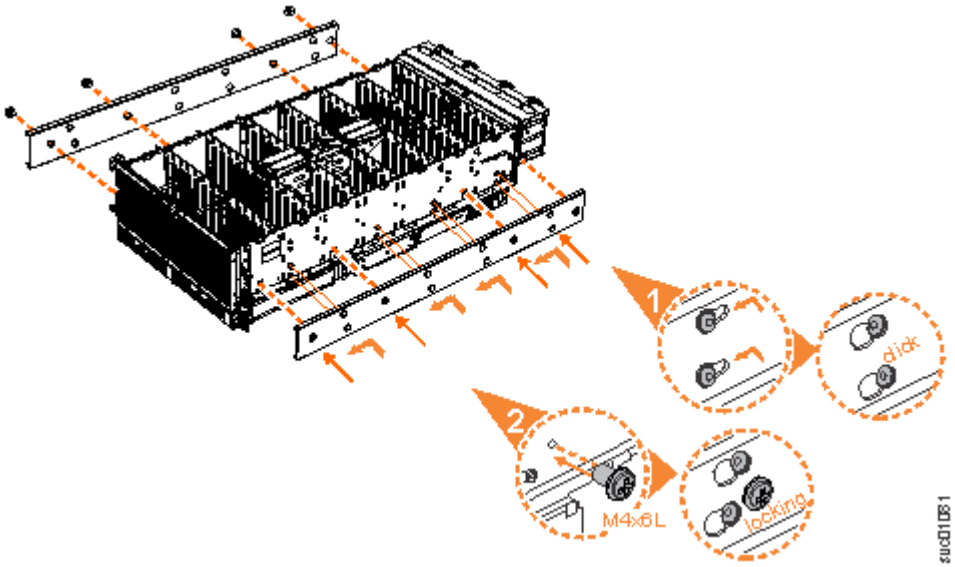


Figure 46. Attaching the inner rail section to the enclosure

6. Use the M5 screws to install the outer rail member and bracket assembly to the rack, as shown in Figure 47 on page 49.

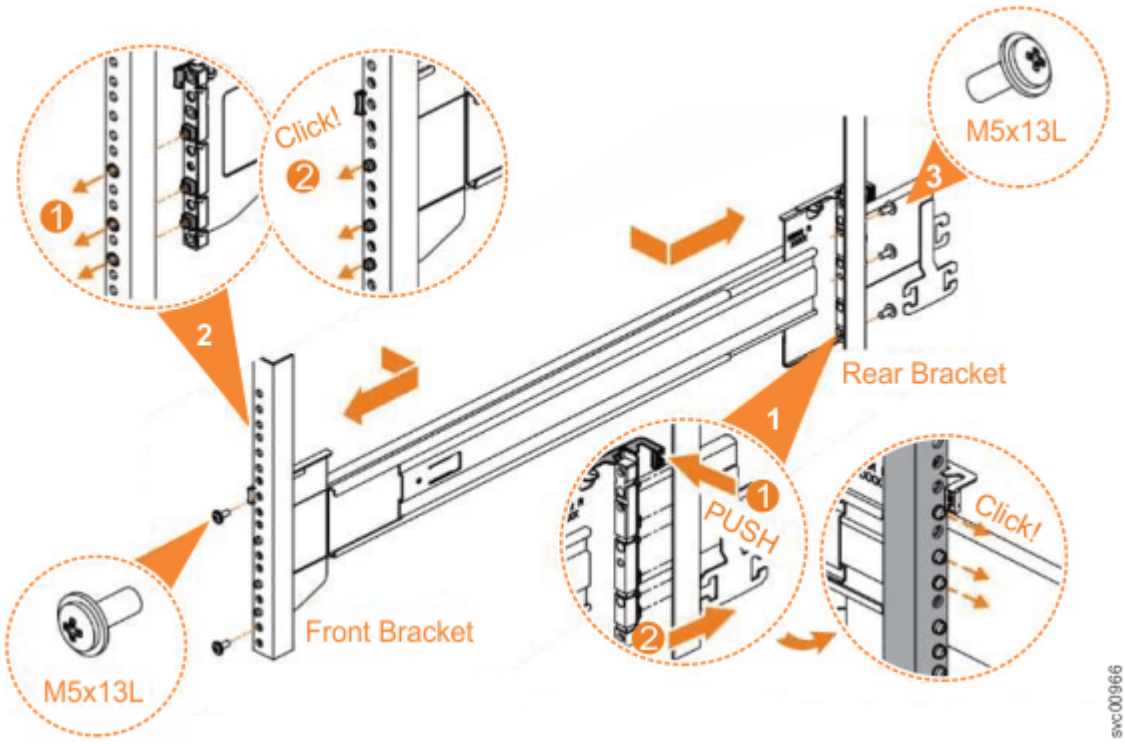


Figure 47. Installing the rail assembly to the rack frame

For example, Figure 48 on page 49 shows the front of the rail that is attached to the frame.

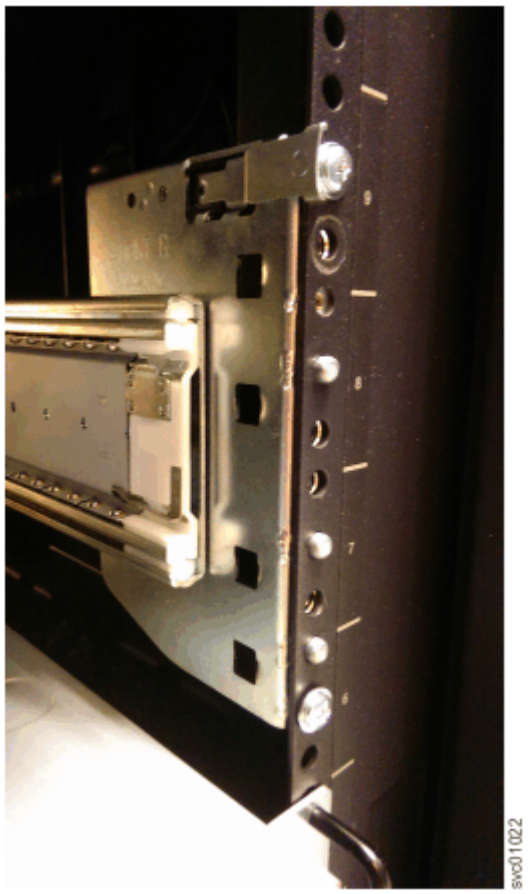


Figure 48. Example of the required rack space

7. Repeat steps “5” on page 48 through “6” on page 48 to install the opposite rail.
8. Install the expansion enclosure in the rack, as described in “Installing or replacing an expansion enclosure in a rack: 2076-92F ” on page 50.

Installing or replacing an expansion enclosure in a rack: 2076-92F

Use the following procedure to place the 2076-92F expansion enclosure in a rack during the installation process. To complete some service tasks, you might also need to slide the enclosure back in to the rack.

About this task

Important: The 2076-92F expansion enclosure is heavy. Before you install the expansion enclosure in the rack for the first time or replace it in the rack to complete a service task, review and implement the following tasks:

- Always use a suitably rated mechanical lift or four persons to raise the enclosure to install it in the rack. Even after the drives, power supply units, secondary expander modules, canisters, fans, and top cover are removed, the enclosure weighs 43 kg (95 lbs).
- Install the expansion enclosure in the lowest position in the rack. Figure 49 on page 50 shows an example.

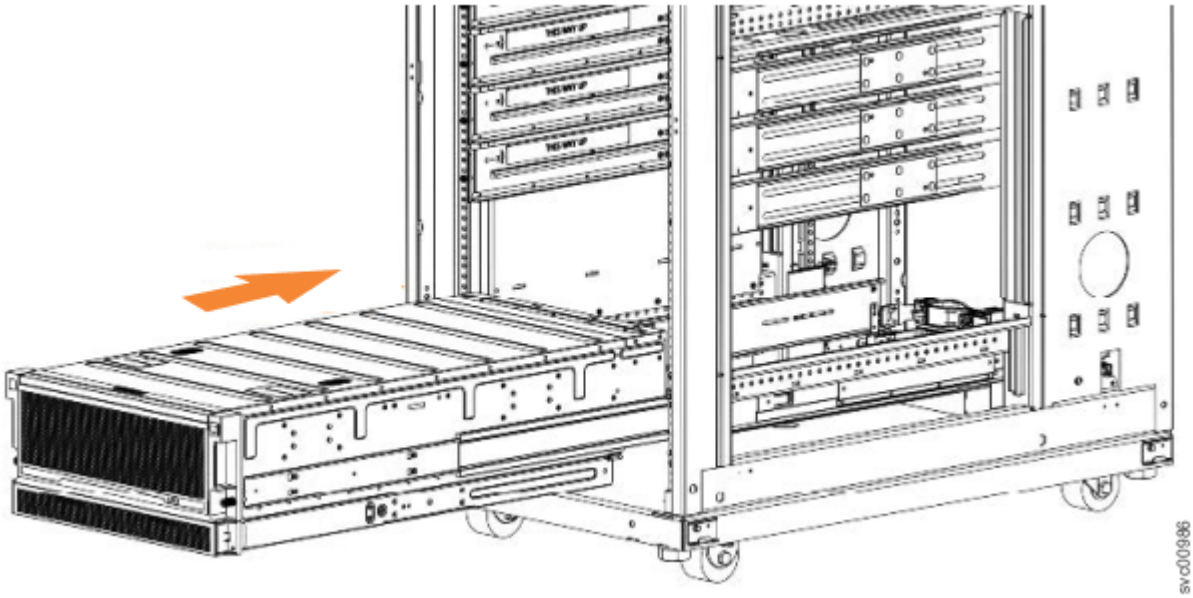


Figure 49. Example installation of the enclosure in the rack

- Ensure that the drives are easily accessible. Avoid installing the 2076-92F expansion enclosure above position 22U in the rack.

Procedure

1. Fully extend the left and right drawer sections from the rack to lock the rails in the extended position (1 in Figure 50 on page 51).

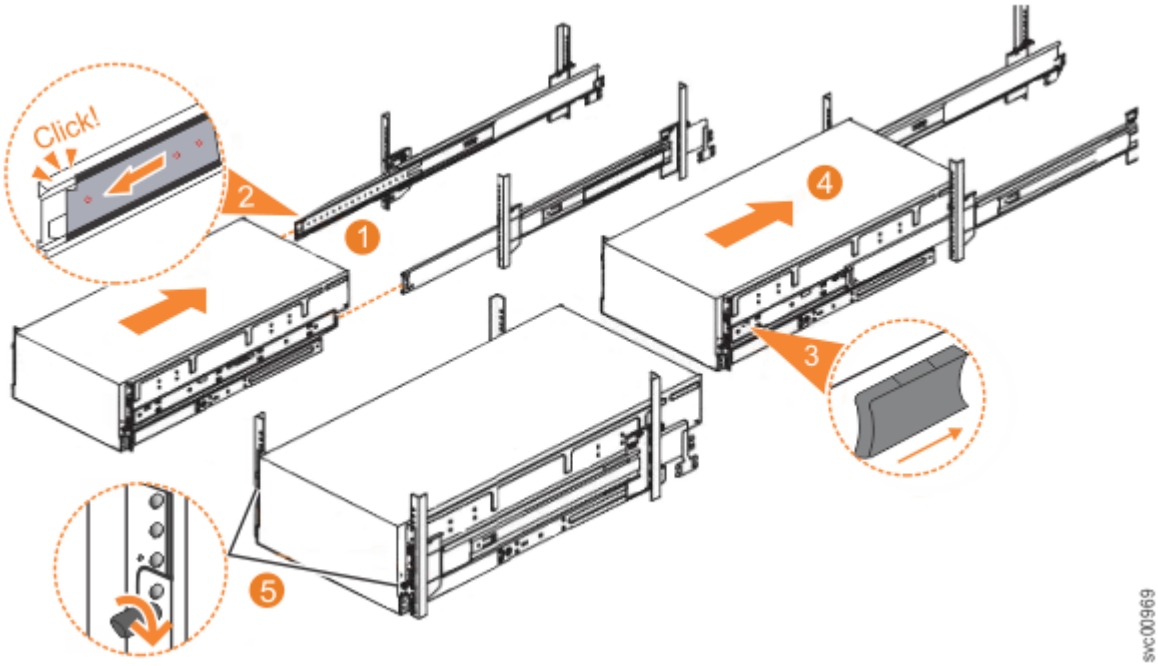


Figure 50. Replacing the 2076-92F enclosure in the rack

2. Ensure that the ball bearing retainer clicks into place inside the front of the left and right drawer sections (2 in Figure 50 on page 51).

Sliding the enclosure into the rack

3. Locate the left and right blue release tabs near the front of the enclosure. Press both release tabs forward to unlock the drawer mechanism (3 in Figure 50 on page 51).
4. Push the enclosure firmly into the rack (4 in Figure 50 on page 51).
5. Tighten the locking thumb screws (5 in Figure 50 on page 51) to secure the enclosure in the rack.
6. Reconnect power to the expansion enclosure.

Installing or replacing an expansion canister: 2076-92F

You can reinstall an expansion canister in a 2076-92F expansion enclosure or replace a faulty expansion canister with one from FRU stock.

Before you begin

Important: You can replace an expansion canister without powering off the expansion enclosure. However, to maintain operating temperature, replace the expansion canister within 10 minutes of its removal. When an expansion canister is removed, the reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

An expansion canister provides SAS connectivity between the 2076-92F expansion enclosure and Storwize V7000 system. The expansion enclosure contains two expansion canisters. Figure 51 on page 52 shows an example of an expansion canister. If either of the two expansion canisters has a failure, the other expansion canister assumes the full I/O load.

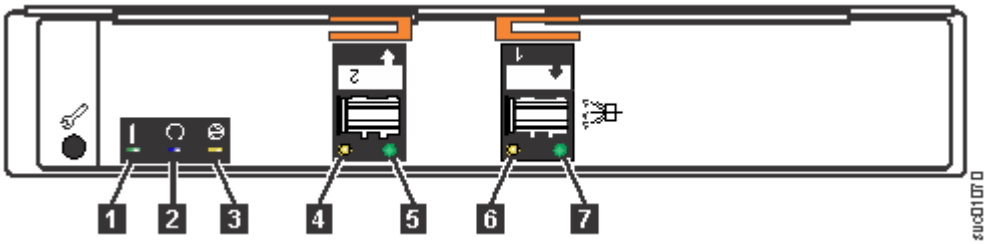


Figure 51. Expansion canister

1 Canister fault indicator
2 Canister status
3 Canister power indicator
4 and 6 SAS link fault indicators
5 and 7 SAS link operational indicators
8 Canister release handles

Procedure

1. Disconnect the elbow of the lower cable management arm to swing it out of the way, as shown in Figure 52 on page 52.

   Follow the procedure that is described in "Moving the cable management arms" on page 55.
2. Carefully align the expansion canister with the expansion enclosure.
3. Rotate both the handles outward and insert the expansion canister into the expansion enclosure.
4. When the expansion canister is fully inserted, rotate each handle inward to lock it into position, as shown in Figure 52 on page 52.

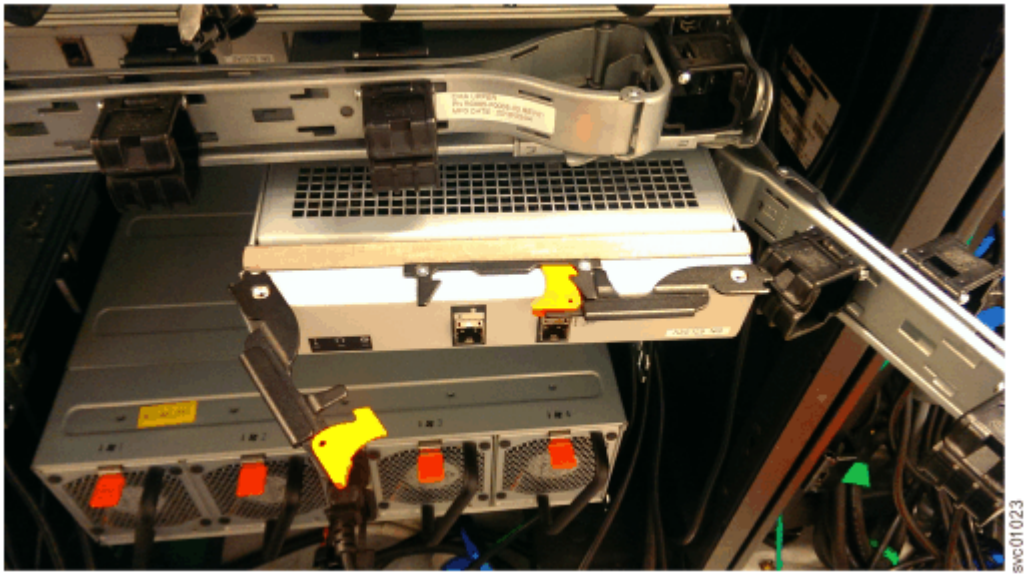


Figure 52. Install the expansion canister

5. Reconnect all the SAS cables to the appropriate SAS ports on the expansion canister, as described in "Removing and installing a SAS cable: 2076-92F " on page 75.
6. Reconnect the elbow of the lower cable management arm to the inner member of the slide rail.

Removing or moving the cable-management arm: 2076-92F

You might need to move the cable-management arm (CMA) aside to access components or complete service tasks. If needed, you can also remove the CMA from the 2076-92F expansion enclosure.

About this task

The cable management arm (CMA) consists of an upper and lower arm assembly, as Figure 53 on page 53 shows. The upper and lower are independent of each other. They can be installed, moved, or removed from the enclosure individually.

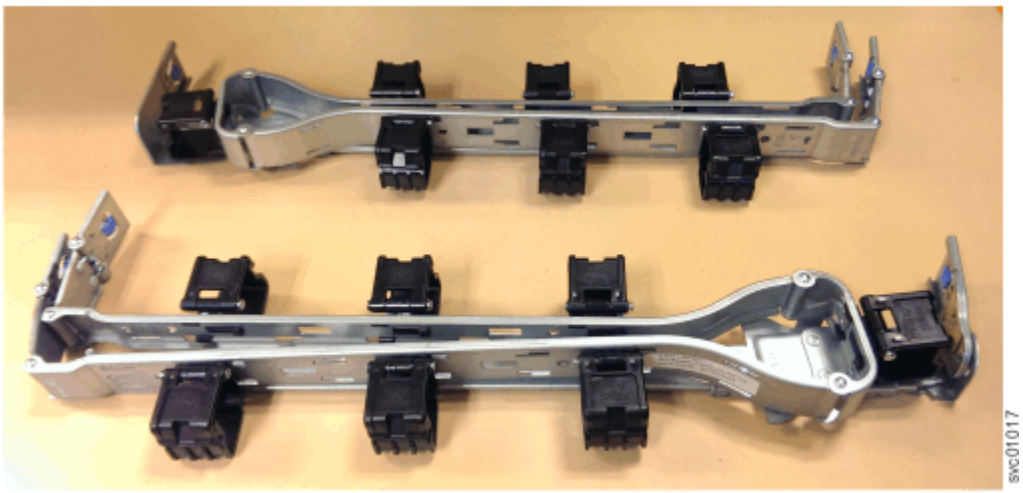


Figure 53. Upper and lower cable-management arms

To complete many service tasks, you can swing the CMA assemblies away from the expansion enclosure. You do not have to completely remove the CMA assemblies from the enclosure. For these service tasks, complete step “1” on page 56 through step “4” on page 57 in “Moving the cable management arms” on page 55.

However, you might need to remove a CMA assembly from the 2076-92F expansion enclosures. To do so, complete step “1” on page 54 through step “8” on page 55 in following procedure.

Procedure

Remove the upper CMA assembly

The connectors of the CMA are installed on the rail hooks at the end of the support rails. Figure 54 on page 54 shows the connectors on the upper CMA assembly.

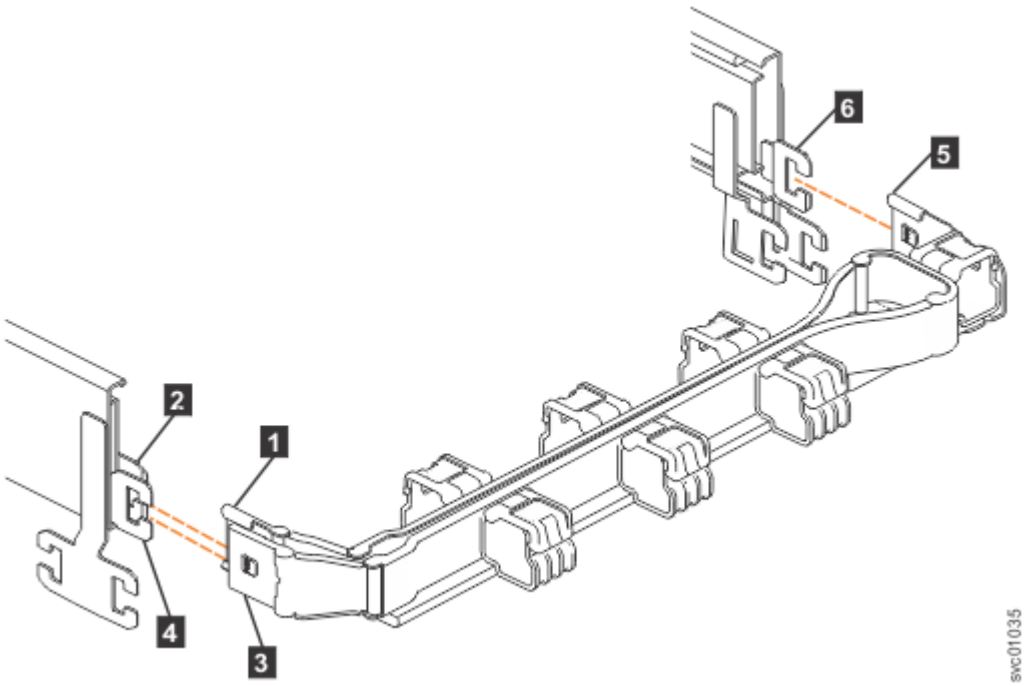


Figure 54. Connectors for the upper cable management arm

1 Inner connector on the upper CMA
2 Connector base on inner rail member
3 Outer connector on the upper CMA
4 Connector base on outer rail member
5 Support rail connector on the upper CMA
6 Connector base on outer rail member

1. Press the latch on the connector base on the upper CMA assembly (5 in Figure 54 on page 54).
2. Pull the connector to remove it from the connector base on the right support rail (6 in Figure 54 on page 54).
3. Press the latch on the outer connector of the upper CMA assembly (3 in Figure 54 on page 54).
4. Remove the outer connector from the inner member of the left support rail (4 in Figure 54 on page 54).
5. Remove the inner connector of the upper CMA assembly (1) from the inner member of the left support rail (2), as shown in Figure 54 on page 54.

Remove the lower CMA assembly

Note: The procedure for removing the lower CMA assembly is the same as the procedure to remove the upper CMA assembly. However, the connector locations are reversed. For example, the connector base of the upper CMA (5 in Figure 54 on page 54) connects to the right rail. The connector base of the lower CMA (11 in Figure 55 on page 55) attaches to the left rail.

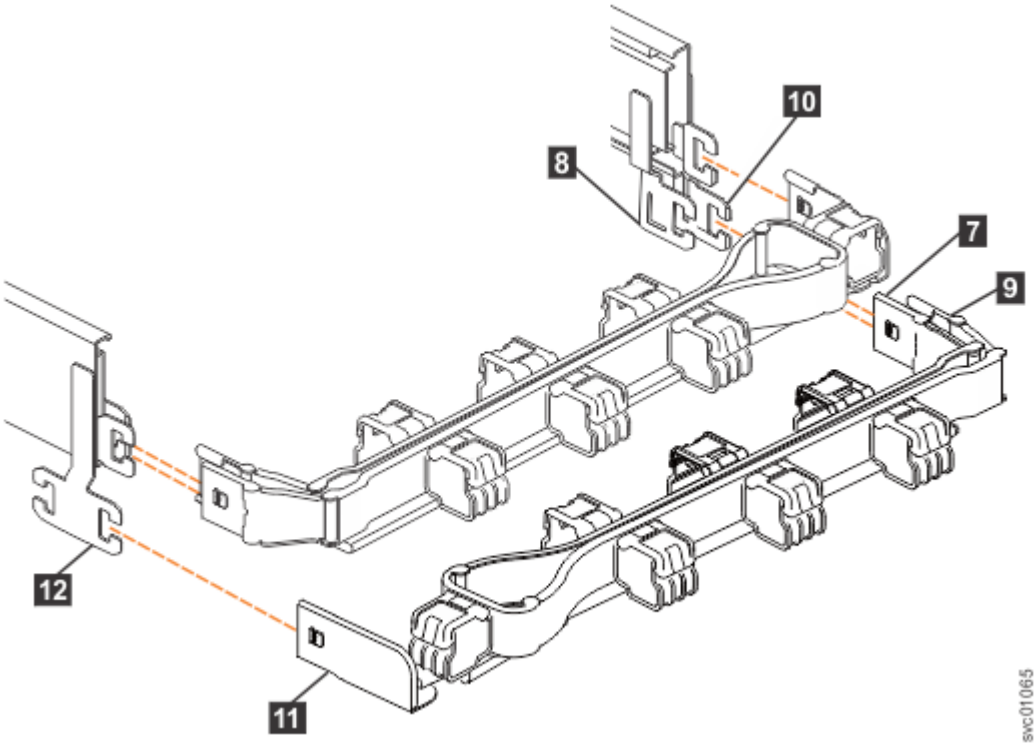


Figure 55. Components of the lower CMA assembly

6. Remove the connector base on the lower CMA assembly (11) from the connector on the left support rail (12), as Figure 55 on page 55.
7. Remove the inner connector of the lower CMA assembly (9) from the outer member of the right support rail (10), as shown in Figure 55 on page 55.
8. Remove the outer connector of the lower CMA assembly (7) from the inner member of the right support rail (8), as shown in Figure 55 on page 55.

Replace the CMA assembly

9. To reinstall the CMA, or replace it with one from FRU stock, follow the procedure in "Installing or replacing the cable-management arm: 2076-92F " on page 57.

Moving the cable management arms

About this task

To complete most service tasks, you can swing the CMA assemblies out of the way. You can move each arm independently or you can move both arms. For example, Figure 56 on page 56 shows that both of the CMA assemblies are swung away from the rear of the enclosure.

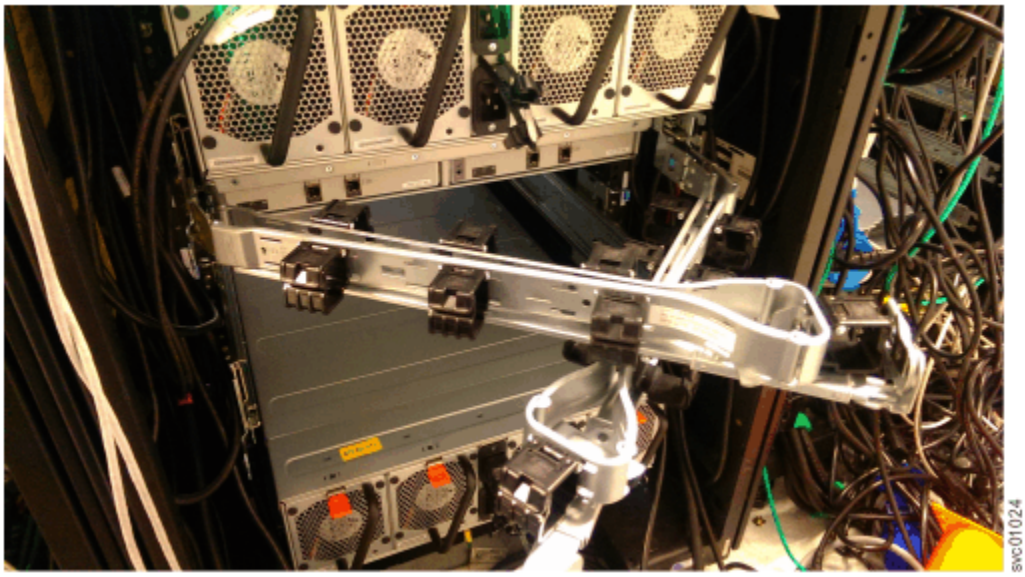


Figure 56. Upper and lower CMA assemblies moved aside

Figure 57 on page 56 shows that the lower CMA assembly is swung away from the rear of the enclosure so that the expansion canister is accessible.

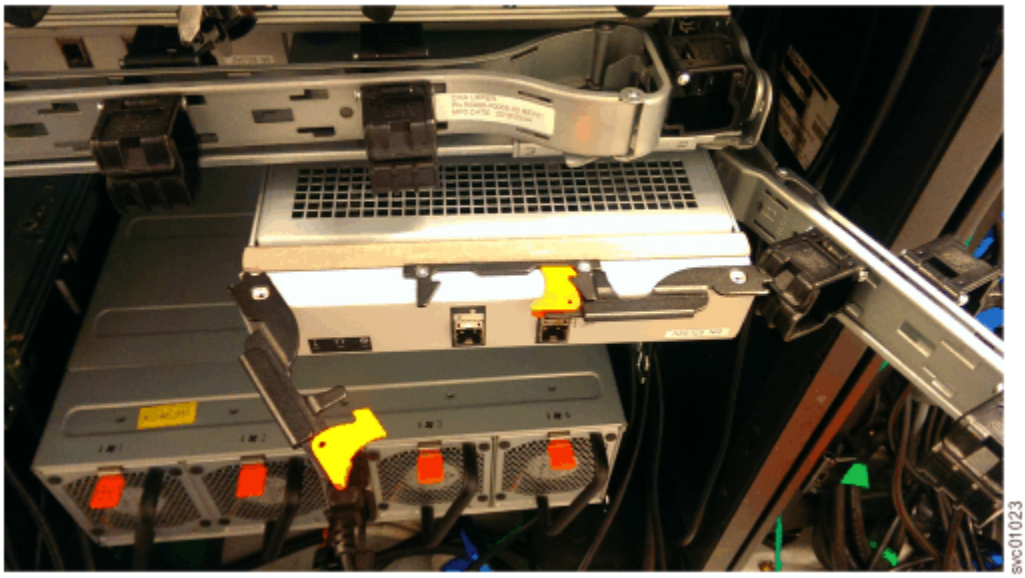


Figure 57. Lower CMA assembly moved

Procedure

1. To release the upper CMA, push the latch on the support rail connector 5 to release it from the connector base 6 on the right rail.

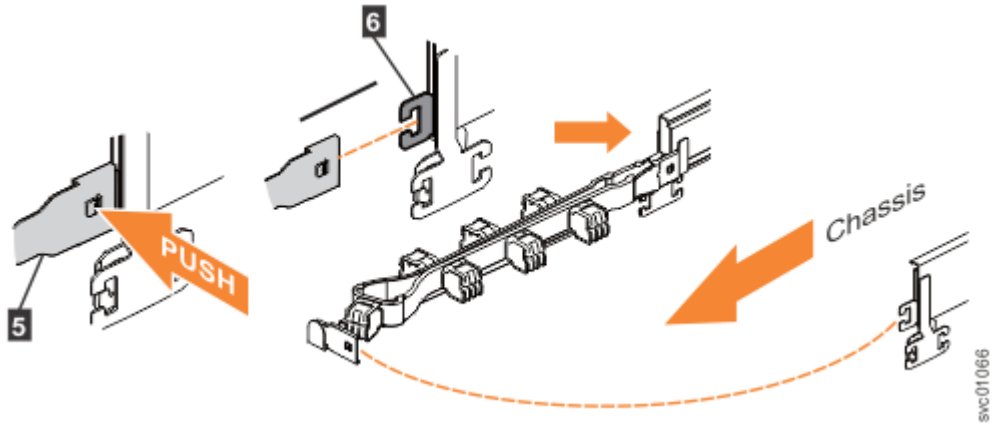


Figure 58. Release the upper CMA assembly

2. Move the upper CMA to the left to swing it out of the way.
   a) To reattach the upper CMA to the rail, reverse the procedure.
3. To release the lower CMA, push the latch on the support rail connector 11 to release it from the connector base 12 on the left rail.

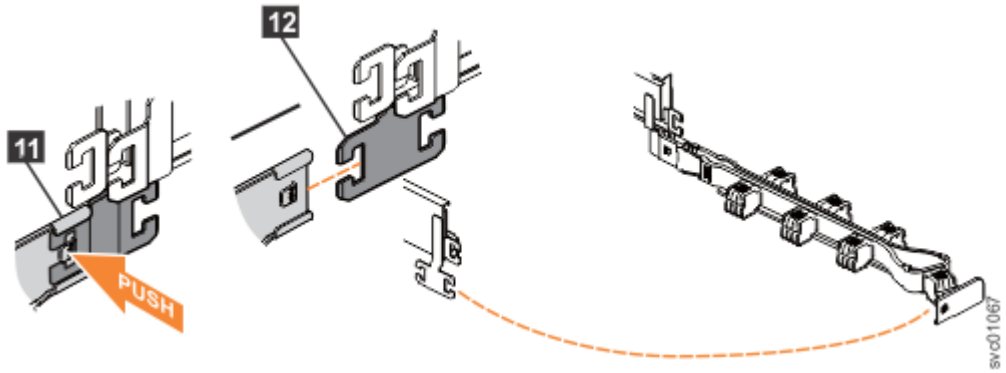


Figure 59. Release the lower CMA assembly

4. Move the lower CMA to the right to swing it out of the way.
   a) To reattach the lower CMA to the rail, reverse the procedure.

Installing or replacing the cable-management arm: 2076-92F

Use these procedures to install the cable-management arm (CMA) for the 2076-92F expansion enclosure. You can also use these procedures to replace a faulty CMA assembly.

About this task

As part of the initial installation of the 2076-92F expansion enclosure, you must attach the CMA. You might also need to replace a faulty CMA with a new one from FRU stock.

The cable management arm (CMA) consists of an upper arm and a lower arm assembly, as Figure 60 on page 58 shows.

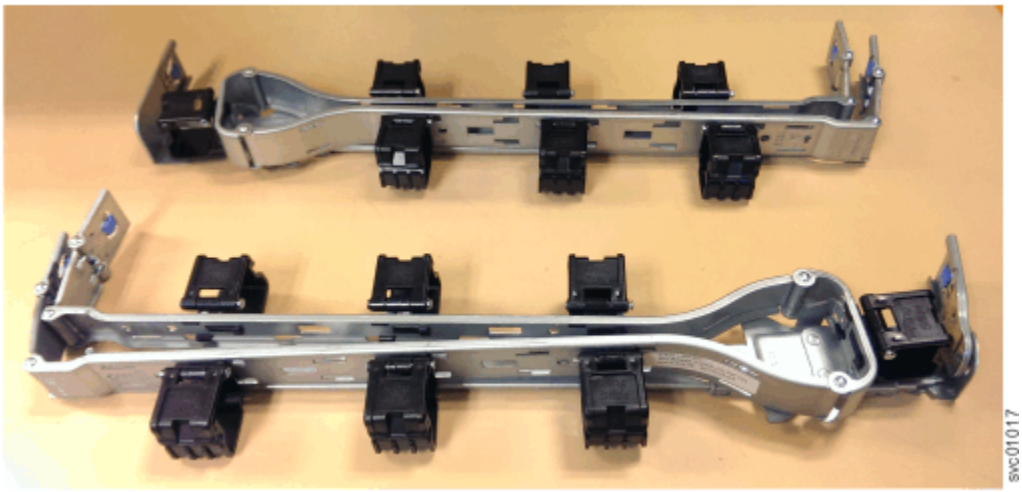


Figure 60. Upper and lower cable-management arms

As Figure 61 on page 58 shows, the support rail connectors of each CMA assembly are installed on the rail hooks at the end of the support rails.

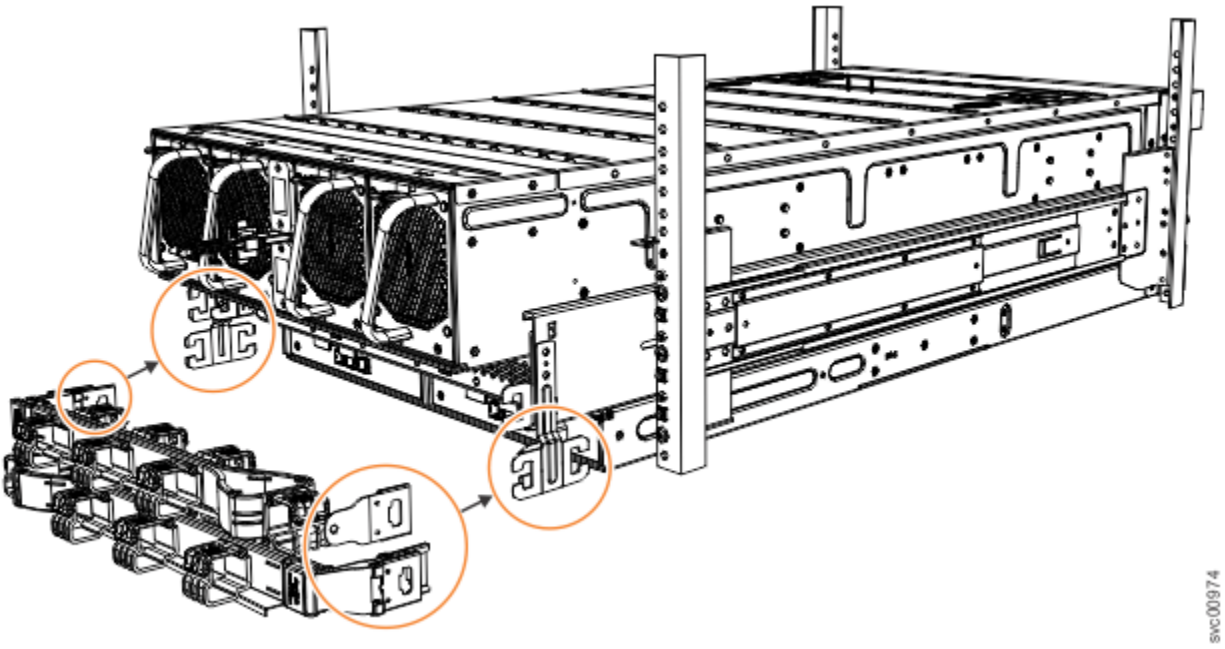


Figure 61. Upper and lower cable-management arms

Procedure

1. Remove the loop straps from the upper and lower CMA assemblies. The straps are used only for shipping.

Installing the upper CMA assembly

Figure 62 on page 59 shows the connectors on the upper CMA assembly.

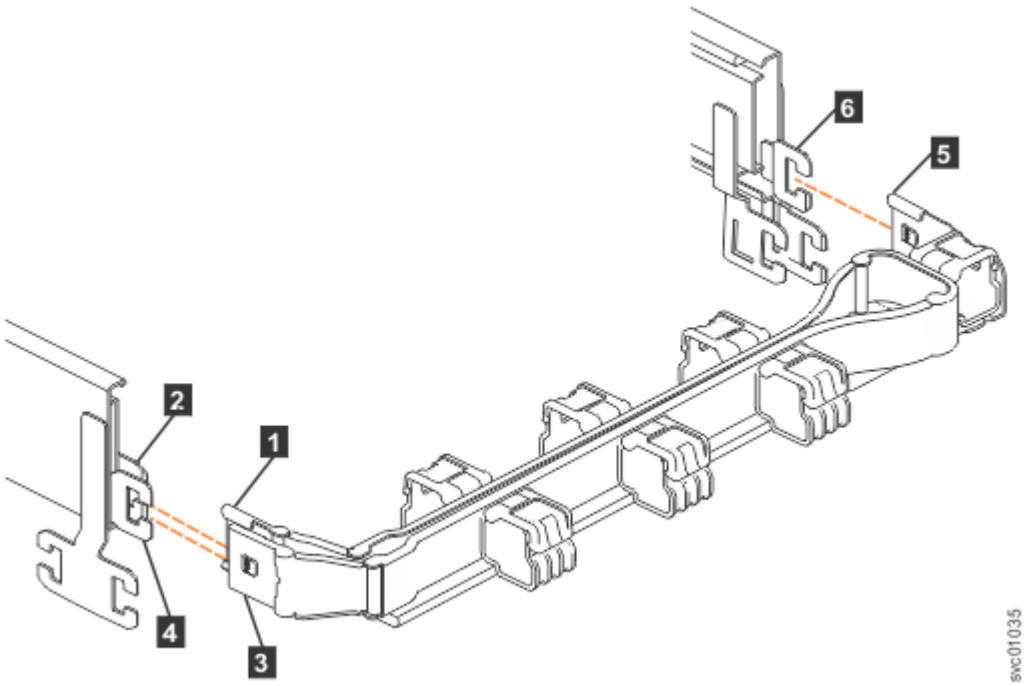


Figure 62. Connectors for the cable management arm

1 Inner connector on upper CMA
2 Connector base on inner rail member
3 Outer connector on upper CMA
4 Connector base on outer rail member
5 Support rail connector on upper CMA
6 Connector base on outer rail member

2. Install the inner connector of the upper CMA assembly (1) to the inner member of the left support rail (2), as shown in Figure 63 on page 59.

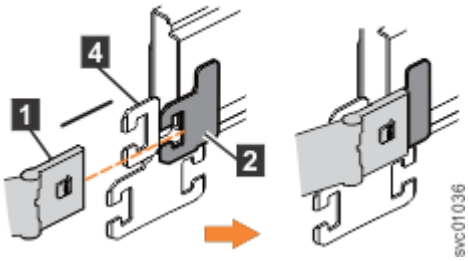


Figure 63. Install the inner connector of the upper CMA to the inner member of the support rail

3. Install the outer connector of the upper CMA assembly (3) to the outer member of the left support rail (4), as shown in Figure 64 on page 59.

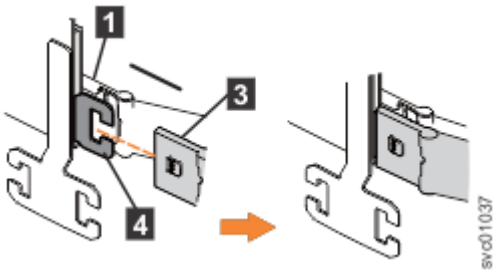


Figure 64. Install the outer connector of the upper CMA to the outer member of the support rail

4. Attach the support rail connector on the upper CMA assembly (5) to the connector base on the right support rail (6), as shown in Figure 65 on page 60.

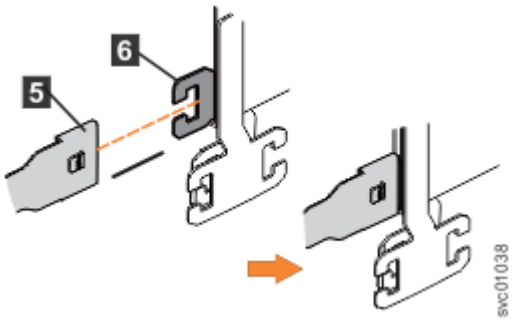


Figure 65. Attach the support rail connector of the upper CMA to the right support rail

Ensure the cable-management arm connector attaches securely to the hooks on the rails.

Installing the lower CMA assembly

Note: The procedure for attaching the lower CMA assembly is the same as the procedure to attach the upper CMA assembly. However, the connector locations are reversed. For comparison, Figure 66 on page 60 shows the upper and lower CMA assemblies as they are aligned to the support rails. The support rail connector of the upper CMA attaches to the right rail. The support rail connector of the lower CMA 11 attaches to the left rail.

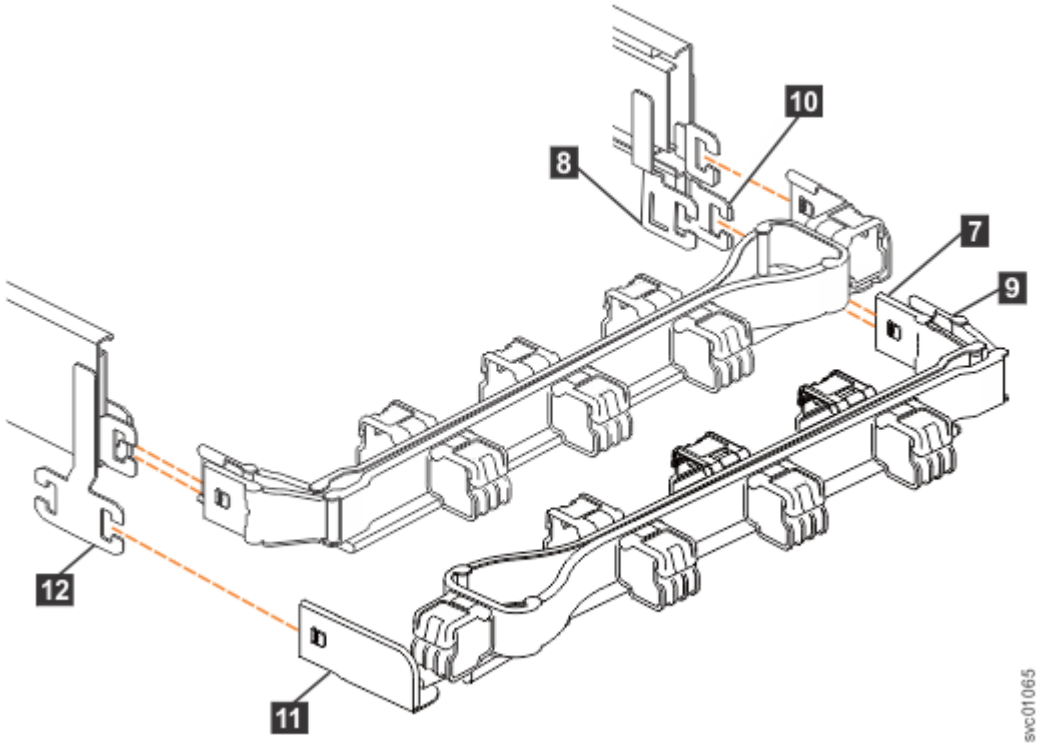


Figure 66. Comparing the location of the components of the CMA assemblies

7 Inner connector on lower CMA
8 Connector base on inner rail member
9 Outer connector on lower CMA
10 Connector base on outer rail member
11 Support rail connector the lower CMA
12 Connector base on outer rail member

5. Install the inner connector of the lower CMA assembly (7) to the inner member of the right support rail (8), as shown in Figure 66 on page 60).

6. Install the outer connector of the lower CMA assembly (9) to the outer member of the right support rail 10, as shown in Figure 66 on page 60.
7. Attach the support rail connector on the lower CMA assembly (11) to the connector on the left support rail (12), as shown in Figure 66 on page 60.

   Ensure that the lower CMA assembly is securely attached to the hooks on the end of the support rails.
8. Route the cables and power cords on the CMA. If needed, secure them with cable ties or hook-and-loop fasteners.

   Notes:

   - Use the cable straps that are provided on the rear of the system to retain the cables and prevent them from sagging.
   - Allow slack in all of the cables to avoid tension in the cables as the CMA moves.
9. Reconnect the power cords and other cables, as needed.

Installing or replacing the top cover: 2076-92F

You can replace the top cover on a 2076-92F expansion enclosure during the installation process or after you complete a service task.

Before you begin

Important: You can install the cover while the expansion enclosure is powered on. To maintain operating temperature, replace the cover within 15 minutes of completing other service tasks. When the cover is removed, the reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

To install or replace the top cover on the 2076-92F expansion enclosure, complete the following steps.

Procedure

1. Carefully lower the cover and ensure that it is aligned correctly with the back of the enclosure, as shown in Figure 67 on page 61.

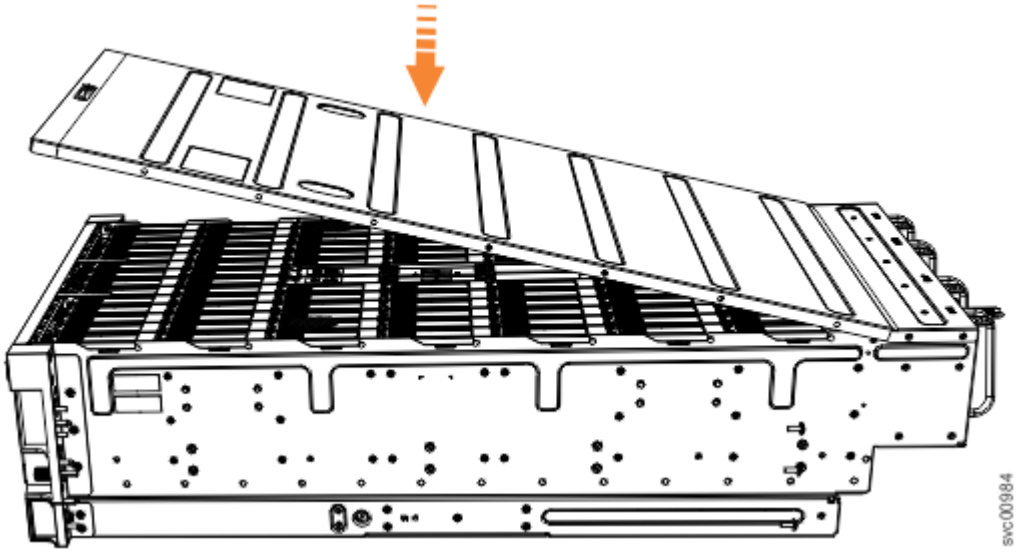


Figure 67. Aligning the 2076-92F top cover

2. Push the cover release lever to the side (2) as shown in Figure 68 on page 62.
3. Slide the cover towards the back of the enclosure (3) back until it stops, as shown in Figure 68 on page 62.

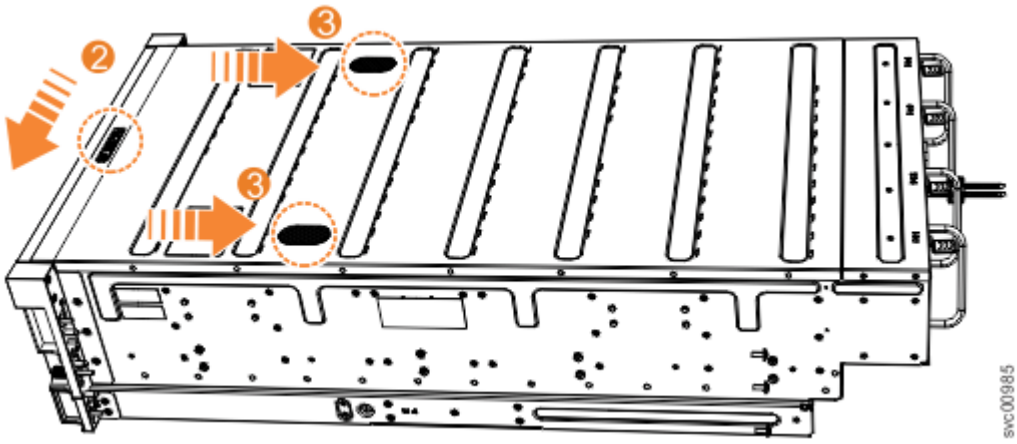


Figure 68. Replacing the 2076-92F top cover

4. Verify that the cover correctly engages the cover release latch and all of the inset tabs on the expansion enclosure.
5. Lock the cover into position by sliding the release lever 4, as shown in Figure 69 on page 62

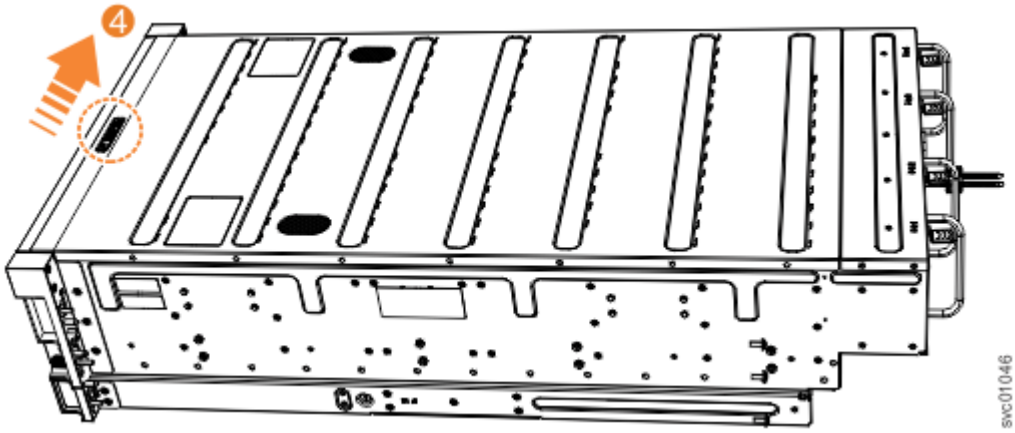


Figure 69. Locking the top cover

Installing or replacing a drive: 2076-92F

Use the following procedure to install a drive for the first time or to replace a faulty drive in a 2076-92F expansion enclosure with a new one received from FRU stock.

Before you begin

Important:

- You can replace a drive assembly without powering off the expansion enclosure. However, to maintain operating temperature, do not keep the cover off an operational enclosure for more than 15 minutes. The reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.
- Ensure that the drive that you are replacing is not a spare or a member of an array. The drive status is shown in **Pools** > **Internal Storage** in the management GUI. If the drive is a member of an array, follow the fix procedures in the management GUI. The fix procedures minimize the risk of losing data or access to data; the procedures also manage the system's use of the drive.

About this task

The 2076-92F expansion enclosure supports 92 drives. Figure 70 on page 63 shows an example of a drive assembly.

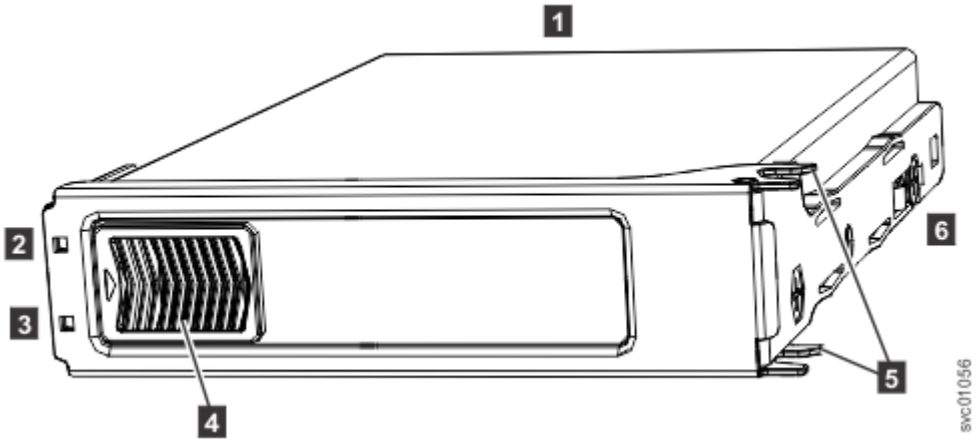


Figure 70. Drive assembly

1 Disk drive
2 Online indicator
3 Fault indicator
4 Release latch
5 Drive latch toes
6 Drive carrier

Procedure

1. Read all the available safety information.
2. Remove the cover, as described in “Removing the top cover: 2076-92F ” on page 45.
3. Locate the empty drive slot to receive the new drive or that contains the faulty drive that you want to replace.

   Note: When a drive is faulty, the amber fault indicator is lit (3 in Figure 70 on page 63). Do not replace a drive unless the drive fault indicator is on or you are instructed to do so by a fix procedure.

   A label on the enclosure cover (Figure 71 on page 63) shows the drive locations in the enclosure. The drive slots are numbered 1-14 from left to right and A-G from the back to the front of the enclosure.

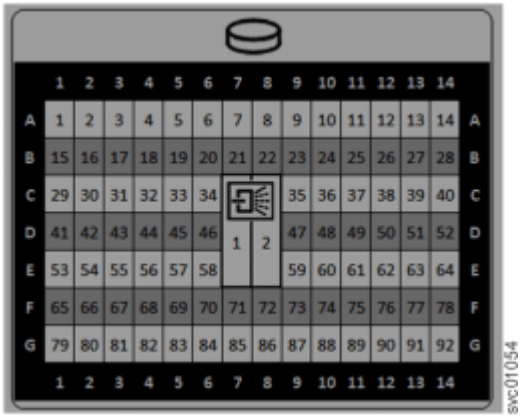


Figure 71. Drive locations in a 5U expansion enclosure

The drive slots must be populated sequentially, starting from the back-left corner position (slot 1, grid A1). Sequentially install the drive in the slots from left to right and back row to front. Always complete a full row before you install drives in the next row. For example, in Figure 72 on page 64, the drives are installed correctly. Drives are installed in slots 1 -14 of row A and the installation continues in slot 15 in row B.

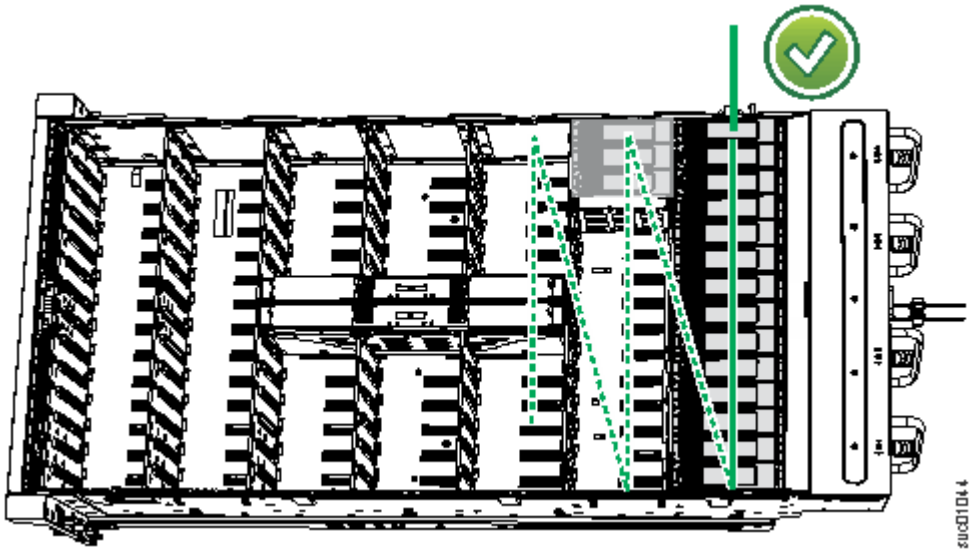


Figure 72. Correct drive installation

In Figure 73 on page 64, the drives are not installed correctly. Slot 1 (A1) does not contain a drive. In addition, drives are installed in row B even though row A contains empty drive slots.

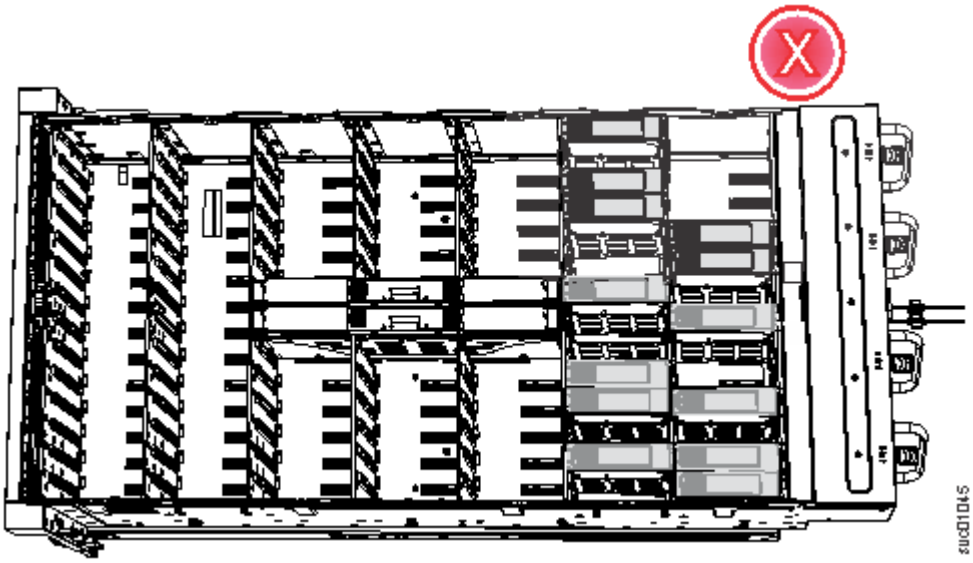


Figure 73. Incorrect drive installation

4. Touch the static-protective package that contains the drive to any unpainted metal surface on the enclosure. Wear an anti-static wrist strap to remove the drive from the package.
5. Ensure that the drive handle (1 in Figure 74 on page 65) of the drive assembly is in the open (unlocked) position.
6. Align the drive carrier into the appropriate drive slot.
7. Gently push the drive down until it stops and the bottom of the latch is aligned with the top of the partition. Ensure that the handle is not open more than 45 degrees from the drive carrier. (2 in Figure 74 on page 65).

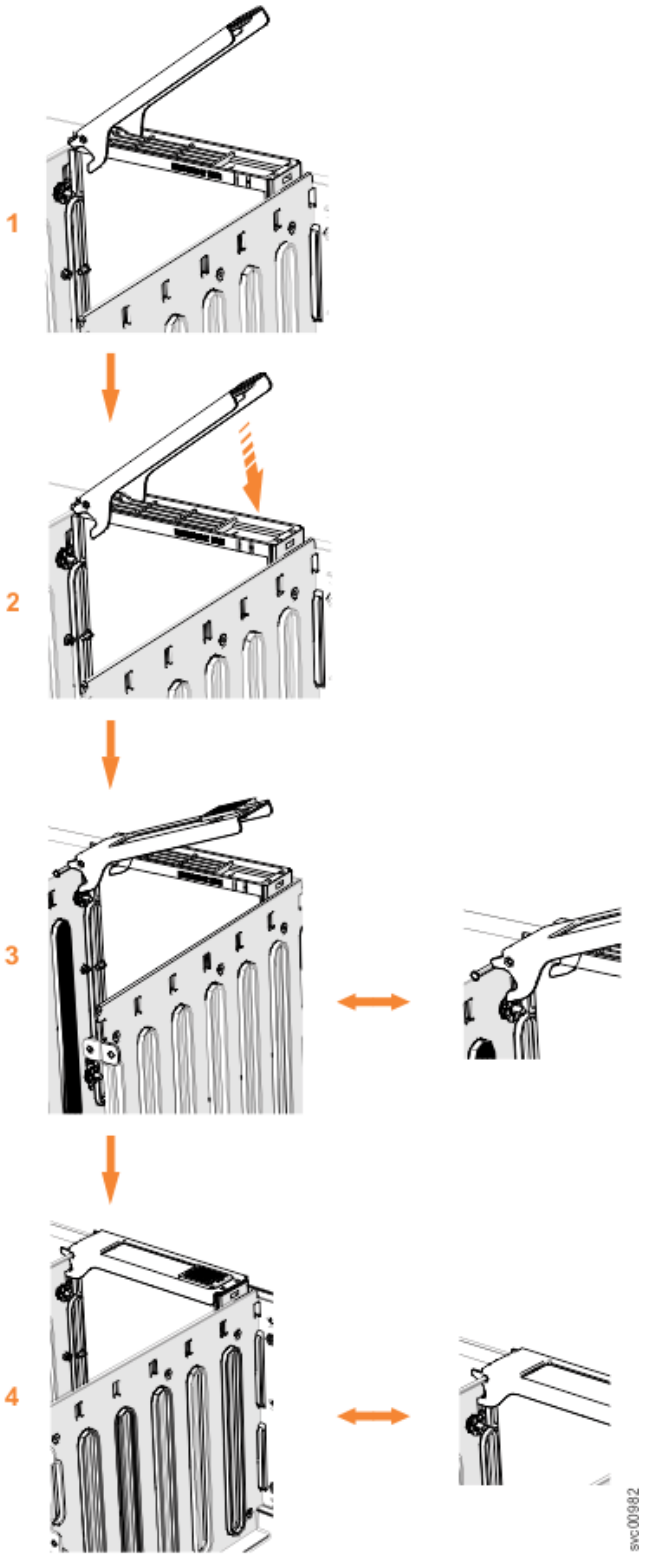


Figure 74. Replace the drive

8. Rotate the handle down to lock the drive assembly into the chassis (3 in Figure 74 on page 65).
9. Ensure the toe on the bottom of the latch is fully engaged with the partition in the chassis.
10. Ensure that the top toe of the latch is also fully engaged (4 in Figure 74 on page 65).
11. Repeat steps "4" on page 64 through "10" on page 65 for each drive you are replacing.

12. Replace the cover, as described in “Installing or replacing the top cover: 2076-92F ” on page 61.
13. Slide the expansion enclosure back into the rack, as described in “Installing or replacing an expansion enclosure in a rack: 2076-92F ” on page 50.

Installing or replacing a secondary expander module: 2076-92F

You can replace a faulty secondary expander module in a 2076-92F (5U) expansion enclosure. You may also need to install a secondary expander module that was temporarily removed to perform other service tasks.

Before you begin

DANGER:

Hazardous voltage present. Voltages present constitute a shock hazard, which can cause severe injury or death. (L004)

CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)

CAUTION:

- Only an IBM Service Support Representative (SSR) can remove or replace the secondary expander module from an enclosure (FRU P/N 01LJ112) that is powered on. If the 01LJ112 enclosure is powered on, use caution and avoid contact with the connectors on the main board.
- If the FRU part number of the enclosure is 01LJ607, you can remove or replace the secondary expander module while the enclosure is powered on.

Important:

- You can replace a secondary expander module without powering off the expansion enclosure. However, to maintain operating temperature, do not keep the cover off an operational enclosure for more than 15 minutes. The reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.
- Ensure that the FRU P/N for the replacement secondary expander module is appropriate for the enclosure in which it is being installed.

About this task

As Figure 75 on page 67 shows, the 5U expansion enclosure contains two secondary expander modules. In the figure, A shows the location of secondary expander module 1, B shows secondary expander module 2, and C shows the front of the enclosure.

The secondary expander modules provide SAS connectivity between the expansion canisters and the drives. Each drive has 2 SAS ports. SAS port 1 of each drive is connected to expansion canister 1 through secondary expander module 2. SAS port 2 of each drive is connected to expansion canister 2 through secondary expander module 1. If secondary expander module 2 is missing or is faulty, the expansion

canister can communicate only with SAS port 2 on each drive. Similarly, if secondary expander module 1 is missing or is faulty, the expansion canister can communicate only with SAS port 1 on each drive.

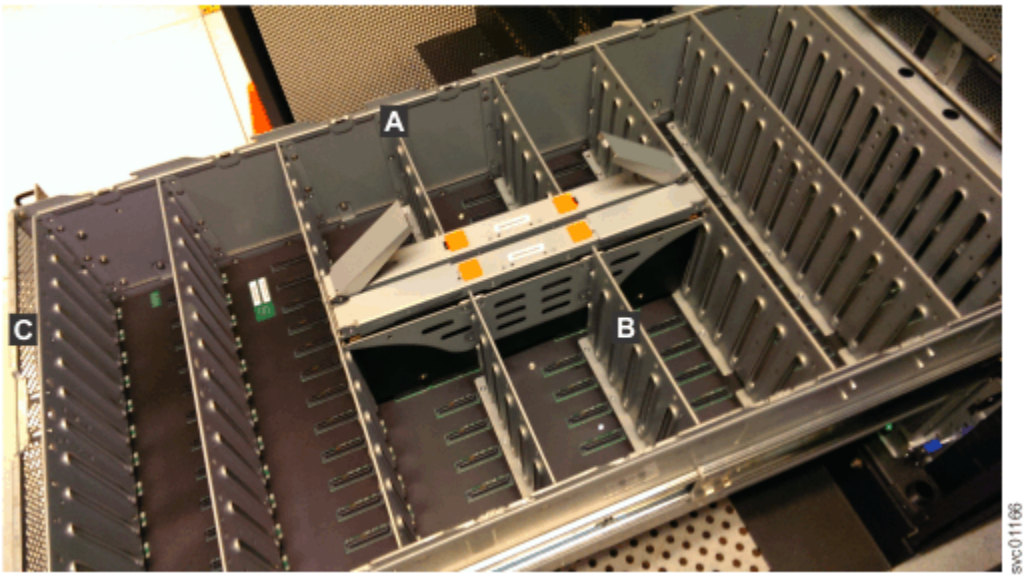


Figure 75. Location of secondary expander modules

This task assumes that the following conditions were met:

- The top cover was removed, as described in “Removing the top cover: 2076-92F ” on page 45.
- The secondary expander module was removed, as described in “Removing a secondary expander module: 2076-92F ” on page 92.

Procedure

1. Slide the expansion enclosure out from the rack, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82.
2. Identify the secondary expander module to be replaced; Figure 76 on page 67 shows the LEDs on top of a secondary expander module.

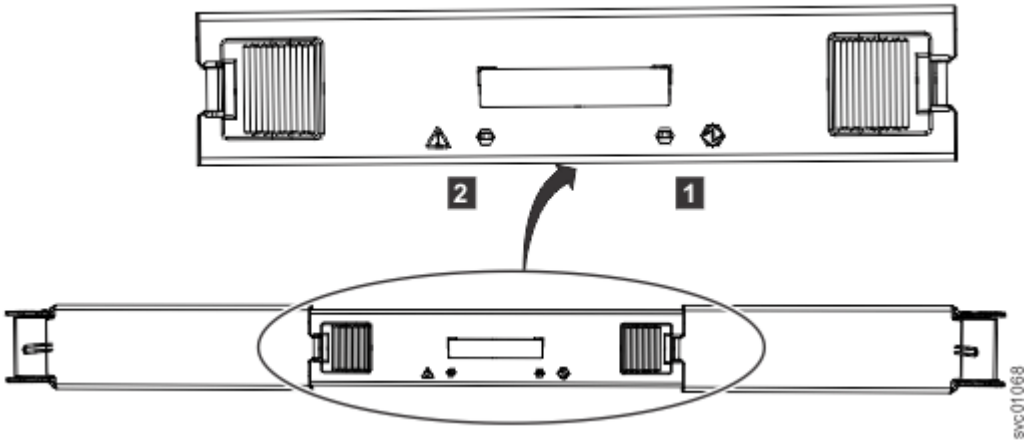


Figure 76. LEDs on a secondary expander module

1 Online indicator
2 Fault indicator

3. Rotate both handles on the new secondary expander module to an open position, as shown in Figure 77 on page 68.

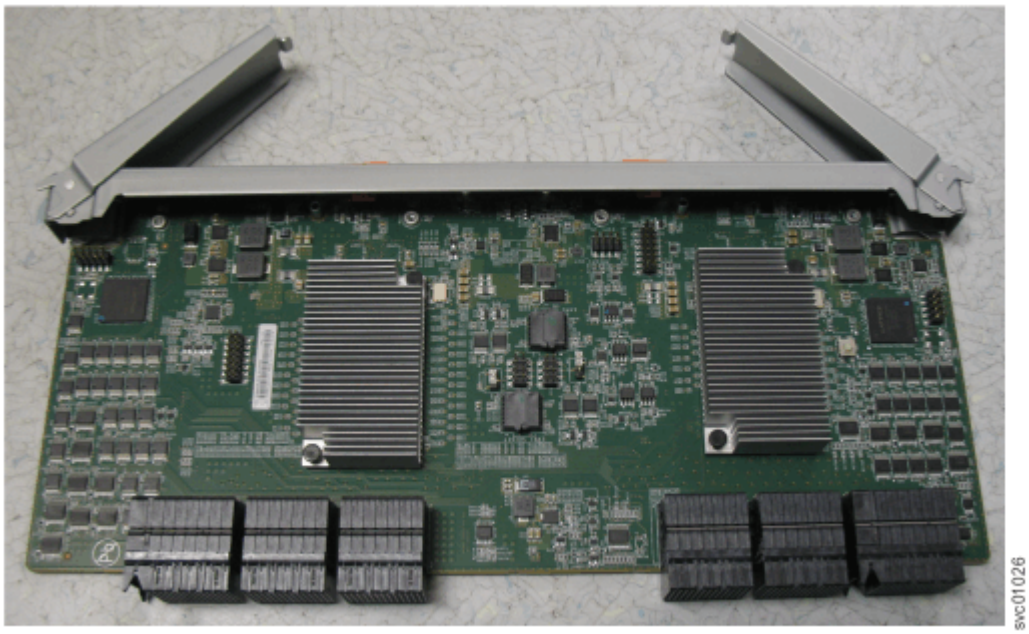


Figure 77. Open the secondary expander module handles

4. Align the edges of the secondary expander module carefully in the guide slot in the enclosure, as shown in Figure 78 on page 68.

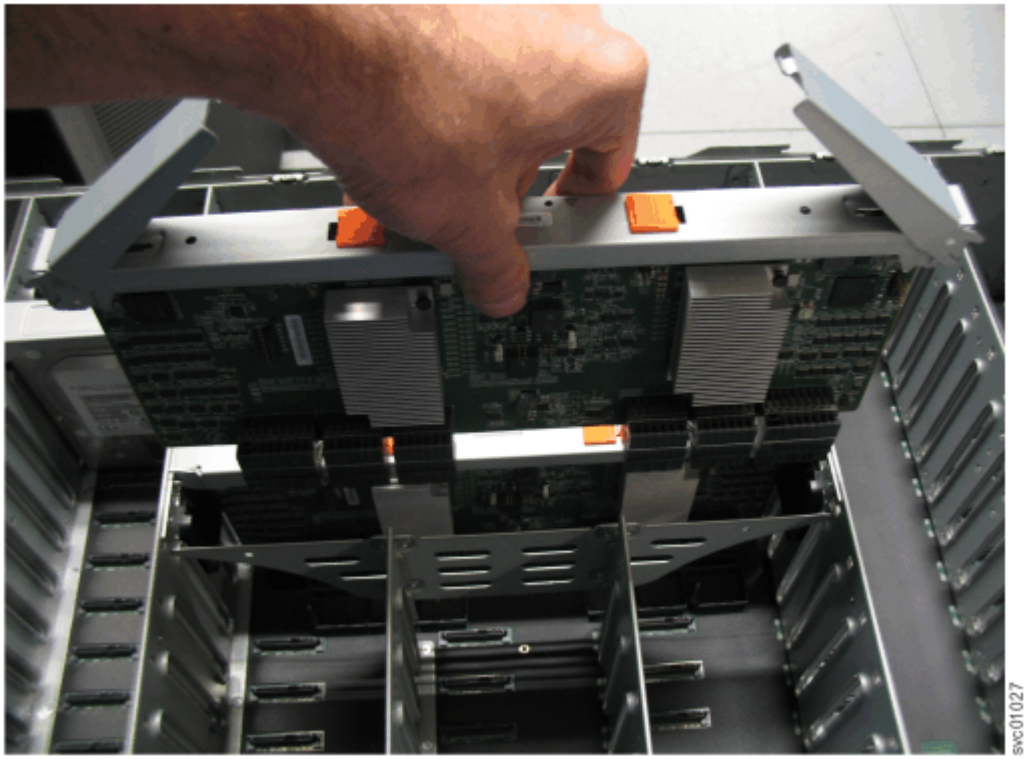


Figure 78. Replace the secondary expander module

5. Press the secondary expander module down into position in the enclosure.
6. Rotate the handles on the secondary expander module to the closed position to lock it in the enclosure.
7. If needed, repeat step “3” on page 67 through step “6” on page 68 to replace the other secondary expander module.
8. Replace the top cover, as described in “Installing or replacing the top cover: 2076-92F ” on page 61.

9. If needed, reconnect the power cables to the expansion enclosure, as described in “Powering on the 5U expansion enclosure: 2076-92F ” on page 111.
10. Check the LEDs on the top of the secondary expander module to verify that it is receiving power.
    “ Storwize V7000 2076-92F expansion enclosure LEDs and indicators” on page 115 describes the status indicated by the LEDs.

Installing or replacing the fascia: 2076-92F

During the initial installation process or after you perform service, you can install the fascia components on the front of a 2076-92F expansion enclosure.

About this task

The 4U fascia covers the display panel of the expansion enclosure. It is attached to the enclosure by four screws. The bottom 1U fascia covers both of the power supply units (PSUs) on the enclosure. As Figure 79 on page 69 shows, the fascias are independent; you can remove or replace one without having to remove or replace the other.

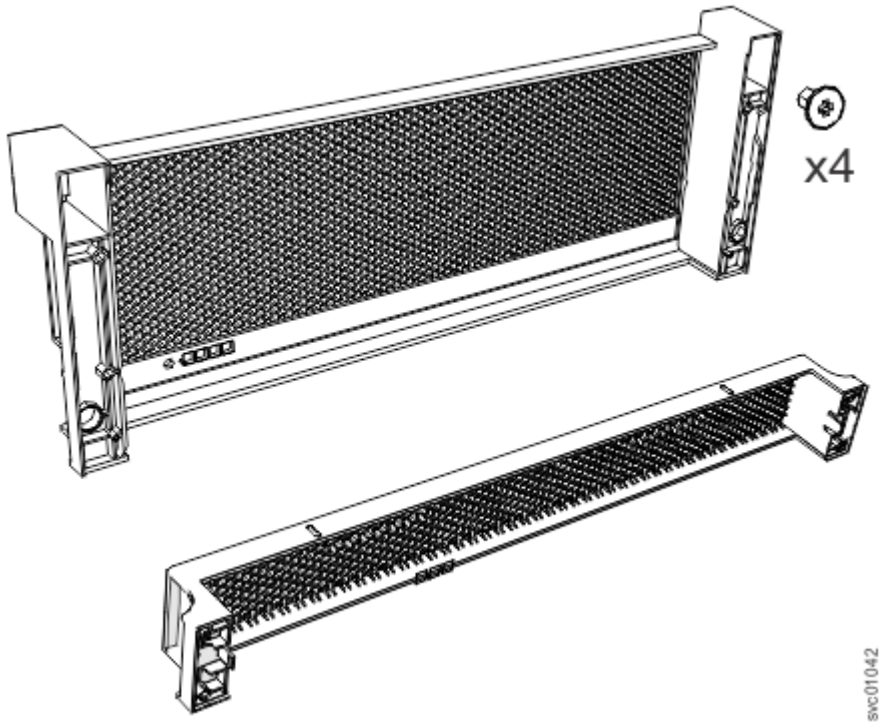


Figure 79. Fascia components on the expansion enclosure

Note: When the expansion enclosure is shipped, the 4U and 1U fascia are not installed. You must install them as part of the initial installation process.

Procedure

Attach the front (4U) fascia

1. Align the front 4U fascia with the enclosure so that the thumbscrews go through the holes on each side. As Figure 80 on page 70 shows, this action aligns the screw holes on the back of the fascia with the screw holes on the front flange of the enclosure.
2. Replace the four screws to reattach the 4U fascia. Secure the screws from the back of the flange and into the rear of the fascia. Each side of the 4U fascia contains two screws.

Attach the bottom (1U) fascia

3. Reattach the bottom 1U fascia that covers the power supply units (PSUs). Align the fascia with the enclosure and gently push it until it clicks into place on the chassis, as shown in Figure 80 on page 70.

   Align the tab on each side of the 1U fascia with the corresponding slots on the enclosure flange. Pins on each flange must also align with a hole in each side of the 1U fascia.

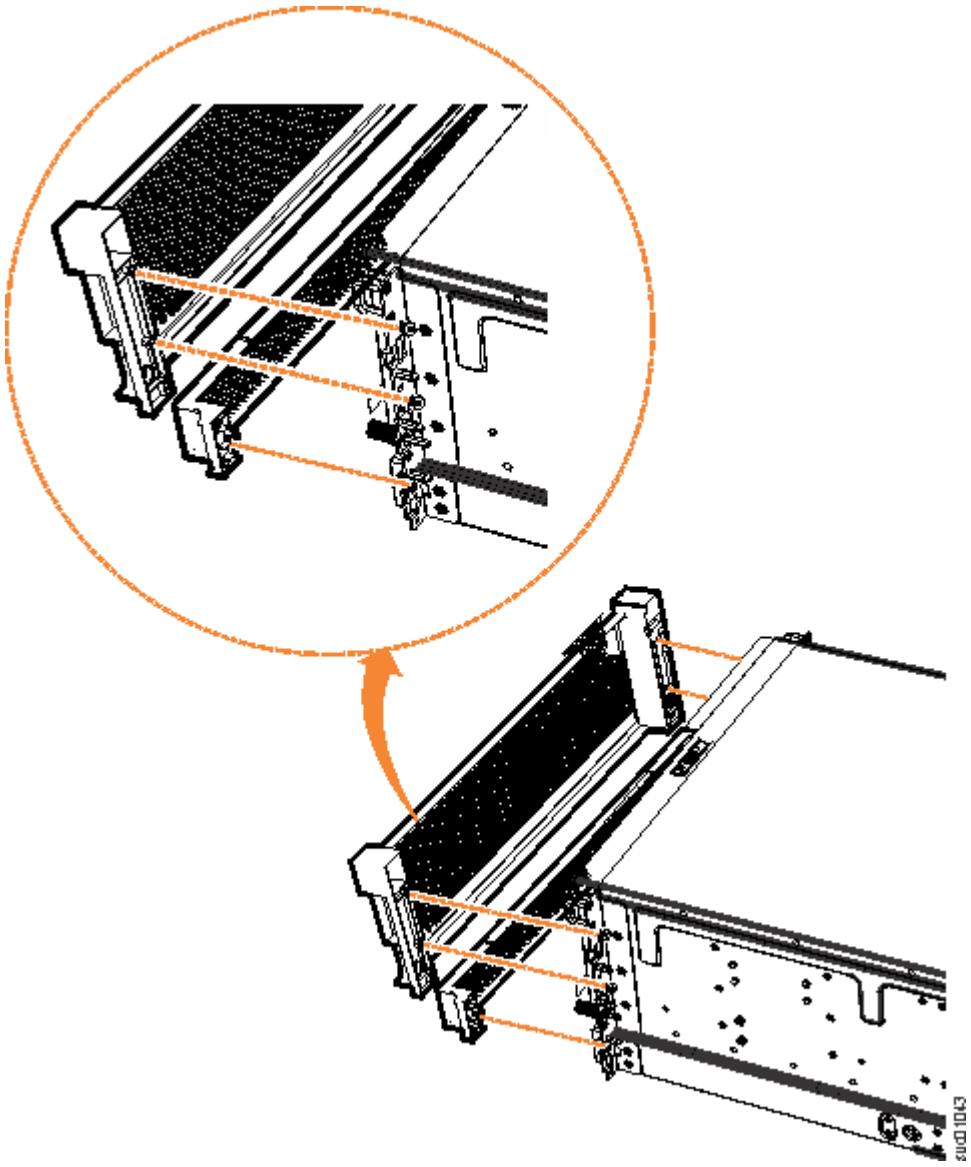


Figure 80. Replace fascia components on the expansion enclosure

Installing or replacing a power supply: 2076-92F

Use the following procedures to replace either of the redundant power supplies in the 2076-92F expansion enclosure. The redundant power supplies operate in parallel; one continues to provide power to the enclosure if the other fails.

Before you begin

Important: You can replace a PSU without powering off the expansion enclosure. However, to maintain operating temperature, replace the PSU within 10 minutes of its removal. When a PSU is removed, the reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

This task assumes that the following conditions are met:

- You removed the PSU, following the procedure described in “Removing a power supply: 2076-92F ” on page 88.
- You removed the fascia that covers the PSU from the front of the expansion enclosure, as described in “Removing the fascia: 2076-92F ” on page 73.
- You are aware of the procedures for handling static-sensitive devices.

Procedure

1. Read all safety information.
2. Rotate the handles on the PSU outward, as shown in Figure 81 on page 71.

Figure 81. Preparing to install the power supply

3. Slide the PSU forward into the chassis until it clicks in to place, as shown in Figure 82 on page 72.

Figure 82. Install the power supply

4. Close the handles on the PSU and ensure the handle lock clicks in to place.
5. Verify that the AC input and the DC power indicators are lit on the front of the PSU, as shown in Figure 83 on page 72.

Figure 83. Power supply indicators

For more information about the power supply indicators, see “ Storwize V7000 2076-92F expansion enclosure LEDs and indicators” on page 115.

Removing the fascia: 2076-92F

To complete some service tasks, you can remove each component of the fascia from the front of a 2076-92F expansion enclosure.

About this task

The expansion enclosure has a 4U front fascia that covers the display panel and a 1U fascia that covers the power supply units (PSUs). As Figure 84 on page 73 shows, the fascias are independent; you can remove or replace one without having to remove or replace the other.

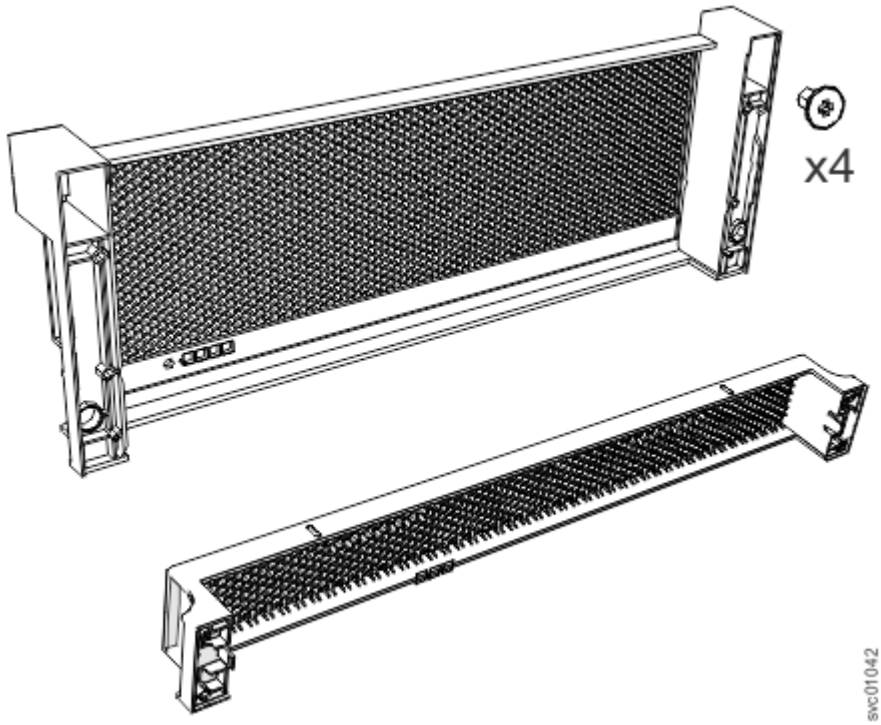


Figure 84. Fascia components on the expansion enclosure

Procedure

1. Use the slide rails to pull the enclosure out of the rack, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82.

   Ensure that a mechanical lift is available to support the weight of the enclosure.

Remove the front (4U) fascia

2. Remove the front fascia by removing the two screws that attach the fascia to the flange on each side of the chassis, as shown in Figure 85 on page 74.

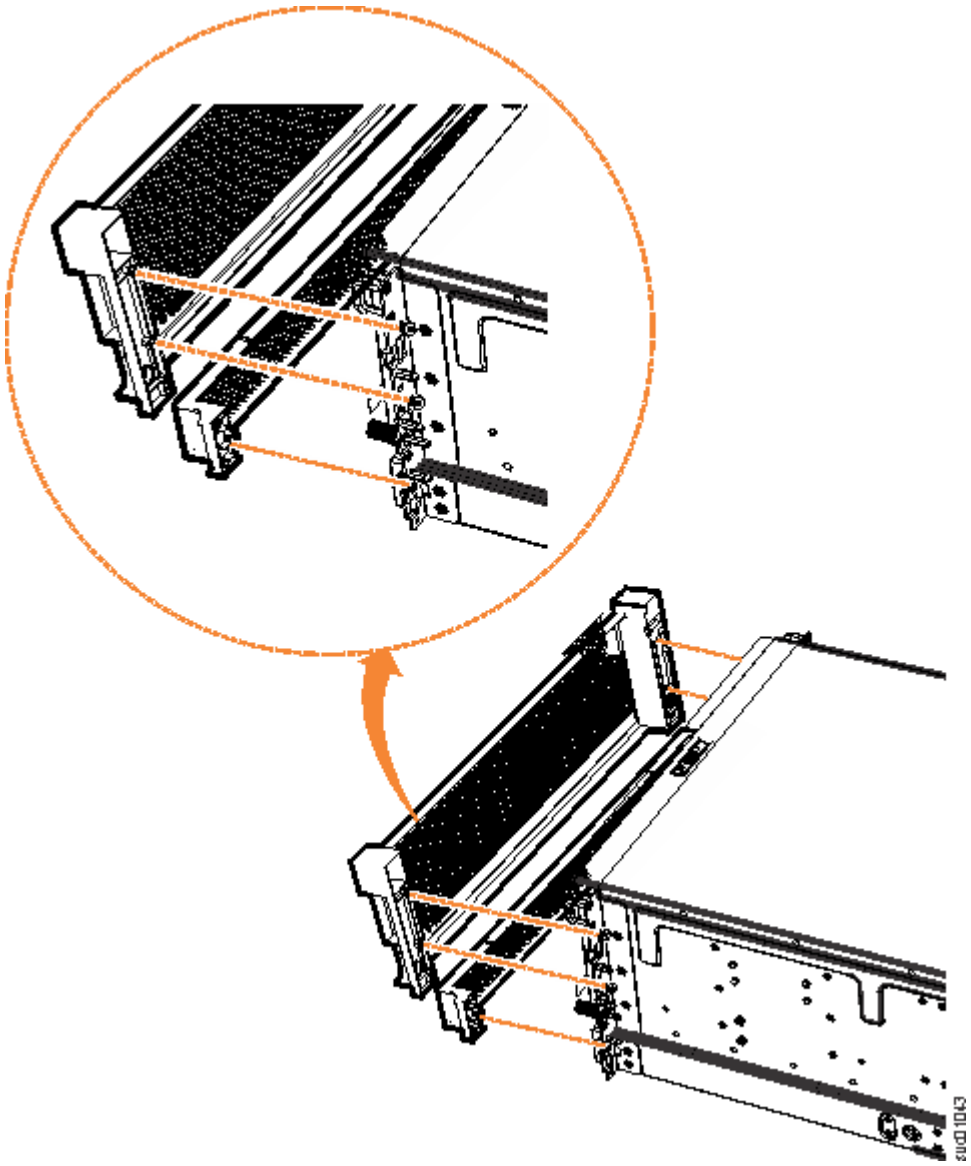


Figure 85. Remove fascia components from the expansion enclosure

Remove the bottom (1U) fascia

3. Gently pull on each side of the PSU fascia to remove it from the chassis, as shown in Figure 85 on page 74. The PSU fascia disengages from the slot and pin that connect it to each side of the chassis.

   You must remove the bottom fascia to access and service either PSU. However, as Figure 86 on page 75 shows, you do not have to remove the front fascia.

Figure 86. Fascia removed from the PSUs

Replace the fascia

4. To reinstall the front or PSU fascia, or replace them with parts from FRU stock, follow the procedure in “Installing or replacing the fascia: 2076-92F ” on page 69.

Removing and installing a SAS cable: 2076-92F

Use the following procedures to attach SAS cables to the 2076-92F enclosure during the initial installation process. You can also use this procedure to remove a faulty SAS cable and replace it with a new one received from FRU stock.

About this task

Be careful when you are replacing the hardware components that are located in the back of the system. Do not inadvertently disturb or remove any cables that you are not instructed to remove.

If you replace more than one cable, record which two ports, canisters, and enclosures each cable connects, so you can match the connections with the replacement cables. The system cannot operate if the SAS cabling to the expansion enclosure is incorrect.

When the 2076-92F expansion enclosure is installed in the rack, the expansion canisters are upside down. The input cable connects to the right port (port 1) on the expansion canister. The output cable connects to the left port (port 2) on the canister.

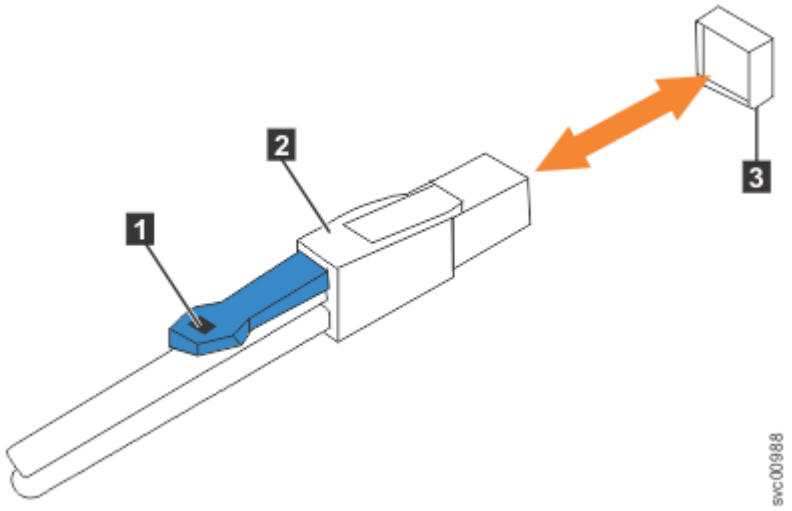
Procedure

Removing a SAS cable

1. Locate the connector at the end of the SAS cable that is to be removed from the expansion enclosure.
2. Grasp the connector by its blue tag. Pull the tag.
3. Release the connector and slide it out of the SAS port.
4. Repeat steps “2” on page 75 and “3” on page 75 on the other end of the SAS cable.

Replacing a SAS cable

5. Ensure that the SAS connector is oriented correctly, as shown in Figure 87 on page 76. The blue tab must face towards the top of the enclosure canister.



1 Blue pull tab
2 SAS cable
3 SAS port

Figure 87. Correct orientation for SAS cable connectors

6. Insert the SAS cable into the SAS port until you hear or feel a click. When the cable is successfully inserted, you cannot disconnect the cable without pulling on the blue tag.

Connecting to a Storwize V7000 node

7. Connect the SAS cable to the SAS port with blue tab **above** the connector (that is, facing towards the top of the node).

   You hear or feel a click when the cable is successfully inserted. You cannot disconnect the cable without pulling on the blue tag.

8. Route the SAS cables through the cable management arms, as shown in Figure 88 on page 77.

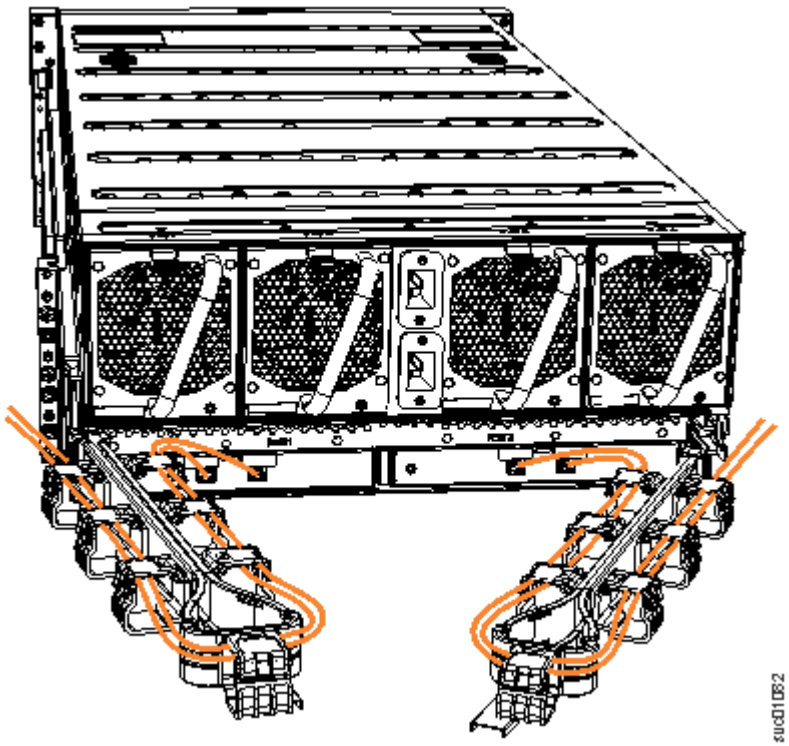


Figure 88. Example of SAS cables routed through the cable management arms

9. When both ends of a SAS cable are correctly connected, the green link-LED next to the connected SAS ports are lit.

   For example, Figure 89 on page 77 shows the LEDs of expansion canister 1 on a 2076-92F expansion enclosure. The SAS cable is successfully inserted in to port 1 (input); port 2 (output) does not contain a SAS cable.

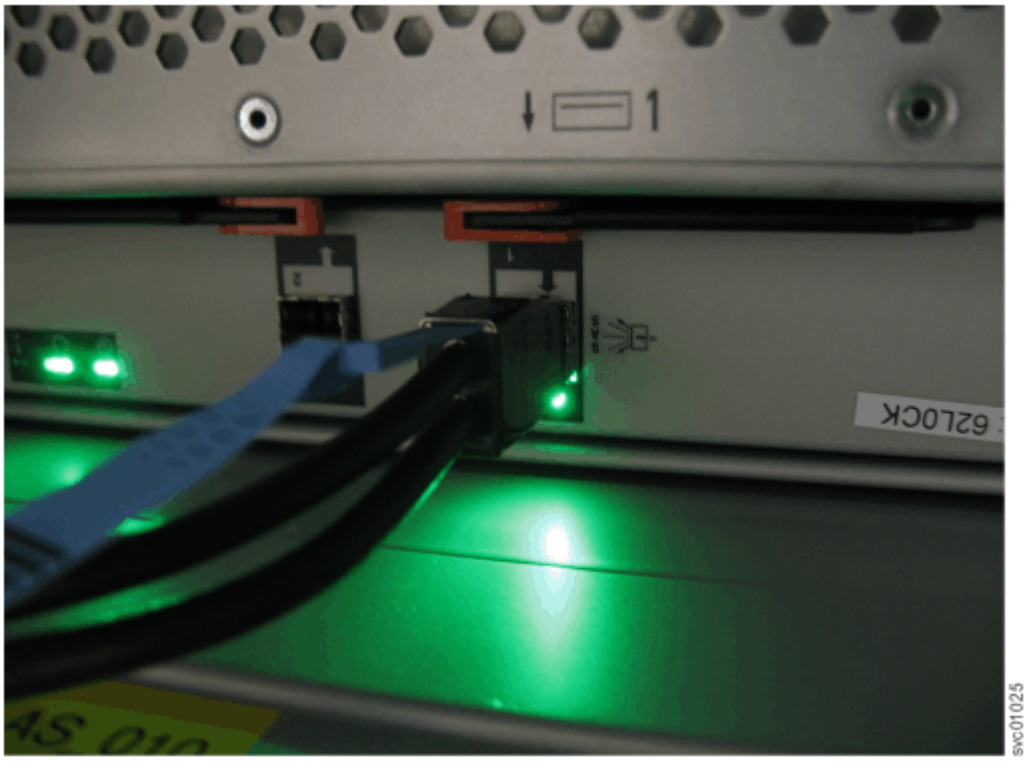


Figure 89. SAS cable correctly inserted into the SAS port

Installing or replacing a fan module: 2076-92F

You can reinstall a fan module or replace a faulty fan module in a 2076-92F expansion enclosure.

Before you begin

Important: You can replace a fan module without powering off the expansion enclosure. However, to maintain operating temperature, replace the fan module within 10 minutes of its removal. When a fan module is removed, the reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

The expansion enclosure might or might not be powered on, depending on the number of fan modules that need to be replaced. For example, the expansion enclosure must be powered off if all four fan modules are removed.

This task assumes that the following condition was met:

- You removed a fan module, following the process described in “Removing a fan module: 2076-92F ” on page 97.

Procedure

1. Hold the fan module with the release tab on top and the connector pin on the bottom, as shown in Figure 90 on page 78.

Figure 90. Fan module orientation

2. Carefully insert the fan module into the chassis until it clicks in place, as shown in Figure 91 on page 79.

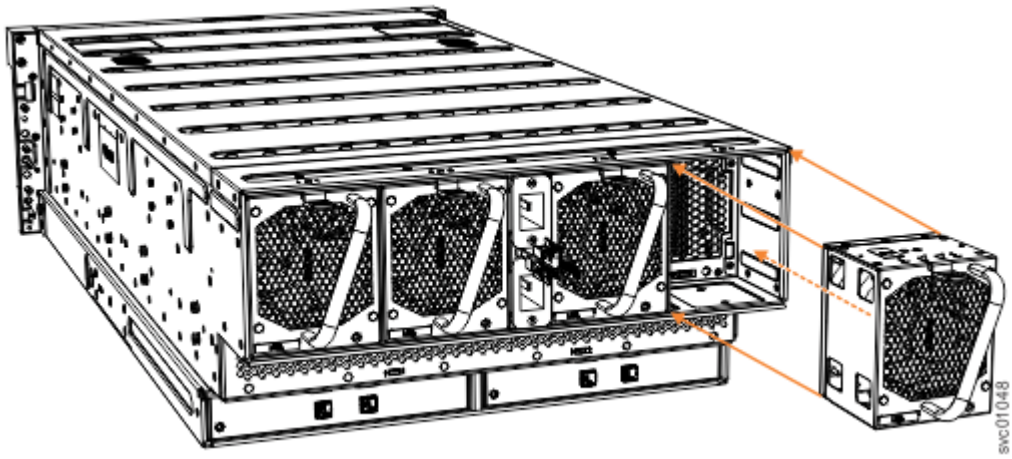


Figure 91. Replace fan module

Replacing all fan modules

3. Repeat steps “1” on page 78 and “2” on page 78 for each fan module to be replaced.
4. Power on the expansion enclosure.

Installing or replacing a fan interface board: 2076-92F

You can replace a fan interface board (FIB) in a 2076-92F expansion enclosure.

Before you begin

This task assumes that the following conditions are met:

- You removed the fan interface board, following the process described in “Removing a fan interface board: 2076-92F ” on page 99.
- All power cables were removed from the enclosure, as described in “Powering off the expansion enclosure: 2076-92F ” on page 114.
- The expansion enclosure is removed from the rack, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82.
- A lift is supporting the weight of the enclosure.
- The top cover, fans, drives, and other heavy FRUs are removed from the enclosure.

About this task

The 2076-92F expansion enclosure contains two fan interface boards (FIBs). The FIBs act as the interface between the fans and the system drive board. FIB 1 connects fan modules 1 and 2 to the drive board; FIB 2 connects fan modules 3 and 4. If the fault LED on each fan module is lit, it is possible that the FIB that controls those modules needs to be replaced. You can also issue the **`lsenclosurefanmodule`** command to display the status of the fans.

If you removed the FIBs from a faulty expansion enclosure, you must reinstall them in the replacement enclosure. Refer to the procedure described in “Replacing an enclosure: 2076-92F ” on page 102.

Procedure

1. Assemble the new FIB, cover, and the cover screws (shown in Figure 92 on page 80) in a safe location.

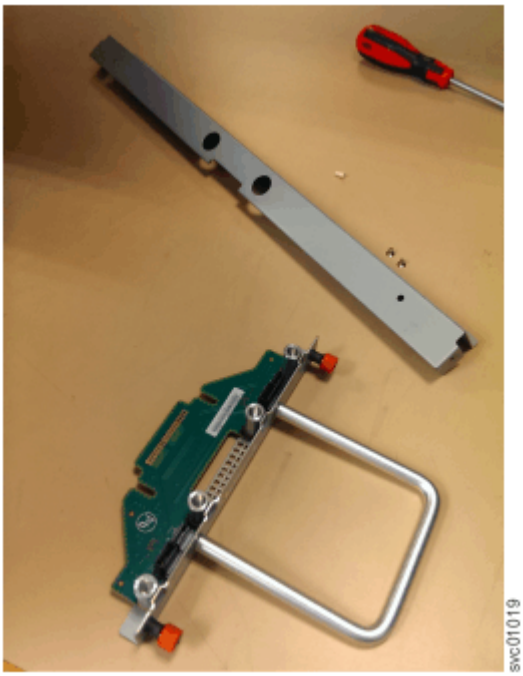


Figure 92. FIB parts for the chassis

2. Carefully insert the new FIB into the expansion enclosure chassis, as shown in Figure 93 on page 80.

Figure 93. Insert the new FIB in the chassis

3. Use a cross head screwdriver to tighten the retaining screws that secure the FIB to the drive board, as shown in Figure 94 on page 81.

Figure 94. Secure the FIB to the drive board

4. If needed, repeat steps “2” on page 80 and “3” on page 80 to replace the other FIB.
5. Replace the narrow metal cover, which is shown in Figure 95 on page 81, over the FIB assemblies. The attachment screws are on each side of the chassis.

Figure 95. Replace the FIB cover

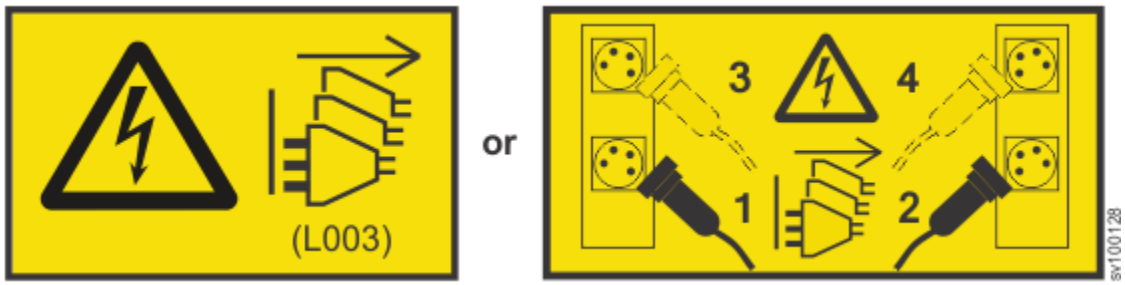
6. Place the enclosure back in the rack, as described in “Installing or replacing an expansion enclosure in a rack: 2076-92F ” on page 50
7. Replace each of the fan modules. Follow the procedure that is described in “Installing or replacing a fan module: 2076-92F ” on page 78.
8. Replace the drives, secondary expander modules, and other heavy FRUs that were removed before the enclosure was removed from the rack.
9. Replace the top cover, as described in “Installing or replacing the top cover: 2076-92F ” on page 61.
10. Reconnect power to the enclosure, as described in “Powering on the 5U expansion enclosure: 2076-92F ” on page 111.

Removing an expansion enclosure from a rack: 2076-92F

You might need to slide the 2076-92F expansion enclosure out of the rack to apply service. For some tasks, you might need to completely remove the expansion enclosure from the rack.

Before you begin

DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)



Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM Storwize V7000 Safety Notices*.

DANGER:

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**

- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)**

CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- (For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- (For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

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)

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)

DANGER: DANGER: Serious injury or death can occur if loaded lift tool falls over or if a heavy load falls off the lift tool. Always completely lower the lift tool load plate and properly secure the load on the lift tool before moving or using the lift tool to lift or move an object. (D010)

CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C011)

CAUTION: To avoid personal injury, before lifting this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)

CAUTION: CAUTION regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers). Read and completely understand the contents of LIFT TOOL operator's manual before using.
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's website.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads. (C048, part 1 of 2)

- **Do not operate while under the influence of drugs or alcohol.**
- **Do not support ladder against LIFT TOOL.**
- **Tipping hazard. Do not push or lean against load with raised platform.**
- **Do not use as a personnel lifting platform or step. No riders.**
- **Do not stand on any part of lift. Not a step.**
- **Do not climb on mast.**
- **Do not operate a damaged or malfunctioning LIFT TOOL machine.**
- **Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.**
- **No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.**
- **Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.**
- **Do not leave LIFT TOOL machine unattended with an elevated load.**
- **Watch and keep hands, fingers, and clothing clear when equipment is in motion.**
- **Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.**
- **A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048, part 2 of 2)**

About this task

To complete some service tasks, you might need to slide the enclosure out of the rack to gain access to parts. For these tasks, you do not have to completely remove the enclosure from the rack. However, in limited circumstances, you must remove the enclosure out of the rack.

Important:

The 2076-92F expansion enclosure is heavy. Always use a suitably rated mechanical lift or four persons to support the weight of the enclosure whenever you slide the enclosure out from the rack or remove it completely.

In addition to using a mechanical lift, always complete the following tasks before you attempt to remove the expansion enclosure from the rack:

- Remove both power cables from the expansion enclosure.
- Remove all of the following parts:
  - Cover
  - Drives
  - Fan modules
  - Power supply units and 1U fascia
  - Secondary expansion modules
  - Expansion canisters and SAS cables

  When the enclosure is not secured to the rails in a rack, you can minimize the risk of injury and make maneuvering the enclosure on a lift easier. However, even after you remove the drives, power supply units, secondary expander modules, canisters, fans, and cover, the enclosure weighs 43 kg (95 lbs).

Procedure

Sliding the expansion enclosure out of the rack

Note: You can accomplish most service actions when the expansion enclosure is fully extended from the rack on its slide rails.

1. Loosen the locking thumb screws (1) on the front of the enclosure, as shown in Figure 96 on page 87.

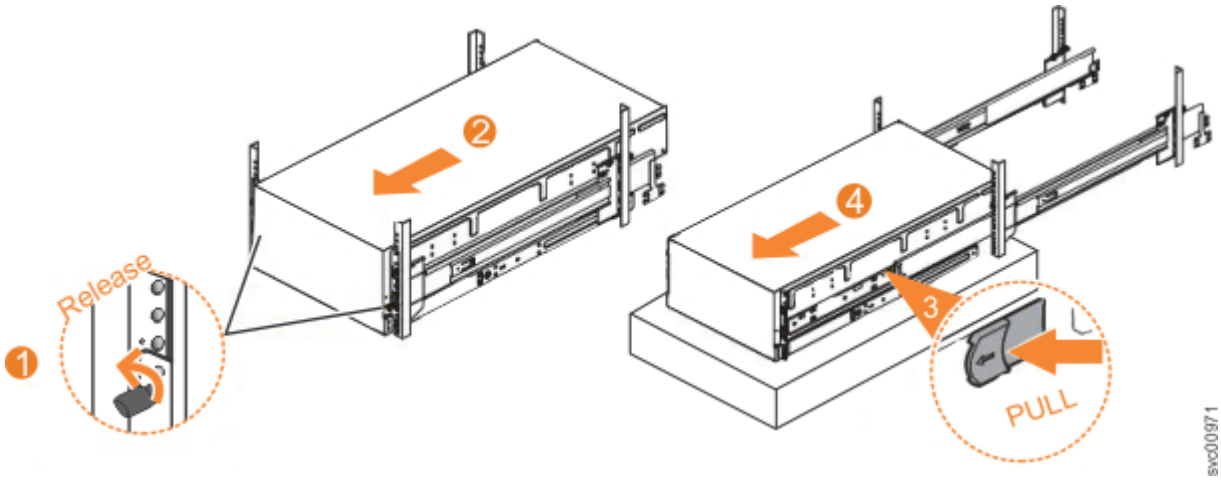


Figure 96. Removing the 2076-92F enclosure from the rack

2. Carefully slide the enclosure forward out of the rack (2), as shown in Figure 96 on page 87.
3. Locate the left and right blue release tabs near the front of the enclosure. Pull both release tabs forward to unlock the drawer mechanism (3 in Figure 96 on page 87).
4. Slide the enclosure and inner rail member out of the rack (4 in Figure 96 on page 87).

   For safety, ensure that a mechanical lift or other mechanism is available to support the weight of the enclosure.

Removing the expansion enclosure from the rack

Note: Continue the procedure (step "5" on page 87 through step "7" on page 87) only if you must completely remove the expansion enclosure from the rack to complete a service procedure.

5. Power down the expansion enclosure and disconnect all power cords.
6. Remove all of the following parts from the enclosure, as described in the following procedures:
   - "Removing the top cover: 2076-92F " on page 45
   - "Removing the fascia: 2076-92F " on page 73 (for the PSU fascia) and "Removing a power supply: 2076-92F " on page 88
   - "Removing a drive: 2076-92F " on page 89
   - "Removing a secondary expander module: 2076-92F " on page 92
   - "Removing an expansion canister: 2076-92F " on page 95 and "Removing and installing a SAS cable: 2076-92F " on page 75
   - "Removing a fan module: 2076-92F " on page 97
7. With the help of multiple persons or a mechanical lift, lift and remove the enclosure from the rack.

Replace the enclosure in the rack

8. To reinstall or return the expansion enclosure in the rack, follow the procedure in "Installing or replacing an expansion enclosure in a rack: 2076-92F " on page 50.

Removing a power supply: 2076-92F

You can remove either of the redundant power supply units in a 2076-92F expansion enclosure. Redundant power supplies operate in parallel; one continues to provide power to the enclosure if the other fails.

Before you begin

Important: You can remove a PSU without powering off the expansion enclosure. However, to maintain operating temperature, ensure that you perform the following tasks.

- Do not remove a faulty PSU until its replacement is ready to be installed.
- Do not remove a PSU from an operational enclosure for more than approximately 10 minutes. The reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

Each PSU provides cooling to the lower part of the enclosure. Ensure that the second PSU in the enclosure is powered on and operating correctly. For example, in Figure 97 on page 88, PSU 1 is operating while PSU 2 is being removed.

Review and follow the procedures for handling static-sensitive devices before you remove the power supply unit (PSU).

Procedure

1. Read all safety information.
2. Remove the 1U fascia that covers the PSUs on the front of the expansion enclosure, as described in “Removing the fascia: 2076-92F ” on page 73.
3. Press on the handle lock to release the handles on the PSU.
4. Rotate the handles outward, as shown in Figure 97 on page 88.

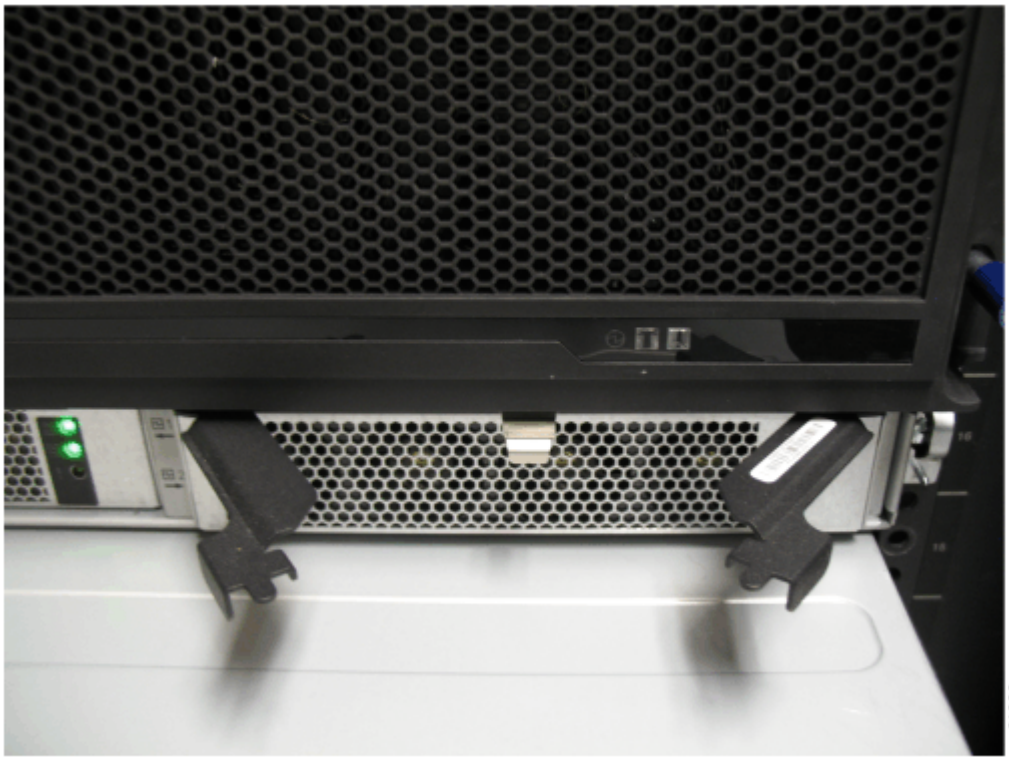


Figure 97. Releasing the power supply handles

5. Carefully pull the PSU out of the expansion enclosure chassis and place it in a safe location, as shown in Figure 98 on page 89.

Figure 98. Removed power supply

6. If you are instructed to return the power supply, follow all packaging instructions. Use any packaging materials for shipping that are supplied to you.

Replace the power supply

7. To reinstall the PSU, or replace it with one from FRU stock, follow the procedure in “Installing or replacing a power supply: 2076-92F ” on page 70.

Removing a drive: 2076-92F

You can remove a faulty drive from a 2076-92F expansion enclosure to replace it with a new one received from FRU stock.

Before you begin

Ensure that the drive is not a spare or a member of an array. The drive status is shown in **Pools** > **Internal Storage** in the management GUI. If the drive is a member of an array, follow the fix procedures in the management GUI. The fix procedures minimize the risk of losing data or access to data; the procedures also manage the system's use of the drive.

Important: You can remove a drive assembly without powering off the expansion enclosure. However, to maintain operating temperature, complete the following tasks.

- Do not remove a faulty drive assembly until its replacement is ready to be installed.
- Do not keep the cover off an operational enclosure for more than 15 minutes. The reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

The 2076-92F expansion enclosure supports 92 drives. Figure 99 on page 90 shows an example of a drive assembly.

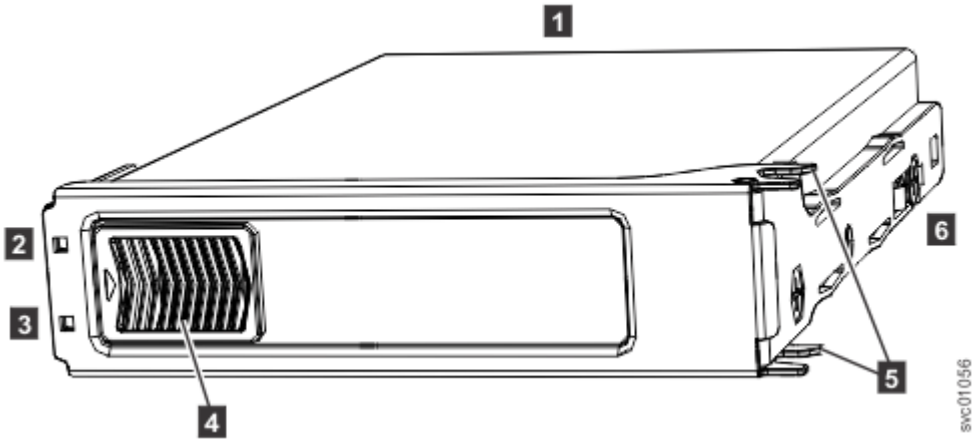


Figure 99. Drive assembly

1 Disk drive
2 Online indicator
3 Fault indicator
4 Release latch
5 Drive latch toes
6 Drive carrier

Procedure

1. Read all available safety information.
2. Use the slide rails to pull the enclosure out from the rack, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82.
3. Remove the top cover, as described in “Removing the top cover: 2076-92F ” on page 45.
4. Locate the slot that contains the drive assembly that you want to remove.

   Note: When a drive is faulty, the amber fault indicator is lit (3 in Figure 99 on page 90). Do not replace a drive unless the drive fault indicator is on or you are instructed to do so by a fix procedure. When lit, the green indicator shows that activity is occurring on the drive.

   A label on the enclosure cover (Figure 100 on page 91) shows the location of the drive slots. The drive slots are numbered 1-14 from left to right and A-G from the back to the front of the enclosure.

   The drive locations are also marked on the enclosure itself. The rows (A-G) are marked on the left and right edges of the enclosure. The columns (1-14) are marked on the front edge of the enclosure. The row and column marks are visible when the top cover is removed.

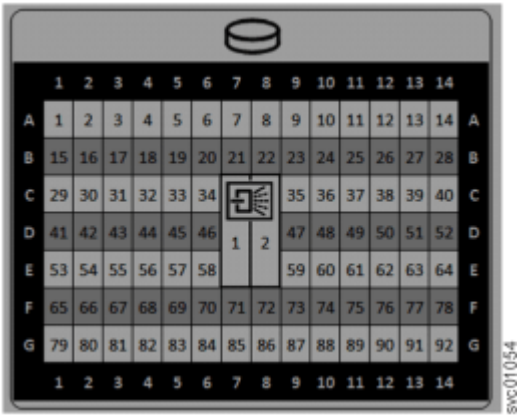


Figure 100. Drive locations in a 2076-92F expansion enclosure

5. Slide the release latch forward (**1**), as shown in Figure 101 on page 91.

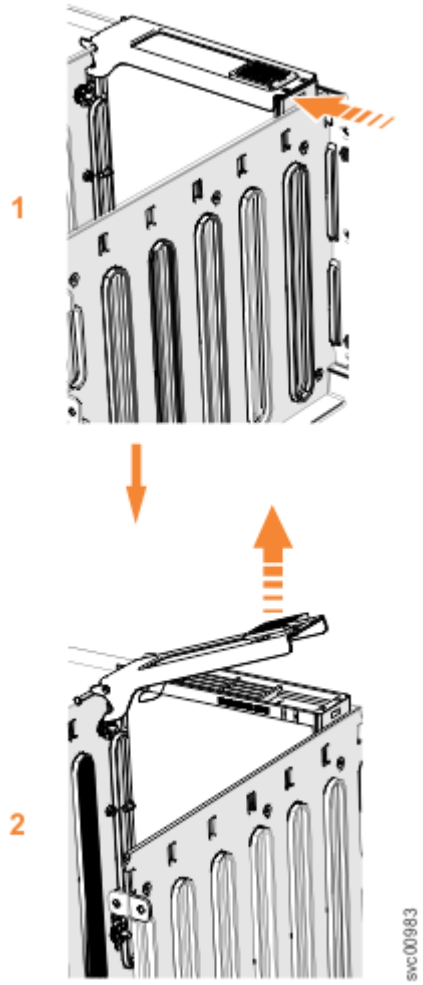


Figure 101. Remove the drive assembly

6. Lift the handle (**2**) to unlock the drive carrier from the partition, as shown in Figure 101 on page 91. Ensure the toe on the bottom of the latch is fully disengaged.
7. Carefully lift the drive carrier up to remove it from the expansion enclosure.
8. Repeat step "4" on page 90 through step "7" on page 91 for each drive you need to remove.

Replace the drive

9. To reinstall a drive, or replace it with one from FRU stock, follow the procedure in “Installing or replacing a drive: 2076-92F ” on page 62.

Removing a secondary expander module: 2076-92F

You can remove a secondary expander module from a 2076-92F expansion enclosure if it is faulty or to perform other service tasks.

Before you begin

DANGER:

Hazardous voltage present. Voltages present constitute a shock hazard, which can cause severe injury or death. (L004)

CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both. (L005)

CAUTION:

- Only an IBM Service Support Representative (SSR) can remove or replace the secondary expander module from an enclosure (FRU P/N 01LJ112) that is powered on. If the 01LJ112 enclosure is powered on, use caution and avoid contact with the connectors on the main board.
- If the FRU part number of the enclosure is 01LJ607, you can remove or replace the secondary expander module while the enclosure is powered on.

Important: You can remove a secondary expander module without powering off the expansion enclosure. However, to maintain operating temperature, perform the following tasks.

- Do not remove a faulty secondary expander module until its replacement is ready to be installed.
- Do not keep the cover off an operational enclosure for more than 15 minutes. The reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

The secondary expander modules provide SAS connectivity between the expansion canisters and the drives. Each drive has 2 SAS ports. SAS port 1 of each drive is connected to secondary expander module 1. SAS port 2 of each drive is connected to secondary expander module 2. Each expansion canister is connected to both secondary expander module 1 and secondary expander module 2. If secondary expander module 2 is missing or is faulty, the expansion canisters can communicate only with SAS port 1 on each drive. Similarly, if secondary expander module 1 is missing or is faulty, the expansion canisters can communicate only with SAS port 2 on each drive.

The two secondary expansion modules are already installed when the 2076-92F expansion enclosure is shipped, as Figure 102 on page 93 shows.

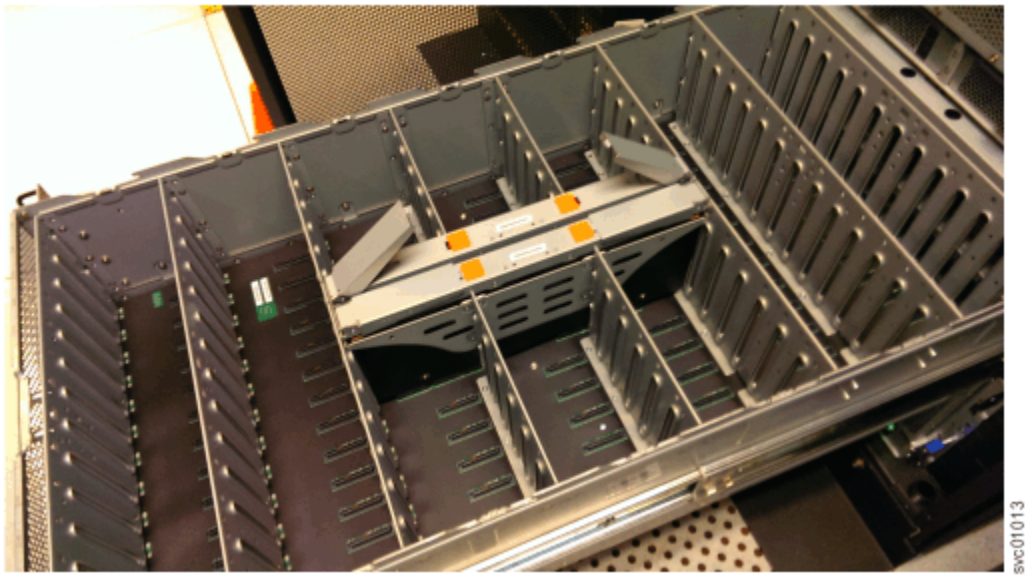


Figure 102. Location of secondary expander modules

Figure 103 on page 93 shows the location of the LED indicators on the top of the secondary expander module. Each secondary expander module has its own set of LEDs. When power is connected to the expansion enclosure, the LEDs identify the operational status of the secondary expander modules.

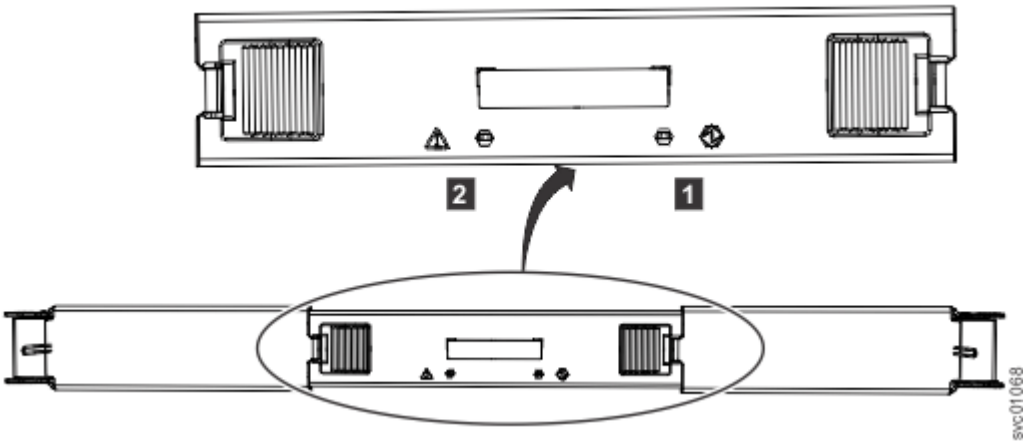


Figure 103. Location of LEDs on the secondary expander module

Table 13 on page 93 describes the function and status values of each LED indicator.

Table 13. LEDs on the secondary expander modules

LED	Color	Status	Description
Power 1	Green	On	The secondary expander module is receiving power.
		Off	The secondary expander module is not receiving power.

Table 13. LEDs on the secondary expander modules (continued)			
LED	**Color**	**Status**	**Description**
Fault 2	Amber	On	Not used.
		Blink	The secondary expander module is being identified.
		Off	Normal operation.

This task assumes that the following conditions were met:

- The expansion enclosure is slid out from the rack, as described in "Removing an expansion enclosure from a rack: 2076-92F " on page 82.
- The top cover was removed, as described in "Removing the top cover: 2076-92F " on page 45.

Procedure

1. Identify the secondary expander module to be replaced; refer to Table 13 on page 93.
2. Press the release buttons on top of the secondary expander module to release the handles.
3. Rotate the handles outward to the unlocked position.
4. Lift the secondary expander module carefully out of the enclosure, as shown in Figure 104 on page 94.

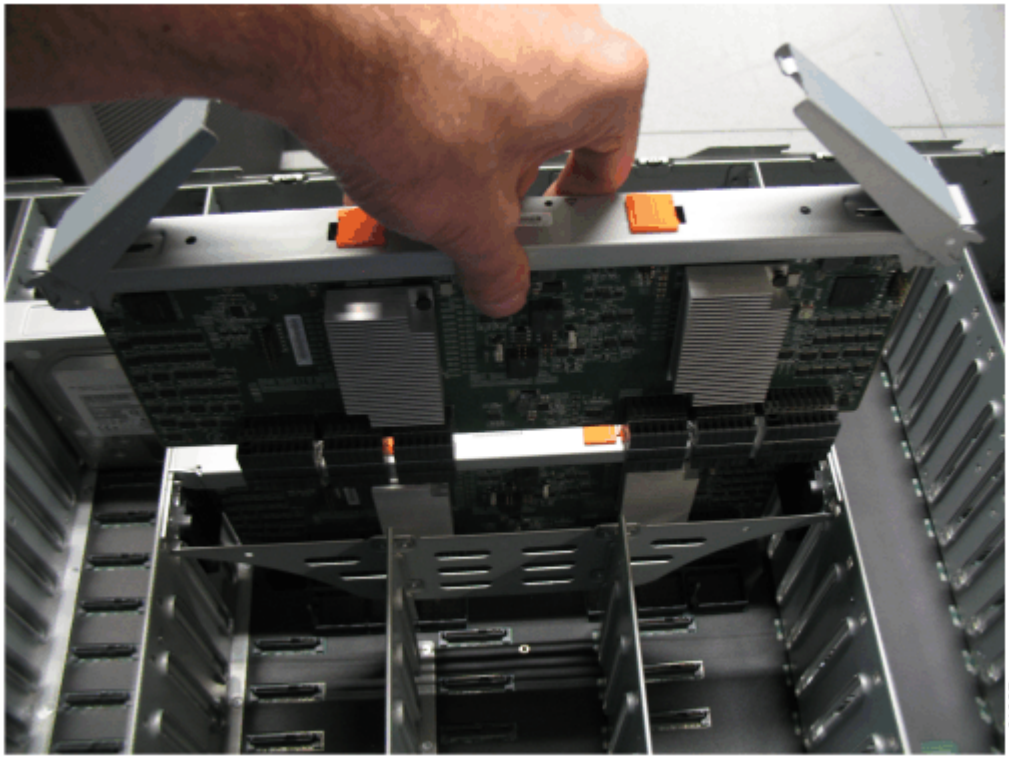


Figure 104. Remove the secondary expander module

Important: To avoid electric shock after you remove the secondary expander module, do not touch the connectors inside the enclosure (FRU P/N 01LJ112), which are shown in Figure 105 on page 95.

Figure 105. Secondary expander module connectors

5. Place the secondary expander module in a safe location, as shown in Figure 106 on page 95.

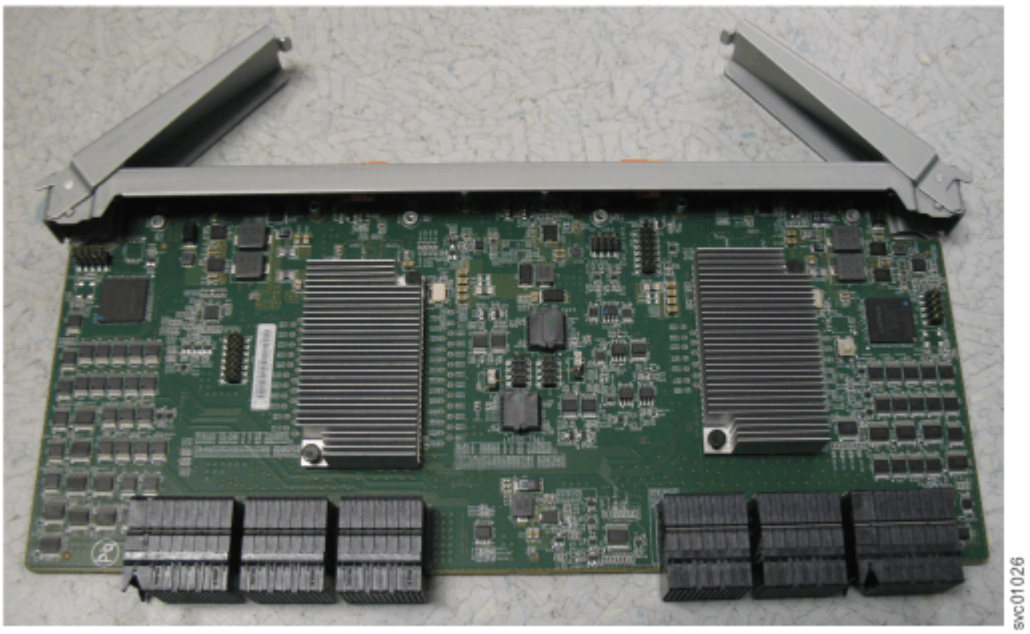


Figure 106. Secondary expander module removed from the enclosure

6. If needed, repeat step “2” on page 94 through step “5” on page 95 to remove the other secondary expander module.

Replace the secondary expansion module

7. To reinstall the secondary expansion module, or replace it with one from FRU stock, follow the procedure in “Installing or replacing a secondary expander module: 2076-92F ” on page 66.

Removing an expansion canister: 2076-92F

You can remove the expansion canisters in a 2076-92F expansion enclosure.

Before you begin

Important: You can remove an expansion canister without powering off the expansion enclosure. However, to maintain operating temperature, perform the following tasks.

- Do not remove a faulty expansion canister until its replacement is ready to be installed.
- Do not remove an expansion canister from an operational enclosure for more than approximately 10 minutes. The reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

An expansion canister provides SAS connectivity between the 2076-92F expansion enclosure and Storwize V7000 system. If either of the two expansion canisters has a failure, the other expansion canister assumes the full I/O load. Figure 107 on page 96 shows the features of an expansion enclosure.

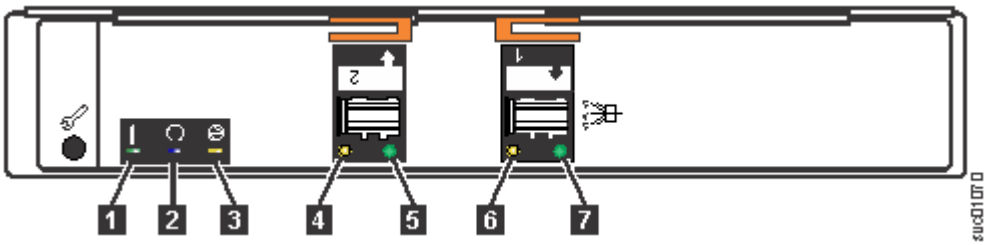


Figure 107. Expansion canister

1 Canister fault indicator
2 Canister status
3 Canister power indicator
4 and 6 SAS link fault indicators
5 and 7 SAS link operational indicators
8 Canister release handles

Procedure

1. Read all safety information.
2. Locate the expansion canister to be removed.
3. Release the lower cable management arm to swing it out of the way, as described in “Moving the cable management arms” on page 55.
4. Remove the SAS cables from the expansion canister, as described in “Removing and installing a SAS cable: 2076-92F ” on page 75.
5. Rotate the handles on the expansion canister outward, as shown in Figure 108 on page 97.

Figure 108. Removing the expansion canister

6. Carefully pull the expansion canister out of the chassis and place it on a safe, level surface.

Replace the expansion canister

7. To reinstall an expansion canister, or replace it with one from FRU stock, follow the procedure in "Installing or replacing an expansion canister: 2076-92F " on page 51.

Removing a fan module: 2076-92F

You can remove a faulty fan module from a 2076-92F expansion enclosure.

Before you begin

Important: You can remove a fan module without powering off the expansion enclosure. However, to maintain operating temperature, do not remove more than one fan module at a time.

- Remove a faulty fan module only when its replacement is ready to be installed.
- Do not remove a fan module from an operational enclosure for more than approximately 10 minutes. The reduction in airflow through the enclosure might cause the enclosure or its components to shut down to protect from overheating.

About this task

Note: If you plan to remove the expansion enclosure from the rack, you must remove all of the fan modules.

Procedure

1. Identify the fan module to be replaced. When lit, the amber LED on the front of the fan module (1 in Figure 109 on page 98) identifies a fault.

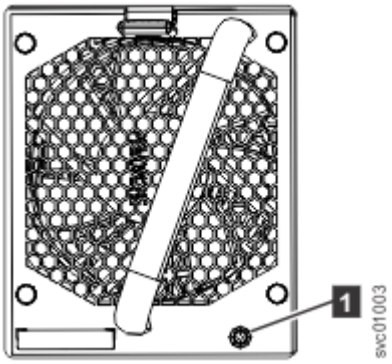


Figure 109. Fan module LED

You can also issue the **lsenclosurefanmodule** command to display the status of the fan modules.

2. Press the release tab on the fan module, as Figure 110 on page 98 shows.

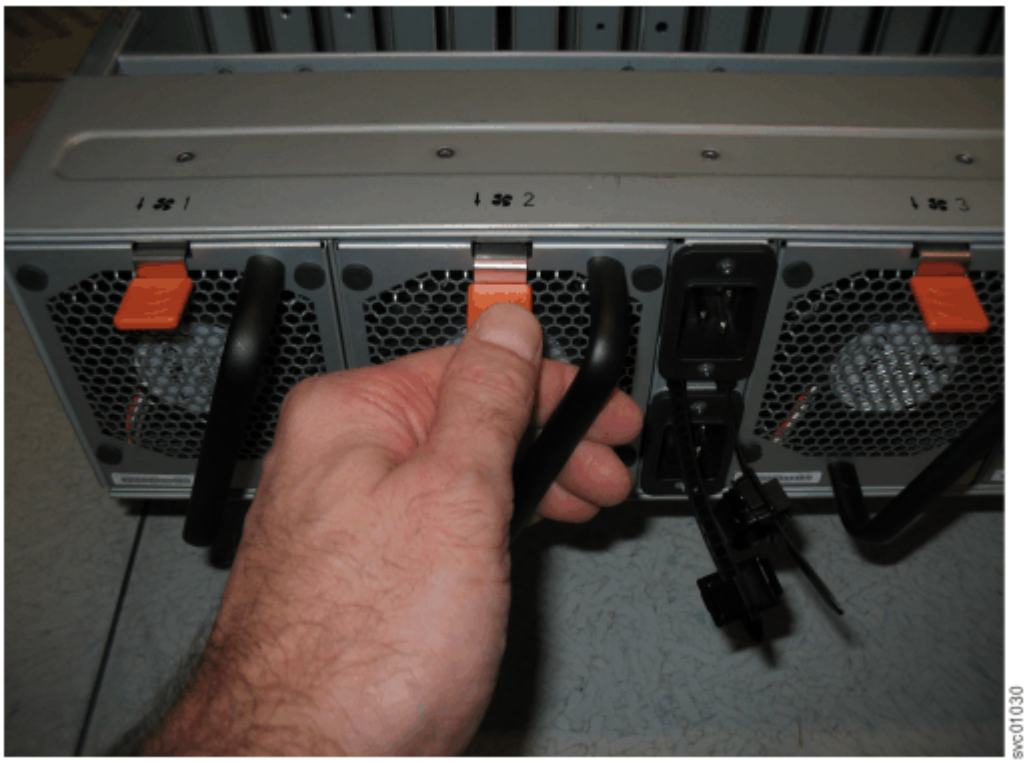


Figure 110. Fan module release tab

3. Use the handle to pull the fan module out of the expansion enclosure chassis, as shown in Figure 111 on page 99.

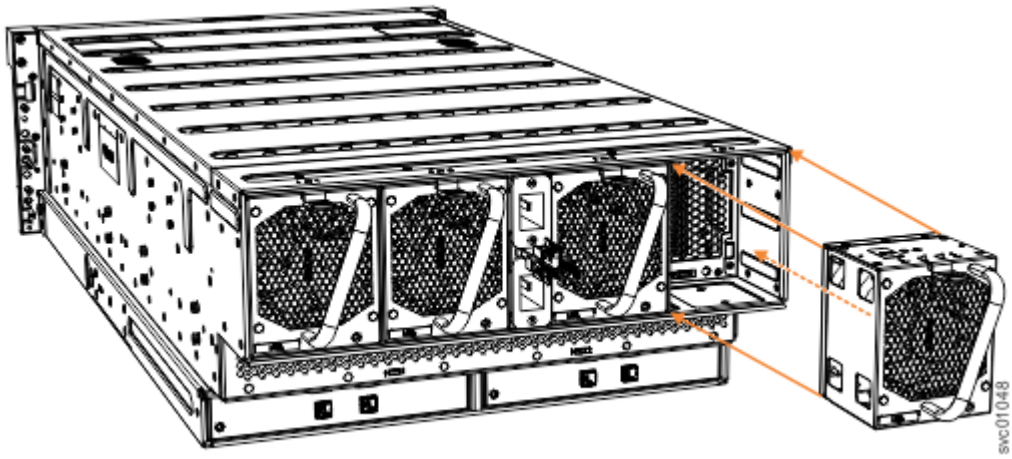


Figure 111. Remove fan module

4. Repeat steps “2” on page 98 and “3” on page 98 for each additional fan module you need to remove.

Replace a fan module

5. To reinstall a fan module, or replace it with one from FRU stock, follow the procedure in “Installing or replacing a fan module: 2076-92F ” on page 78.

Removing a fan interface board: 2076-92F

You can remove a fan interface board (FIB) from a 2076-92F expansion enclosure.

Before you begin

This task assumes that the following conditions were met:

- All power cables were removed from the enclosure, as described in “Powering off the expansion enclosure: 2076-92F ” on page 114.
- The top cover, fan modules, and the other heavy FRUs (drives, secondary expander modules) were removed before the enclosure was removed from the rack.
- The expansion enclosure was removed from the rack, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82.

  Ensure that you use a lift to support the weight of the enclosure.

About this task

The 2076-92F expansion enclosure contains two fan interface boards (FIBs). The FIBs act as the interface between the fans and the system drive board. FIB 1 connects fan modules 1 and 2 to the drive board; FIB 2 connects fan modules 3 and 4. If both fan modules controlled by a FIB fail, it is possible that the FIB needs to be replaced.

Important: Because this task is disruptive to the storage system, always attempt fan replacement first. See “Removing a fan module: 2076-92F ” on page 97 and “Installing or replacing a fan module: 2076-92F ” on page 78 for information about the removal and replacement procedures. Ensure that both fans are installed correctly. Perform the following procedure only if the amber fault LED on each fan remains lit (1 in Figure 112 on page 100).

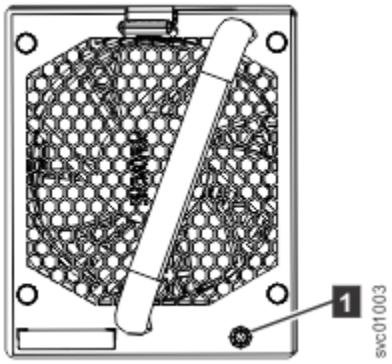


Figure 112. Fan module LED

Procedure

1. Using a cross head screwdriver, remove the narrow metal cover that is over the FIBs, as shown in Figure 113 on page 100. The screws are on each side of the chassis. Place the cover and cover screws in a safe location.

Figure 113. Location of the FIB cover

2. Use a cross head screwdriver to loosen the retaining screws on the FIB, as shown in Figure 114 on page 101.

Figure 114. Loosen the FIB screws

3. Use the handle to pull the FIB out of the expansion enclosure chassis, as shown in Figure 115 on page 101.

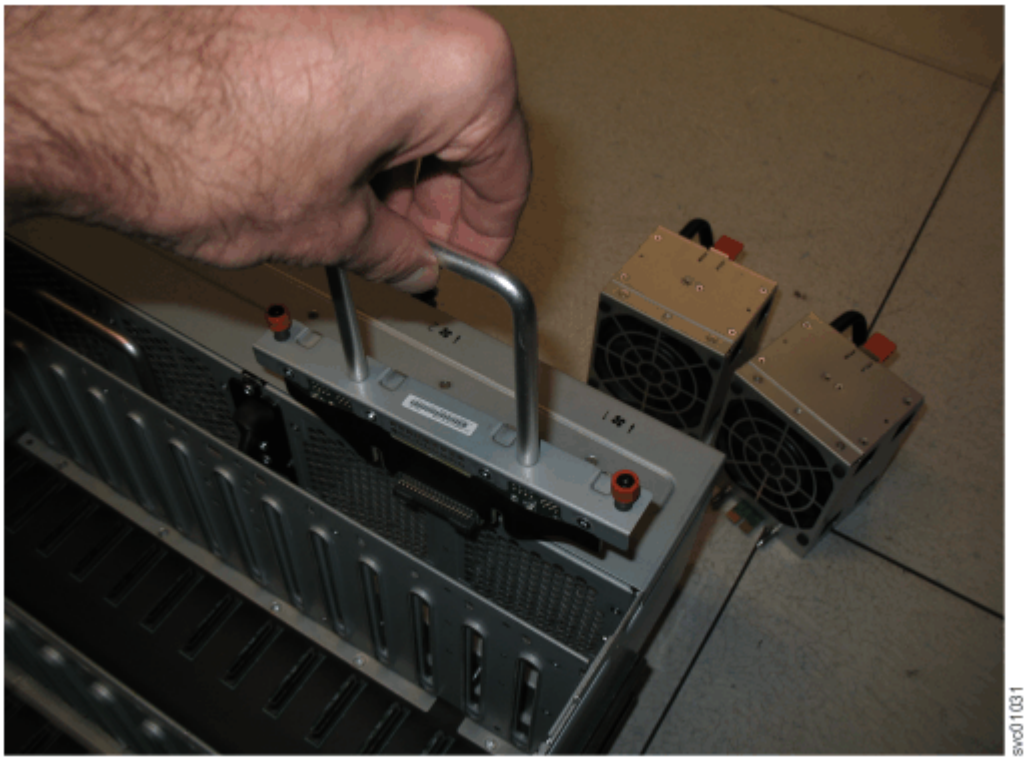


Figure 115. Remove the FIB from the chassis

4. Place the FIB (shown in Figure 116 on page 102) in a safe location.

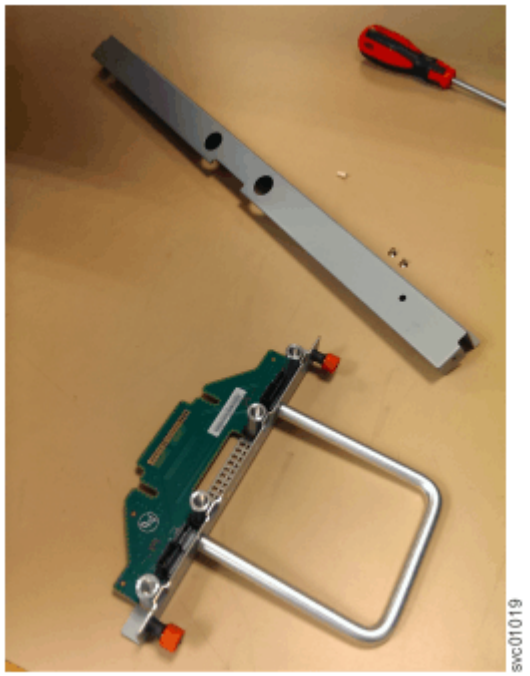


Figure 116. FIB parts removed from the chassis

5. If needed, repeat steps "2" on page 100 through "3" on page 101 to remove the other FIB.

Replace the fan interface board

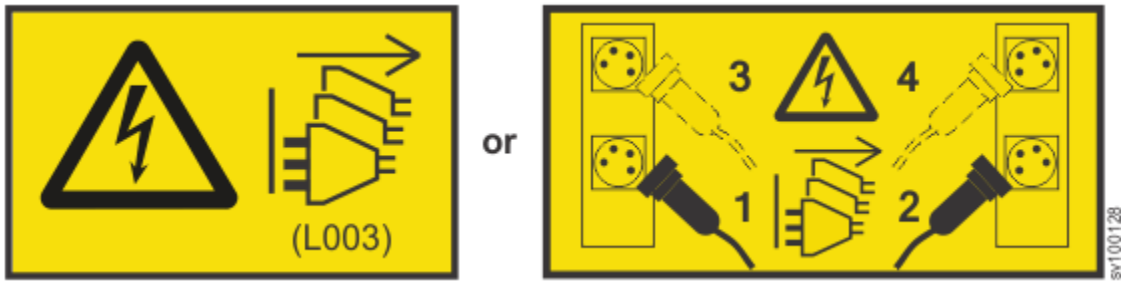
6. To reinstall a fan interface board, or replace it with one from FRU stock, follow the procedure in "Installing or replacing a fan interface board: 2076-92F " on page 79.

Replacing an enclosure: 2076-92F

You can replace a faulty enclosure of a 2076-92F expansion enclosure with a new one from FRU stock.

Before you begin

DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)



CAUTION:

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C011)

CAUTION: To avoid personal injury, before lifting this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)

Notes:

- Perform the following procedure only if directed to do so by IBM Remote Technical support or by a fix procedure in the management GUI.
- An enclosure can have FRU P/N 01LJ112 or FRU P/N 01LJ607. When needed, an enclosure with FRU P/N 01LJ607 is used to replace FRU P/N 01LJ112.

This task assumes that the following conditions are met:

- All power cables were removed from the enclosure, as described in "Powering off the expansion enclosure: 2076-92F " on page 114.
- All SAS cables were removed, as described in "Removing and installing a SAS cable: 2076-92F " on page 75.
- The following FRUs were removed from the enclosure, as described in the applicable tasks:
  - Top cover ("Removing the top cover: 2076-92F " on page 45)
  - Drives ("Removing a drive: 2076-92F " on page 89)
  - PSU (1U) fascia ("Removing the fascia: 2076-92F " on page 73)
  - Power supply units ("Removing a power supply: 2076-92F " on page 88)
  - Secondary expander modules ("Removing a secondary expander module: 2076-92F " on page 92)
  - Expansion canisters ("Removing an expansion canister: 2076-92F " on page 95)
  - Fan modules ("Removing a fan module: 2076-92F " on page 97)
- The expansion enclosure was removed from the rack, as described in "Removing an expansion enclosure from a rack: 2076-92F " on page 82.
- A suitably rated mechanical lift is available to support the weight of the enclosure.

About this task

The expansion enclosure contains the drive board, signal interconnect board, and internal power cables. If a fault with the drive board or the intercanister link is suspected, you can replace the enclosure. However, you can remove the parts from the old expansion enclosure and reinstall them in the replacement enclosure.

Procedure

1. Remove the front display (4U) and PSU (1U) fascia from the old enclosure, as described in "Removing the fascia: 2076-92F " on page 73.
   a) Install the front display (4U) and PSU (1U) fascia on the new enclosure, as described in "Installing or replacing the fascia: 2076-92F " on page 69.
2. Remove the display panel assembly from the old enclosure, as described in "Removing the display panel assembly: 2076-92F " on page 104.
   a) Install the display panel assembly into on the new enclosure, as described in "Installing or replacing the display panel assembly: 2076-92F " on page 106.
3. Remove the fan interface boards from the old enclosure, as described in "Removing a fan interface board: 2076-92F " on page 99.
   a) Install the fan interface boards into on the new enclosure, as described in "Installing or replacing a fan interface board: 2076-92F " on page 79.
4. Remove the inner section of the slide rail from the old enclosure, as described in "Removing the support rails: 2076-92F " on page 108.
5. Attach the inner rail section to the new enclosure, as described in "Installing or replacing the support rails: 2076-92F " on page 26.

6. Replace the new enclosure in rack, as described in “Installing or replacing an expansion enclosure in a rack: 2076-92F ” on page 50.
7. Reinstall the remaining parts into the enclosure, as described in the following topics. You can install the parts in any order.

   Important: Ensure that a mechanical lift is available and in place to support the additional weight as the FRUs are reinstalled in the enclosure.

   - “Installing or replacing a power supply: 2076-92F ” on page 70
   - “Installing or replacing a drive: 2076-92F ” on page 62
   - “Installing or replacing a secondary expander module: 2076-92F ” on page 66
   - “Installing or replacing an expansion canister: 2076-92F ” on page 51
   - “Installing or replacing a fan module: 2076-92F ” on page 78
   - “Installing or replacing the top cover: 2076-92F ” on page 61
8. Reconnect the SAS cables, as described in “Removing and installing a SAS cable: 2076-92F ” on page 75.
9. Reconnect the power cables, as described in “Powering on the 5U expansion enclosure: 2076-92F ” on page 111.
10. Run the next recommended fix procedure in the management GUI to set the serial number of the 2076-92F enclosure.

Removing the display panel assembly: 2076-92F

You can remove the display panel assembly from a 2076-92F expansion enclosure.

Procedure

1. Slide the expansion enclosure out of the rack, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82.
2. Remove the top cover, as described in “Removing the top cover: 2076-92F ” on page 45.
3. Press the release tab at the top of the display panel assembly, as shown in Figure 117 on page 104.

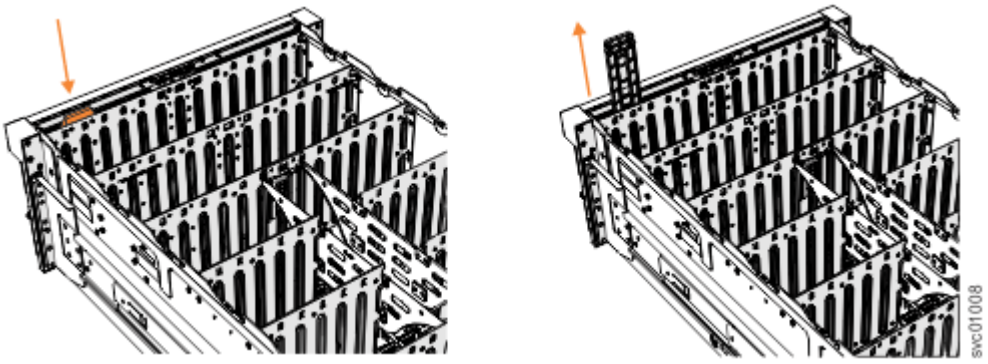


Figure 117. Removing the display panel assembly

4. Carefully pull the display panel assembly, which is shown in Figure 118 on page 105, out of the chassis.

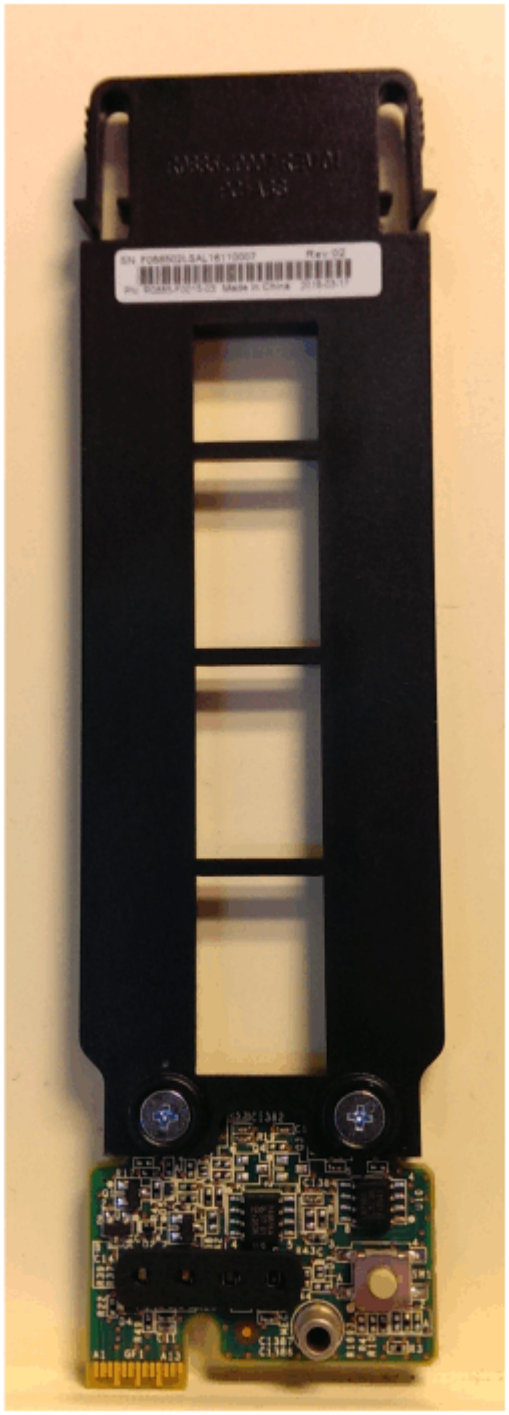


Figure 118. Display panel assembly

Replace the display panel assembly

5. To reinstall the display panel assembly, or replace it with one from FRU stock, follow the procedure in “Installing or replacing the display panel assembly: 2076-92F ” on page 106.

Installing or replacing the display panel assembly: 2076-92F

You can replace the display panel assembly in a 2076-92F expansion enclosure.

About this task

This task assumes that the following conditions were met:

- The expansion enclosure was moved out from the rack on the slide rails, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82
- The top cover was removed, as described in “Removing the top cover: 2076-92F ” on page 45.
- The display panel assembly was removed, as described in “Removing the display panel assembly: 2076-92F ” on page 104.

Procedure

1. Remove the display panel assembly, which is shown in Figure 119 on page 107, from its packaging.

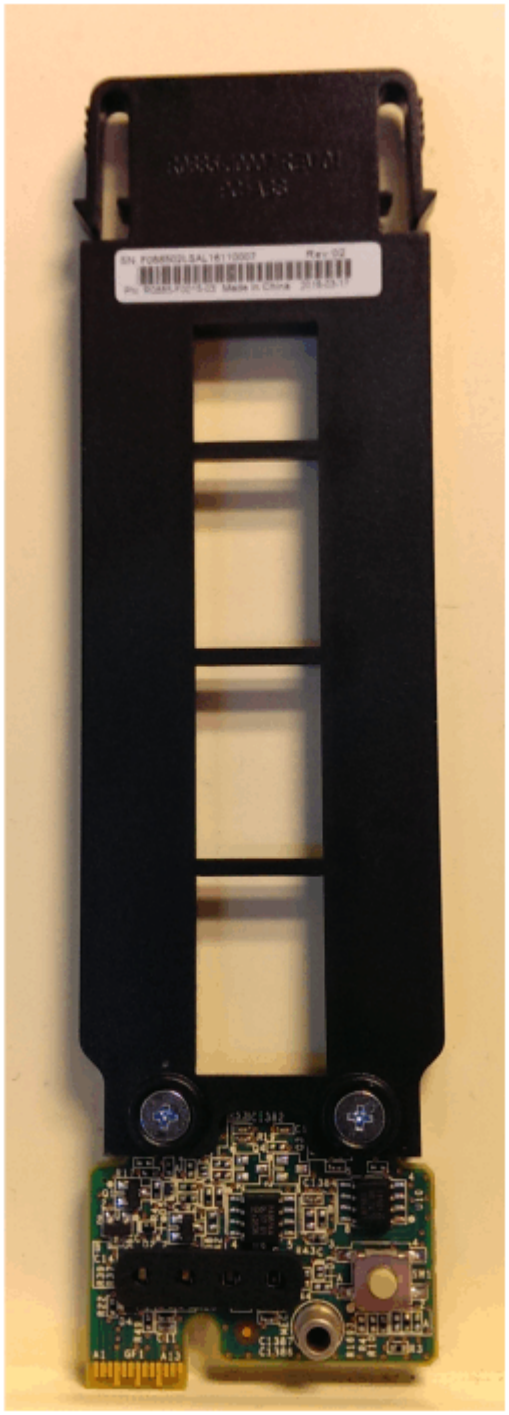


Figure 119. Display panel assembly

2. Carefully align the display panel assembly in the slot at the front of the expansion enclosure, as shown in Figure 120 on page 108.

   Ensure the display panel assembly, which is shown in Figure 119 on page 107, faces toward the outside of the chassis.

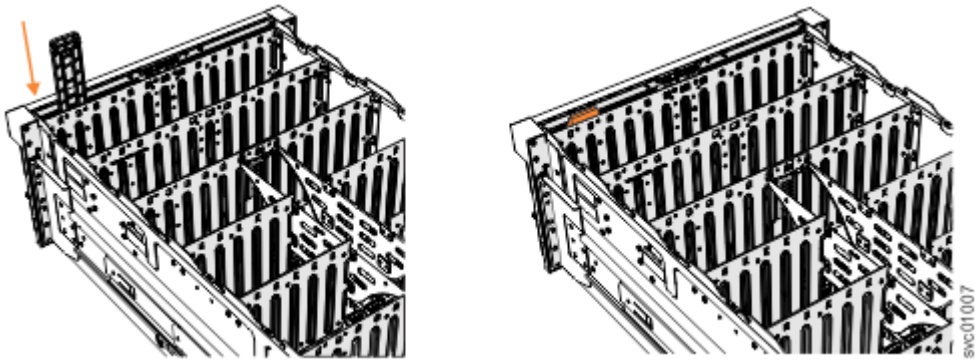


Figure 120. Installing the display panel assembly

3. Insert the display panel assembly until it clicks into position.
4. Replace the top cover, as described in “Installing or replacing the top cover: 2076-92F ” on page 61.
5. Ensure the LEDs on the display panel are lit correctly. See “ Storwize V7000 2076-92F expansion enclosure LEDs and indicators” on page 115 for details.

Removing the support rails: 2076-92F

You can remove the support rails for the 2076-92F expansion enclosure.

About this task

This task assumes the following conditions:

- The cable management arm is removed, as described in “Removing or moving the cable-management arm: 2076-92F ” on page 53.
- The expansion enclosure is removed from the rack, as described in “Removing an expansion enclosure from a rack: 2076-92F ” on page 82.

Procedure

1. Remove the two screws that attach the outer rail section to the front bracket assembly, as shown in Figure 121 on page 108.

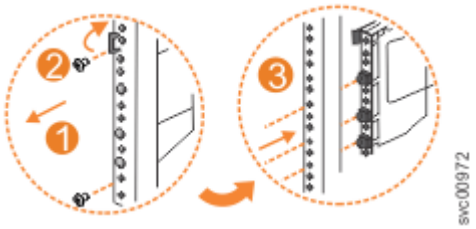


Figure 121. Remove the rail assembly from the front frame bracket

2. Remove the rail section by pulling it away from the front bracket, as shown in Figure 121 on page 108.
3. Remove the two screws that attach the inner rail section to the rear bracket, as shown in Figure 122 on page 108.

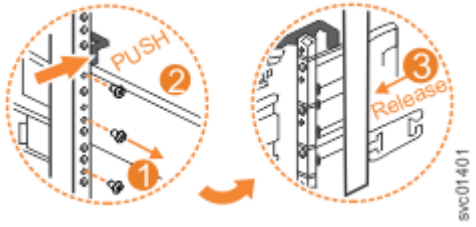


Figure 122. Remove the rail assembly from the rear frame bracket

4. Pull the rail forward, away from the rear bracket, as shown in Figure 122 on page 108.
5. Repeat step "1" on page 108 through step "4" on page 109 for the other side of the rail assembly.

Replace the support rails

6. To reinstall the support rails, or replace them with support rails from FRU stock, follow the procedure in "Installing or replacing the support rails: 2076-92F " on page 26.

Connecting optional SAS expansion enclosures: 2076-92F

After you install 5U expansion enclosures into the rack, you must connect them to each system that will use them. The system requires software version 7.8.0 or later. Do not connect the expansion enclosure if software version 7.8.0 is not installed on the system.

About this task

This task applies if you are installing a 2076-92F expansion enclosure.

Note: When you insert SAS cables, ensure that the connector is oriented correctly to the control enclosure and expansion enclosure.

- For Storwize V7000 Gen2 systems, Storwize V7000 Gen2+ control enclosures, and 2U expansion enclosures, the blue pull tab must be below the cable (1 in Figure 123 on page 109).

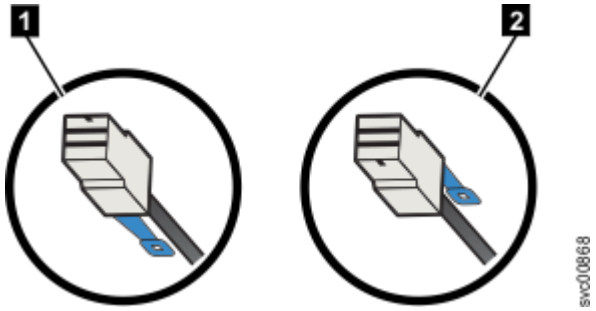


Figure 123. SAS cable connector orientation

- For 2076-92F 5U expansion enclosures, the blue pull tab must be above the connector (2 in Figure 123 on page 109).
- 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 be removed only by pulling the tab.

Be aware of the following guidelines when you attach the cables to the SAS ports.

- No cable can be connected between a port on a left canister and a port on a right canister of the expansion enclosures.
- Ensure that cables are installed in an orderly way to reduce the risk of cable damage when replaceable units are removed or inserted.
- SAS cables must be routed through the cable management arms to reduce the risk of disconnecting the nodes from their storage arrays. This step also helps to protect the SAS cables from getting damaged if you slide the node or enclosure out of the rack while they are attached. Arrange your cables to provide access to the following components:
  - Ethernet ports, including the technician port. The technician port is used for initial setup of the system by directly attaching to a personal computer. It can also be used to complete service actions for the system.
  - USB ports.
  - Fibre Channel and Fibre Channel over Ethernet (FCoE) ports. If your system has an optionally installed Fibre Channel and FCoE adapter for host and external storage attachment, ensure that these ports are accessible.

– The nodes and the enclosures themselves. Access is required to the hardware for servicing and for safely removing and replacing components by using two or more people.

Procedure

1. Install the cables, as shown in Figure 124 on page 110.

   Note: Figure 124 on page 110 shows the cable connections between the SAS enclosures and the Storwize V7000 Gen2 control enclosure. It does not imply or represent the precise racking order for the enclosures in a rack. However, due to its size and weight, always place the 2076-92F enclosure near the bottom of the rack.

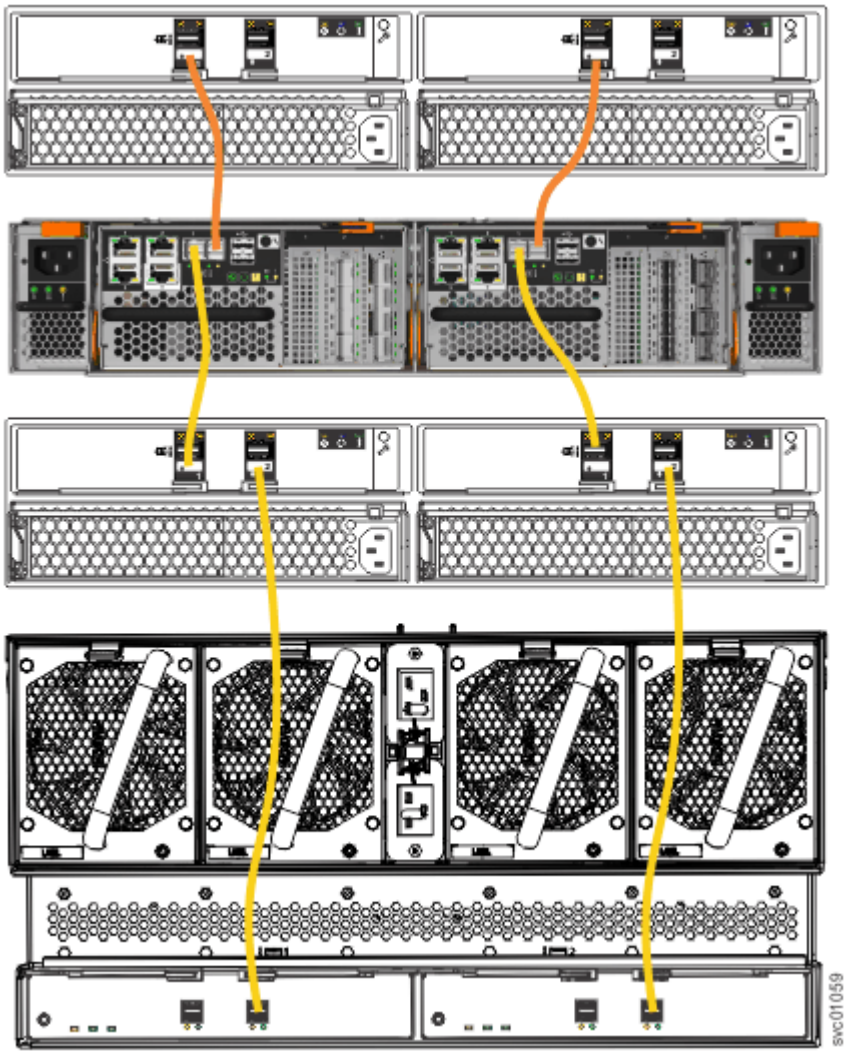


Figure 124. Connecting the SAS cables

2. If more I/O groups are configured, repeat the cabling procedure for the other I/O groups. Each system can have a maximum of four I/O groups, with two chains of expansion enclosures attached to each I/O group. Two chains of expansion enclosures can be attached to each I/O group. On each SAS chain, the systems can support up to a SAS chain weight of 10.

Combining 2U and 5U expansion enclosures

About this task

As Figure 124 on page 110 shows, you can combine , , and 2076-92F enclosures in a SAS chain. The limiting factor is the combined *chain weight* of the various components. The maximum SAS chain weight that can be attached to a node SAS port is 10:

- 2076-92F enclosures have a chain weight of 2.5
- and enclosures have a chain weight of 1.

Example

Table 14 on page 111 shows example of different combinations of SAS weights.

Table 14. Examples of supported SAS chain combinations

Enclosures	Enclosures	2076-92F Enclosures	Combined chain weight
2	0	3	9.5
2	3	2	10
0	7	1	9.5
1	1	1	4.5 (as shown in Figure 124 on page 110)

In addition, the orientation of the Input and Output SAS ports on the 2U and 5U SAS enclosures differs. Figure 125 on page 111 shows the SAS ports on the 2076-92F , , and enclosures.

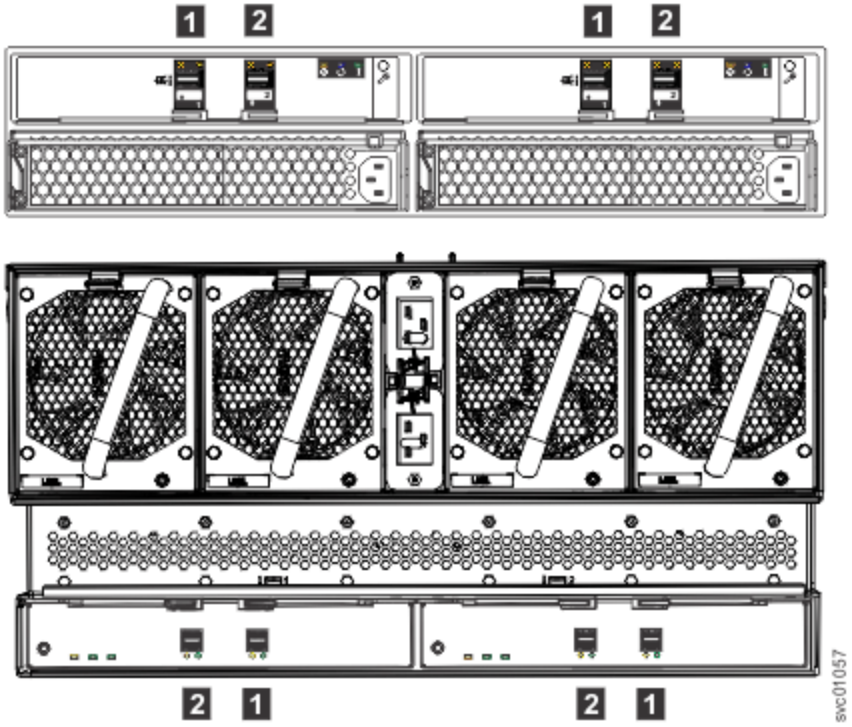


Figure 125. SAS port orientation on expansion enclosures

1 Input SAS port
2 Output SAS port

Powering on the 5U expansion enclosure: 2076-92F

Use the following procedure to provide power to the 2076-92F expansion enclosure as part of the initial installation process or after a service procedure.

Before you begin

Important:

- To support the 2076-92F expansion enclosure, a Storwize V7000 Gen2 or Storwize V7000 Gen2+ system requires software version 7.8.0. If software version 7.8.0 is not installed on the system, do not connect or power on the expansion enclosure.

  The Storwize V7000 2076-724 control enclosure (Gen3) requires software version 8.2.0 at the latest available fix level or later. If software version 8.2.0.x is not installed on the system, do not connect or power on the expansion enclosure.
- Before you connect the power cables to the rear of the enclosure, always check that the expansion enclosure is secured in the rack. If needed, tighten the thumbscrews on the front of the enclosure (2 in Figure 126 on page 112) to ensure that the enclosure drawer does not roll open.

About this task

The 2076-92F expansion enclosure has two power supply units (PSUs) that are accessible from the front of the enclosure (4 in Figure 126 on page 112). As the figure also shows, the PSUs are covered by the 1U fascia (5).

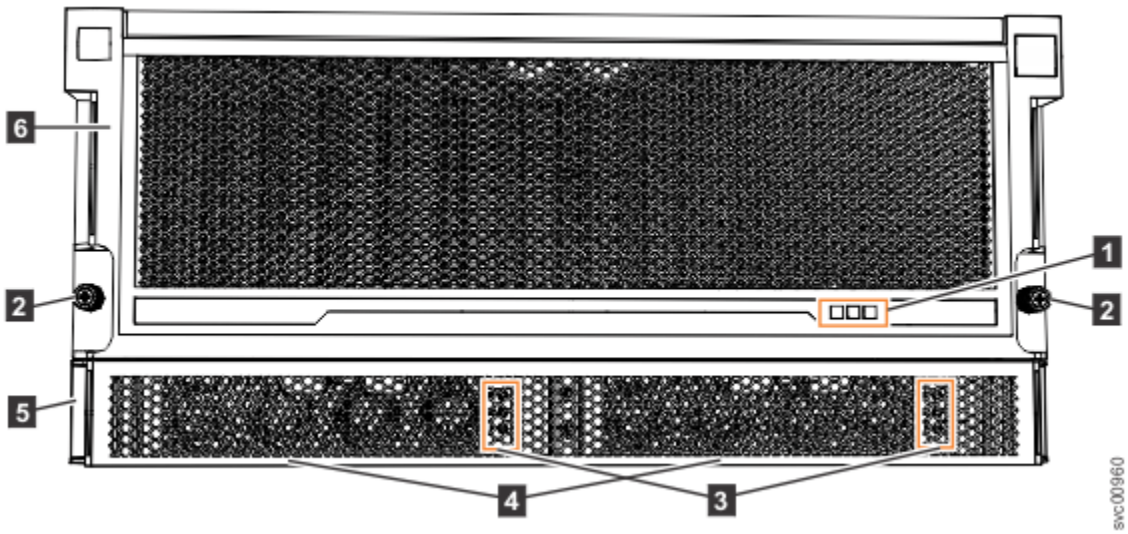


Figure 126. Features on the front of the 2076-92F expansion enclosure

1 Display panel LEDs
2 Rack retention thumb screws
3 Power supply unit LEDs
4 Power supply units (PSUs)
5 PSU fascia (1U)
6 Front fascia (4U)

Each PSU has a power supply connector and power cable, which are accessible from the back of the enclosure. Power is provided by plugging a C19-C20 power cable into each power supply unit and, if necessary, turning on the power source. The expansion enclosure does not have a power button.

Procedure

1. Connect the C19-C20 power cables to the power connectors on the rear of the expansion enclosure.

   The enclosure automatically powers on and begins its Power On Self-Tests (POST).
2. Secure the power cables in the cable retainer at each power connector on the rear of the enclosure, as shown in Figure 127 on page 113. Also, ensure that each cable is installed along one of the cable management arms. The cable management arms also support the SAS cables.

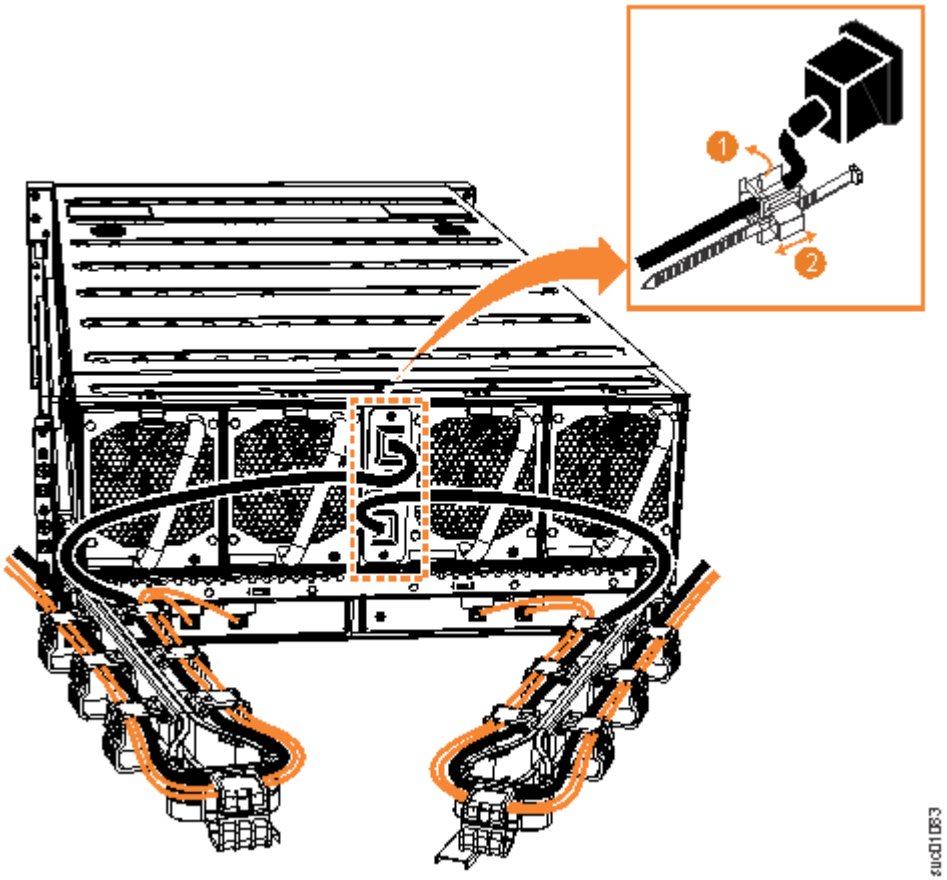


Figure 127. Secure power cables

Important: Always secure each power cable with a cable retainer and ensure that the cable is installed along one of the cable management arms. When secured, the power and SAS cables stay connected when you slide the expansion enclosure out of the rack to perform service tasks.

Figure 128. Power and SAS cable connections on the back of the enclosure

3. Verify that the expansion enclosure and its components are operating as expected.

   On the back of the expansion enclosure, all four fans and the expansion canister indicators (3 and 8 in Figure 129 on page 114) become active when the power is connected.

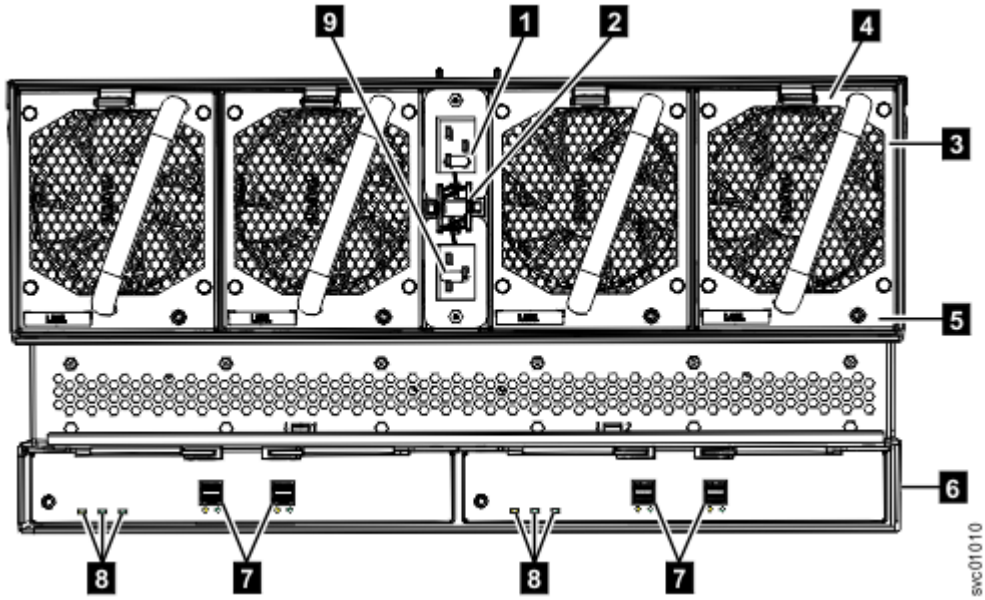


Figure 129. Features on the rear of the 2076-92F expansion enclosure

1 Power cable connector for PSU 2
2 Power cable retention clamps
3 Fan module
4 Fan release latch
5 Fan fault indicator
6 Expansion canister
7 SAS ports and indicators
8 Expansion canister indicators
9 Power cable connector for PSU 1

4. Verify that the system recognizes the expansion enclosure.

   In the management GUI, view information about the system status and the expansion enclosure.

   - If a new expansion enclosure was installed, make sure that the enclosure was discovered by the system. A newly recognized expansion enclosure is visible in the management GUI.
   - If the expansion enclosure was powered off as part of a service procedure, view the information in the management GUI to confirm that the enclosure is operating as expected. You can also access the Event Log to view enclosure and component events and complete any remaining fix procedures.

Powering off the expansion enclosure: 2076-92F

Before you power down a 2076-92F expansion enclosure, review the following procedure.

Before you begin

When you power off an expansion enclosure, the drives in that enclosure are no longer available to the control enclosure. The SAS chain also breaks. Any expansion enclosures that are beyond the enclosure that is powered down are also disconnected from the control enclosure.

Before you power off an enclosure, use the management GUI to show the volumes that depend on that enclosure. In the system view, select the expansion enclosure to be powered off. Then, select **Dependent Volumes**. If no configuration changes are made, other volumes remain available to the system.

Procedure

1. Stop all I/O to the system from hosts that access the expansion enclosure.
2. Unmount any associated file systems.

3. Wait 5 minutes for all write data to be flushed to the drives.
4. Unplug both of the power cords from the rear of the expansion enclosure to remove all power from the enclosure.

Storwize V7000 2076-92F expansion enclosure LEDs and indicators

The 2076-92F (5U) expansion enclosure has several sets of LEDs that provide information about the overall status of the enclosure, power, drives, fans, canisters, and SAS connections.

The 2076-92F (5U) expansion enclosure has sets of LEDs on the front and rear of the enclosure. Inside of the expansion enclosure, LEDs also indicate the status of the drives and each secondary expander module.

Note: All of the information about the 2076-92F expansion enclosure is also applicable to the 2076-A9F expansion enclosure.

LEDs on the front of the expansion enclosure

As Figure 130 on page 115 shows, the front of the 2076-92F expansion enclosure contains LEDs for the display panel (1) and for each of the power supply units (3).

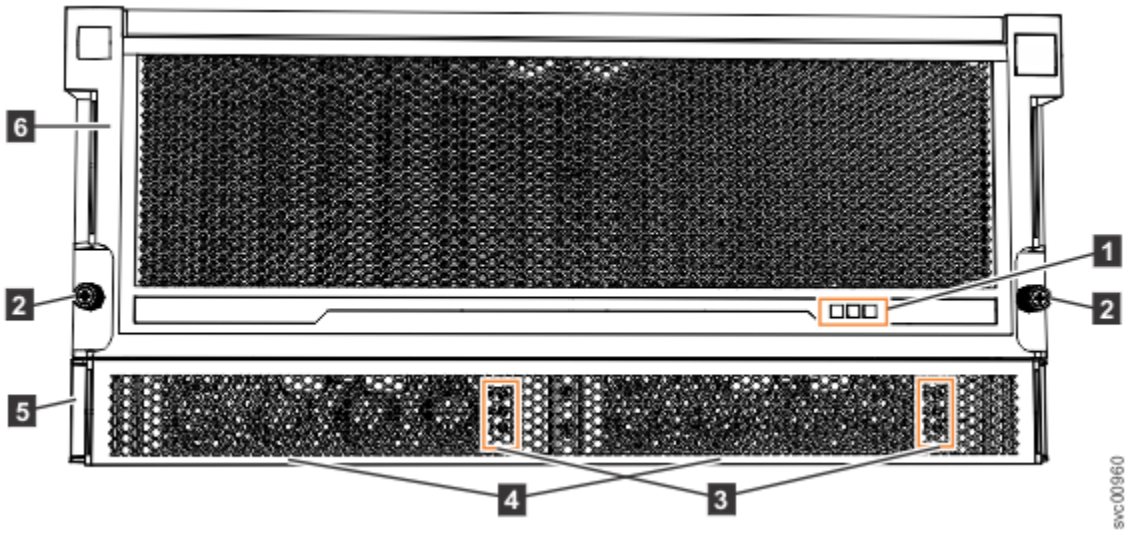


Figure 130. LEDs on the front of the expansion enclosure

1. Display panel LEDs
2. Rack retention thumb screws
3. Power supply unit LEDs
4. Power supply units (PSUs)
5. PSU fascia (1U)
6. Front fascia (4U)

The display panel (1) contains three LEDs that describe the operational status of the expansion enclosure. Table 15 on page 116 describes the function and meaning of the LEDs on the front display panel.

Table 15. Display panel LEDs			
Function	**Color**	**Status**	**Description**
Power	Green	On	The expansion enclosure power is on; this LED is controlled by the expansion enclosure.
		Off	The expansion enclosure power is off.
Identify	Blue	On	Identifies the expansion enclosure; this LED is controlled by the system. Use the management GUI or service interface to identify an enclosure.
		Off	The expansion enclosure is operating normally.
Enclosure fault	Amber	On	The expansion enclosure is coming up or a fault is detected against a component within the enclosure.
		Off	No faults are detected.

The 2076-92F expansion enclosure contains two PSUs (4 in Figure 130 on page 115) that are accessible from the front of the enclosure. Each PSU has its own a set of LEDs, as shown in Figure 131 on page 116.

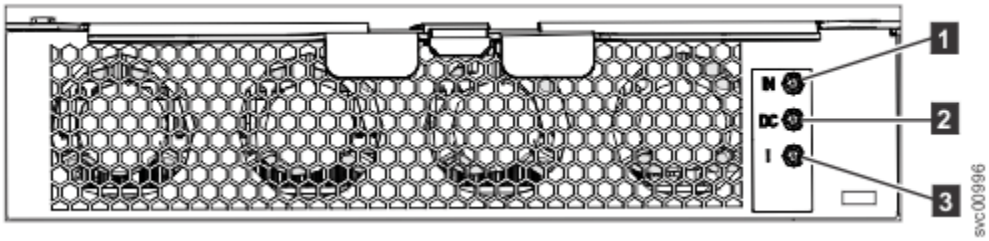


Figure 131. LEDs on the front of a power supply unit

1 Input power
2 DC power
3 Fault indicator

Table 16 on page 116 explains the function and status that is indicated by each of the LEDs. The power cords for each PSU are accessible from the rear of the expansion enclosure (1), as shown in Figure 134 on page 119.

Table 16. Power supply unit LEDs			
Function	**Color**	**Status**	**Description**
1 Input power	Green	On	The input voltage is within specification.
		Off	No power input detected.

Table 16. Power supply unit LEDs (continued)			
Function	**Color**	**Status**	**Description**
2 DC power	Green	On	DC power outputs are within specification.
		Off	DC power is not available.
3 Fault	Amber	On	A fault is detected in the PSU.
		Off	No faults are detected.

LEDs inside of the expansion enclosure

Each of the drives and secondary expansion modules within the 2076-92F expansion enclosure has two LED indicators. To view the drives and secondary expansion modules, you must remove the cover of the enclosure, as described in “Removing the top cover: 2076-92F ” on page 45.

Figure 132 on page 117 shows the components of a drive assembly. Each drive has an online indicator (2) and fault indicator (3).

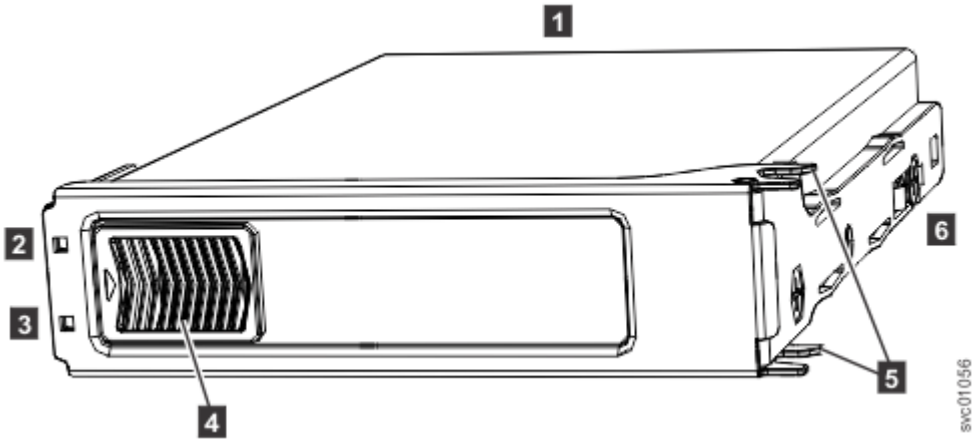


Figure 132. LEDs on a drive assembly

Table 17 on page 117 describes the meaning of the LEDs on each drive.

Table 17. LED indicators on drives			
Function	**Color**	**Status**	**Description**
2 Activity	Green	On	The drive is ready to be used.
		Flashing	The drive is operating and I/O is occurring.
		Off	The drive is not installed or an installed drive is not ready to be used.

Table 17. LED indicators on drives (continued)			
Function	**Color**	**Status**	**Description**
3 Fault	Amber	On	A fault occurred on the drive. The LED is turned off when the drive is removed and replaced.
		Flash	The drive is being identified, a fault might or might not be detected.
		Off	The installed drive is operating normally.

Figure 133 on page 118 shows the LEDs on a secondary expansion module.

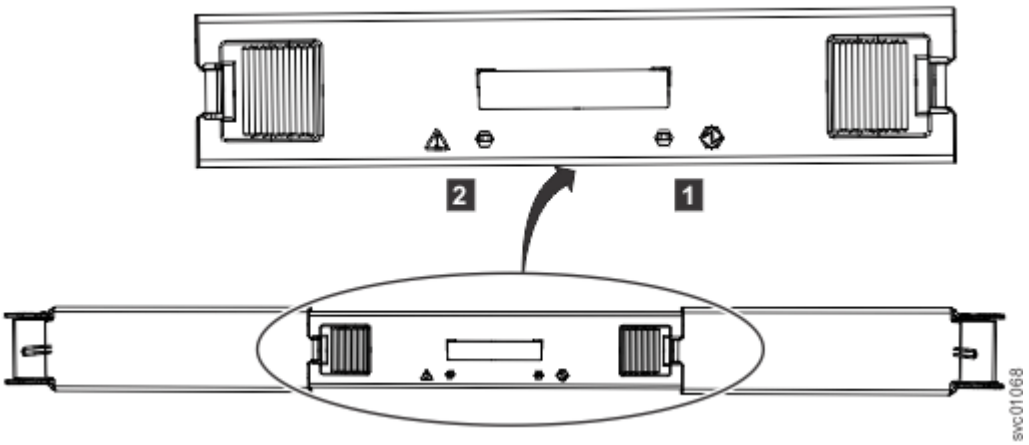


Figure 133. LEDs on a secondary expansion module

1 Online indicator
2 Fault indicator

Table 18 on page 118 describes the meaning of the LEDs on each secondary expansion module.

Table 18. LED indicators on secondary expansion modules			
Function	**Color**	**Status**	**Description**
1 Power	Green	On	The secondary expansion module is receiving power.
		Flashing	Not used.
		Off	The secondary expansion module is not receiving power.
2 Fault	Amber	On	Not used.
		Flash	The secondary expansion module is being identified.
		Off	The secondary expansion module is operating normally.

LEDs on the rear of the expansion enclosure

Figure 134 on page 119 shows the rear view of a 2076-92F expansion enclosure. LEDs on the rear of the enclosure provide information about each fan module, each expansion canister, and SAS links.

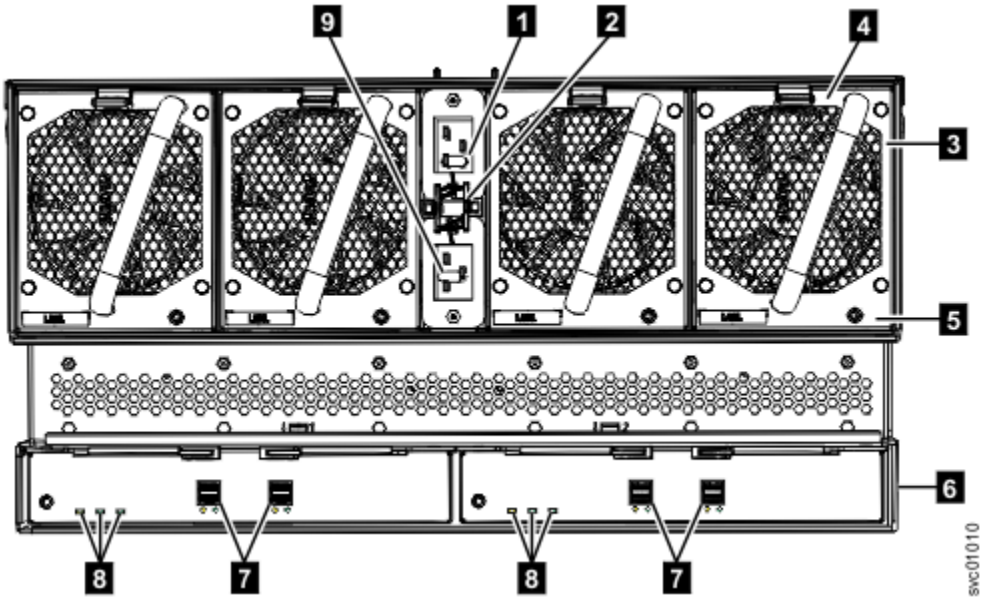


Figure 134. LEDs on the back of the expansion enclosure

The expansion enclosure has four fans. Each fan has one LED; for example, Figure 134 on page 119 shows the location of the LED (5) for fan number four. When a fan is operating normally, the LED is not lit. If a fault is detected, the amber LED is lit.

As Figure 134 on page 119 also shows, the expansion enclosure contains two expansion canisters. Each expansion canister contains its own set of LEDs, as shown in Figure 135 on page 119. The LEDs provide status information about the expansion canister itself and the SAS connections.

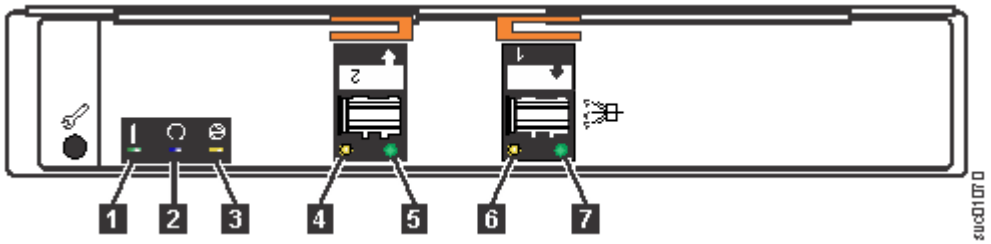


Figure 135. LEDs on the back of the expansion canister

1 Canister fault
2 Canister status
3 Canister power
4 and 6 SAS link fault
5 and 7 SAS link operational
8 Canister release handles

Table 19 on page 120 describes the values and meaning of each LED.

Table 19. Expansion canister and SAS port LEDs			
Name	**Color**	**State**	**Meaning**
1 Canister fault	Amber	Off	Normal operation.
		On	A fault was detected.
		Flashing	The expansion canister is being identified. A fault might or might not be detected.
2 Canister status	Green	Off	Canister is off.
		On	Normal operation.
		Flashing	A vital product data (VPD) error occurred.
3 Canister power	Green	Off	Canister is off.
		On	Canister is receiving power.
4 and 6 SAS link fault	Amber	Off	No faults are detected. All four phys have a link connection.
		On	Several error conditions are possible: • Only 1, 2, or 3 phys are connected, but not all 4. • The phys are not operating at the same speed. • All phys are not connected to the same remote port. One or more of the connected lanes are attached to a different address.
5 and 7 SAS link operational	Green	Off	No link connection on any lane. The connection is down.
		On	The SAS link is active. At least one of the four lanes is connected.

Storwize V7000 5U expansion enclosure parts

In the 5U expansion enclosure, all replaceable parts are customer-replaceable units (CRUs).

Expansion enclosure drives

Table 20 on page 121 summarizes the types of SAS drives that are supported by the 2076-92F expansion enclosure. The 2076-92F expansion enclosure is supported on Storwize V7000 Gen2 and Storwize V7000 Gen2+ systems.

Table 20. Supported expansion enclosure SAS drives

FRU Part Number	Description
01LJ061	600 GB 15 K disk drive
01LJ062	1.2 TB 10 K disk drive
01LJ063	1.8 TB 10 K disk drive
01LJ064	6 TB 7.2 K Near-Line SAS disk drive
01LJ065	8 TB 7.2 K Near-Line SAS disk drive
01LJ066	10 TB 7.2 K Near-Line SAS disk drive
01LJ067	1.6 TB 2.5-inch flash drive
01LJ068	3.2 TB 2.5-inch flash drive
01LJ069	1.92 TB tier 1 flash drive
01LJ070	3.84 TB tier 1 flash drive
01LJ071	7.68 TB tier 1 flash drive
01LJ072	15.36 TB tier 1 flash drive
01LJ179	12 TB 7.2 K Near-Line SAS disk drive

Other expansion enclosure parts

Table 21 on page 121 summarizes the part numbers for other parts. The values are the same for all Storwize V7000 systems that support the 2076-92F expansion enclosure.

Table 21. Other expansion enclosure parts

FRU Part Number	Description	Comments
00AR317	3 m 12 Gb SAS Cable (mSAS HD)	
01EJ190	6 m 12 Gb SAS Cable (mSAS HD)	
01LJ114	Rail kit	
01LJ116	Front fascia (4U front cover)	
01LJ118	Display panel assembly	
01LJ120	PSU fascia (1U cover)	The fascia must be removed to access the power supply units.
01LJ122	Power supply unit (PSU)	The expansion enclosure contains 2 PSUs. Each PSU requires a C19/C20 power cord.

Table 21. Other expansion enclosure parts (continued)		
FRU Part Number	**Description**	**Comments**
01LJ124 (use with enclosure FRU P/N 01LJ112) 01LJ860 (use with enclosure FRU P/N 01LJ607	Secondary expansion module	The expansion enclosure supports two-secondary expansion modules. **Note:** The secondary expansion modules are Tier 2 CRUs. You can replace them or request that they be replaced by IBM Service. For example, if the enclosure is FRU P/N 01LJ112 and it is powered on, you can contact your service representative to replace the secondary expansion module. **CAUTION:** Use caution when you are removing or replacing a secondary expansion module from an enclosure with FRU part number 01LJ112. Avoid contact with the connectors on the main board.
01LJ126	Fan module	The expansion enclosure contains four fan modules.
01LJ128	Expansion canister	
01LJ130	Cable management arms (CMA)	The part contains the upper and lower CMA.
01LJ132	Top cover	
01LJ134	Fan interface board	
01LJ607	Enclosure **Note:** Replaces enclosure FRU P/N 01LJ112.	Includes the drive board, signal interconnect board, and internal power cables, in an otherwise empty enclosure.
39M5388	16A power cord C19/C20 2 m	

Connecting the components

After installing the rails and enclosures in the rack, the Storwize V7000 2076-724 control enclosures are connected to power, the network, and any optional expansion enclosures.

After all cabling connections are completed, the system components are powered on.

Connecting Ethernet cables to the node canisters

To provide system management connectivity for the system, connect Ethernet cables to Ethernet port 1 of both node canisters in the control enclosure.

Procedure

To install the Ethernet cables, complete the following steps.

1. Connect Ethernet port 1 of each node canister in the system to the IP network that will provide connection to the system management interfaces, as shown in Figure 136 on page 123 and Figure 137 on page 123.

   This port can also be used for iSCSI connectivity to the system by hosts on the network. Where more than one control enclosure is present in the system, ensure port 1 of every node canister is connected to the same network to provide access if the configuration node fails.

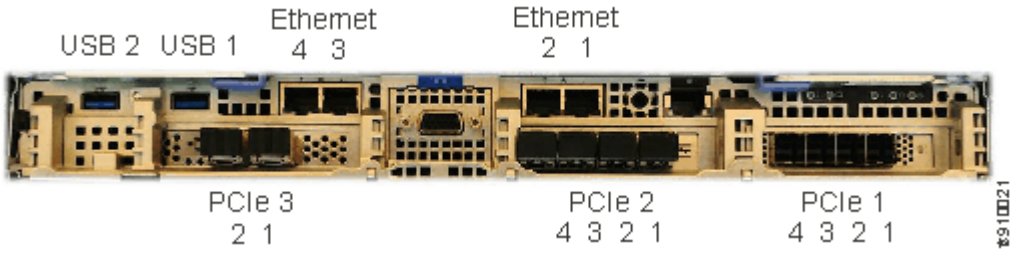


Figure 136. Ethernet ports on canister 1 (upper canister)

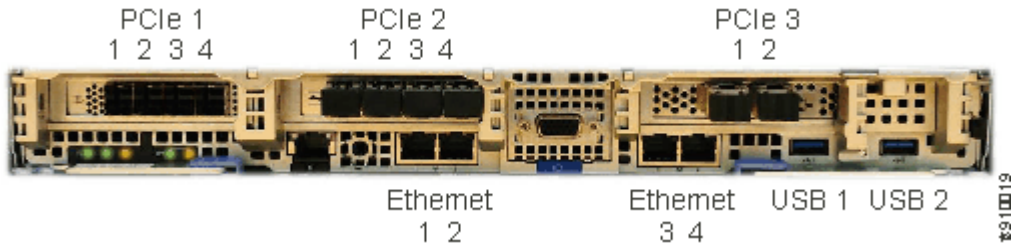


Figure 137. Ethernet ports on canister 2 (lower canister)

2. Optionally, connect Ethernet port 2 of each node canister in the system to a second IP network that will provide redundant connection to the system management interfaces.

   This port can also be used for iSCSI connectivity to the system by hosts on the network. If there is more than one control enclosure 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 Fibre Channel cables to the control enclosure

If your system has one or more 4-port 16 Gbps Fibre Channel adapters installed, use Fibre Channel cables to connect the two node canisters in the enclosure to the switches in the Fibre Channel SAN.

Before you begin

Refer to the "Planning" section of the IBM Knowledge Center for instructions on determining the number of required cables and their intended port locations.

Procedure

To install the cables, complete the following steps.

1. "Planning" section of the IBM Knowledge Center for instructions on determining the number of required cables and their intended port locations, connect the required number of Fibre Channel cables to the node canisters in the control enclosure.

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

   Figure 138 on page 123 and Figure 139 on page 124 show the location and port numbers of optional Fibre Channel adapters in adapter slot 1 of the two node canisters. (The system might also have an optional Fibre Channel adapter installed in slot 2 of each canister.)

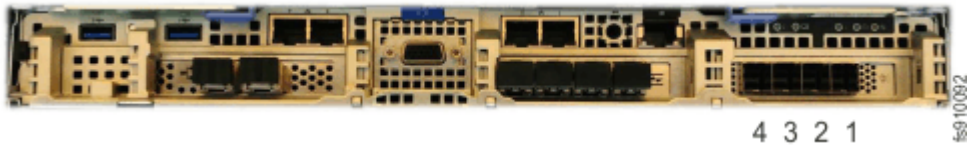


Figure 138. Fibre Channel adapter in node canister 1, adapter slot 1

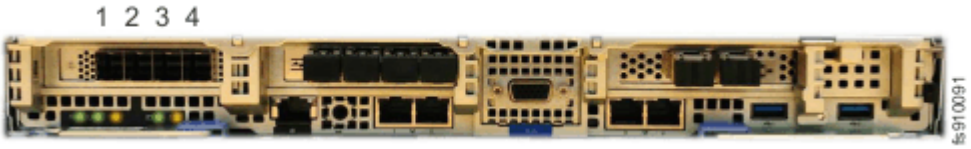


Figure 139. Fibre Channel adapter in node canister 2, adapter slot 1

2. To connect additional Fibre Channel cables, connect the same number of cables to each canister.

Connecting optional SAS expansion enclosures to the Storwize V7000 2076-724 or 2076-U7B control enclosure

If you have installed expansion enclosures in the rack, you must connect them to the control enclosure.

About this task

This task applies if you are installing one or more expansion enclosures. Each control enclosure in the system can manage two chains of expansion enclosures; each chain can consist of a maximum of 10 2U expansion enclosures. Therefore, each control enclosure can support up to 20U of expansion enclosures. A system that contains two control enclosures can support up to 40U of expansion enclosures.

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 Figure 140 on page 125.

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 Figure 140 on page 125.
   a) Connect SAS port 1 of the upper 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 lower node canister in the control enclosure to SAS port 1 of the right expansion canister in the first expansion enclosure.

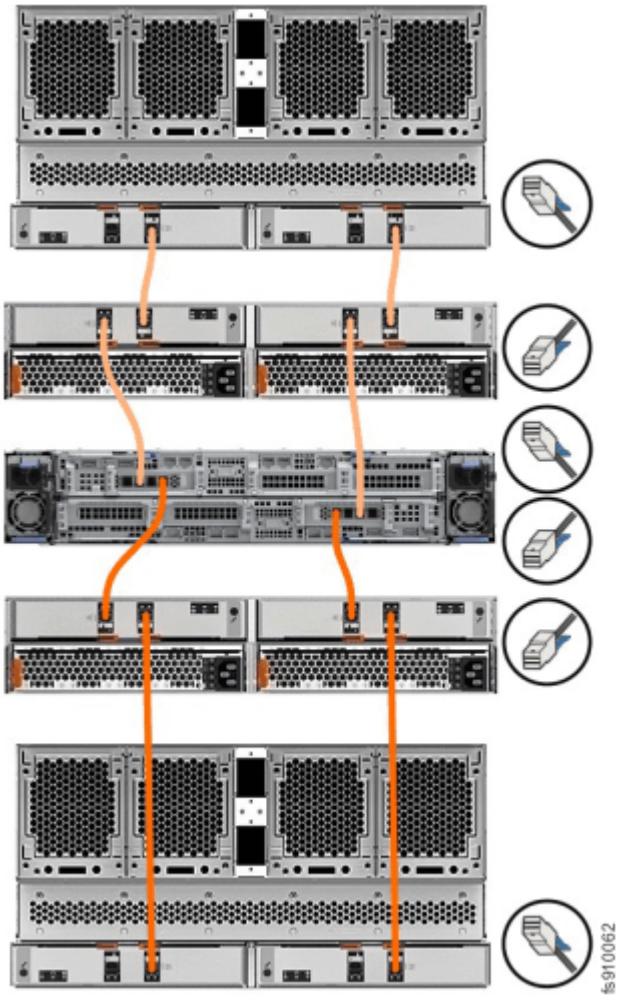


Figure 140. Connecting the SAS cables

2. To add a second expansion enclosure chain to the control enclosure, use the supplied SAS cables to connect the control enclosure to the expansion enclosure at rack position 2. Refer to Figure 140 on page 125 for an example.
   a) Connect SAS port 3 of the upper node canister in the control enclosure to SAS port 1 of the left expansion canister in the second expansion enclosure.
   b) Connect SAS port 3 of the lower node canister in the control enclosure to SAS port 1 of the right expansion canister in the second expansion enclosure.
3. If additional 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 140 on page 125.

   Note: A control enclosure can support up to 20U of expansion enclosures in two chains: 10Uin the upper chain (above the control enclosure) and 10U in the lower chain.
4. If additional control enclosures are installed, repeat this cabling procedure on each control enclosure and its expansion enclosures.

   When using more than one control enclosure, divide the total number of expansion enclosures among the control enclosures to enhance performance.

SAS cabling guidelines

When connecting SAS cables between 2U expansion 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 141 on page 126) 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.

  Note: On Storwize V7000 2076-724 systems, node canister 1 is inverted from node canister 2. Because the orientation of the ports differ, you must ensure that the orientation of the SAS cables is also correct for each canister.
- For ports in the upper canister (canister 1), the blue pull tab must be **above** the connector. For ports in the lower canister (canister 2), 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.

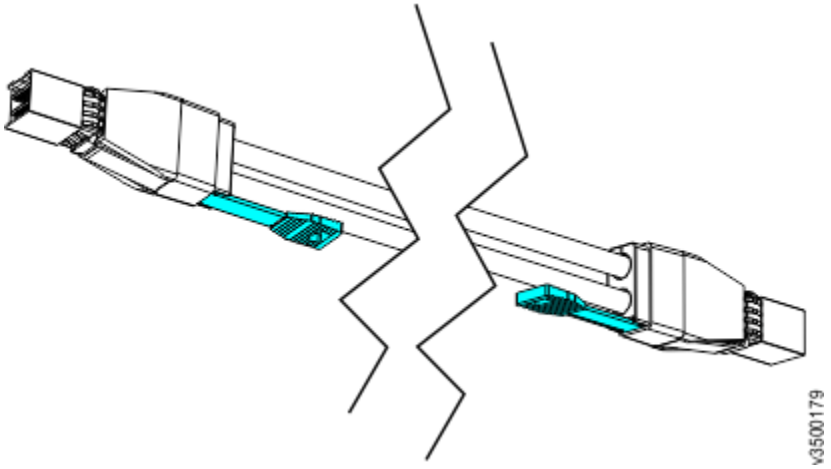


Figure 141. SAS cable connectors

Guidelines

Be aware of the following guidelines when you connect a Storwize V7000 2076-724 control enclosure to the SAS ports in 2U and 5U expansion enclosures.

- Storwize V7000 2076-724 systems support 4-port SAS interface adapters. However, only ports 1 and 3 are used for SAS connections, as Figure 142 on page 127 shows.
- The SAS interface adapter should already be installed in PCIe slot 3 of each node canister when you unpack the control enclosure.
- No more than ten 2U expansion enclosures can be chained to SAS port 1 of a node canister. The expansion enclosures in this chain should be installed below the control enclosure, as shown in Figure 142 on page 127.
- No more than ten 2U expansion enclosures can be chained to SAS port 3 of a node canister. The expansion enclosures in this chain should be installed above the control enclosure, as shown in Figure 142 on page 127.
- No cable can be connected between a port on a left expansion canister and a port on a right expansion 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 expansion enclosure in a chain must not have cables in port 1 of canister 1 or port 1 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.

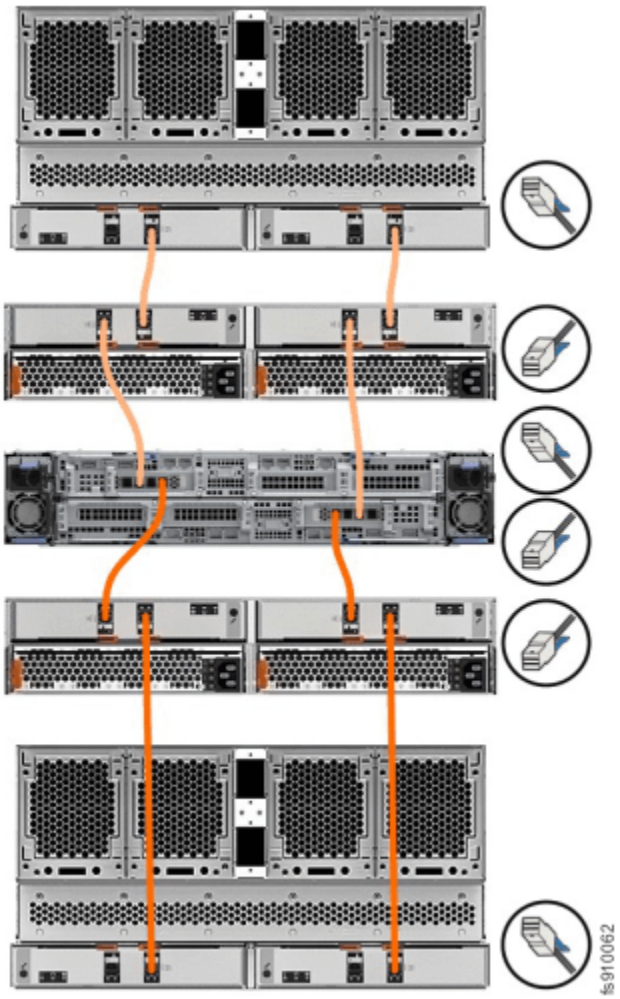


Figure 142. Connecting the SAS cables

Powering on the optional 2U SAS expansion enclosures

After you install all the hardware components, power on the optional 2U SAS expansion enclosures and check their status.

About this task

Attention: Do not power on an expansion enclosure 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 2U SAS expansion enclosures, complete the following steps.

1. Use the supplied power cords to connect both power supply units of the first expansion enclosure to their power sources.

   If the power sources have circuit breakers or switches, ensure that they are turned on. The expansion 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 rack, check the LEDs on each expansion enclosure (see Figure 143 on page 128).

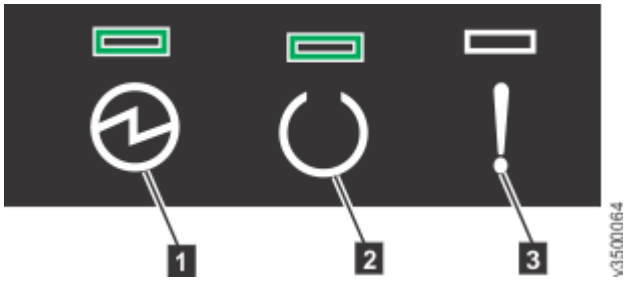


Figure 143. Expansion enclosure LEDs

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.
3. Wait for all expansion canisters to finish powering on before you proceed with the system installation process.

Powering on the 5U expansion enclosure: 2076-92F

Use the following procedure to provide power to the 2076-92F expansion enclosure as part of the initial installation process or after a service procedure.

Before you begin

Important:

- To support the 2076-92F expansion enclosure, a Storwize V7000 Gen2 or Storwize V7000 Gen2+ system requires software version 7.8.0. If software version 7.8.0 is not installed on the system, do not connect or power on the expansion enclosure.

  The Storwize V7000 2076-724 control enclosure (Gen3) requires software version 8.2.0 at the latest available fix level or later. If software version 8.2.0.x is not installed on the system, do not connect or power on the expansion enclosure.
- Before you connect the power cables to the rear of the enclosure, always check that the expansion enclosure is secured in the rack. If needed, tighten the thumbscrews on the front of the enclosure (2 in Figure 144 on page 129) to ensure that the enclosure drawer does not roll open.

About this task

The 2076-92F expansion enclosure has two power supply units (PSUs) that are accessible from the front of the enclosure (4 in Figure 144 on page 129). As the figure also shows, the PSUs are covered by the 1U fascia (5).

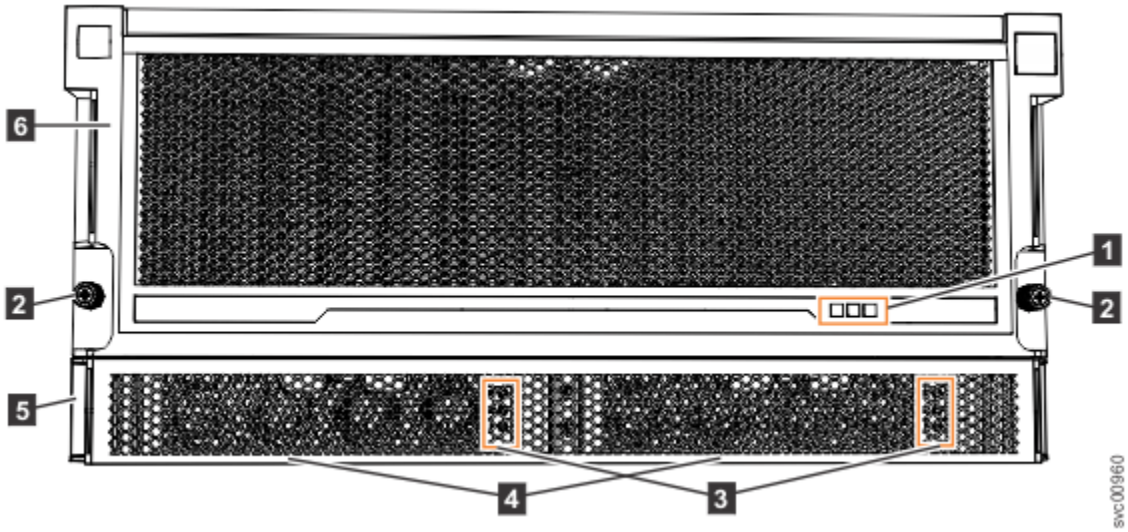


Figure 144. Features on the front of the 2076-92F expansion enclosure

1 Display panel LEDs
2 Rack retention thumb screws
3 Power supply unit LEDs
4 Power supply units (PSUs)
5 PSU fascia (1U)
6 Front fascia (4U)

Each PSU has a power supply connector and power cable, which are accessible from the back of the enclosure. Power is provided by plugging a C19-C20 power cable into each power supply unit and, if necessary, turning on the power source. The expansion enclosure does not have a power button.

Procedure

1. Connect the C19-C20 power cables to the power connectors on the rear of the expansion enclosure.
   The enclosure automatically powers on and begins its Power On Self-Tests (POST).
2. Secure the power cables in the cable retainer at each power connector on the rear of the enclosure, as shown in Figure 145 on page 130. Also, ensure that each cable is installed along one of the cable management arms. The cable management arms also support the SAS cables.

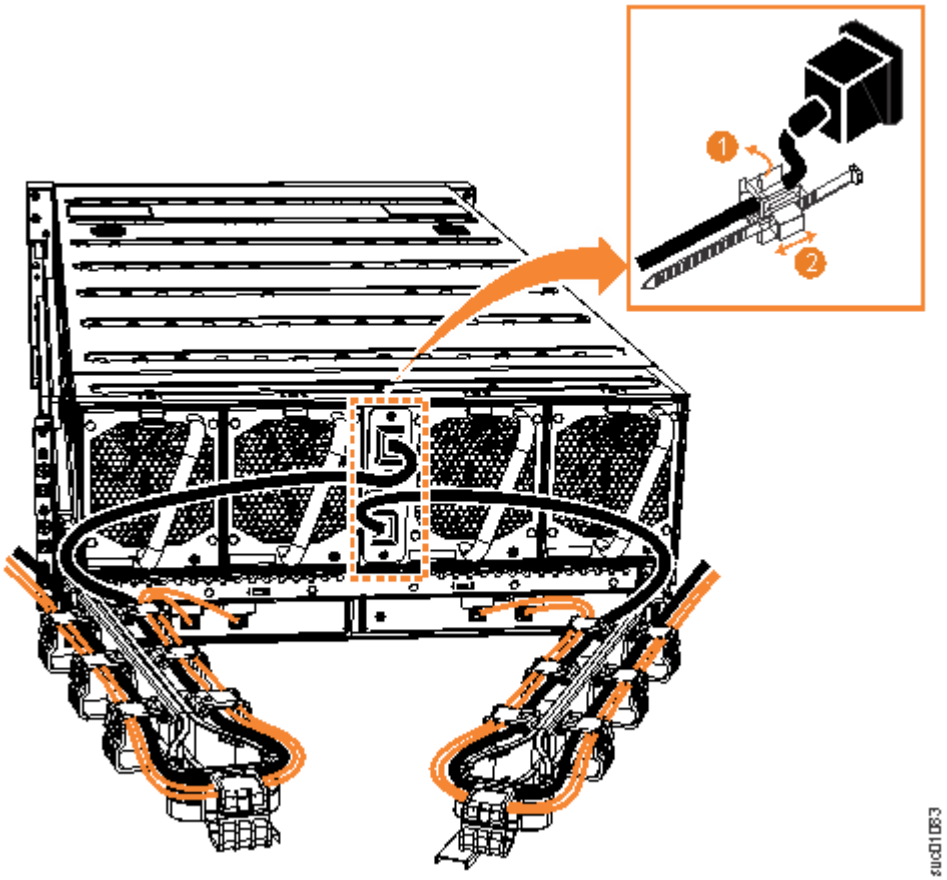


Figure 145. Secure power cables

Important: Always secure each power cable with a cable retainer and ensure that the cable is installed along one of the cable management arms. When secured, the power and SAS cables stay connected when you slide the expansion enclosure out of the rack to perform service tasks.

Figure 146. Power and SAS cable connections on the back of the enclosure

3. Verify that the expansion enclosure and its components are operating as expected.

   On the back of the expansion enclosure, all four fans and the expansion canister indicators (3 and 8 in Figure 147 on page 131) become active when the power is connected.

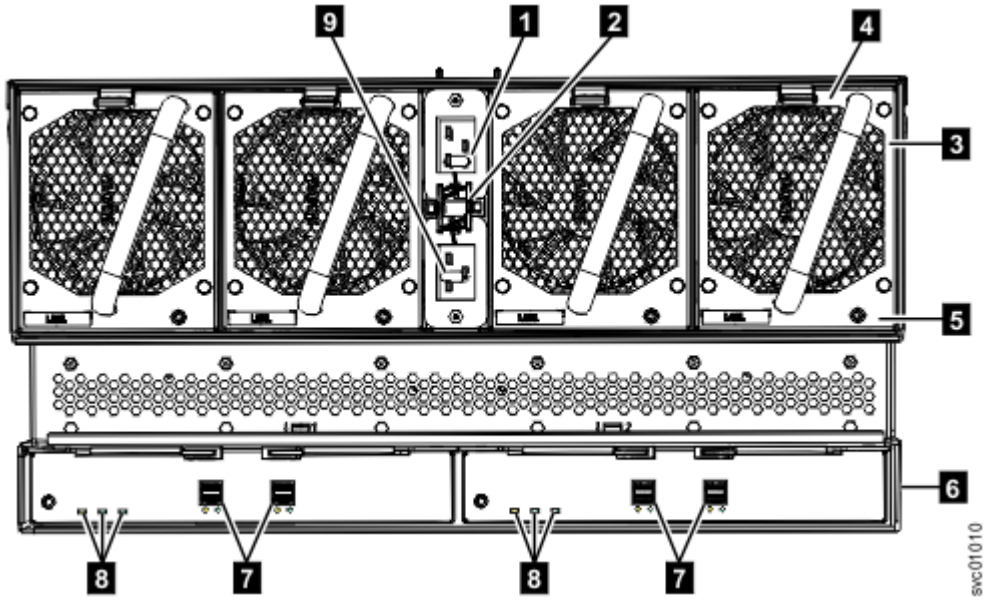


Figure 147. Features on the rear of the 2076-92F expansion enclosure

1. Power cable connector for PSU 2
2. Power cable retention clamps
3. Fan module
4. Fan release latch
5. Fan fault indicator
6. Expansion canister
7. SAS ports and indicators
8. Expansion canister indicators
9. Power cable connector for PSU 1

4. Verify that the system recognizes the expansion enclosure.

   In the management GUI, view information about the system status and the expansion enclosure.

   - If a new expansion enclosure was installed, make sure that the enclosure was discovered by the system. A newly recognized expansion enclosure is visible in the management GUI.
   - If the expansion enclosure was powered off as part of a service procedure, view the information in the management GUI to confirm that the enclosure is operating as expected. You can also access the Event Log to view enclosure and component events and complete any remaining fix procedures.

Configuration details for using RDMA-capable Ethernet ports for node-to-node communications

Before you configure a system to use RDMA-capable Ethernet ports for node-to-node communications, consider the following recommendations.

Important: Before you configure a system that uses RDMA-capable Ethernet ports for node-to-node communications and includes IBM HyperSwap® configurations, contact your product support representative.

When you configure RDMA-capable Ethernet ports for node-to-node communication, use the following recommendations:

- Assign different subnets for ports that are used for node-to-node communication and port that are used for host attachment. For node-to-node communications with RDMA-capable Ethernet ports, physical port identifiers of all the nodes in the system must match and must be in the same subnet.

- Use dual, redundant switch configuration to avoid single point of failure in Ethernet connectivity.
- Verify RDMA support on all switches before you configure RDMA-capable Ethernet ports on nodes in the system.
- Ensure that round-trip time (RTT) is up to 80 milliseconds without any packet drops.
- Use virtual LAN to create physical separation of networks for unrelated systems, wherever possible. All the ports that are used for node-to node communication must be assigned with one VLAN ID and ports that are used for host attachment must have a different VLAN ID. If you plan to use VLAN to create this separation, you must configure VLAN support on the all the Ethernet switches in your network before you define the RDMA-capable Ethernet ports on nodes in the system. On each switch in your network, set VLAN to `Trunk` mode and specify the VLAN ID for the RDMA-ports that will be in the same VLAN. In addition, if VLAN settings for a RDMA-capable Ethernet port needs to be updated, these settings cannot be updated independently of other configuration settings. Before you update VLAN settings on specific RDMA-capable Ethernet ports, you must unconfigure the port, make any necessary changes to the switch configuration, then reconfigure RDMA-capable Ethernet ports on each of the nodes in the system.
- All systems that are not part of the current system that is being configured must be physically separated from the Ethernet fabric. You can configure different VLANs to achieve separation among systems.
- Verify the configuration on IP addresses on your network to ensure that there are no duplicate IP addresses assigned.
- If you use firewalls in your network configuration, ensure that traffic is open for TCP port 21455 and UDP ports 4791, 21451 and 21452. Node-to-node communications with RDMA-capable Ethernet connections use TCP port 21455 for data traffic and UDP port 21451 and 21452 for service discovery on the system. If you are using the RoCE protocol, ensure that traffic is also open for UDP port. Additionally, RDMA-capable Ethernet ports use Internet Group Management Protocol (IGMP) for group multicast communication for service discovery, so ensure that IGMP traffic is enabled on the firewall for redundant site configurations.
- Assign an IP address with a different subnet for each individual RDMA-capable Ethernet port on each node so that the system can select a unique route depending on the destination IP address that it is connecting to.
- RDMA-capable Ethernet ports can be used for both node-to-node communications and host attachment; however, do not share RDMA-capable Ethernet ports for hosts and node-to-node communications. RDMA-capable ports are not supported for connections to external storage. A variety of other protocols are also supported for host attachment and virtualization of external storage.
- For HyperSwap configurations, ensure that the number of interswitch links is sufficient for RDMA-capable connections between nodes. Use the peak traffic that can flow between sites in failure scenarios, such as a single-site failure, Metro Mirror connections, or volume mirroring between sites to determine the number of inter-switch links that are required for the system.

For systems that use RDMA-capable Ethernet ports for node-to-node communication, the system has the following limitations:

- Only IPv4 addresses are supported on RDMA-capable Ethernet ports.
- Only the default value of 1500 is supported for maximum transmission unit (MTU) for node-to-node communications that use RDMA-capable Ethernet ports.
- Port masking is not supported on RDMA-capable Ethernet ports. Due to this limitation, do not exceed the maximum of four ports for node-to-node communications.
- Hot-spare nodes are not supported on systems that use RDMA-capable Ethernet ports for node-to-node communications.
- Node-to-node communications that use RDMA-capable Ethernet ports are not supported in network configuration that contain more than 2 hops in the fabric of switches.
- Only certain models of the system support RDMA-capable Ethernet ports for node-to-node communications. For a list of the system hardware models that support RDMA-capable Ethernet ports, see the following website:

http://www-03.ibm.com/systems/support/storage/ssic/interoperability.wss

For other information about using RDMA-capable Ethernet ports on the system, go to the following website and search for `Configuration Limits and Restrictions`:

www.ibm.com/support

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

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

Procedure

To power on the system, complete the following steps.

1. All expansion enclosures should already be powered on.
2. Wait for all expansion enclosures to finish powering on.
3. 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.

   Notes:

   - Each enclosure has two power supply units. To provide power failure redundancy, connect the two power cords to separate power circuits.
   - Ensure that each power cable is secured to each PSU on the back of the enclosure.

What to do next

Next, you will connect an Ethernet cable to the technician port on the control enclosure, and initialize the system.

Chapter 3. Configuring the system

After initializing the system, you can complete the configuration of the system with the management GUI or command-line interface.

To use the management GUI to complete the configuration procedures after initializing the system, you need a supported browser and you need to log on to the system.

- To use the enclosure hardware, the system software must be configured. Your web browser is used to access the system's initialization and configuration interfaces. “Checking your web browser settings for the management GUI” on page 135 describes how to ensure that you are using a supported web browser.
- To create a new system of enclosures, for example, when you are creating your first system, refer to the "Knowledge Center topic, "User name and password for system initialization.". Then, follow the procedure that is described in “Connecting an Ethernet cable to the technician port ” on page 137.
- To add a control enclosure to an existing system, follow the procedure in Chapter 5, “Adding a control enclosure to an existing system ,” on page 143.
- Each control enclosure supports the connection of SAS expansion enclosures. These can be added by following the procedure in Chapter 4, “Adding an expansion enclosure to an existing system,” on page 141.

Checking your web browser settings for the management GUI

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

Before you begin

The management GUI supports the following HTML5-compliant browsers:

- Mozilla Firefox 63
- Mozilla Firefox Extended Support Release (ESR) 60
- Microsoft Internet Explorer (IE) 11 and Microsoft Edge 42
- Google Chrome 70

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) 11 and Microsoft Edge running on Microsoft Windows 10, JavaScript is enabled by default and requires no additional configuration.

   For Microsoft Internet Explorer (IE) running on Microsoft Windows 7, complete the following steps:

   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, complete the following steps:

a. In Internet Explorer, click **Tools** > **Internet Options**.
b. Click **Security**.
c. Click **Trusted sites**.
d. On the **Trusted sites** window, 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** window.
f. Click **Close** on the **Trusted sites** window.
g. Click **OK**.
h. Refresh your browser.

For Google Chrome, complete the following steps:

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 Microsoft Internet Explorer (IE) 11 and Microsoft Edge running on Microsoft Windows 10, cookies are enabled by default and require no additional configuration.

For Mozilla Firefox, complete the following steps:

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, complete the following steps:

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, complete the following steps:

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 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** window.

   For Microsoft Internet Explorer (IE) 11 and Microsoft Edge running on Microsoft Windows 10, file download is enabled by default and requires no additional configuration.
4. Enable scripts to disable or replace context menus (Mozilla Firefox only).

   For Mozilla Firefox, complete the following steps:
   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.

Connecting an Ethernet cable to the technician port

Before you initiate the system, you must connect an Ethernet cable to the technician port on the 2076-724 control enclosure.

Before you begin

Procedure

1. Locate the technician ports on the control enclosure, as shown in the following figure:

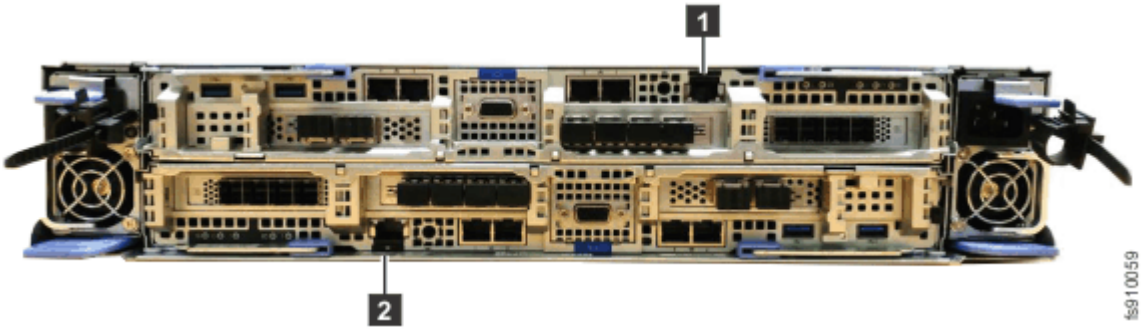


Figure 148. Technician ports

1 Node canister 1 technician port
2 Node canister 2 technician port

2. Connect an Ethernet cable to a technician port. The cable must be long enough to connect easily to a notebook computer.
3. Open a new web browser page.
4. If the node canisters will communicate with each other via RDMA over Ethernet, then browse to address `http://service` or press the wrench button on the initialization page to access the Service Assistant Tool. Use the **Change node IP** tab of the Service Assistant Tool to configure the node IP settings for the node as provided by the customer on the worksheet. Repeat this step for each node canister that will be in the system.
5. Using the initialization GUI, enter the requested information by using the worksheets that you created during the planning phase, including the management IP address and service IP addresses.

Initial setup of the system

After the service setup of the new system is complete, use the management GUI to input initial system setup information.

Before you begin

You should consider your particular storage implementation and the background information in the **Configuring** section of this IBM online documentation. You should also have on hand the following information:

- The management IP address of the control enclosure
- Licensed function information.
- The worksheet on Call Home and Storage Insights registration details that was completed during the system planning process

Procedure

Use the management GUI to complete the following high-level tasks:

1. From the management GUI, choose and create a new password.
2. Configure licensed functions.
   - If encryption was purchased, it can either be activated now, or later by opening the management GUI and selecting **Settings** > **Security** > **Encryption**.
   - For External Virtualization, the base license entitles Storwize V7000 2076-724 to all the licensed functions such as Virtualization, FlashCopy, Global Mirroring, and Metro Mirroring. (Real-Time Compression is not supported in Storwize V7000 Gen 3.)

     Any connected storage that is not Storwize V7000 requires the External Virtualization license, which is based on a per capacity unit of metric. Because subcapacity licensing applies, the amount of FlashCopy or Remote Mirror licenses does not always need to be the same quantity as that of External Virtualization.
3. If you are already using IBM Storage Insights, log in to Storage Insights, select **Add Storage System** and register the new system by using the IP address.

   Important: If you have not been using IBM Storage Insights, you were registered for this service during the initial system setup process and will receive an email when Storage Insights is ready for use. IBM® Storage Insights is an IBM Cloud™ software as a service offering that can help you monitor and optimize the storage resources in the system and across your data center.
4. If any errors exist, you are prompted to resolve them.
5. Review the system summary page, then click **Finish**.

   The customer Setup Wizard creates the storage array.

Important: Make sure that you have at least one storage pool now so that the MDisk in it can be used as a quorum disk, before you attempt to run the fix procedure against any error code that might appear in the events page of the management GUI.

6. Referring to the Call Home and Storage Insights configuration worksheet, use the following link to register the new system:

   IBM Call Home - Activate Assets and Register Clients

7. If you just activated an encryption license, when you log in to the system for the first time, you should click **Enable Encryption** and complete the encryption setup wizard.

Verify and update the system firmware and software

After the installation and initial configuration of the hardware is complete, IBM strongly recommends that you check to see whether a later level of firmware and software is available, and update to that level.

To download updated drive firmware, system software, and other applicable software, go to https://www.ibm.com/support/fixcentral and follow the instructions there.

Chapter 4. Adding an expansion enclosure to an existing system

When you add an expansion enclosure to an existing system, you must use the 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 135). For more information on installing a 5U expansion enclosure, see “Installing an optional 5U SAS expansion enclosure” on page 29.

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. In the management GUI, select **Monitoring** > **System**. On the **System -- Overview** page, select **Add Enclosure**. When a new enclosure is cabled correctly to the system, the **Add Enclosures** action automatically displays on the **System -- Overview** page. If this action does not appear, review the installation instructions to ensure the new enclosure is cabled correctly. You can also add a new enclosure by selecting **Add Enclosure** from the **System Actions** menu.
8. Continue to follow the on-screen instructions.

Chapter 5. Adding a control enclosure to an existing system

To add a control enclosure to an existing system, you must first install it in the rack. Then, you must connect it to the system through a zone in the SAN or by using RDMA over Ethernet.

About this task

The management GUI requires a supported web browser (see “Checking your web browser settings for the management GUI” on page 135).

Note: When you add a control enclosure, do not use the initialization tool.

Procedure

To add a control enclosure to an existing 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 or to a 25 Gbps (or faster) Ethernet.

   See “Connecting Fibre Channel cables to the control enclosure” on page 123 or “Configuration details for using RDMA-capable Ethernet ports for node-to-node communications ” on page 131.
4. Configure the zoning on the SAN switches.

   The correct zoning provides a way for the ports to connect to each other. If the configuration tool for the SAN switches does not provide the worldwide port names (WWPNs), use the service assistant to find them.

   If the new node canisters must communicate with other node canisters by using RDMA over Ethernet, then use the service assistant tool or the **satask chnodeip** command to set the node IP of each node that will be in the system.
5. Start the management GUI on the existing system.
6. Go to **Monitoring** > **System**.
7. In the management GUI, select **Monitoring** > **System**. On the **System -- Overview** page, select **Add Enclosure**. When a new enclosure is cabled correctly to the system, the **Add Enclosures** action automatically displays on the **System -- Overview** page. If this action does not appear, review the installation instructions to ensure the new enclosure is cabled correctly. You can also add a new enclosure by selecting **Add Enclosure** from the **System Actions** menu.
8. Continue to follow the on-screen instructions.

Appendix A. Accessibility features for the system

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 system:

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. HTML documents are tested by 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 system 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 for operations and to initiate menu actions that can also be done through mouse actions. You can go to the system online documentation from the keyboard by using the keyboard shortcuts for your browser or screen-reader software. See your browser or screen-reader software Help for a list of keyboard shortcuts 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 V7000 IBM Knowledge Center.

The *Statement of Limited Warranty* is included (in hardcopy form) with your product. See “Publications and related libraries ” on page xxvii for the part number.

Appendix C. Control enclosure requirements

Before you install a system, your physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Safety notices

Use the following general safety information for all rack-mounted devices:

DANGER:

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**

- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)**

CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- (For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- (For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

Important: In addition, remember:

- The rack design must support the total weight of the installed enclosures and incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or normal use.
- The rack must not exceed the maximum enclosure operating ambient temperature of 35-degrees C (95-degrees Fahrenheit). Air is drawn through the control enclosure by fans in each node canister and each power supply.

  In particular, the rack front and rear doors must be at least 60% perforated to enable sufficient airflow through the enclosure. If there is less airflow, additional mechanisms are required to cool the enclosure. An appropriate IBM rack configuration would be the 7014-T42 IBM Rack Model T42, with standard rear door and feature code 6069 Front Door For 2.0 Meter Rack (High Perforation).
- The rack must have a safe electrical distribution system. It must provide over-current protection for the enclosure and must not be overloaded by the total number of enclosures installed. The electrical power consumption rating that is shown on the nameplate should be observed.
- The electrical distribution system must provide a reliable ground for each enclosure in the rack.

Power requirements for each power supply (two per enclosure)

Ensure that your environment meets the following power requirements.

To aid in power and cooling requirements planning, Table 22 on page 150 lists the rating of each power supply unit (PSU) by enclosure.

The power that is used by the system depends on various factors, including the number of enclosures and drives in the system and the ambient temperature.

Table 22. Power specifications per power supply

Model and type	PSU	Input power requirements	Maximum input current	Maximum power output
2076-724 Control Enclosure	2000 W (2)	200 V to 240 V single phase AC At a frequency of 50 Hz or 60 Hz IEC C14 standardized	10A (x2)	2000 W
Storwize V7000 2076-U7B Control Enclosure	2000 W (2)	200 V to 240 V single phase AC At a frequency of 50 Hz or 60 Hz IEC C14 standardized	10A (x2)	2000 W
2076-92F Expansion Enclosure with 92 3.5-inch form factor SAS drive slots	2400 W (2)	180 V to 264 V single phase AC at a frequency of 47 Hz to 63 Hz	16A Requires a C19 power socket (C19 PDU)	2400 W

Note: One or more C19 power distribution units (PDU) are needed in the rack to connect power to 2076-92F power supplies.

The power and thermal measurements that are shown in Table 23 on page 151 were obtained in the specific operating environment and under the conditions described. These measurements are presented as an illustration; measurements that are obtained in other operating environments might vary. Conduct your own testing to determine specific measurements for your environment.

Table 23. Power consumption examples per enclosure

Model and type	Configuration	Total power consumption	Caloric value (BTU/hr)
Storwize V7000 2076-724 and Storwize V7000 2076-U7B	1 enclosure with up to 24 dual port NVMe drives (1.92 TB, 3.84 TB, 7.68 TB, 15.36 TB), 3 host adapters	711 W	2426
2076-92F	1 enclosure with 92 10 TB nearline SAS drives	848 W	-
2076-92F	1 enclosure with 92 15 TB tier 1 flash drives	748 W	-

Each Storwize V7000 enclosure contains two PSUs for redundancy. The total power consumption values represent the total power that is drawn by both PSUs.

Environmental requirements

System airflow is from the front to the rear of each enclosure:

- Airflow passes between drive carriers and through each enclosure.
- Airflow for the upper 4U of the 5U enclosure enters the front, passes between the disk drives, and exits through the large fans in the rear of the enclosure.
- Airflow for the lower 1U of the 5U enclosure is driven through the power supplies via 40 mm X 56 mm fans. Air continues through the chassis cooling the ESMs or controllers and exits the rear of the enclosure.
- The combined power and cooling module exhausts air from the rear of each canister.

Ensure that your environment falls within the ranges that are shown in Table 24 on page 151.

Table 24. Temperature requirements

Environment	Ambient temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating	5°C to 35°C (41°F to 95°F)	0 - 3048 m (0 - 10000 ft)	8% to 80% noncondensing	23°C (73°F)
Non-operating	1°C to 50°C (34°F to 122°F)	-305 to 12192 m (-1000 to 40000 ft)	8% to 80% noncondensing	27°C (80°F)
Storage	1°C to 60°C (34°F to 140°F)		5% to 80% noncondensing	29°C (84°F)
Shipping	-40°C to 60°C (-40°F to 140°F)		5% to 100% condensing, but not precipitating	

Note: Decrease the maximum air temperature by 1 degree C per 300 m above 900 m.

Dimensions and weight requirements for rack installation

Ensure that space is available in a standard 19" rack that is capable of supporting the enclosure. The rack rail kit supports racks with either threaded round or square rail mounting holes. The following table lists the dimensions and weights of the enclosures.

Table 25. Physical characteristics of the enclosures

Enclosure	Height	Width	Depth	Maximum weight	
				Drive ready (without drive modules)	Fully configured (with drive modules)
Storwize V7000 2076-724 and Storwize V7000 2076-U7B Control Enclosures with 24 drive slots	87 mm (3.46 in.)	483 mm (19.0 in.)	850 mm (33.5 in.)	44.85 kg (98.87 lb)	49.65 kg (109.46 lb)
2076-92F Expansion Enclosure with 92 drive slots	222.2 mm (8.75 in.)	483 mm (19.0 in.)	968 mm (38.1 in.)	67 kg (147.7 lb)	135 kg (297 lb)

Warning: The 2076-92F model needs 968 mm from the rack front post to the back of the cable management arm (CMA). Some racks do not provide sufficient space to close the rear door. In addition, allow 905 mm from the front post to the back of the enclosure. To allow space for the power cables, provide 60 to 70 mm from the back of the enclosure.

Figure 149 on page 152 shows the rack space requirements for the 92F models.

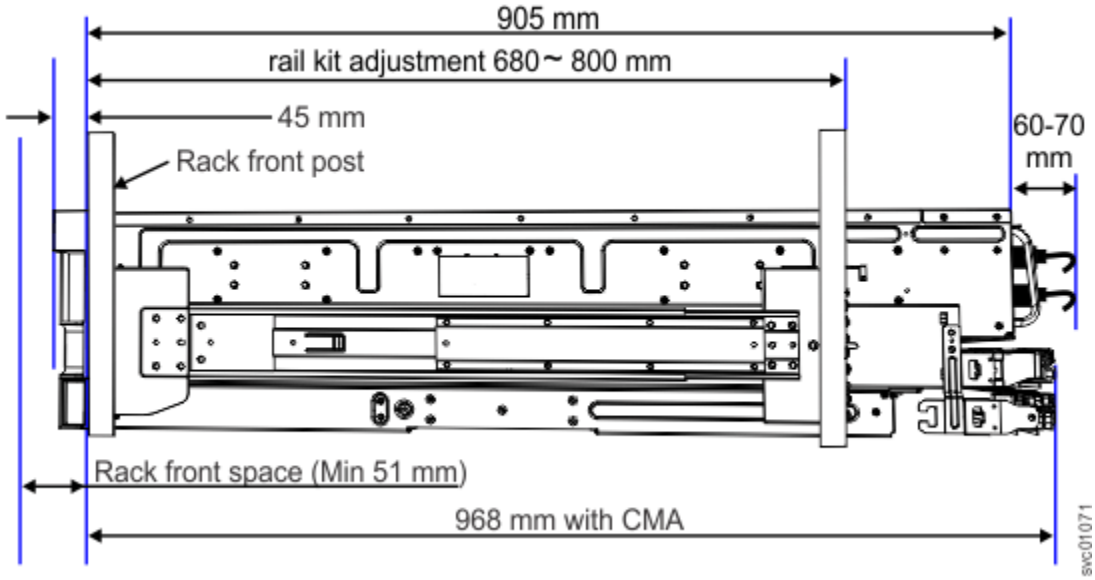


Figure 149. Rack space requirements for the 92F models

The following table shows the rack space requirements for the control enclosure in tabular form.

Table 26. Rack space requirements for the Storwize V7000 2076-724 or Storwize V7000 2076-U7B control enclosure

Minimum rail length	Maximum rail depth
685 mm (27 in.)	765 mm (30.1 in.)

Additional space requirements

Ensure that these additional space requirements, as shown in Table 27 on page 153, are available around the enclosures.

Table 27. Clearances

Location	Additional space requirements	Reason
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	Minimum: 100 mm (4 in.) This is not needed for 92F models.	Cable exit

Supported drives for Storwize V7000 enclosures

Table 28 on page 153 provides drive specifications for your Storwize V7000 system.

Table 28. Drive specifications

Model and type	3.5-inch drives	2.5-inch drives
Storwize V7000 2076-724 or Storwize V7000 2076-U7B Control Enclosure with 24 2.5-inch drive slots	-	24 dual port NVMe drives (1.92 TB, 3.84 TB, 7.68 TB, 15.36 TB), or 24 dual port FCM NVMe drives (4.8 TB, 9.6 TB, 19.2 TB)
2076-12F Expansion Enclosure with 12 3.5-inch drive slots	3.5” 7.2 K RPM HDD 2 TB, 3 TB, 4 TB, 6 TB, 8 TB	-
2076-24F Expansion Enclosure with 24 2.5-inch drive slots	-	• 2.5” Flash Drive 200 GB, 400 GB, 800 GB, 1.6 TB • 2.5” 15 K RPM HDD 300 GB, 600 GB • 2.5” 10K RPM HDD 600 GB, 900 GB, 1.2 TB, 1.8 TB • 2.5” 7.2 K RPM HDD 1 TB, 2 TB
2076-92F Expansion Enclosure with 92 3.5-inch drive slots	• 3.5” 7.2 K RPM 12 Gbps SAS nearline HDD 6 TB, 8 TB, 10 TB • 3.5” 10K RPM HDD 1.2 TB, 1.8 TB • 3.5” 15 K RPM HDD 600 GB	• 2.5” Flash Drive 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB, 15.36 TB

Acoustical specifications for NVMe drives for each Storwize V7000 enclosure

Table 29 on page 154 provides the acoustical specifications for the 2076-92F SAS expansion enclosure in accordance with ISO 9296[1, 2, 3].

Important: Hearing conservation program (HCP) procedures are required for field service personnel servicing a 2076-92F SAS expansion enclosure.

Table 29. Declared noise emissions for 2076-92F SAS expansion enclosures in accordance with ISO 9296

Model and type	Declared A-Weighted Sound Power Level, L_{WAd} (B)		Declared A-Weighted Sound Pressure Level, L_{pAm} (dB)	
	Operating	Idling	Operating	Idling
Fully configured expansion enclosure, MTM/ Model, 2076-92F	8.5	8.5	85	85

Notes:

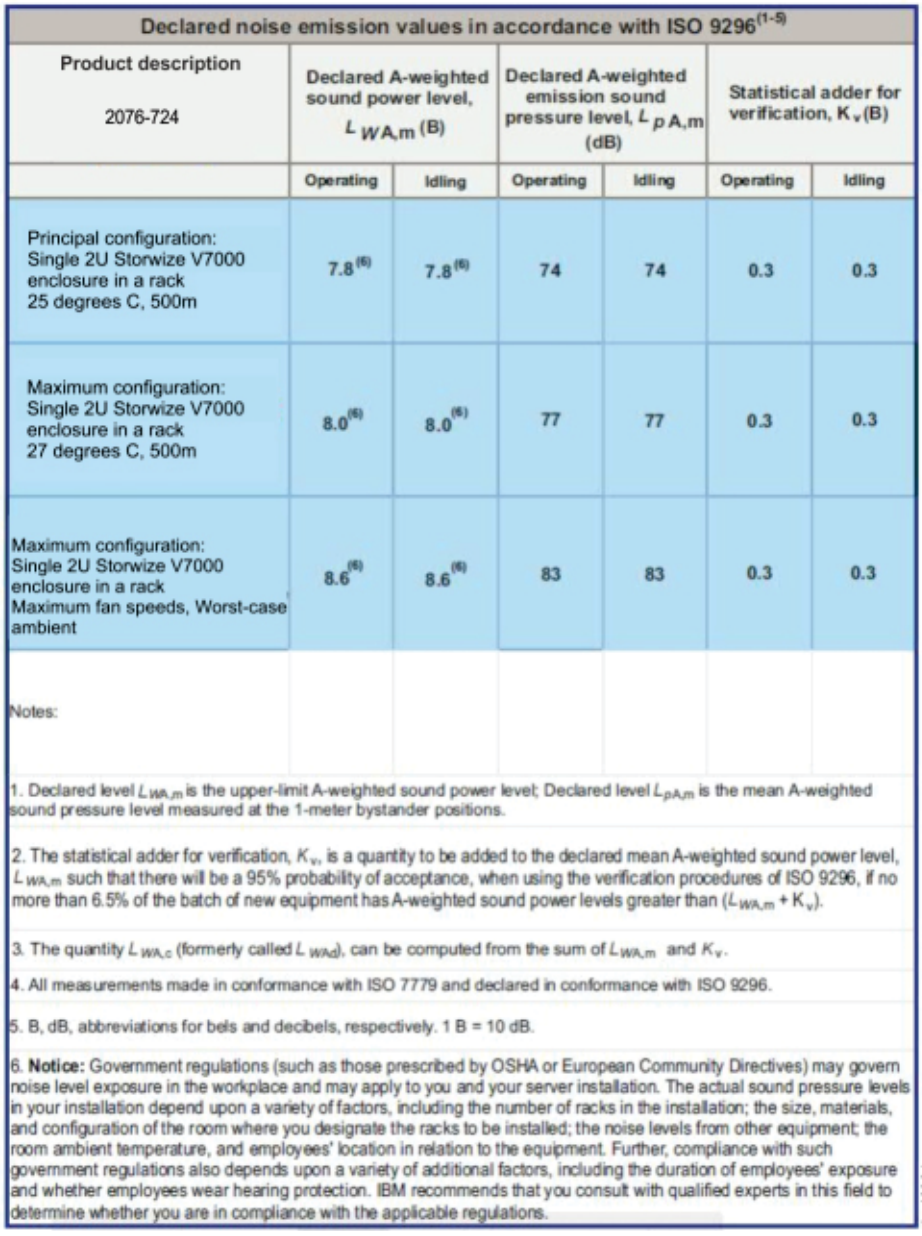
1. Declared level L_{WAd} is the upper-limit A-weighted sound power level. Declared level L_{pAm} is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.
2. All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.
3. "B" and "dB" are abbreviations for bels and decibels, respectively. 1 B = 10 dB.

Important: Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. This system is available with an optional acoustical door feature that can help reduce the noise emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

The noise emission level that is stated is the declared (upper limit) sound power level, in decibels, for a random sample of machines. All measurements are made in accordance with ISO 7779 and reported in conformance with ISO 9296.

Acoustical Declaration with Noise Hazard Notice

Figure 150 on page 155 indicates the declared noise emissions values in accordance with ISO 9296.



Declared noise emission values in accordance with ISO 9296[1-5]

Product description 2076-724	Declared A-weighted sound power level, $L_{WA,m}$ (B)		Declared A-weighted emission sound pressure level, $L_{pA,m}$ (dB)		Statistical adder for verification, K_v (B)	
	Operating	Idling	Operating	Idling	Operating	Idling
Principal configuration: Single 2U Storwize V7000 enclosure in a rack 25 degrees C, 500m	7.8[6]	7.8[6]	74	74	0.3	0.3
Maximum configuration: Single 2U Storwize V7000 enclosure in a rack 27 degrees C, 500m	8.0[6]	8.0[6]	77	77	0.3	0.3
Maximum configuration: Single 2U Storwize V7000 enclosure in a rack Maximum fan speeds, Worst-case ambient	8.6[6]	8.6[6]	83	83	0.3	0.3

Notes:

1. Declared level $L_{WA,m}$ is the upper-limit A-weighted sound power level; Declared level $L_{pA,m}$ is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.

2. The statistical adder for verification, K_v, is a quantity to be added to the declared mean A-weighted sound power level, $L_{WA,m}$ such that there will be a 95% probability of acceptance, when using the verification procedures of ISO 9296, if no more than 6.5% of the batch of new equipment has A-weighted sound power levels greater than ($L_{WA,m} + K_v$).

3. The quantity $L_{WA,c}$ (formerly called L_{WAd}), can be computed from the sum of $L_{WA,m}$ and K_v.

4. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.

5. B, dB, abbreviations for bels and decibels, respectively. 1 B = 10 dB.

6. **Notice:** Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

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Figure 150. Acoustical Declaration with Noise Hazard Notice

Shock and vibration specifications for Storwize V7000 enclosures

Table 30 on page 155 and Table 31 on page 156 provide the shock and vibration testing results for your Storwize V7000 system.

Table 30. Shock testing results

Shock categories	Test level	Performance
Operational	5 g 10 ms 1/2 Sine	<=25 g 10 ms
Non-operational	30 g 10 ms 1/2 Sine	<=75 g 11 ms

Table 31. Vibration testing results

Vibration categories	Test level	Performance
Operational	0.21 grms 5-500 Hz Random	Throughput loss <=10% FCAL <= 0.68 grms
Non-operational	1.04 grms 2-200 Hz Random	<=3.12 grms
Shipping	0.3 g 2-200 Hz Sine	<=5 g
Rotational vibration	Normal operation performance measurements in enclosure with no external vibration.	Throughput loss for all drives of the same type within performance profile.

Appendix D. SAS expansion enclosure requirements

Before you install a Storwize V7000 2076-12F , 2076-24F , or 2076-92F SAS expansion enclosure, your physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Power requirements for each power supply (two per enclosure)

Ensure that your environment meets the following power requirements.

To aid in power and cooling requirements planning, Table 32 on page 157 lists the rating of each power supply unit (PSU) by enclosure.

The power that is used by the system depends on several factors, including the number of enclosures and drives in the system and the ambient temperature.

Table 32. Power specifications per power supply

Model and type	PSU	Input power requirements	Maximum input current	Maximum power output	Caloric value (BTU/hr)
2076-12F or 2076-24F	764 W (2)	100 V to 240 V single phase AC at a frequency of 50 Hz to 60 Hz	10A for 100V 6A for 240V	764W	2607
2076-92F	2400 W (2)	AC 200-240 V~ , (nominal; +/- 10% tolerant) 50/60 Hz (nominal; 47-63 Hz tolerant)	12 A (x2 - per inlet redundancy) Requires an IEC C20 appliance coupler (16-20A branch circuit or C19 power socket PDU)	2400W	8189

Note: One or more C19 power distribution units (PDU) are needed in the rack to connect power to 2076-92F power supplies.

The power and thermal measurements that are shown in Table 33 on page 158 were obtained in the specific operating environment and under the conditions described. These measurements are presented as an illustration; measurements that are obtained in other operating environments might vary. Conduct your own testing to determine specific measurements for your environment.

Table 33. Power consumption examples per enclosure

Model and type	Configuration	Total power consumption
2076-12F or 2076-24F	1 enclosure with 24 2.5-inch flash drives	151 W
2076-12F or 2076-24F	1 enclosure with 24 10 K SAS drives	175 W
2076-12F or 2076-24F	1 enclosure with 24 15 K SAS drives	234 W
2076-12F or 2076-24F	1 enclosure with 12 7.2 K nearline SAS drives	158 W

Table 33. Power consumption examples per enclosure (continued)		
Model and type	**Configuration**	**Total power consumption**
2076-92F	1 enclosure with 92 10 TB nearline SAS drives	848 W
2076-92F	1 enclosure with 92 15 TB tier 1 flash drives	748 W

Each SAS expansion enclosure contains two PSUs for redundancy. The total power consumption values represent the total power that is drawn by both PSUs.

Environmental requirements

System airflow is from the front to the rear of each enclosure:

- Airflow passes between drive carriers and through each enclosure.
- Airflow for the upper 4U of the 5U enclosure enters the front, passes between the disk drives, and exits through the large fans in the rear of the enclosure.
- Airflow for the lower 1U of the 5U enclosure is driven through the power supplies via 40mm X 56mm fans. Air continues through the chassis cooling the ESMs or controllers and exits the rear of the enclosure.

- The combined power and cooling module exhausts air from the rear of each canister.

Ensure that your environment falls within the ranges that are shown in Table 34 on page 160.

Table 34. Temperature requirements

Environment	Ambient temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating	5°C to 35°C (5°C to 40°C for 24F) 41°F to 95°F (41°F to 104°F for 24F)	0 - 2133 m (0 - 7000 ft)	8% to 80% noncondensing	23°C (73°F)
	5°C to 30°C (41°F to 86°F)	2134 - 3048 m (7001 - 10000 ft)		
Non-operating	1°C to 50°C (34°F to 122°F)	-305 to 12192 m (-1000 to 40000 ft)	8% to 80% noncondensing	27°C (80°F)
Storage	1°C to 60°C (34°F to 140°F)		5% to 80% noncondensing	29°C (84°F)
Shipping	-40°C to 60°C (-40°F to 140°F)		5% to 100% condensing, but not precipitating	

Dimensions and weight requirements for rack installation

Ensure that space is available in a standard 19" rack that is capable of supporting the enclosure. The rack rail kits support racks with either threaded round or square rail mounting holes. The following table lists the dimensions and weights of the expansion enclosures.

Table 35. Physical characteristics of the expansion enclosures

Enclosure	Height	Width	Depth	Maximum weight	
				Drive ready (without drive modules)	Fully configured (with drive modules)
2076-12F or 2076-24F	87 mm (3.46 in.)	483 mm (19.0 in.)	556 mm (21.9 in.)	16.7 kg (36.8 lb)	25.0 kg (55.1 lb)

Table 35. Physical characteristics of the expansion enclosures (continued)					
Enclosure	**Height**	**Width**	**Depth**	**Maximum weight**	
				Drive ready (without drive modules)	**Fully configured (with drive modules)**
2076-92F	222.2 mm (8.75 in.)	483 mm (19.0 in.)	968 mm (38.1 in.)	67 kg (147.7 lb)	135 kg (297 lb)

Warning: Some racks will not provide sufficient space to close the rear door. and 2076-92F model enclosures need 968 mm from the rack front post to the back of the cable management arm (CMA). In addition, allow 905 mm from the front post to the back of the enclosure. To allow space for the power cables, provide 60 to 70 mm from the back of the enclosure.

Figure 151 on page 161 shows the rack space requirements for the 2076-24F , and 2076-92F expansion enclosures.

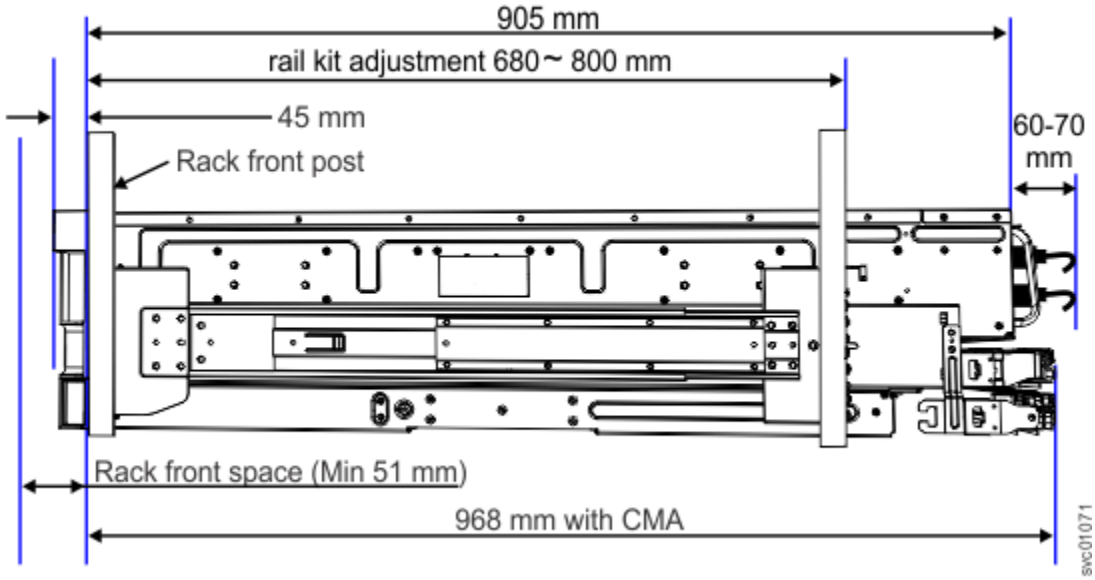

Figure 151. Rack space requirements for the 2076-24F , and 2076-92F expansion enclosures

The following table shows the rack space requirements for the expansion enclosures in tabular form.

Table 36. Rack space requirements for the 2076-24F , and 2076-92F expansion enclosures		
Enclosure	**Minimum rail length**	**Maximum rail depth**
2076-12F or 2076-24F	595 mm (23.4 in.)	795 mm (31.3 in.)
2076-92F	680 mm (26.8 in.)	800 mm (31.5 in.)

Additional rack space requirements

Ensure that these additional space requirements, as shown in Table 37 on page 162, are available around the enclosures.

Table 37. Clearances		
Location	**Additional space requirements**	**Reason**
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	Minimum: 100 mm (4 in.) This space is not needed for or 2076-92F models.	Cable exit

Supported drives for Storwize V7000 SAS expansion enclosures

Table 38 on page 163 provides drive specifications for Storwize V7000 SAS expansion enclosures.

All drives are dual-port and hot-swappable. Drives of the same form factor and connector type can be intermixed within an enclosure.

Table 38. Drive specifications		
Model and type	**3.5-inch drives**	**2.5-inch drives**
2076-12F or 2076-24F	-	• 2.5” Flash Drive 200 GB, 400 GB, 800 GB, 1.6 TB • 2.5” 15 K RPM HDD 300 GB, 600 GB • 2.5” 10K RPM HDD 600 GB, 900 GB, 1.2 TB, 1.8 TB, 2.4 TB • 2.5” 7.2 K RPM HDD 2 TB
2076-92F	-	• 2.5” Flash Drive 1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 7.68 TB, 15.36 TB

Acoustical specifications for Storwize V7000 SAS expansion enclosures

The following table provides the acoustical specifications for the 2076-24F SAS expansion enclosures.

Table 39. Acoustical specifications for 2076-24F SAS expansion enclosures	
Model and type	**Acoustical output per enclosure**
2076-24F	Less than 6.3 B LwA -- Operating (40% Average seek rate) @ 23°C ambient

The noise emission level that is stated is the declared (upper limit) sound power level, in decibels, for a random sample of machines. All measurements are made in accordance with ISO 7779 and reported in conformance with ISO 9296.

Table 40 on page 164 provides the acoustical specifications for the and 2076-92F SAS expansion enclosures in accordance with ISO 9296(1,2,3).

Important: Hearing conservation program (HCP) procedures are required for field service personnel servicing a or 2076-92F SAS expansion enclosure.

Table 40. Declared noise emissions for and 2076-92F SAS expansion enclosures in accordance with ISO 9296

Model and type	Declared A-Weighted Sound Power Level, L_{WAd} (B)		Declared A-Weighted Sound Pressure Level, L_{pAm} (dB)	
	Operating	Idling	Operating	Idling
Fully configured expansion enclosure, MTM/ Model , 2076-92F	8.5	8.5	85	85

Notes:

1. Declared level L_{WAd} is the upper-limit A-weighted sound power level. Declared level L_{pAm} is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.
2. All measurements are made in conformance with ISO 7779 and declared in conformance with ISO 9296.
3. "B" and "dB" are abbreviations for bels and decibels, respectively. 1 B = 10 dB.

Important: Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. This system is available with an optional acoustical door feature that can help reduce the noise emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Shock and vibration specifications for Storwize V7000 SAS expansion enclosures

Table 41 on page 164 and Table 42 on page 164 provide the shock and vibration testing results for Storwize V7000 SAS expansion enclosures.

Table 41. Shock testing results

Shock categories	Test level	Performance
Operational	5 g 10 ms 1/2 Sine	<=25 g 10 ms
Non-operational	30 g 10 ms 1/2 Sine	<=75 g 11 ms

Table 42. Vibration testing results

Vibration categories	Test level	Performance
Operational	0.21 grms 5-500Hz Random	Throughput loss <=10% FCAL <= 0.68 grms
Non-operational	1.04 grms 2-200Hz Random	<=3.12 grms
Shipping	0.3 g 2-200Hz Sine	<=5 g
Rotational vibration	Normal operation performance measurements in enclosure with no external vibration.	Throughput loss for all drives of the same type within performance profile.

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CAN ICES-3 (A)/NMB-3(A)

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Generelle Informationen:

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要領に基づく定格入力電力値：Knowledge Centerの各製品の
仕様ページ参照

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

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