IBM System Storage EXN1000 Storage Expansion Unit

Hardware and Service Guide

GC26-7802-02

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Note:
Before using this information and the product it supports, be sure to read the general information in "Notices" on page 51.

Safety and environmental notices

This section contains information about:

Safety notices and labels

When using this product, observe the danger, caution, and attention notices contained in this guide. The notices are accompanied by symbols that represent the severity of the safety condition.

The following sections define each type of safety notice and provide examples.

The following notices and statements are used in IBM® documents. They are listed below in order of increasing severity of potential hazards. Follow the links for more detailed descriptions and examples of the danger, caution, and attention notices in the sections that follow.

- **Note:** These notices provide important tips, guidance, or advice.
- **"Attention notices" on page vii:** These notices indicate potential damage to programs, devices, or data.
- **"Caution notices" on page vi:** These statements indicate situations that can be potentially hazardous to you.
- **"Danger notices":** These statements indicate situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these situations.
- In addition to these notices, "Labels" on page vi may be attached to the product to warn of potential hazards.

Danger notices

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people. A lightning bolt symbol accompanies a danger notice to represent a dangerous electrical condition. A sample danger notice follows.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on 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. (D004)

A comprehensive danger notice provides instructions on how to avoid shock hazards when servicing equipment. Unless instructed otherwise, follow the procedures in the following danger notice.

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:

- **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 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 below when installing, moving, or opening covers on this product or attached devices.**

To Disconnect:

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

To Connect:

1. **Turn off everything (unless instructed otherwise).**
2. **Attach all cables to devices.**
3. **Attach signal cables to the connectors.**
4. **Attach power cords to the outlets.**
5. **Turn on the devices.**

(D005)

Labels

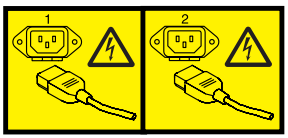
As an added precaution, safety labels are often installed directly on products or product components to warn of potential hazards.

The actual product safety labels may differ from these sample safety labels:

(L001)

DANGER

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



(L003)

DANGER

Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.

Caution notices

A caution notice calls attention to a situation that is potentially hazardous to people because of some existing condition. A caution notice can be accompanied by different symbols, as in the examples below:

If the symbol is...	It means...
	A hazardous electrical condition with less severity than electrical danger.
	A generally hazardous condition not represented by other safety symbols.
	A hazardous condition due to the use of a laser in the product. Laser symbols are always accompanied by the classification of the laser as defined by the U. S. Department of Health and Human Services (for example, Class I, Class II, and so forth).

Attention notices

An attention notice indicates the possibility of damage to a program, device, or system, or to data. An exclamation point symbol may accompany an attention notice, but is not required. A sample attention notice follows:

Attention: Do not bend a fibre cable to a radius less than 5 cm (2 in.); you can damage the cable. Tie wraps are not recommended for optical cables because they can be easily overtightened, causing damage to the cable.

Laser safety

When using an NVRAM5 or NVRAM6 cluster media converter, the storage system must be installed in a restricted access location.

CAUTION:
This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

This equipment contains Class 1 laser products, and complies with FDA radiation Performance Standards, 21 CFR Subchapter J and the international laser safety standard IEC 825-2.

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

Attention: In the United States, use only SFP or GBIC optical transceivers that comply with the FDA radiation performance standards, 21 CFR Subchapter J. Internationally, use only SFP or GBIC optical transceivers that comply with IEC standard 825–1. Optical products that do not comply with these standards may produce light that is hazardous to the eyes.

Usage restrictions

The optical ports of the modules must be terminated with an optical connector or with a dust plug.

Rack safety

Rack installation

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 should not be moved for servicing unless specified by manufacturer. Attempting to move the drawer partially or completely out of the rack may cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Rack relocation (19″ rack)

CAUTION:
Removing components from the upper positions in the rack cabinet improves rack stability during 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 do the following:**
  - **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.**
  - **Inspect the route that you plan to take when moving the rack 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 came with your rack cabinet for the weight of a loaded rack cabinet.**
  - **Verify that all door openings are at least 760 x 2030 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 ten degrees.**
  - **Once the rack cabinet is in the new location, do the following:**
    - **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 of the pallet and bolt the rack cabinet to the pallet.**

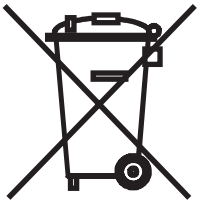
(R002)

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at:

www.ibm.com/ibm/environment/products/prp.shtml

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. IBM recomienda a los propietarios de equipos de tecnología de la informacion (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean utiles. IBM dispone de una serie de programas y servicios de devolucion de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar informacion sobre las ofertas de reciclado de productos de IBM en el sitio web de IBM www.ibm.com/ibm/environment/products/prp.shtml.



Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labelled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'étiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, contact your local waste disposal facility or go to the following Web site:

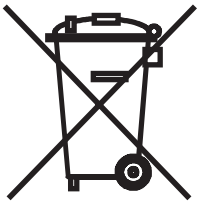
www.ibm.com/ibm/environment/products/batteryrecycle.shtml

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the IBM part number listed on the battery available prior to your call.

For Taiwan:

廢電池請回收

For the European Union:



Note: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

Fire suppression systems

A fire suppression system is the responsibility of the customer. The customer's own insurance underwriter, local fire marshal, or a local building inspector, or both, should be consulted in selecting a fire suppression system that provides the correct level of coverage and protection. IBM designs and manufactures equipment to internal and external standards that require certain environments for reliable operation. Because IBM does not test any equipment

for compatibility with fire suppression systems, IBM does not make compatibility claims of any kind nor does IBM provide recommendations on fire suppression systems.

Contents

Figures

Tables

About this document

This guide provides general information about the IBM System Storage™ EXN1000 Storage Expansion Unit (model number 2861-001), a roadmap on the installation, and information on managing the expansion unit, which connects to N series storage systems.

Compliance ID 2861–NAS covers the model 2861–001.

Who should read this document

This document is for customer use. It addresses setup, operation, and servicing of the 2861–001. This document is intended to provide information to customers, operators, administrators, installers, and service personnel.

Supported features

IBM N series products are driven by NetApp® Data ONTAP® software. Some features described in the product software documentation are neither offered nor supported by IBM. Please contact your local IBM representative or reseller for further details.

Information about supported features can also be found at the following Web site:

www.ibm.com/storage/support/nas/

A listing of currently available N series products and features can be found at the following Web site:

www.ibm.com/storage/nas/

How this document is organized

This document contains the following chapters:

- Chapter 1, "Preparing for the installation," on page 1 describes the preparation requirements for first-time installation of the IBM EXN1000 Storage Expansion Unit (model number 2861-001).
- Chapter 2, "Connecting an EXN1000 expansion unit," on page 13 describes how to connect a single EXN1000 expansion unit or a loop of EXN1000 expansion units to a supported N series storage system, how to ground your system, and how to connect your system to power.

- Chapter 3, “Monitoring the EXN1000 expansion unit,” on page 19 describes how to monitor the EXN1000 expansion unit from the error messages displayed on the console that is connected to the N series storage system and identifies the location of the various LEDs on the EXN1000 expansion unit.
- Chapter 4, “Replacing EXN1000 expansion unit devices,” on page 29 describes how to replace EXN1000 expansion units in a rack, disks in an EXN1000 expansion unit, and other devices.
- Appendix A, “Recommended power line sizes,” on page 39 describes the recommended AC power line lengths.
- Appendix B, “FRU/CRU and power cord list for N series products,” on page 41 lists the feature codes for the power cords and FRU/CRUs for the EXN1000 expansion unit.
- Appendix C, “IBM System Storage N series documentation,” on page 45 lists the documents in the IBM System Storage N series hardware and Data ONTAP product libraries, as well as other related documents.

Getting information, help, and service

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your IBM N series product, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation and use the diagnostic tools that come with your system.
- Refer to the IBM Support Web site for information on known problems and limitations.

Using the documentation

Information about the N series product and Data ONTAP software is available in printed documents and a documentation CD that comes with your system. The same documentation is available as PDF files on the IBM NAS support Web site:

www.ibm.com/storage/support/nas/

Web sites

IBM maintains pages on the World Wide Web where you can get the latest technical information as well as download device drivers and updates.

- For N series product information, go to the following Web site:
  www.ibm.com/storage/nas/
- For N series support information, go to the following Web site:
  www.ibm.com/storage/support/nas/
- For AutoSupport information, go to the following Web site:
  www.ibm.com/storage/support/nas/
- You can order publications through the IBM Publications Ordering System at the following Web site:
  www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi/

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services. Visit the following Web site for support telephone numbers:

www.ibm.com/planetwide/

Supported servers and operating systems

IBM N series products attach to many servers and many operating systems. To determine the latest supported attachments, visit the following Web site and access the IBM System Storage N series interoperability matrix:

www.ibm.com/storage/support/nas/

Firmware updates

As with all devices, it is recommended that you run the latest level of firmware, which is embedded in DataONTAP. If there are changes, they will be posted to the following Web site:

www.ibm.com/storage/support/nas/

Note: If you do not see new changes on the Web site, you are running the latest level of firmware.

Verify that the latest level of firmware is installed on your machine before contacting IBM for technical support.

Conventions and terminology used in this document

This guide uses the following terminology, command conventions, format conventions and keyboard conventions:

Terminology

In this and other IBM N series documents, the term filer or storage system describes IBM N series models that either contain internal disk storage or attach to the disk storage expansion units specifically designed for the IBM N series storage systems. There are three disk storage expansion units specifically designed for the IBM N series:

- IBM EXN4000 fibre-channel disk storage expansion unit
- IBM EXN2000 fibre-channel disk storage expansion unit
- IBM EXN1000 serial advanced technology attachment (SATA) storage expansion unit

Note: None of these expansion units are intended to attach to a gateway system.

This guide uses the following terms:

- *Active-Active configuration* (sometimes referred to as *clustered configuration*) refers to a High Availability system with at least two nodes that share resources to provide redundancy.
- *AT-FCX* refers to the EXN1000 module.
- *Device carrier* refers to the container that encases a fan/power supply unit or a disk.
- *Disk* applies to any SATA disk encased in its device carrier.
- *Disk shelf* or *expansion unit* refers to any shelf or expansion unit containing hard disk drives.
- *Loop* refers to one or more daisy-chained EXN1000 expansion units connected to an N series storage system.
- *Module* refers to the AT-FCX module.
- *System* and *N series storage system* refer to the filer, either by itself or with additional expansion units.
- *SES* refers to SCSI Enclosure Services.

Command conventions

You can enter filer commands on the system console or from any client that can obtain access to a filer using a Telnet session. In examples that illustrate commands executed on a UNIX® workstation, the command syntax and output might differ, depending on your version of UNIX.

Formatting conventions

The following table lists different character formats used in this guide to set off special information.

Formatting convention	Type of information
Italic type	• Words or characters that require special attention. • Placeholders for information you must supply. For example, if the guide requires you to enter the `fctest` *adaptername* command, you enter the characters “fctest” followed by the actual name of the adapter. • Book titles in cross-references.
`Monospaced` font	• Command and daemon names. • Information displayed on the system console or other computer monitors. • The contents of files.
`Bold monospaced` font	Words or characters you type. What you type is always shown in lowercase letters, unless your program is case-sensitive and uppercase letters are necessary for it to work properly.

Keyboard conventions

This guide uses capitalization and some abbreviations to refer to the keys on the keyboard. The keys on your keyboard might not be labeled exactly as they are in this guide.

What is in this guide...	What it means...
hyphen (-)	Used to separate individual keys. For example, Ctrl-D means holding down the Ctrl key while pressing the D key.
Enter	Used to refer to the key that generates a carriage return, although the key is named Return on some keyboards.
type	Used to mean pressing one or more keys on the keyboard.
enter	Used to mean pressing one or more keys and then pressing the Enter key.

How to send your comments

Your feedback is important in helping us provide the most accurate and high-quality information. If you have comments or suggestions for improving this document, send us your comments by e-mail to starpubs@us.ibm.com or use the Readers' Comments form at the back of this publication. Be sure to include the following:

- Exact publication title
- Form number (for example, GC26-1234-02)
- Page numbers to which you are referring

If the Reader Comment Form in the back of this manual is missing, you can direct your mail to:

International Business Machines Corporation
Information Development
Department GZW
9000 South Rita Road
Tucson, Arizona 85744-0001 U.S.A.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Chapter 1. Preparing for the installation

This chapter describes the preparation requirements for first-time installation of the IBM EXN1000 Storage Expansion Unit (model number 2861-001).

This chapter discusses the following topics:

Required manuals, tools and equipment

In addition to this document, you need the following manuals:

- *Installation and Setup Instructions* for your storage system
- *EXN1000 Installation and Setup Instructions*
- *Hardware and Service Guide* for your storage system

Required tools and equipment for installation

You must supply the following tools and equipment:

- Ethernet LAN cables
- Fibre Channel cables
- Console (for example, a PC or laptop)
- #2 Phillips screwdriver and slotted screwdriver
- Pointed tool for setting switches
- 7-mm nut driver
- Antistatic ESD strap and grounding leash

Handling static-sensitive devices

Attention: The EXN1000 expansion unit uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you can damage these components. Put on an antistatic ESD strap and grounding leash to free yourself of static electricity before touching any electronic components.

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

To reduce the possibility of electrostatic discharge (ESD), 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 its 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 static-protective package, touch it to an unpainted metal part of the system unit for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it in its static-protective package. Do not place the device on your system unit cover or on a metal table. Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

Planning and organizing the installation

This section identifies the shipment contents and the rules and regulations you need to observe for the proper installation of your EXN1000 expansion unit. It also provides an overview of the entire system installation process and the appropriate documentation references for the procedures.

For detailed information, see the following topics:

- "Hardware specifications" on page 3
- "Checking shipment package contents" on page 4
- "Rules for installing EXN1000 expansion units in a rack" on page 4
- "Guide to the installation process" on page 5

Hardware specifications

The following table lists the characteristics and requirements for your hardware.

Table 1. EXN1000 physical characteristics and environmental requirements

Physical characteristics			
	Weight	With maximum number of disk drives	77 lbs (35 kg)
		Empty	50.6 lbs (23 kg)
	Rack units		3U
	Height		5.25 in. (13.3 cm)
	Width		17.6 in. (44.8 cm)
	Depth		20 in. (50.9 cm)
Clearance dimensions			
	Front-cooling	All versions	6 in. (15.3 cm)
	Front-maintenance	All versions	25 in. (63.5)
	Rear-cooling	All versions	12 in. (30.5 cm)
	Rear-maintenance	All versions	12 in. (30.5 cm)
Environmental requirements **Note:** Operating at the extremes of the following environmental requirements might increase the risk of device failure.			
	Operating temperature maximum range		50° F to 104° F (10° C to 40° C)
	Operating temperature recommended range		68° F to 77° F (20° C to 25° C)
	Nonoperating temperature range		-40° F to 149° F (-40° C to 65° C)
	Relative humidity		10 to 90% noncondensing
	Recommended operating temperature relative humidity range		40 to 55%
	Maximum wet bulb temperature		28° C (82° F)
	Maximum altitude		3050 m (10,000 ft.)
	Acoustic level		56.4 dBA @ 23° C 5.64 bels @ 23° C

Table 2. EXN1000 electrical requirements

Input voltage		**100 to 120V**		**200 to 240V**	
		Worst-case	**Typical single PSU/ system**	**Worst-case**	**Typical single PSU/ system**
Input current measured, A	7.2K drives	2.85	1.56/3.12	1.43	0.78/1.56
Input power measured, W	7.2K drives	284	155/310	283	152/304
Thermal dissipation, BTU/hr	7.2K drives	968	529/1058	964	517.5/1035
Inrush peak, A	7.2K drives	21	20	12.5	12.0
Input power frequency, Hz		50 to 60			
Maximum electrical power		7 A		3.5 A	

Note: *Worst-case* indicates a system running with one PSU and high fan speed. *Typical* indicates a system running two PSUs on two circuits.

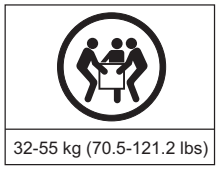
Checking shipment package contents

Make sure that your shipment package includes the following items, in addition to the *IBM System Storage EXN1000 Storage Expansion Unit Hardware and Service Guide*:

- *EXN1000 Installation and Setup Instructions*.
- An EXN1000 expansion unit containing the power supplies and SATA disks you ordered.
- FC-AL cables and power cords, as ordered.
- A rail kit for mounting the EXN1000 in a standard 19–inch rack may also be included.

Rules for installing EXN1000 expansion units in a rack

You need to observe the following rules and restrictions when installing an EXN1000 expansion unit in a standard 19-inch (48.26 cm) equipment rack with mounting rails:



DANGER

DANGER The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

Attention: Remove the power supplies and fan units from the chassis before attempting to lift the system.

- You must work with two other people.

  DANGER

  The EXN1000 expansion unit is extremely heavy. To avoid injuring yourself or damaging the EXN1000 expansion unit, you must work with at least two other people when you install the EXN1000 expansion unit in the rack.

- Install the expansion unit at the bottom of the rack first.

  DANGER

  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. (R001 part 1 of 2)

  For additional rack safety notices, refer to "Rack safety" on page viii.

- When installing EXN1000 expansion units in a rack, do not exceed the maximum storage limit for your N series storage system.
- Always install the EXN1000 expansion units fully loaded. Do not remove the disk drives or drive blank covers to reduce the weight.

Guide to the installation process

The following table provides a guide to the EXN1000 expansion unit installation process.

Refer to the *Installation and Setup Instructions* for your storage system for complete installation details.

DANGER

Three people are required to lift the EXN1000 during installation. Do not remove the disk drives or drive blank covers to reduce the weight.

Table 3. EXN1000 expansion unit installation process

Stage	Procedure	Is the procedure required?	For instructions, go to...
1	Install the N series storage system in a freestanding rack.	Only if the EXN1000 expansion unit installation is part of a new system installation.	Hardware guide for your N series storage system, or the *Installation and Setup Instructions* that came with your N series storage system.
2	Install the EXN1000 expansion units in the rack. **Attention:** When installing multiple storage expansion units that share a drive loop, always install them sequentially as they will appear in the loop.	Yes, if the EXN1000 expansion unit is an addition to your existing system or if your new system was not shipped in a rack.	See the *EXN1000 Installation and Setup Instructions*.
3	Connect the EXN1000 expansion unit to the N series storage system.	Only in the following scenarios: • If the EXN1000 expansion unit installation is part of a new system installation. • If the EXN1000 expansion unit is the first in an additional loop to your existing system.	Chapter 2, "Connecting an EXN1000 expansion unit," on page 13, or the *EXN1000 Installation and Setup Instructions*.

Table 3. EXN1000 expansion unit installation process (continued)

Stage	Procedure	Is the procedure required?	For instructions, go to...
4	Connect the EXN1000 expansion units.	Only in the following scenarios: • If the new system installation has multiple EXN1000 expansion units. • If the EXN1000 expansion unit is an addition to your existing system.	See the *EXN1000 Installation and Setup Instructions*.
5	Ground the EXN1000 expansion units and N series storage system.	Yes.	"Grounding EXN1000 expansion units" on page 15, or the *EXN1000 Installation and Setup Instructions*.
6	Connect the EXN1000 expansion units to a power source.	Yes.	"Connecting the EXN1000 expansion unit to a power source" on page 15
		If the system was shipped in a rack, you must connect the rack to a power source.	See the documentation that shipped with your cabinet.
7	Configure the system.	Yes, if the EXN1000 expansion unit installation is part of a new system installation.	See the *Data ONTAP Software Setup Guide* for your version of Data ONTAP.

Before you begin your installation

Before you install one or more EXN1000 expansion units in a rack, you need to understand the following information:

- EXN1000 expansion unit numbering
- Drive addressing
- Speed setting
- Supported disk drives
- Drive bay requirements

Attention: Verify that all shelf IDs are correct and sequential in the individual loop(s). If this system was configured by manufacturing, there are labels on the outside of the packaging carton and on the side of the expansion unit chassis to indicate which loop on which node (Filer 1 or 2) that shelf should be located. Make certain the expansion units are placed and cabled according to these labels. The filer nodes may also have a label on the packaging carton and chassis side to clearly distinguish the nodes (Filer 1 and Filer 2).

EXN1000 expansion unit numbering

Each EXN1000 expansion unit in a loop must have a unique ID. A valid shelf ID is from 1 through 7. ID 1 is used for the first EXN1000 in a new loop, or if the filer also contains disks, then ID 2 is used for the EXN1000 closest to the N series storage system controller (which uses ID 1). Shelf IDs for additional expansion units are incremented sequentially from the number of the first expansion unit (either 1 or 2).

Each EXN1000 expansion unit shipped with an N series storage system has its assigned ID already set on its back panel and has a shelf ID label already placed on its front bezel.

You must ensure that the EXN1000 expansion unit has the correct shelf ID number on the label. If you change the shelf ID of the expansion unit by changing the ID switch at the rear of the unit, replace the shelf ID label to match the new shelf ID for the unit.

Note: Additional shelf ID labels are supplied with your unit.

The shelf ID label is on the right side of the unit, as shown in the following illustration.

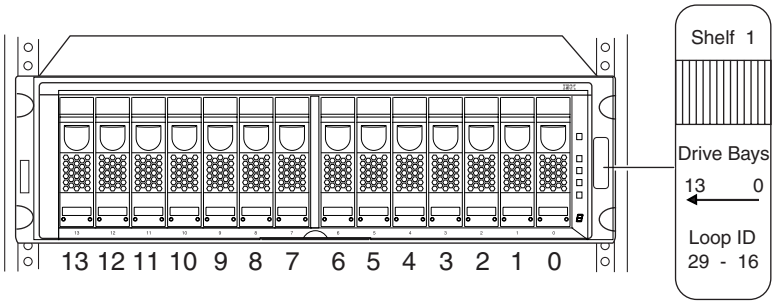


Figure 1. Shelf ID label

IBM sets the disk shelf IDs at the factory on configured systems, using an ID switch on the back panel. If you order additional EXN1000 expansion units, you must set the disk shelf ID and apply the correct labels provided with the EXN1000.

Note: If you enter a shelf ID that is not from 1 through 7, the drive addresses default to those of a shelf with the ID switch set to 7 even though the Shelf ID indicator in the front operation panel displays a dash (-).

The example in the following illustration shows an EXN1000 expansion unit with the disk shelf ID set to 2.

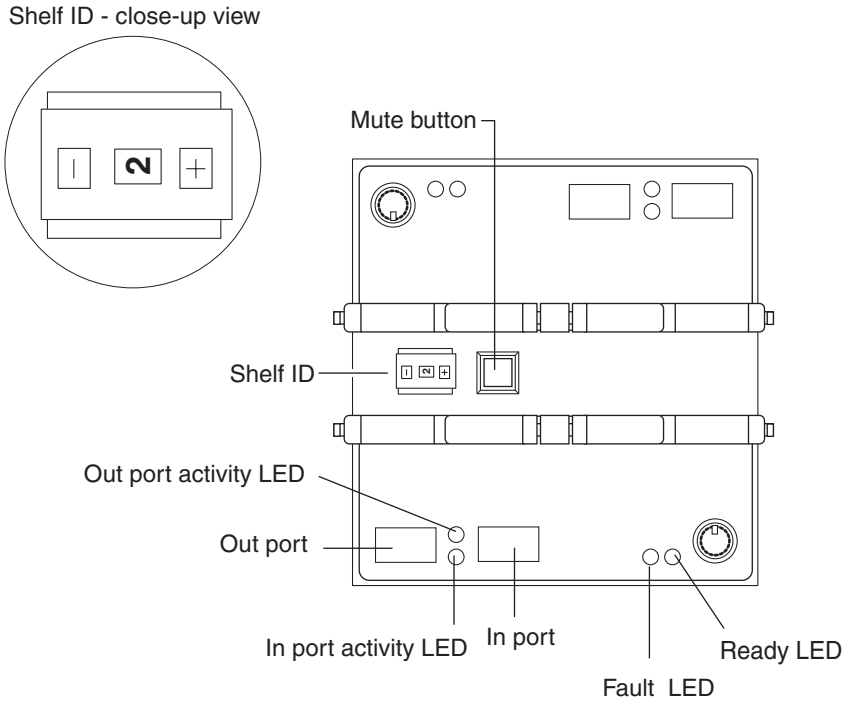


Figure 2. EXN1000 shelf ID

Drive addressing

In addition to identifying the disk shelf ID and the direction of the drive bays, the ID label on the right side of the EXN1000 expansion unit includes the drive address. The drive address identifies the disks in the EXN1000 expansion unit. The last sheet of the quick reference cards that come with your EXN1000 expansion unit shows the seven disk shelf IDs and their corresponding drive addresses.

Note: For AT-FCX module A, drive addressing is in descending order, and for AT-FCX module B, drive addressing is ascending order. AT-FCX A is the top controller module in the EXN1000. AT-FCX B is the bottom controller module.

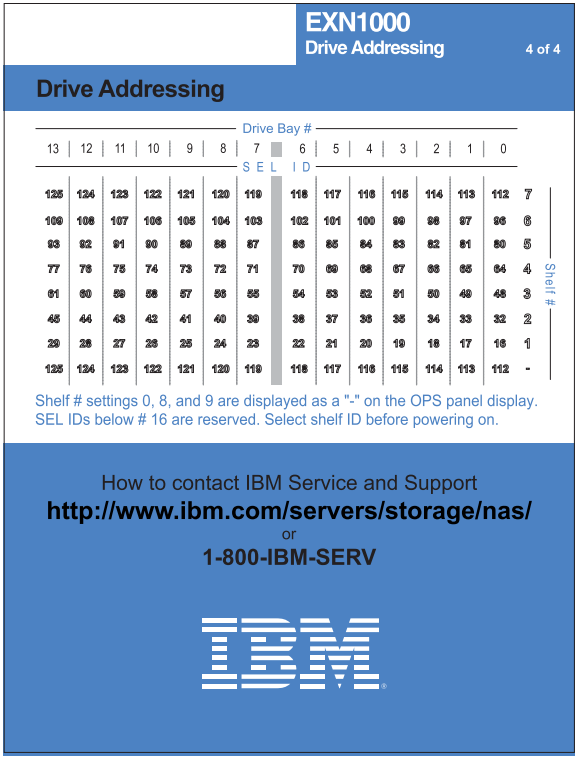


Figure 3. EXN1000 disk shelf IDs and drive addressing

Speed setting

Make sure that all expansion unit speed switches are set to the correct position for your application.

- If connecting to an N3700 storage system, the speed switch must be set to the 1Gb position.
- If connecting to any other N series storage system, the speed switch must be set to the 2Gb position.

Note: The speed setting switch is located on the circuit board inside the AT-FCX module. In order to set or adjust the speed setting, you must remove the AT-FCX module. See “Replacing an AT-FCX module” on page 35.

The speed setting must be set before you power on the expansion unit.

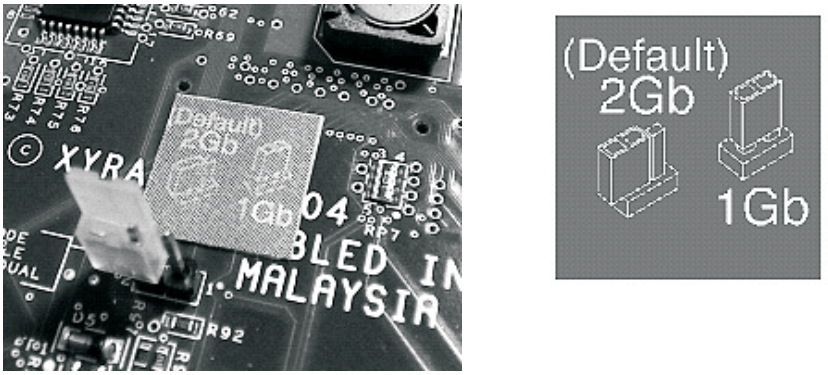


Figure 4. EXN1000 speed setting switch

Supported disk drives

For the types of disks the EXN1000 expansion unit supports, visit the following Web site:

www.ibm.com/storage/nas/

Note: You should not mix different drive types in the same expansion unit.

Drive bay requirements

For enclosure services monitoring to work, drive bays 0 and 1 must contain a disk. In addition, the EXN1000 expansion unit must be populated with at least 5 hard disk drives to ensure proper operation.

Attention: All drive bays in the expansion must contain either a hard disk drive or a drive blank cover to maintain proper air flow and cooling.

The 14 drive bays in the EXN1000 expansion unit are numbered 0 through 13 from right to left, as shown in Figure 1 on page 8. Hard disk drives should be populated in adjacent drive bays in the expansion unit in this sequence, beginning with drive bay 0.

The N series storage system uses the enclosure services monitoring method to monitor environmental conditions of the EXN1000 expansion unit. Enclosure services conditions are communicated to the N series storage system through the AT-FCX module.

The following table describes the three stages of enclosure services monitoring.

Table 4. Stages of enclosure services monitoring

Stage	Device	What it does...
1	N series storage system	Uses a subset of SCSI-3 commands to monitor the EXN1000 expansion unit for data related to disk presence, temperature, power supply units, and fan status.
2	N series storage system	Sends the commands through its Fibre Channel interface to the AT-FCX I/O module on the EXN1000 expansion unit.
3	AT-FCX module	Collects the requested data and sends it to the storage appliance.

Chapter 2. Connecting an EXN1000 expansion unit

This chapter describes how to connect a single EXN1000 expansion unit or a loop of EXN1000 expansion units to a supported N series storage system or to other expansion units. This chapter also describes how to ground your system and how to connect your system to power.

This chapter discusses the following topics:

Handling fiber-optic cables

Before you use fiber-optic cables, read the following precautions.

Attention: To avoid damage to the fiber-optic cables, follow these guidelines:

- Do not route the cable along a folding cable-management arm.
- When attaching to a device on slide rails, leave enough slack in the cable so that it does not bend to a radius of less than 38 mm (1.5 in.) when extended or become pinched when retracted.
- Route the cable away from places where it can be snagged by other devices in the rack cabinet.
- Do not overtighten the cable straps or bend the cables to a radius of less than 38 mm (1.5 in.).
- Do not put excess weight on the cable at the connection point. Be sure that the cable is well supported.

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

Connecting EXN1000 expansion units

This section describes the requirements for connecting the EXN1000 expansion unit to N series storage systems and other expansion units. For detailed instructions about how to install and connect one or more EXN1000 expansion units in a rack, refer to the *Installation and Setup Instructions*.

- IBM strongly recommends using optical (fibre channel) cabling whenever possible.
- Refer to the *IBM System Storage N series Introduction and Planning Guide* for details about the maximum number of drive loops, maximum number of expansion units or hard disk drives per loop, maximum total storage capacity, and maximum total number of hard disk drives for configurations using your N series storage system. (For example, you can connect a maximum of one loop of three fully populated expansion units to an N3700.)
- Multipath looping is recommended for all configurations to provide additional redundancy. This includes single or dual controller and single or multiple EXN1000 expansion units.
- Do not mix Fibre Channel EXN2000 or EXN4000 and SATA EXN1000 expansion units in the same loop.

EXN1000 expansion unit cabling requirements

You must meet the cabling requirements discussed in the following sections when connecting the EXN1000 AT-FCX module to an N series storage system or to other expansion units.

For the latest information on cabling requirements, see the *Installation and Setup Instructions* and the *Hardware and Service Guide* for your storage system.

Connecting the expansion unit directly to the N series storage system

When connecting the EXN1000 to an N series storage system, you must use appropriate cables and connectors according to the following guidelines:

- **For direct connections to N3700 storage systems with system serial numbers between 13-00032 and 13-01000 (in general, these are N3700 systems shipped prior to January 31, 2006):** Use a NAS-to-EXP fibre channel copper cable (#2020 or 2022). For attachment to an N3700 Model A10, one NAS-to-EXP fibre channel copper cable is required. For attachment to an N3700 Model A20, two NAS-to-EXP fibre channel copper cables are required.
- **For direct connections to N3700 storage systems with system serial numbers 13-01001 or higher (in general, these are N3700 systems shipped after January 31, 2006):** Use an LC-to-LC fibre channel optical cable and 2 SFPs for attachment to an N3700 Model A10. Use 2 LC-to-LC fibre channel optical cables and 4 SFPs for attachment to an N3700 Model A20.

- **For direct connections to all other N series storage systems:** Use an LC-to-LC fibre channel optical cable and one SFP.

Connecting the expansion unit to other expansion units

When connecting the EXN1000 to other expansion units, IBM strongly recommends using LC-to-LC fibre channel optical cables. You must use 2 SFPs per LC-to-LC fibre channel optical cable.

Note: SFP-to-SFP fibre channel copper cables may also be used for connections (to a maximum of three meters) between expansion units.

Grounding EXN1000 expansion units

For proper grounding, you must daisy-chain the EXN1000 expansion units together with the provided braided copper cables and screws. If possible, you should ground the N series storage system to the EXN1000.

Each EXN1000 expansion unit is shipped with a 0.25m (~6 inch) braided copper cable and an M5 x 0.5 inch Phillips head screw. The copper cable has a hole on each end for grounding shelf-to-shelf.

For detailed instructions about how to ground connected EXN1000 expansion units in a rack, refer to the *Installation and Setup Instructions* for your storage system.

Connecting the EXN1000 expansion unit to a power source

The EXN1000 expansion unit is shipped with two power supplies, installed in bay PSU1 and bay PSU2, respectively, and an AC power cord for each power supply. You must have separate circuit breakers for each power supply.

For detailed instructions about how to connect EXN1000 expansion units to a power source, refer to the *EXN1000 Installation and Setup Instructions*.

Hot-adding an EXN1000 expansion unit to an existing loop

This section provides information about how to hot-add an EXN1000 expansion unit to an existing loop. It also tabulates the error messages that appear on your N series storage system console if the attempt at hot-adding was unsuccessful.

Note: The hot-added EXN1000 expansion unit must have new drives that will be used as spares only.

Attention: It is recommended that you stop all I/O processes before hot-adding an EXN1000 to an existing loop. Perform a hot-add only during off-peak times.

To hot-add an EXN1000 expansion unit to an existing loop, complete the following steps:

1. Put on the antistatic ESD strap and grounding leash.
2. Verify that you received the disk shelf ID labels.
3. Install the new EXN1000 expansion unit in the rack, cable and ground the EXN1000, and connect the power cables to the EXN1000, as described in the *Installation and Setup Instructions* you received with your N series product.

   CAUTION:
   Do not turn on the power to the EXN1000 expansion unit yet.

   After you have completed the installation steps described in the *Installation and Setup Instructions*, continue with Step 4.
4. Verify that all the cables are securely fastened.

   CAUTION:
   Poorly secured cables cause the N series storage system to panic over an open loop.
5. If you have not done so, give the EXN1000 expansion unit a unique disk shelf ID. It is recommended that you choose a number which is one higher than the previous shelf (or ID 1 if this is the first EXN1000 in the loop).
   a. Press the small buttons on the switch on the rear of the EXN1000 expansion unit, using the + button to raise the number and the - button to lower the number to a valid ID from 1 through 7. Refer to Figure 2 on page 9 for an illustration.

      Note: Only use disk shelf ID 7 if it is the last ID available. If you change a disk shelf ID, you must power-cycle the EXN1000 expansion unit for the new ID to take effect. The disk shelf ID display on the front of the EXN1000 expansion unit blinks until you power-cycle the EXN1000 expansion unit.

   b. Verify that the disk shelf ID is not being used in the loop by entering the following command at the console:

      ```
      fcstat device_map adaptername
      ```

   c. Select the correct matching shelf ID label, reference Figure 1 on page 8, and attach it to the right flange of the new EXN1000 expansion unit.

      CAUTION:
      An invalid disk shelf ID causes the N series storage system to panic.
6. Turn on the power to the EXN1000 expansion unit. You must wait 30 seconds for the shelf electronics to finish initializing.

7. In 60 seconds, the N series storage system recognizes the hot-added EXN1000 expansion unit.

Error messages

The following error messages appear on your N series storage system console if your attempt at hot-adding the EXN1000 expansion unit is unsuccessful.

Table 5. N series storage system console error messages

Error message	Explanation
`Open loop panic`	One of two reasons cause this error message to appear: • The shelf-to-shelf cable between the now second-to-last unit and the newly added EXN1000 expansion unit is defective or is not securely fastened. • The speed of the newly added EXN1000 expansion unit is incorrectly set.
`Soft address panic`	One of two reasons cause this error message to appear: • There is an invalid disk shelf ID. • The power was turned on before the disk shelf ID was changed and the EXN1000 expansion unit was not power-cycled after the disk shelf ID was changed.

Chapter 3. Monitoring the EXN1000 expansion unit

This chapter describes how to monitor the EXN1000 expansion unit from the error messages displayed on the console that is connected to the N series storage system and identifies the location of the various LEDs on the EXN1000 expansion unit.

Note: The quick reference cards in the slide-out tray at the base of the EXN1000 expansion unit describe the functions of each LED on the EXN1000 expansion unit and the suggested course of action.

This chapter discusses the following topics:

Monitoring the front operation panel

The front operation panel has five LEDs and a disk shelf ID display. The LEDs indicate whether your EXN1000 expansion unit is functioning normally or there are problems with the hardware. Hardware failure associated with the front operation panel of the EXN1000 expansion unit can be identified from the error messages displayed on your N series storage system console.

Location of LEDs

The following illustration shows the location of the disk shelf ID display and the front panel LEDs.

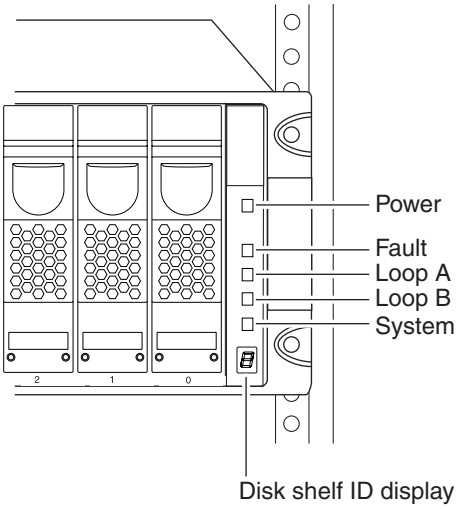


Figure 5. Front panel LEDs

Note: The Fault and System LEDs are amber. The other three LEDs are green. See Figure 6 on page 21 for an illustrated explanation of how the LEDs function.

Monitoring the disk shelf ID

When you use the switch on the back of the EXN1000 expansion unit to change the disk shelf ID, the disk shelf ID display on the front panel blinks until you power-cycle the EXN1000 expansion unit to make the change take effect.

LED status on the front operation panel

The following illustration is of the first sheet of the quick reference cards that come with your EXN1000 expansion unit. It shows the normal and fault conditions that the LEDs indicate and recommends a corrective action.

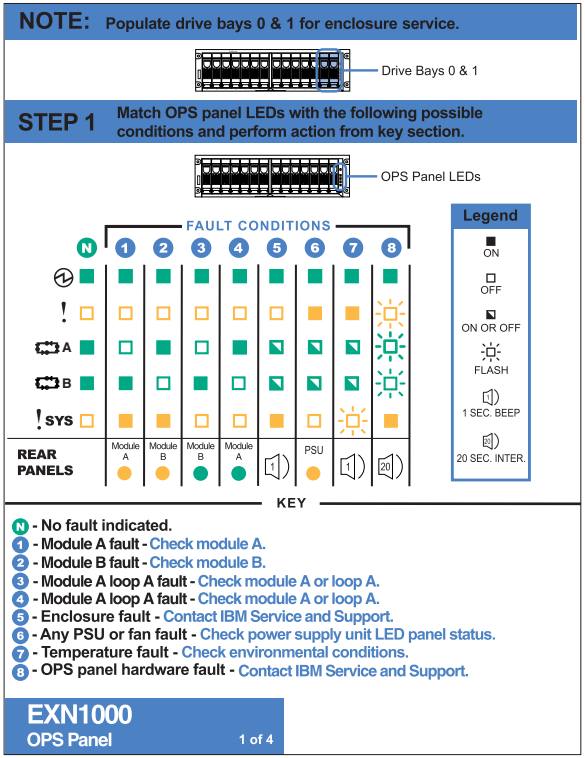


Figure 6. LED indications of normal and fault conditions

Front operation panel console error messages

The following error messages appear on your N series storage system console if an SES element on the front operation panel fails. For information about replacing an EXN1000 expansion unit, see "Removing an EXN1000 expansion unit" on page 29.

Table 6. N series storage system error messages

Error message	Action required
`Temperature sensor Element 1: failed`	The temperature sensor on the front operation panel failed. Contact IBM customer service to replace the EXN1000 expansion unit.
`Alarm Element 1: failed`	The alarm on the front operation panel failed. Contact IBM customer service to replace the EXN1000 expansion unit.
`Display Element 1: failed`	The display on the front operation panel failed. Contact IBM customer service to replace the EXN1000 expansion unit.

Monitoring the AT-FCX modules

The AT-FCX module has four LEDs. The LEDs indicate whether the module is functioning normally, or whether there are any problems with the hardware. You can also identify any hardware failure associated with the module from the error messages displayed on your N series storage system console.

This section also describes the different types of messages that appear on the N series storage system console in response to a command monitoring the AT-FCX.

Location of the module LEDs

The modules are in the middle of the back of the EXN1000 expansion unit. The following illustration shows the location of the LEDs for an AT-FCX. See "LED status on the AT-FCX" on page 23 for an illustrated explanation of the LED functions.

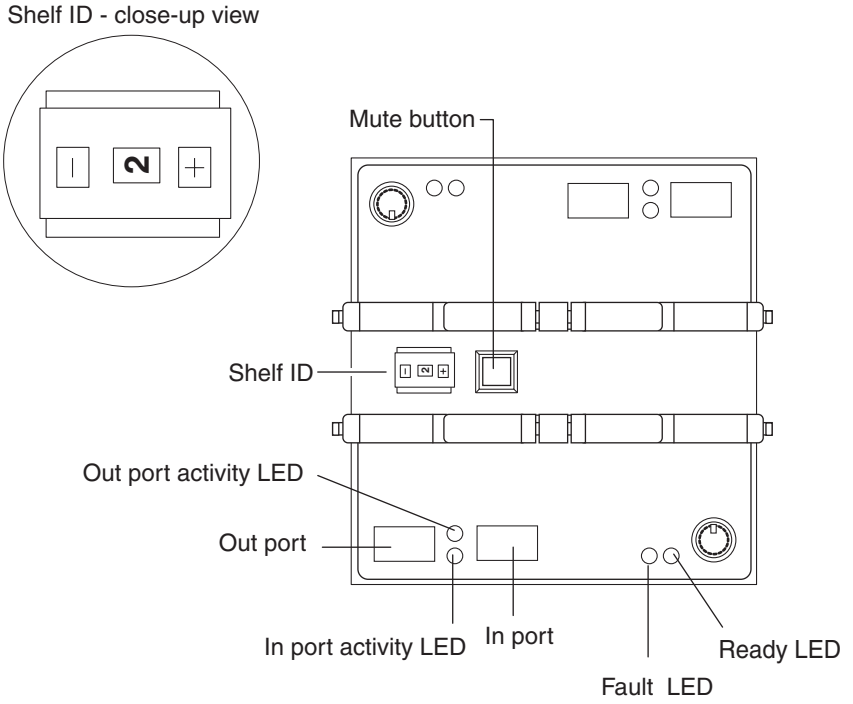


Figure 7. Location of the LEDs for an AT-FCX

Note: Because module A on the EXN1000 expansion unit is inverted, the location of the module A LEDs is the inverse of what is shown in the preceding illustrations.

LED status on the AT-FCX

The following illustration is of the second sheet of the quick reference cards that come with your EXN1000 expansion unit.

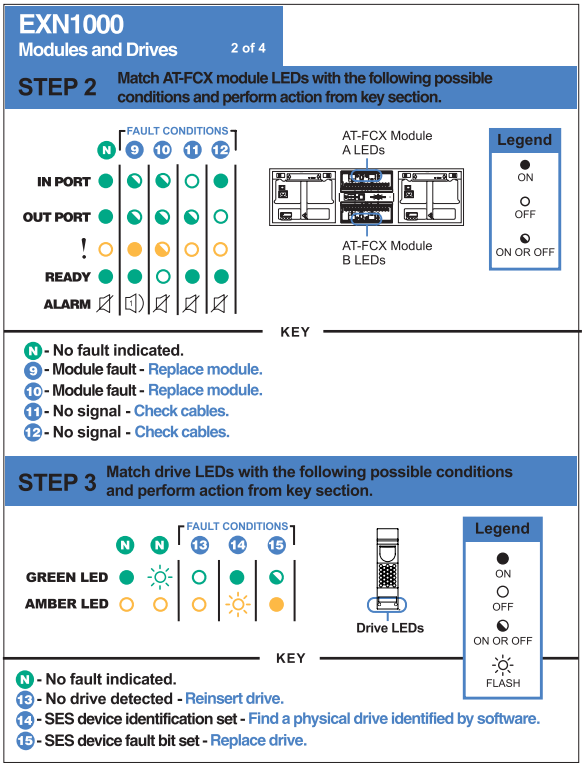


Figure 8. EXN1000 rear panel quick reference card

Note: The rest of the second sheet of the quick reference card identifies the LED status conditions for the ATA disks.

AT-FCX console error messages

The following error messages appear on your N series storage system console if an SES element on the AT-FCX fails. For information about replacing the AT-FCX, see “Replacing an AT-FCX module” on page 35.

Table 7. AT-FCX console error messages

Error message	Action required
`Temperature sensor 2: failed`	Contact IBM customer service to replace the module.
`Temperature sensor 3: failed`	
`SES electronics Element 1: component is from a different product family`	This configuration is unsupported. Contact IBM customer service to replace the module.
`SES electronics Element 1: failed`	Contact IBM customer service.
`SES electronics Element 2: failed`	The AT-FCX module on the expansion unit failed. Contact IBM customer service to replace the module.
`Temperature sensor 2: not installed or failed`	Contact IBM customer service.
`Environmental sensor 3: not installed or failed`	
`SES electronics Element 1: not installed or failed`	
`Vendor-specific Element 1: not installed or failed`	
`SES electronics Element 2: not installed or failed`	Communication with the temperature sensor on the AT-FCX module failed. Replace the AT-FCX module as described in “Hot-swapping a module” on page 37.
`Vendor-specific Element 2: not installed or failed`	

Monitoring the power supply

The power supply has four LEDs. The LEDs indicate whether the power supply or the integrated fan module is functioning normally or there are problems with the hardware. You can also identify any hardware failure associated with the power supplies from the error messages displayed on your N series storage system console.

The following illustration is of the third sheet of the quick reference cards that comes with your EXN1000 expansion unit.

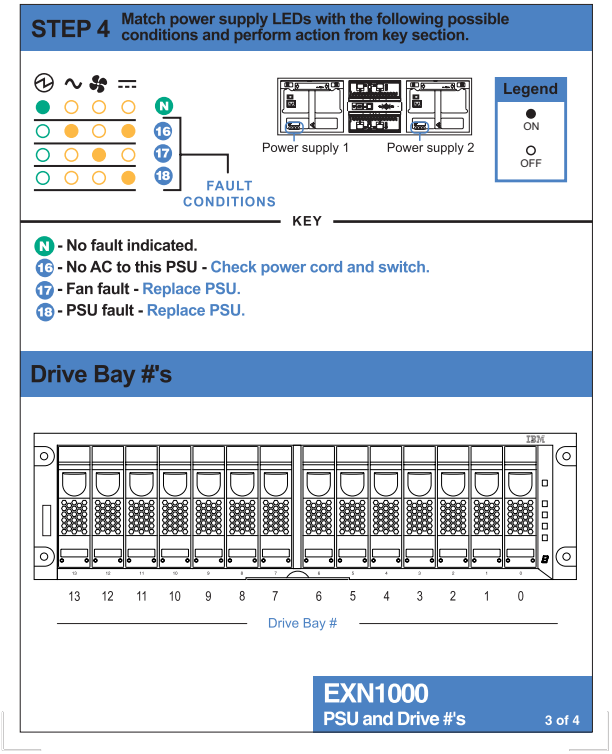


Figure 9. Third sheet of the quick reference cards

Location of LEDs

Each power supply, which contains four LEDs, is encased in a device carrier and housed at the rear of the EXN1000 expansion unit. The following illustration shows the location of the power supply LEDs.

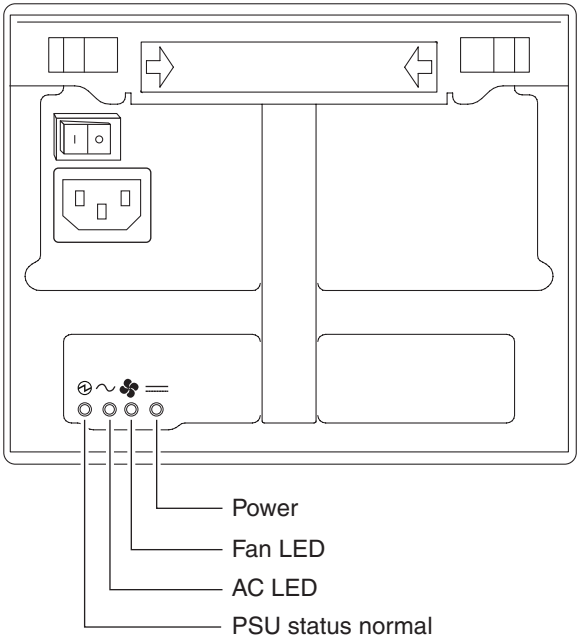


Figure 10. Location of power supply LEDs

Note: The PSU status LED is green. The other three LEDs are amber. See Figure 9 on page 25 for an illustrated explanation of how the LEDs function.

Power supply console error messages

The following error messages appear on your N series storage system console if an SES element on the power supply fails. For information about replacing the power supply, see "Replacing a power supply in an EXN1000 expansion unit" on page 33.

Table 8. Power supply console error messages

Error message	Action required
`Power supply Element 1: failed`	The power supply unit on the left at the back of the EXN1000 expansion unit failed. Contact IBM customer service to replace the power supply.
`Power supply Element 2: failed`	The power supply unit on the right at the back of the EXN1000 expansion unit failed. Contact IBM customer service to replace the power supply.

Table 8. Power supply console error messages (continued)

Error message	Action required
`Cooling element` `Element 1: failed`	The integrated fan module in the power supply unit on the left at the back of the EXN1000 expansion unit failed. Contact IBM customer service to replace the power supply.
`Cooling element` `Element 2: failed`	The integrated fan module in the power supply unit on the right at the back of the EXN1000 expansion unit failed. Contact IBM customer service to replace the power supply.

Monitoring the ATA disk

The ATA disk has two LEDs. The LEDs indicate whether the disk is functioning normally or there are problems with the hardware. See Figure 8 on page 23 for an illustrated explanation of how the LEDs function.

Location of LEDs

The following illustration shows the ATA disk, which has two LED indicators on the front.

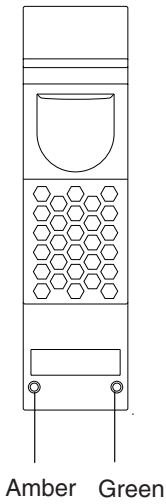


Figure 11. ATA disk

Note: Drives that are idle perform a media scan in the background resulting in the LEDs pulsing every half-second.

Chapter 4. Replacing EXN1000 expansion unit devices

This chapter describes how to replace EXN1000 expansion units in a rack, disks in an EXN1000 expansion unit, and other devices, in the following sections:

- "Removing an EXN1000 expansion unit"
- "Replacing a disk in an EXN1000 expansion unit" on page 32
- "Replacing a power supply in an EXN1000 expansion unit" on page 33
- "Replacing an AT-FCX module" on page 35

Attention: Return failed parts to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Removing an EXN1000 expansion unit

This section discusses how to disconnect an EXN1000 expansion unit from an N series storage system and how to remove an EXN1000 expansion unit from a daisy-chain configuration. It does not discuss how to install an EXN1000 expansion unit or how to hot-add an EXN1000 expansion unit. For information about installing an EXN1000 expansion unit in a rack, see "Guide to the installation process" on page 5. For information about hot-adding a disk-shelf, see "Hot-adding an EXN1000 expansion unit to an existing loop" on page 15.

CAUTION:
Hot removal or hot-swapping of an EXN1000 expansion unit is not supported.

For detailed information about removing an EXN1000 expansion unit from a rack, see the following topics:

- "Removing an EXN1000 expansion unit from a single EXN1000 expansion unit configuration" on page 30
- "Removing an EXN1000 expansion unit from a loop" on page 31

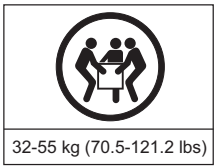
Removing an EXN1000 expansion unit from a single EXN1000 expansion unit configuration

To remove an EXN1000 expansion unit from a single EXN1000 expansion unit configuration, complete the following steps:

1. Shut down the N series storage system by entering the following command at the console:

   ```
   halt
   ```

   CAUTION:
   Disable the cluster first and then use the `halt` command to shut down all controllers to which the loop is connected.
2. Turn off the power switches on the EXN1000 expansion unit.
3. Put on the antistatic ESD strap and grounding leash.
4. Disconnect the two EXN1000 expansion unit power cords from the EXN1000 expansion unit.
5. Disconnect the Fibre Channel cable connecting the EXN1000 expansion unit and N series storage system.
6. Use a flat-blade screwdriver to remove the tie-down screws securing the rear of the EXN1000 to the rack. Use a 7mm nut driver to remove the screws securing the front of the EXN1000 to the rack.



DANGER

DANGER The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

Attention: Remove the power supplies and fan units from the chassis before attempting to lift the system.

7. With the help of at least two people, remove the EXN1000 expansion unit from the rack.

DANGER

The EXN1000 expansion unit is extremely heavy. To avoid injuring yourself or damaging the EXN1000 expansion unit, you must work with at least two other people when you install the EXN1000 expansion unit in the rack.

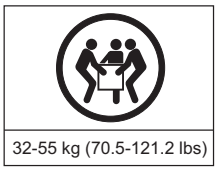
Removing an EXN1000 expansion unit from a loop

To remove an EXN1000 expansion unit from a loop of EXN1000 expansion units, complete the following steps:

1. Shut down the N series storage system by entering the following command at the console:

   ```
   halt
   ```

   CAUTION:
   Disable the cluster first and then use the `halt` command to shut down all controllers to which the loop is connected.
2. Turn off the power switches on the EXN1000 expansion unit.
3. Put on the antistatic ESD strap and grounding leash.
4. Disconnect the two EXN1000 expansion unit power cords from the EXN1000 expansion unit that you are going to remove.
5. Disconnect the Fibre Channel cables connecting the EXN1000 expansion unit to the other EXN1000 expansion units or the N series storage system.
6. Use a flat-blade screwdriver to remove the tie-down screws securing the rear of the EXN1000 to the rack. Use a 7mm nut driver to remove the screws securing the front of the EXN1000 to the rack.



CAUTION:
Use safe practices when lifting.

7. With the help of at least two people, remove the EXN1000 expansion unit from the rack.

DANGER

The EXN1000 expansion unit is very heavy when fully loaded and requires at least three people to remove it.

8. Do one of the following:
   - If you are not installing a replacement EXN1000 expansion unit, then reestablish the loop by connecting the disconnected EXN1000 expansion units or by connecting the unconnected EXN1000 expansion unit to the N series storage system.
   - If you are installing a replacement EXN1000 expansion unit, then see "Guide to the installation process" on page 5.

Replacing a disk in an EXN1000 expansion unit

You can replace a disk in an EXN1000 expansion unit for any reason. However, the most common reason is disk failure. If a disk fails, the N series storage system logs a warning message to the system console indicating which disk on which loop failed.

In addition, an EXN1000 expansion unit with an AT-FCX module identifies any one of the following situations as disk failure:

- A disk is bypassed.
- The filer system boots with the presence of bypassed disks.
- The filer system detects an eminent threshold bypass.

Preparing to replace a disk

Before you replace a disk in an EXN1000 expansion unit, you must first check the EXN1000 expansion unit to ensure that after you remove the disk you still have enough disks installed to meet the enclosure services requirements. For information about these requirements, see "Drive bay requirements" on page 11.

Replacing a disk in an EXN1000 expansion unit consists of the following procedures:

- "Removing a disk"
- "Installing a disk" on page 33

Removing a disk

To remove a disk, complete the following steps:

1. Do one of the following:
   - If you are removing a disk that is a member of a volume, then enter:
     ```
     disk fail disk_name
     ```
   - If you are removing a disk that is a spare disk, then enter:

```
disk remove disk_name
```

Note: To display the status of the disk, enter the following command:

```
disk show -b
```

Note: Either command causes the amber fault LED on the disk to illuminate. For more information about LEDs, see "Monitoring the ATA disk" on page 27.

For more information about disk commands, see the *System Administrator's Guide*.

2. Put on the antistatic ESD strap and grounding leash.
3. To remove the disk, press down on its release mechanism with one hand while grasping the top flange of the EXN1000 expansion unit with the other hand.
4. Gently slide the disk until it disengages. Wait 30 seconds for the disk to stop spinning; then continue removing the disk from the chassis.

   CAUTION:
   When removing a disk, always use two hands to support its weight.

Installing a disk

To install a disk in an EXN1000 expansion unit, complete the following steps:

1. Put on the antistatic ESD strap and grounding leash.
2. Orient the device carrier so that the release mechanism is at the top.
3. Insert the device carrier into the guide slot in the EXN1000 expansion unit and firmly push it in until it engages the backplane and you see the release mechanism click into place.

   Note: If the device carrier does not fully seat in the drive bay, you may be trying to install an unsupported disk drive in the EXN1000 expansion unit.

   CAUTION:
   Do not slam the device carrier into place.
4. Make sure that disks are installed in drive bays 0 and 1 for Enclosure Services to work.

Replacing a power supply in an EXN1000 expansion unit

Replacing a power supply in an EXN1000 expansion unit consists of the following procedures:

- "Removing a power supply" on page 34
- "Installing a power supply" on page 35

Rules for replacing power supplies

When replacing a power supply on your EXN1000 expansion unit, observe the following rules:

- You do not need to turn off the power to the expansion unit when you replace one power supply, only the power supply that is being replaced.
- If you are replacing both power supplies in the same EXN1000 expansion unit, replace them one at a time to avoid powering down the EXN1000 expansion unit.
- Although a single fan failure in one of the power supplies is not a critical event, it is recommended that you install a new power supply when one of the two fans in either power supply stops working.
- When hot-swapping power supplies, remove and install the power supplies within two minutes.

Attention: Your EXN1000 can run with one power supply removed for a maximum of two minutes. The airflow through your EXN1000 is degraded when only one power supply is present and operating. Therefore, if the power supplies are not replaced within two minutes, the system halts and no data is accessible.

- Have the replacement power supply close by and ready to install before removing the old one.

CAUTION:
Never remove the cover on a power supply fan unit. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Removing a power supply

To remove a power supply, complete the following steps:

1. Put on the antistatic ESD strap and grounding leash.
2. Turn off the switch on the power supply that you are replacing.
3. Lift up the clip lock and unplug the power cord from the N series storage system power supply.
4. Using your thumb and index finger, press the cam mechanism levers toward each other to release the power supply handle. The following figure shows how to press the levers on the cam mechanism and release the power supply handle.

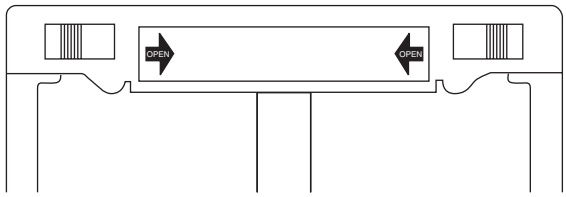


Figure 12. Cam mechanism

5. Use the handle to pull the power supply out of the EXN1000 expansion unit.

   CAUTION:
   When removing a power supply, always use two hands to support its weight.

Installing a power supply

To install a power supply in an EXN1000 expansion unit, complete the following steps:

CAUTION:
Do not use excessive force when sliding the power supply into the EXN1000 expansion unit. You can damage the connector.

1. Put on the antistatic ESD strap and grounding leash.
2. Slide the power supply in the power supply bay until you hear the power supply connect with the connector inside the EXN1000 expansion unit chassis.
3. Raise the handle and push it into place.
4. Using your thumb and index finger, press the cam mechanism levers toward each other to engage the power supply into place.
5. Plug the power cord into the power receptacle and fasten it with the clamp.
6. Plug the other end of the power cord into a grounded AC power source.
7. Turn on the power switch.

Replacing an AT-FCX module

The AT-FCX module in an EXN1000 expansion unit includes a SCSI-3 Enclosure Services Processor. It maintains the integrity of the loop when disks are swapped and provides signal retiming for enhanced loop stability. There are two AT-FCX modules in the middle of the rear of the EXN1000 expansion unit, one for Channel A and one for Channel B.

Note: The Input and Output ports on module A on the EXN1000 expansion unit are inverted from module B.

Connectors in an AT-FCX

The AT-FCX module has the following connectors:

Input Provides the interface between the EXN1000 expansion unit and the N series storage system.

Output
Provides the interface between two EXN1000 expansion units to create a loop of daisy-chained EXN1000 expansion units.

For detailed information

This section provides information about the following topics:

- "Removing a module"
- "Installing a module"
- "Hot-swapping a module" on page 37

Removing a module

To remove a module that is connected to the Fibre Channel loop, complete the following steps:

1. Put on the antistatic ESD strap and grounding leash.
2. Shut down the N series storage system by entering the following command at the console:

   ```
   halt
   ```

   CAUTION:
   Disable the cluster first and then use the `halt` command to shut down all controllers to which the loop is connected.
3. Disconnect the AT-FCX module from the Fibre Channel cabling. If you are using optical cables, remove the associated SFPs from the input and output ports of the AT-FCX module.
4. Using the thumb and index finger of both hands, press the levers on the cam mechanism on the module to release it.
5. Pull the module out of the EXN1000 expansion unit.
6. Go to "Installing a module."

Installing a module

To install a module into the EXN1000 expansion unit, complete the following steps:

CAUTION:
Observe the "EXN1000 expansion unit cabling requirements" on page 14.

1. Put on the antistatic ESD strap and grounding leash.
2. Verify that the speed setting for the AT-FCX module meets the requirements for your N series storage system. See "Speed setting" on page 10.

3. Push apart the levers on the cam mechanism and slide the module into the slot at the rear of the EXN1000 expansion unit, then push the levers of the cam mechanism into place.

   CAUTION:
   Do not use excessive force when sliding the module into the EXN1000 unit; you might damage the connector.
4. If you are using optical cables, insert SFPs into the input and output ports of the AT-FCX module.
5. Reconnect the Fibre Channel cabling.
6. Turn on the power to the EXN1000 expansion units.
7. Reboot the N series storage system.

Hot-swapping a module

The assumptions about this procedure are that AT-FCX modules on the EXN1000 expansion unit have multipath connections to an N series storage system.

CAUTION:
If you attempt to hot-swap the AT-FCX on an EXN1000 expansion unit that does not have multipath connections, you lose all access to the drives on this EXN1000 expansion unit as well as those below it.

To hot-swap a module, complete the following steps:

Note: To hot-swap a module on an EXN1000 expansion unit in a cluster, see the cluster guide for your filer.

1. Put on the antistatic ESD strap and grounding leash.
2. From the console of the N series storage system, enter the following command to disable the loop in which the failed module is a connection:

   `storage disable adapter` *`adaptername`*
3. Disconnect the module that you are removing from the Fibre Channel cabling.
4. Using the thumb and index finger of both hands, press the levers on the cam mechanism on the module to release it and pull it out of the EXN1000 expansion unit.
5. If you are using optical cables, remove the SFPs from the input and output ports of the AT-FCX module you have removed. Plug the SFPs into the input and output ports of the replacement AT-FCX.
6. Verify that the speed setting for the replacement AT-FCX module meets the requirements for your N series storage system. See “Speed setting” on page 10.
7. Slide the replacement module into the slot at the rear of the EXN1000 expansion unit and push the levers of the cam into place.

CAUTION:
Do not use excessive force when sliding the AT-FCX into the EXN1000 unit; you might damage the connector.

8. Reconnect the Fibre Channel cabling.
9. From the console of the filer, enter the following command to enable the loop in which the replacement AT-FCX is a connection:

   `storage enable adapter` *`adaptername`*

Appendix A. Recommended power line sizes

This appendix describes the recommended AC power line lengths running from the N series storage system to the power source.

Recommended AC power line sizes

Longer AC power feeds need to be properly designed to preserve voltage levels to the equipment. The wiring from the breaker panel to the power strip, which supplies power to the N series storage system and EXP600 expansion units, can often exceed 50 feet.

Note: Total AC wire length = breaker to wall or ceiling outlet + extension cable or ceiling drop.

The following table lists the recommended conductor size for 2% voltage drop for a particular distance in feet (taken from the *Radio Engineer's Handbook*).

Table 9. Recommended conductor size for 2% voltage drop

110V, single-phase	20A circuit	30A circuit	40A circuit	50A circuit
25 feet	12 AWG	10 AWG	8 AWG	8 AWG
50 feet	8 AWG	6 AWG	6 AWG	4 AWG
75 feet	6 AWG	4 AWG	4 AWG	2 AWG

220V, single-phase	20A circuit	30A circuit	40A circuit	50A circuit
25 feet	14 AWG	12 AWG	12 AWG	10 AWG
50 feet	12 AWG	10 AWG	8 AWG	8 AWG
75 feet	10 AWG	8 AWG	6 AWG	6 AWG

The following table lists the approximate equivalent wire gauge (American Wire Gauge (AWG) to Harmonized Cordage).

Table 10. American Wire Gauge (AWG) to Harmonized Cordage

AWG	8	10	12
Harmonized, mm-mm mm-mm = millimeter squared	4.0	2.5	1.5

Appendix B. FRU/CRU and power cord list for N series products

This appendix contains information about FRU/CRUs and power cords for N series products.

FRU/CRU list for N series products

For the most current FRU/CRU list for your N series product, see the following Web site:

www.ibm.com/storage/support/nas/

Power cord list for N series products

The following list details the power cord feature codes (FCs) for N series products.

FC 9000 (All countries)
Power cord, Rack PDU

- 27 inches
- Rated 250 V/15 A
- Product end uses C14; PDU end uses C13.

FC 9001 Europe and others
Provides power cords for Austria, Belgium, Bolivia, Bulgaria, Chile, Croatia, Czech Republic, Egypt, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Latvia, Lebanon, Lithuania, Luxemburg, Morocco, Netherlands, Norway, Peru, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Suriname, Sweden, Turkey

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 211 (CEE 7-VII) designed for 200-240 V ac input.

FC 9002 United Kingdom and others
Provides power cords for United Kingdom, Costa Rica, Cyprus, Guyana, Hong Kong, Ireland, Kuwait, Malta, Oman, Singapore, Sri Lanka

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 210 (13A fuse) designed for 200-240 V ac input.

FC 9003 Japan
Provides power cords for Japan

- 1.83 m (6 feet), unshielded, rated 125 V/15 A.
- Attached plug EL 302 (JIS C3306) designed for 100-110 V ac input.

FC 9004 U.S., Six Feet (2 m)

Provides power cords for U.S., Canada, Mexico, Belize, Columbia, Ecuador, El Salvador, Guatemala, Honduras, Korea, Nicaragua, Panama, Philippines, Puerto Rico, Saudi Arabia, Thailand, Venezuela

- 1.83 m (6 feet), unshielded, rated 125 V/15 A.
- Attached plug EL 302 (Nema 5-15P) designed for 100-120 V ac input.

FC 9005 Australia, New Zealand

Provides power cords for Australia, New Zealand, Uruguay

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 206 (AS 3112) designed for 200-240 V ac input.

FC 9006 Switzerland, Liechtenstein

Provides power cords for Switzerland, Liechtenstein

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 203 (SEV 1011) designed for 200-240 V ac input.

FC 9007 Argentina

Provides power cords for Argentina

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 219 (IRAM 2073) designed for 200-240 V ac input.

FC 9008 China

Provides power cords for China

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 602 (GB 2099/GB 1002) designed for 200-240 V ac input.

FC 9009 Denmark

Provides power cords for Denmark

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 213 (DHCR 107-2-D1) designed for 200-240 V ac input.

FC 9010 India, Pakistan, South Africa

Provides power cords for India, Macau, Pakistan, South Africa

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 208 (BS 164-1, BS 546) designed for 200-240 V ac input.

FC 9011 Israel

Provides power cords for Israel

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 212 (SI 32) designed for 200-240 V ac input.

FC 9012 Italy

Provides power cords for Italy

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 502 (CEI 23-16) designed for 200-240 V ac input.

FC 9013 North America (250 V)

Provides power cords for U.S.

- 1.83 m (6 feet), unshielded, rated 250 V/15 A.
- Attached plug EL 309 (NEMA 6-15P) designed for 200-240 V ac input.

FC 9014 Brazil

Provides power cords for Brazil

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 211 (NBR 6147/2000) designed for 200-240 V ac input

FC 9015 Taiwan

Provides 125 V power cords for Taiwan

- 2.5 m (9 feet), unshielded, rated 125 V/15 A.
- Attached plug EL 302 (CNS 10917-3) designed for 100-120 V ac input.

FC 9016 Taiwan (250 V)

Provides 250 V power cords for Taiwan

- 1.83 m (6 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 610 (CNS 10917, CNS 690) designed for 250 V ac input.

Appendix C. IBM System Storage N series documentation

The following lists present an overview of the IBM System Storage N series hardware and Data ONTAP product libraries, as well as other related documents.

You can access the documents listed in these tables at the following Web site:

www.ibm.com/storage/support/nas/

N7000 series systems library

- *IBM System Storage N7000 Series Hardware and Service Guide*, GC26-7953
- *IBM System Storage N7000 Series Filer Installation and Setup Instructions*, GC26-7954
- *IBM System Storage N7000 Series Gateway Installation and Setup Instructions*, GC26-7956

N5000 series systems library

- *IBM System Storage N5000 Series Hardware and Service Guide*, GC26-7785
- *IBM System Storage N5000 Series Filer Installation and Setup Instructions*, GC26-7784
- *IBM System Storage N5000 Series Gateway Installation and Setup Instructions*, GC26-7838

N3300 and N3600 storage systems library

- *IBM System Storage N3300 and N3600 Hardware and Service Guide*, GC27-2087
- *IBM System Storage N3300 Installation and Setup Instructions*, GC27-2086
- *IBM System Storage N3600 Installation and Setup Instructions*, GC27-2089

N3700 storage system library

- *IBM System Storage N3700 Hardware and Service Guide*, GA32-0515
- *IBM System Storage N3700 Installation and Setup Instructions*, GA32-0517

EXN1000, EXN2000 and EXN4000 expansion units library

- *IBM System Storage EXN1000 Storage Expansion Unit Hardware and Service Guide*, GC26-7802
- *IBM System Storage EXN1000 Installation and Setup Instructions*, GC26-7786
- *IBM System Storage EXN2000 Storage Expansion Unit Hardware and Service Guide*, GA32-0516
- *IBM System Storage EXN2000 Installation and Setup Instructions*, GC27-2064
- *IBM System Storage EXN4000 Storage Expansion Unit Hardware and Service Guide*, GC27-2080
- *IBM System Storage EXN4000 Installation and Setup Instructions*, GC27-2079

Data ONTAP 7.2 filer library

- *IBM System Storage N series Data ONTAP 7.2 Release Notes*, GC26-7963
- *IBM System Storage N series Data ONTAP 7.2 Active-Active Configuration Guide*, GC26-7964
- *IBM System Storage N series Data ONTAP 7.2 File Access and Protocols Management Guide*, GC26-7965
- *IBM System Storage N series Data ONTAP 7.2 Storage Management Guide*, GC26-7966
- *IBM System Storage N series Data ONTAP 7.2 Data Protection Online Backup and Recovery Guide*, GC26-7967
- *IBM System Storage N series Data ONTAP 7.2 Data Protection Tape Backup and Recovery Guide*, GC26-7968
- *IBM System Storage N series Data ONTAP 7.2 MultiStore Management Guide*, GC26-7969
- *IBM System Storage N series Data ONTAP 7.2 Network Management Guide*, GC26-7970
- *IBM System Storage N series Data ONTAP 7.2 Commands: Manual Page Reference, Volume 1*, GC26-7971
- *IBM System Storage N series Data ONTAP 7.2 Commands: Manual Page Reference, Volume 2*, GC26-7972
- *IBM System Storage N series Data ONTAP 7.2 Upgrade Guide*, GC26-7976
- *IBM System Storage N series Data ONTAP 7.2 Block Access Management Guide for iSCSI & FCP*, GC26-7973
- *IBM System Storage N series Data ONTAP 7.2 System Administration Guide*, GC26-7974
- *IBM System Storage N series Data ONTAP 7.2 Software Setup Guide*, GC26-7975
- *IBM System Storage N series Data ONTAP 7.2 Core Commands Quick Reference*, GC26-7977

Data ONTAP 7.1 filer library

- *IBM System Storage N series Data ONTAP Release Notes*, GC26-7862
- *IBM System Storage N series Data ONTAP 7.1 Cluster Installation and Management Guide*, GC26-7790
- *IBM System Storage N series Data ONTAP 7.1 File Access and Protocols Management Guide*, GA32-0520
- *IBM System Storage N series Data ONTAP 7.1 Storage Management Guide*, GA32-0521
- *IBM System Storage N series Data ONTAP 7.1 Data Protection Online Backup and Recovery Guide*, GA32-0522
- *IBM System Storage N series Data ONTAP 7.1 Data Protection Tape Backup and Recovery Guide*, GA32-0523
- *IBM System Storage N series Data ONTAP 7.1 MultiStore Management Guide*, GA32-0524
- *IBM System Storage N series Data ONTAP 7.1 Network Management Guide*, GA32-0525
- *IBM System Storage N series Data ONTAP 7.1 Commands: Manual Page Reference, Volume 1*, GA32-0526
- *IBM System Storage N series Data ONTAP 7.1 Commands: Manual Page Reference, Volume 2*, GA32-0527
- *IBM System Storage N series Data ONTAP 7.1 Upgrade Guide*, GC26-7791
- *IBM System Storage N series Data ONTAP 7.1 Block Access Management Guide for iSCSI & FCP*, GA32-0528
- *IBM System Storage N series Data ONTAP 7.1 System Administration Guide*, GA32-0529
- *IBM System Storage N series Data ONTAP 7.1 Software Setup Guide*, GA32-0530
- *IBM System Storage N series Data ONTAP 7.1 Core Commands Quick Reference*, GA32-0531

Data ONTAP 7.2 gateway systems library

- *IBM System Storage N series Data ONTAP 7.2 Gateway Release Notes*, GC26-7955
- *IBM System Storage N series Data ONTAP 7.2 Gateway Software Setup, Installation, and Management Guide*, GC26-7962
- *IBM System Storage N series Data ONTAP 7.2 Gateway Connecting Your System*, GC26-7990
- *IBM System Storage N series Data ONTAP 7.2 Gateway Planning Guide*, GC26-7957

- *IBM System Storage N series Data ONTAP 7.2 Gateway Software Upgrade Guide*, GC26-7958
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for IBM Storage*, GC26-7959
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for Hitachi Storage*, GC26-7960
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for HP XP Storage*, GC26-7961
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for EMC CLARiiON Storage*, GC27-2081
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for Fujitsu ETERNUS Storage*, GC27-2082
- *IBM N series Gateway Data ONTAP 7.2 Integration Guide for IBM SAN Volume Controller Storage*, GC27-2061
- *IBM Gateway Data ONTAP 7.2 3PAR Implementation Guide*, GC27-2090
- *IBM Gateway Data ONTAP 7.2 MetroCluster Guide*, GC27-2091
- *IBM Gateway Data ONTAP 7.2 Installation Requirements, Quick Start, & Reference Guide*, GC27-2092

Data ONTAP 7.1 gateway systems library

- *IBM System Storage N series Gateway Planning Guide*, GC26-7839
- *IBM System Storage N series Gateway Integration Guide for IBM Storage*, GC26-7840
- *IBM System Storage N series Gateway Integration Guide for Hitachi Storage*, GC26-7841
- *IBM System Storage N series Gateway Integration Guide for HP Storage*, GC26-7858
- *IBM System Storage N series Gateway Software Upgrade Guide*, GC26-7859
- *IBM System Storage N series Gateway Software Setup, Installation, and Management Guide*, GC26-7886
- *IBM System Storage N series Gateway Release Notes*, GC26-7837

Other N series and N series-related documents

- *IBM System Storage N series Platform Monitoring Guide*, GC27-2088
- *IBM System Storage N series Diagnostics Guide*, GC26-7789
- *IBM System Storage N series Introduction and Planning Guide*, GA32-0543
- *IBM System Storage N series Autosupport Overview*, GC26-7854
- *IBM System Storage N series: Changing the cluster cfmode Setting in Fibre Channel SAN Configurations*, GC26-7876

- *IBM System Storage N series Fibre Channel Configuration Guide*, GC26-7835
- *IBM System Storage N series Metrocluster Redbook*, REDP-4243-00
- *IBM System Storage Systems Safety Notices*, G229-9054
- *IBM Storage Solution Rack 2101 Rack Installation and Service Guide: Models 200 and N00*, GC26-7993

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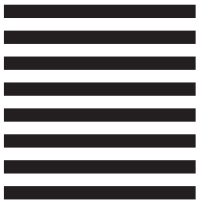

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