NEXSAN

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HYPER-UNIFIED STORAGE

Nexsan Unity

Storage Expansion Reference Guide

Unity v. 7.0

Regulatory Compliance

United States Statement for FCC: Nexsan equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Electromagnetic Emissions: FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A, ICES-003

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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RoHS: RoHS2 (Global)

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Table of Contents

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About this document

This *Unity Storage Expansion Reference Guide* provides information and steps for installing and connecting the following Nexsan Unity Storage Systems:

- Nexsan UNITY3300™ Storage System
- Nexsan UNITY7900™ Storage System
- Nexsan Unity NV10000™ Storage System
- Nexsan Unity Storage US224™ Expansion
- Nexsan Unity Storage US316™ Expansion
- Nexsan Unity Storage U2G460™ Expansion

This Reference Guide assumes that you are familiar with Serial Attached SCSI (SAS) technology, computer hardware, data storage and network administration terminology and tasks.

Because this guide provides information that can be used to manage one or more Nexsan Unity Storage Expansions, the generic term "storage system" is used to refer to the controller, disk drives, and expansions being used together for data storage.

Many of the terms and concepts referred to in this Reference Guide are known to computer users by multiple names. This terminology is used:

- I/O Controller (also known as an I/O module, controller or controller node)
- Disk drive (also known as hard disk drive (HDD) or hard disk, and solid state disk drive (SSD)
- HBA (also known as Host Bus Adapter or SAS Adapter)

Audience

This guide has been prepared for the following audience:

- IT system administrators
- Engineers
- Technicians
- Any qualified NST/Unity administrator.

Conventions

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

Convention	Description
underline blue	Cross-references, hyperlinks, URLs, and email addresses.
boldface	Text that refers to labels on the physical unit or interactive items in the graphical user interface (GUI).
`monospace`	Text that is displayed in the command-line interface (CLI) or text that refers to file or directory names.
`monospace bold`	Text strings that must be entered by the user in the command-line interface or in text fields in the graphical user interface (GUI).
italics	System messages and non-interactive items in the graphical user interface (GUI) References to Software User Guides
▶ (arrow icon)	A visual cue to indicate an action carried out by the user to accomplish a given task, or to draw attention to key information. Also used to indicate the beginning of, a step within, or what's next after a procedure.

Contacting Nexsan

For questions about Nexsan products, please visit the Nexsan support Web page, and the Nexsan Unity 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 Unity Documents & Downloads page:
https://helper.nexsansupport.com/unt_downloads.html

Contact Nexsan Unity support:
https://helper.nexsansupport.com/unt_support

Worldwide Web site: www.nexsan.com

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 unit or result in mild injury to the user, or both. In software manuals, cautions alert 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.

Related documentation

The following Nexsan product manuals contain related information:

- Nexsan Unity Online Help
- *NexsanUnity Hardware Reference Guide*
- *NexsanUnityHardware Maintenance Guide, Unity Next Generation*
- *NexsanUnity Software User Guide*
- *NexsanUnity nxadmin Command-line Interface Reference Guide*
- *NexsanUnity nxcmd Command-line Interface Reference Guide*
- *NexsanUnity Snapshots and Replication Guide*
- *NexsanUnity Storage Expansion Reference Guide*
- *NexsanUnity VMware Best Practices Guide*
- *NexsanUnity NFS Interoperability*
- *NexsanUnity Networking Best Practices Guide*
- *NexsanUnity Performance Best Practices Guide*
- *NexsanUnity Microsoft Best Practices Guide*

Safety notices

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

- 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.

- The system only be installed in a clean, dry environment. The operating temperature is 10º to 35º C (50º to 95º F), with operating relative humidity at 20 to 95%, non-condensing.

- Do not install hardware in an enclosed cabinet or other small area without ventilation.

- Ensure correct lifting methods are used when handling hardware. Special care should be taken when removing hardware from its packaging and positioning it into its required location. When lifting hardware, 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 installing the 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 unit not being fully supported in the rack and could lead to the product falling from the rack causing personal injury or falling onto 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.

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

- The system has multiple power connections; as a result, you must remove all power leads to completely isolate the power and always use the IEC power cords which are supplied with the system.

> **CAUTION:** All NexsanUnity Storage Systems are hot-pluggable. However, new expansions must be powered on AFTER you connect it to the existing system.

Chapter 1

Overview

This document describes and explains how to install and monitor the Nexsan Unity Storage Systems:

- Nexsan UNITY3300™ Storage System
- Nexsan UNITY7900™ Storage System
- Nexsan Unity NV10000™ Storage System
- Nexsan Unity Storage US224™ Expansion
- Nexsan Unity Storage US316™ Expansion
- Nexsan Unity Storage U2G460™ Expansion

This section includes these topics:

1

Storage capacities by Unity Storage System

Here is a brief listing of maximum storage capacities by Unity Storage System.

Unity Storage System	System capacity		Description
	Maximum storage capacity with SSDs	Maximum storage capacity with HDDs	
UNITY3300	983 TB	2.16 PB	The UNITY3300 storage system can be used standalone as well.
UNITY7900	3.31 PB	8.64 PB	Advanced system Cascade and daisy chain support: One storage system with up to eight storage expansions.
UNITY NV10000	3.31 PB	8.64 PB	Advanced system, All-Flash NVMe Cascade and daisy chain support: One storage system with up to eight storage expansions.

1

Connection and configuration options

This table lists the Unity Storage Systems and their supported Unity Storage Expansions.

Nexsan Unity Storage Systems	US224 Expansion	US316 Expansion	U2G460 Expansion
UNITY3300	Up to 2 of any combined Storage Expansions, plus the front bay	Up to 2 of any combined Storage Expansions, plus the front bay	Up to 2 of any combined Storage Expansions, plus the front bay
UNITY7900	Up to 8 of any combined Storage Expansions, plus the front bay	not supported	Up to 8 of any combined Storage Expansions, plus the front bay
UNITY NV10000	Up to 8 of any combined Storage Expansions, plus the front bay	not supported	Up to 8 of any combined Storage Expansions, plus the front bay

► **What's next**

- Basic configurations on page 1
- Cascade configurations on page 62

Components and features

This section shows the main components and capacities available in Unity Storage Systems.

1

Front and top views

This section shows the Unity Storage Expansion front views with bezels removed, and the top view of the U2G460 Expansion.
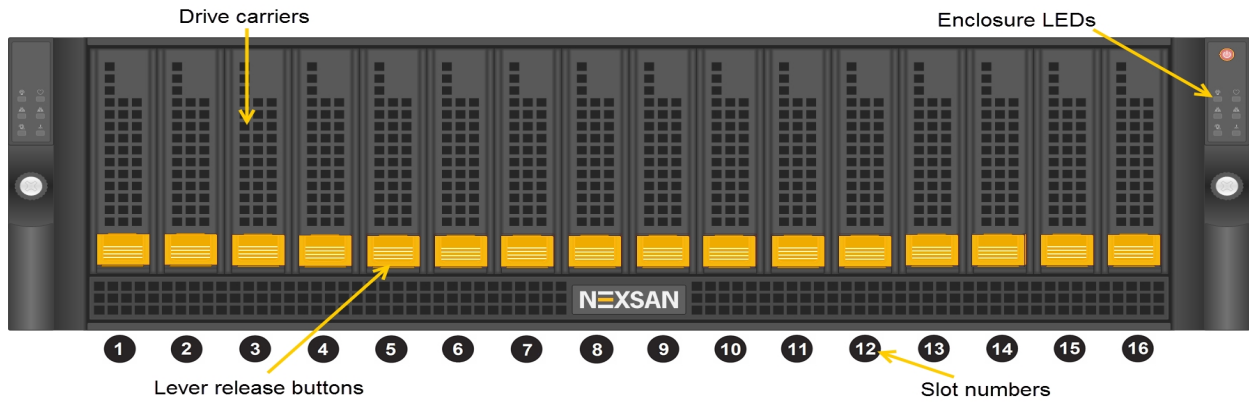
Figure 1-1: UNITY3300

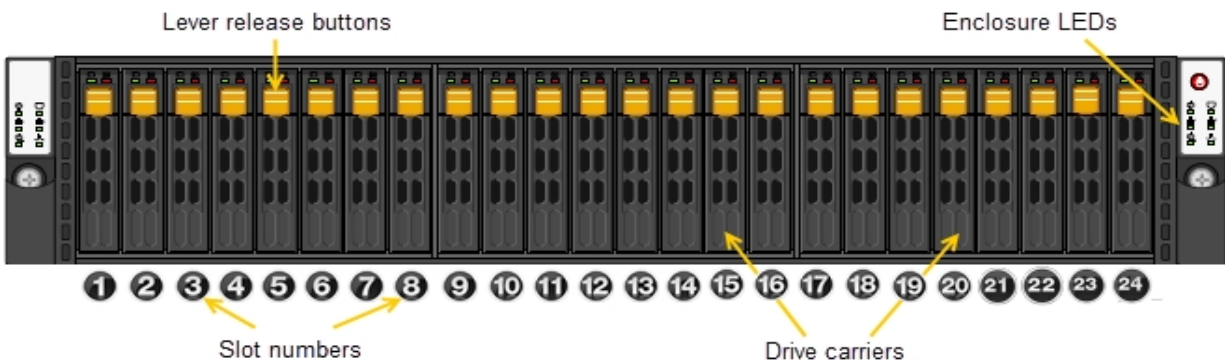

Figure 1-2: UNITY7900, and US224 Expansion
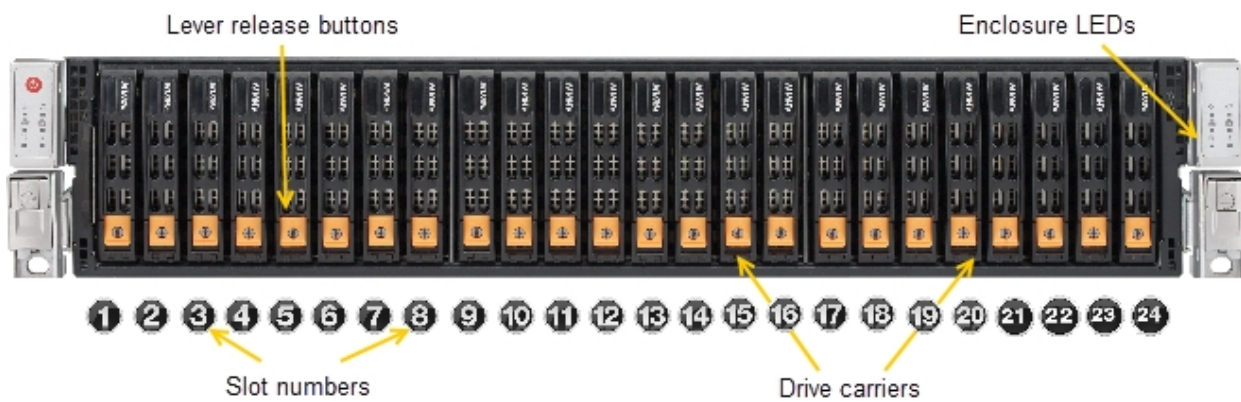

Figure 1-3: UNITY NV10000

Figure 1-4: US316 Expansion

Drive carriers

Enclosure LEDs

Lever release buttons
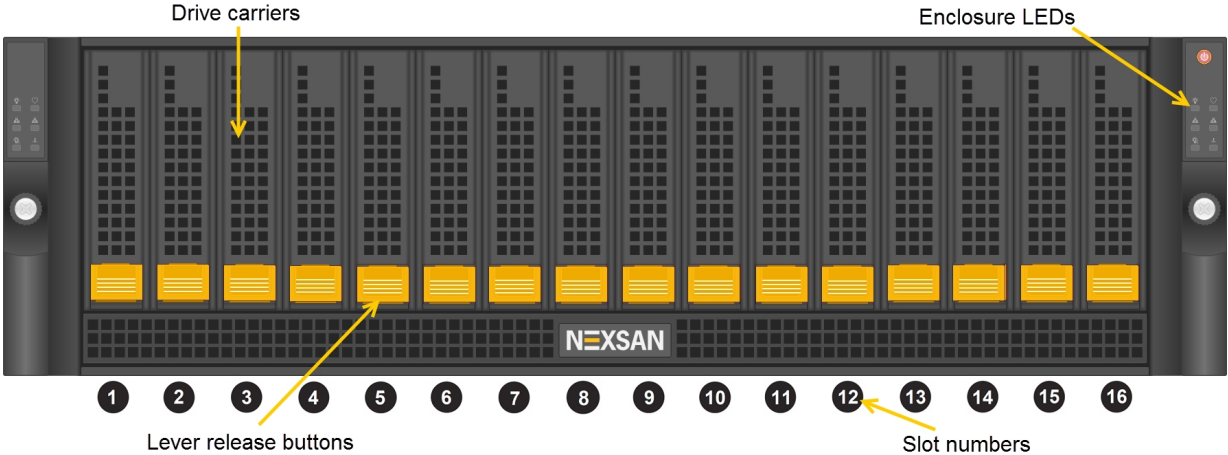
Slot numbers

Figure 1-5: U2G460 Expansion top view

1

Rear views

This section shows the Unity rear views.

Figure 1-6: UNITY3300

Item	Name	Description
1	Power supply unit	1,200W redundant power supplies with PMBus
2	Fan assembly	4x 80mm and 4x 40mm PWM cooling fans Redundant cooling
3	On-board 10GigE LAN ports (2 per controller)	Right port: Primary data network interface (nx0 - optional) Left port: Management Interface (nx99) and IPMI interface
4	KVM connections	USB, VGA and Serial connections for remote console access to the UNITY3300
5	Storage connectivity	Dual-port SAS PCIe to HD Mini-SAS HBA
6	Optional connectivity to Fibre Channel hosts:	You can use these slots for additional network cards, which can be any of these supported NICs: • Single and dual port 100GbE NIC • Pair of 40GbE NIC with dual QSFP connectivity • Pair of 10GbE NIC with dual RJ-45 • Pair of 10GbE NIC with dual SFP+ • Pair of 1GigE, Quad-port NIC, RJ-45 • Pair of 1GigE, Dual-port NIC, RJ-45 • Pair of 32Gb Fibre Channel - dual-port • Pair of 16Gb Fibre Channel - dual-port • Pair of 8Gb Fibre Channel - dual-port

Figure 1-7: UNITY7900
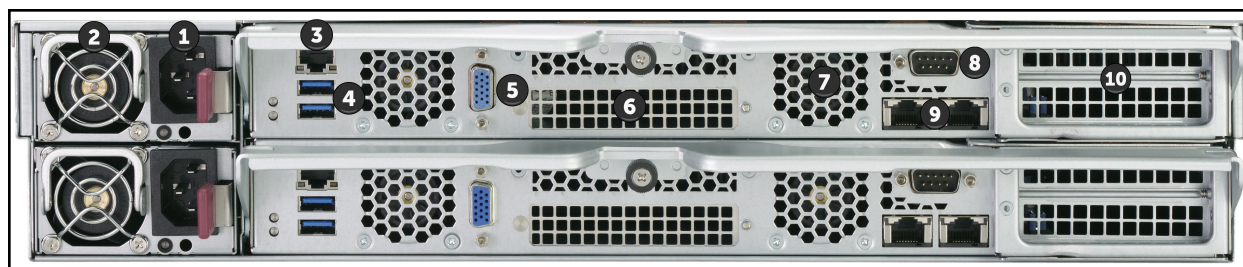

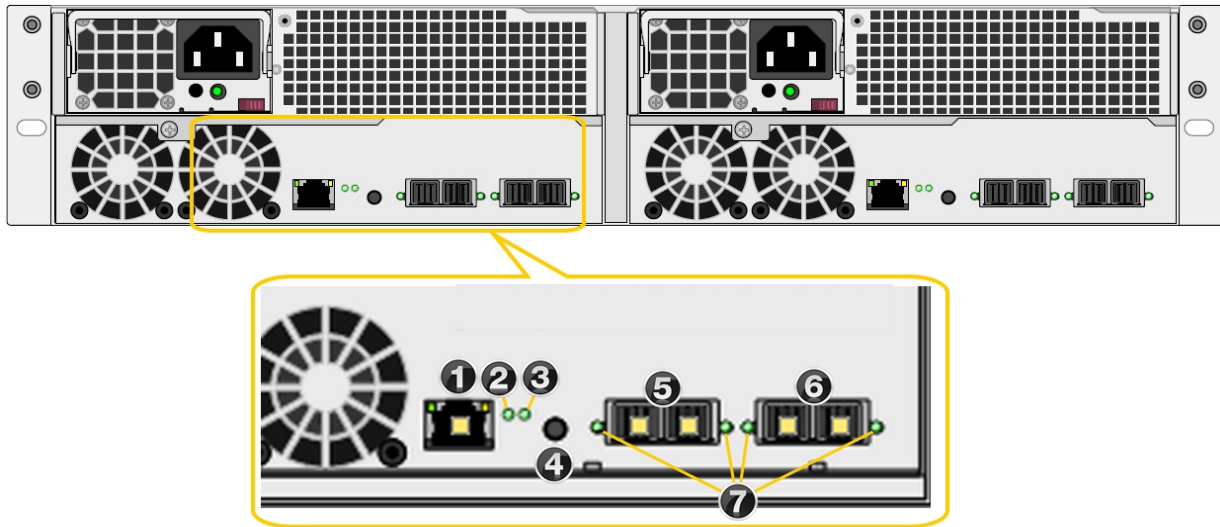| Item	Name	Description
1	Power supply unit	1,200W redundant power supplies with PMBus
2	Fan assembly	4x 80mm and 4x 40mm PWM cooling fans Redundant cooling
3	On-board 10GigE LAN ports (2 per controller)	Right port: Primary data network interface (nx0 - optional) Left port: Management Interface (nx99) and IPMI interface
4	KVM connections	USB, VGA, and Serial connections for remote console access to the UNITY3300
5	Storage connectivity	Quad-port SAS PCIe to HD Mini-SAS HBA
6	Optional connectivity to Fibre Channel hosts	You can use these slots for additional network cards, which can be any of these supported NICs: ● Single and dual port 100GbE NIC ● Pair of 40GbE NIC with dual QSFP connectivity ● Pair of 10GbE NIC with dual RJ-45 ● Pair of 10GbE NIC with dual SFP+ ● Pair of 1GigE, Quad-port NIC, RJ-45 ● Pair of 1GigE, Dual-port NIC, RJ-45 ● Pair of 32Gb Fibre Channel - dual-port ● Pair of 16Gb Fibre Channel - dual-port ● Pair of 8Gb Fibre Channel - dual-port

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Figure 1-8: UNITY NV10000

Item	Name	Description
1	Power supply unit	2,000W Titanium level power supply (redundant in device)
2	Fan assembly	Five 8-cm mid-mounted cooling fans and four 4-cm exhaust fans
3	Dedicated IPMI LAN port	Intelligent Platform Management Interface, for remote access, monitoring, and management
4	USB 3.0 ports (2)	Can support USB-enabled devices such as keyboard, mouse, USB/SATA DVD drive, or flash drive
5	VGA port	For VGA display or monitor
6	Storage connectivity	Quad-port SAS-3 controller with HD Mini-SAS connectors
7	Internal cooling fan vents (2)	Positioned over rear chassis for optimal cooling
8	Serial port	For configuration, diagnostics, and emergency maintenance access
9	Dual RJ45 10GbE LAN ports	• Left port: Management Interface (nx99) • Right port: Primary data network interface (nx0) (If additional NIC HBA is available, both interfaces are nx99)
10	PCIE 3.0x16 slots (2), Optional host connectivity	Can be used to support the following Network Interface Card (NIC) and Fibre Channel (FC) connections: • Dual port 16G/32G FC • Dual port 40G NIC • Single and Dual port 100G NIC

Unity Storage Expansions

This section illustrates Unity Storage Expansions.

Figure 1-9: US224 Expansion

Item	Name	Description
1	LAN Port	Not used
2	Storage unit status LED	Green: Initialization successful Red: Initialization failure
3	Unit ID status LED	On/Off
4	BMC Reset button	Resets the base management controller
5	SAS IN ports	Serial Attached SCSI IN ports from the Storage System
6	SAS OUT ports	SAS OUT ports to another storage unit
7	SAS link status LEDs (2 IN, 2 OUT)	Green: All four physical layers (PHY) of each port connected with consistent link speed (12 G or 6 G) Red: Single PHY degraded link speed or disconnected

Figure 1-10: US316 Expansion

Item	Name	Description
1	LAN Port	Not used
2	Storage unit status LED	Green: Initialization successful Red: Initialization failure
3	Unit ID status LED	On/Off
4	BMC Reset button	Resets the base management controller
5	SAS IN ports	Serial Attached SCSI IN ports from the Storage System
6	SAS OUT ports	SAS OUT ports to another storage unit
7	SAS link status LEDs (2 IN, 2 OUT)	Green: All four physical layers (PHY) of each port connected with consistent link speed (12 G or 6 G) Red: Single PHY degraded link speed or disconnected

Figure 1-11: U2G460 Expansion

Item	Name	Description
1	Power supply units	Two 1,600W PSUs, hot swappable and redundant AC Input voltage: 200-240V
2	Fan assemblies	Rear fan: ● Top and bottom latch releases ● Internal power and I/O connector ● Hot swappable ● Toolless release IOM fan (installed in central chassis): ● Cools the enclosure IOM ● Toolless release
3	LEDs	LEDs for SAS link and fault states, ID, controller fault, power, Ethernet activity, and Ethernet connector. See U2G460 Expansion Front panel LEDs on page 1
4	I/O module (IOM) ports	6 HD Mini-SAS ports. The U2G460 can use passive cables (limited to 3m or less) or active cables (any length). Active cables must be used for U2G460 Data60 daisy chaining connections.
5	Management ports	All SES (SCSI Enclosure Services) enclosure information can be obtained through the out-of-band management port. Used to obtain storage subsystem health information, to locate enclosure components using the IDENT LEDs, and to update firmware.

For more information, see:

-
-
-
-
-

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About the SAS I/O controllers

Unity Storage Systems and Unity Storage Expansions connect using HBA SAS I/O controllers on the back of the enclosures.

Making SAS connections

The UNITY NV10000 connects from the upper, add-on SAS ports to the lower on-board HBA SAS ports on the US224 Expansion or the U2G460 Expansion. See Connection and configuration options on page 11.

▶ **SAS I/O controller LEDs and ports**

Each controller also has status LEDs on the front, as described in Monitoring enclosures on page 70. The diagram below identifies the rear I/O controller ports and LEDs.

About the power supply units (PSUs)

The cooling fans in each PSU run on separate circuits from the power supply. Therefore, if one PSU fails, its fans continue to run on power supplied by the other PSU.

Note PSUs are hot-swappable; see Replacing a PSU on page 81 for more information.

▶ **Maintaining correct airflow and cooling:**

In addition to supplying power, the PSUs maintain proper airflow and cooling within the enclosure.

Because there are two PSUs, Unity Storage Systems can continue to operate even if one PSU fails. However, for proper operation and cooling, two PSUs with fully-functional fans must be installed at all times. A unit can run **temporarily** (for no more than five minutes) with a single PSU while you install a new one— you must install a second PSU **as quickly as possible** to maintain correct airflow and cooling.

⚠ **CAUTION:** Once you remove a failed PSU, you must replace it within five minutes or the remaining unit may overheat and shut down to prevent hardware damage. This type of shutdown is **immediate**—unexpected loss of data access and permanent data loss may occur.

About the disk drives and drive carriers

Each disk drive is mounted in a drive carrier with a push-button lever for quick installation and removal. Each drive carrier has two LEDs, which indicate status as described in Monitoring disk drives on page 74.

To maintain proper airflow and cooling inside the enclosure, drive slots cannot be left empty. Blank drive carriers are available to fill empty drive slots.

Disk drives are hot-swappable.

Note A disk drive must not be removed from its drive carrier. A disk drive removed from its carrier is not covered by the hardware warranty.

▶ **Drive slot numbers:**

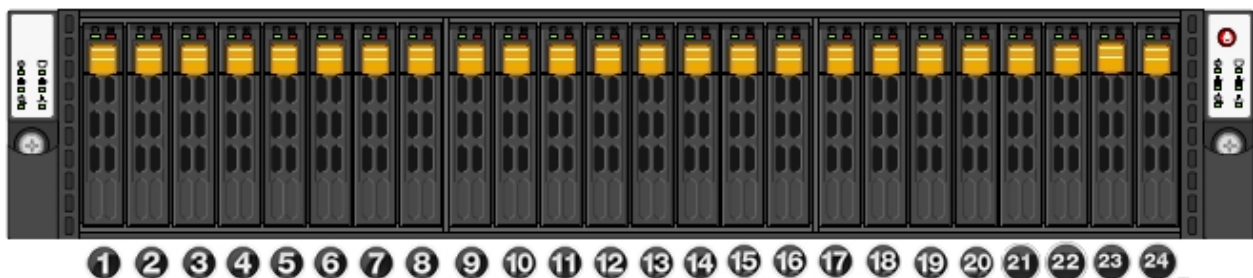Figure 1-12: US224 Expansion drive slot numbers
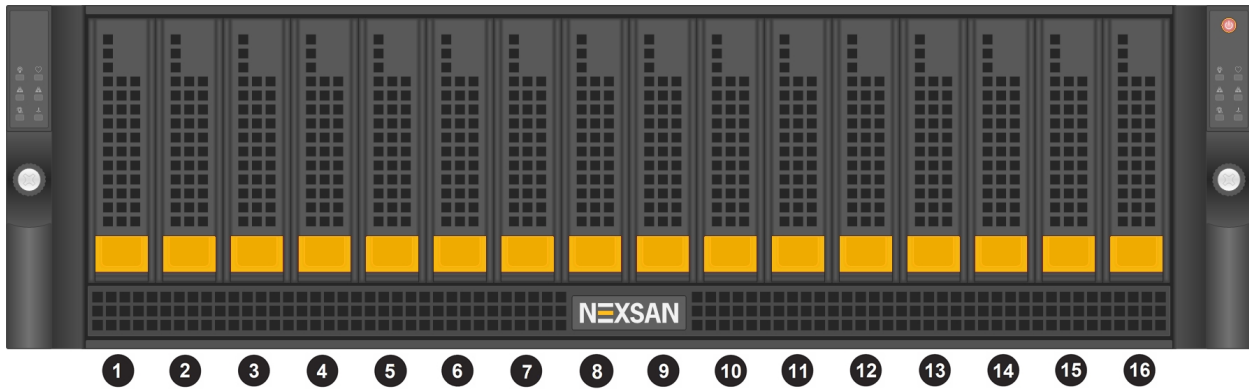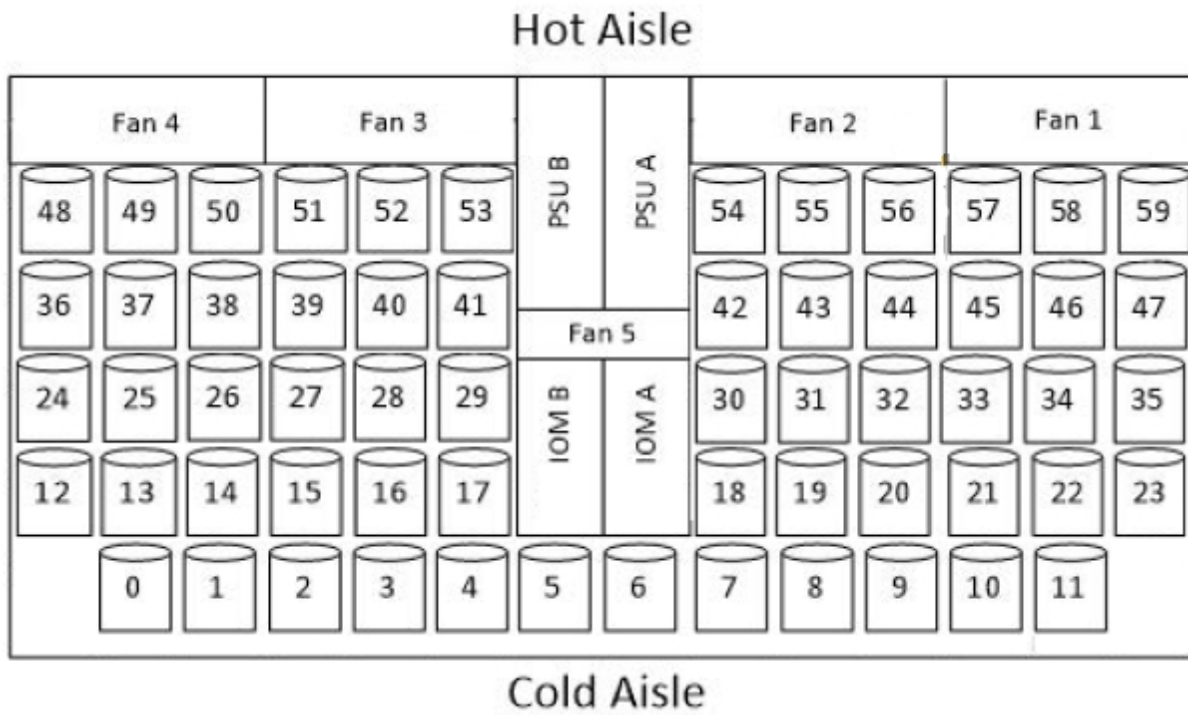
Figure 1-13: US 316 drive slot numbers

Figure 1-14: U2G460 Expansion drive slot numbers

Disk drive specifications

Unity Storage System disk drives must be qualified by Nexsan and meet the specifications listed in this section. See also Technical specifications on page 87 and the product data sheets, available at Nexsan.com.

US316 Expansion

Disk drive specifications for these Unity storage expansions:

Feature	Description
Form factor	3U 3.5" front-loading
Disk drives	Up to 14 HDDs and two FASTier read drives
	HDD drives: 7.2K 600 GB | 900 GB | 1.2 TB | 1.8 TB
	One pair of 1.92 TB FASTier drives
Cascadable?	Yes
Hot-swap/hot-plug support	Yes
Interface	SAS 3
Transfer rate	12.0 Gb/sec
Upgradable disk drive firmware?	Yes

UNITY7900, and US224 Expansion

Disk drive specifications for these Unity storage expansions:

Feature	Description
Form factor	2U 2.5" front-loading
Disk drives	Supports up to 24 drives (SSD option)
	SSD drives: 1.92 TB | 3.84 TB | 7.68 TB | 15.36TB
	FASTier SSD drives:1.92 TB with option to upgrade to 3.84 TB or 7.68TB drives.
Cascadable?	Yes. See Connection and configuration options on page 11
Hot-swap/hot-plug support	Yes
Interface	SAS 3
Transfer rate	12.0 Gb/sec
Upgradable disk drive firmware?	Yes

UNITY NV10000

Feature	Description
Form factor	2U 2.5" front-loading
Disk drives	Supports up to 24 NVMe SSD drives
	NVMe 1DWPD SSDs	1.92 TB	3.84 TB	7.68 TB| 15.36 TB
Cascadable?	Yes. See Connection and configuration options on page 11
Hot-swap/hot-plug support	Yes
Interface	SAS 3
Transfer rate	20 GB/sec
Upgradable disk drive firmware?	Yes

U2G460 Expansion

Disk drive specifications for these Unity storage expansions:

Feature	Description
Form factor	4U 3.5" top loading
Disk drives	U2G460 Expansion: Supports up to 60 drives (combinations of 20, 40, or 60 HDDs)
	Supported drives: HGST or Sandisk 2TB	4TB	6TB	8TB	10TB	12TB 14TB	16TB |18TB
Cascadable?	Yes
Hot-swap/hot-plug support	Yes
Interface	SAS 3
Transfer rate	12.0 Gb/sec
Upgradable disk drive firmware?	Yes

Cable specifications

To connect a Nexsan Unity Storage Expansion, use high-quality SAS cables that meet these length requirements:

Passive SAS

- Minimum length: 0.5 meters
- Maximum length: 3 meters

Active cables

- Any length

The U2G460 can use passive cables (limited to 3m or less) or active cables (any length). Active cables must be used for U2G460 Data60 daisy chaining connections.

For updated disk drive information or to purchase approved SAS cables, please contact your Nexsan sales representative or reseller.

1

Chapter 2

Installing Unity Storage Systems

This chapter explains how to install Unity Storage Systems. It includes these topics:

2

Preparing for the installation

► **Before you begin:**

1. Carefully read Safety notices on page 1.

2. Ensure ahead of time that you have chosen a suitable location for the enclosure and the rack; see Technical specifications on page 87.

3. Ensure that you have a Phillips screwdriver.

4. Have someone assist you during installation.

> ⚠️ **CAUTION:** Acclimate new disk drives to room temperature for 2 hours before installation.

► **To unpack the Unity Storage Expansions:**

1. Remove all the components from packaging. Position hands under the chassis to pull it free from the foam insert.

   Do NOT lift out the chassis from its packaging using the controller handles or attached rails.

2. Place the components on an anti-static surface until you are ready to use them.

Package contents

When you receive your Unity hardware shipment, check to ensure that no damage has been sustained to the packaging in transit. If any enclosure shows damage, you should file a damage claim with the carrier who delivered it. See also Components not included in your package

UNITY3300 Storage System

Your shipment includes these components:

Quantity	Item description
1	UNITY3300 3U dual-controller chassis with 16-drive (3.5") front bay enclosure (with front bezel)
Rack mounting hardware	
2	Outer-rack rail assemblies (inner-chassis rails are already installed)
4	Mounting screws with 4 washers to attach outer-rack rails to the rack (1 on the front and 1 on the back for both the left and right rail assemblies)
Disk drives	
	FASTier, SSD, and HDD drives. Check that the components included in your shipment correspond to your packing slip.
Cables and miscellaneous items	
2	SAS cables (Mini SAS HD to Mini SAS HD)

Quantity	Item description
2	Power cords
2	KVM cables
1	Electrostatic discharge (ESD) wrist strap
1	DVD containing the Discovery wizard and documentation

UNITY7900 Storage System

Your shipment includes these components:

Quantity	Item description
1	UNITY7900 2U dual-controller chassis with 24-drive (2.5") front bay enclosure (with front bezel)
Rack mounting hardware	
2	Outer-rack rail assemblies (inner-chassis rails are already installed)
4	Mounting screws with 4 washers to attach outer-rack rails to the rack (1 on the front and 1 on the back for both the left and right rail assemblies)
2	Long screws to secure the chassis to the rack from the front (attached to the chassis)
Disk drives	
	FASTier and HDD drives. Check that the components included in your shipment correspond to your packing slip.
Cables and miscellaneous items	
4	SAS cables (Mini SAS HD to Mini SAS HD)
2	Power cords
2	KVM cables
1	Electrostatic discharge (ESD) wrist strap
1	DVD containing the Discovery wizard and documentation

UNITY NV10000 Storage System

Quantity	Item description
1	UNITY NV10000 2U dual-controller chassis with 24-drive (2.5") front bay enclosure (with front bezel)
Rack mounting hardware	

2

Quantity	Item description
2	Outer-rack rail assemblies (inner-chassis rails are already installed)
4	Mounting screws with 4 washers to attach outer-rack rails to the rack (1 on the front and 1 on the back for both the left and right rail assemblies)
2	Long screws to secure the chassis to the rack from the front (attached to the chassis)

Disk drives

	NVMe drives. Check that the components included in your shipment correspond to your packing slip.

Cables and miscellaneous items

4	SAS cables (Mini SAS HD to Mini SAS HD)
2	Power cords
2	KVM cables
1	Electrostatic discharge (ESD) wrist strap
1	DVD containing the Discovery wizard and documentation

US224 Expansion

Your shipment includes these components:

Quantity	Item description
1	US224 Expansion 2U storage expansion (with front bezel)

Rack mounting hardware

2	Outer-rack rail assemblies (inner-chassis rails are already installed)
4	Mounting screws with 4 washers to attach outer-rack rails to the rack (1 on the front and 1 on the back for both the left and right rail assemblies)
2	Long screws to secure the chassis to the rack from the front (attached to the chassis)

Disk drives

	FASTier and SSD drives. Check that the components included in your shipment correspond to your packing slip.

Cables and miscellaneous items

	SAS cables (Mini SAS HD to Mini SAS HD)
2	Power cords
1	Electrostatic discharge (ESD) wrist strap

US316 Expansion

Your shipment includes these components:

Quantity	Item description
1	US316 Expansion 3U dual-controller storage expansion with 16-drive (3.5") front bay enclosure (with front bezel)
Rack mounting hardware	
2	Outer-rack rail assemblies (inner-chassis rails are already installed)
4	Mounting screws with 4 washers to attach outer-rack rails to the rack (1 on the front and 1 on the back for both the left and right rail assemblies)
Disk drives	
	FASTier, SSD, and HDD drives. Check that the components included in your shipment correspond to your packing slip.
Cables and miscellaneous items	
	SAS cables (Mini SAS HD to Mini SAS HD)
2	Power cords
1	Electrostatic discharge (ESD) wrist strap

U2G460 Expansion

Your shipment includes these components:

Quantity	Item description
1	U2G460 Expansion 4U dual-controller storage expansion, which can house up to 60-drives, with top loading 3.5" drive bays (with front bezel)
1	Chassis with all internal components pre-installed, except disk drives.
Rack mounting hardware	
2	Outer-rack rail assemblies with 1 inner rack per rail (inner-chassis rails are already installed)
2	Top cover guide brackets
10	Cage nuts
30	M5 x 12, T15 Torx screws, 2 M5 x 12 Philips panhead screws (for the cover), 4 custom, lowprofile M4 screws (packaged with the rail kit)

Quantity	Item description
16	Custom round washers to attach outer-rack rails to the rack (1 on the front and 1 on the back for both the left and right rail assemblies)

Disk drives

Up to 60 (3 drive packs of 20 each)	Drive packs consist of 20 DATA drives. Up to 3 drive packs can be used in a U2G460. Standard 3.5" drive slots. Check that the drives included in your shipment correspond to your order and packing slip.
	Drive blanks to fill empty slots, if applicable

Cables and miscellaneous items

	MiniSAS HD passive cables
	Optional MiniSAS HD active cables
2	C13 to C14 power cables (3m)
1	Electrostatic discharge (ESD) wrist strap

Components not included in your package

- Client computer
- Network switches
- Network cables

Recommended	Acceptable
10GbE Ethernet: CAT6a cable	10GbE Ethernet: CAT6 or higher cable
1GbE Ethernet: CAT6 cable	1GbE Ethernet: CAT5E or higher cable
10GbE Fiber	Multimode duplex LC/LC 50µ OM3 fiber cable

Installing a UNITY3300 or US316 Expansion in a rack

⚠️ **CAUTION:** Unity Storage Systems and Expansions are heavy. Physical installation requires two people.

▶ **Step 1: Remove the front bezel**

1. Turn the keylock at the right end of the bezel to the unlock position.

2. Unhook the left end of the bezel from the chassis.

▶ **Step 2: Install the outer-rack rails on the rack**

1. Attach the RIGHT and LEFT outer-rack rails to the rack by inserting the hooks included on the rails into the holes provided on the rack. The hooks should be located in the TOP holes of the rack units selected.

2. Extend rail assemblies to fit the depth of the rack. Pull on the rear of the assembly until the hooks reach the back of the rack.
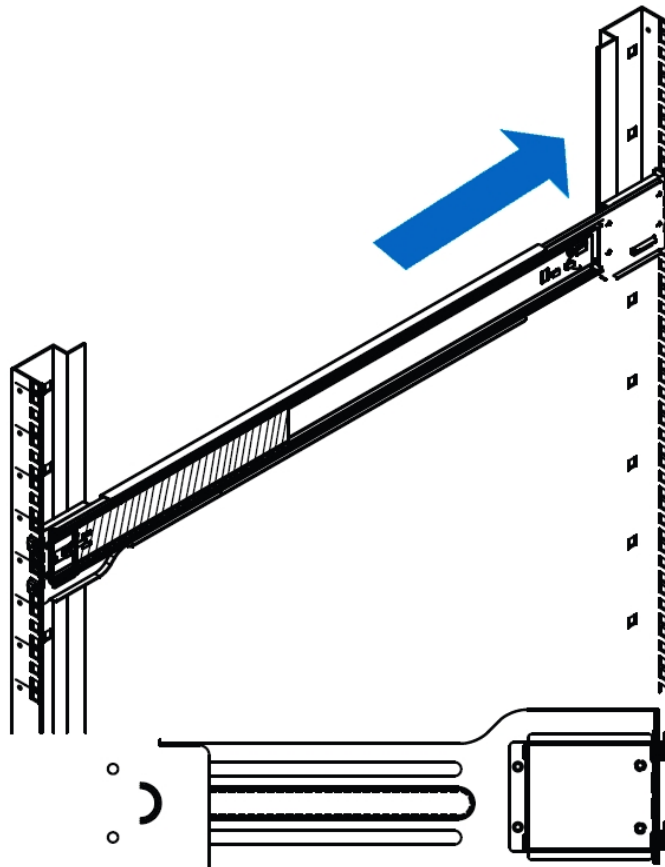
3. Screw the rail to the rack using the mounting screws provided. The screws should be secured in the BOTTOM hole on the front and back of each rail assembly.

► Step 3: install the inner-rack rails (if necessary):

1. Ensure the Unity chassis is upright and locate the LEFT hand rail assembly.

2. Extend the inner rail toward the front of the rail assembly as far as possible, then depress the locking tab to pull it completely out and remove it from the rest of the rail assembly.

3. Place the inner rail on the side of the chassis, and make sure that you align the hooks of the chassis with the rail extension holes.

4. Slide the extension toward the front of the chassis until it clicks and locks into place.

5. Secure the inner-rail rack to the chassis with the mounting screws provided with your hardware installation package.

6. Repeat these steps for the RIGHT inner-rack rail.

7.

► **Step 3: Install the Unity Storage Expansion on the rack**

1. Lift the chassis from each side—not from the front and back.

2. Line up the inner-rack (chassis) rails with the front of the outer-rack rails.
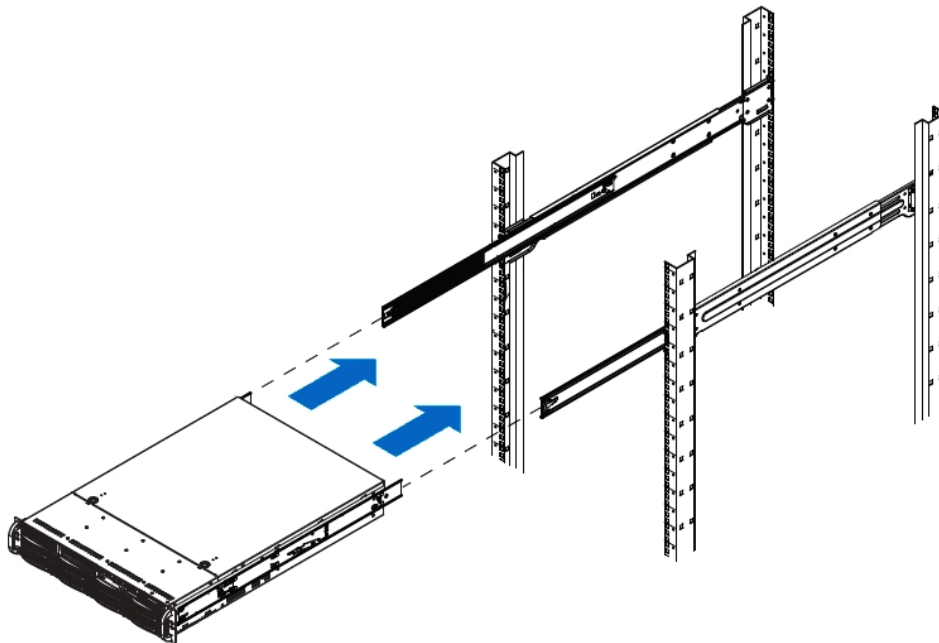
3. Slide the inner-rack rails into the outer-rack rails, keeping the pressure even on both sides. You have to depress the locking tabs when inserting.
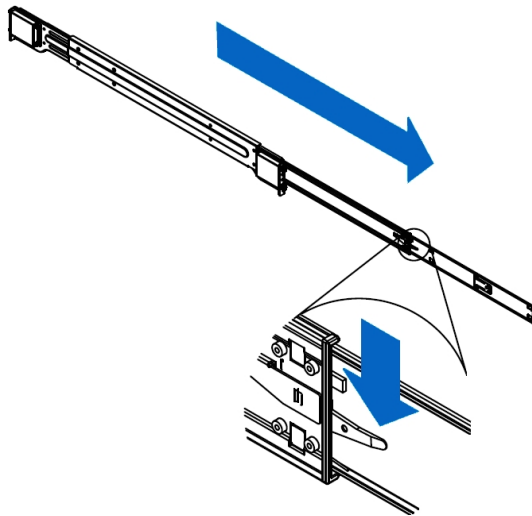
4. When you push the chassis completely into the rack, you should hear the locking tabs click into position.

5. Tighten the thumbscrews that hold the front of the unit to the rack.

► **What's Next:**

Continue with .

Installing a UNITY7900, UNITY NV10000, or US224 Expansion in a rack

⚠ **CAUTION:** Unity Storage Systems and Expansions are heavy. Physical installation requires two people.

▶ **Step 1: Remove the front bezel**

1. Turn the keylock at the right end of the bezel to the unlock position.

2. Unhook the left end of the bezel from the chassis.

▶ **Step 2: Install the outer-rack rails on the rack**

1. Attach the **RIGHT** and **LEFT** outer-rack rails to the rack by inserting the hooks included on the rails into the holes provided on the rack.

    The hooks should be located in the **TOP** holes of the rack units selected (see image in Step 3).

2. Extend rail assemblies to fit the depth of the rack. Pull on the rear of the assembly until the hooks reach the back of the rack.

2
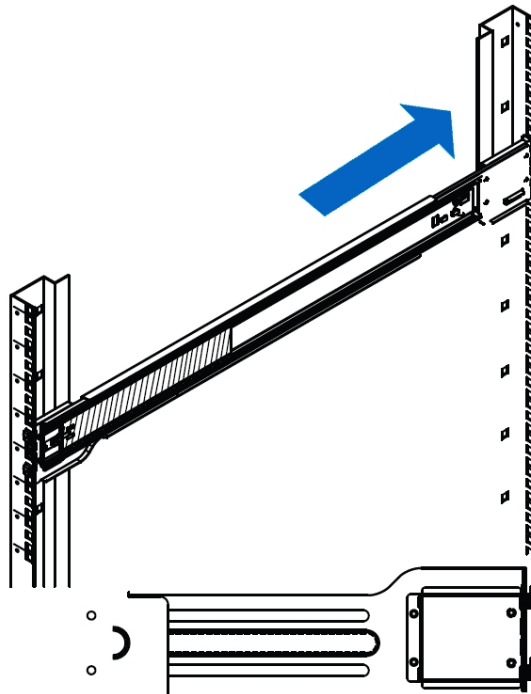
3. Screw the rail to the rack using the mounting screws provided with your hardware installation package. The screws should be secured in the **MIDDLE** hole of each of the rails.
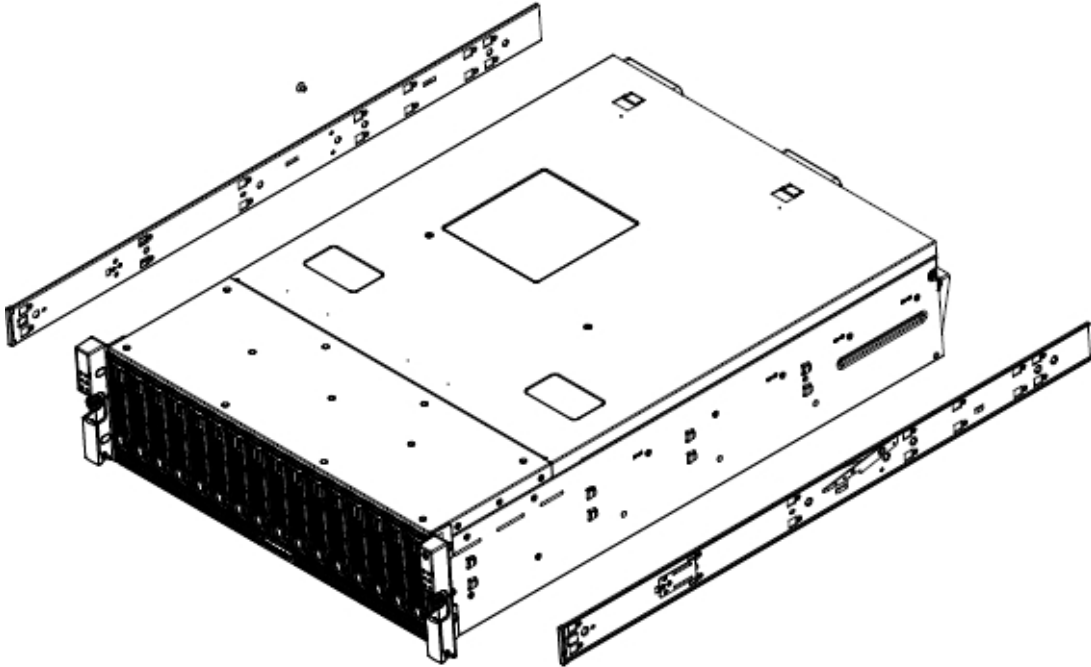

2

► **Step 3: Install the inner-rack rails (if necessary):**

1. Ensure the Unity chassis is upright and locate the LEFT hand rail assembly.

2. Extend the inner rail toward the front of the rail assembly as far as possible, then depress the locking tab to pull it completely out and remove it from the rest of the rail assembly.

3. Place the inner rail on the side of the chassis, and make sure that you align the hooks of the chassis with the rail extension holes.

4. Slide the extension toward the front of the chassis until it clicks and locks into place.

5. Secure the inner-rail rack to the chassis with the mounting screws provided with your hardware installation package.

6. Repeat these steps for the RIGHT inner-rack rail.

► **Step 4: Install the Unity Storage Expansion on the rack**

1. Lift the chassis from each side—not from the front and back.

2. Line up the inner-rack (chassis) rails with the front of the outer-rack rails.
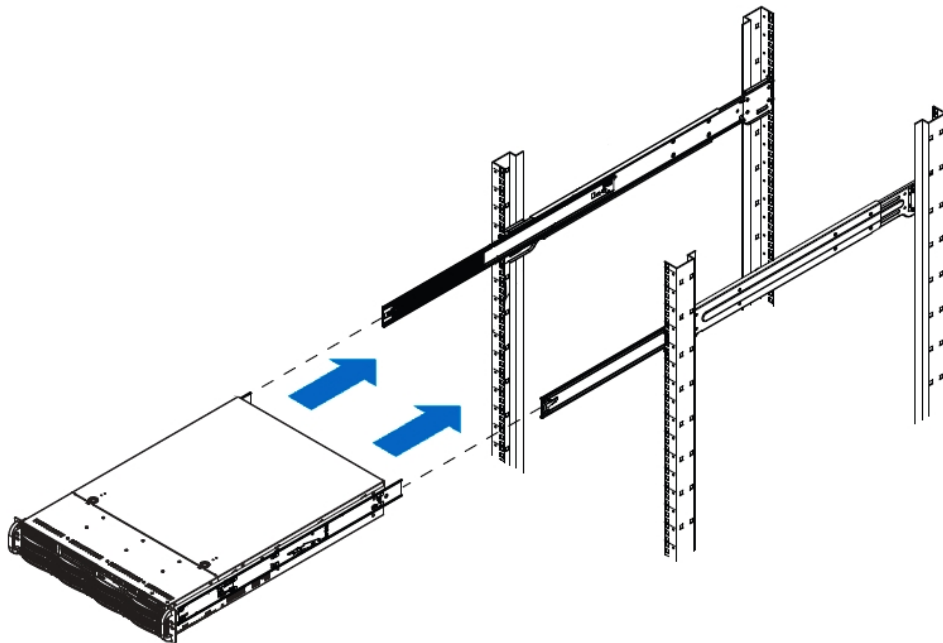
3. Slide the inner-rack rails into the outer-rack rails, keeping the pressure even on both sides. You have to depress the locking tabs when inserting.
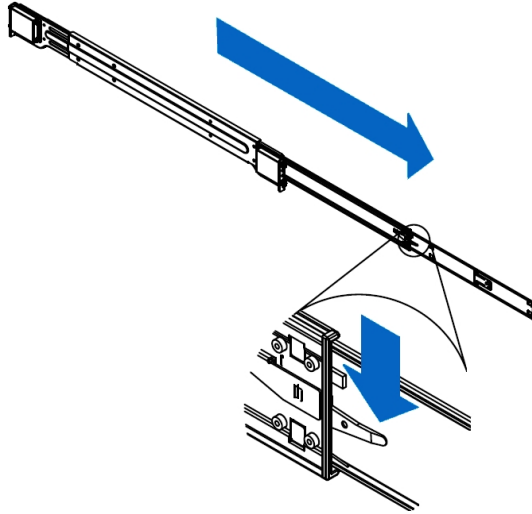
4. When you push the chassis completely into the rack, you should hear the locking tabs click into position.

5. Tighten the thumbscrews that hold the front of the unit to the rack.

Install the US 460 in a rack

► **What's Next:**

Continue with .

Installing a U2G460 Expansion in a rack

⚠️ **CAUTION:** Physical installation requires three people--two to move the enclosure into position in the rack, and one to guide and spot the others.

► **Install the outer-rack rails on the rack:**

1. From the inside of the rail kit, press the release latch to unlock the inner rails from the rack mount rails. Pull the inner rail out of the rack mount rail, and repeat for the remaining rail.
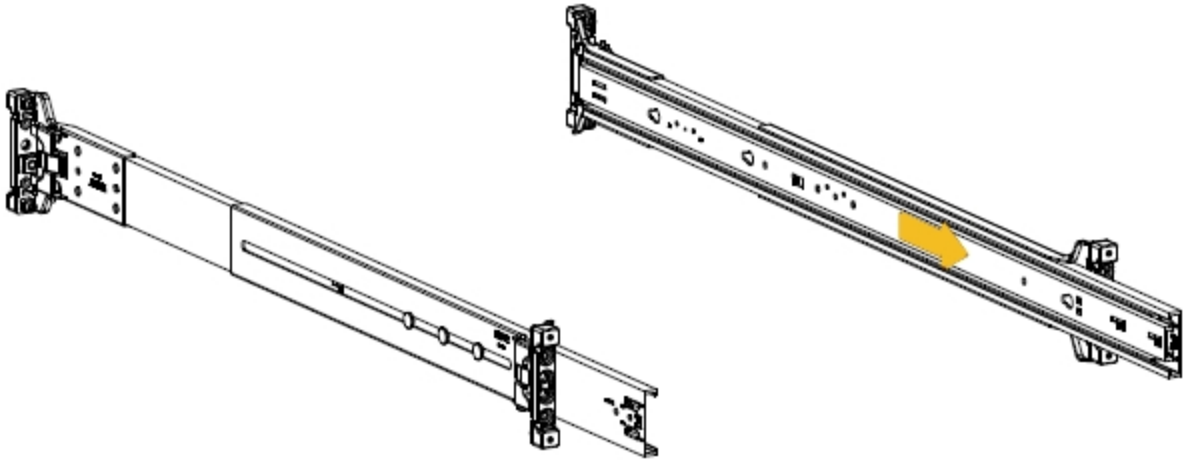

2. From the inside of the rail kit, press the release latch to unlock the inner rails from the rack mount rails. Pull the inner rail out of the rack mount rail, and repeat for the remaining rail.

3. Attach the outer rails to the rack. Pay special attention to which side is being installed. The embossed R is for the right side and L is for the left side. Right and Left refer to when you are facing the front of the rack.

   a. Move to the rear of the rack.

   b. Orient the rail so that the word "REAR" embossed on the rail is at the rear end of the rack, and the release button is facing the inside of the rack posts as shown in the following image.
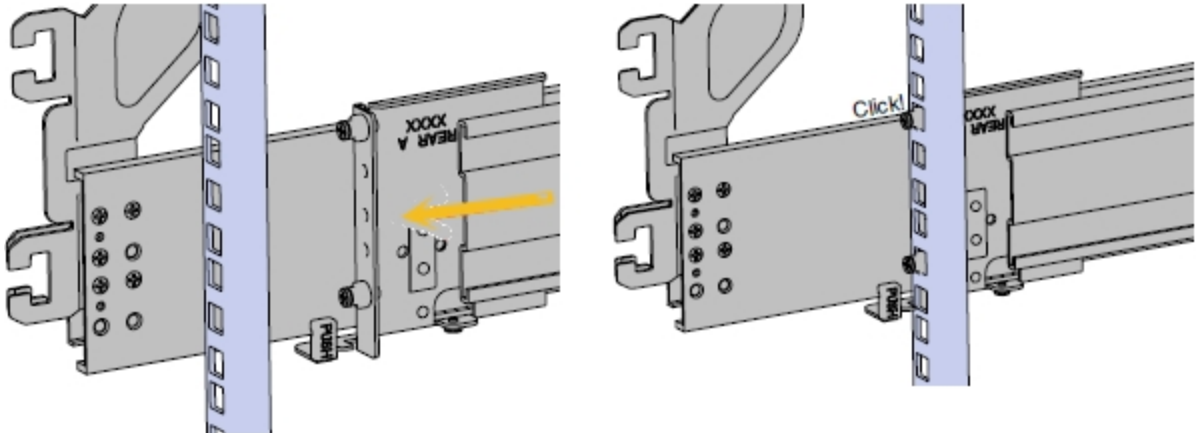
   c. Align the rail on the rack posts at the U-height desired for installation. The bottom of the rail will be the lower most U of the total 4U height.

   d. Pull the rail toward the rack post until the toolless latching mechanism engages the rack. The latching mechanism may need to be pulled open to get around the rack post.

   e. Move to the front of the rack.

f. Align the front of the rail with the holes on the rack posts that will receive the rails and pull the rail toward the holes until the toolless latching mechanism engages the rack.
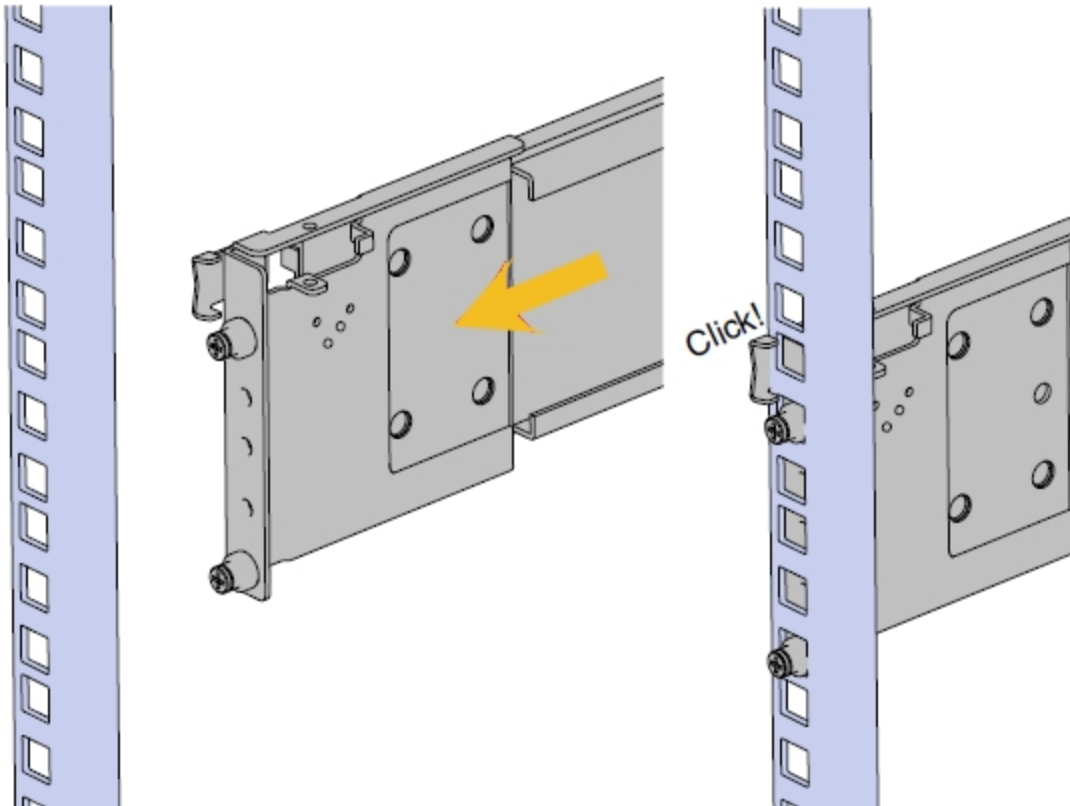
g. Use a level to make sure that the rails are aligned properly.

h. Follow these steps for the other outer rail.

► **Install the inner rails on the chassis**

1. Attach left and right inner rails (viewing from the front) by aligning the keyholes on the inner rail with the mounting pegs on the side of the chassis and sliding them forward to lock them in place. Left and right are embossed with the letter "L" and "R" on the side facing away from the chassis.

2. From the side of the chassis, using the #2 Phillips-head screwdriver, attach the inner rails to the chassis using the screws provided with the rail kit.

    ⚠️ **CAUTION:** When installing the inner rail onto the chassis, make sure to only use the special low-profile M4 x 3.2mm Philips screws provided in the accessory kit with the CMA. These screws should be tightened to 8-10 in-lbf using a # 2 Philips screwdriver. These screws are specially designed for this purpose. Using unapproved screws could cause damage to the slides inside the rail.

3. Slide the inner rail toward the rear of the chassis to lock it into place.

4. Repeat the previous steps to attach the other inner rail to the chassis.

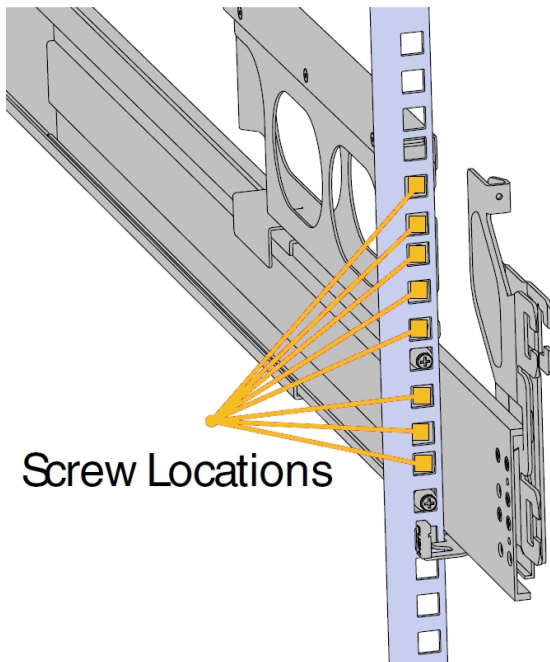► **Secure the cable tray (if necessary)**

1. Secure the cable tray onto the enclosure using the included M3 x 8mm T10 Torx screws and the long T10 Torx screwdriver. These screws should be tightened to 3-5 in-lbf.

   The cable tray only needs to be installed if the number of cables being used is greater than 10. If not, this step is unnecessary.

   ⚠️ **CAUTION:** To avoid possible tipping of the rack, install the U2G460 as low as possible. Each fully loaded enclosure weighs 175 lbs.

2. Install one cage nut at the uppermost mounting hole of the 4U space that the enclosure will occupy.

3. If the U2G460 will be installed in a rack for shipping purposes, install four more cage nuts in holes 3-6 of the 4U space. These will receive the M5 x 10mm T15 Torx screws that secure the enclosure to the rack with the shipping bracket. These screws should be tightened to 30-32 in-lbf using a long T15 Torx screwdriver.

4. Install the rear cover alignment brackets.

   a. From the rear of the rack, orient the alignment brackets so that the groove that will catch the lid is facing the inside of the rack.

   b. Use five of the M5 x 10mm T15 Torx screws and 5 of the included washers and attach the rear cover alignment bracket to the vertical rail with the Long T15 Torx Screwdriver. Add three M5 x 10mm T15 Torx screws and three included washers to attach the rear rail to the rack posts as shown in the following image. These screws should be tightened to 30-32 in-lbf using a Long T15 Torx Screwdriver.


Screw Locations

► **Install the cable management arms (if necessary)**

Note If you are using a storage enclosure with a shorter depth you may not be able to use CMAs. Ensure that the CMAs do not bind or bend. Improper installations could result in damage to cabling and components.
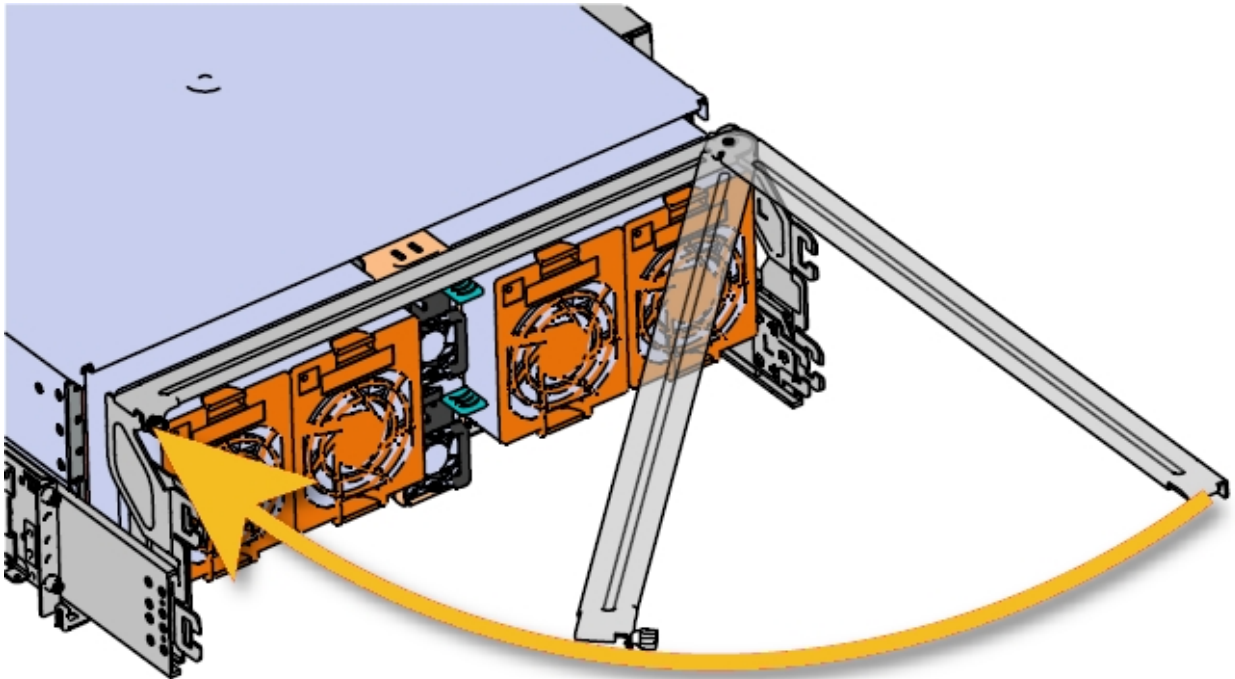
1. Install the upper CMA, orienting the elbow on the right hand side.

2. Align the crossbar with the mounting peg facing down and pointing toward the CMA mounting bracket.
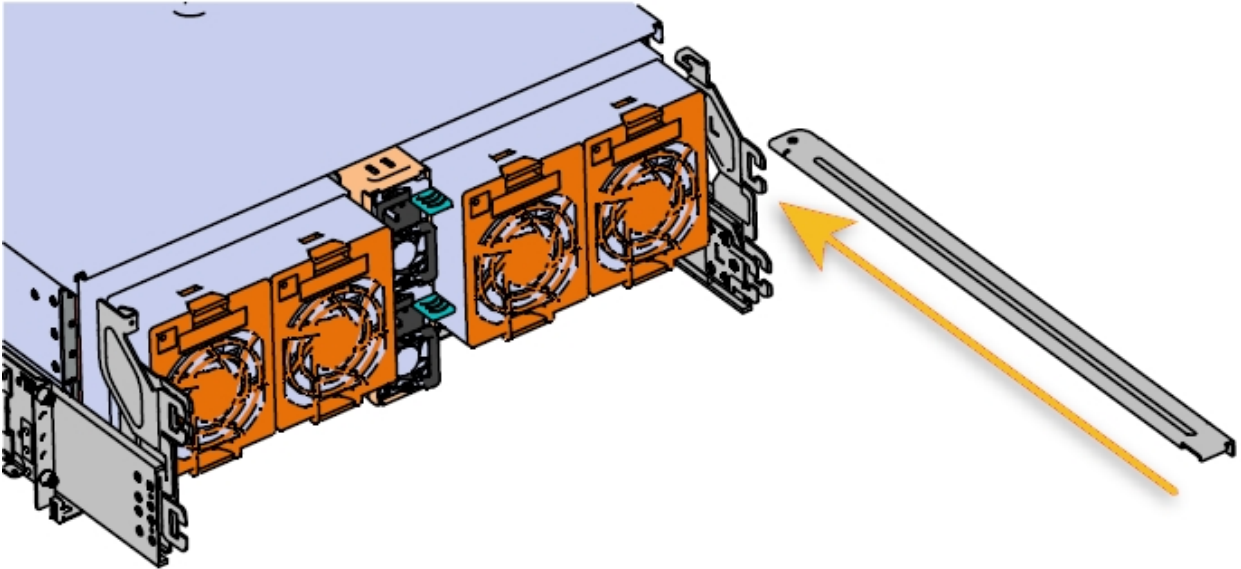
3. Insert the peg on the underside of the crossbar into the slot on the CMA mounting bracket.
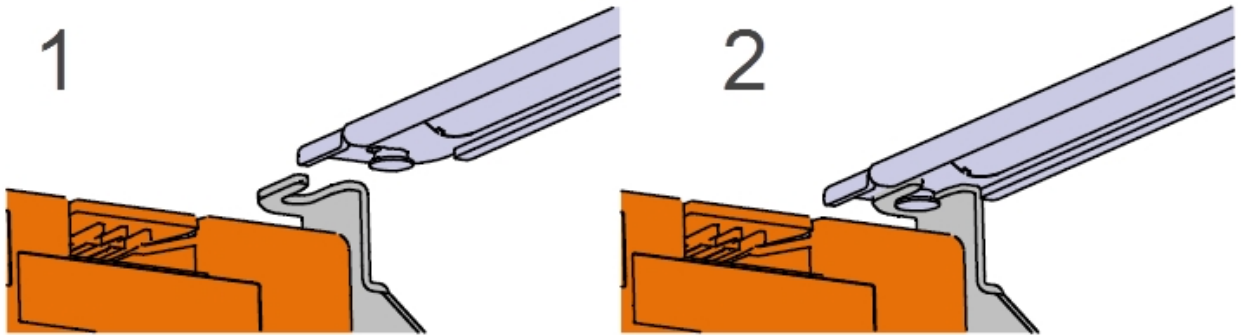
4. Swing the crossbar so that the thumbscrew lines up with the mounting hole on the opposite side of the enclosure.

2

5. Press the crossbar against the CMA mounting bracket and secure the crossbar in place by pressing and turning the thumbscrew clockwise until snug.

6. Install the lower CMA arm, orienting the elbow on the left side.

7. Attach all of the connectors to the brackets on the rails and chassis. There should be one at the elbow side and two at the other end.
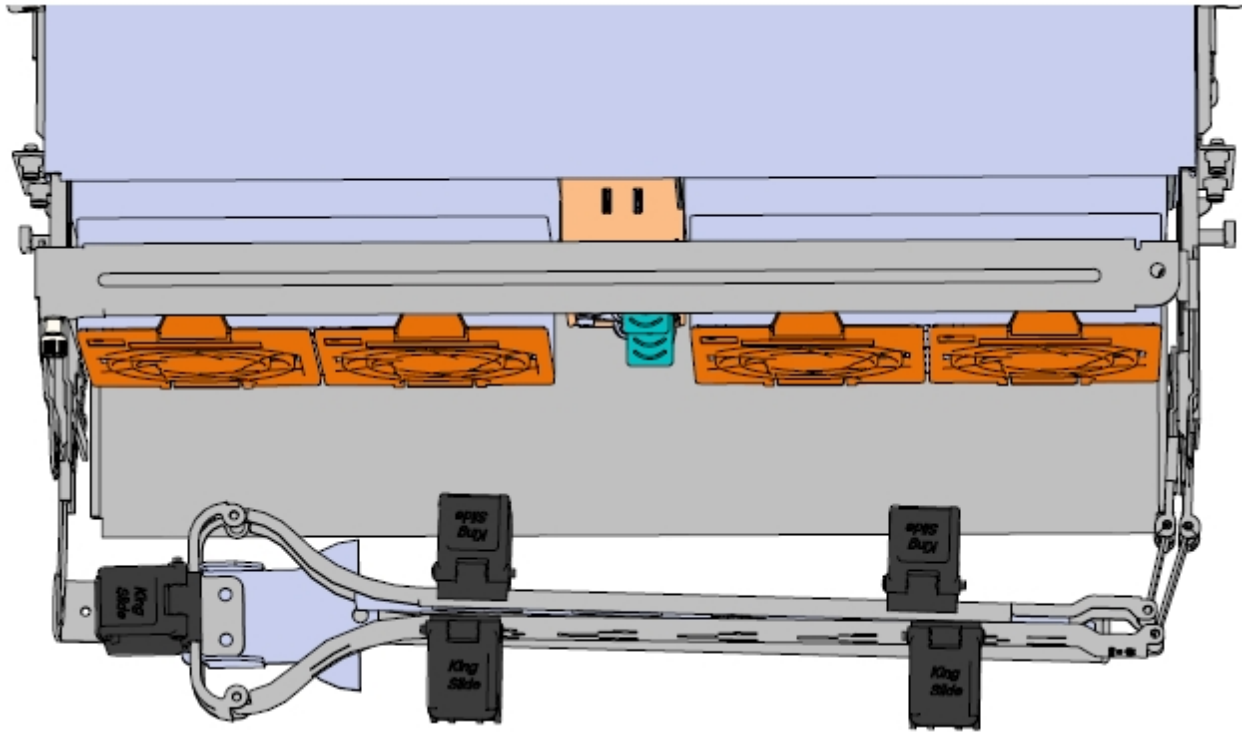
8. Slowly slide the enclosure forward to ensure the CMA arm is operating properly, then slide it back into the rack.

9. Mirror the steps above to install the lower cable management arm.

► **Thread the cables through the CMAs:**

Note Before cabling the CMAs, note the following routing of the cables. For best results, the cables that are supported by the upper CMA are inserted into IOM B (right hand side looking at the rear) and the lower CMA cables are routed to IOM A (left hand side looking at the rear)

1. Thread the cables into the CMAs, beginning with the lower CMA.

2. Unlatch the elbow side of the CMA arm and swing it forward by pressing the blue button that says "push" to unlatch it.

3. Gather the SAS cables, one power cable, and one Ethernet cable to install in the left hand side.

4. For each cable, reserve enough slack at the connector end to operate smoothly. Allow 20" - 21" (508 – 533.4mm) between the end of the connector and the first basket. Make sure to route all of the upper CMA cables under the lower CMA cables.

5. Test for binding in the extension of the CMAs by gently pulling the enclosure out of the rack to ensure the cables extend properly and that the system doesn't bind. Adjust the lengths as necessary.

► **Install the U2G460 on the rack**

⚠ **CAUTION:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others whom may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. Do not attempt to lift the system if it is fully populated with drives.

⚠ **CAUTION:** The handles on the front of the chassis are not intended to be used to support the weight of the Ultrastar Data60. Lifting the unit by the chassis handles or trying to support the unit on the handles can cause them to fail. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

⚠ **WARNING: Do not lift the chassis by the cable tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the storage expansion or serious bodily harm to those handling it.**

Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

1. Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.
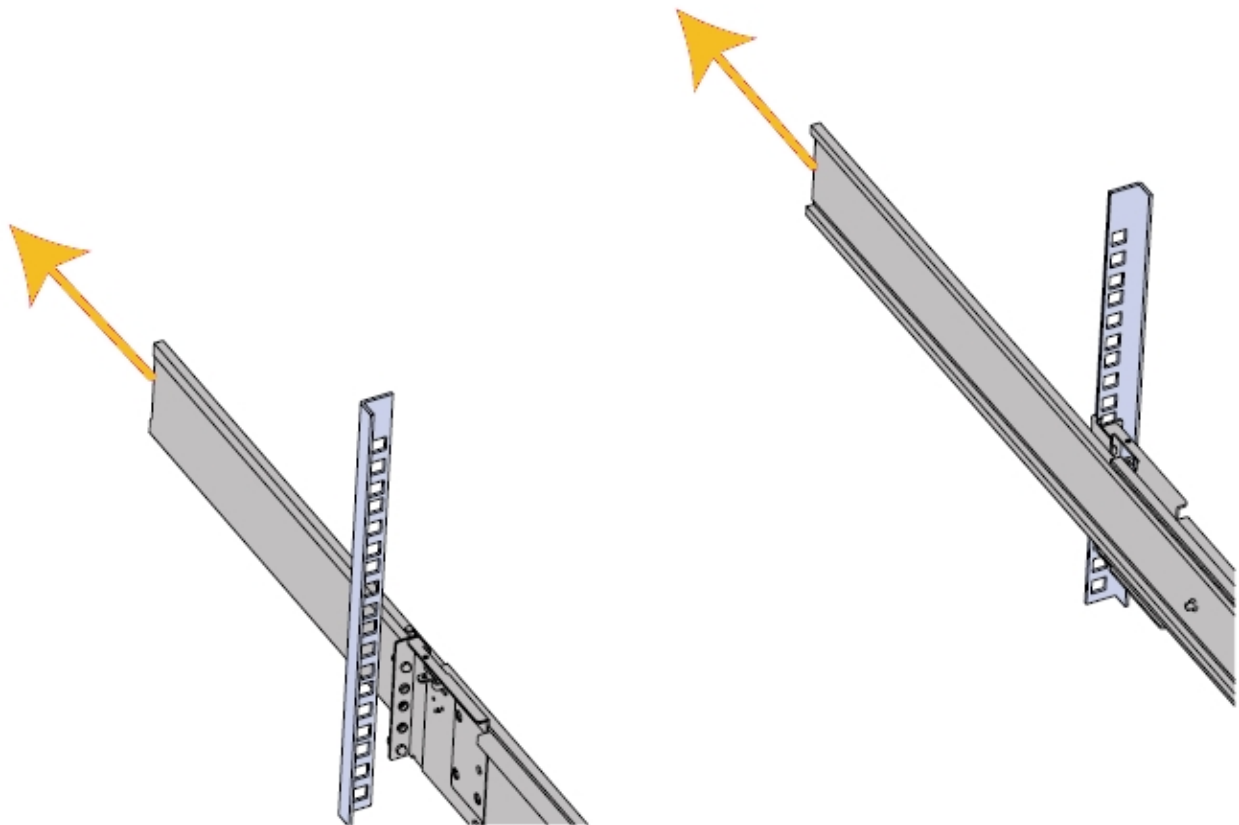
⚠ **CAUTION:** To prevent potential damage due to improper mating of the rails, make sure that the bearing plates on the inside of the mid-rails are fully forward and that the lock has engaged..

2. Team lift the U2G460 chassis from the sides—not from the front and back.

3. Line up the inner-chassis rails with the extended rack rails, until the rail locks engage.

4. Locate the blue tabs on each of the inner rails, and slide them towards the front of the chassis. Push on the chassis, pushing the U2G460 completely into the rack; you should hear the locking tabs click into position.
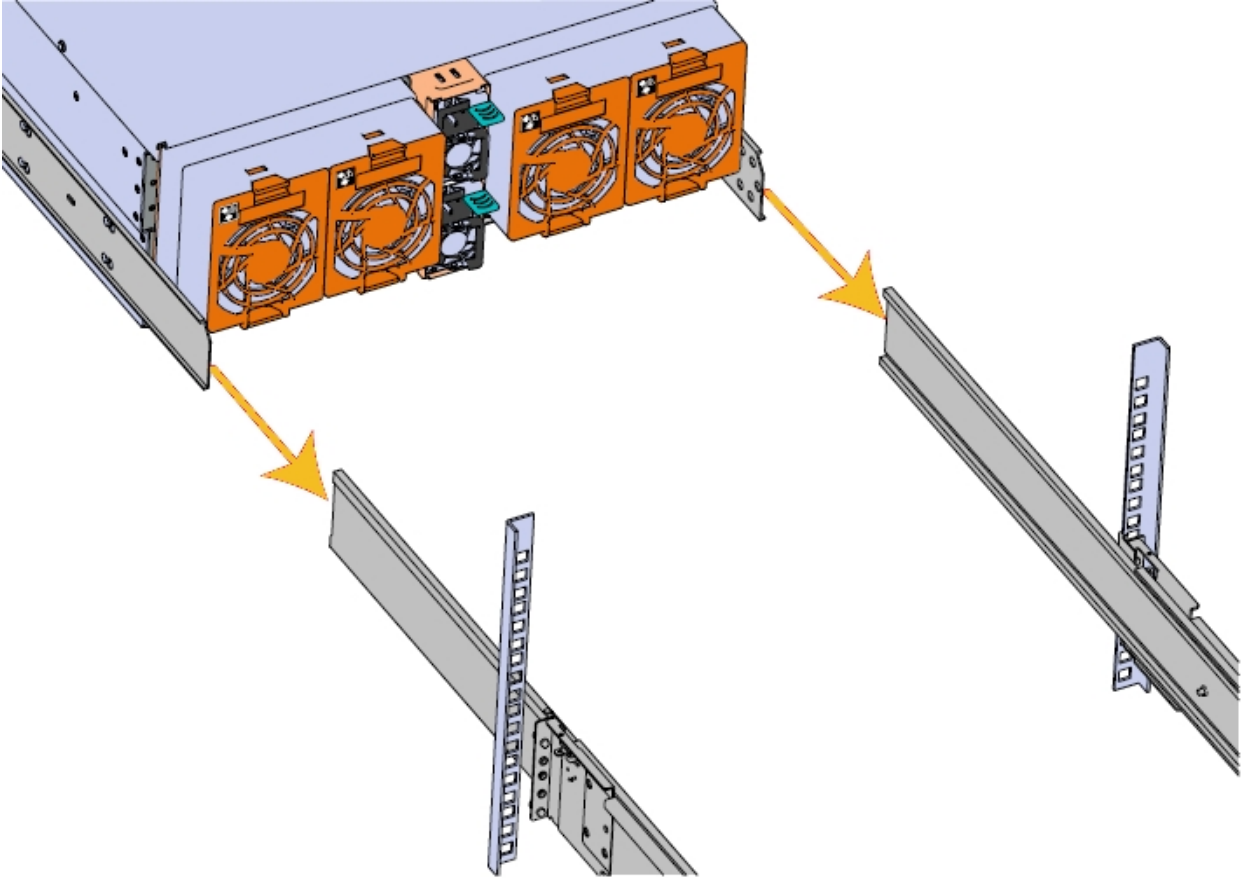
5. Tighten the thumbscrews that hold the front of the U2G460 to the rack.

► **What's Next:**

Continue with .

Installing disk drives in the UNITY3300 and US316 Expansion

This section explains how to install the disk drives in the UNITY3300 and US316 Expansion.

⚠️ **CAUTION:** Put on the ESD wrist strap before starting:

  1. Slip the wrist loop over your hand (left or right), then tighten the loop against your wrist.

  2. Attach the clip end of the anti-static wrist strap to a properly grounded metal surface.

► **Installation order:**

1. Install the FASTier Write Cache drive in the FIRST slot on the LEFT.

2. Install the FASTier Read Cache drive in the SECOND slot on the LEFT.

3. Install the disk drives in any order in the remaining slots.

► **To install the drives on the Unity Storage Expansion:**

1. Hold the disk drive so that the LEDs are on the bottom and THE LEVER IS FULLY OPEN.
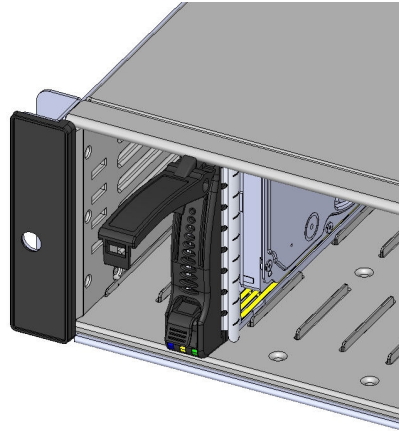
2. Slide the disk drive into the drive slot using the lever until the drive locks into place.

3. Gently push the lever until it mates with the latch on the bottom of the drive slot and clicks into place.
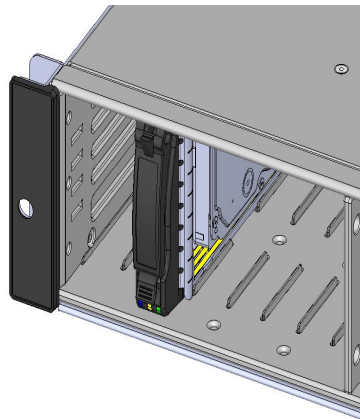
4. Repeat these steps for all remaining disk drives.

Note To maintain proper airflow and cooling, a disk drive or a blank drive carrier must be installed in every slot of the enclosure.

► **What's Next:**

● Connecting and powering on on page 55

Installing disk drives in the US224 Expansion and UNITY7900

This section explains how to install the SAS disk drives in the US224 Expansion and UNITY7900.

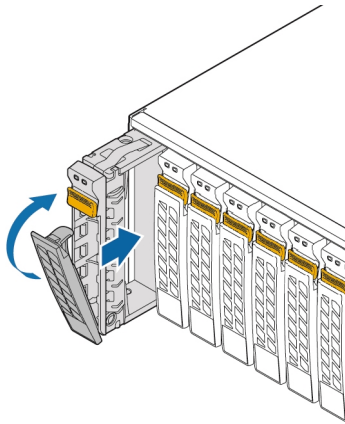⚠️ **CAUTION:** Put on the ESD wrist strap before starting:

1. Slip the wrist loop over your hand (left or right), then tighten the loop against your wrist.
2. Attach the clip end of the anti-static wrist strap to a properly grounded metal surface.

▶ **Installation order:**

1. Install the FASTier Read Cache SSDs from the LEFT, starting with the FIRST slot.
2. Install the disk drives in any order in the remaining slots.

▶ **To install the drives:**

1. Slide the release button on the front of the drive carrier and open the handle.

2. Insert the hard-drive carrier into the drive bay until the carrier contacts the backplane.
3. Close the hard-drive carrier handle to lock the drive in place.
4. Repeat these steps for each drive.

Note To maintain proper airflow and cooling, a disk drive or a blank drive carrier must be installed in every slot of the enclosure.

▶ **What's Next:**

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Installing disk drives in the UNITY NV10000

This section explains how to install the NVMe disk drives in the UNITY NV10000.

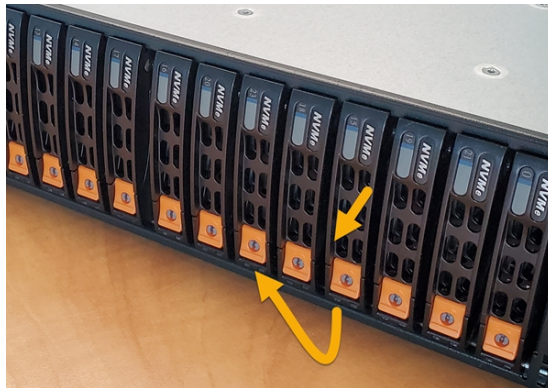⚠️ **CAUTION:** Put on the ESD wrist strap before starting:

1. Slip the wrist loop over your hand (left or right), then tighten the loop against your wrist.

2. Attach the clip end of the anti-static wrist strap to a properly grounded metal surface.

▶ **Installation order:**

● Install the disk drives in any order in the available slots.

▶ **To install the drives:**

1. Slide the release button on the front of the drive carrier and open the handle.

2. Insert the hard-drive carrier into the drive bay until the carrier contacts the backplane.

3. Close the hard-drive carrier handle to lock the drive in place.

4. Repeat these steps for each drive.

Note To maintain proper airflow and cooling, a disk drive or a blank drive carrier must be installed in every slot of the enclosure.

▶ **What's Next:**

● [Connecting and powering on](#) on page 55

Installing disk drives in the U2G460 Expansion

This section explains how to install the SAS disk drives in the U2G460 Expansion.

⚠️ **CAUTION:** Put on the ESD wrist strap before starting:

1. Slip the wrist loop over your hand (left or right), then tighten the loop against your wrist.

2. Attach the clip end of the anti-static wrist strap to a properly grounded metal surface.

▶ **Installation order:**

1. Install the FASTier Read Cache SSD(s) from the BACK RIGHT, starting with the FIRST slot (slot 59).

2. Install the rest of the disk drives in any order in the remaining slots.

▶ **To install the drives:**

1. Slide the expansion out of the rack, by pulling on the front handles.

2. Slide the expansion cover back to show the drive bays.

3. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

4. Pinch the latch release and carefully press downward to seat the drive assembly the rest of the way.

5. Insert the hard-drive carrier into the drive bay until the drive is fully seated. There should be an audible click.

6. Repeat these steps for each drive.

▶ **What's Next:**

● [Connecting and powering on](#) on page 55

Chapter 3

Connecting and powering on

This chapter explains how to connect and power on Unity Storage Systems.

The chapter includes these topics:

Connecting a US224 Expansion to a UNITY7900

The UNITY7900 can be connected to the US224 Expansion Storage Expansion.

► **To connect a US224 Expansion:**

On each Unity Storage System controller, cross-connect SAS cables from the Add-on HBA SAS OUT ports to the HBA SAS IN ports on the Unity Storage Expansion controllers, as shown.

Slot A

1. On the Unity Storage System, connect a SAS cable into the HBA SAS OUT port (1).

2. Connect the other end of the SAS cable into the SAS IN port (2) on the Unity Storage Expansion.

3. On the Unity Storage System, connect the second SAS cable into the SAS OUT port (3).

4. Cross-connect the other end of the SAS cable into the SAS IN port (4) on the Unity Storage Expansion.
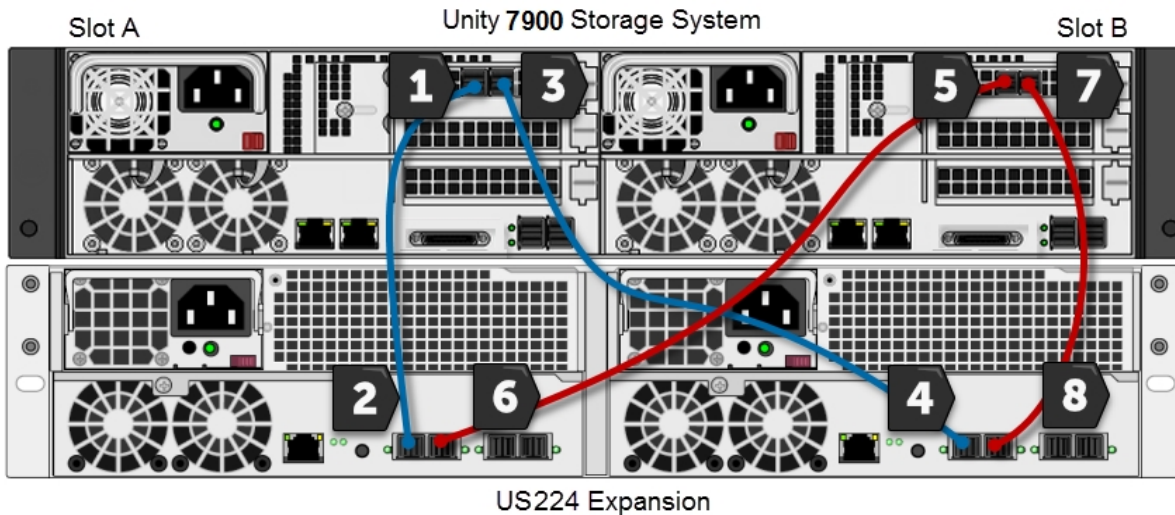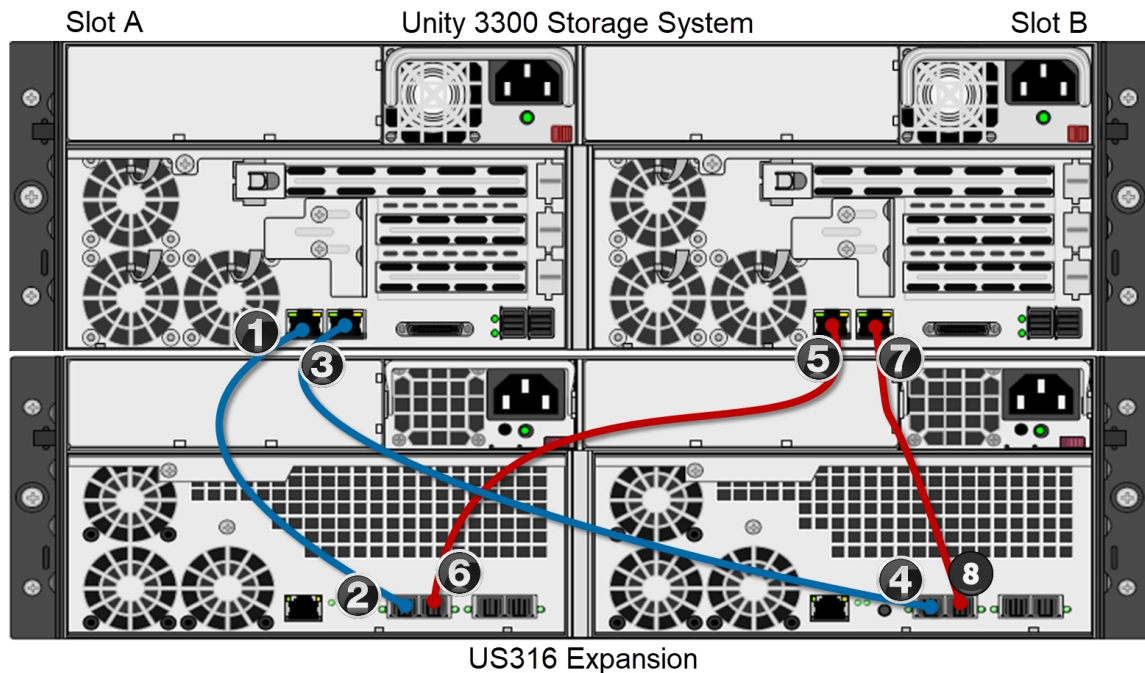
Slot B

5. On the Unity Storage System, connect the third SAS cable into the HBA SAS OUT port (5).

6. Cross-connect the other end of the SAS cable into the SAS IN port (6) on the Unity Storage Expansion.

7. On the Unity Storage System, connect the fourth SAS cable into the SAS OUT port (7).

8. Connect the other end of the cable into the SAS IN port (8) on the Unity Storage Expansion.

Additional storage connections should be parallel connected. See

Note Be sure to snap all cables securely into place.

Figure 3-1: UNITY7900 connected to the US224 Expansion

► **What's Next:**

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Connecting a US316 Expansion to a UNITY3300

The UNITY3300 can be connected to up to three US316 Expansion units .

► **To connect a US316 Expansion:**

On each Unity Storage System controller, cross-connect SAS cables from the Add-on HBA SAS OUT ports to the HBA SAS IN ports on the Unity Storage Expansion controllers, as shown.

Slot A

1. On the Unity Storage System, connect a SAS cable into the HBA SAS OUT port (1).

2. Connect the other end of the SAS cable into the SAS IN port (2) on the Unity Storage Expansion.

3. On the Unity Storage System, connect the second SAS cable into the SAS OUT port (3).

4. Cross-connect the other end of the SAS cable into the SAS IN port (4) on the Unity Storage Expansion.

Slot B

5. On the Unity Storage System, connect the third SAS cable into the HBA SAS OUT port (5).

6. Cross-connect the other end of the SAS cable into the SAS IN port (6) on the Unity Storage Expansion.

7. On the Unity Storage System, connect the fourth SAS cable into the SAS OUT port (7).

8. Connect the other end of the cable into the SAS IN port (8) on the Unity Storage Expansion.

Additional storage connections should be parallel connected. See Cascade configurations on page 62

Note Be sure to snap all cables securely into place.

US316 Expansion

► **What's Next:**

Cascade configurations on page 62

Connecting the power cords on page 65.

Connecting a U2G460 Expansion to a UNITY7900

The UNITY7900 can be connected to up to eight Unity Storage Expansions. See also: Cascade configurations on page 62

► **To connect a U2G460 Expansion:**

On each Unity Storage System controller, cross-connect SAS cables from the Add-on HBA SAS OUT ports to the HBA SAS IN ports on the Unity Storage Expansion controllers, as shown.

Slot A

1. On the Unity Storage System, connect a SAS cable into the HBA SAS OUT port (1).

2. Connect the other end of the SAS cable into the SAS IN port (2) on the Unity Storage Expansion.

3. On the Unity Storage System, connect the second SAS cable into the SAS OUT port (3).

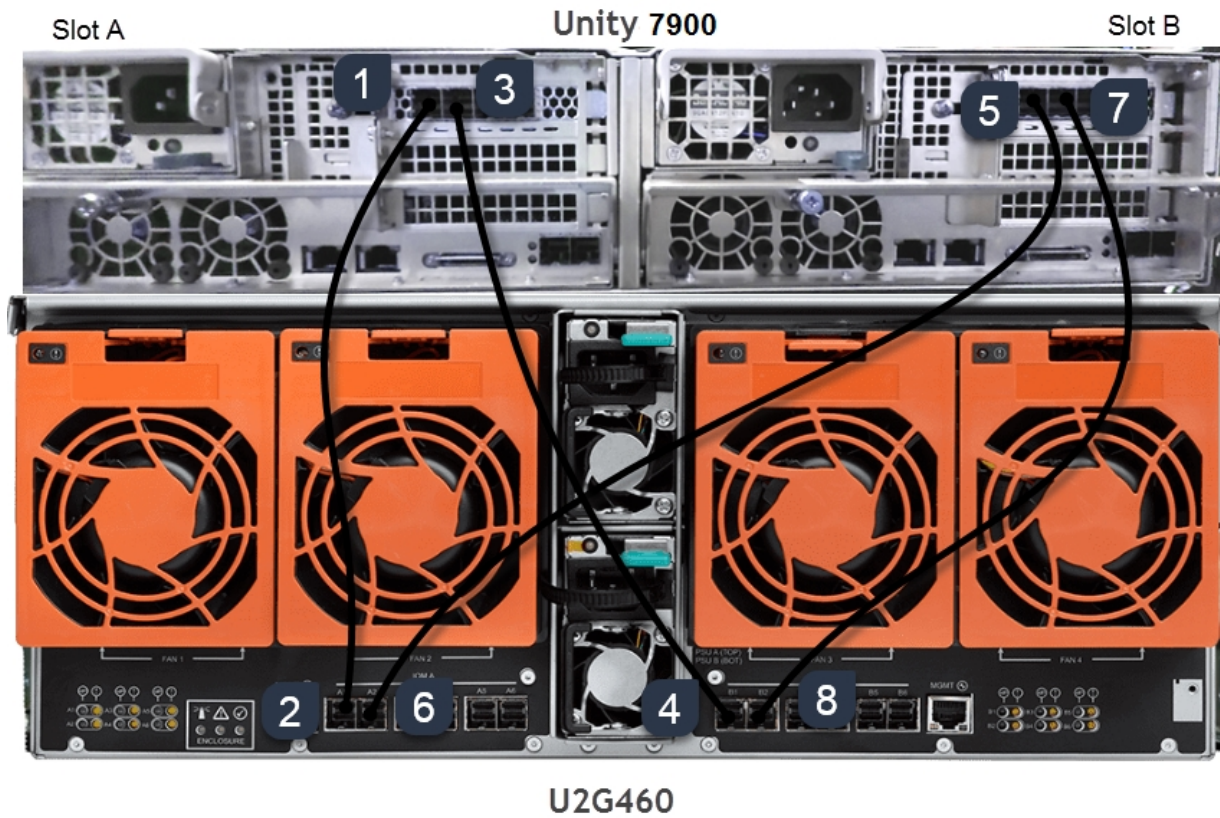4. Cross-connect the other end of the SAS cable into the SAS IN port (4) on the Unity Storage Expansion.

Slot B

5. On the Unity Storage System, connect the third SAS cable into the HBA SAS OUT port (5).

6. Cross-connect the other end of the SAS cable into the SAS IN port (6) on the Unity Storage Expansion.

7. On the Unity Storage System, connect the fourth SAS cable into the SAS OUT port (7).

8. Connect the other end of the cable into the SAS IN port (8) on the Unity Storage Expansion.

Additional storage connections should be parallel connected. See Cascade configurations on page 62

Note Be sure to snap all cables securely into place.

Figure 3-2: UNITY7900 connected to the U2G460 Expansion

► **What's Next:**

Connecting a U2G460 Expansion to a UNITY NV10000

The UNITY NV10000 can be connected to up to eight Unity Storage Expansions. See also: Cascade configurations on page 62

► **To connect a U2G460 Expansion:**

On each Unity Storage System controller, cross-connect SAS cables from the Add-on HBA SAS OUT ports to the HBA SAS IN ports on the Unity Storage Expansion controllers, as shown.

Slot A

1. On the Unity Storage System, connect a SAS cable into the HBA SAS OUT port (1).

2. Connect the other end of the SAS cable into the SAS IN port (2) on the Unity Storage Expansion.

3. On the Unity Storage System, connect the second SAS cable into the SAS OUT port (3).

4. Cross-connect the other end of the SAS cable into the SAS IN port (4) on the Unity Storage Expansion.

Slot B

5. On the Unity Storage System, connect the third SAS cable into the HBA SAS OUT port (5).

6. Cross-connect the other end of the SAS cable into the SAS IN port (6) on the Unity Storage Expansion.

7. On the Unity Storage System, connect the fourth SAS cable into the SAS OUT port (7).

8. Connect the other end of the cable into the SAS IN port (8) on the Unity Storage Expansion.

Additional storage connections should be parallel connected. See Cascade configurations on page 62

Note Be sure to snap all cables securely into place.

Figure 3-3: UNITY NV10000 connected to the U2G460 Expansion
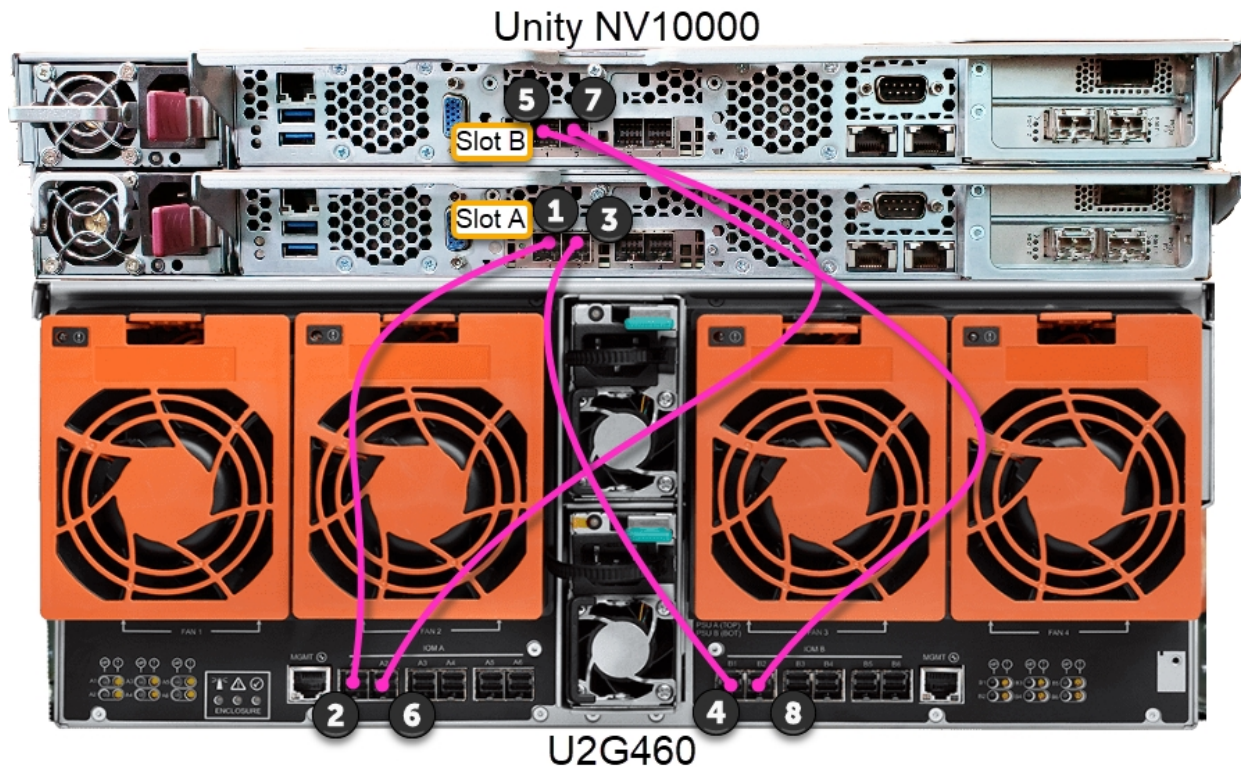
► **What's Next:**

3

Cascade configurations

You can connect multiple Unity Storage Expansions in almost any combination to the UNITY NV10000 Storage System.

To take advantage of redundancy, the first two Unity Storage Expansions must be cross-connected to the SAS add-on ports on the Unity Storage System, and the rest can be connected in parallel. With the UNITY NV10000, you can connect up to eight storage expansions

Note For more details about connecting Nexsan Unity Storage Expansions, please consult your Quick Start Guide.

Here are the Unity Storage Expansions available for cascade configurations:

- US224 Expansion
- US316 Expansion
- U2G460 Expansion

3

Cascading the UNITY NV10000 Storage System

You can cascade (daisy chain) up to eight Unity Storage Expansion to the UNITY NV10000. Connect the first two storage expansions directly to the four SAS add-on ports on the UNITY NV10000, and then daisy-chain from those expansions, as shown in UNITY NV10000 cascade example with two U2G460 Expansions on the next page.

Important: Cross-connect from opposite controllers on the Unity Storage System, so that in the event of the failure of one unit, the other nodes in the array can remain in service. If you are mixing different Unity Storage Expansions, and include one or more U2G460 Expansions, place them at the end of the series.

► **To connect the Unity Storage Expansions:**

1. Cross-connect the first Unity Storage Expansion from the add-on HBA SAS ports on the UNITY NV10000 to the on-board SAS ports on the first Unity Storage Expansion. See Connecting a U2G460 Expansion to a UNITY NV10000 on page 60

2. Parallel-connect the rest of the Unity Storage Expansions using the on-board SAS ports.

Figure 3-4: UNITY NV10000 cascade example with two U2G460 Expansions
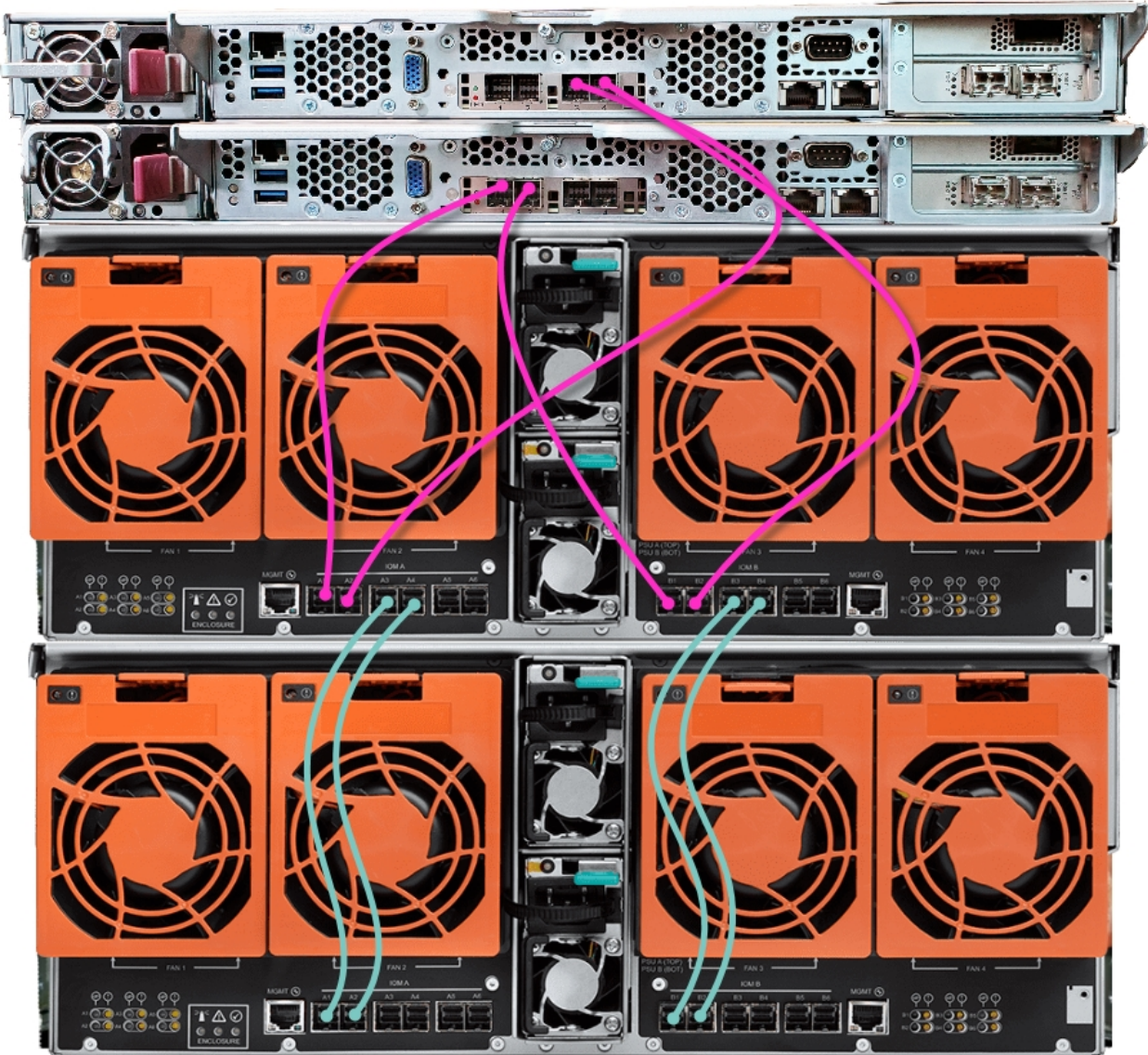
► **What's Next:**

Connecting the power cords

This section describes typical power connections.

⚠️ **CAUTION:** Use only the power cords supplied with the Unity Storage Expansion. Do not use another type of cord or extension cords. If you require additional power cords, please contact your Nexsan sales representative or reseller.

► **To connect the power cords:**

1. Plug the power cords into their respective power supplies on the rear of the storage expansions.

2. Using the included power cords, connect each power supply unit to an AC power source.

Figure 3-5: Example showing a US316 Expansion
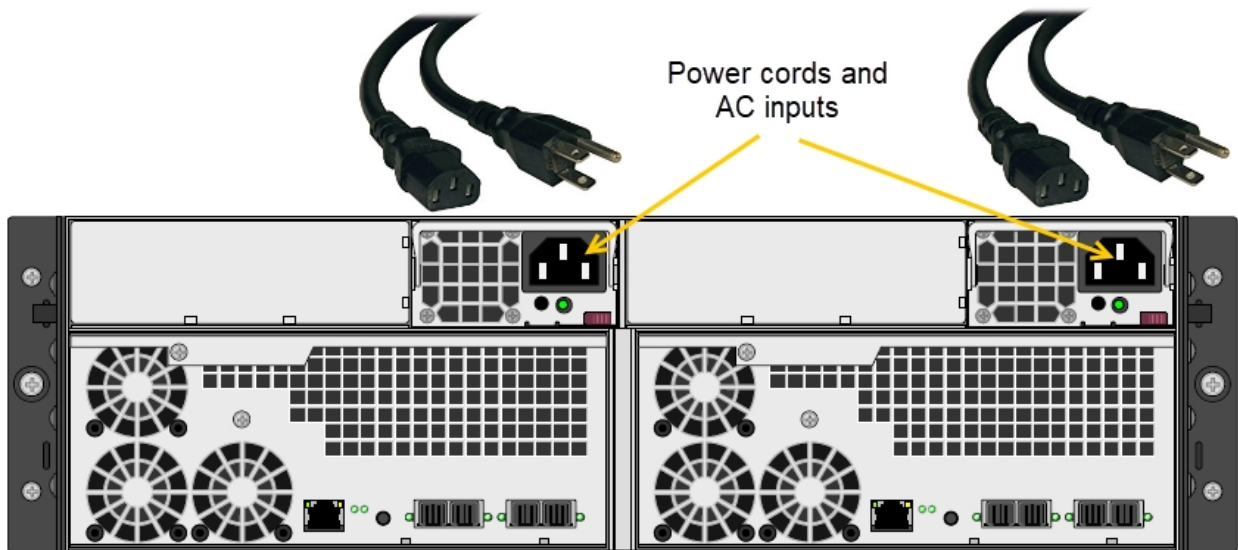
Note We strongly recommend that you use an uninterruptible power supply (UPS) to protect your enclosure.

Powering on

Unity Storage Expansions must be powered on first and allowed to complete drive spin-up and discovery prior to powering on the Unity Storage System for the first time. Discovery is complete once the drive LEDs stop flashing.

The Unity Storage System is hot pluggable: Once in service, powering down is not normally required to add a Unity Storage Expansion.

Powering on the U2G460 Expansion

▶ **To power on the U2G460 Expansion:**

1. Connect the U2G460 Expansion to a UNITY NV10000 storage system.

2. Connect the power cord to each AC Input on the back of the U2G460 Expansion.

3. Plug the power cord into AC power.

Powering on all other Unity 2.0 enclosures

▶ **To power on Unity Storage Systems (except (U2G460):**

1. Connect to AC power. See Connecting the power cords on the previous page

2. Press and hold the power button 🔘 located on the right front panel of the chassis until the power LED 💡 lights up.

▶ **Attach the front bezel to the storage expansion:**

1. Hook the left end of the bezel onto the chassis.

2. Fit the right side of the bezel onto the chassis.

3. Turn the key lock at the right end of the bezel to the lock position to secure the bezel to the chassis.

▶ **Check Storage Expansion and drive status:**

1. Check the status LEDs on the front of the unit:

    For the US224 Expansion, or US316 Expansion:

    ● Check the power LEDs on the LEFT and RIGHT front control panels to ensure that both controllers are receiving power and that the power modules are functioning properly.

    ● Verify that the heartbeat ♡ is blinking yellow in 2-3 second intervals.

    For the U2G460 Expansion*:*

    ● Check that the Power (left) and Ready (middle) LEDs are illuminated and solid GREEN.

2. Verify that the drive carrier LEDs are illuminated in green.

3. Wait approximately one minute for all drives to become ready. All drive carrier activity LEDs should be illuminated in green.

    If a drive carrier activity LED does not light up, check to make sure the corresponding drive is properly seated in the chassis.

Chapter 4

Monitoring

This chapter describes the status and activity LEDs that help you monitor the Nexsan Unity Storage Systems and Unity Storage Expansions.

The Chapter includes these topics:

4

Monitoring power supply units

This section documents PSU status LEDs for the following Unity Storage Expansions:

● US224 Expansion

● US316 Expansion

● U2G460 Expansion

When a failure occurs on a power supply unit, the enclosure LEDs indicate an enclosure fault. Always check the PSU status whenever the enclosure LEDs indicate a fault.

Both controllers for the units in this section have a PSU LED.

For additional information about enclosure LEDs, see Monitoring enclosures on page 70.

Note With the exception of the U2G460, the power button 🔘 is located on the front right side of the enclosure. The U2G460 Expansion has no power button. The unit powers up when you plug it in.
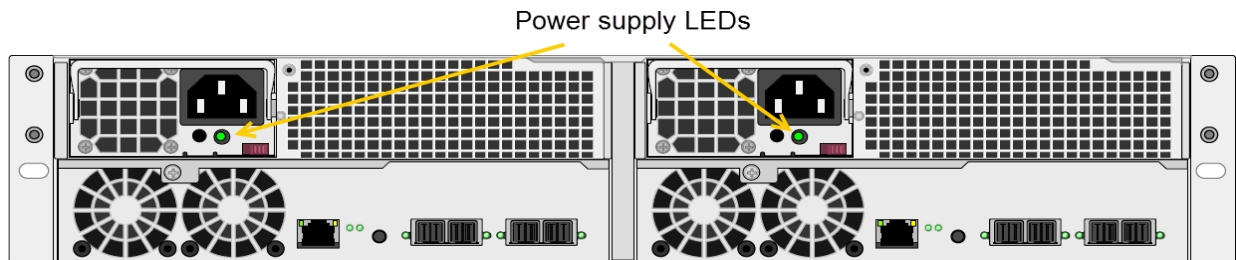
Figure 4-1: US224 Expansion
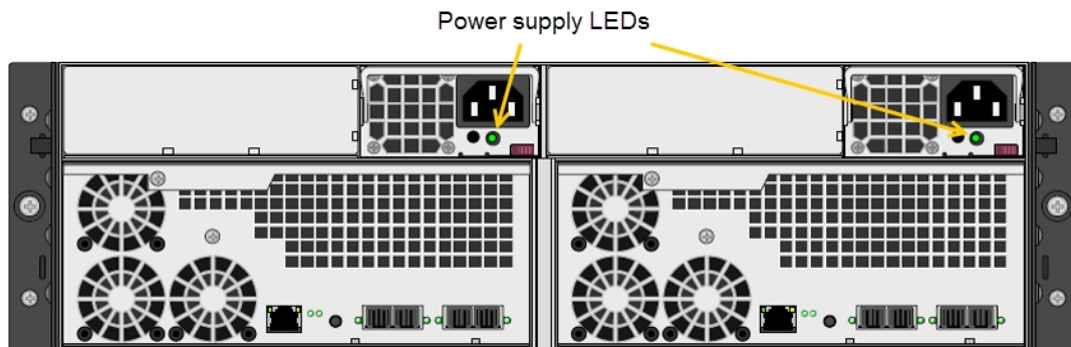

Figure 4-2: US316 Expansion

Figure 4-3: U2G460 Expansion front power LED (green)

Figure 4-4: U2G460 Expansion rear power and AC Input LEDs

Monitoring enclosures

⚠️ **CAUTION:** If the power fail LED comes on, or if the fan fail LED starts flashing on either controller, replace the component as described in Replacing a controller on page 79.

All Unity Storage Systems feature redundant PSUs, accessed from the rear of the unit. Each PSU has one or more status LEDs.

Note With the exception of the U2G460, the power button 🔘 is located on the front right side of the enclosure. The U2G460 Expansion has no power button. The unit powers up when it is plugged in.

The Unity control panel located on the side of chassis has several LEDs. These LEDs provide critical information related to the node on the same side of the chassis.

This table describes each LED and any corrective action you may need to take.

Table 4-1: Control panel LEDs

LED	Description
	Power Indicates power is being supplied to the system's power supply units. This LED is illuminated when the system is operating.
	Heartbeat Indicates that power is being supplied to the server board. This LED flashes amber to indicate normal activity.
	NIC1 Indicates network activity on the LAN1 port when flashing.
	NIC2 Indicates network activity on the LAN2 port when flashing.

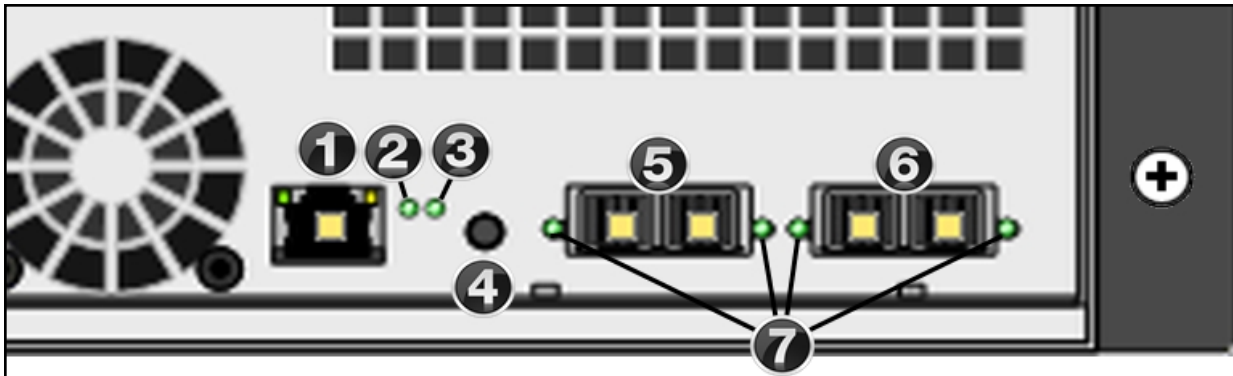| LED	Description
	Power failure Indicates a power supply module as failed. The second power supply module will take the load and keep the system running but the failed module will need to be replaced. This LED is OFF when the system is operating normally.
	Overheat/fan failure ● When this LED flashes, it indicates a fan failure. ● When it is ON continuously, it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. This LED will remain flashing or on as long as the indicated condition exists. ► **Perform these steps:** 1. Check the routing of the cables and make sure all fans are present and operating normally. 2. Check to make sure that the chassis covers are installed. 3. Verify that the heat sinks are installed properly.

4

Monitoring controllers

When a fault condition occurs on a controller, the enclosure LEDs indicate an enclosure fault. Because the controllers are on the back of the Unity Storage Expansions where they may be hard to see, always check controller status whenever the enclosure LEDs indicate a fault.

When the controller Fault LED illuminates, replace the controller; for more information, see Replacing a controller on page 79).

The image and table below describe the controller ports and status LEDs for these Unity Storage Expansions:

- US224 Expansion
- US316 Expansion

Figure 4-5: I/O controller LEDs

The controller I/O ports, reset button, and I/O status LEDs are described in this table.

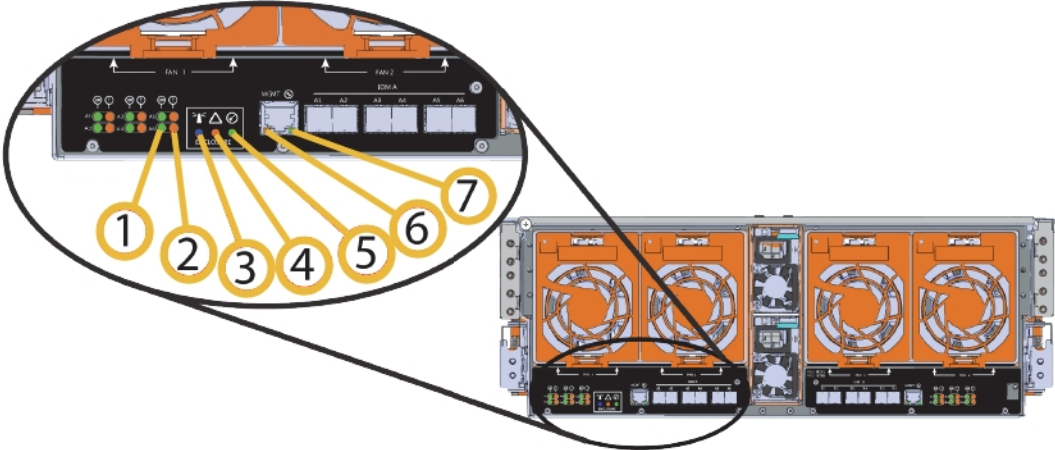| Item	Name	Description
1	LAN port	Used only with Unity Storage Systems. Not used with Unity Storage Expansions.
2	Status LED	Green: Initialization successful
		Red: Initialization failure
3	Unit ID status LED	On/Off (controlled by the base management controller)
4	BMC Reset button	Resets the base management controller
5	SAS IN ports	Serial Attached SCSI IN ports from the Storage System
6	SAS OUT ports	SAS OUT ports to another storage unit
7	SAS link status LEDs (2 IN, 2x OUT)	Green: All four physical layers (PHY) of each port connected with consistent link speed (12 G or 6G)
		Red: Single PHY degraded link speed or disconnected

Figure 4-6: U2G460 Expansion back panel

Table 4-2: U2G460 Expansion back panel LEDs

Number	Color	LED name	Description
1	Green	SAS link status	Solid – SAS Cable Connected Off – SAS Cable Not Connected
2	Amber	SAS fault status	Blink @ 1 Hz – SAS connection fault Off – No SAS connection fault
3	Blue	Identification	Blink @ 1 Hz – Blinks only when Identification has been activated. Will blink when any component is identified.
4	Amber	Fault	Blink @ 1 Hz –Enclosure has a fault Off – Enclosure has no fault
5	Green	Power	Solid - Powered On
6	Green/Amber	Ethernet connections link/activity	Off - Operating at 10 Mbps Green Solid - Operating at 100 Mbps Amber Solid - Operating at 1Gpbs
7	Green	Ethernet connector	Off - No Connection Solid - Connected Blink - Activity

Monitoring disk drives

Each Unity Storage Expansion disk drive carrier has LEDs that indicate the status of the disk drive. If a drive fails, replace the drive as described in Removing a disk drive on page 80.

Note If replacing a disk drive does not resolve a fault or failure indicated by LED 2, replace the I/O controller; for more information, see Replacing a controller on page 79

All Unity Storage Expansion drive carriers have two status LEDs, as shown in these images.
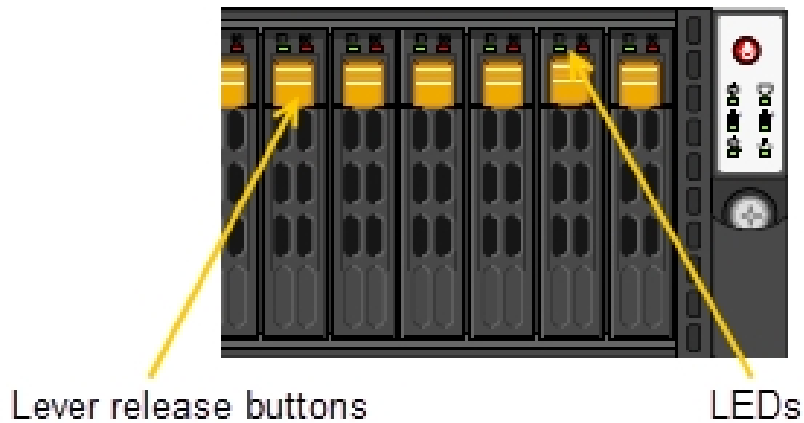
Figure 4-7: US 224

Lever release buttons   LEDs

Figure 4-8: US316 Expansion

Lever release buttons   LEDs
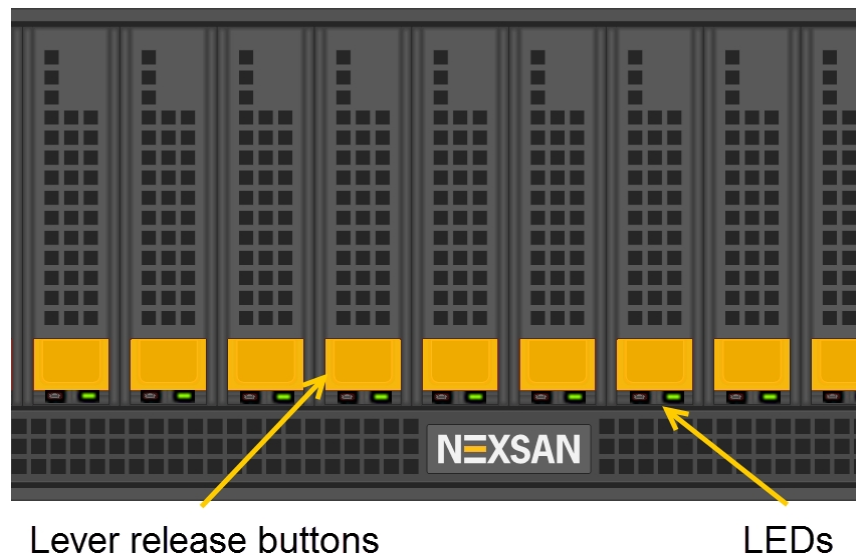
Table 4-3: Drive carrier LEDs

LED	Indication
Green	- A steady green LED indicates the drive is powered on. - If this LED is not lit, the drive is not getting power. - If this LED is flashing, the drive is being accessed (read or write).
Red	A steady red LED indicates a drive failure.

4

4

Chapter 5

Solving problems

This chapter describes how to remove and replace failed or failing components of the Unity Storage Expansions. It includes these topics:

5

General troubleshooting tips

Use these tips if you encounter difficulties installing or using your Unity Storage System or Unity Storage Expansion,

- Check all components on the enclosure—disk drives, power supply units, I/O controllers—for illuminated Fault LEDs. See Monitoring enclosures on page 70 for more information.

- Ensure that all components are fully and properly seated in their slots.

- Ensure that all cables are properly connected. If necessary, try using different SAS cables.

- Ensure that both APC units are powered on.

If you need to power down your equipment

The Unity Storage System is hot pluggable and powering down is not required to add a Unity Storage Expansion. If however, you determine that powering down is necessary, perform the shutdown in this order:

1. Power down the Unity Storage Expansion.

2. Power on the Unity Storage Expansion.

3. Power on Unity.

For procedural steps, see Powering down on the facing page and Powering on on page 66.

5

Powering down

This section describes the power down sequence for Unity Storage Expansions and Unity Storage Systems.

Note The Unity Storage System should be shut down before the Unity Storage Expansions during a power down sequence. You can do this from Nexsan Unity or from the nxadmin Command-line Interface (CLI) on Unity; for more information, see the *Nexsan Unity Software User Guide*.

► **To power down the Unity Storage Expansions and Unity Storage System:**

1. Power down the Unity Storage System from Nexsan Unity or from the nxadmin Command-line Interface (CLI).

   Note Both Unity controllers must be powered off simultaneously.

2. Power down the Unity Storage Expansion by pressing and holding the power button on the power supply units or by unplugging the unit (U2G460).

Replacing a controller

⚠️ **CAUTION:** Although the controllers are hot-swappable, the **safest** way to replace a controller without any risk of damage or data loss is with the Unity Storage Expansion powered off.

Note I/O traffic to an I/O controller should be stopped before hot swapping a controller.

► **To remove the controller:**

1. If you are not doing a hot-swap, power off your equipment in this order:
   a. Power off Unity.
   b. Power off the Unity Storage Expansion.
   c. For more information about the power off sequence, see "Powering down," above.

2. Before you disconnect the cables, label each cable with the name of the port it connects to. You will need this information when installing a new controller.

3. Disconnect all the cables connected to the controller.

4. Pull the two black release handles and carefully slide the controller out of the enclosure.

Release
Handles
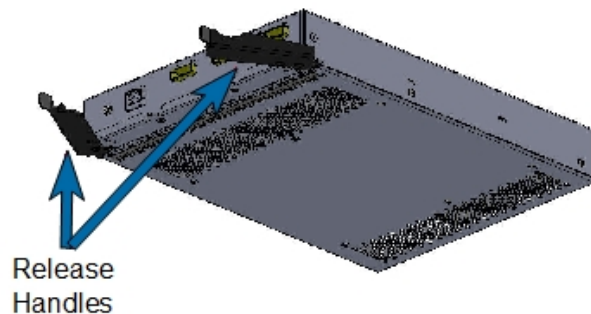
5. Gently slide a new controller into the empty controller bay until the black handles engage, then press the handles until the I/O canister latches into place.

6. Connect the cables according to the notes you made when you removed the old controller.

7. If necessary, power on your equipment **in this order**:

    a. Power on the Unity Storage Expansion.

    b. Power on Unity.

Removing a disk drive

If you will be installing a replacement disk drive, allow it to acclimate to room temperature before continuing.

**Note** For disk drive installation instructions, see Installing Unity Storage Systems on page 27.

> **Important safety precautions**
>
> - To avoid data loss, stop all I/O activity on the disk drive before removing it. Removing a disk drive during I/O activity could also hang the host system.
>
> - **Do not** attempt to remove more than one disk drive or blank drive carrier at a time. Damage to the drive carrier can occur if adjacent disk drives are removed at the same time.
>
> - To maintain proper airflow and cooling inside the enclosure, install either a disk drive or a blank drive carrier into the empty drive bay as quickly as possible.

▶ **To remove a disk drive (or blank drive carrier):**

1. Press the button on the disk drive carrier to release the lever (drive may not be exactly as shown).
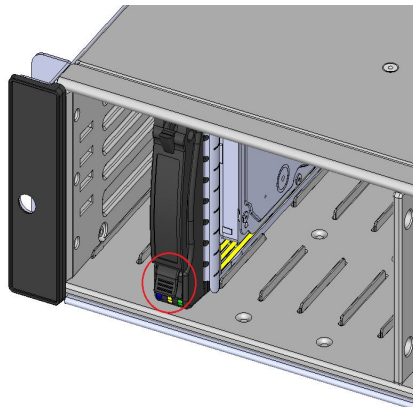
2. Gently pull open the lever.
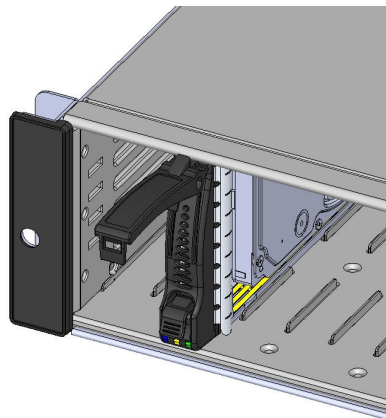
3. If the enclosure is powered on, in the case of HDDs, allow the disk drive to fully spin down (wait approximately 30 seconds).

> ⚠️ **CAUTION:** Removing a disk drive before it has fully spun down may result in disk drive damage and possible personal injury.

4. Gently pull the disk drive out of the enclosure.

   Note Do not remove the disk drive from its drive carrier. A disk drive removed from its carrier is not covered by the hardware warranty.

5. Immediately replace the disk drive or install a blank drive carrier to maintain correct airflow and cooling; for more information, see Installing Unity Storage Systems on page 27.

Replacing a PSU

You must replace a failed PSU **as quickly as possible** (within five minutes) to maintain correct airflow and cooling. failed PSUs can be hot-swapped.

If you don't have a replacement unit available for immediate installation, you must power off the enclosure.

Note If the enclosure is still operational, the failed PSU can be left installed to maintain proper cooling until a replacement unit is available. The fans in both PSUs will continue to run at high speed until the PSU is replaced.

For more information about PSUs, see Components and features on page 12.

► **To replace a PSU:**

1. Power off the failed PSU and remove the power cable. If the enclosure is powered on, the fans in the other PSU switch to high speed to compensate for the reduced airflow.

2. Push the release tab to the right and rotate the handle down.

3. Slide the PSU out of the enclosure. **Do not** use the thumb-presses as handles to lift or carry the PSU (example picture shown).
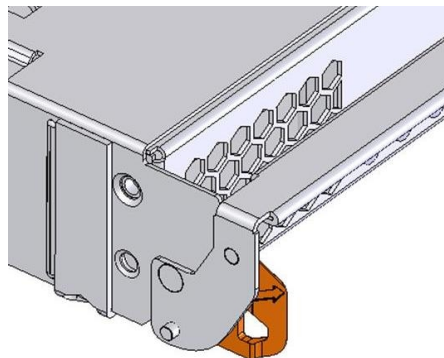
> ⚠️ **CAUTION:** To avoid electrical shock, **do not** insert any instruments or tools into the open PSU slot.

4. Gently slide a new PSU into the empty slot until the handle rotates up and the release tab clicks into place.

5. Reconnect the power cable.

6. Power on the PSU.

When proper airflow returns, the cooling fans in the other PSU return to their normal speed.

Removing a Unity Storage Expansion

This section describes how to disconnect a Unity Storage Expansion from an Unity or another Nexsan Unity Storage Expansion. Nexsan Unity Storage Expansions are hot-pluggable. They can be added or removed from an Unity or another Nexsan expansion unit that is currently running.

▶ **Before you begin:**

Before you can physically remove a Unity Storage Expansion, you must:

1. Remove all storage pools on the Unity Storage Expansion, as described in Deleting a storage pool below.

2. Remove the Unity Storage Expansion from Unity, as described in Removing a Unity Storage System on page 84.

▶ **To remove a Unity Storage Expansion:**

1. Put on the disposable ESD strap:

   a. Slip the wrist loop over your hand (left or right), then tighten the loop against your wrist.

   b. Attach the clip end of the anti-static wrist strap to a properly grounded metal surface, such as a server rack's grounding pin.

2. Power OFF the expansion unit.

3. Unplug the power cords from their respective power supplies on the rear of the expansion unit, then unplug them from the power source.

4. Unplug the SAS cables connected to the expansion unit from the main unit.

5. (Optionally) Replace the expansion unit with another one by connecting the SAS cable from the SAS on-board port to the appropriate SAS port on the new expansion unit.

Deleting a storage pool

This section explains how to delete a storage pool on Unity.

⚠️ **CAUTION:** Deleting a storage pool also deletes all shares and their underlying data in the storage pool, including snapshots of the data. If the storage pool is replicated, Unity will ask you if you want to also delete the storage pool's replica on the remote site, or if you want to promote the storage pool's replica to primary pool.

▶ **To delete a storage pool:**

1. On the **Unity navigation bar**, select **Storage > Storage Pools**.

2. In the **Storage Pool** panel, click the link to the pool you want to delete.

3. Click the **Delete Pool** button. The **Delete Storage Pool** confirmation popup opens.

Figure 5-1: Delete Pool popup
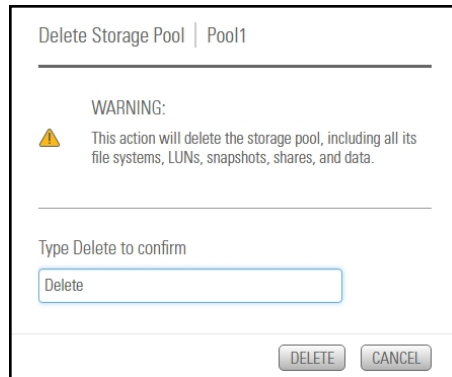
4. Type **Delete** in the text box.
5. Click **Delete** to delete the storage pool.

5

Removing a Unity Storage System

Use this procedure to remove a Unity Storage System.

⚠️ **CAUTION:** This action will permanently remove the storage system from the Unity System; if you proceed, the storage system will no longer be allocated to the Unity System.

As part of the removal process, you can specify whether or not you want Unity to delete all existing volumes (RAID sets) on the storage system, or leave them intact.

Note that Unity supports two options for the RAID sets on the system being removed:

- **Delete volumes**: With this option, you remove existing RAID configurations.
- **Leave volumes intact**. With this option, you keep the RAID configurations on the removed system.

Prerequisites

- Remove storage pools allocated to the system, as described in <u>Deleting a storage pool </u>on page 82.

► **To remove a Unity Storage System:**

1. From the **Unity navigation bar**, select **Storage > Storage Systems**. The **Storage Systems** panel opens.
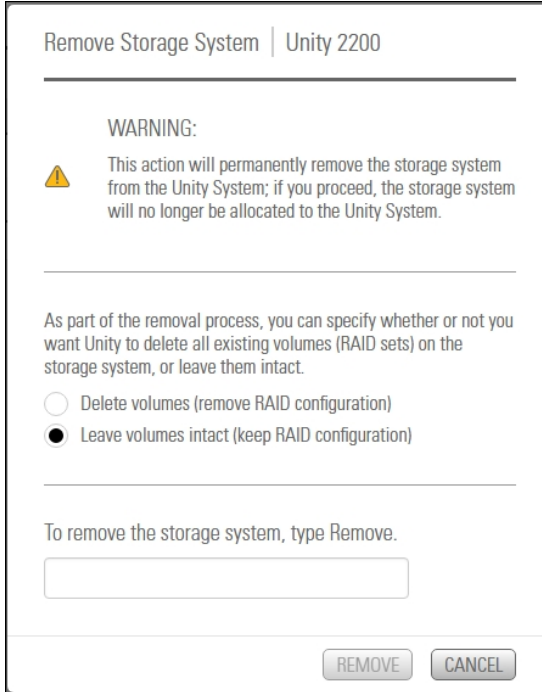
Figure 5-2: Storage Systems panel
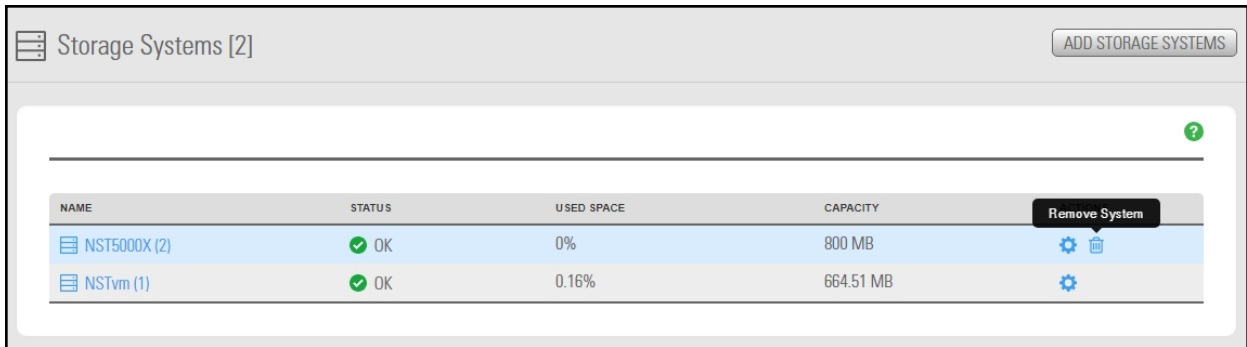
2. In the row containing the system you that want to remove, click the **Remove System** icon 🗑. The **Remove Storage System** window opens.

Figure 5-3: Remove Storage System window

3. Choose one of the following:

    * **Delete volumes**: With this option, you remove existing RAID configurations.

    * **Leave volumes intact**. With this option, you keep the RAID configurations on the removed system.

4. Type **Remove** in the text box.

5. Click the **Remove** button to complete the operation.

► **What's Next:**

You can now remove the storage enclosure physically.

5

Chapter   A

Technical specifications

This chapter lists the technical specifications of the Nexsan Unity Storage Expansions. It includes these topics:

A

US224 Expansion general specifications

This section describes the US224 Expansion hardware specifications.

Hardware component	Specifications
System	• up to 24, 2.5" SSD drives
Rail kit mounting	• 2U enclosure height • Cable specifications: 19.6"(500 mm) minimum 118.1" (3000 mm) maximum
Field Replaceable Units (FRU)	• Disk drives and drive carrier blanks • APC units • I/O modules • I/O module slot blanks
Enclosure physical dimensions	Height 3.5" 88 mm Width 17.2" 437 mm Length 25.5" 641 mm
Weight	Chassis: 67 lbs (30.4 kg) With drives installed: 114 lbs (51.7 kg)

Power supply units	• System input requirements:
	  • AC Input voltage: 100-240 V
	  • AC Input frequency: 50-60 Hz
	  • AC Input amperage: 11-4,5 Amp
	  • 1,200W redundant power supplies with PMBus
	• Output power:
	  • Output Type: 19 pairs gold finger connector
	  • Total output power: 1,200 W/1,000, 80 plus Titanium Certified
	  • Rated output voltages: +5V (45A), 3.3V (24A), -12V (0.6A)
	• Power consumption: varies depending on the number and size of drives, running fans, and room temperature.
	• Cooling system:
	  • 2 hot-swappable APC units
	  • 8x 40mm cooling fans
	  • Variable speed blowers, two per APC. Total of four blowers per enclosure.

A

US316 Expansion general specifications

This section describes the US316 Expansion hardware specifications.

Hardware component	Specifications
System	• Up to 16 drives with 3.5" SAS or SSD disk drives
Rail kit mounting	• 3U enclosure height • The rack must have square holes • Maximum distances: 30" (800 mm)
Redundant components	• 2 power supply units • Cooling fans • Host connectivity ports • Controllers
Enclosure physical dimensions	• Height 5.2" 132 mm • Width 17.2" 437 mm • Length 25.5" 648 mm
Weight	Chassis: 56 lbs (25.5 kg) With drives installed: 75 lbs (34 kg)

Advanced power and cooling units	• Rated output power : 1,200W redundant
	• Rated output voltages: +12V (83A max.) +5Vsb (4A max.)
	• Input voltage: 100-240VAC
	• AC input frequency: 50/60 Hz
	• Power consumption: varies depending on the number and size of drives, running fans, and room temperature
	• Cooling system: 12 fans (4 cm)
	    • 6 counter-rotating fans behind the HDD backplane
	    • 6 counter-rotating fans at the rear of each node
	    • Power supply: 2 fans (one per power supply)

A

U2G460 Expansion general specifications

This section describes the U2G460 Expansion hardware specifications.

Hardware component	Specifications
System	Up to 60 top-loading, hot swappable 3.5" drives, SAS 3 I/O controllers. Minimum 20 HDDs per enclosure.
Rail kit mounting	4U enclosure height ● Cable specifications: 19.6" (500 mm) minimum 118.1" (3000 mm) maximum
Drive bays	60 x 3.5" hot swappable SAS drive bays
Field Replaceable Units (FRU)	Disk drives and drive carrier blanks I/O modules I/O module slot blanks
Enclosure physical dimensions	Height 6.88" 174 mm Width 17.72" 450 mm Depth 35.43" 900 mm - With drawer extended: 72" 1830 mm Weight 83.9 lbs. 38.4 kg (no drives installed) 175 lbs. 79.4 kg (all drives installed)
Power supply units	Two 1,600W PSUs, hot swappable and redundant AC Input voltage: 200-240V

A

Appendix B

Regulatory compliance

This chapter includes these topics:

Regulatory compliance statements

Nexsan Unity Storage Expansions conform to the following Regulatory Agency requirements:

Category	Range
Temperature	Operating: 5 °C to +40 °C
	Storage: 1°C to +60 °C
	Transit: -40°C to +60 °C
	Maximum Rate of Temperature Change: 20 °C per hour
Humidity	Relative Humidity Operating: 20% to 80%, non-condensing
	Maximum Rate of Operational Humidity Change: 10% per hour
	Relative Humidity Storage: 10% to 80%, non-condensing
Altitude	Altitude Operating: -200 to 10,000 feet
	Altitude Storage: -200 to 10,000 feet
Operational shock	5 G half sine shock with pulse duration of 11 milliseconds or less.
Non-operational shock	Half Sine Shock: 10 G half sine shock with pulse duration of 11 milliseconds or less.
Operational vibration	Sinusoidal vibration from 5 to 500 Hz at 0.16 G (0 to peak) at a sweep rate of 0.5 octaves per minute.
	Random vibration from 5 to 500 Hz at 0.15 G (rms).
Non-operational vibration	Sinusoidal vibration from 5 to 500 Hz at 0.75 G (half-sine) at a sweep rate of 0.5 octaves per minute.
	Random vibration from 5 to 500 Hz at 0.5 G (rms).
Acoustics	Acoustic level shall not exceed a weighted sound power of 6.9 Bels at normal operation tested to ISO7779.

B

Regulatory agency compliance

Nexsan Unity Storage Expansions comply with the following Regulatory Agency requirements:

Standard	Certifications
Product safety standards	
	UL60950 Information Technology Equipment (US)
	CSA C22.2 No 60950 Information Technology Equipment (Canadian Law)
	EN 60950 Information Technology Equipment (European Norm)
	IEC60950 Information Technology Equipment
Product safety third party certifications	
	cUL Listed USA
	TUV, GS Certified Germany
	TUV CB Certified

The Unity Storage Expansion is CE and FCC marked to indicate compliance with the European Low Voltage Directive and the EMC directive. The Unity Storage Expansion is certified to Class A emission limits.

Product Safety	
	EN60950 ITE
Emissions Testing	
	EN55024 Radiated and conducted emissions
	FCC, Part 15
	VCCI
Immunity Testing	
	CENELEC EN55024 Light Industry
	CENELEC EN61000-4-2 Electrostatic Discharge
	CENELEC EN61000-4-3 Radiated Immunity
	CENELEC EN61000-4-4 Electrical Fast Transients (Burst)
	CENELEC EN61000-4-5 Transient (Surge)

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Standard	Certifications
	CENELEC EN61000-4-6 Conducted Immunity
	CENELEC EN61000-4-8 Power Frequency Magnetic Fields
	CENELEC EN61000-4-11 Power Line Interruption
	EN61000-3-2 Harmonic current emissions
	EN61000-3-3 Voltage fluctuations and flicker

Certification marks

The Unity Storage Expansion is labeled with the following compliance marks:

	United States FCC standard, 47 CFR Part 15
	Canadian standard, Industry Canada ICES-003
	CE Mark
	GS Mark
	TUV Safety Mark

Product safety certifications on power supplies as a component

	UL Recognized Component (QQGQ2)
	TUV BG Certification
	CB Certificate and Report
	CE Mark
	BSMI
	CCC

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NEXSAN

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Nexsan Unity Documents & Downloads page:
https://helper.nexsansupport.com/unt_support

Nexsan Unity support:
https://helper.nexsansupport.com/unt_support

Worldwide Web
www.nexsan.com

This product is protected by one or more of the following patents, and other pending patent applications worldwide:

United States patents US8,191,841, US8,120,922;

United Kingdom patents GB2466535B, GB2467622B, GB2467404B, GB2296798B, GB2297636B