



# Nexsan E48 and Nexsan E60 Storage Systems

## FRU Removal and Replacement Guide

## Trademarks

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Electromagnetic Emissions: FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

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)

Safety: CSA/EN/IEC/UL 60950-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

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## About this manual

This FRU removal and replacement guide provides detailed procedures for installing, removing, and replacing field-replaceable units (FRUs) in Nexsan E48 and Nexsan E60 and their 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
<u>underlined blue</u>	Cross-references, hyperlinks, URLs, and email addresses.
<b>boldface</b>	Labels on the physical Nexsan Storage System or interactive items in the graphical user interface (GUI).
<i>italics</i>	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.
<b>monospace bold</b>	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.

#### Nexsan Headquarters

1289 Anvilwood Avenue  
Sunnyvale, CA 94089  
United States of America

#### Worldwide Web site

[www.nexsan.com](http://www.nexsan.com)

#### E-Series and BEAST support:

<https://www.nexsan.com/support/e-series-and-beast/>

#### Contact:

<https://www.nexsan.com/support>

#### European Head Office, UK

Units 33–35 Parker Centre  
Mansfield Road  
Derby, DE21 4SZ  
United Kingdom

## Related documents

The following Nexsan product manuals contain related information:

- *Nexsan E48 and Nexsan E60 Storage Systems Installation 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 Systems 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

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

## Revision history

This section lists updates and new material added to the *Nexsan E48 and Nexsan E60 FRU Removal and Replacement Guide*.

### P0450139, Rev. B, March 2022

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

### NXS-ES4U-MG Rev. 03, October 2014

Added section [Take proper ESD precautions on page 24](#) to the beginning of Chapter 2; updated all ESD warnings; added ESD warnings to all sections that deal with handling electronic components or disk drives, each one referencing [Take proper ESD precautions on page 24](#).

### NXS-ES4U-MG 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 [Adding Modules on page 23](#).

### NXS-ES4U-MG 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

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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.

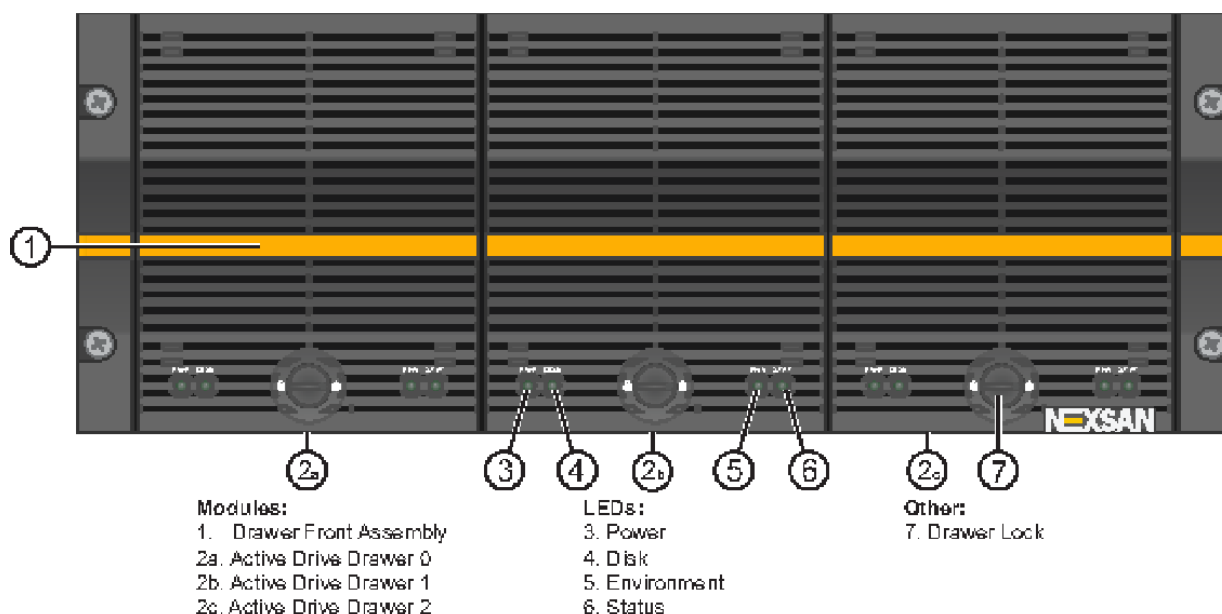
This chapter contains the following sections:

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## Front panel

Use this section to understand front panel components.

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



### Legend

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

Table 1-2: Field-replaceable modules

Number	Component	Description
1.	Drawer Front Assembly w/ Fan	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 <a href="#">Front drive drawer fans on page 36</a> ).

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 ( <b>PWR</b> )	<p>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 <b>Environmental Information</b> page (under <i>System Information</i>) in the graphical user interface (GUI) displays details (see the <i>Nexsan High-Density Storage User Guide</i>).</p> <p>If the <b>PWR</b> 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 <b>SW0</b> switch (see <a href="#">Switches</a> on page 17).</p>
4.	Disk LED ( <b>DSK</b> )	<p>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 <b>Disk Drives</b> page (under <i>RAID Information</i>) in the graphical user interface (GUI) displays details (see the <i>Nexsan High-Density Storage User Guide</i>).</p>
5.	Environment LED ( <b>ENV</b> )	<p>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 <b>Environmental Information</b> page (under <i>System Information</i>) in the graphical user interface (GUI) displays details (see the <i>Nexsan High-Density Storage User Guide</i>).</p>
6.	Status LED ( <b>STAT</b> )	<p>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:</p> <ul style="list-style-type: none"> <li>• A Power Supply Unit issue with the fan, temperature, or voltage</li> <li>• A RAID Controller issue with the temperature, voltage, battery, firmware, or other hardware</li> <li>• A drawer voltage issue</li> </ul> <p>The <b>Environmental Information</b> page (under <i>System Information</i>) in the graphical user interface displays details (see the <i>Nexsan High-Density Storage User Guide</i>).</p>

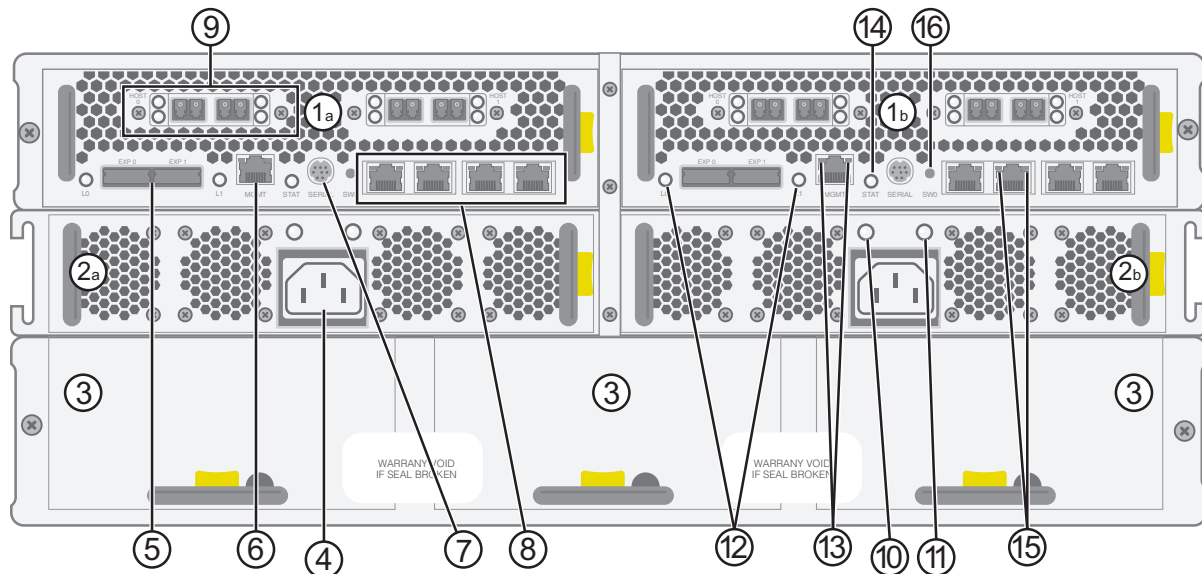
Table 1-5: Other items

Number	Component	Description
7.	Drawer Lock:	Secures the drive drawer in place. When this lock is disengaged, the <b>STAT</b> 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

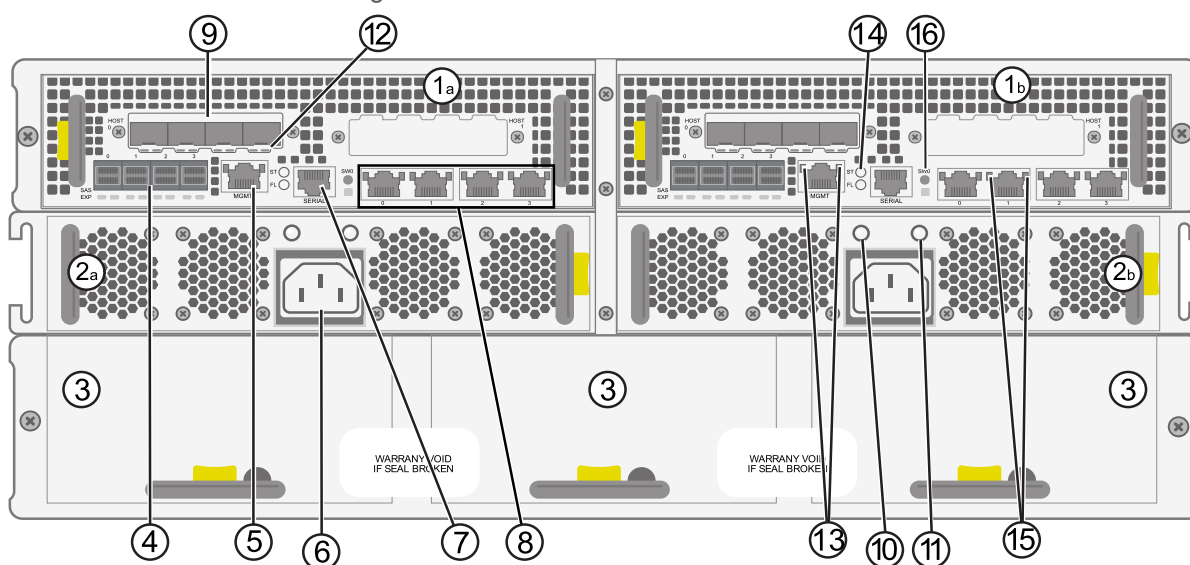
**LEDs:**

- 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 <a href="#">RAID Controllers</a> on page 31). RAID Controllers are designated Controller 0 (left) and Controller 1 (right) in the graphical user interface (GUI) (see the <i>Nexsan Nexsan High-Density Storage User Guide</i> ).  <b>Note</b> 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 <a href="#">Power Supply Units (PSUs)</a> on page 30).

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).	 <b>CAUTION:</b> 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 <b>ONLY</b> the IEC power cords originally supplied with the Nexsan Storage System. Do <b>NOT</b> use other power cords, even if they appear identical to the supplied cords.
5.	E-Series V/VT	Two expansion ports ( <b>EXP 0</b> and <b>EXP 1</b> ) 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 ( <b>MGMT</b> ) per RAID Controller	Dedicated management port (RJ45) for Web-based configuration (1Gb in E-Series P, 10/100 in prior series models).
7.	One <b>SERIAL</b> 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 ( <b>0</b> through <b>3</b> ) per RAID Controller	1Gb/s Ethernet ports (RJ45s) for iSCSI. If a host port option is installed (see <a href="#">Host port options on page 18</a> ), only ports <b>0</b> and <b>1</b> are usable.
9.	Host ports	See <a href="#">Host port options on page 18</a> .

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 <b>Environmental Information</b> page (under <i>System Information</i> ) in the graphical user interface (GUI) has more information. See the <i>Nexsan Nexsan High-Density Storage User Guide</i> .

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 <b>Environmental Information</b> page (under <i>System Information</i> ) in the graphical user interface (GUI) has more information. See the <i>Nexsan Nexsan High-Density Storage User Guide</i> .
12.	Expansion port LEDs	<p>For Nexsan E48 and Nexsan E60 controllers:</p> <p>There are two LEDs (<b>L0</b> and <b>L1</b>), 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.</p> <p>For E48P and E60P controllers:</p> <p>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.</p>
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.

Number	Component	Description
14.	Controller status LED ( <b>STAT</b> )	<p>Indicates the status of the RAID Controller.</p> <p>For Nexsan E48V/VT and Nexsan E60V/VT controllers:</p> <ul style="list-style-type: none"> <li>● Solid blue indicates that the controller is operating within specifications and that there is no user data in the cache.</li> <li>● 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.</li> <li>● Flashing red (once per second) indicates that the controller is offline due to a fault being detected.</li> <li>● 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.</li> <li>● Alternating blue and red indicates that the controller is booting in Emergency mode (see <a href="#">Switches</a> on the facing page).</li> </ul> <p>For Nexsan E48P and Nexsan E60P controllers:</p> <ul style="list-style-type: none"> <li>● Solid green indicates that the controller is operating within specifications.</li> <li>● Flashing red (once per second) indicates that the controller is offline due to a fault being detected.</li> <li>● Solid red indicates that the controller has been deliberately stopped.</li> <li>● 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.</li> <li>● Alternating red and green indicates that the controller is booting in Emergency mode (see <a href="#">Switches</a> on the facing page).</li> </ul>
15.	iSCSI port LEDs (activity and status):	For 1Gb/s connections, the left LED illuminates green when the link is up, and both LEDs flash green when there is activity.

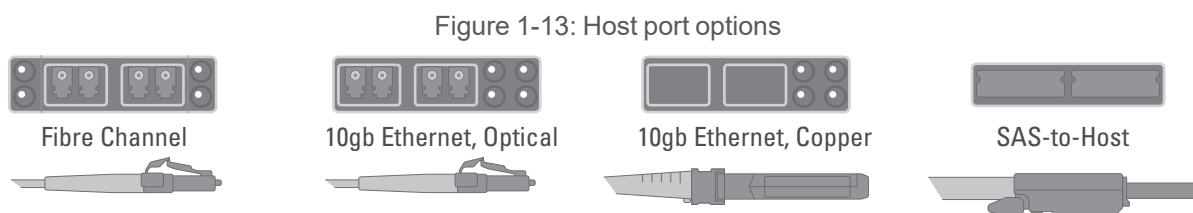


Table 1-12: Switches

Number	Component	Description
16.	<b>SW0</b> Switch	<p>This switch can be used to turn the RAID Controller off or on, boot the controller in Emergency mode, or silence an audible alarm.</p> <p>With the Nexsan Storage System powered on:</p> <ul style="list-style-type: none"> <li>● Briefly press the <b>SW0</b> switch to silence the audible alarm. This can also be done via the graphical user interface (GUI) (see the <i>Nexsan Nexsan High-Density Storage User Guide</i>).</li> <li>● Press and hold the <b>SW0</b> 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 <i>Nexsan Nexsan High-Density Storage User Guide</i>). On dual-controller systems, both <b>SW0</b> switches must be held simultaneously for 8 seconds.</li> </ul> <hr/> <p>With the Nexsan Storage System powered off:</p> <ul style="list-style-type: none"> <li>● Press and hold the <b>SW0</b> switch on either RAID Controller for approximately 4 seconds to power up the Nexsan Storage System. Release the <b>SW0</b> switch to boot normally.</li> <li>● Continue pressing the <b>SW0</b> switch after the Nexsan Storage System powers up to put the RAID Controllers into Emergency mode (see the <i>Nexsan Nexsan High-Density Storage User Guide</i>). Emergency mode is indicated by the controller status LED alternating between blue and red (see <a href="#">LEDs on page 14</a>).</li> </ul>

## 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.



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 ( <b>0</b> and <b>1</b> ) per HBA card	16Gb/s or 8Gb/s Fibre Channel optical SFPs.
Two or Four 10Gb iSCSI (10GbE) ports ( <b>0</b> and <b>1</b> ) per HBA card	10Gb/s Ethernet optical SFPs or copper SFP sockets for iSCSI.
Two or Four SAS ports ( <b>0</b> and <b>1</b> ) 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.

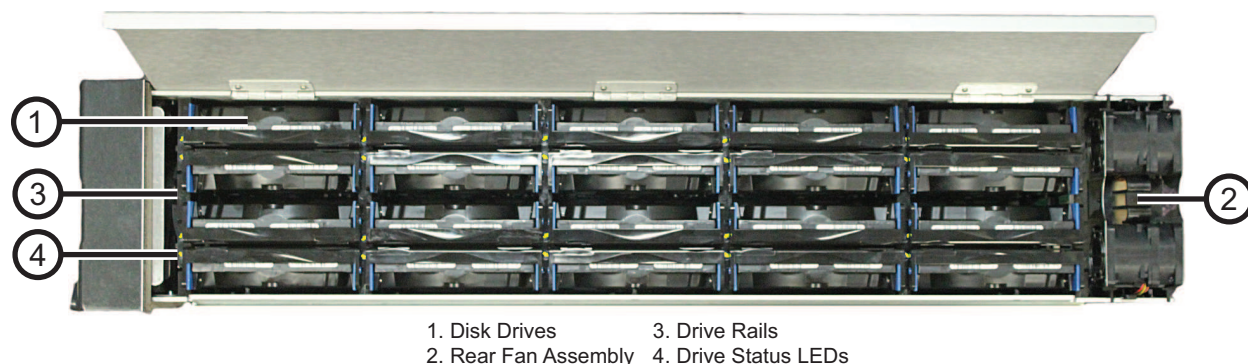
**Notes:**

- 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

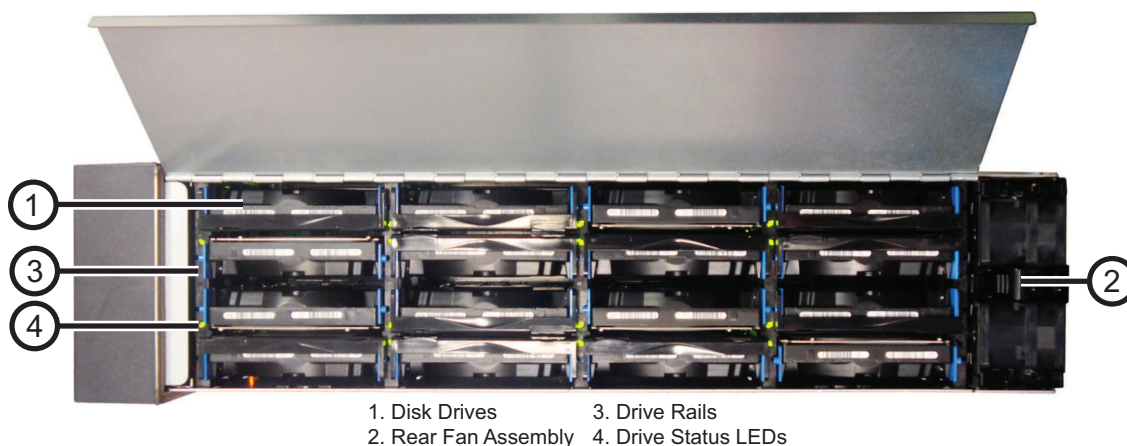
Use this section to understand Drawer interior components.

Figure 1-14: Nexsan E60 drawer interior



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

Figure 1-15: Nexsan E48 drawer interior



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

## Legend

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

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 <a href="#">Disk drives</a> on page 33).
2.	Rear Fan Assembly	Dual-fan assembly located at the rear of each drawer. Can be field-replaced in the event of failure (see <a href="#">Rear drive drawer fan assembly</a> on page 38).

## Physical characteristics

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.

## 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.)

## 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)

## Adding Modules

---

Nexsan E48 and Nexsan E60 Storage Systems are designed so that adding data disks can be performed while the system is powered on and operating normally. Also, a second RAID Controller can be added to single-Controller systems, but this requires the system to be powered down.

**Note** Only the Nexsan E48 and Nexsan E60, and Nexsan E18P come in a single-controller configuration.



**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 next page for detailed instructions.

This chapter contains the following sections:

Take proper ESD precautions .....	24
Adding a second RAID Controller .....	25
Adding disk drives .....	26

## Take proper ESD precautions

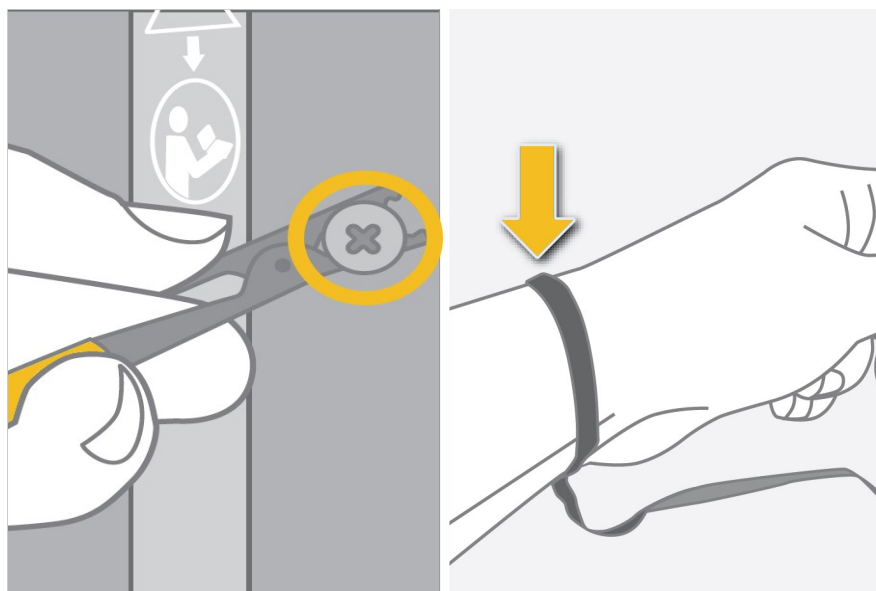


**CAUTION:** Computer components and disk drives are sensitive to electrostatic discharge (ESD). Always ground any electrostatic charge from your person before touching components with your hands or with any tools. Always use an anti-static wrist strap (one ships with each storage system) while installing 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 2-1: 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.



## Adding a second RAID Controller

It is possible to upgrade a single-Controller system to a dual-Controller system by installing a second RAID Controller module. This is necessary if you want to attach a Nexsan Storage Expansion to the Nexsan E48 or Nexsan E60 Storage System or if you want to use any of the system modes that enable failover (see *System Mode* in the *Nexsan High-Density Storage User Guide* for more information).



**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 add a second RAID Controller to a single-Controller system:**

1. Shut down or disconnect all hosts connected to the Nexsan E60/Nexsan E48 Storage System.
2. For dual-Controller Nexsan E48 or Nexsan E60 Storage Systems, use the Nexsan GUI to configure dual-Controller mode:
  - a. Select **System Admin > System Mode**.
  - b. Select the appropriate dual-Controller mode (**2-Port Active-Active**, **4-Port Active-Active**, or **All Ports All LUNs**).

**Note** You should select **All Ports All LUNs** unless there is a specific reason to select one of the other modes.

For more information on system modes, see *System Mode* in *Chapter 3* of the *Nexsan High-Density Storage User Guide*.

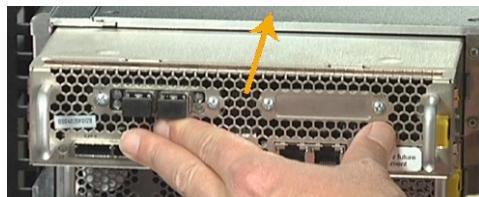
3. Reboot the Nexsan E48 or Nexsan E60 storage system:
  - a. Select **System Admin > Reboot**.
  - b. Select the **System Reboot** option.
  - c. Check the confirmation check box.
  - d. Click **Execute NOW**.
4. Wait 1–2 minutes for the system to reboot.
5. Remove the blank back plate from the back of the unit by pressing the spring lock tabs inward, then carefully removing the plate from the unit.

Figure 2-2: Removing the back plate



6. Make sure that the new RAID Controller is right-side up. The Host ports should be at the top.
7. Insert the RAID Controller into the slot and carefully slide it back until the spring lock tab clicks.

Figure 2-3: Inserting the new RAID controller



8. Attach all communication cables (Fibre Channel/10Gb iSCSI/SAS, Ethernet, serial) to the appropriate connectors on the new RAID Controller.
9. In the graphical user interface (GUI), go to the **Home** page and verify that the status bar for the new RAID Controller is green. See *Home Page* in *Chapter 3* of the *Nexsan High-Density Storage User Guide* for more information.

**Note** One of the two Controllers will be grayed out on the **Home** page. This is normal and only serves to indicate which Controller you are currently accessing the graphical user interface (GUI) through.

## Adding 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 24 for detailed instructions.

Systems that are not fully populated with disk drives can have disk drives added to them at a later time.

**Note** The Spare Mode that the Nexsan Storage System is set to determines whether or not newly-inserted disks are automatically assigned as pool spares. To check or set the spare mode, go to **Configure RAID > Spare Mode** in the graphical user interface (GUI). See the *Nexsan High-Density Storage User Guide* for more information.

### ▶ To add disk drives to the Nexsan Storage System:

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

Figure 2-4: Unlocking the drive drawer



The **STAT** LED turns amber to let you know that the drive drawer is unlocked.



**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.

- Carefully slide the drawer all the way out.

Figure 2-5: 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.

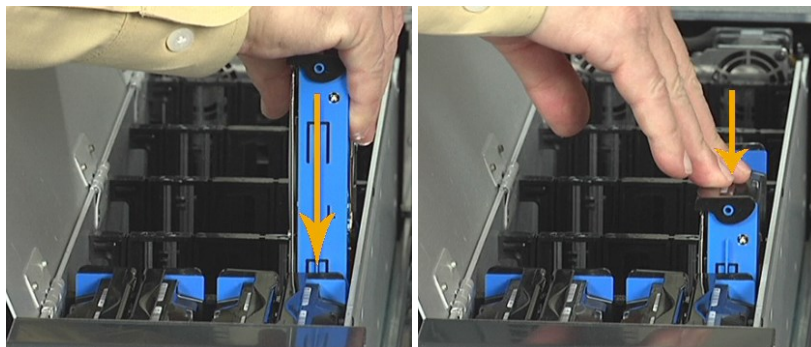
- Open the drive drawer lid.



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

- Using the drive guides to help you orient the disks, carefully load the new 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 2-6: Loading a new disk drive



The drive status LED lights up green to inform you that the disk is connected and functioning properly.



**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.

- 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.

The **STAT** LED on the front of the drawer turns from amber to green to let you know that the drive drawer is properly latched. The **DSK** LED lights up green to let you know that all drives are functioning properly.

8. In the graphical user interface (GUI), go to the **Home** page and verify that the status bar for the new drive is either blue or gray, meaning that it has been automatically detected and assigned as a pool spare or that it is unassigned and ready to be used in a new array or assigned as a spare. See *Home Page* in *Chapter 3* of the *Nexsan High-Density Storage User Guide* for more information.

## Replacing Modules

---

Nexsan E48 and Nexsan E60 Storage Systems are designed so that some components can be replaced without turning off the system or interrupting its functioning. This chapter describes how to replace each of these modules in the field while the unit is running.



**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 24](#) for detailed instructions.

This chapter contains the following sections:

Power Supply Units (PSUs) .....	30
RAID Controllers .....	31
Disk drives .....	33
Front drive drawer fans .....	36
Rear drive drawer fan assembly .....	38

## Power Supply Units (PSUs)

In the event of a power supply or PSU fan failure, replace the PSU using the following procedure.



**CAUTION:** DO NOT REMOVE THE FAILED PSU until the new PSU has arrived and is ready to be installed. Removing a PSU reduces air flow and cooling and can result in the system overheating.

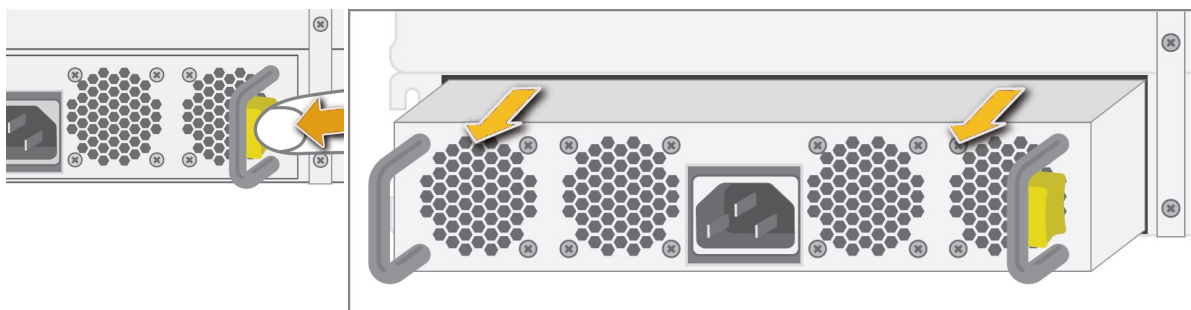


**CAUTION:** Computer components and disk drives are sensitive to electrostatic discharge (ESD). Always ground any electrostatic charge from your person before touching components with your hands or with any tools. Always use an anti-static wrist strap (one ships with each Nexsan Storage System) while installing or performing maintenance on any Nexsan Storage System. See [Take proper ESD precautions on page 24](#) for detailed instructions.

### ► To replace a PSU:

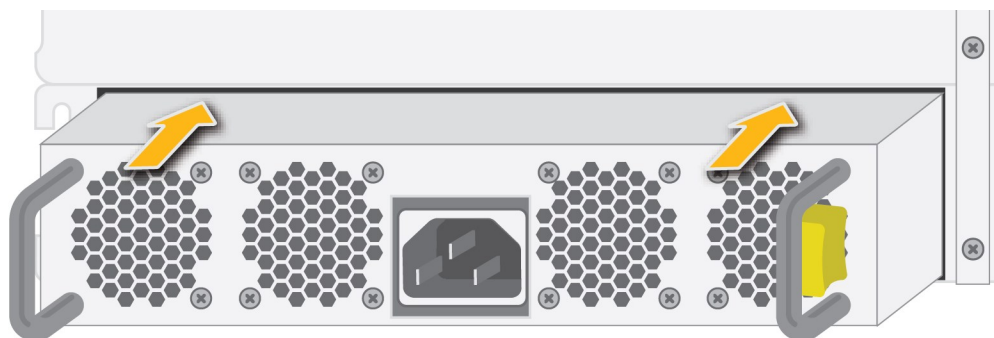
1. Determine which PSU or PSU fan has failed by examining the PSU status LEDs on each module. A red LED indicates the failed module (see [Rear panel on page 12](#)). The **Home** page of the GUI also tells you which module has failed (see the *Nexsan High-Density Storage User Guide*).
2. Remove the power cable from the power socket on the PSU where the failure has occurred.
3. Press the spring lock tab away from the edge of the PSU, then carefully remove the PSU from the unit. Support the weight of the PSU with your free hand while removing it.

Figure 3-1: Removing the PSU



4. Make sure that the replacement PSU is right side up. The spring lock tab should be on the right.
5. Insert the replacement PSU into the slot and carefully slide it back until the spring lock tab clicks.

Figure 3-2: Sliding the PSU into place



6. Plug the power cable into the power cable socket on the replacement PSU.



The two PSU status LEDs light up green to indicate that the unit is functioning properly and supplying power to the unit.

7. In the graphical user interface (GUI), go to the **Home** page and verify that the status bar for the new Power Supply Unit is green. See the *Nexsan High-Density Storage User Guide* for more information.

## RAID Controllers

In the event of a RAID Controller failure, replace the Controller using the following procedure:



**CAUTION:** DO NOT REMOVE THE FAILED RAID CONTROLLER until the new RAID Controller has arrived and is ready to be installed. Removing a RAID Controller reduces air flow and cooling and can result in the system overheating.



**CAUTION:** Single RAID Controller replacement in a dual-Controller system should always be carried out as a hot-swap operation. This ensures that firmware versions match and enables RAID Controller settings to be automatically applied to the new RAID Controller.



**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 24](#) for detailed instructions.

### Notes:

- If you are running in **Dual-Controller Non-Redundant** mode (see *System Mode* in the *Nexsan High-Density Storage User Guide*) or if you have hosts that do not have multipathing configured but have paths available to each RAID Controller, shut down or disconnect all hosts prior to beginning this procedure.
- For a single-Controller system or when changing both Controllers, you will need to use a serial connection or the Nexsan IP Config tool. Refer to the *Nexsan High-Density Storage User Guide* and Nexsan Storage Tools.

### ▶ To replace a RAID Controller:

1. Determine which RAID Controller has failed by examining the **STAT** LED on each module (see [Rear panel on page 12](#)). A flashing red LED indicates the failed module. The **Home** page of the graphical user interface (GUI) also tells you which module has failed (see the *Nexsan High-Density Storage User Guide*).

**Note** In some cases, a RAID Controller needs to be replaced even if it has not failed outright. In this case, you must determine which RAID Controller to replace by following the troubleshooting procedures in *Chapter 4* of the *Nexsan High-Density Storage User Guide*.

**Note** If you are replacing a single *failed* RAID Controller in a dual-Controller system, skip to step 3.

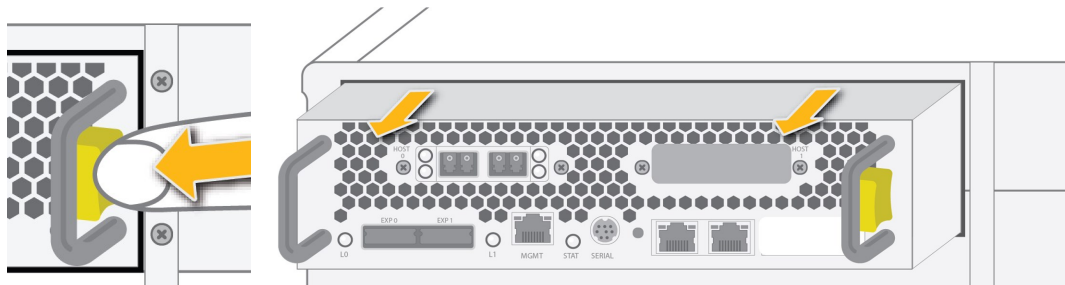
2. If necessary, do one of the following:
  - If you have a dual-Controller Nexsan Storage System and you need to replace a RAID Controller *that has not yet failed*, navigate to **System Admin > Reboot** in the graphical user interface (GUI). Under *Controller Maintenance*, select the RAID Controller that you need to replace, select the confirmation check box, and click **Execute NOW**.
  - If you have a single-RAID Controller Nexsan Storage System or if you must replace both RAID Controllers in a dual-Controller Nexsan Storage System, navigate to **System Admin >**

**Reboot** in the graphical user interface (GUI), select **System Shutdown**, select the confirmation check box, and click **Execute NOW**.

- Carefully note communication cable locations, then remove all cables from the failed RAID Controller.
 

**Note** Cables should only be reconnected to the same ports from which they were removed in order to ensure proper communication between the Nexsan Storage System and connected hosts.
- Press the spring lock tab away from the edge of the RAID Controller, then carefully remove the RAID Controller from the Nexsan Storage System . Support the weight of the RAID Controller with your free hand while removing it.

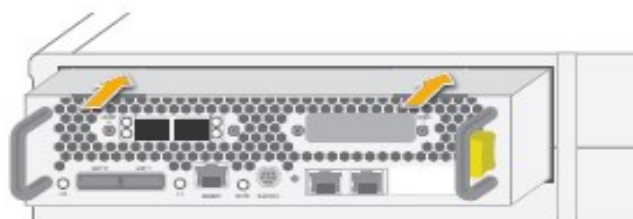
Figure 3-3: Removing the RAID Controller



- Make sure that the battery switch on the back of the replacement RAID Controller is in the on (I) position (does not apply to E-Series P models).
- Make sure that the replacement RAID Controller is right side up. The host ports should be at the top.
 

**Note** If you have a Nexsan Storage Expansion attached to your Nexsan Storage System, plug the SAS cables from the Nexsan Storage Expansion into the expansion ports on the replacement RAID Controller BEFORE you insert the RAID Controller into its slot.
- Insert the replacement RAID Controller into the slot and carefully slide it back until the spring lock tab clicks.

Figure 3-4: Sliding the RAID Controller into place



**Note** If the Nexsan Storage System was not shut down in step 2, the **STAT** LED lights up blue or green to let you know that the Nexsan Storage System is functioning properly.

- Reconnect all communication cables (Fibre Channel/iSCSI/SAS, management, serial) to the appropriate connectors on the replaced RAID Controller.
 

**Note** If you have replaced only one RAID Controller in a dual-Controller Nexsan Storage System , skip to step 11.
- If you have replaced the RAID Controller in a single-Controller Nexsan Storage System or *both* RAID Controllers in a dual-Controller Nexsan Storage System , press and hold the **SW0** switch for approximately 4 seconds to power the Nexsan Storage System on.



10. If you have replaced the RAID Controller in a single-Controller Nexsan Storage System or *both* RAID Controllers in a dual-Controller Nexsan Storage System, clone the RAID Controller settings from a disk by doing one of the following:
  - On a computer attached to the same Ethernet network as the RAID Controller, launch the Nexsan IP Configuration utility (included with Nexsan Storage Tools). Select the storage system and choose the option to clone RAID Controller settings from disk.
  - Connect a serial cable to your device and log in with a telnet program (115200 baud, 8 data bits, 1 stop bit, no parity, no flow control). At the prompt, choose the option to clone RAID Controller settings from disk
11. Wait 1–2 minutes for the new RAID Controller to boot.
12. In the graphical user interface (GUI), go to the **Home** page and verify that the status bar for the new RAID Controller is green. See the *Nexsan High-Density Storage User Guide* for more information.
13. If necessary, restart or reconnect your hosts and verify that all volumes are working as expected.

## Disk drives

In the event of a disk drive failure, replace the drive using the following procedure.

**Note** The Spare Mode that the unit is set to determines whether or not newly-inserted disks are automatically assigned as pool spares. To check or set the spare mode, go to **Configure RAID > Spare Mode** in the graphical user interface (GUI). See the *Nexsan High-Density Storage User Guide* for more information.



**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 24](#) for detailed instructions.

### ► To replace disk drives in the Nexsan Storage System:

1. Determine which drive drawer contains the failed drive by examining the **DSK** LEDs on the front of each drawer (see [Front panel on page 10](#)). A red LED indicates which drawer contains the failed drive.
2. Turn the drawer lock counter-clockwise to unlock the drive drawer.

Figure 3-5: Unlocking the drive drawer



The **STAT** LED turns amber to let you know that the drive drawer is unlocked.



**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.

3. 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.

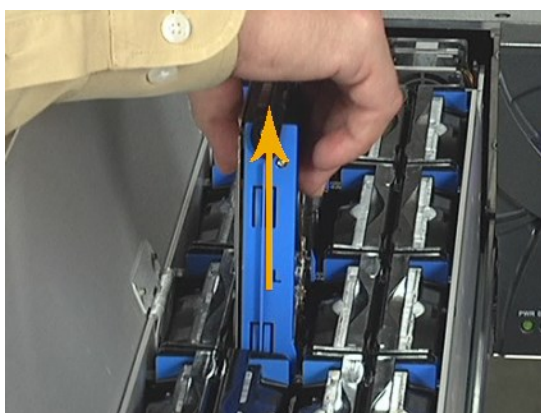
4. Open the drive drawer lid.



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

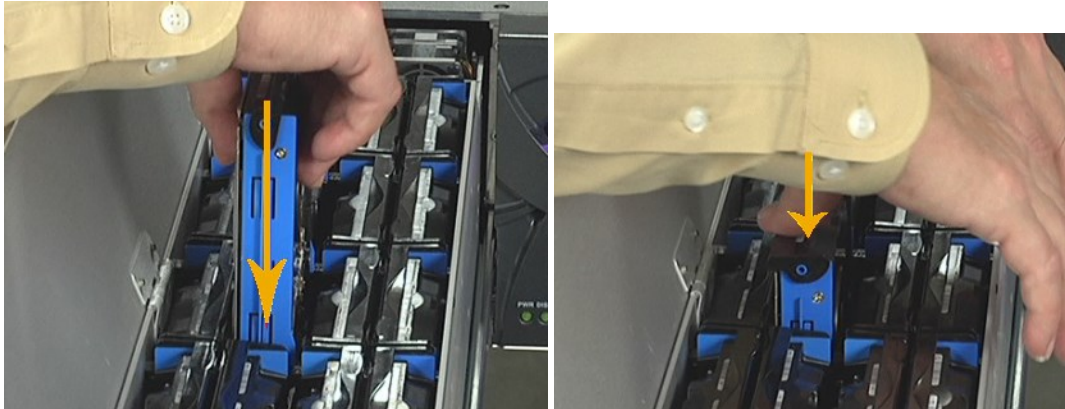
5. Determine which drive has failed by examining the arrow-shaped drive status LEDs next to each drive (see [Drawer interior](#) on page 19). A red LED indicates the failed drive.
6. Carefully lift the drive's ejection handle to disengage the drive, then remove the drive from the drive slot. Support the weight of the drive with your free hand while removing it.

Figure 3-7: Removing a disk drive



7. Using the drive guides to help you orient the disks, carefully load the replacement disk drive into the drive slot. Make sure that the disk is fully seated and that the drive ejection handle is flat against the drive.

Figure 3-8: Loading a new disk drive



The drive status LED lights up green to inform you that the disk is connected and functioning properly.

8. Close the drive drawer lid.
9. Carefully slide the drawer back into the unit, making sure that it is flush with the rest of the front panel.
10. Turn the drawer lock clockwise to lock the drawer into place.

The **STAT** LED on the front of the drawer turns from amber to green to let you know that the drive drawer is properly latched. The **DSK** LED lights up green to let you know that all drives are functioning properly.

11. In the graphical user interface (GUI), go to the **Home** page and verify that the status bar for the new drive is either blue or gray, meaning that it has been automatically detected and assigned as a pool spare or that it is unassigned and ready to be used in a new array or assigned as a spare. See *Home Page* in *Chapter 3* of the *Nexsan High-Density Storage User Guide* for more information.

## Front drive drawer fans

In the event of the failure of a front drive drawer fan, replace the drawer front assembly by using the following procedure:

► **To replace the front drive drawer fans:**

1. Determine which drive drawer contains the failed fan by examining the **ENV** LEDs on the front of each drawer (see [Front panel on page 10](#)). A red LED indicates which drawer has the failed fan. The **Home** page of the graphical user interface (GUI) also tells you which fan has failed (see *Home Page* in *Chapter 3* of the *Nexsan High-Density Storage User Guide*).
2. Turn the lock clockwise to unlock the drive drawer (see [Figure 3-5](#)).

The STAT LED turns amber to let you know that the drive drawer is unlocked.



**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.

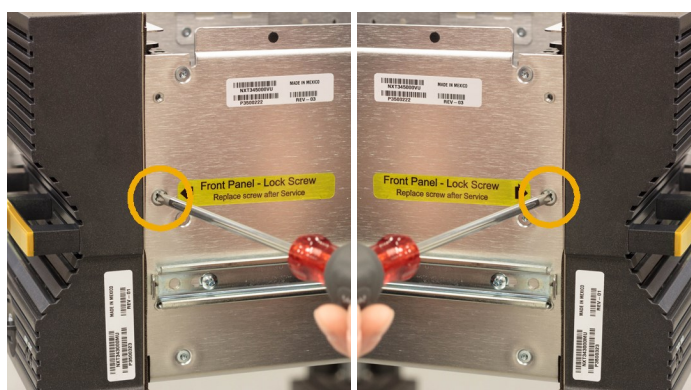
3. Carefully slide the drawer all the way out (see [Figure 2-5](#)).



**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.

4. Open the drive drawer lid.
5. Unscrew the retaining screws on either side of the drive drawer.

Figure 3-9: Unscrewing the drawer front assembly retaining screws



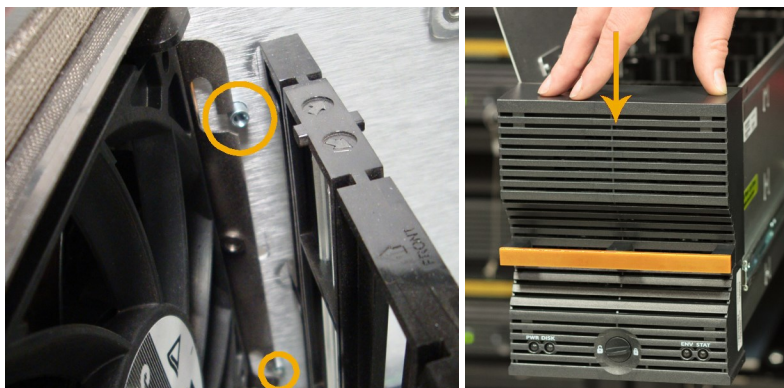
6. Carefully slide the drawer front assembly upwards to disengage it, then remove it from the front of the drive drawer.

Figure 3-10: Removing the drawer front assembly



7. Guide the replacement drawer front assembly onto the guides in the front of the drawer, then carefully push down to seat it.

Figure 3-11: Replacing the drawer front assembly



The LEDs on the front of the drawer front assembly light up to let you know that the assembly is properly in place.

8. Replace the retaining screws on the sides of the drive drawer.
9. Close the drive drawer lid.
10. Carefully slide the drawer back into the unit, making sure that it is flush with the other drawers.
11. Turn the lock clockwise to lock the drawer into place.

The **STAT** LED on the front of the drawer turns from amber to green to let you know that the drive drawer is properly latched. The **ENV** LED lights up green to let you know that the fan is functioning properly and that the drawer temperature is within specifications.

12. In the Nexsan GUI, go to the **Home** page and verify that the status bar for the replacement fan assembly is green. See *Home Page* in *Chapter 3* of the *Nexsan High-Density Storage User Guide* for more information.



## Rear drive drawer fan assembly

In the event of the failure of a rear drive drawer fan, replace the rear fan assembly by using the following procedure:

► **To replace the rear drive drawer fans:**

1. Determine which drive drawer contains the failed fan by examining the **ENV** LEDs on the front of each drawer (see [Front panel on page 10](#)). A red LED indicates which drawer has the failed fan. The **Home** page of the graphical user interface (GUI) also tells you which fan has failed (see the Nexsan High-Density Storage User Guide).
2. Turn the lock clockwise to unlock the drive drawer (see [Figure 2-4](#)).

The **STAT** LED turns amber to let you know that the drive drawer is unlocked.



**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.

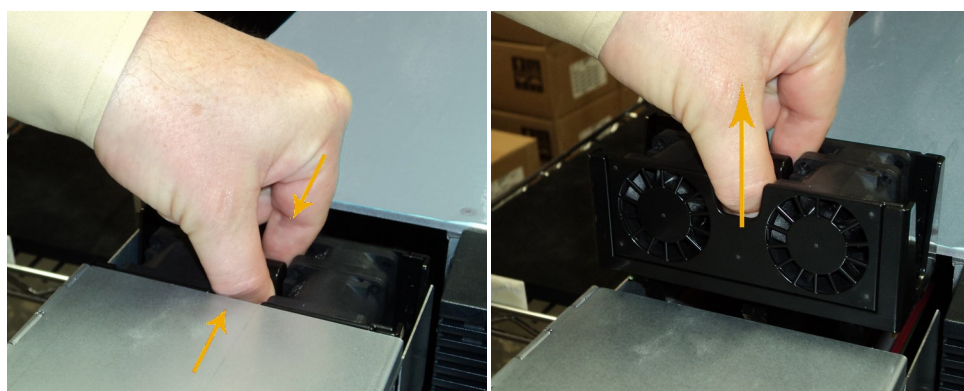
3. Carefully slide the drawer all the way out (see [Figure 2-5](#)).



**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.

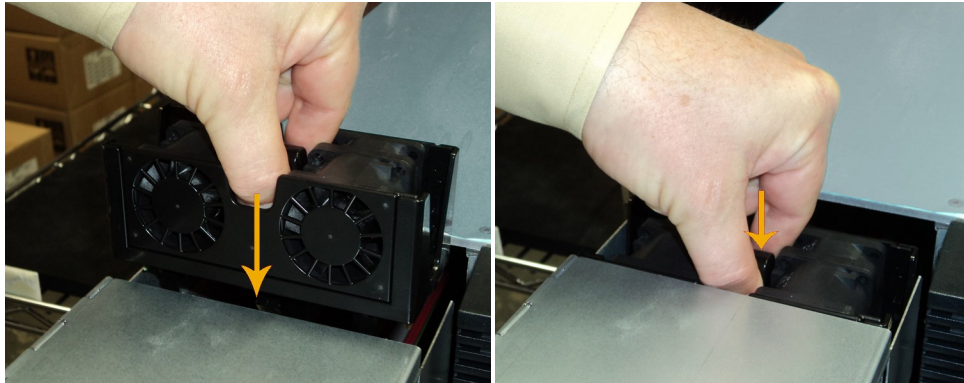
4. On the fan assembly at the back of the drawer, press the release tabs inward. Then carefully pull the fan assembly out of the drawer.

Figure 3-12: Disengaging and removing the rear fan assembly



- Carefully slide the replacement fan assembly down until the two tabs click into place.

Figure 3-13: Inserting the rear fan assembly



- Carefully slide the drawer back into the enclosure, making sure that it is flush with the other drawers.
- Turn the lock clockwise to lock the drawer into place.  
The **STAT** LED on the front of the drawer turns from amber to green to let you know that the drive drawer is properly latched. The **ENV** LED lights up green to let you know that the fan is functioning properly and that the drawer temperature is within specifications.
- In the Nexsan GUI, go to the **Home** page and verify that the status bar for the new fan assembly is green. See *Home Page* in *Chapter 3* of the *Nexsan High-Density Storage User Guide* for more information.

3



# Glossary

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## 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

communicate with users and computers in other locations.

### 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  $10^{12}$  (1,000,000,000,000) bytes, but can also be computed as  $2^{40}$  (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 com-



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