Nexsan E48 and Nexsan E60 Storage Systems

Installation Guide

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Electromagnetic Immunity: EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

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Contents

Contents

About this manual

This installation guide provides information and steps for performing the physical installation of the Nexsan E48 and Nexsan E60 and and Nexsan E32 Storage Systems and their V, VT and P variants .

Note While Nexsan makes every effort to ensure the accuracy of technical documentation, screen images and procedures may change after publication. In case of discrepancy, please check for the latest updates on the E-Series and BEAST Documents and Downloads page. Also, refer to the latest Release Notes.

Conventions

Here is a list of text conventions used in this document:

Convention	Description
underlined blue	Cross-references, hyperlinks, URLs, and email addresses.
boldface	Labels on the physical Nexsan Storage System or interactive items in the graphical user interface (GUI).
italics	System messages and non-interactive items in the GUI. References to software user guides.
`monospace`	Command-line interface (CLI) text or text that refers to file or directory names.
`monospace bold`	Text strings that must be entered by the user in the CLI or in text fields in the GUI.

Notes, tips, cautions, and warnings

Note Notes contain important information, present alternative procedures, or call attention to certain items.

Tip Tips contain handy information for end-users, such as other ways to perform an action.

CAUTION: In hardware manuals, cautions alert the user to items or situations which may cause damage to the Nexsan Storage System or result in mild injury to the user, or both. In software manuals, cautions alerts the user to situations which may cause data corruption or data loss.

WARNING: Warnings alert the user to items or situations which may result in severe injury or death to the user.

Contacting Nexsan

For questions about Nexsan products, please visit the Nexsan support Web page, and the E-Series and BEAST Documents and Downloads page. If you are unable to find the answer to your question there, please see our contact information below.

Service and support

Nexsan's Technical Services Group provides worldwide assistance with installation, configuration, software support, warranty, and repair for all Nexsan products. A variety of service and support programs are available to provide you with the level of coverage and availability your operation requires.

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Related documents

The following Nexsan product manuals contain related information:

- *Nexsan E48 and Nexsan E60 Storage Systems FRU Removal and Replacement Guide*

- *Nexsan E48X and Nexsan E60X Storage Expansions Installation Guide*

- *Nexsan E48X and Nexsan E60X Storage Expansions FRU Removal and Replacement Guide*

- *Nexsan High-Density Storage User Guide*

- *Nexsan E-Series Snapshots and Replication User Guide*

- *Nexsan E-Series Multipathing Best Practices Guide*

Safety notices

This guide covers the Nexsan E60 and Nexsan E48 Storage Systemss only. Refer to the relevant product manuals for information on other Nexsan Storage Systems or Storage Expansions and other Nexsan products mentioned in this guide.

Always observe the following precautions to reduce the risk of injury and equipment damage:

WARNING: There is a risk of ELECTRIC SHOCK if Nexsan E-Series components are removed or tampered with when a Nexsan Storage System power is on. Only a trained operator may remove certain FRUs. The Nexsan E-Series Storage Systems include the following FRUs:

- Power Supply modules
- RAID Controller and Expansion modules
- Disk drives
- Fan modules

- Computer components and disk drives are sensitive to static discharge. Take precautions to discharge any electrostatic charge from your person before and while handling components with your hands or any tools. Use an anti-static wrist-strap.

- Ensure correct lifting methods are used when removing the storage system from its packaging and positioning it into its required location. When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. Always keep your back straight and lift with your legs.

- When removing the storage system from the packaging, DO NOT lift the enclosure by any plastic parts or module handles on the chassis. Doing so may cause damage to the chassis or to internal components, or both. Lift the enclosure ONLY by the bottom edges of the chassis, using safe lifting practices.

- The storage system should only be installed in a clean, dry environment. The operating temperature is 5º to 35º C (41º to 95º F), with operating relative humidity at 20 to 80%, non-condensing.

- Do not install the storage system in an enclosed cabinet or other small area without ventilation.

- When installing the storage system as a rack-mounted component, ensure that all Nexsan-supplied mounting fixtures are secure. All bolts and screws should be fully tightened. Failure to comply with this may result in the storage system not being fully supported in the rack and could lead to the product falling from the rack, causing personal injury or damage to other rack components.

- Ensure that the rack is sufficiently stable by having wall anchors and/or stabilizing legs, and that the floor supporting the rack has sufficient strength for the overall weight loading.

- The cordset specification for the Nexsan E60 and Nexsan E48 in North America is USA IEC C13 to IEC C14, rated 250V/10A. When applying power to the storage system, use ONLY the IEC power cords originally supplied with it. Do NOT use other power cords, even if they appear identical to the supplied cords.

- Only a fully-trained Service Engineer is authorized to disassemble any other part of the storage system, and then only when the storage system is powered off.

- All Nexsan E-Series Storage Systems have multiple power connections; as a result, you must remove all power leads to completely remove power from the storage system.

- Nexsan E-Series Storage Systems do not have power switches. Do NOT attach the power cords until the storage system is fully installed, with all disk drives in place.

Revision history

This section lists updates and new material added to the *Nexsan E60 and Nexsan E48 Storage Systems Installation Guide*.

P0450140, Rev. B, March 2022

- Updated for technical accuracy, applied new Nexsan template and branding.

P0450140, Rev. A, July 2016

- Changed document number to part number
- Added Information for E60P and E48P

NXS-ES4U-IG Rev. 03, October 2014

Moved information regarding taking proper ESD precautions from Mount the Nexsan Storage System on page 36 and put it into its own section in Chapter 2, Take proper ESD precautions on page 29; updated all ESD warnings through manual, adding them to all sections that deal with handling components or disks, and referencing Take proper ESD precautions on page 29.

NSX-ES4U-IG Rev. 02, July 2014

Added information about 16Gb/s fibre channel connections to Host port options on page 18; updated single-controller and dual-controller configuration information under Installing the Nexsan Storage System on page 35.

NXS-ES4U-IG Rev. 01, February 2014

Changed formatting throughout to reflect Nexsan as an Nexsan brand; separated installation content from FRU replacement content into two documents; changed name of document to *Nexsan E60 and Nexsan E48 RAID Storage Units Installation Guide*.

Chapter 1

Overview

Nexsan E48 and Nexsan E60 4U, rack-mountable Storage Systems can hold up to 48 or 60 SATA, SAS, or SSD data disks respectively.

Nexsan E-Series base models use 3Gb/s SAS for internal communication between the RAID Controllers and hard disks. E-Series P models use 6-Gb/s SAS for internal communication.
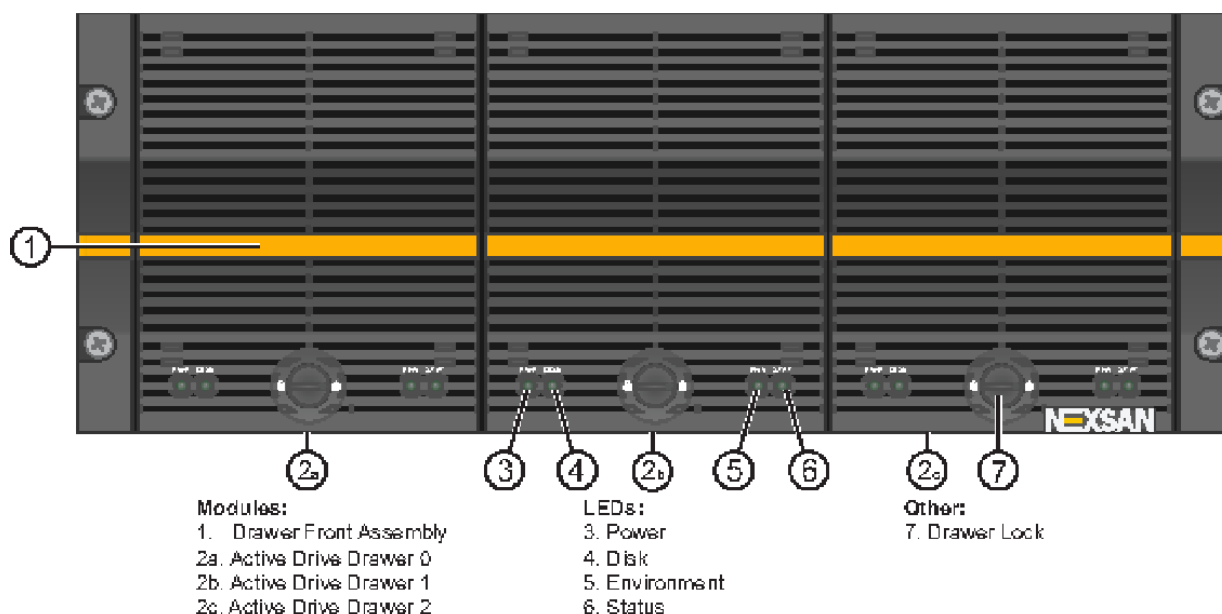
This chapter contains the following sections:

1

Front panel

Use this section to understand front panel components.

Figure 1-1: Nexsan E48/Nexsan E60 front panel

Modules:
1. Drawer Front Assembly
2a. Active Drive Drawer 0
2b. Active Drive Drawer 1
2c. Active Drive Drawer 2

LEDs:
3. Power
4. Disk
5. Environment
6. Status

Other:
7. Drawer Lock

Legend

Use the following tables as a legend for the front panel diagram.

Table 1-2: Field-replaceable modules

Number	Component	Description
1.		Each assembly can be field-replaced in the event of a fan failure by removing a screw on each side of the drive drawer (see the *Nexsan E-Series FRU Removal and Replacement Guide* for your Storage System).

Table 1-3: Other modules

Number	Component	Description
2.	Active Drive Drawers (3)	Each drawer can hold up to 16 (for Nexsan E48 Storage Systems) or 20 (for Nexsan E60 Storage Systems) 3.5" disk drives, for a total of up to 48 or 60 drives in the enclosure.

Table 1-4: LEDs

| Number	Component	Description
3.	Power LED (**PWR**)	Indicates the status of power to the components in the drawer. Green indicates that all power levels are within specifications. Red indicates that one or more power levels are outside of specifications. The **Environmental Information** page (under *System Information*) in the graphical user interface (GUI) displays details (see the *Nexsan High-Density Storage User Guide*). If the **PWR** LED on the left drive drawer is amber and all other front panel LEDs are off, this means that the Nexsan Storage System has been powered down through the GUI. It can be powered back up using the **SW0** switch (see Switches on page 17).
4.	Disk LED (**DSK**)	Indicates the status of the disk drives in the drawer. Green indicates that all disk drives are operating within specifications. Red indicates that one or more disk faults have been detected. The **Disk Drives** page (under *RAID Information*) in the graphical user interface (GUI) displays details (see the *Nexsan High-Density Storage User Guide*).
5.	Environment LED (**ENV**)	Indicates the temperature and fan status for the drawer. Green indicates that the drawer temperature is within specifications and that all fans are operating properly. Red indicates that the temperature exceeds specifications or that one or more fans are not operating properly. The **Environmental Information** page (under *System Information*) in the graphical user interface (GUI) displays details (see the *Nexsan High-Density Storage User Guide*).
6.	Status LED (**STAT**)	Indicates overall status. Green indicates that the Nexsan Storage System is operating within specification. Amber indicates that the drawer is unlocked. Red indicates a fault in the Nexsan Storage System, which could be any of the following: • A Power Supply Unit issue with the fan, temperature, or voltage • A RAID Controller issue with the temperature, voltage, battery, firmware, or other hardware • A drawer voltage issue The **Environmental Information** page (under *System Information*) in the graphical user interface) displays details (see the *Nexsan High-Density Storage User Guide*).

Table 1-5: Other items

Number	Component	Description
7.	Drawer Lock:	Secures the drive drawer in place. When this lock is disengaged, the **STAT** LED turns amber.

Rear panel

Use this section as a legend for rear panel components.

Figure 1-6: Nexsan E48 and Nexsan E60 rear panel (8Gb/s Fibre Channel connections shown)
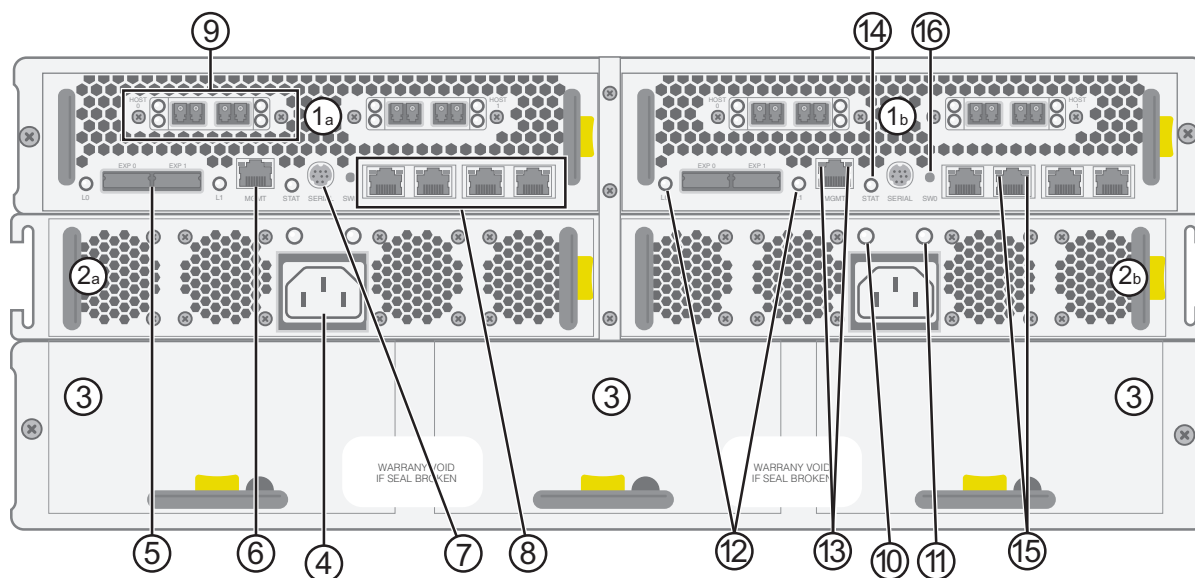
Field Replaceable Modules:
1a. RAID Controller 0
1b. RAID Controller 1
2a. Power Supply Unit (PSU) 0
2b. Power Supply Unit (PSU) 1
Other Modules:
3. Interconnect Service Modules (ISMs)

Connectors:
4. Power
5. Expansion
6. Management
7. Serial
8. iSCSI
9. Host Port

**LEDs:**
10. PSU status
11. PSU Fan status
12. Expansion Port status
13. Mgmt Port status/activity
14. Controller status
15. iSCSI status/activity

Switches:
16. SW0

Figure 1-7: Nexsan E48P and Nexsan E60P

Field Replaceable Modules:
1a. RAID Controller 0
1b. RAID Controller 1
2a. Power Supply Unit (PSU) 0
2b. Power Supply Unit (PSU) 1
Other Modules:
3.   Interconnect Service Modules (ISMs)

Connectors:
4. Expansion
5. Management
6. Power
7. Serial
8. iSCSI
9. Host Port

LEDs:
10. PSU status
11. PSU Fan status
12. Expansion Port status
13. Mgmt Port status/activity
14. Controller status
15. iSCSI status/activity

Switches:
16. SW0
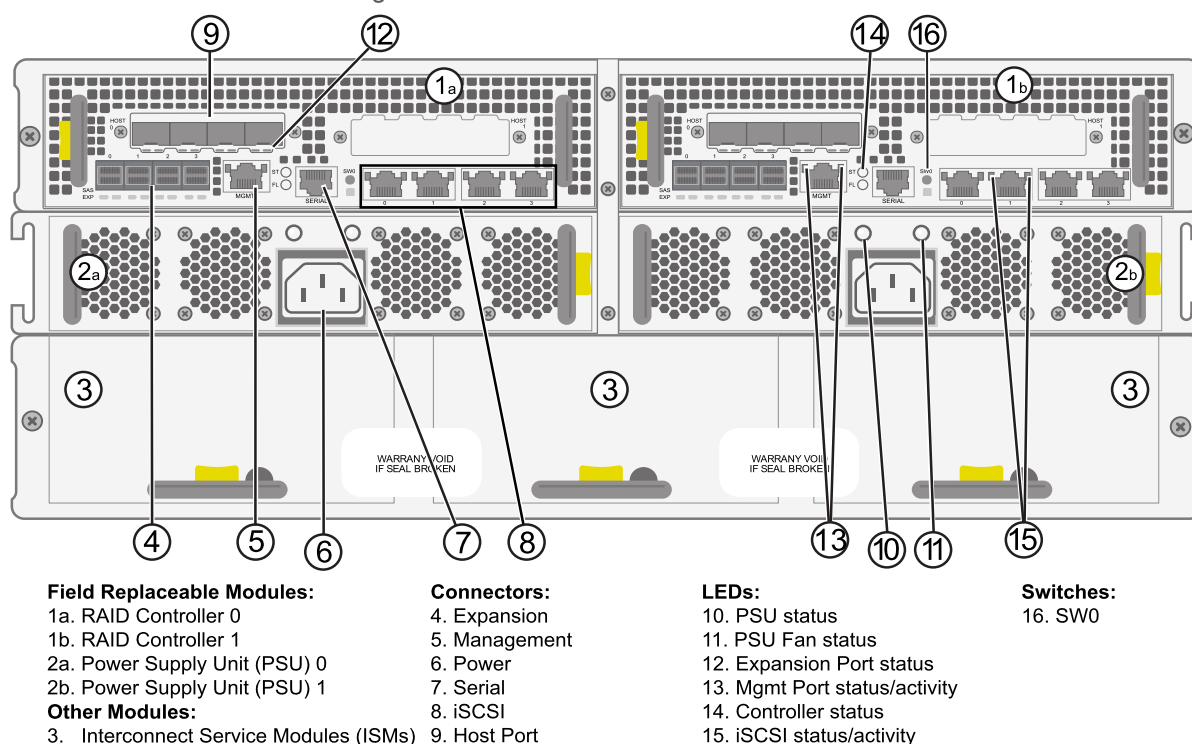
Legend

Use the following tables as a legend for the rear panel diagram.

Table 1-8: Field-replaceable modules

Number	Component	Description
1.	RAID Controller(s) (1 or 2)	Each controller can be field-replaced in the event of failure (see the *Nexsan E60 and Nexsan E48 Storage Systems FRU Removal and Replacement Guide*). RAID Controllers are designated Controller 0 (left) and Controller 1 (right) in the graphical user interface (GUI) (see the *Nexsan Nexsan High-Density Storage User Guide*). **Note** In single-controller Nexsan Storage Systems, the right slot contains a back plate which helps regulate air flow.
2.	Power Supply Units (PSUs) (2)	Each controller can be field-replaced in the event of a PSU or PSU fan failure (see the *Nexsan E60 and Nexsan E48 Storage s FRU Removal and Replacement Guide*).

Table 1-9: Other modules

Number	Component	Description
3.	Interconnect Service Modules (ISMs) (3)	Can only be replaced by a fully-trained Service Engineer.

Table 1-10: Connectors

Number	Component	Description
4.	Power (2): 200–240VAC, 47–63Hz (for Nexsan E60 Storage Expansions) or 110–240VAC, 47–63Hz (for Nexsan E48 Storage Expansions).	⚠️ **CAUTION**: The cordset specification for the Nexsan E48 and in North America is IEC C13 to IEC C14 rated 250V/10A. When applying power to the system, use ONLY the IEC power cords originally supplied with the Nexsan Storage System. Do NOT use other power cords, even if they appear identical to the supplied cords.
5.	E-Series V/VT	Two expansion ports (**EXP 0** and **EXP 1**) per RAID Controller, Mini-SAS 26 pin I-Pass (8088) 6Gb/s SAS connectors.Nexsan E48 and Nexsan E60: Four expansion ports, Mini-SAS HD expansion connectors, 12Gb/s SAS connectors.
6.	One Management port (**MGMT**) per RAID Controller	Dedicated management port (RJ45) for Web-based configuration (1Gb in E-Series P, 10/100 in prior series models).
7.	One **SERIAL** port per RAID Controller	Mini-DIN (RJ45 for Nexsan E48 and Nexsan E60) serial port for low-level reporting (Support use only).
8.	Four iSCSI ports (**0** through **3**) per RAID Controller	1Gb/s Ethernet ports (RJ45s) for iSCSI. If a host port option is installed (see Host port options on page 18), only ports **0** and **1** are usable.
9.	Host ports	See Host port options on page 18.

Table 1-11: LEDs

Number	Component	Description
10.	PSU status LED	Indicates the status of power. Green indicates that the 12V and 3V3 outputs are within specification. Red indicates that one or the other, or both, are outside of specified limits. Orange indicates that the PSU is in standby mode. The **Environmental Information** page (under *System Information*) in the graphical user interface (GUI) has more information. See the *Nexsan Nexsan High-Density Storage User Guide*.

| Number	Component	Description
11.	PSU fan LED	Indicates the status of the PSU fans. Green indicates that all fans are operating within specifications. Red indicates that one or more fans are either running too slowly or have failed. When the PSU is in standby mode, this LED is off. The **Environmental Information** page (under *System Information*) in the graphical user interface (GUI) has more information. See the *Nexsan Nexsan High-Density Storage User Guide*.
12.	Expansion port LEDs	For Nexsan E48 and Nexsan E60 controllers: There are two LEDs (**L0** and **L1**), each indicating the connection status for an expansion port. Green indicates that the SAS cable is properly connected. Flashing amber indicates that the cable is improperly connected. If no cable is connected, this LED is off. For E48P and E60P controllers: Each connector has two LEDs below it. If neither is lit the port is disabled or disconnected. A green light indicates that the connection is healthy, a flashing red light indicates an incorrectly attached cable, and a flashing red light indicates that the connection may be faulty.
13.	Management port LEDs status/activity	The left LED flashes green when there is port activity. The right LED lights up green when there is a 1Gb or 100Mb/s connection. When there is only a 10Mb/s connection, the right LED is off.

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Number	Component	Description
14.	Controller status LED (**STAT**)	Indicates the status of the RAID Controller.
		For Nexsan E48V/VT and Nexsan E60V/VT controllers:
		● Solid blue indicates that the controller is operating within specifications and that there is no user data in the cache.
		● Solid green indicates that the controller is operating within specifications and that there is user data in the cache, which will be retained in flash memory upon power-down and then restored when the Nexsan Storage System is powered up again.
		● Flashing red (once per second) indicates that the controller is offline due to a fault being detected.
		● Flashing green (twice per second) indicates that the controller is operating in battery-backup mode and is backing up cached data to flash memory. This can take several minutes.
		● Alternating blue and red indicates that the controller is booting in Emergency mode (see Switches on the facing page).
		For Nexsan E48P and Nexsan E60P controllers:
		● Solid green indicates that the controller is operating within specifications.
		● Flashing red (once per second) indicates that the controller is offline due to a fault being detected.
		● Solid red indicates that the controller has been deliberately stopped.
		● Flashing green (twice per second) indicates that the controller is operating in battery-backup mode and is backing up cached data to flash memory. This can take several minutes.
		● Alternating red and green indicates that the controller is booting in Emergency mode (see Switches on the facing page).
15.	iSCSI port LEDs (activity and status):	For 1Gb/s connections, the left LED illuminates green when thelink is up, and both LEDs flash green when there is activity.

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Table 1-12: Switches

Number	Component	Description
16.	**SW0** Switch	This switch can be used to turn the RAID Controller off or on, boot the controller in Emergency mode, or silence an audible alarm. With the Nexsan Storage System powered on: • Briefly press the **SW0** switch to silence the audible alarm. This can also be done via the graphical user interface (GUI) (see the *Nexsan Nexsan High-Density Storage User Guide*). • Press and hold the **SW0** switch for approximately 8 seconds to power down the RAID Controllers. If there is data in the cache, it will be stored in flash memory. This is the same as performing a System Shutdown via the graphical user interface (GUI) (see the *Nexsan Nexsan High-Density Storage User Guide*). On dual-controller systems, both **SW0** switches must be held simultaneously for 8 seconds.
		With the Nexsan Storage System powered off: • Press and hold the **SW0** switch on either RAID Controller for approximately 4 seconds to power up the Nexsan Storage System. Release the **SW0** switch to boot normally. • Continue pressing the **SW0** switch after the Nexsan Storage System powers up to put the RAID Controllers into Emergency mode (see the *Nexsan Nexsan High-Density Storage User Guide*). Emergency mode is indicated by the controller status LED alternating between blue and red (see LEDs on page 14).

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Host port options

The RAID Controllers can be configured (with one or two optional Host Bus Adapter (HBA) cards) for one of four different host port options: 16Gb/s Fibre Channel, 8Gb/s Fibre Channel, 10Gb/s iSCSI (10GbE), or SAS-to-Host.

Figure 1-13: Host port options

| Fibre Channel | 10gb Ethernet, Optical | 10gb Ethernet, Copper | SAS-to-Host |
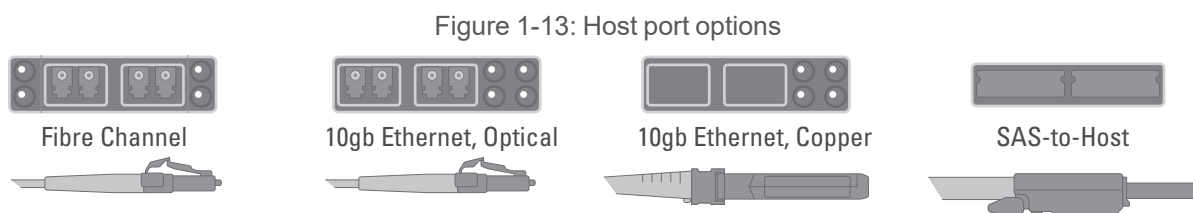
Depending on the RAID Controller configuration, the host port connectors are one of the following:

Host port type	Description
Two or Four Fibre Channel ports (**0** and **1**) per HBA card	16Gb/s or 8Gb/s Fibre Channel optical SFPs.
Two or Four 10Gb iSCSI (10GbE) ports (**0** and **1**) per HBA card	10Gb/s Ethernet optical SFPs or copper SFP sockets for iSCSI.
Two or Four SAS ports (**0** and **1**) per HBA card	Mini-SAS 26 pin I-Pass (8088) connectors, each with four 6GB/s SAS links.

Depending on the RAID Controller configuration, the host port LEDs are one of the following:

Host port LED	Description
16Gb/s Fibre Channel port LEDs (speed and activity)	The top LED is amber when there is a 4Gb/s connection and flashes amber when there is activity. The middle LED is green when there is an 8Gb/s connection and flashes green when there is activity. The bottom LED is amber when there is a 16Gb/s connection and flashes amber when there is activity. All three LEDs light up during the power-up sequence.
8Gb/s Fibre Channel port LEDs (speed and activity)	The upper LED is orange when there is a 2Gb/s connection and green when there is a 4Gb/s connection. The lower LED flashes yellow for data activity, but also lights up yellow when there is an 8Gb/s connection. When there is an 8Gb/s connection, the upper LED is off. During the power-up sequence, both Fibre Channel port LEDs are solid yellow. If both LEDs are flashing yellow, the Fibre Channel connection has been lost.
10Ge iSCSI port LEDs (connection and activity)	For each 10Ge iSCSI connection (left and right), the lower LED lights up green when there is a 10GbE connection and the upper LED flashes green when there is activity. When there is no connection, these LEDs are off.

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Notes:

- The SAS-to-Host port option has no LEDs.

- For Nexsan E48/E48V and Nexsan E60/E60V Storage Systems with two HBA cards, the right HBA card's LEDs are inverted.

Drawer interior

Use this section to understand Drawer interior components.
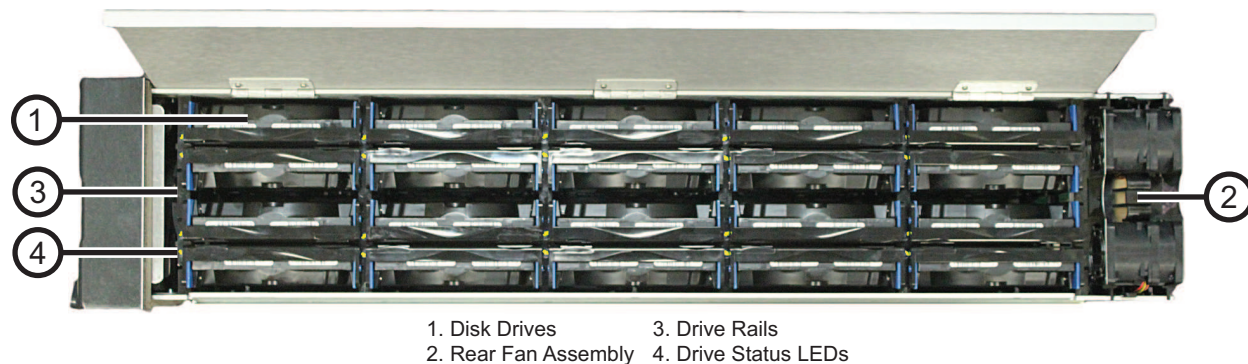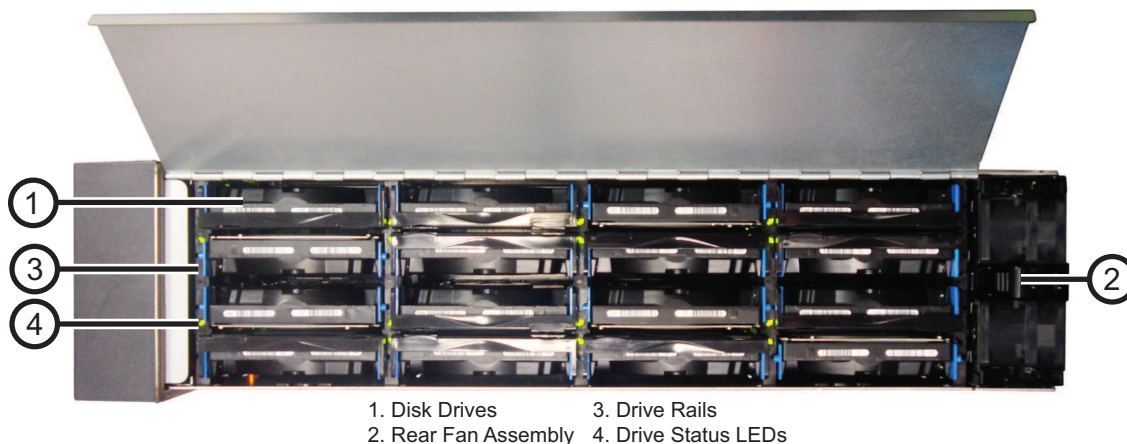
Figure 1-14: Nexsan E60 drawer interior

1. Disk Drives
2. Rear Fan Assembly
3. Drive Rails
4. Drive Status LEDs

Figure 1-15: Nexsan E48 drawer interior

1. Disk Drives
2. Rear Fan Assembly
3. Drive Rails
4. Drive Status LEDs

Legend

Use the following tables as a legend for the Drawer interior components diagrams.

Table 1-16: Field-replaceable modules

Number	Module	Description
1.	Disk Drives	Up to 16 (for Nexsan E48 Storage Systems) or 20 (for Nexsan E60 Storage Systems) 3.5" disk drives in each drawer. Disk drives can be field-replaced in the event of failure (see the *Nexsan E60 and Nexsan E48 FRU Removal and Replacement Guide*).

Number	Module	Description
2.	Rear Fan Assembly	Dual-fan assembly located at the rear of each drawer. Can be field-replaced in the event of failure (see the *Nexsan E60 and Nexsan E48 FRU Removal and Replacement Guide*).

Table 1-17: Other modules

Number	Module	Description
3.	Drive Guides	Align with plastic rails on disk drives to guide installation. These are integral to the drive drawer and cannot be individually replaced.

Table 1-18: LEDs

Number	Module	Description
4.	Drive status	One for each disk drive slot. Solid green indicates that the disk is operating within specifications and is not currently being accessed. Flashing green indicates disk activity. Red indicates that a disk fault has been detected and that the disk is not currently being used by the system. For disk drive slots where no disk drive is installed, this LED is off.

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Physical characteristics

Use this section as a reference for the physical characteristics of Nexsan Storage Systems or Nexsan Storage Expansions.

Dimensions, Nexsan E48

Measurement	Value
Chassis height	4U: 177mm (6.97")
Chassis length	835mm (32.87")
Chassis length, including fascia and handles	887mm (35.95") (allow at least 150mm for cables at rear; a 1,000mm rack is recommended)
Chassis width, body	448mm (17.64")
Chassis width, overall	482.6mm (19")
Storage System weight, no drives	47.63 kg (105 lbs.)
Storage System weight, with drives	84 kg (185.2 lbs.)
Rack mount kit length	660mm to 914mm (26" to 36")
Rack mount kit weight	approx. 2.5 kg (5.5 lbs.)

Dimensions, Nexsan E60

Measurement	Value
Chassis height	4U: 177mm (6.97")
Chassis length	950mm (37.4")
Chassis length, including fascia and handles	1,026mm (40.39") (allow at least 150mm for cables at rear; a 1,200mm rack is recommended)
Chassis width, body	448mm (17.64")
Chassis width, overall	482.6mm (19")
Storage System weight, no drives	48 kg (106 lbs.)
Storage System weight, with drives	93 kg (205 lbs.)
Rack mount kit length	660mm to 914mm (26" to 36")
Rack mount kit weight	approx. 2.5 kg (5.5 lbs.)

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Power

- Two 1,600W load-sharing, hot-pluggable, redundant PSUs.

- Nexsan E60 nominal input voltage is 200–240VAC, 47–63Hz. Cordset specification in North America is IEC C13 to IEC C14 rated 250V/10A.

- Nexsan E48 nominal input voltage is 110–240VAC, 47–63Hz. Cordset specification in North America is IEC C13 to IEC C14 rated 250V/10A.

- Typical power consumption for the E60 Storage Systems is 1,164W (5.18A) for 600GB SAS drives and 806W (3.6A) for 3TB SATA drives. Peak current is up to 15A.

- Typical power consumption for the E48 Storage Systems is 1,059W (4.74A) for 600GB SAS drives and 684W (3.0A) for 3TB SATA drives. Peak current is up to 15A.

Cooling

- Front panel: One 120mm 12V axial fan (life 40,000 hrs) per drive drawer, for a total of three.

- Internal: Two double-gang 12V axial fans (life 40,000 hrs) per drive drawer, for a total of six.

- PSUs: Four 12V axial fans (life 40,000 hrs) per PSU, for a total of eight.

Materials

- Chassis, external: Galvanized sheet steel

- Chassis, internal: Galvanized sheet steel divider plates and sub-assemblies

- Fascia: ABS (blend) Thermoplastic UL 94 V.0

Environment

- Ambient operating temperature: 5°C–35°C (41°F–95°F)

- Minimum drawer operation temperature: 10°C (50°F)

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Chapter 2

Getting Started

This document is designed to enable the user to install and configure the Nexsan E60/Nexsan E48 Storage System quickly and safely. Please read this document carefully and review all of the information in this section before installing the Nexsan Storage System.

This chapter contains the following sections:

2

Taking delivery of your Nexsan Storage System

Upon receipt of your Nexsan Storage System, inspect the packaging for damage that may have been sustained in transit. If there is visible damage on the packaging, contact your shipper before proceeding.

Unpack the Nexsan Storage System

Carefully unpack your Nexsan Storage System and inspect each item before installation.

► **To unpack the Nexsan Storage System:**

1. Carefully cut the straps holding the box closed and remove the outer lid.

Figure 2-1: Opening the outer box
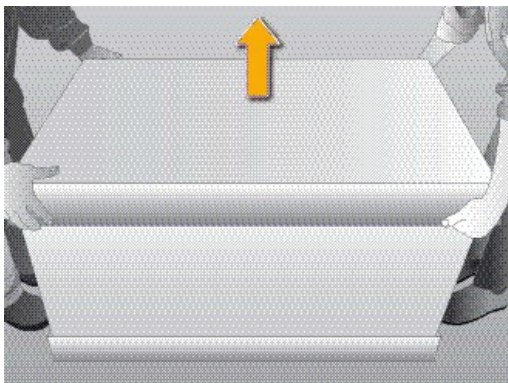
2. Remove the outer packing sleeve.

Figure 2-2: Removing the outer packing sleeve
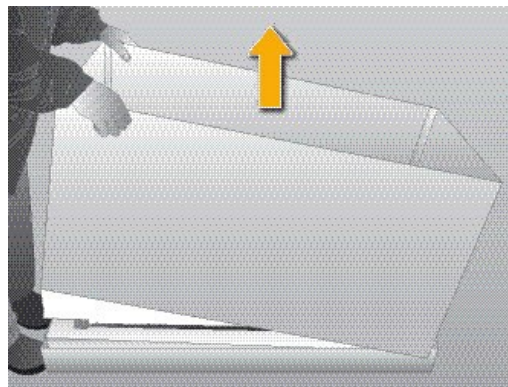
3. Open the accessory boxes and make sure that all expected contents are present.

Figure 2-3: Accessory box contents

The accessory box should contain:

- rack mounting hardware:
  - two (2) rail assemblies, one left and one right
  - ten (10) rail nuts and ten (10) large bolts for securing the rail nuts to the rack
  - four (4) brackets, four (4) nuts, and four (4) bolts for securing the Nexsan E60/Nexsan E48 to the rack
- two (2) power cables
- disposable ESD strap
- one (1) serial cable per RAID Controller
- any additional items that may have been ordered, such as Fibre Channel cables

4. Set the accessory boxes aside.

5. Open the disk boxes and make sure that the proper number of disk drives is included.

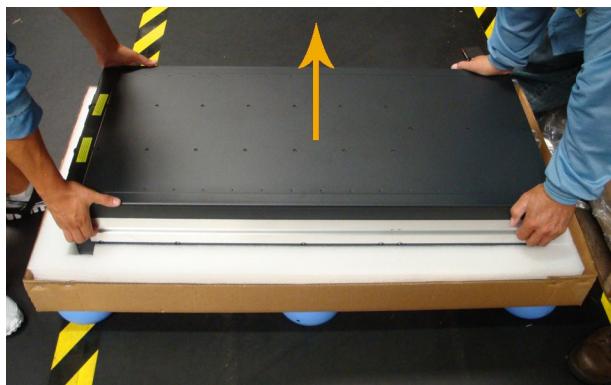Figure 2-4: Disk box contents (example)

6. Set the disk boxes aside.

7.   Remove the foam lid covering the Nexsan E60/Nexsan E48 Storage System.

Figure 2-5: Removing the foam lid

2
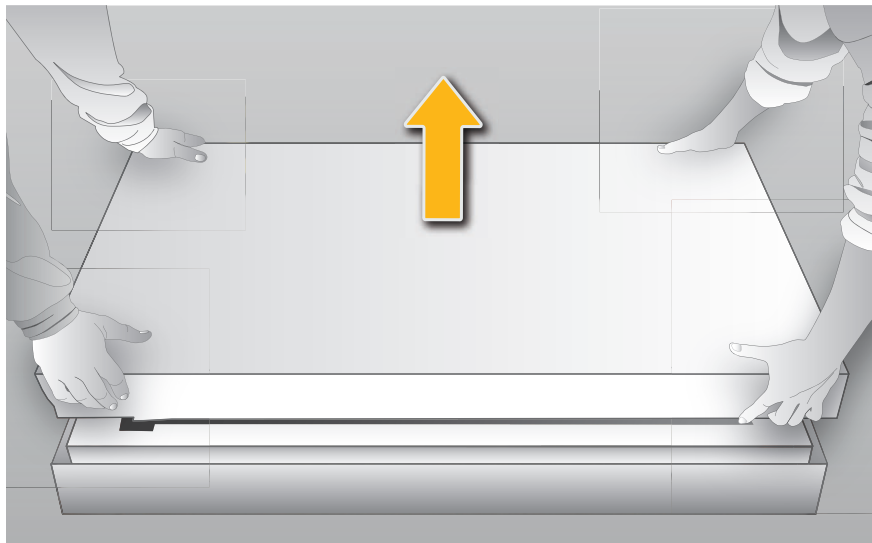
8. With the help of a second person, carefully lift the Nexsan E60/Nexsan E48 enclosure out of the packaging using the lifting straps.

Figure 2-6: Removing the enclosure from the box
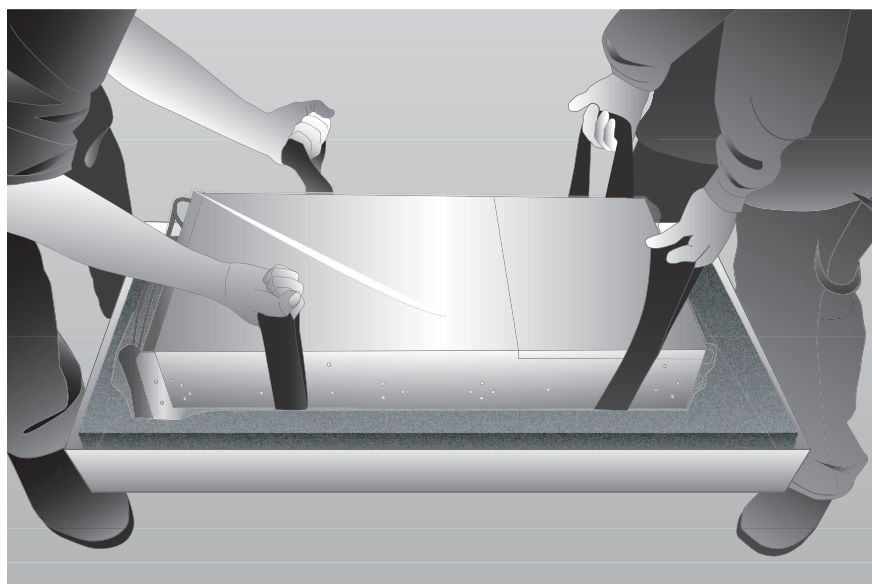
⚠ **CAUTION**: When removing the enclosure from the packaging, DO NOT lift the enclosure by any plastic parts or module handles on the chassis. Doing so may cause damage to the chassis or to internal components, or both. Lift the enclosure ONLY using the supplied lifting straps, using safe lifting practices.

Tip The packaging that the Nexsan E60/Nexsan E48 ships in is reusable and should be retained for future re-shipment. Be sure to keep all packaging components.

2

Before installation

Required tools and equipment

To perform the installation, you will need the following tools and equipment:

- a suitable equipment rack (1,200mm (E60) or 1,000mm (E48) deep recommended, see Physical characteristics on page 21) with sufficient load capacity to hold the Nexsan Storage System's weight

  Note The rails that ship with the Nexsan Storage System can accommodate a rack post depth of 660mm to 914mm (26" to 36").

- a suitable source of A/C power: 200–240VAC, 47–63Hz, 15A

  ⚠ DO NOT attempt to power the Nexsan E60 Storage System from a 110V or 120V power source. Use ONLY a 200–240V power source.

- PH2 and PZ2 screwdrivers
- Ethernet cables of sufficient length to connect the **MGMT** port on each RAID controller to the local area network (LAN)

Prepare the site

Before installing the Nexsan Storage System, prepare the installation site and rack.

▶ **To prepare the site and rack for Nexsan Storage System installation:**

- Ensure that the ambient temperature at the installation site is between 5°C (41°F) and 35°C (95°F).
- Place the rack so that full, unimpeded air flow can enter the front of the Nexsan Storage System and exit the back of the Storage System.
- Ensure that the floor beneath the mounting rack has enough load-bearing capacity to support the rack and all mounted components.
- Fully stabilize the rack with wall anchors or stabilizing legs, or both, before mounting the Nexsan Storage System or any other components onto the rack.
- Ensure that the source of A/C power is near the rack and easily accessible.
- Ensure that the rack is properly grounded per the manufacturer's instructions and that proper ESD safeguards are in place.
- Ensure that the power drawn by Nexsan Storage Systems do not overload the available electrical supply (see Power on page 22). Cordset specification in North America is IEC C13 to IEC C14 rated 250V/10A.

2

Take proper ESD precautions

⚠️ **CAUTION**: Computer components and disk drives are sensitive to electrostatic discharge (ESD). Always ground any electrostatic charge from your person before touching components with your hands or with any tools. Always use an anti-static wrist strap (one ships with each storage system) while installing or performing maintenance on any Nexsan Storage System.

► **To protect the storage system from electrostatic discharge:**

1. Ground any electrostatic charge from your person by touching a metal part of the rack or any properly grounded conductive object (such as the ground point at an anti-static workstation).

2. Attach the clip end of the anti-static wrist strap to the rack's ESD grounding pin or to any bare metal part of the rack (for a racked storage system) or to any proper grounding point (for an unracked storage system). Secure the loop end around your wrist.

Figure 2-7: Attaching and putting on the anti-static wrist strap
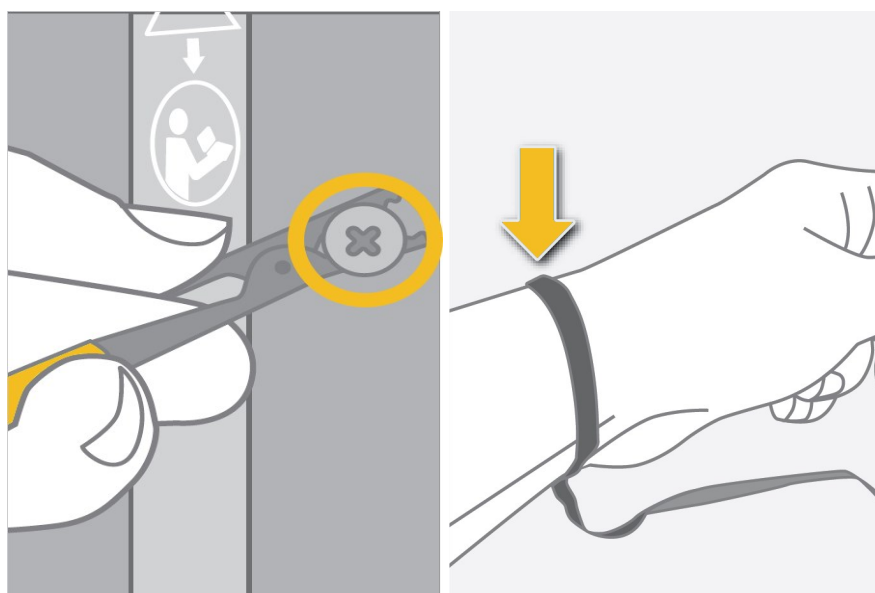
⚠️ **CAUTION**: Do not attach the anti-static wrist strap to any powder-coated part of the equipment rack or storage system. The powder coating can interfere with the transmission of current, resulting in improper grounding which can allow a static charge to build.

3. When working on unracked storage systems or components, place the storage system or component on an anti-static surface.

Prepare the Nexsan Storage System

Before installation, prepare the Nexsan Storage System.

> ⚠️ **CAUTION**: Before opening any of the drive drawers on the Nexsan E60/Nexsan E48, be sure that the internal temperature is 10°C (50°F) or above. If the Nexsan Storage System has been shipped or stored in very low temperatures, allow the system to come to room temperature. Failure to do so may result in internal cable damage.

> ⚠️ **CAUTION**: Computer components and disk drives are sensitive to electrostatic discharge (ESD). Always ground any electrostatic charge from your person before touching components with your hands or with any tools. Always use an anti-static wrist strap (one ships with each Nexsan Storage System) while installing or performing maintenance on any Nexsan Storage System. See Take proper ESD precautions on the previous page for detailed instructions.

▶ **To prepare the Nexsan Storage System for installation:**

1. Ground yourself with the included anti-static wrist strap (see Take proper ESD precautions on the previous page).

2. Remove the two PSUs from the Nexsan Storage System. Press the spring lock tab inward, then carefully remove the PSU from the Nexsan Storage System. Support the weight of the PSU with your free hand while removing it.

Figure 2-8: Removing the PSU
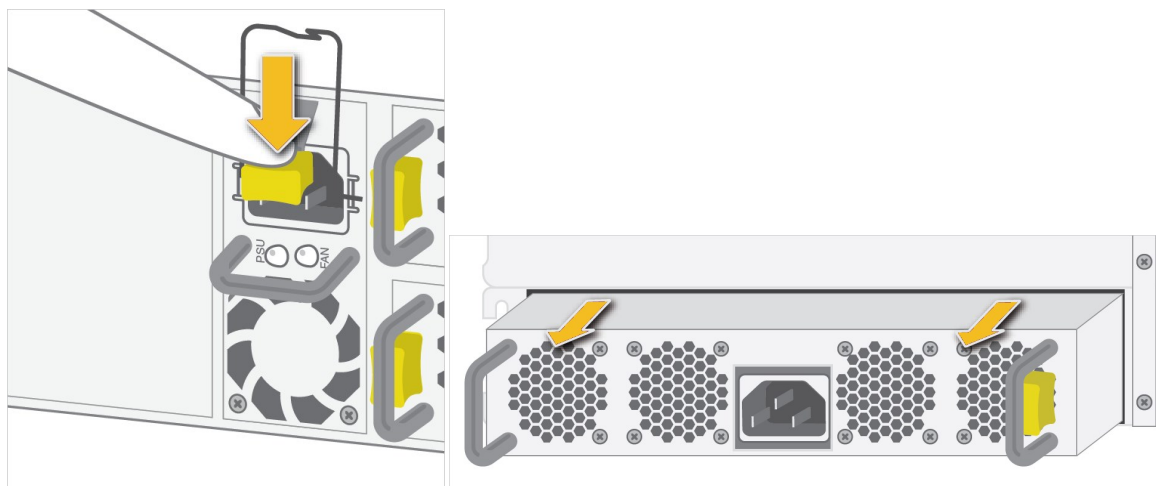
Set the PSUs aside.

Note If you are installing more than one Nexsan E60/Nexsan E48 Storage System, keep each Nexsan Storage System's disk drives with the storage system they shipped with so as to avoid installing them into the wrong storage system (disks are pre-configured for the specific storage system at the factory).

Prepare the mounting rails

⚠️ **CAUTION**: Ensure that your rack can support the total weight of all mounted components and that your floor is sufficiently strong.

Note As the Nexsan Storage System is a fixed-in-rack design, cable management arms are not required.

The rails are labeled "L" (left) and "R" (right) on the outside surfaces, as shown in Figure 2-9. When installing them into the rack, be sure to place them on the correct sides.

Figure 2-9: Mounting rails' "left" and "right" labeling

▶ **To prepare the mounting rails for Nexsan Storage System installation:**

1. Extend the slides to fit your rack.

    Note The rails can be adjusted to between 26" (66cm) and 36" (91.4cm).
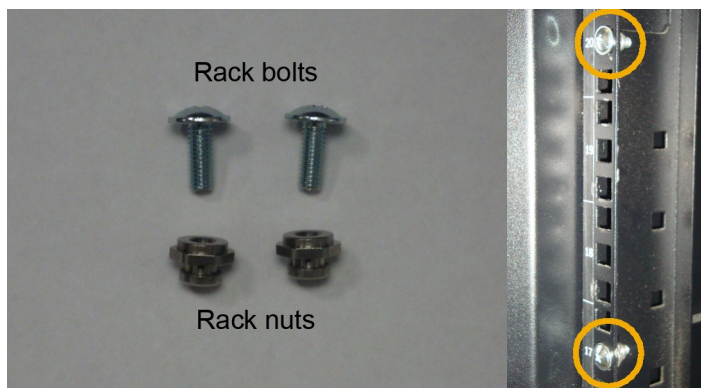
Figure 2-10: Extending the rack-mount rails

2. Attach the rack nuts to the front of the rack on the left and right sides. The rack nuts should be mounted towards the interior of the rack.

    Note The rack nuts should be placed 3U apart. Use the rail as a guide for rack nut placement.

   Figure 2-11: Attaching the front rack nuts

3. Attach the rack nuts to the rear of the rack on the left and right sides. The rack nuts should be mounted towards the interior of the rack.

    Figure 2-12: Attaching the rear rack nuts

4. (For square-hole racks only) For each of the four plastic brackets:

    a. Insert the bracket nut into the recess in the plastic bracket.

    Figure 2-13: Inserting the nut into the plastic bracket
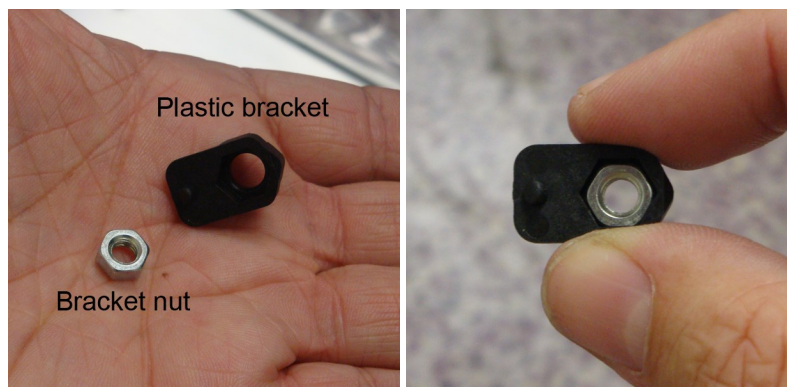
b. Clip the bracket to the appropriate place on the front of the mounting rail.

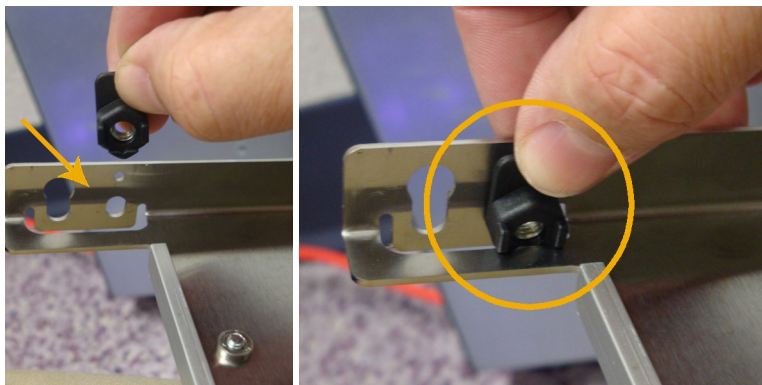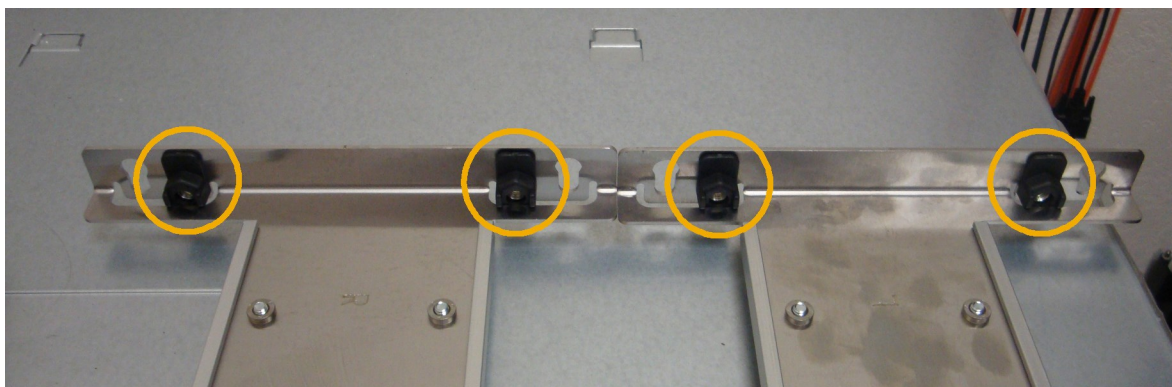Figure 2-14: Clipping the plastic bracket to the front of the rail

Figure 2-15: Rails fronts with all four brackets attached

5. Attach the rear slide of the left rail to the rack nuts by sliding the large part of the mounting hole over the rack nut and then pressing outward to seat the nut in the small part of the mounting hole.

Figure 2-16: Attaching the mounting rail in back
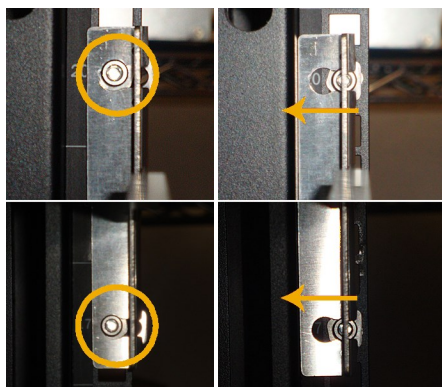
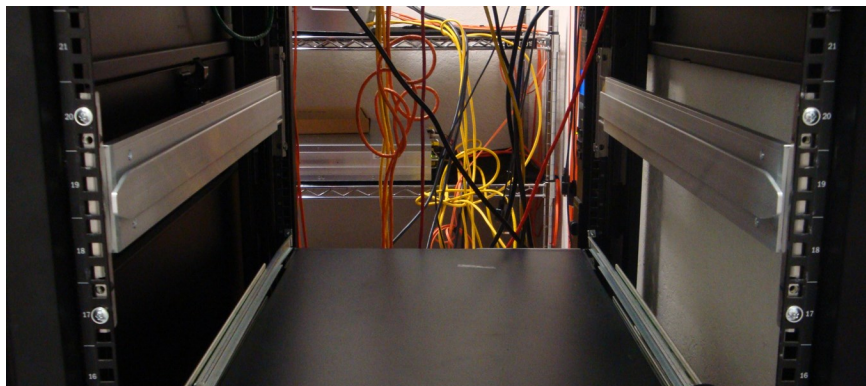6. Repeat the previous step for the front of the mounting rail.

Figure 2-17: Attaching the mounting rail in front
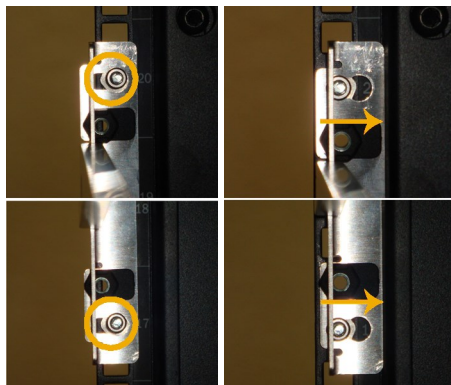
7. Repeat the previous two steps for the right mounting rail.

The mounting rails are now ready to receive the Nexsan Storage System.

Figure 2-18: Both mounting rails in place

Note The rails may seem "loose" before the Nexsan Storage System is mounted on them. This is normal. Once the storage system is on the rails, they are held in place by the body of the storage system.

Chapter 3

Installing the Nexsan Storage System

The Nexsan E60 and Nexsan E48 come in single-controller and dual-controller configurations. These instructions assume a dual-controller Nexsan Storage System installation, but where the steps differ, additional instructions for single-controller Nexsan Storage Systems are provided.

The V and VT variants only come in dual-controller configurations.

This chapter contains the following sections:

3

Mount the Nexsan Storage System

CAUTION: Computer components and disk drives are sensitive to electrostatic discharge (ESD). Always ground any electrostatic charge from your person before touching components with your hands or with any tools. Always use an anti-static wrist strap (one ships with each Nexsan Storage System) while installing or performing maintenance on any Nexsan Storage System. See Take proper ESD precautions on page 29 for detailed instructions.

CAUTION: The enclosure is heavy and requires two people to lift it and slide it onto the mounting rails. Do NOT attempt to mount it onto the mounting rails by yourself.

▶   **To mount the Nexsan Storage System on the mounting rails:**

1. Ground any electrostatic charge from your person by touching a metal part of the rack. Both people lifting the enclosure must do this.

2. Attach one end of the anti-static wrist strap to a bare metal part of the rack. Secure the other end around your wrist. Both people lifting the enclosure must do this. See Take proper ESD precautions on page 29.

3. With the help of a second person, carefully lift the enclosure so that the grooves in the side of the chassis line up with the mounting rails on the rack.

CAUTION: Only support the enclosure by placing hands under the metal chassis. Do NOT attempt to lift the enclosure by any plastic parts or module handles.

4. Carefully slide the enclosure onto the mounting rails so that the mounting ears sit against the rack.

Figure 3-1: Sliding the Nexsan E60/Nexsan E48 onto the mounting rails
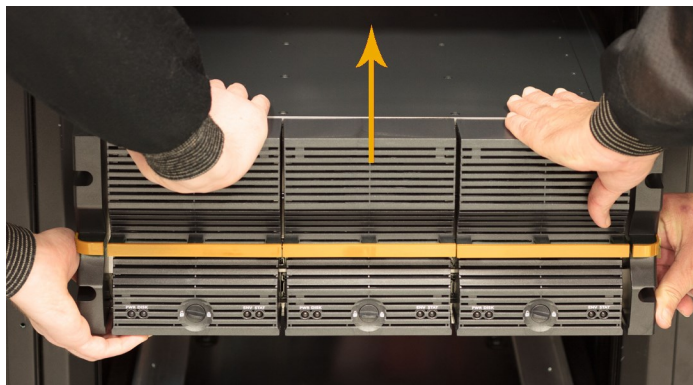
5. Tightly bolt the front of the Nexsan E60/Nexsan E48 to the rail fronts.

Figure 3-2: Bolting the enclosure in place, top and bottom

## Restore the power supply units

CAUTION: Computer components and disk drives are sensitive to electrostatic discharge (ESD). Always ground any electrostatic charge from your person before touching components with your hands or with any tools. Always use an anti-static wrist strap (one ships with each Nexsan Storage System) while installing or performing maintenance on any Nexsan Storage System. See Take proper ESD precautions on page 29 for detailed instructions.

▶ **To insert the two PSUs into the back of the Nexsan Storage System:**

1. Make sure that the PSU is right side up. The spring lock tab should be on the right (see "Rear panel" (page 12)).

2. Insert the PSU into the slot and carefully slide it back until the spring lock tab clicks into place.

Figure 3-3: Sliding the PSU into place
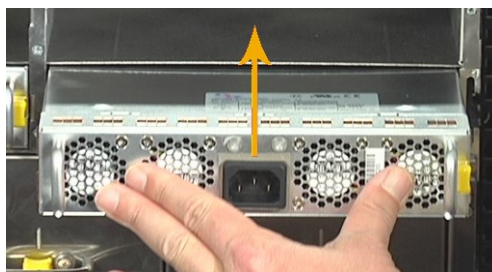
3. Repeat steps 1 and 2 for the second PSU.

   Note Do not connect the power cords to the PSUs at this time.

Reseat the RAID controllers

Tip For dual-Controller Nexsan Storage Systems, remember to check the "left" and "right" labels.

▶ **To insert the one or two RAID Controllers into the back of the Nexsan Storage System:**

1. Make sure that the RAID Controller is right side up. The spring lock tab should be on the right, except for 'P' type controllers, for which it is on the left (see "Rear panel" (page 12)).

2. Insert the RAID Controller into the slot and carefully slide it back until the spring lock tab clicks into place.

Figure 3-4: Sliding the RAID Controller into place
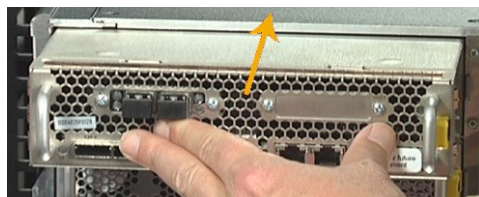
3. Repeat steps 1 and 2 for the second RAID Controller (if present).

Load the disk drives

⚠️ **CAUTION**: Computer components and disk drives are sensitive to electrostatic discharge (ESD). Always ground any electrostatic charge from your person before touching components with your hands or with any tools. Always use an anti-static wrist strap (one ships with each Nexsan Storage System) while installing or performing maintenance on any Nexsan Storage System. See Take proper ESD precautions on page 29 for detailed instructions.

⚠️ **CAUTION**: Before opening any of the drive drawers on the Nexsan E-Series Storage System, be sure that the internal temperature is 10°C (50°F) or above. If the Nexsan Storage System has been shipped or stored in very low temperatures, allow the Nexsan Storage System to come to room temperature. Failure to do so may result in internal cable damage.

To load the disk drives into the Nexsan Storage System drive drawers:

1. Turn the drawer lock counter-clockwise to unlock the left drive drawer.

Figure 3-5: Unlocking the drive drawer

⚠️ **CAUTION**: Only open ONE drawer at a time. Fully close and lock each drawer before opening another one. Failure to do so may overbalance the rack, causing equipment damage or injury to personnel.

2. Carefully slide the drawer all the way out.

Figure 3-6: Sliding the drive drawer out

⚠ **CAUTION**: Do not lean on or place any heavy object on an open drive drawer. Doing so may damage the drawer slide mechanism or overbalance the rack.
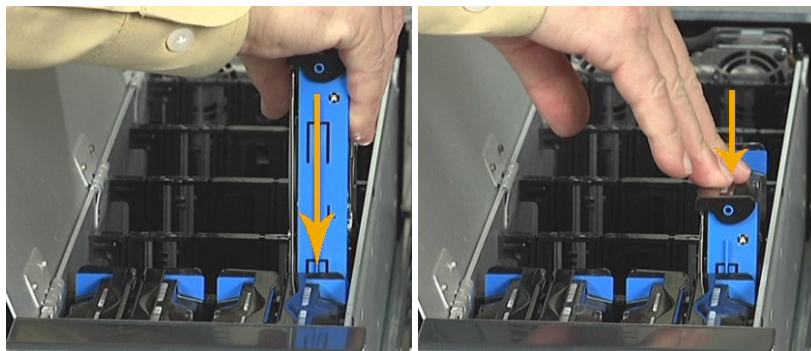
3. Open the drive drawer lid.

⚠ **CAUTION**: Disk drives are shock sensitive. Perform all actions involving disk drives carefully to avoid damage and data loss.

4. Using the drive guides to help you orient the disks, carefully load each disk drive into a drive slot. Make sure that each disk is fully seated and that the drive ejection handles are flat against each drive.

Figure 3-7: Loading a disk drive

⚠ **CAUTION**: Where possible, always load disk drives in rows of four across the width of the drive drawer. Leaving large gaps between disk drives decreases cooling efficiency and may result in some disk drives overheating.

Tip You can mix SAS and SATA drives, and drives with different speeds in the same drive drawer, but it is recommended that all SAS drives are loaded towards the front of the drawer, with the SATA drives behind the SAS drives, and faster drives in front of slower ones.

5. Close the drive drawer lid.

6. Carefully slide the drawer back into the enclosure, making sure that it is flush with the rest of the front panel.

7. Turn the drawer lock clockwise to lock the drawer into place.

8. Repeat all previous steps for the middle and right drive drawers.

Attach communication cables

Connect all necessary communication cables to the RAID Controller (or Controllers) on the rear of the Storage System (see Rear panel on page 12).

► **To connect communication cables:**

1. Connect the Storage System to your local area network (LAN) by attaching 1000Mb/s Ethernet cable to the Management (**MGMT**) port. This enables you to access the Storage System's graphical user interface (GUI).

2. Connect the Storage System to your storage area network (SAN) by one of the following methods:

    ● If you have a 1Gb iSCSI network, attach 1000Mb/s Ethernet cables to the iSCSI ports (**Net 0** and **1**, or **0** through **3** if no host port option is installed) (see Connectors on page 14).

    ● If you have a Fibre Channel network, attach either 8Gb/s or 16Gb/s fibre optic or twisted-pair copper cables to the Fibre Channel ports (see Host port options on page 18).

    ● If you have a 10GbE iSCSI network, attach 10,000Mb/s fibre optic or twisted-pair copper cables to the 10Gb Ethernet iSCSI ports (see Host port options on page 18).

    ● If you have a SAS-to-Host network, attach 6Gb/s SAS cables to the SAS ports (see Host port options on page 18).

Note If you are attaching a Nexsan E60X or Nexsan E48X to your Nexsan Storage System, follow the connection instructions under "Attach a Nexsan Storage Expansion to a Nexsan Storage System" in Chapter 3 of the *Nexsan E60X and Nexsan E48X Storage Expansion Installation Guide*.

Power on the Nexsan Storage System

CAUTION: The cordset specification for the Nexsan E60/Nexsan E48 in North America is IEC C13 to IEC C14 rated . When applying power to the Nexsan Storage System, use ONLY the IEC power cords originally supplied with it. Do NOT use other power cords, even if they appear identical to the supplied cords.

CAUTION: The Nexsan E60/Nexsan E48 does not have power switches. The only way to apply power to the Nexsan Storage System is to attach the power cords. Do NOT attach the power cords until the Nexsan Storage System is fully installed, with all disk drives in place and all connections to the local area network (LAN) and storage area network (SAN) connected.

CAUTION: Ensure that the A/C power socket/outlet is near the equipment and easily accessible.

Note If you are attaching a Nexsan E60X or Nexsan E48X to your Nexsan Storage System, follow the power-on instructions under "Attach a Nexsan Storage Expansion to a Nexsan Storage System" in *Chapter 3* of the *Nexsan E60X and Nexsan E48X Storage Expansions Installation Guide*.

► **To power on the Nexsan Storage System:**

1. Using the two supplied power cords, connect each PSU to A/C power. See Rear panel on page 12.

2. If necessary, press and hold one of the two **SW0** switches on the rear of the Nexsan Storage System for approximately 4 seconds to initiate the power-up sequence. See Switches on page 17.

Note If the audible alarm sounds when the Nexsan Storage System is first powered on, this may be because the controller batteries are discharged. Press either **SW0** switch on the rear of the storage system to silence the alarm. The battery should reach full charge after approximately eight hours of the storage system being plugged in.

Set up the Nexsan Storage System

When the Nexsan Storage System has finished booting up, follow the instructions in "Chapter 1, Basic Setup" of the *Nexsan High-Density Storage User Guide* to get your Nexsan E60/Nexsan E48 Storage System configured and running.

Note The default IP addresses for the RAID controllers in a dual-controller system are 10.11.12.13 and 10.11.12.14. In a single-controller system, the default IP address is 10.11.12.13. It is very important, however, that you change these IP addresses by following the instructions under "Initial Network Address Setup" in Chapter 1 of the *Nexsan High-Density Storage User Guide*.

3

3

Glossary

1

10Gb Ethernet
A 10 gigabit per second (Gb/s) Ethernet connection using either fibre-optic cables or twisted-pair copper wires.

10Gb iSCSI
An iSCSI connection that runs on a 10Gb Ethernet network.

10GbE
See 10Gb Ethernet and 10Gb iSCSI.

A

active drawer
A slide-out container on the front of Nexsan Storage Systems that houses the disk drives used by the system for data storage. Also sometimes referred to as a "pod" in event logs and other internal statistics.

Active Drawer Technology
Nexsan's industry-first technology which enables users to replace drives and perform certain maintenance tasks without powering off the system and without interrupting service. An advanced, built-in cable management system allows cables to extend and retract with the active drawer for easy servicing.

Anti-Vibration Design
Nexsan's proprietary disk installation scheme wherein drives are loaded into the chassis in opposite-facing pairs. Disks in each pair rotate in opposite directions and serve to self-dampen any related vibration.

antistatic wrist strap
An anti-static device used to prevent electrostatic discharge (ESD) by safely grounding a person working on electronic equipment. Also called an ESD strap or a grounding bracelet.

array
A linked group of one or more physical, independent hard disk drives. See also RAID.

B

bit
The smallest unit of digital data, representing a 0 or a 1. Abbreviated "b".

byte
A unit of data that is 8 bits long. Often used for alphanumeric characters. Abbreviated "B".

C

cache

Reserved areas of memory that are used to speed up instruction execution, data retrieval, and data updating. In Nexsan Storage Systems, a memory unit in the RAID controller that temporarily holds user data.

CoolDrive Technology

Nexsan's proprietary active drawer cooling system, which uses front- and rear-mounted fans to provide air intake and exhaust through the drawer. Air flows from the front of the drawer to the back through airflow channels located between the drive pairs. Either fan can fail; air is still supplied to the drawer by the alternate fan.

D

daisy-chain

The attachment of hardware to a computing system by connecting each component to another similar component rather than directly to the computing system that uses the component. Only the last component in the chain directly connects to the computing system. For example, up to two Nexsan Storage Expansions can be daisy-chained to the back of one Nexsan Storage System.

drawer front assembly

In Nexsan E60 and E48 Storage Systems (and their V, VT and P variants), the assembly that houses the active drawer status LEDs, the drive drawer lock, and the front drive drawer fan.

drive drawer

See active drawer.

E

E-Series

The series of Nexsan Storage Systems that includes the Nexsan E18, E48, and E60 Storage Systems (and their V, VT and P variants), the Nexsan E32V, the Nexsan E18X, E48X, and E60X expansions (and their V variants), and the Nexsan E32V. Nexsan E-Series Storage Systems feature Active Drawer Technology, Anti-Vibration Design, and CoolDrive Technology.

electrostatic discharge

The sudden and momentary electric current that flows between two objects at different electrical potentials caused by direct contact or induced by an electrostatic field. Potentially harmful to electronic components.

ESD

See electrostatic discharge.

ESD strap

See anti-static wrist strap.

Ethernet

A system for connecting a number of computer systems to form a local area network (LAN), with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems. Supports data transfer rates of 10, 100, 1,000, and 10,000 megabits per second (Mb/s). 10, 100, and 1,000Mb/s networks are often referred to as 10BASE-T, 100BASE-T, and 1000BASE-T, respectively. 10,000Mb/s networks are usually referred to as 10Gb Ethernet or 10GbE.

Expansion Controller

A module of Nexsan E-Series expansion units (Nexsan E18X/XV, E32XV, E48X/XV, and E60X/XV) that connects via SAS to a Nexsan Storage System's RAID controller.

F

FC port

See Fibre Channel port.

FCC

The Federal Communications Commission; the United States federal agency that regulates electromagnetic emissions.

Fibre Channel

A gigabit (Gb) speed network technology primarily used for storage networking and the current standard connection type for storage area networks (SANs). Despite its name, Fibre Channel signaling can run on both twisted-pair copper wire and fibre-optic cables.

Fibre Channel port

Any entity that actively communicates over a Fibre Channel network. Usually implemented in a device such as disk storage or a Fibre Channel switch. Depending on the system, the Fibre Channel ports on Nexsan Storage Systems can support 2Gb/s, 4Gb/s, 8Gb/s, 16Gb/s, or 32GB/s connections.

Fibre Channel switch

A network switch compatible with the Fibre Channel protocol. Enables the creation of a Fibre Channel network, which is currently the core component of most storage area networks (SANs).

FRU (Field Replaceable Unit)

A module within a Nexsan Storage System or Nexsan Storage Expansion that can be replaced on site. Consult Nexsan Support for details.

G

Gb

Gigabit. Approximately one billion (1,000,000,000) bits.

GB

Gigabyte. Approximately one billion (1,000,000,000) bytes. Used to describe the storage capacity of hard disk drives. A gigabyte is usually computed as 109 (1,000,000,000) bytes, but can also be computed as 230 (1,073,741,824) bytes (often called a "binary gigabyte" and abbreviated GiB).

Gb/s

Gigabits (Gb) per second. Used to describe the speed of network data transmission.

GB/s

Gigabytes (GB) per second. Used to describe the speed of network data transmission. 1 GB/s is eight times faster than 1Gb/s.

gigabit interface converter

A standard for transceivers, commonly used with Gigabit (Gb) Ethernet and Fibre Channel, with a hot-swappable electrical interface. Gigabit interface converter ports can support a wide range of physical media, from copper to optical fibre, at lengths of up to hundreds of kilometers.

graphical user interface

A type of user interface that enables users to interact with electronic devices using images rather than text commands. Nexsan Storage Systems use a graphical user interface for system configuration.

grounding bracelet

See anti-static wrist strap.

GUI

See graphical user interface.

H

hot-plug

To insert a new piece of hardware into a computerized system while the system is running. See also hot-swap.

hot-swap

To replace a failed or faulty component of a computerized system while the system is running. See also hot-plug.

I

I/O

Input/Output. The communication between an information processing system (such as a computer or a Nexsan Storage System RAID controller), and the outside world (either an operator or another information processing system). Inputs are the signals or data received by the system, and outputs are the signals or data sent from it.

IEC

The International Electrotechnical Commission. Prepares and publishes international standards for all electrical, electronic, and related technologies.

interconnect service module

A module of the Nexsan E-Series storage units that provides connectivity between all modules in the chassis.

IP address

Internet Protocol address. A numerical label assigned to each device (such as a computer, printer, or Nexsan Storage System) on a computer network that uses TCP/IP for communication.

iSCSI

Internet Small Computer System Interface. A transport protocol that provides for the SCSI protocol to be carried over a TCP/IP network.

ISM

See Interconnect Service Module.

L

LAN

See local area network.

LED

Light Emitting Diode. LEDs are used for indicator lights on the front and back of Nexsan Storage Systems.

link module

A module of single-controller Nexsan E18/E18V storage units that fits into a RAID controller slot and provides connections to the mid-plane.

local area network

A computer network that links devices within a small geographic area, such as a building or group of adjacent buildings.

M

Mb

Megabit. Approximately one million (1,000,000) bits.

Mb/s

Megabits (Mb) per second. Used to describe the speed of network data transmission.

P

PCIe

Peripheral Component Interconnect Express. A computer expansion card standard designed to replace the older Peripheral Component Interconnect (PCI), PCI-eXtended (PCI-X), and Accelerated Graphics Port (AGP) standards.

pod

See active drawer.

power supply unit

A module that regulates electrical power to the components of Nexsan Storage Systems.

PSU

See power supply unit.

R

rack

A metal frame designed to hold hardware devices.

rack-mounted

Attached to a rack.

rack mount

Hardware for attaching devices to a rack.

RAID

Redundant Array of Independent Disks. A system using multiple hard drives organized into a single logical unit for the sharing or replication of data in order to increase data integrity, fault-tolerance, and throughput. Also referred to as a RAID set. RAIDs are organized into RAID levels, which describe their architecture and configuration.

RAID Controller

A hardware device, software program, or combination of the two which manages the physical disk drives in a RAID and presents them as a single logical unit to attached devices. The RAID Controllers in Nexsan Storage Systems are hardware modules. Nexsan RAID Controllers also provide connections for system administration and configuration.

RAID level

A numeric indicator of the architecture used by a RAID. RAIDs can be built using any combination of striping, mirroring, and parity. The levels are numbered from 0 through 6. Some RAID levels can also be combined, and these configurations are usually referred to with a two-digit number. For example, RAID 10 = RAID 1 + RAID 0.

rail

A type of rack mount that enables a device to be easily slid into and back out of a rack.

S

SAN

See storage area network.

SAS

Serial Attached SCSI. A serial version of the SCSI interface. A point-to-point architecture that uses a disk controller with four or more channels that operate simultaneously. Each full-duplex channel, known as a SAS port, transfers data at 1.5Gb/s, 3Gb/s, or 6Gb/s in each direction. SAS also supports Serial ATA (SATA) drives, which can be mixed with SAS drives in a variety of configurations.

SATA

Serial Advanced Technology Attachment. A connection standard for fixed and removable hard disk drives.

SCSI

Small Computer System Interface. A collection of standards and proposed standards for input/output (I/O) communication, primarily intended for connecting storage subsystems or devices to hosts.

SFP

Small Form-factor Pluggable. A type of gigabit interface converter (GBIC) in a compact form factor. The Fibre Channel ports or 10Gb iSCSI ports on Nexsan storage devices are SFPs.

SSD

Solid State Disk. A high-performance storage device that contains no moving parts.

storage area network

An architecture that provides for attachment of remote computer storage devices to servers in such a way that the devices appear as locally attached to the operating system.

T

TB

Terabyte. Approximately one trillion (1,000,000,000,000) bytes. Used to describe the storage capacity of hard disk drives. A terabyte is usually computed as 1012 (1,000,000,000,000) bytes, but can also be computed as 240 (1,099,511,627,776) bytes (often called a "binary terabyte" and abbreviated TiB).

TCP/IP

Transmission Control Protocol/Internet Protocol. The set of communications protocols used for the Internet and other similar networks. TCP provides reliable delivery of messages between networked computers. IP uses numeric IP addresses to join network segments.

U

U

Unit. The standard unit of measure for designating the vertical usable space, or height, of racks. 1U is equal to 1.75 inches. A device that is described as being 1U in height may be shorter than 1.75 inches, but, due to the design of most racks, will still take up 1.75 inches of rack space.

W

WAN

See wide area network.

wide area network

A telecommunication network that covers a broad area or that links across metropolitan, regional, or national boundaries. Wide area networks are used to connect local area networks and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations.

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