

EMC® VNXe® Series
VNXe3200™

Hardware Information Guide

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This guide is a hardware information guide for the VNXe3200™ Dual Storage Processor platform. It provides an overview of the architecture, features, and components of the VNXe3200 platform. The specific aspects of the major components include the front and rear connectors and the LED indicators. These components are:

- ◆ a disk processor enclosure
- ◆ a disk-array enclosure.

In the VNXe3200 Dual Storage Processor (SP) platform, the disk processor enclosure (DPE) and the disk-array enclosure (DAE) use either a 12 drive, 3.5-inch disk 2U enclosure or a 25 drive, 2.5-inch disk 2U enclosure.

Topics include:

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About this guide

This guide is designed for personnel who install, configure, and maintain the VNXe3200 Dual SP platform. To use this hardware publication, you should be familiar with digital storage equipment and cabling.

IMPORTANT

When calculating the number of drives for your VNXe3200 Dual SP platform, the DPE is included in the total drive slot quantity from 120 to 150 drives. If the total drive slot quantity exceeds from 120 to 150, you will not be able to add another DAE. The “[Disk-array enclosure](#)” section on [page 41](#) provides more information about the available DAEs for the VNXe3200 Dual SP platform as well as a configuration table.

This guide is available online at <https://www.emc.com/vnxesupport>. Select the *EMC® VNXe® VNXe3200 Hardware Information Guide* from this list. This guide and other related VNXe Series guides can be downloaded from here.

Product software and hardware release revisions

As part of an effort to improve and enhance the performance and capabilities of its product line, EMC from time to time releases revisions of its hardware and software. Therefore, some functions described in this document might not be supported by all revisions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

Contact your EMC technical support professional if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. Go to EMC Online Support (<https://support.emc.com>) to ensure that you are using the latest version of this document.

Revision history

The following table presents the revision history of this document:

| Revision | Date | Description |
|----------|----------------|--|
| 04 | March, 2016 | Updated |
| 03 | November, 2014 | Updated the following sections: <ul style="list-style-type: none"> • “Hardware features” on page 8 • “Personality modules” on page 35 • Miscellaneous edits. |
| 02 | October, 2014 | Updated the following sections: <ul style="list-style-type: none"> • “Hardware features” on page 8 • “DC power supply module (optional)” on page 19 • Table 19, “DPE and DAE configuration rules for dual SP configuration,” on page 42 • “Appendix A: Cabling” on page 58 • Miscellaneous edits. |
| 01 | April, 2014 | First release of the <i>VNXe3200 Hardware Information Guide</i> |

How this document is organized

The major sections of this guide are listed in the following table.

Table 1 Organization

| Title | Description |
|---|---|
| “Overview” on page 6 | Describes the software and hardware features of a typical VNXe3200 Dual SP platform. |
| “VNXe3200 platform” on page 7 | Describes and shows the front and rear views of a typical VNXe3200 Dual SP platform. |
| “System component description” on page 11 | Provides a description of the components that comprise a VNXe3200 Dual SP platform. Along with a description, illustrations of each component are also shown. |
| “Disk processor enclosure” on page 11 | Describes and illustrates the front and rear of a DPE and the components that comprise the DPE. |
| “Cooling modules/fans” on page 16 | Describes and illustrates the DPE cooling modules/fans. |
| “Power supply modules” on page 18 | Describes and illustrates the DPE power supply module. |
| “Storage processor (SP)” on page 20 | Describes and illustrates the DPE storage processor. |
| “SDRAM or memory modules” on page 23 | Describes and illustrates the SDRAM or memory modules in the SP. |

Table 1 Organization (continued)

| | |
|---|--|
| “mSATA SSD interface” on page 25 | Describes and illustrates the mSATA SSD interface built into the SP. |
| Title | Description |
| “Personality modules” on page 35 | Describes and illustrates the three personality modules supported in the SP. |
| “Disk-array enclosure” on page 41 | Describes and illustrates the front and rear of a DAE and the components that comprise it. |
| “6-Gb/s SAS LCC” on page 46 | Describes and illustrates the DAE LCC. |
| “DAE AC power supply/cooling module” on page 47 | Describes and illustrates the DAE power supply/cooling module. |
| “Appendix A: Cabling” on page 58 | Describes and illustrates how the VNXe3200 platform is cabled. |

Related documentation

The following EMC publications provide additional information:

- ◆ *DC-Powered VNXe® Series Enclosures Installation and Operation Guide*
- ◆ *EMC® VNXe® VNXe3200 Installation Guide*

These guides are available online at <https://www.emc.com/vnxesupport>.

Safety warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you or damage the equipment. A caution, warning, or danger symbol precedes each safety statement. The safety warnings provide safety guidelines that you should follow when working with any equipment that connects to electrical power or communications wiring.

EMC uses the following safety warnings:



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

Conventions used in this document

EMC uses the following conventions:

Note: A note presents information that is important, but not hazard-related.

IMPORTANT

An important notice contains information essential to software or hardware operation.

Typographical conventions

EMC uses the following type style conventions in this document:

| | |
|-------------------------|--|
| Bold | Use for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks) |
| <i>Italic</i> | Use for full titles of publications referenced in text |
| Monospace | Use for: <ul style="list-style-type: none"> • System output, such as an error message or script • System code • Pathnames, filenames, prompts, and syntax • Commands and options |
| <i>Monospace italic</i> | Use for variables. |
| Monospace bold | Use for user input. |
| [] | Square brackets enclose optional values |
| | Vertical bar indicates alternate selections — the bar means “or” |
| { } | Braces enclose content that the user must specify, such as x or y or z |
| ... | Ellipses indicate nonessential information omitted from the example |

Where to get help

EMC support, product, and licensing information can be obtained as follows:

Product information — For documentation, release notes, software updates, or information about EMC products, licensing, and service, go to the EMC Online Support website (registration required) at:

<https://Support.EMC.com>

Technical support — For technical support, go to EMC online support website (registration required) and select Support. On the Support page, you will see several options, including one to create a service request. Note that to open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.

Overview

The VNXe Series provides an integrated storage platform for small/medium businesses as well as remote offices and departments in larger enterprise businesses. Providing significant advancements in efficiency and simplicity, the VNXe Series facilitates complete storage consolidation with advanced file and block functionality as well as a simple, application-driven approach to managing shared storage.

Supporting high availability through the use of redundant components—power supplies, fans, storage processors—as well as dynamic failover and failback, the VNXe Series also supports the ability to upgrade system software or hardware while the VNXe platform is running.

The VNXe3200 Dual SP platform is ideal for businesses with physical server infrastructures, as well as those making the move to server virtualization to drive consolidation and greater efficiency. The VNXe3200 Dual SP platform also shares a comprehensive set of features including exceptional capacity utilization, data protection and availability solutions, and advanced support capabilities.

The following illustration shows an example of the VNXe3200 Dual SP platform front bezel.



Figure 1 Example of a VNXe3200 front bezel

VNXe3200 platform

This section shows examples of the front and rear views of a VNXe3200 Dual Storage Platform (Dual SP) platform. A description of the hardware features is also included in this section.

Front view

The following illustrations show examples of the front view of the VNXe3200 Dual SP platform having either a 2U, 12 (3.5-inch) disk drive DPE or 2U, 25 (2.5-inch) disk drive DPE, respectively.

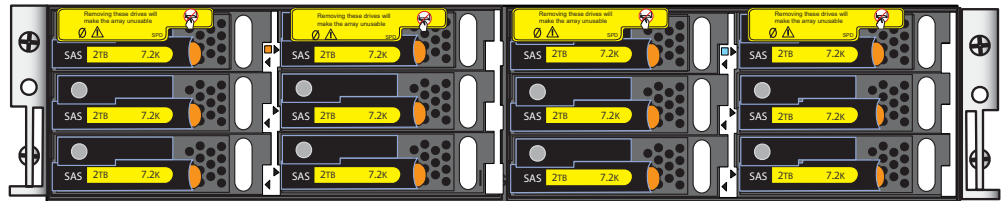
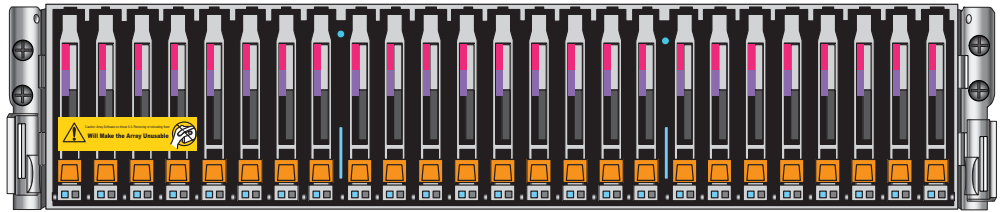


Figure 2 Example of the front view of a VNXe3200 Dual SP platform with a 2U, 12 (3.5-inch) disk drive DPE

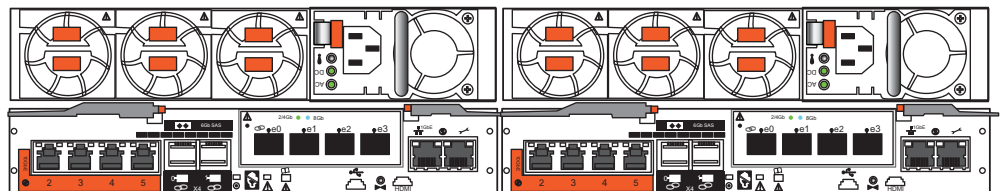


VNX-000504

Figure 3 Example of the front view of a VNXe3200 Dual SP platform with a 2U, 25 (2.5-inch) disk drive DPE

Rear view

Looking from left to right, the following illustration shows an example of the rear view of a VNXe3200 Dual SP platform having a DPE with two storage processors (SP B and A), respectively.



VNX-000505

Figure 4 Example of the rear view of a VNXe3200 Dual SP platform DPE with two SPs

Hardware features

Contained in a 2U platform architecture, the VNXe3200 Dual SP DPE weighs approximately 54 lb (24.5 kg) for a 12-drive DPE to 45 lb (20.4 kg) for a 25-drive DPE. The 12-drive DPE measures 3.5 inches high x 17.5 inches wide x 19.7 inches deep (8.89 cm x 44.45 cm x 50.16 cm) and the 25-drive DPE measures 3.5 inches high x 17.5 inches wide x 17 inches deep (8.89 cm x 44.45 cm x 43.18 cm). Between the front and rear of the enclosure, a midplane distributes power and signals to all the enclosure components. In the VNXe3200 Dual SP platform, the 2U DPE SPs, the cooling modules/fans, and the power supply modules plug directly into the midplane connections.

Note: The previously mentioned dimensions are approximate and do not include a rack or cabinet enclosure.

Configured for AC-input power, the VNXe3200 Dual SP platform includes the following hardware features:

Note: An optional DC power supply for the SP is also available (for more information, see the “[DC power supply module \(optional\)](#)” section on [page 19](#)).

- ◆ One 2U DPE:
 - The DPE supports Serial attached-SCSI (SAS), near-line SAS (NL-SAS), and Flash drives in two types of carriers, 2U, 12 (3.5-inch) disk drive carrier or a 2U, 25 (2.5-inch) disk drive carrier. For more information about the supported disk drives for the VNXe3200 Dual SP, refer to the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document available online at <https://www.emc.com/vnxesupport>.

Note: Drives used in the 2U, 12 disk drive carrier cannot be used in the 2U, 25 disk drive carrier. They are incompatible.

- On the rear of the 2U DPE, dual SPs (A and B) are supported; each SP consists of:
 - A CPU module with an Intel Xeon Quad Core 2.2-GHz processor with three Double Data Rate Three (DDR3) synchronous dynamic RAM (SDRAM) slots supporting 24 GB (3 x 8 GB) of memory per SP, for a total of 48 GB per DPE

Note: The SDRAM or memory modules reside on the SP printed circuit board (motherboard) within the SP. To replace or upgrade a memory module, you must first remove the SP from the DPE, and then remove the top cover on the SP to gain access to the SP components. The *EMC® VNXe® Replacing a VNXe3200 Memory Module* document provides more information.

This guide is available online at <https://www.emc.com/vnxesupport>. This guide and other related VNXe Series guides can be downloaded from here.

- Three supported personality or I/O modules:
 - a.) Four-port 1Gb/s copper Ethernet I/O personality module supporting 1 Gb/s (labeled **1 GbE e0, e1, e2, and e3**), see “[Four-port 1-Gb/s copper Ethernet personality module](#)” on page 35
 - b.) Four-port 8-Gb/s Fibre Channel (FC) I/O personality module supporting 2/4/8 Gb/s (labeled **2/4Gb, 8Gb e0, e1, e2, and e3**), see “[Four-port 8-Gb/s Fibre Channel personality module](#)” on page 36

Note: The ports are labeled **2/4 Gb** (green LED) **8Gb** (blue LED). When the personality module is running at 2/4 Gb/s, the LED lights green, when it is running at 8 Gb/s, the LED lights blue.
 - c.) Four-port 10-Gb/s Optical Ethernet I/O personality module supporting 10 Gb/s (labeled **10 GbE e0, e1, e2, and e3**), see “[Four-port 10-Gb/s Optical Ethernet personality module](#)” on page 37

Note: Only one supported personality module can be installed at a time. Additionally, both SPs must have the same personality module installed.

- Four integrated 10-GbE iSCSI (host IP connect) Base-T ports (labeled **10GbE 2, 3, 4, and 5**); supporting CIFS, NFS, and iSCSI
- Two integrated four lane 6-Gb/s mini-SAS HD ports (labeled **6Gb SAS 0 and 1 x4**); supported speeds are 1.5, 3, and 6 Gb/s; uses a mini-SAS HD cable
- One 10/100/1000 LAN management (RJ-45) port (labeled with a management icon)
- One 10/100/1000 LAN service (RJ-45) port (used to access the SP console with the IPMItool)

Note: Used for diagnostic and services only, this service port uses SOL (serial on LAN). The customer may be directed to use this port under the guidance of support personnel. A technical note (*EMC® VNXe® IPMI Tool*) is available online at <https://www.emc.com/vnxesupport>.
- One Mini-USB port (Mini-B receptacle)

Note: This port is used to connect a full size USB Flash drive to the either storage processor of the system to assign an IP address to the system. A Mini-USB adaptor/converter (Mini-B plug to Standard A USB receptacle) is provided for using a full size USB Flash drive.
- One HDMI port (not used)
- One debug (NMI) port
- SP LEDs
- One power supply module (with three LEDs labeled with ! for fault, **DC** and **AC**);

Note: The labels on the LEDs are printed upside down.
- Three cooling modules/fans
- ◆ A 2U, 12 (3.5-inch) disk drive DAE or a 2U, 25 (2.5-inch) disk drive DAE is supported
- ◆ Any required cables including LAN cables

- ◆ Mounting rails with hardware
- ◆ Front bezel with VNXe3200 badge

Shipping and storage requirements

NOTICE

Systems and components must not experience changes in temperature and humidity that are likely to cause condensation to form on or in that system or component. Do not exceed the shipping and storage temperature gradient of 45°F/hr (25°C/hr).

Table 2

| Requirement | Description |
|--|--|
| Ambient temperature | |
| Temperature gradient | 45°F/hr (25°C/hr) |
| Relative humidity | 10% to 90% noncondensing |
| Elevation | -50 to 35,000 ft (-16 to 10,600 m) |
| Storage time (unpowered) Recommendation | Do not exceed 6 consecutive months of unpowered storage. |

System component description

This section describes the VNXe3200 Dual SP platform components. Included are illustrations and descriptions of the front and rear connectors and the LED indicators.

Disk processor enclosure

The VNXe3200 Dual SP platform consists of a 2U disk processor enclosure (DPE).

Two types of disk drive DPEs are supported in the VNXe3200 Dual SP platform:

- ◆ A “[2U, 12 \(3.5-inch\) disk drive DPE](#)” on [page 13](#) carrier which includes either 3.5-inch 6-Gb/s SAS, 6-Gb/s NL-SAS, or Flash disk drives (hot-swappable)¹
- ◆ A “[2U, 25 \(2.5-inch\) disk drive DPE](#)” on [page 14](#) carrier which includes either 2.5-inch 6-Gb/s SAS, 6-Gb/s NL-SAS, or Flash disk drives (hot-swappable)¹

Note: Disk drives used in the 2U, 12 disk drive DPE cannot be interchanged with the disk drives from a 2U, 25 disk drive DPE.

IMPORTANT

When calculating the number of drives for your VNXe3200 Dual SP platform, the DPE is included in the total drive slot quantity of from 24 to 150 drives. If the total drive slot quantity exceeds from 24 to 150 drives, you will not be able to add another DAE. The actual count of disk drives can vary depending on what type of DPE and DAE is used in your system. [Table 19](#) on [page 42](#) provides a configuration matrix showing the relationship between the DPE and the supported DAE types for the VNXe3200 Dual SP platform. Use this table as a recommendation for configuring your DAEs with the VNXe3200 Dual SP system.

General

Each VNXe3200 Dual SP DPE consists of the following components:

- ◆ Drive carrier
- ◆ Disk drives
- ◆ Midplane
- ◆ Storage processor (SP)
- ◆ Power supply module
- ◆ Cooling modules/fans
- ◆ EMI shielding

1. You can add or remove a disk drive while the DPE is powered up, but you should exercise special care when removing drives while they are in use. Only one drive should be removed at a time. Drives should not be removed while the RAID is rebuilding.

Drive carrier

Disk drive carriers are plastic assemblies that provide smooth, reliable contact with the enclosure slot guides and midplane connectors. Each carrier has a handle with a latch and spring clips. The latch holds the disk drive in place to ensure proper connection with the midplane. The “2U, 12 (3.5-inch) disk drive DPE” section on [page 13](#) shows an example of the disk drive status LEDs that are integrated into the chassis that the carrier is in. These LEDs primarily show the disk drive readiness as well as activity.

Disk drives

You can visually distinguish between drive types by their different latch and handle mechanisms and by the type, capacity, and speed labels on each drive. You can add or remove a disk drive while the DPE is powered up, but you should exercise special care when removing drives while they are in use. Disk drives are extremely sensitive electronic components.

Note: For more information about the supported disk drives for the VNXe3200 Dual SP, refer to the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document. This guide is available online at <https://www.emc.com/vnxesupport>. On the page that appears, under Series, click **VNXe2 Series**. This guide and other related VNXe Series guides can be downloaded from here.

IMPORTANT

You cannot replace a 3-inch disk drive from a 2U, 12 (3-inch) disk drive DPE or DAE with a 2-inch disk drive from a 2U, 25 (2-inch) disk drive DPE or DAE.

Midplane

A midplane separates the front-facing disk drives from the rear-facing SPs. It distributes power and signals to all components in the enclosure. SPs and disk drives plug directly into the midplane.

Storage processor

The storage processor (SP) is the intelligent component of the disk processor enclosure (DPE). Basically, it acts as the control center. Each SP includes status LEDs, an optional I/O personality module, and LAN ports. Two latches on the SP lock it into place to ensure proper connection. The “Rear view” section on [page 15](#) provides more information about the location and description of the connectors and LEDs.

Power supply module

When viewed from the rear, the power supply module is located on the top, right side of each SP enclosure. This module is an auto-ranging, power-factor-corrected, multi-output, off-line converter with its own line cord. Each power supply module includes status LEDs. A latch on the power supply module locks it into place to ensure proper connection. The “AC power supply module” section on [page 18](#) provides more information about the location and description of the connectors and LEDs.

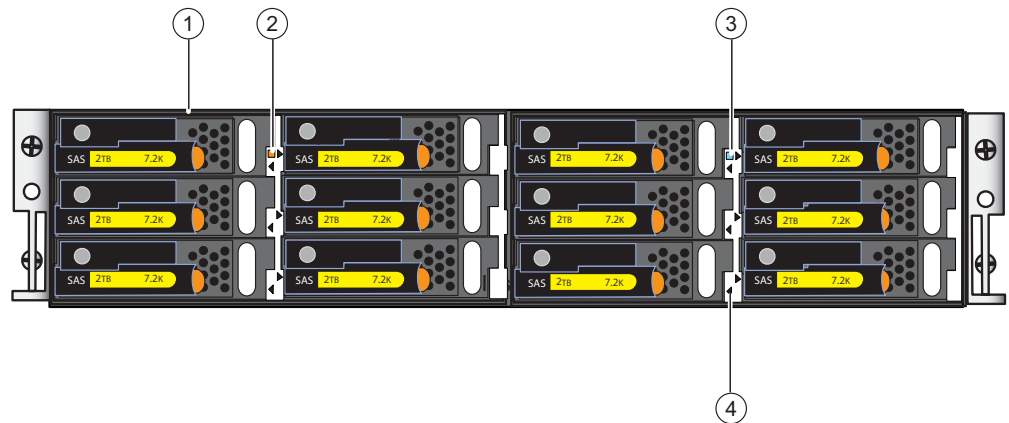
Note: An optional DC power supply is available for the VNXe3200. (The “DC power supply module (optional)” section on [page 19](#) provides more information.)

Cooling modules/fans

When viewed from the rear, each SP has three cooling modules/fans located on the top, left side of the SP. Each cooling module/fan includes a status LED. Latches on the cooling module/fan lock it into place to ensure proper connection. The “Cooling modules/fans” section on [page 16](#) provides more information.

2U, 12 (3.5-inch) disk drive DPE

The following illustration shows the location of the disk drives and the status LEDs in a 2U, 12 (3.5-inch) disk drive DPE.



| | | | |
|---|--------------------------------------|---|--------------------------------------|
| 1 | 3.5-inch SAS disk drive ¹ | 3 | DPE power on LED (blue) |
| 2 | DPE fault LED (amber) | 4 | Disk drive ready/activity LED (blue) |

1. The VNXe3200 Dual SP platform also supports 6-Gb/s NL-SAS or Flash drives. For more information about the disk drives supported in the VNXe3200 Dual SP, refer to the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document available online at: <https://support.emc.com>.

Figure 5 Example of the VNXe3200 Dual SP platform with a 2U, 12 (3.5-inch) disk drive DPE (front view)

The following table describes the VNXe3200 Dual SP platform with 2U, 12 (3.5-inch) disk drive DPE and the disk drive status LEDs.

Table 3 VNXe3200 Dual SP 2U, 12 (3.5-inch) DPE and disk drive LEDs

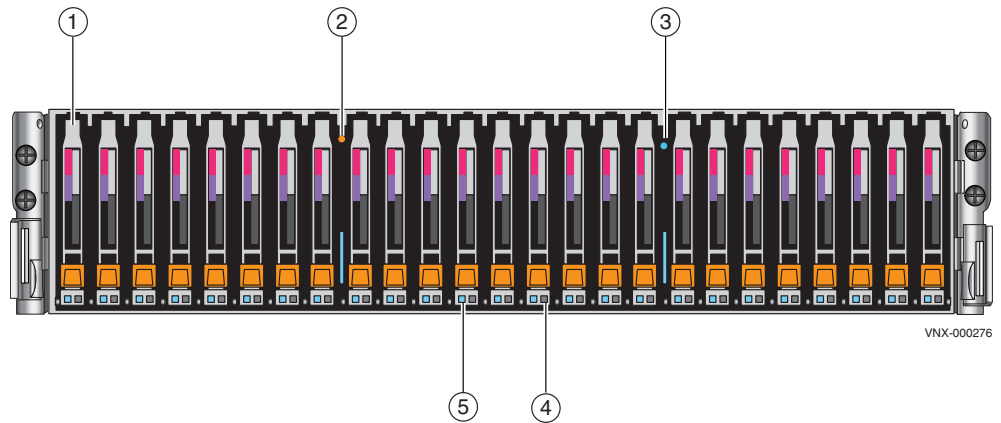
| LED | Color | State | Description |
|----------------------------|-------|-------|---------------------------------|
| DPE fault (see location 2) | Amber | On | DPE fault, including SP faults. |
| | — | Off | Normal |
| DPE power (see location 3) | Blue | On | Powering and powered up |
| | — | Off | Powered down |

Table 3 VNXe3200 Dual SP 2U, 12 (3.5-inch) DPE and disk drive LEDs (continued)

| LED | Color | State | Description |
|---|-------|---------------------------|--|
| Disk drive ready/activity (see location 4) Note: The disk drive LED (a left or right triangle symbol) points to the disk drive that it refers to. | Blue | On | Powering and powered up |
| | | Blinking, mostly on | Disk drive is on with I/O activity |
| | | Blinking at constant rate | Disk drive is spinning up or down normally |
| | | Blinking, mostly off | Disk drive is powered up but not spinning Note: This is a normal part of the spin-up sequence, occurring during the spin-up delay of a slot. |
| — | — | Off | Disk drive is powered down |

2U, 25 (2.5-inch) disk drive DPE

The following illustration shows the location of the disk drives and the status LEDs in a 2U, 25 (2.5-inch) disk drive DPE.



| | | | |
|---|--------------------------------------|---|--------------------------------------|
| 1 | 2.5-inch SAS disk drive ¹ | 4 | Disk drive fault LED (amber) |
| 2 | DPE fault LED (amber) | 5 | Disk drive ready/activity LED (blue) |
| 3 | DPE power status LED (blue) | | |

1. The VNXe3200 Dual SP platform also supports 6-Gb/s NL-SAS or Flash drives. For more information about the disk drives supported in the VNXe3200 Dual SP, refer to the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document available online at: <https://support.emc.com>.

Figure 6 Example of the VNXe3200 Dual SP platform with a 2U, 25 (2.5-inch) disk drive DPE (front view)

The following table describes the VNXe3200 Dual SP platform with 2U, 25 (2.5-inch) disk drive DPE and the disk drive status LEDs.

Table 4 VNXe3200 2U, 25 (2.5-inch) DPE and disk drive LEDs

| LED | Color | State | Description |
|---|-------|----------|---|
| DPE fault (see location 2) | — | Off | No fault has occurred, normal operation |
| | Amber | On | Fault has occurred |
| DPE power (see location 3) | Blue | On | Powering and powered up |
| | — | Off | Powered down |
| Disk drive fault (see location 4) | Amber | On | Fault has occurred |
| | — | Off | No fault has occurred |
| Disk drive on/activity (see location 5) | Blue | On | Powering and powered up |
| | | Blinking | Disk drive activity |



Rear view

On the rear of the 2U DPE, viewing from left to right, each SP (B and A), consists of:

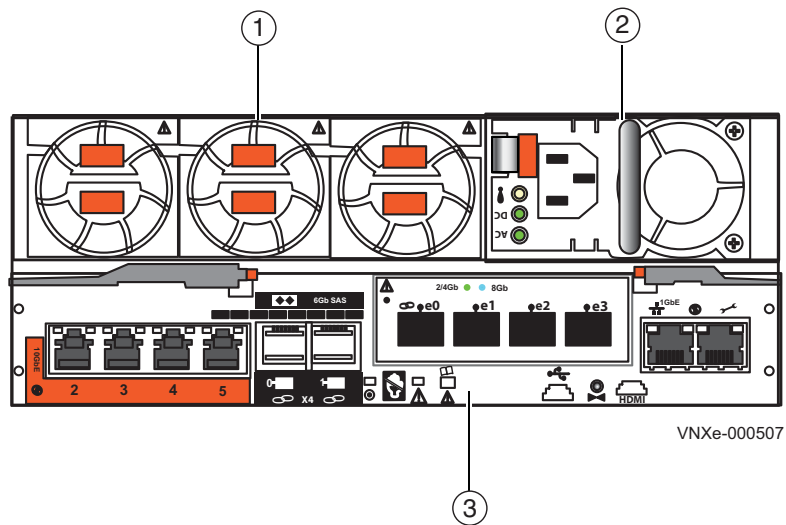
- ◆ Three cooling modules/fans
 - Fault LED
 - Fans
- ◆ AC power supply module (for a closer view, see the “[AC power supply module](#)” section on [page 18](#)):
 - Power in (recessed) connector (plug)
 - Power supply status LEDs (labeled **AC**, **DC**, and **!** for fault)
 - Power supply latch handle
- ◆ Optional DC power supply module (for a closer view, see the “[DC power supply module \(optional\)](#)” section on [page 19](#)):
 - Power in (recessed) connector (plug)
 - Power supply status LEDs (labeled **AC**, **DC**, and **!** for fault)
 - Power supply latch handle
- ◆ SP B and A:
 - Mini-USB
 - Four 10-GbE iSCSI (host IP connect) ports (labeled **10GbE 2, 3, 4, and 5**)
 - Two 6-Gb/s mini-SAS HD ports (labeled **6Gb SAS 0 x4** and **1 x4**)
 - Three supported personality modules:
 - Four-port 1Gb/s Copper Ethernet I/O personality module supporting 1 Gb/s (labeled **1 GbE e0, e1, e2, and e3**)

- Four-port 8-Gb/s Fibre I/O supporting 2/4/8 Gb/s (labeled **2/4Gb**, **8Gb e0**, **e1**, **e2**, and **e3**)
- Four-port 10-Gb/s Optical Ethernet I/O personality module supporting 10 Gb/s (labeled **10 GbE e0**, **e1**, **e2**, and **e3**)

Note: Only one supported personality module can be installed at a time. Additionally, both SPs must have the same personality module installed.

- Two (RJ-45) LAN connectors (labeled with a network management symbol  **1GbE** and a wrench symbol )
- SP status LEDs
- HDMI port (labeled **HDMI**), not used
- Reset switch (NMI)

The following illustration shows the location of the DPE components.



| | |
|--|---|
| <p>1 Cooling modules/fans (3); for a closer view, see Figure 8</p> | <p>3 SP; for a closer view, see Figure 13 on page 21</p> |
| <p>2 Power supply module; for a closer view, see Figure 10 on page 18</p> | |

Figure 7 Example of DPE components (rear view)

Cooling modules/fans

[Figure 8](#) shows the three cooling modules/fans located on the top, left side of each SP enclosure when viewed from the rear. Each cooling module/fan includes a fault LED. An orange latch release on each cooling module/fan locks it into place to ensure proper connection.

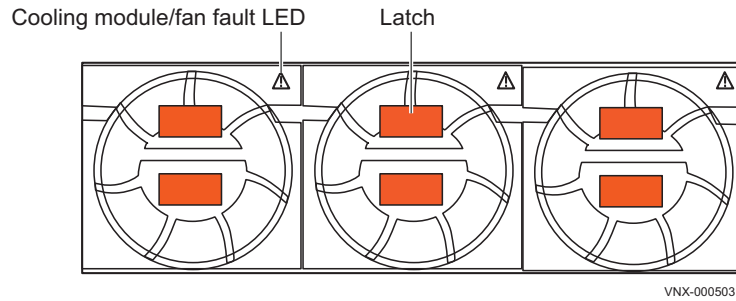


Figure 8 Cooling module/fan fault LED and latch release

The following table describes the cooling module/fan fault LED.

Table 5 Cooling module/fan fault LED

| Led | Color | State | Description |
|-------|-------|-------|----------------------------------|
| Fault | Amber | On | Fault, not operating properly |
| | — | Off | No fault, fan operating normally |

Replacing a cooling module/fan

To replace a cooling fan/module:

1. Pinch the two orange tabs on the sides of the cooling module/fan together to release it from the chassis (see location 1 in [Figure 9](#)).
2. Pull the cooling module/fan out of the chassis (see location 2 in [Figure 9](#)) and place it on a clean static-free work surface.

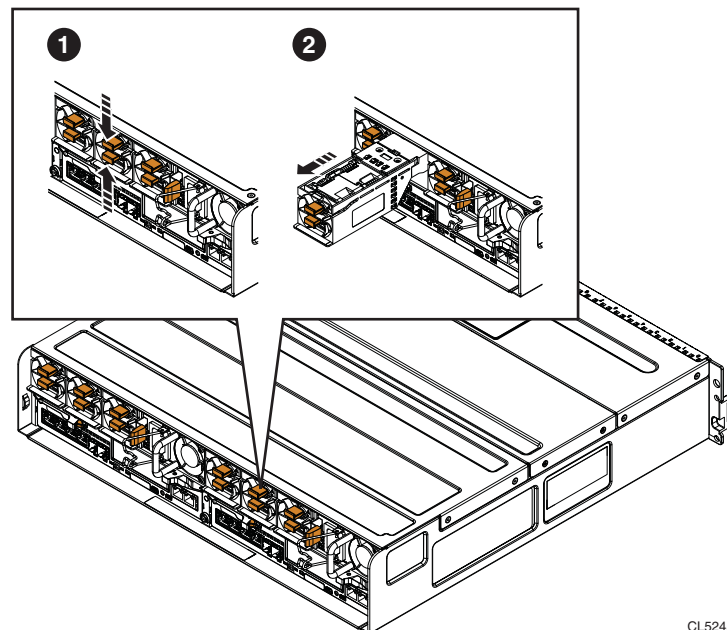


Figure 9 Replacing a cooling module/fan

Note: For more information about replacing a cooling module/fan in the VNXe3200 Dual SP, refer to the *EMC® VNXe® Replacing a DPE Fan Module in a VNXe3200* document. This guide is available online at <https://www.emc.com/vnxesupport>. This guide and other related VNXe Series guides can be downloaded from here.

Power supply modules

The VNXe3200 SP supports two types of power supplies, AC and DC. Both power supply modules look identical. The only difference is the part number. The part number label is located on the underside of the module. To determine what the part number is, go to the “Replacing a power supply” section on page 19. It describes how to replace a module.

AC power supply module

Figure 10 shows the SP power supply module located on the top, right side of each SP enclosure when viewed from the rear. Each power supply includes three status LEDs (labeled AC, DC, and ! for fault). A latch locks it into place to ensure proper connection.

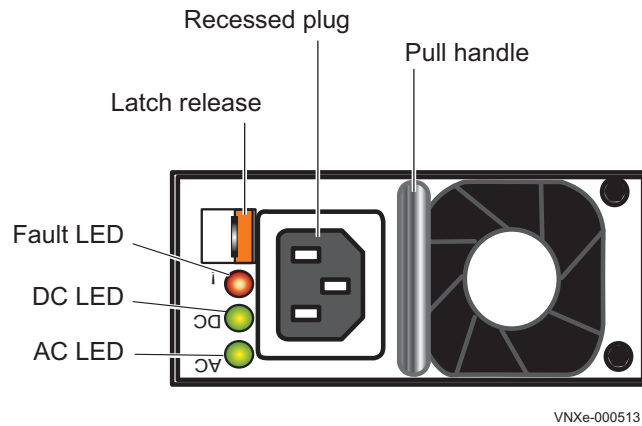


Figure 10 AC/DC power supply module power connector, status LEDs, and pull handle

Note: The labels on the AC/DC power supply are printed upside down.

The following table describes the power supply (fault and power on) LEDs.

Table 6 Power supply module (fault and power on) LEDs

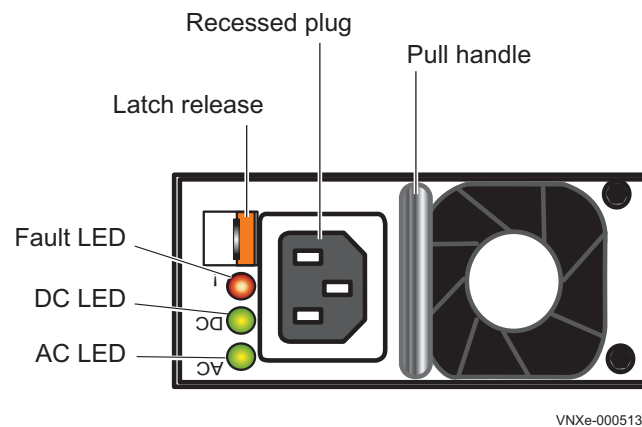
| Led | Color | State | Description |
|---|-------|----------|--|
| Fault (labeled with an exclamation point !) | Amber | On | Power supply or backup fault, check cable connection |
| | | Blinking | BIOS, POST and OS booting up or system overheating |
| | — | Off | No fault or power off |

Table 6 Power supply module (fault and power on) LEDs (continued)

| Led | Color | State | Description |
|------------------------------|-------|-------|-----------------------------------|
| DC power output (labeled DC) | Green | On | DC Power on |
| | — | Off | DC Power off, verify source power |
| AC power input (labeled AC) | Green | On | AC Power on |
| | — | Off | AC Power off, verify source power |

DC power supply module (optional)

As mentioned earlier, both the AC and DC power supplies look identical (Figure 11). Like the AC power supply, the DC power supply includes three status LEDs (labeled AC, DC, and ! for fault). Like the AC power supply, the DC power supply has a separate latch handle located on the top, left portion of the module.

**Figure 11** AC/DC power supply module power connector, status LEDs, and pull handle

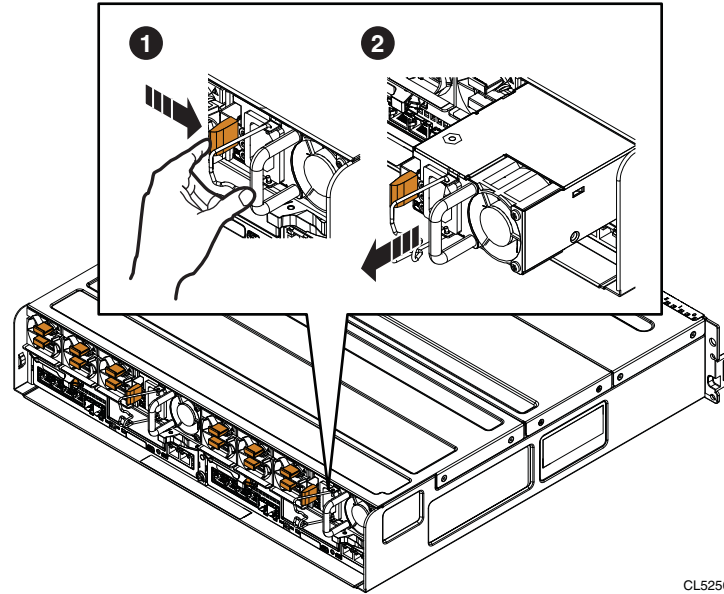
Note: The labels on the AC/DC power supply are printed upside down.

For more information about the DC power supply used in the VNXe3200 Dual SP platform, refer to the *DC-Powered VNXe® Series Enclosures Installation and Operation Guide* (“[Related documentation](#)” on page 4).

Replacing a power supply

To replace a power supply:

1. Identify the faulted power supply by its amber fault LED (Figure 10 on page 18)
2. Disconnect the AC power cord from the power supply.
3. While grasping the power supply's handle, push the supply's orange release tab to the right (see location 1 in Figure 12 on page 20).
4. Pull the power supply out from the enclosure (see location 2 in Figure 12 on page 20) and place it on a clean, static-free surface.



CL5250

Figure 12 Replacing a power supply

Note: For more information about replacing a power supply in the VNxe3200 Dual SP, refer to the *EMC® VNxe® Replacing a DPE Power Supply in a VNxe3200* document. This guide is available online at <https://www.emc.com/vnxesupport>. This guide and other related VNxe Series guides can be downloaded from here.

Storage processor (SP)

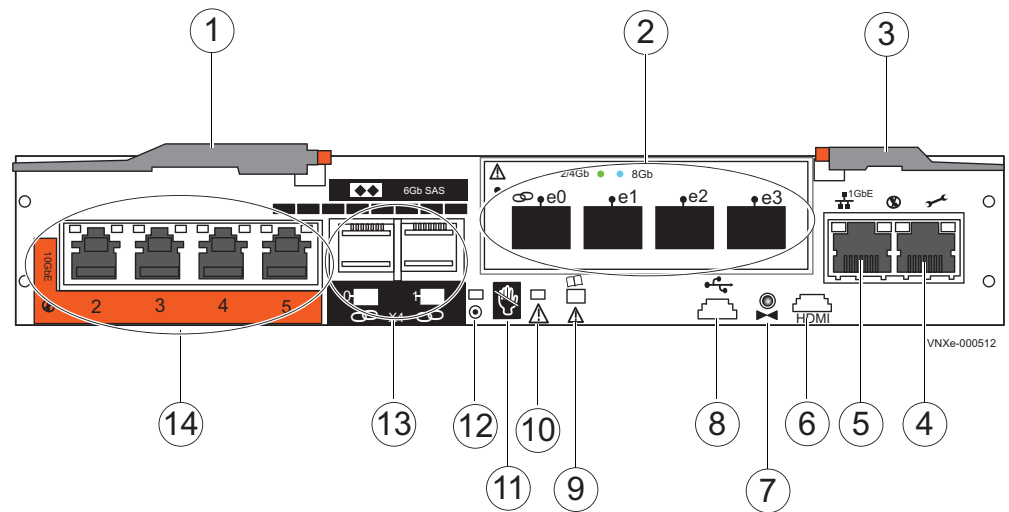
Storage processors are configured in pairs for maximum availability and are Field Replaceable Units (FRUs). SPs in the VNxe3200 Dual SP provide both front-end connectivity to the hosts and back-end connectivity to the physical disks. Each storage processor has an Intel Xeon Quad Core 2.2-GHz processor with three Double Data Rate Three (DDR3) synchronous dynamic RAM (SDRAM) slots supporting 24 GB of memory.

NOTICE

DO NOT REMOVE an SP assembly while the “Unsafe to remove SP” LED shown below is lit



[Figure 13 on page 21](#) shows an example of the front panel of the storage processor.



| | | | |
|---|---|----|--|
| 1 | SP release lever (left side) | 8 | Mini-USB connector ¹ (Mini-B receptacle); for more information, see “Mini-USB port (Mini-B receptacle)” on page 31 |
| 2 | Example of an optional four-port 8-Gb/s Fibre Channel I/O personality module (labeled e0 , e1 , e2 , and e3 with two LED labels, one green for 2/4Gb and the other blue for 8Gb) | 9 | SP status/fault LED (amber/blue); for more information, see Table 7 on page 22 |
| 3 | SP release lever (right side) | 10 | CRU fault LED (amber); for more information, see Table 7 on page 22 |
| 4 | Service LAN (RJ-45) port ² (labeled with a wrench symbol); uses SOL (serial over LAN); for a closer view, see “Network management and service laptop Ethernet (RJ-45) ports” on page 29 | 11 | SP unsafe to remove LED (black with white hand); for more information, see Table 7 on page 22 |
| 5 | Management LAN (RJ-45) port (labeled with a network management symbol and 1GbE); “Network management and service laptop Ethernet (RJ-45) ports” on page 29 | 12 | SP power LED (green); for more information, see Table 7 on page 22 |
| 6 | HDMI connector (labeled HDMI) | 13 | Two 6-Gb/s mini-SAS HD ports (labeled 6Gb SAS 0 x4 and 1 x4); for a closer view, see “6-Gb/s mini-SAS HD ports” on page 31 |
| 7 | NMI ³ (password reset) push button | 14 | Four 10-Gb/s iSCSI ports (labeled 10 GBE 2, 3, 4, and 5); for a closer view, see “Four 10-Gb/s iSCSI host IP connect ports” on page 40 |

1. A Mini-USB adaptor/converter (Mini-B plug to Standard A receptacle) is provided if you are using a full-sized USB Flash drive.
2. The Serial over LAN (SOL) port can be accessed using the VNXe IPMI tool. The user guide “EMC® VNXe® IPMItool User Guide” is available online at: <https://support.emc.com>.
3. NMI = non-maskable interrupt, push button used for password reset and forcing a system dump. Hold for 2 seconds to reset the password. Hold for 10 seconds or more forces a reboot.

Figure 13 Example of the front panel of the SP

The following table describes the SP status LEDs. The locations in the table are shown in [Figure 13 on page 21](#).

Table 7 SP LEDs

| LED | Color | State | Description |
|----------------------------------|-----------------|-------------------------------------|---|
| Status/fault (see location 9) | Amber | Blinks once every four seconds | BIOS running |
| | | Blinks once every second | POST running |
| | | Blinks four times a second | Operating system boot started |
| | | On | Fault is detected. |
| | — | Off | Normal, no fault detected |
| | Blue | Blinks once every four seconds | Operating system booted |
| | | Blinks once every second | Operating system driver starting |
| | | Blinks four times a second | 1. Operating system driver started 2. Fault, a system error has occurred, causing some storage resources to become unavailable. The SP is not operating and the status LED is blinking. For example, MCC has at least one private LUN lost. SP reboots after marking the LED. |
| | | On | System not initialized. A management IP address (static or dynamic) is assigned. Note: Once license is accepted, the SP Fault LED turns off. Degrade Mode |
| | — | Off | Ready for I/O |
| | Blue and amber | Alternating at one second intervals | Service mode |
| | Blue with amber | Blinking once every three seconds | System not initialized. No management IP address (static or dynamic) is assigned. Once management IP address is assigned, the Led should restore to original state and color. |
| CRU fault (see location 10) | Amber | On | Fault, lights amber when an internal CRU is faulted. For example, bad DIMM or bad mSATA. |
| | — | Off | No fault or power off |

Table 7 SP LEDs (continued)

| LED | Color | State | Description |
|---------------------------------------|-------|---------------------|---|
| Unsafe to remove (see location 11) | White | On | <i>Do not</i> remove SP, data could be lost during time periods like flashing BIOS/POST firmware, updating resume PROMs or dumping the cache data to the Vault. |
| | — | Off | Safe to remove SP without the risk of data loss. |
| Power (see location 12) | Green | On | Power on |
| | | Blink once a second | The SP is initializing a serial over LAN (SOL) session (standby) |
| | — | Off | Power off, verify connection |

Included within the SP, are the following FRU components:

- ◆ “[SDRAM or memory modules](#)” on this page
- ◆ “[Battery backup unit \(BBU\)](#)” on page 25
- ◆ “[mSATA SSD interface](#)” on page 25
- ◆ “[Personality modules](#)” on page 27

NOTICE

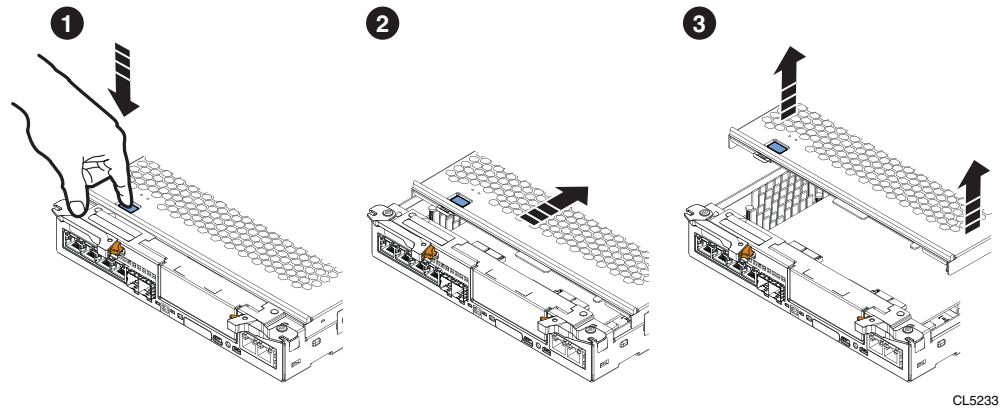
To protect the VNXe3200 Dual SP from accidental data loss while you replace a part in an SP, you must prepare the SP for service by putting it in the Service mode before you replace the part. Do **NOT** put both SPs in the Service mode at the same time.

SDRAM or memory modules

The SDRAM slots support 24 GB (3 x 8 GB) of memory (for a total of 48 GB per DPE). The SDRAM or memory modules ([Figure 15 on page 24](#)) reside on the rear section of the SP printed circuit board (motherboard) within the SP. To replace or upgrade a memory module, you must first prepare the SP for service, disconnect the network and all other cables from the back of the SP, label the cables with the port numbers from which you removed them, remove the SP from the DPE, and then remove the top cover on the SP ([Figure 14 on page 24](#)) to gain access to the memory modules.

To take off the SP cover:

1. Press the blue button on the cover (see location 1 in [Figure 14 on page 24](#)).
2. Push the cover straight back 1/4 inch (see location 2 in [Figure 14 on page 24](#)).
3. Lift the cover up (see location 3 in [Figure 14 on page 24](#)).



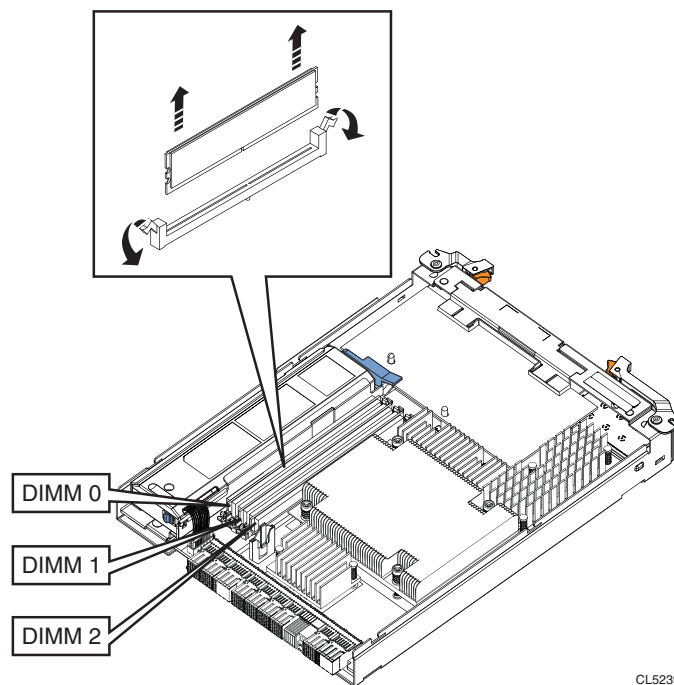
CL5233

Figure 14 Example of removing top cover from SP

Note: For more information about replacing a SPE memory module in the VNXe3200 Dual SP, refer to the *EMC® VNXe® Replacing a DPE memory module in a VNXe3200* document. This guide is available online at <https://www.emc.com/vnxesupport>. This guide and other related VNXe Series guides can be downloaded from here.

To remove SDRAM or memory modules (Figure 15):

1. Locate the SDRAM (DIMM) slots.
2. Open the ejector tabs on the DIMM slot by pushing them out to the sides.
3. Holding the DIMM by the edges, lift it straight up out of the slot, and place it on an antistatic surface.



CL5239

Figure 15 Example of memory module (DIMM) location in a VNXe3200 Dual SP

Battery backup unit (BBU)

The SP includes a 3-cell Lithium-ion (Li-ion) internal battery or BBU that powers the associated SP module and fans during a power event.

Like the SDRAM slots, the BBU (Figure 16) also resides on the rear section of the SP. To replace or upgrade a BBU, you must first prepare the SP for service, disconnect the network and all other cables from the back of the SP assembly, label the cables with the port numbers from which you removed them, remove the SP from the DPE, and then remove the top cover (Figure 14 on page 24) on the SP to gain access to the BBU.

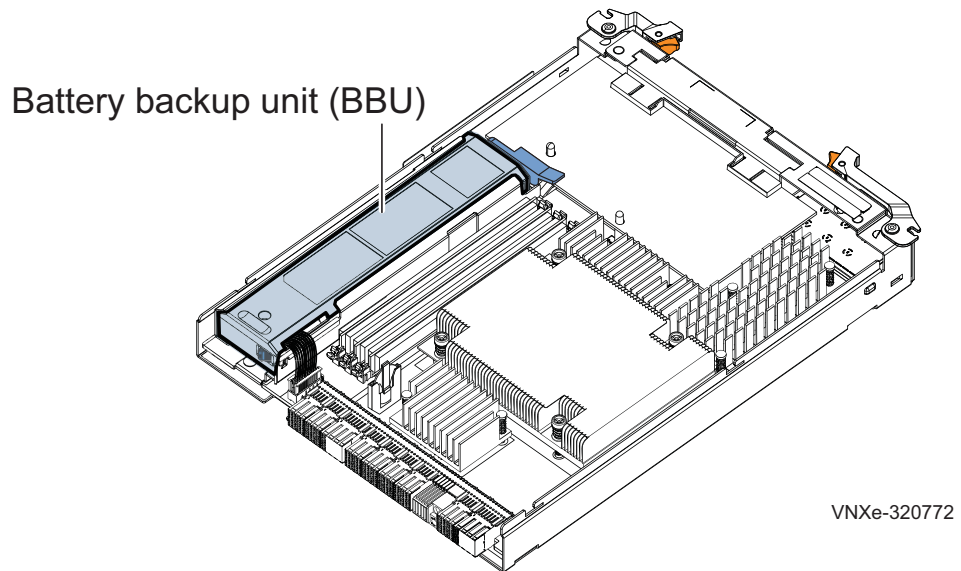


Figure 16 Example of a battery backup unit (BBU) in a VNXe3200 Dual SP

Note: The EMC® VNXe® *Replacing a DPE Battery Backup Unit (BBU) in a VNXe3200* document provides more information. This guide is available online at <https://www.emc.com/vnxesupport>. Select the *EMC® VNXe® Replacing a DPE Battery Backup Unit (BBU) in a VNXe3200* document from this list. This guide and other related VNXe Series guides can be downloaded from here.

mSATA SSD interface

Each SP in a VNXe3200 Dual SP has an mSATA SSD interface. Located under a plastic cover on the bottom of the SP assembly (Figure 17 on page 26), the mSATA SSD interface uses a 32GB Flash module. This Flash module is the system boot device.

The mSATA Flash device resides on the bottom of the SP. To replace or upgrade an mSATA Flash module, you must first prepare the SP for service, disconnect the network and all other cables from the back of the SP assembly, label the cables with the port numbers from which you removed them, remove the SP from the DPE, turn the SP assembly over so that the bottom faces up, and then remove the cover on the bottom of the SP to gain access to the mSATA SSD.

To remove the mSATA SSD cover (Figure 17):

1. Turn the SP assembly over so that the bottom side faces up.
2. Push the latch in on the plastic cover to expose the mSATA SSD.

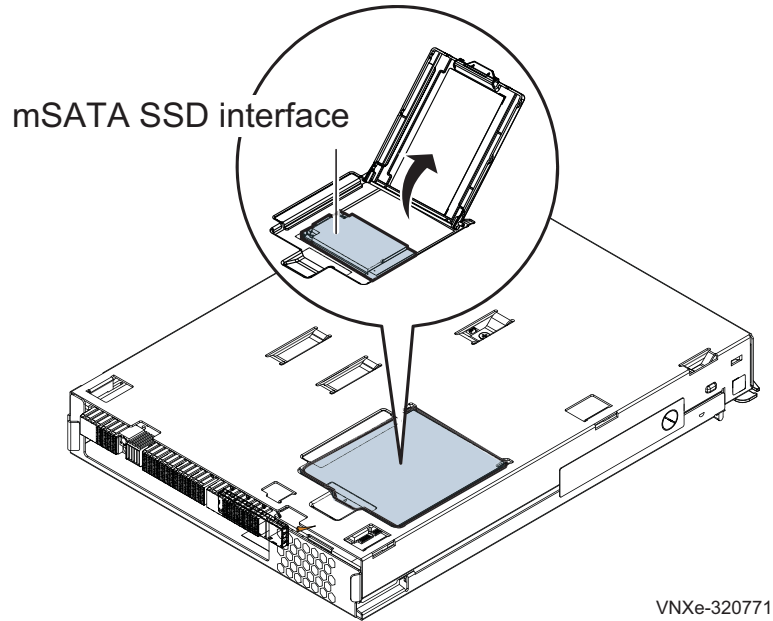
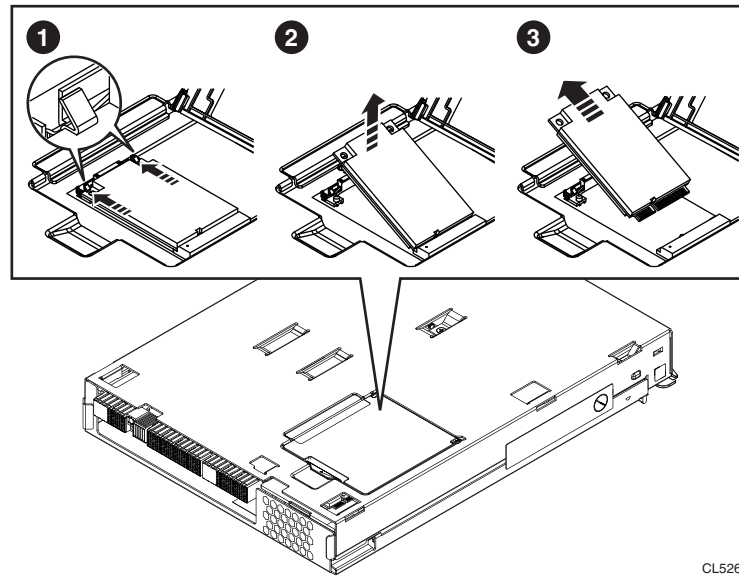


Figure 17 Example of the mSATA SSD location in the SP

Note: The EMC® VNXe® *Replacing a DPE mSATA Solid State Disk (mSATA SSD) in a VNXe3200* document provides more information. This guide is available online at <https://www.emc.com/vnxesupport>. Select the EMC® VNXe® *Replacing a DPE mSATA Solid State Disk (mSATA SSD) in a VNXe3200* document from this list. This guide and other related VNXe Series guides can be downloaded from here.

Removing the mSATA SSD from the SP:

1. Press back on the tab on each wire clip to release the mSATA SSD (see location 1 in Figure 18 on page 27).
2. Gently pull the mSATA SSD from the connector (see location 3 in Figure 18 on page 27).
3. Remove the mSATA SSD from the SP assembly (see location 3 in Figure 18 on page 27), place it on a static-free surface.



CL5265

Figure 18 Example of removing the mSATA SSD from the SP

Personality modules

Three personality modules are supported in the VNXe3200 Dual SP. These personality modules are:

- ◆ The four-port 1 Gb/s Copper Ethernet personality or I/O module supports 1 Gb/s (labeled 1 GbE e0, e1, e2, and e3). For more information, see “[Four-port 1-Gb/s copper Ethernet personality module](#)” on page 35.
- ◆ The four-port 8-Gb/s Fibre Channel personality or I/O module supports 2/4/8 Gb/s (labeled e0, e1, e2, and e3 with two LED labels, one green for 2/4Gb and the other blue for 8Gb). For more information, see “[Four-port 8-Gb/s Fibre Channel personality module](#)” on page 36.
- ◆ Four-port 10-Gb/s Optical Ethernet I/O personality module supports 10 Gb/s (labeled 10 GbE e0, e1, e2, and e3). For more information, see “[Four-port 10-Gb/s Optical Ethernet personality module](#)” on page 37.

The personality module ([Figure 19 on page 28](#)) resides on the front of the SP. To replace or upgrade a personality module, you must first prepare the SP for service, disconnect the network and all other cables from the back of the SP assembly, label the cables with the port numbers from which you removed them, remove the SP from the DPE, and then remove the top cover on the SP ([Figure 14 on page 24](#)) to gain access to the personality module.

Note: The *EMC® VNXe® Replacing an Input/Output Module in a DPE in a VNXe3200* document provides more information. This guide is available online at <https://www.emc.com/vnxesupport>. Select the *EMC® VNXe® Replacing an Input/Output Module in a DPE in a VNXe3200* document from this list. This guide and other related VNXe Series guides can be downloaded from here.

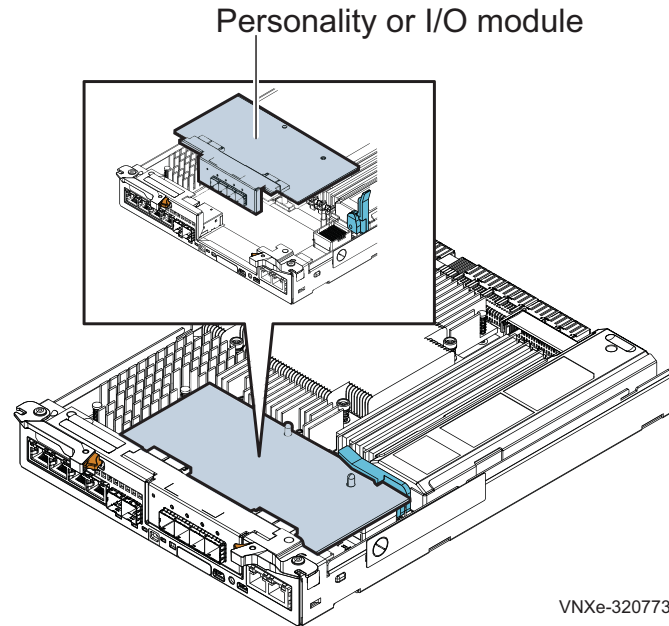




Figure 19 Example of a personality or I/O module in the SP

SP Input/output ports and connectors

The VNXe3200 Dual SP supports the following I/O ports on the rear:

- ◆ One Ethernet (RJ-45) 10/100/1000 LAN, network management port (labeled  **1GbE**)
- ◆ One Ethernet (RJ-45) 10/100/1000 LAN, service laptop port (labeled )

Note: The RJ-45 connector for the service port uses SOL (serial on LAN). This port is used for diagnostic and services only. The customer may be directed to use this port under the guidance of support personnel. A technical note (*EMC® VNXe® IPMI Tool*) is available at: <https://support.emc.com>.

- ◆ One HDMI port (not used)
- ◆ One USB port

Note: This port is used to connect a Flash drive to the either storage processor of the system to assign an IP address to the system. A mini-USB adaptor/converter is provided if you are using a full-sized USB Flash drive.

- ◆ One optional four-port 8-Gb/s Fibre Channel I/O personality module (labeled **2/4Gb** and **8Gb e0, e1, e2, and e3**)
- ◆ Two 6-Gb/s mini-SAS HD ports (labeled **6Gb SAS 0 x4** and **1 x4**); supported speeds are 1.5, 3, and 6 Gb/s; uses mini-SAS HD cable
- ◆ Four integrated 10-Gb/s iSCSI Lan ports, for front-end connectivity (labeled **10GbE 2, 3, 4, and 5**)

Network management and service laptop Ethernet (RJ-45) ports

The VNXe3200 platform SP comes with two integrated dual-port Ethernet ports (labeled with a network management symbol and a wrench symbol, respectively). These ports provide an interface for connecting to the public LAN and a service laptop computer, respectively. The ports are 8-pin MDI RJ-45 type ports for either IEEE 802.3 10Base-T (10 Mb/s), IEEE 802.3u 100Base-TX (100 Mb/s), or 1000Base-T (1000 Mb/s) Ethernet connections.

IMPORTANT

The ports shown in [Figure 20 on page 29](#) are LAN ports. A symbol depicting a telephone handset with a line through it indicates that you should not connect WAN type RJ-45 telephone connectors to these ports.

WARNING

The SP Ethernet (RJ-45) ports are LAN ports not WAN ports. LAN ports contain safety extra-low voltage (SELV) circuits, and WAN ports contain telephone-network voltage (TNV) circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. To avoid electric shock, do not connect TNV circuits to SELV circuits.

The following illustration shows an example of the SP network management and service laptop Ethernet (RJ-45) ports.

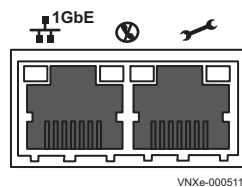


Figure 20 Network management and service laptop Ethernet (RJ-45) ports

To access the Ethernet ports, connect a Category 3, 4, 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the SP, as described in the following table.

Table 8 Ethernet cabling guidelines

| Type | Description |
|------------|---|
| 10Base-T | EIA Categories 3, 4, or 5 UTP (2 or 4 pairs) up to 328 ft (100 m) |
| 100Base-TX | EIA Category 5 UTP (2 pairs) up to 328 ft (100 m) |
| 1000Base-T | EIA Category 6 (recommended) |

Network management and service laptop Ethernet (RJ-45) port and connector (adapter)

The following illustration shows an example of the Ethernet (RJ-45) cable connector and port.

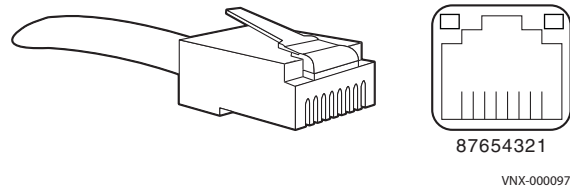


Figure 21 Network management and service laptop Ethernet (RJ-45) connector (adapter) and port

The following table lists the SP network management and service laptop Ethernet (RJ-45) pin signals used on the connector.

Table 9 Network management and service laptop Ethernet port and connector pinout

| RJ-45 pin | Signal | Description |
|-----------|--------|-------------------------|
| 1 | BI_DA+ | Bi-directional pair A + |
| 2 | BI_DA- | Bi-directional pair A - |
| 3 | BI_DB+ | Bi-directional pair B + |
| 4 | BI_DC+ | Bi-directional pair C + |
| 5 | BI_DC- | Bi-directional pair C - |
| 6 | BI_DB- | Bi-directional pair B - |
| 7 | BI_DD+ | Bi-directional pair D + |
| 8 | BI_DD- | Bi-directional pair D - |

Network management and service laptop Ethernet (RJ-45) port LEDs — The following illustration shows the SP network management and service laptop Ethernet (RJ-45) port LEDs—a green LED to the left of the connector and a bi-color (green/amber) LED to the right of the connector—that indicate the link/activity and speed of the Ethernet ports, respectively.

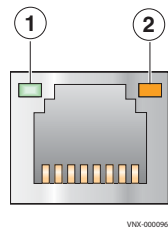


Figure 22 Network management and service laptop Ethernet (RJ-45) port LEDs

The following table describes the link/activity and connection speed associated with the SP network management and service laptop Ethernet (RJ-45) port LEDs.

Table 10 Network management and service laptop Ethernet (RJ-45) port LEDs

| LED | Color | State | Description |
|--|-------|----------|--|
| Left, link (see location 1) | Green | On | Network/link connection |
| | Green | Blinking | Transmit/receive activity |
| | — | Off | No network/link connection |
| Right, link speed (see location 2) | Green | On | 100-Mb/s connection |
| | Amber | On | 1000-Mb/s (or 1-Gb/s) connection |
| | — | Off | 10-Mb/s connection (if left LED is on or blinking) |

HDMI port — Not used at this time.

Mini-USB port (Mini-B receptacle) — In conjunction with the Connection Utility, you can connect a USB Flash drive (thumb drive) to either storage processor using the Mini-USB adapter/converter (provided), as shown in [Figure 24](#). You use the connected USB Flash drive to assign an IP address to the system. [Figure 23](#) shows an example of the Mini-USB port (Mini-B receptacle) on the SP.

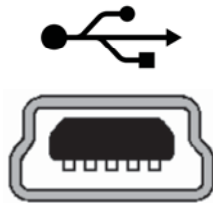


Figure 23 Mini-USB port (Mini-B receptacle)

The following illustration shows an example of the Mini-USB adaptor/converter (Mini-B plug on one side and a Standard A receptacle on the other side) provided with the VNxe3200 Dual SP system to be used with a full-size USB Flash drive.

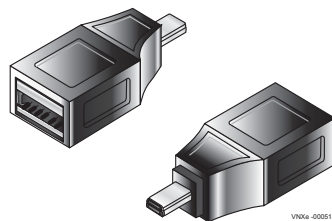
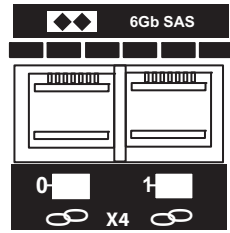


Figure 24 Mini-USB adapter (Mini-B plug to Standard A receptacle)

6-Gb/s mini-SAS HD ports

The VNxe3200 Dual SP supports two 6-Gb/s mini-SAS HD ports (labeled **6GB SAS 0 x4** and **6GB SAS 1 x4**) on the rear of each SP (A and B). These ports ([Figure 25 on page 32](#)) provide an interface for SAS and NL-SAS drives on the DAE. This port is a 36-pin mini-SAS HD small form-factor 8644 (SFF-8644) specification connector (socket or receptacle) using an SFF-8644 specification mini-SAS HD cable (plug) with a pull tab.

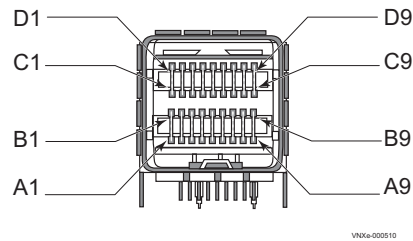


VNX-000501

Figure 25 6-Gb/s mini-SAS HD ports

Note: The first DAE connection comes from these 6-Gb/s mini-SAS HD ports. This connection uses a 36-pin mini-SAS HD small form-factor 8644 (SFF-8644) specification connector (plug) with a pull tab on one end of the cable (Figure 27 on page 34) to a 26-pin mini-SAS small form-factor 8088 (SFF-8088) specification connector (plug) with a pull tab on the other end cable.

The following illustration shows an example of the 6-Gb/s mini-SAS HD connector (socket) and pinout.



VNXe-000510

Figure 26 6-Gb/s mini-SAS HD port connector (socket) and pinout

The following two tables list the 6-Gb/s mini-SAS HD port pin signals used on the connector and define the connection requirements of the signal.

Table 11 6-Gb/s mini-SAS HD port connector pinout

| Pin | Signal | Pin | Signal |
|-----|-----------------------|-----|------------------|
| A1 | Reserved ¹ | C1 | SCL ¹ |
| A2 | Int1 ¹ | C2 | SDA ¹ |
| A3 | Signal GND | C3 | Signal GND |
| A4 | Rx 1- | C4 | Tx 1+ |
| A5 | Rx 1+ | C5 | Tx 1- |
| A6 | Signal GND | C6 | Signal GND |
| A7 | Rx 3+ | C7 | Tx 3+ |
| A8 | Rx 3- | C8 | Tx 3- |
| A9 | Signal GND | C9 | Signal GND |

Table 11 6-Gb/s mini-SAS HD port connector pinout (continued)

| Pin | Signal | Pin | Signal |
|-----|----------------------|-----|-------------------|
| B1 | Vact ¹ | D1 | Vact ¹ |
| B2 | ModPrsL ¹ | D2 | Vman ¹ |
| B3 | Signal GND | D3 | Signal GND |
| B4 | Rx 0+ | D4 | Tx 0+ |
| B5 | RX 0- | D5 | Tx 0- |
| B6 | Signal GND | D6 | Signal GND |
| B7 | Rx 2+ | D7 | Tx 2+ |
| B8 | Rx 2- | D8 | Tx 2- |
| B9 | Signal GND | D9 | Signal GND |

1. [Table 12](#) defines the connection requirements of this signal.

Table 12 Management Interface connection requirements

| Signal | Connection requirements |
|----------|---|
| Intl | Active Low Module Interrupt: The cable assembly asserts this pin to indicate an interrupt bit has been set to one in the management interface memory map. This pin is connected to Vman on the receptacle side of the management interface. The source of the interrupt may be identified using the 2-wire serial management interface. If a cable assembly does not support interrupts, then all interrupt bits in the cable management interface memory map are set to zero and the cable assembly negates this pin (e.g., all interrupt bits of a passive cable assembly may be programmed to a clear state and the IntL pin not connected on the cable plug side of the management interface). |
| ModPrsL | Active Low Module Present: On the cable plug side of the management interface, ModPrsL is connected directly to the signal ground pins specified in Table 11 . ModPrsL is connected to Vman on the receptacle side of the management interface to negate this signal when the plug is not fully mated to the receptacle. |
| Reserved | This pin is not connected on the receptacle side and cable plug side of the management interface. |
| SCL | Two-wire interface clock: The receptacle side of the management interface connects this signal to Vman. |
| SDA | Two-wire interface data: The receptacle side of the management interface connects this signal to Vman. |
| Vact | Active cable power: If the receptacle side of the management interface supports active cable assemblies, then it provides all non-management interface power to the cable assembly on the Vact pins. To support equal loading, both Vact pins are connected together on the receptacle side of the management interface. If the receptacle side of the management interface does not support active cable assemblies, then the Vact pins is not connected. |
| Vman | Management interface power: The receptacle side of the management interface provides power on the Vman pin to enable the management interface circuitry of the cable. Power may be removed to reset the management circuitry in the cable assembly. |

The following illustration shows an example of a mini-SAS HD cable connector (plug) with pull tab and pinout.

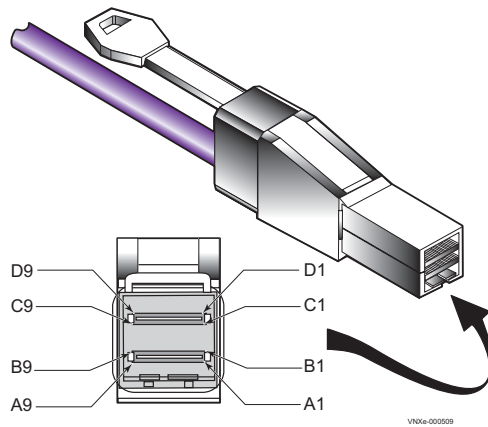
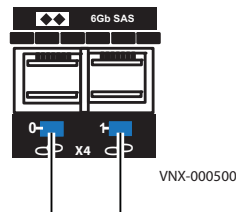


Figure 27 6-Gb/s mini-SAS HD cable connector (plug) and pinout

SP 6-Gb/s mini-SAS HD port LEDs — The following illustration shows an example of the SP 6-Gb/s mini-SAS HD port (labeled **6-Gb SAS 0 x4** and **1 x4**) LEDs (blue) below the bottom connector. These LEDs indicate the link/activity of the 0 x4 and 1 x4 6-Gb/s mini-SAS HD ports.



6Gb SAS port LEDs

Figure 28 6-Gb/s mini-SAS HD port LEDs

Note: Just above the 6-Gb/s mini-SAS HD ports are two black diamonds, ◆◆ to indicate the connection direction (out) to prevent incorrect cabling.

The following table describes the 6-Gb/s mini-SAS HD port LEDs.

Table 13 6-Gb/s mini-SAS HD port LEDs

| LED | Color | State | Description |
|---------------|------------|--------------------------|--|
| Link/activity | Blue | On | Port linked at 6 Gb/s with all four lanes |
| | Green | On | Port linked but at 1.5 Gb/s, 3 Gb/s, or 6 Gb/s with less than four lanes |
| | Blue/green | blinks once every second | SAS port failure |
| | — | Off | No link activity |

Personality modules

Three personality modules are supported in the VNXe3200 platform:

- ◆ “Four-port 1-Gb/s copper Ethernet personality module” on this page
- ◆ “Four-port 8-Gb/s Fibre Channel personality module” on page 36
- ◆ “Four-port 10-Gb/s Optical Ethernet personality module” on page 37

Four-port 1-Gb/s copper Ethernet personality module

The following illustration shows an example of the VNXe3200 platform SP four-port 1-Gb/s copper Ethernet (RJ-45) personality module. The ports are labeled **1 GbE e0**, **e1**, **e2**, and **e3** and are used for front-end connectivity. These ports support speeds of 10-, 100-, and 1000-Mb/s Ethernet transmission rates over copper wiring.

⚠ WARNING

The four-port 1-Gb/s copper Ethernet (RJ-45) ports on the four-port 1-Gb/s copper Ethernet I/O personality module are LAN ports not WAN ports. LAN ports contain safety extra-low voltage (SELV) circuits, and WAN ports contain telephone-network voltage (TNV) circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. To avoid electric shock, do not connect TNV circuits to SELV circuits.

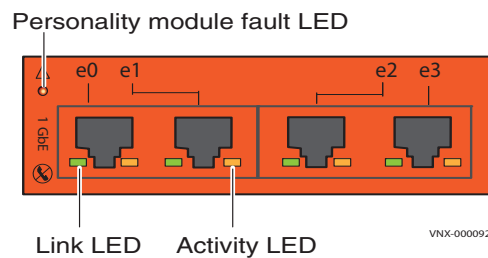


Figure 29 1-Gb/s copper Ethernet personality module (RJ-45) port LEDs

[Table 14](#) describes the SP 1-Gb/s copper Ethernet personality module (RJ-45) fault and port LEDs.

Table 14 1-Gb/s copper Ethernet personality module (RJ-45) fault and port LEDs

| LED | Color | State | Description |
|-----------------|-------|----------|-------------------------------------|
| Fault | Amber | On | Fault, replace personality module |
| Link, left | Green | On | Network/link connection (any speed) |
| | — | Off | No network/link connection |
| Activity, right | Amber | Blinking | Transmit/receive activity |
| | — | Off | No activity |

IMPORTANT

The ports shown in [Figure 29 on page 35](#) are LAN ports. A symbol depicting a telephone handset with a line through it indicates that you should not connect WAN type RJ-45 telephone connectors to these ports.

To access the Ethernet ports, connect a Category 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the SP 1-Gb/s copper Ethernet personality module, as described in [Table 15 on page 36](#).

Table 15 Ethernet cabling guidelines

| Type | Description |
|------------------------|---|
| 10Base-T or 100Base-TX | EIA Categories 5 UTP (2 pairs) up to 328 ft (100 m) |
| 1000Base-T | EIA Category 6 (recommended) |

Four-port 8-Gb/s Fibre Channel personality module

The optional four-port 8-Gb/s Fibre Channel (FC) personality module is supported in the VNXe3200 Dual SP platform.

The following illustration shows an example of the VNXe3200 platform SP four-port 8-Gb/s Fibre Channel personality module. The ports are labeled **2/4 Gb** (green LED) **8Gb** (blue LED) **e0**, **e1**, **e2**, and **e3**. The four-port 8-Gb/s FC I/O personality module uses small form-factor pluggable (SFP) + transceiver modules to connect to LC-type optical fibre cables. These SFP+ transceiver modules are input/output (I/O) devices that plug into the FC port of the FC I/O personality module. These SFP+ modules are hot swappable. This means that you can install and remove an SFP+ module while the SP is operating.

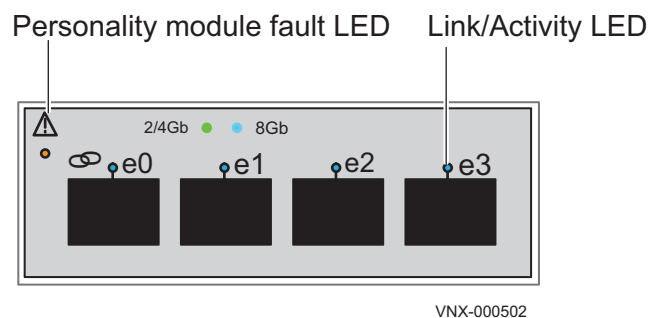


Figure 30 Four-port 8-Gb/s Fibre Channel personality module LEDs

The following table describes the SP four-port 8-Gb/s Fibre Channel personality module fault and port LEDs.

Table 16 Four-port 8-Gb/s FC personality module LEDs

| LED | Color | State | Description |
|-------|-------|-------|-----------------------------|
| Fault | Amber | On | I/O module has faulted. |
| | — | Off | I/O module is powered down. |

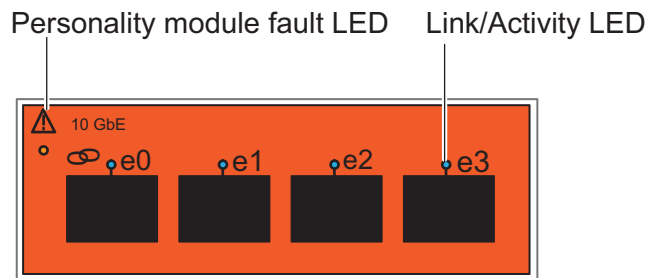
Table 16 Four-port 8-Gb/s FC personality module LEDs (continued)

| LED | Color | State | Description |
|---|------------------|----------|--|
| Link/Activity (each port has one LED) | Green | On | 2- or 4-Gb link speed |
| | Blue | On | 8-Gb/s link speed (maximum) |
| | Green or Blue | Blinking | Small form-factor pluggable (SFP+) transceiver module faulted, unsupported, or optical cable fault. |
| | — | Off | No network connection |

Four-port 10-Gb/s Optical Ethernet personality module

The optional four-port 10-Gb/s Ethernet personality module is supported in the VNXe3200 Dual SP platform.

The following illustration shows an example of the VNXe3200 platform SP four-port 10-Gb/s Ethernet personality module. The ports are labeled **10 GbE e0, e1, e2, and e3**. The four-port 10-Gb/s Ethernet personality module uses small form-factor pluggable (SFP+) transceiver modules to connect to LC-type optical fibre cables. These SFP+ transceiver modules are input/output (I/O) devices that plug into the Ethernet port of the personality module. These SFP+ modules are hot swappable. This means that you can install and remove an SFP+ module while the SP is operating. The four 10-Gb/E ports also support both active and passive Twin-ax cables.

**Figure 31** Four-port 10-Gb/s Ethernet personality module LEDs

The following table describes the SP four-port 10-Gb/s Ethernet personality module fault and port LEDs.

Table 17 Four-port 10-Gb/s Ethernet personality module LEDs

| LED | Color | State | Description |
|---|-------|----------|--|
| Fault | Amber | On | I/O module has faulted. |
| | — | Off | I/O module is powered down. |
| Link/Activity (each port has one LED) | Green | On | 10-Gb link speed |
| | Green | Blinking | Small form-factor pluggable (SFP+) transceiver module faulted, unsupported, or optical cable fault. |
| | — | Off | No network connection |

SFP+ transceiver module

Small form-factor pluggable (SFP) + modules are compact, hot-pluggable transceivers inserted into the SFP+ slot of the I/O personality module in the VNXe3200 Dual SP platform. This transceiver module provides uplink optical interfaces, laser send or transmit (TX) and laser receive (RX). An SFP or SFP+ transceiver module is hot-swappable. You can replace an SFP+ from an SP while the platform is powered up.

Laser safety guidelines: — Before you install SFP+ modules in a VNXe3200 Dual SP platform or attempt to operate or service a VNXe3200 Dual SP platform equipped with SFP+ modules, you must read and observe the important safety information in this section of the document.

The VNXe3200 Dual SP platform SFP+ modules are equipped with a Class 1 Laser, which emits invisible radiation. Do not stare into open optical ports. The following warnings apply to all the SFP+ modules.



Class 1 laser product.

Because invisible laser radiation can be emitted from the aperture of the port when no fiber is connected, avoid exposure to laser radiation and do not stare into open apertures.

Laser radiation is present when the system is open and interlocks bypassed.

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

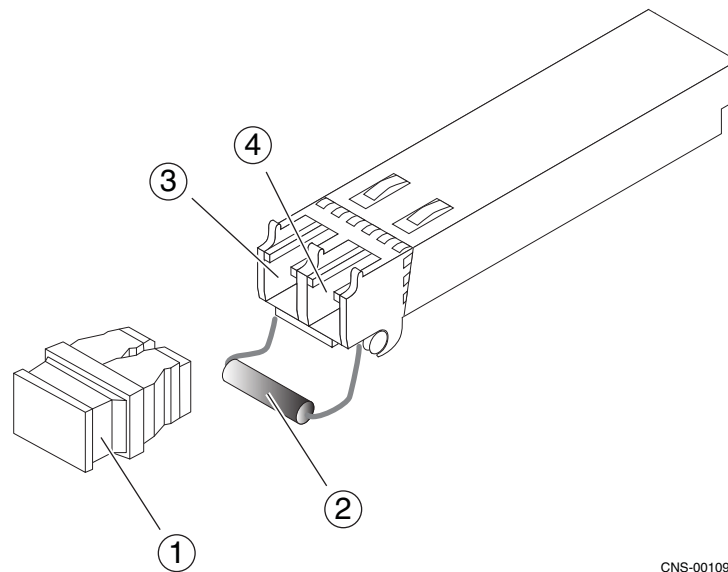
Guidelines for handling SFP+ modules: — Use these guidelines when you work with SFP+ modules:

- ◆ SFP+ modules are static sensitive. Wear an ESD-preventive wrist strap that is connected to the rack in order to prevent ESD damage.
- ◆ SFP+ modules are dust sensitive. Always store the devices with dust plugs installed in the optical bores.
- ◆ Do not remove and insert an SFP+ module more often than is necessary. Repeated removals and insertions of an SFP+ module can shorten its useful life.

Note: To replace an SFP, refer to the *EMC® VNXe® Replacing an SFP module in a VNXe3200* document for more information. This guide is available online at <https://www.emc.com/vnxesupport>. Select the *EMC® VNXe® Replacing an SFP module in a VNXe3200* document from this list. This guide and other related VNXe Series guides can be downloaded from here.

Types of SFP+ module latches: — SFP transceiver modules can have three types of latching devices to secure the SFP or SFP+ transceiver in a port socket.

- ◆ SFP+ transceiver with a Mylar tab latch.
- ◆ SFP+ transceiver with an actuator button latch.
- ◆ SFP+ transceiver that has a bale-clasp latch (see following illustration).

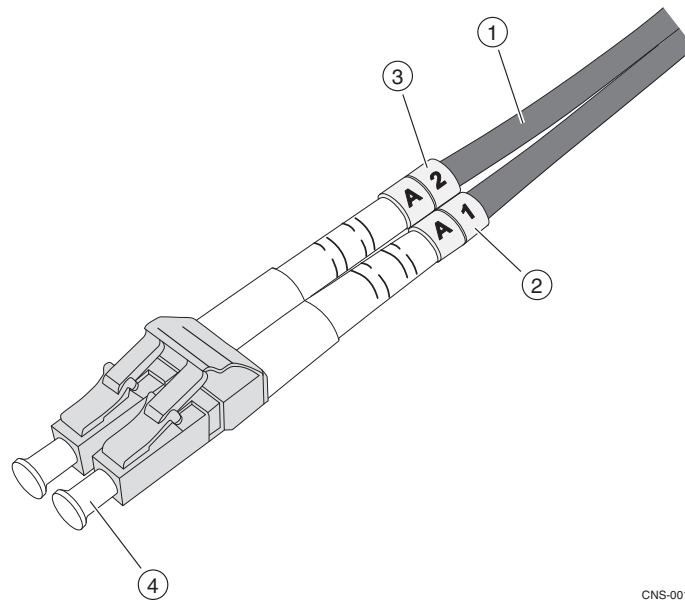


CNS-001090

| | | | |
|---|----------------------------|---|------------------------------------|
| 1 | Dust plug (protective cap) | 3 | Send or transmit (TX) optical bore |
| 2 | Bale clasp latch | 4 | Receive (RX) optical bore |

Figure 32 Example of an SFP+ module

LC type interface: — The LC type interface was developed by Lucent Technologies (hence, Lucent Connector). It uses a push-pull mechanism. LC connectors are normally held together in a multimode duplex configuration with a plastic clip. These cables are usually colored orange for OM2 multimode optical fiber type cables and aqua for OM3 multimode optical fiber type cables. These cables have the duplex connectors encased in a gray plastic covering. To determine the send or transmit (TX) and receive (RX) ferrules (connector ends), these cables will show a letter and numeral (for example A1 and A2 for the TX and RX, respectively) or a white and yellow rubber gasket (jacket) for the send or transmit (TX) and receive (RX) ends ([Figure 33 on page 40](#)).



CNS-001102

| | | | |
|---|---|---|--|
| 1 | Orange cable | 3 | Rubber gasket (jacket), receive (RX) |
| 2 | Rubber gasket (jacket), send or transmit (TX) | 4 | Ferrule (connector end to SFP+ module) |

Figure 33 Example of LC-type connectors

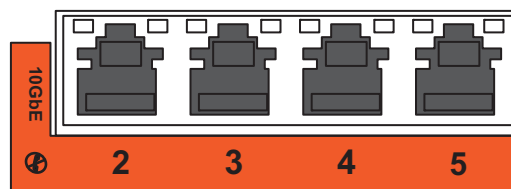
Four 10-Gb/s iSCSI host IP connect ports

IMPORTANT

The ports shown in the following illustration are 10-Gb/s iSCSI ports. A symbol depicting a telephone handset with a line through it indicates that you should not connect WAN type RJ-45 telephone connectors to these ports.

The VNXe3200 platform SP comes with four integrated 10-Gb/s iSCSI Base-T ports (labeled **10GbE 2, 3, 4, and 5**). These ports provide an interface for connecting 10-Gb/s iSCSI protocol for host IP connect.

The following illustration shows an example of the SP 10-Gb/s iSCSI (RJ-45) host IP connect ports.



VNX-000508

Figure 34 10 -Gb/s iSCSI (RJ-45) host IP connect ports

10-Gb/s iSCSI host IP connect (RJ-45) port LEDs

The following illustration shows the SP 10-Gb/s iSCSI host IP connect (RJ-45) port LEDs—a green LED to the left of the connector and a bi-color (green/amber) LED to the right of the connector—that indicate the link/activity and speed of the ports, respectively.

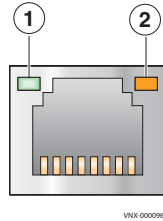


Figure 35 10-Gb/s iSCSI host IP connect (RJ-45) port LEDs

The following table describes the link/activity and connection speed associated with the SP 10-Gb/s iSCSI host IP connect (RJ-45) port LEDs.

Table 18 10-Gb/s iSCSI host IP connect (RJ-45) port LEDs

| LED | Color | State | Description |
|--|-------|----------|--|
| Left, link (see location 1) | Green | On | Network/link connection |
| | Green | Blinking | Transmit/receive activity |
| | — | Off | No network/link connection |
| Right, link speed (see location 2) | Green | On | 100-Mb/s connection |
| | Amber | On | 1000-Mb/s (or 1-Gb/s) connection |
| | — | Off | 10-Mb/s connection (if left LED is on or blinking) |

Disk-array enclosure

⚠ CAUTION

Lifting the disk-array enclosure (DAE) and installing it into or removing it from a rack is a two to three-person job. If needed, use an appropriate lifting device (mechanical lift). A fully loaded 2U, 12 (3.5-inch) DAE or 2U, 25 (2.5-inch) DAE weighs approximately 52 lb (23.6 kg) or 45 lb (20.5 kg), respectively.

The VNXe3200 platform supports two types of disk-array enclosures (DAEs) across a 6-Gb/s SAS bus. The DAEs used in the VNXe3200 platform are the:

- ◆ “2U, 12 (3.5-inch) DAE” on page 44
- ◆ “2U, 25 (2.5-inch) DAE” on page 50

In a VNXe3200 Dual SP system, when the 2U, 12 (3.5-inch) disk drive DAE is used with a 2U, 12 (3.5-inch) disk drive DPE, the VNXe3200 platform supports one 2U, 12 (3.5-inch) disk drive DAE or a maximum of 24 (3.5-inch) disk drives. When the 2U, 25 (2.5-inch) disk drive DAE is used with a 2U, 25 (2.5-inch) disk drive DPE, the VNXe3200 Dual SP platform supports one 2U, 25 (2.5-inch) disk drive DAE or a maximum of 50 (3.5-inch) disk drives.

IMPORTANT

When calculating the number of drives for your VNXe3200 Dual SP platform, the DPE in a dual SP configuration is included in the total drive slot quantity of up to 150 drives. If the total drive slot quantity exceeds 150, you will not be able to add another DAE.

DPE and DAE configuration rules

Table 19 provides a recommended way of configuring the VNXe3200 Dual SP DPE with the 2U, 12 (3.5-inch) disk drive and 2U, 25 (2.5-inch) disk drive DAEs supported by the VNXe3200 Dual SP platform.

Note: Table 19 is a recommendation. You can mix and match the 2U, 12 (3.5-inch) disk drive and 2U, 25 (2.5-inch) disk drive DAEs any way you like as long as you meet the requirement of no more than 150 disk drives (including either the 2U, 12 (3.5-inch) disk drive DPE or the 2U, 25 (2.5-inch) disk drive DPE).

As shown in Table 19, the first column is the DPE column and shows either the number 12, which refers to the 2U, 12 (3.5-inch) disk drive DPE, or 25, which refers to the 2U, 25 (2.5-inch) disk drive DPE used for that configuration. Across the top of Table 19, columns 2 through 12 show the number of DAEs (from DAE1, DAE2, and so on up to DAE11) are listed. Within the body of Table 19, the number 12 refers to the 2U, 12 (3.5-inch) disk drive DAE and the number 25 refers to the 2U, 25 (2.5-inch) disk drive DAE.

The letter X in the table indicates that there is no DAE available beyond that point. Note that the **Total** column in Table 19 shows the total number of disks available using a combination of the DPE and the DAE for that particular configuration.

Table 19 DPE and DAE configuration rules for dual SP configuration

| VNXe3200 Dual SP platform | | | | | | | | | | | | |
|---------------------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| DPE | DAE1 | DAE2 | DAE3 | DAE4 | DAE5 | DAE6 | DAE7 | DAE8 | DAE9 | DAE10 | DAE11 | Total |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 144 |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 25 | X | 145 |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 25 | 25 | X | X | 146 |
| 12 | 12 | 12 | 12 | 12 | 12 | 25 | 25 | 25 | X | X | X | 147 |
| 12 | 12 | 12 | 12 | 25 | 25 | 25 | 25 | X | X | X | X | 148 |
| 12 | 12 | 25 | 25 | 25 | 25 | 25 | X | X | X | X | X | 149 |
| 25 | 25 | 25 | 25 | 25 | 25 | X | X | X | X | X | X | 150 |
| 25 | 25 | 25 | 25 | 25 | 12 | 12 | X | X | X | X | X | 149 |
| 25 | 25 | 25 | 25 | 12 | 12 | 12 | 12 | X | X | X | X | 148 |
| 25 | 25 | 25 | 12 | 12 | 12 | 12 | 12 | 12 | X | X | X | 147 |
| 25 | 25 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | X | X | 146 |
| 25 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | X | 145 |

General

Each DAE consists of the following components:

- ◆ Drive carrier
- ◆ Disk drives
- ◆ Midplane
- ◆ Link control cards (LCCs)
- ◆ Power supply/cooling modules
- ◆ EMI shielding

Drive carrier

Disk drive carriers are plastic assemblies that provide smooth, reliable contact with the enclosure slot guides and midplane connectors. Each carrier has a handle with a latch and spring clips. The latch holds the disk drive in place to ensure proper connection with the midplane. [Figure 36 on page 45](#) shows the disk drive ready LEDs that are integrated into the chassis that the carrier is in. These LEDs primarily show the disk drive readiness as well as activity.

Disk drives

You can visually distinguish between drive types by their different latch and handle mechanisms and by the type, capacity, and speed labels on each drive. You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing drives while they are in use. Disk drives are extremely sensitive electronic components.

Note: For more information about the supported disk drives for the VNXe3200 Dual SP, refer to the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document. This guide is available online at <https://www.emc.com/vnxesupport>. On the page that appears, under VNXe Series, click **VNXe3200**. Select the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document from this list. This guide and other related VNXe Series guides can be downloaded from here.

Midplane

A midplane separates the front-facing disk drives from the rear-facing LCCs and power supply/cooling modules. It distributes power and signals to all components in the enclosure. LCCs, power supply/cooling modules, and disk drives plug directly into the midplane.

Link control cards (LCCs)

An LCC supports, controls, and monitors the DAE, and is the primary interconnect management element. Each LCC includes connectors for input and expansion to downstream devices. [Figure 41 on page 50](#) shows an enclosure address (EA²) indicator that is located on each LCC. [Figure 41 on page 50](#) shows an example of an LCC bus (loop) identification indicator.

2. The EA is sometimes referred to as an enclosure ID.

Power supply/cooling module

NOTICE

You must install a replacement power/cooling module in the enclosure within two minutes after you remove a faulted power/cooling module.

Note: For more information about replacing a power/cooling module in the 2U, 25 DAE of the VNXe3200 Dual SP, refer to the *EMC® VNXe® Replacing a 25-Slot Disk-Array Enclosure (DAE5S) Power/Cooling Module in a VNXe3200*. This guide is available online at <https://www.emc.com/vnxesupport>. Select the *EMC® VNXe® Replacing a 25-Slot Disk-Array Enclosure (DAE5S) Power/Cooling Module in a VNXe3200* document from this list. This guide and other related VNXe Series guides can be downloaded from here.

The power supply/cooling module integrates independent power supply and blower cooling assemblies into a single module.

Each power supply is an auto-ranging power-factor-corrected, multi-output, off-line converter with its own line cord. The drives and LCC have individual soft-start switches that protect the disk drives and LCC if you install them while the disk enclosure is powered up. A disk or power supply with power-related faults will not affect the operation of any other device.

Figure 38 on page 47 shows the three status LEDs on the power supply/cooling module.

The enclosure cooling system consists of dual-blower modules in each power supply/cooling module.

EMI shielding

EMI compliance requires a properly installed electromagnetic interference (EMI) shield in front of the DAE disk drives. The VNXe3200 platform requires a front bezel that has a locking latch and integrated EMI shield. You must remove the bezel/shield to remove and install disk drives.

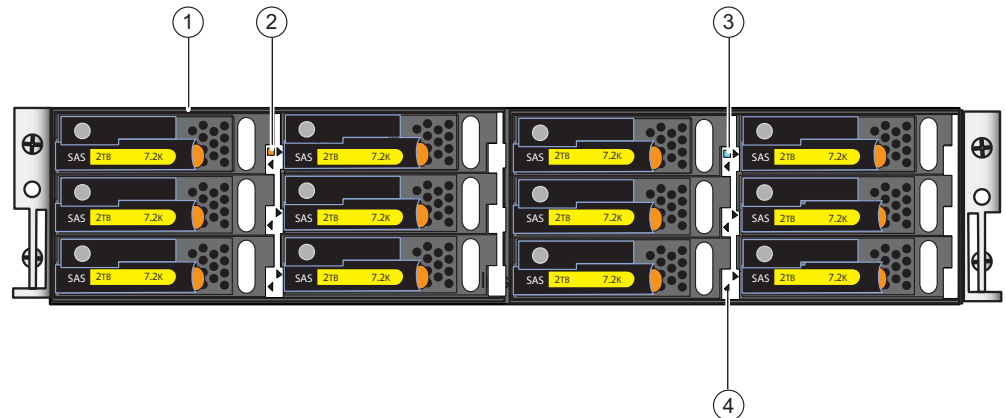
2U, 12 (3.5-inch) DAE

On the front, viewing from left to right, the 2U, 12 (3.5-inch) disk drive DAE carrier includes the following hardware components:

- ◆ 3.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS disk drives (hot-swappable)³
- ◆ Status LEDs

3. You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing drives while they are in use. Disk drives are extremely sensitive electronic components.

The following illustration shows the location of these components.



| | | | |
|---|----------------------------------|---|--------------------------------------|
| 1 | 3.5-inch SAS drives ¹ | 3 | DAE power on LED (blue) |
| 2 | DAE fault LED (amber) | 4 | Disk drive ready/activity LED (blue) |

1. The VNXe3200 Dual SP platform also supports 6-Gb/s NL-SAS or Flash drives. For more information about the disk drives supported in the VNXe3200 Dual SP, refer to the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document.

Figure 36 2U, 12 (3.5-inch) DAE (front view)

The following table describes the DAE and the 3.5-inch disk drive status LEDs

Table 20 Example of a 2U, 12 (3.5-inch) DAE and the disk drive LEDs

| LED | Color | State | Description |
|---|-------|---------------------------|--|
| DAE fault (see location 2) | Amber | On | DPE fault, including SP faults. |
| | — | Off | Normal |
| DAE power (see location 3) | Blue | On | Powering and powered up |
| | — | Off | Powered down |
| Disk drive ready/activity (see location 4) Note: The disk drive LED (a left or right triangle symbol) points to the disk drive that it refers to. | Blue | On | Powering and powered up |
| | | Blinking, mostly on | Disk drive is on with I/O activity |
| | | Blinking at constant rate | Disk drive is spinning up or down normally |
| | | Blinking, mostly off | Disk drive is powered up but not spinning Note: This is a normal part of the spin-up sequence, occurring during the spin-up delay of a slot. |
| | — | Off | Disk drive is powered down |

Rear view

On the rear, viewing from top to bottom, a 2U, 12 (3.5-inch) DAE includes the following hardware components:

- ◆ Two 6-Gb/s SAS LCCs (A and B)
- ◆ Two power supply/cooling modules

6-Gb/s SAS LCC

The LCC ([Figure 37 on page 47](#)) supports and controls one 6-Gb/s SAS bus and monitors the DAE. A blue link (active) LED indicates a DAE operating at 6 Gb/s.

The LCCs in a DAE connect to the DPE and other DAEs with 6-Gb/s SAS cables. The cables connect the LCCs in the system in a daisy-chain topology.

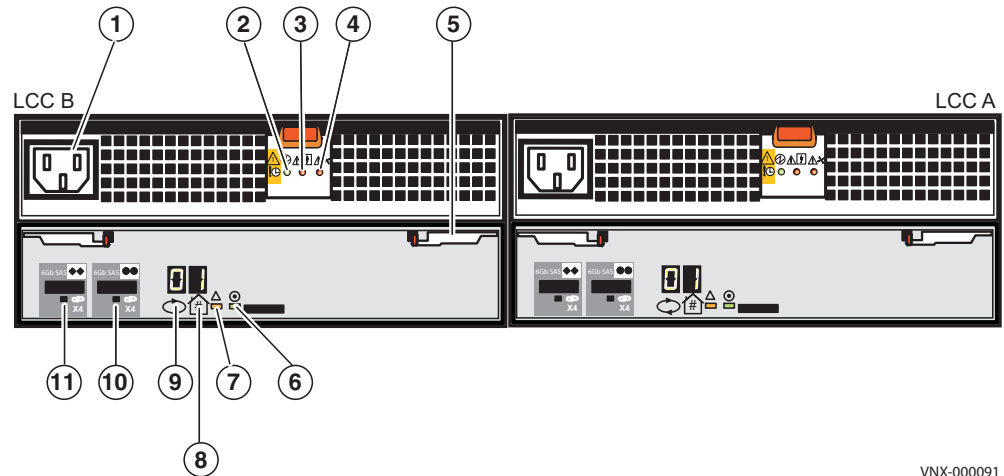
Internally, each DAE LCC connects to the drives in its enclosure in a point-to-point fashion through a switch. The LCC independently receives and electrically terminates incoming signals. For traffic from the system's storage processors, the LCC switch passes the signal from the input port to the drive being accessed; the switch then forwards the drive output signal to the port.

Note: If the target drive is not in the LCC's enclosure, the switch passes the input signal directly to the output port.

Each LCC independently monitors the environmental status of the entire enclosure, using a microcomputer-controlled monitor program. The monitor communicates the status to the storage processor, which polls disk enclosure status. LCC firmware also controls the SAS PHYs (physical links) and the disk-drive status LEDs.

[Figure 37 on page 47](#) shows the location of the enclosure ID indicator⁴ on each LCC. Each LCC also includes a bus (back-end port) identification indicator. The SP initializes the bus ID when the operating system is loaded.

4. The enclosure ID is sometimes referred to as the enclosure address (EA).



VNX-000091

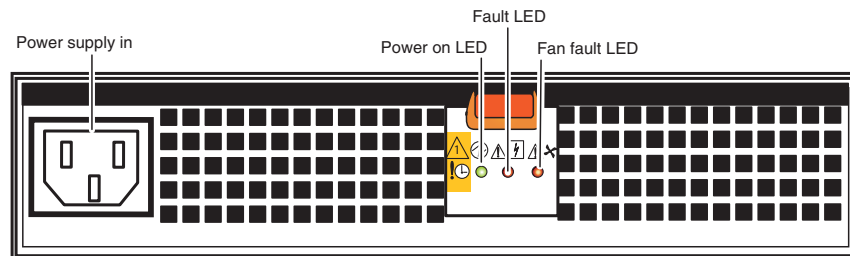
| | | | |
|---|--|----|---|
| 1 | LCC B AC power supply power in (recessed plug) | 7 | LCC B fault LED (on, amber) |
| 2 | LCC B power supply LED (on, green) | 8 | DAE enclosure ID ¹ |
| 3 | LCC B power supply fault LED (on, amber) | 9 | LCC B loop bus ID |
| 4 | LCC B power supply fan fault LED (on, amber) | 10 | LCC B SAS connector (input); labeled with a double black circle (or dot) symbol ●●. |
| 5 | LCC B right latch handle | 11 | LCC B SAS connector (output); labeled with a double black diamond symbol ◆◆. |
| 6 | LCC B power LED (on, green) | | |

1. The DAE enclosure ID is sometimes referred to as the enclosure address (EA).

Figure 37 DAE with two LCCs and two power supply/cooling modules (rear view)

DAE AC power supply/cooling module

The following illustration shows an example of the 2U, 12 (3.5-inch) disk drive DAE AC power supply/cooling module with a power in (recessed) connector (plug) and status LEDs.



VNX-000083

Figure 38 Example of a DAE AC power supply/cooling module power in (recessed) connector (plug) and status LEDs

The following table describes the DAE power supply/cooling module LEDs.

Table 21 DAE AC power supply/cooling module LEDs

| LED | Color | State | Description |
|-------------|-------|----------|--|
| Power | Green | On | Power on |
| | — | Off | Power off |
| Power fault | Amber | On | Power supply fault, check cable connection |
| | | Blinking | BIOS, POST and OS booting up or system overheating |
| | — | Off | No fault or power off |
| Fan fault | Amber | Fault | Fault, not operating normally |
| | — | No fault | No fault, fan operating normally |

The power supply/cooling modules are located above the LCCs. The units integrate independent power supply and blower cooling assemblies into a single module.

Each power supply is an auto-ranging, power-factor-corrected, multi-output, offline converter with its own line cord. Each supply supports a fully configured DAE and shares load currents with the other supply. The drives and LCCs have individual soft-start switches that protect the disk drives and LCCs if they are installed while the disk enclosure is powered up.

Note: Each line cord should be plugged into a different AC power distribution system (PDU) for high availability (the *EMC® VNXe® VNXe3200 Installation Guide* provides more information).

DAE LCC input/output ports and connectors

The 2U, 12 (3.5-inch) DAE LCC supports two 6-Gb/s SAS x4 ports on the rear of the device.

6-Gb/s SAS x4 ports — The 2U, DAE LCC supports two 6-Gb/s SAS x4 ports (labeled **6GB SAS x4**) on the rear of each LCC (A and B). These ports are 26-circuit SAS small form-factor 8088 (SFF-8088) specification connectors (sockets or receptacles) using an SFF-8088 specification mini-SAS 26-circuit cables (plugs) with a pull tab.

The following illustration shows an example of the port connector (socket) and cable connector (plug) with pull tab.

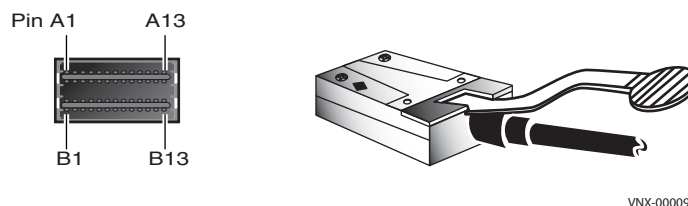


Figure 39 6-Gb/s SAS port and cable connector

Note: Each SAS cable is keyed with an *in* (or one black circle, ●) and *out* (or one black diamond, ◆) connection to prevent incorrect cabling.

The following table lists the DAE LCC 6-Gb/s SAS port pin signals used on the connector.

Table 22 6-Gb/s SAS port connector pinout

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| A1 | GND | B1 | GND |
| A2 | Rx 0+ | B2 | Tx 0+ |
| A3 | Rx 0- | B3 | Tx 0- |
| A4 | GND | B4 | GND |
| A5 | Rx 1+ | B5 | Tx 1+ |
| A6 | Rx 1- | B6 | Tx 1- |
| A7 | GND | B7 | GND |
| A8 | Rx 2+ | B8 | Tx 2+ |
| A9 | Rx 2- | B9 | Tx 2- |
| A10 | GND | B10 | GND |
| A11 | Rx 3+ | B11 | Tx 3+ |
| A12 | Rx 3- | B12 | Tx 3- |
| A13 | GND | B13 | GND |

6-Gb/s SAS port LEDs and port direction (input or output) — The following illustration shows the LCC 6-Gb/s SAS port LED—a bi-color (blue/green) LED below the connector, either left or right—that indicates the link of the SAS port. The following illustration also shows a double black circle (or dot) ●● symbol (for input) or a double black diamond ◆◆ symbol (for output).

Note: For information about the SAS cable, see the note under “6-Gb/s SAS x4 ports” on [page 48](#) and [Figure 39 on page 48](#).

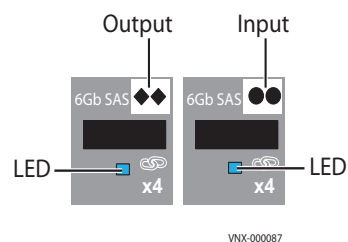


Figure 40 DAE LCC 6-Gb/s SAS port LED

The following table describes the DAE LCC 6-Gb/s SAS port LED.

Table 23 DAE LCC 6-Gb/s SAS port LED

| LED | Color | State | Description |
|------|------------------------|----------|--|
| Link | Blue | On | All lanes are running at 6 GB/s |
| | Green | On | One or more lanes running at 1.5 or 3 Gb/s |
| | Alternating Blue/Green | Blinking | Port is being marked by the host |
| | — | Off | Not connected |

LCC enclosure ID (enclosure address) and bus ID

On the rear of the LCC (A and B), an LCC enclosure ID indicator is provided. This ID indicator is a seven-segment LED for displaying decimal numbers. The LCC enclosure ID appears on both LCCs (A and B) which is the same ID number. The following illustration shows the enclosure ID is set at installation.

Each LCC includes a bus (loop) identification indicator. This indicator is a seven-segment LED for displaying decimal numbers. The following illustration shows the bus ID after the operating system is loaded.

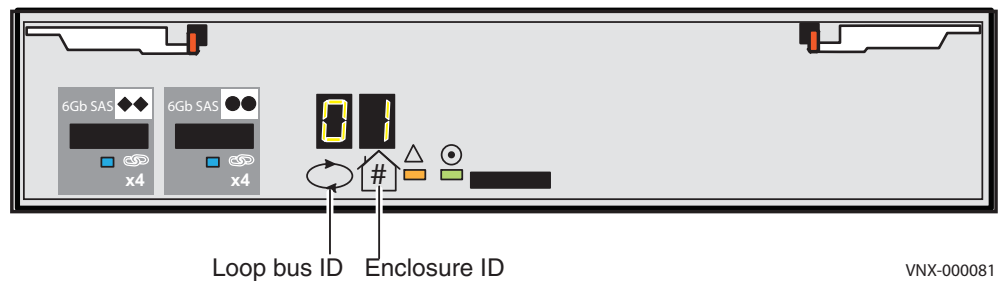


Figure 41 Example of LCC loop bus ID and enclosure ID

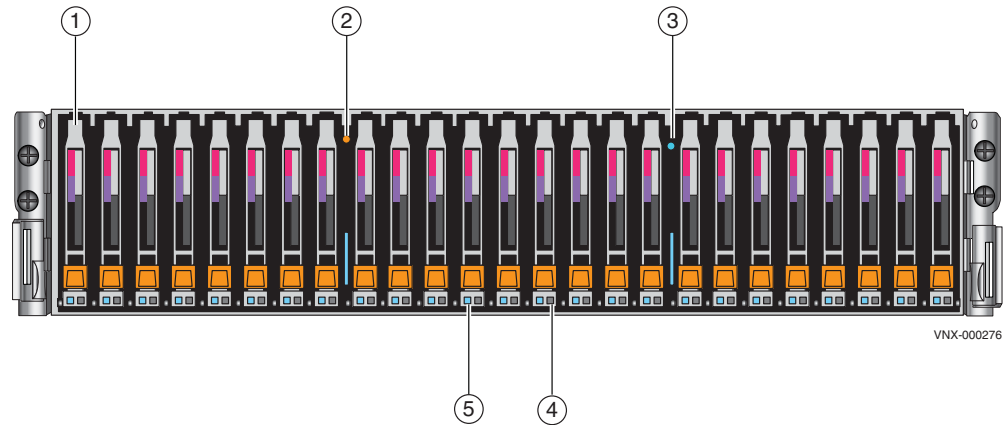
2U, 25 (2.5-inch) DAE

On the front, viewing from left to right, the 2U, 25 (2.5-inch) disk drive DAE carrier includes the following hardware components:

- ◆ 2.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS disk drives (hot-swappable)⁵
- ◆ Status LEDs

[Figure 42 on page 51](#) shows the location of these components.

5. You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing drives while they are in use. Disk drives are extremely sensitive electronic components.



| | | | |
|---|--|---|--------------------------------------|
| 1 | 2.5-inch SAS disk drive ¹ | 4 | Disk drive fault LED (amber) |
| 2 | DAE fault LED (blue), amber if faulted | 5 | Disk drive ready/activity LED (blue) |
| 3 | DAE power status LED (blue) | | |

1. The VNXe3200 platform also supports 6-Gb/s NL-SAS or Flash drives. For more information about the disk drives supported in the VNXe3200 Dual SP, refer to the *EMC® VNXe® Series Storage Systems Disk and OE Matrix* document.

Figure 42 2U, 25 (2.5-inch) DAE (front view)

The following table describes the DAE and the 2.5-inch disk drive status LEDs

Table 24 Example of 2U, 25 (2.5-inch) DAE and the disk drive LEDs

| LED | Color | State | Description |
|---|-------|----------|-------------------------|
| DAE fault (see location 2) | Blue | On | No fault has occurred |
| | Amber | On | Fault has occurred |
| DAE power (see location 3) | Blue | On | Powering and powered up |
| | — | Off | Powered down |
| Disk drive fault (see location 4) | Amber | On | Fault has occurred |
| | — | Off | No fault has occurred |
| Disk drive on/activity (see location 5) | Blue | On | Powering and powered up |
| | | Blinking | Disk drive activity |

Rear view

On the rear, viewing from top to bottom, a 2U, 25 (2.5-inch) DAE includes the following hardware components:

- ◆ Two 6-Gb/s SAS LCCs (A and B)
- ◆ Two power supply/cooling modules

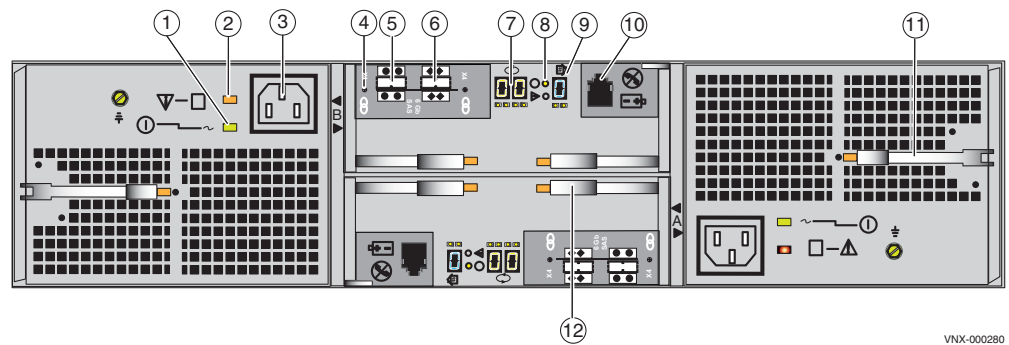
6-Gb/s SAS LCC

The 6-Gb/s SAS LCC supports, controls, and monitors the DAE, and is the primary interconnect management element. Each LCC includes connectors for input and output to downstream devices.

As described previously, the LCCs in the DAE connect to the DPE and other DAEs with 6-Gb/s SAS cables. The cables connect the LCCs in the system in a daisy-chain topology.

Internally, each DAE LCC connects to the drives in its enclosure in a point-to-point fashion through a switch. The LCC independently receives and electrically terminates incoming signals. For traffic from the system’s storage processors, the LCC switch passes the signal from the input port to the drive being accessed; the switch then forwards the drive output signal to the port.

The following illustration shows an example of the rear view of a 2U, 25 (2.5-inch) disk drive DAE.



VNX-000280

| | | | |
|---|---|----|--|
| 1 | LCC B power supply LED (on, green) | 7 | LCC B bus ID |
| 2 | LCC B power supply fault LED (on, amber) | 8 | LCC B power and fault LEDs |
| 3 | LCC B AC power supply power in (recessed plug) | 9 | DAE enclosure ID or address |
| 4 | LCC B SAS connector link LED (on, blue) | 10 | LCC B management (RJ-12) connector to SPS (not used) |
| 5 | LCC B SAS connector (output); labeled with a double black diamond symbol ◆◆. | 11 | LCC A power supply latch handle |
| 6 | LCC B SAS connector (input); labeled with a double black circle (or dot) symbol ●●. | 12 | LCC A right latch handle |

Figure 43 DAE with two LCCs and two power supply/cooling modules (rear view)

Note: Looking from the rear of the DAE, [Figure 43](#) shows LCC B located on the top, middle and LCC A located on the bottom, middle of the DAE.

Each LCC independently monitors the environmental status of the entire enclosure, using a microcomputer-controlled monitor program. The monitor communicates the status to the storage processor, which polls disk enclosure status. LCC firmware also controls the SAS PHYs and the disk-module status LEDs.

As shown in [Figure 43 on page 52](#), an enclosure ID⁶ indicator is located on each LCC. Each LCC also includes a bus (back-end port) identification indicator. The SP initializes the bus ID when the operating system is loaded.

DAE AC power supply/cooling module

The following illustration shows an example of the 2U, 25 (2.5-inch) DAE AC power supply/cooling module with a power in (recessed) connector (plug) and status LEDs.

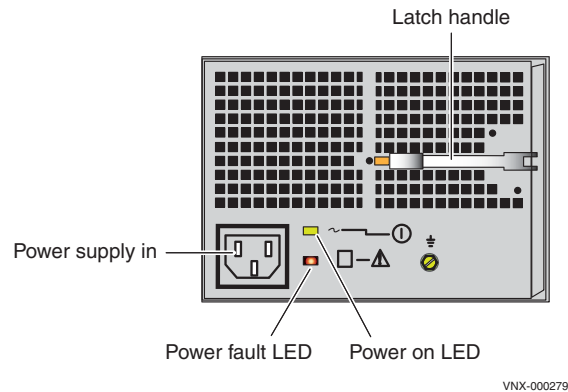


Figure 44 Example of 2U, 25 (2.5-inch) DAE AC power supply/cooling module power in (recessed) connector (plug) and status LEDs

The following illustration describes the 2U, 25 (2.5-inch) DAE power supply/cooling module LEDs.

Table 25 2U, 25 (2.5-inch) DAE AC power supply/cooling module LEDs

| Led | Color | State | Description |
|-------------|-------|----------|--|
| Power fault | Amber | On | Fault |
| | | Blinking | During power shutdown and during overvoltage (OVP) and undervoltage protection (UVP) fault |
| | — | Off | No fault or power off |
| Power on | Green | On | Power on |
| | — | Off | Power off |

The power supply/cooling modules are located to the left and right of the LCCs. The units integrate independent power supply and dual-blower cooling assemblies into a single module.

Each power supply is an auto-ranging, power-factor-corrected, multi-output, offline converter with its own line cord. Each supply supports a fully configured DAE and shares load currents with the other supply. The drives and LCCs have individual soft-start switches that protect the disk drives and LCCs if they are installed while the disk enclosure is powered up. The enclosure cooling system includes two dual-blower modules.

6. The enclosure ID is sometimes referred to as the enclosure address (EA).

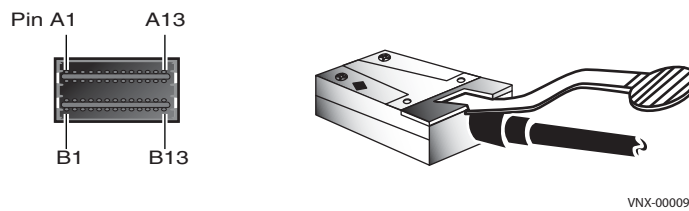
2U, 25 (2.5-inch) DAE LCC input/output ports and connectors

The 2U, 25 (2.5-inch) DAE LCC supports the following I/O ports on the rear:

- ◆ Two 6-Gb/s PCI Gen 2 SAS ports
- ◆ One management (RJ-12) connector to the SPS (not used)

6-Gb/s SAS x4 ports — The DAE LCC supports two (one input and one output) 6-Gb/s SAS x4 ports (labeled **6Gb SAS x4**) on the rear of each LCC (A and B). These ports provide an interface for SAS and NL-SAS drives on the DAE. These ports are 26-circuit SAS small form-factor 8088 (SFF-8088) specification (sockets or receptacles) using SFF-8088 specification mini-SAS 26-circuit cables (plugs) with a pull tab.

The following illustration shows an example of the port connector (socket) and cable connector (plug) with pull tab.



VNX-00094

Figure 45 6-Gb/s SAS port and cable connector

Note: Each SAS cable is keyed with an *in* (or one black circle, ●) and *out* (or one black diamond, ◆) connection to prevent incorrect cabling.

The following table lists the 2U, DAE 6-Gb/s SAS port pin signals used on the connector.

Table 26 6-Gb/s SAS port connector pinout

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| A1 | GND | B1 | GND |
| A2 | Rx 0+ | B2 | Tx 0+ |
| A3 | Rx 0- | B3 | Tx 0- |
| A4 | GND | B4 | GND |
| A5 | Rx 1+ | B5 | Tx 1+ |
| A6 | Rx 1- | B6 | Tx 1- |
| A7 | GND | B7 | GND |
| A8 | Rx 2+ | B8 | Tx 2+ |
| A9 | Rx 2- | B9 | Tx 2- |
| A10 | GND | B10 | GND |
| A11 | Rx 3+ | B11 | Tx 3+ |
| A12 | Rx 3- | B12 | Tx 3- |
| A13 | GND | B13 | GND |

6-Gb/s SAS port LEDs and port direction (input or output)

The following illustration shows the 6-Gb/s SAS port LED—a bi-color (blue/green) LED next to the connector, either left or right—that indicates the link/activity of the SAS port.

Note: For information about the SAS cable, see the note under [Figure 45 on page 54](#).

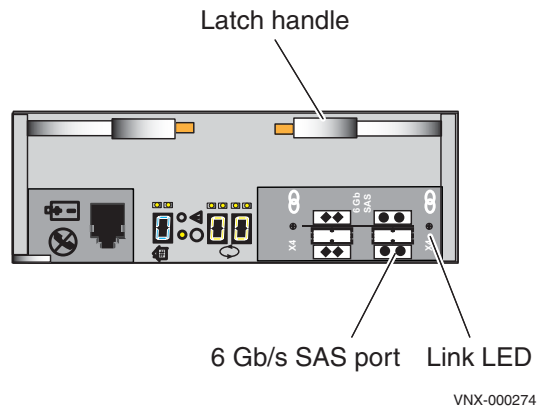


Figure 46 6-Gb/s SAS port LED

The following table describes the 2U DAE LCC 6-Gb/s port LEDs.

Table 27 6-Gb/s SAS port LEDs

| LED | Color | State | Description |
|---------------|------------------------|----------|--|
| Link/activity | Blue | On | All lanes are running at 6 GB/s |
| | Green | On | One or more lanes is not running at full speed or disconnected |
| | Alternating Blue/Green | Blinking | Port is being marked by the host |
| | — | Off | Not connected |

Management (RJ-12) port connector (not used in the VNXe3200 platform)

Note: The management Ethernet (RJ-12) LCC to SPS port connector is not used in the VNXe3200 platform.

[Figure 47 on page 56](#) shows the management port (labeled with two symbols; one depicting a telephone handset with a line through it and the other depicting a battery). The telephone handset with a line through it symbol means that you cannot connect telephone type circuits to this connector (see the following **WARNING**). This port connects the LCC (A and B) ports to the SPS (A and B) ports, respectively.

⚠ WARNING

The SPS (RJ-12) port is a LAN port not a WAN port. LAN ports contain safety extra-low voltage (SELV) circuits, and WAN ports contain telephone-network voltage (TNV) circuits. An RJ-45 (or TNV-type) looks the same as the RJ-12 except for two very important differences. An RJ-45 is an 8-wire modular jack. The RJ-12 is a six-wire modular jack. The RJ-45 plugs and jacks are wider than their RJ-12 counterparts - 7/16" vs 3/8". An RJ-45 plug won't fit into an R-12 jack. But an RJ-12 plug will fit into an RJ-45 jack. Use caution when connecting cables. To avoid electric shock, do not attempt to connect TNV circuits to SELV circuits.

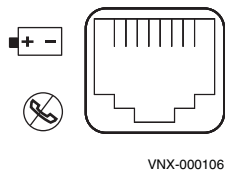


Figure 47 LCC RJ-12 port (not used)

The cable connecting the LCC to the SPS is an RJ-12 to RJ-12. It has an RJ-12 adapter (LCC side) on one end and a RJ-12 (SPS side) adapter on the other end.

LCC enclosure ID (enclosure address) and bus ID

On the rear of the LCC (A and B), an LCC enclosure ID indicator is provided. This ID indicator is a seven-segment LED display for displaying decimal numbers. The LCC enclosure ID appears on both LCCs (A and B) which is the same ID number. The enclosure ID is set at installation (see the following illustration).

Each LCC includes a bus (loop) identification indicator. This indicator includes two seven-segment LED displays for displaying decimal numbers. The SP initializes the bus ID when the operating system is loaded (see the following illustration).

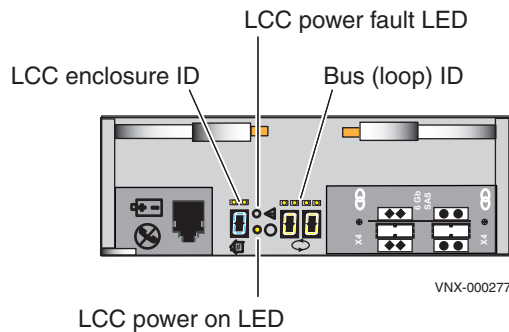


Figure 48 Example of LCC B enclosure ID and bus ID

The following table describes the power on and power fault LEDs.

Table 28 LCC power on and power fault LEDs

| Led | Color | State | Description |
|-------------|-------|-------|-----------------------|
| Power on | Green | On | Power on |
| | — | Off | Power off |
| Power fault | Amber | On | Fault detected |
| | — | Off | No fault or power off |

Appendix A: Cabling

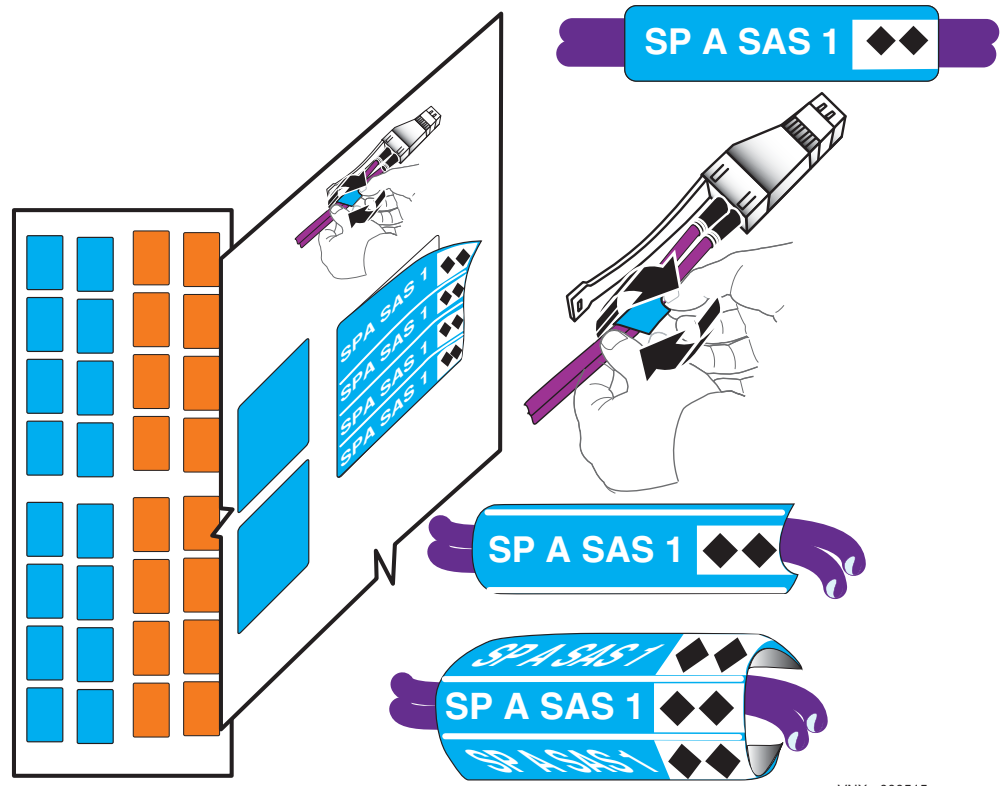
This section describes examples of the types of cabling you will need to connect the DAEs to your VNXe series platform. The descriptions are presented in illustrations and text. Each illustration shows an example of the cable connection points (ports) located on the specific hardware components for the VNXe3200 platform.

For all other cabling of your VNXe3200 platform, the *VNXe3200 Installation Guide* provides information about the DPE power cabling, DAE power cabling, PDU power cabling, LAN cabling, and so on.

Cable label wraps

Each VNXe series platform comes with a cable label wrap guide or set of cable label wraps to affix to the cables on your VNXe series platform. These labels are affixed to the appropriate cables as you connect the cables to your VNXe series platform (for more information, refer to the *VNXe3200 Installation Guide*). The following illustration shows an example of the cable wrap guide and how to affix the cable label wrap to a cable.

Note: If your VNXe series platform was assembled at the factory, all the cable labels have been affixed to the cables except for any DAEs you have ordered. Additionally, if your VNXe series platform was not assembled at the factory, the cable kit supplied with your product will have all the required cables already labeled except for the DAEs.



VNXe-000515

Figure 49 Example of a cable label wrap

VNXe3200 DAE cabling

IMPORTANT

The DAE (s) that are to be directly connected to the DPE need to be located close enough to the DPE so that the DPE-to-DAE interconnect cables (that are provided with every DAE) can be routed and connected to the DPE easily.

Shown in the upcoming figures ([Figure 50 on page 60](#) through [Figure 52 on page 64](#)) are examples of two-bus SAS cabling in the DPE-based VNXe storage platform. The Storage Processors connect to the DAEs with mini-SAS HD (DPE end) to mini-SAS (DAE end) cables. The cables connect LCCs in the DAEs of a storage platform in a daisy-chain topology.

The DPE is automatically Enclosure 0 (EA0). The DAE connected to Storage Processor mini-SAS HD output port 0 is Enclosure 1 (EA1).

The first DAE connected to the Storage Processor mini-SAS HD output port 1 is designated Enclosure 0 (EA0). Each DAE connected after the first DAE increments the enclosure number by one. All enclosures connected to SAS Port 0 will show an ID of 0, but the addresses will increment.

[Figure 50 on page 60](#) shows the first example of a VNXe3200 platform with two DAEs (one 2U, 12 disk drive DAE and the other a 2U, 25 disk drive DAE) or a VNXe3200 platform with a total of 62 disk drives (including the DPE, a 2U, 25 disk drive device).

The mini-SAS HD ports on the VNXe3200 platform DPE are labeled **0** and **1**. Mini-SAS HD port 0 is connected internally to the SAS expander that connects the internal DPE disks. Since mini-SAS HD port 0 is already connected internally to the DPE disks, the first DAE (2U, 12 disk drive DAE, [Figure 50 on page 60](#)) is connected to mini-SAS HD port 1 to balance the load on the SAS ports. The second DAE (2U, 25 disk drive DAE, [Figure 50 on page 60](#)) is connected to mini-SAS HD port 0.

In [Figure 50 on page 60](#), notice that each DAE device supports two completely redundant buses (LCC A and LCC B).

The rule of load or bus balancing is applied to all DAEs. That is, Bus 0 is Enclosure Address 0 (EA0), Bus 1 is EA0, and so on. In the case of the VNXe3200 platform, Bus 0 EA0 is the DPE (SP A and B). So, to balance the load, Bus 1 EA0 becomes the first DAE (LCC A and B) in the cabinet with the next DAE (LCC A and LCC B) as Bus 0 EA1, and so on. If you have several DAEs in your VNXe3200 platform, you can daisy-chain them within that bus. However, it is recommended that you balance each bus. In other words, always optimize your environment by using every available bus, and spreading the number of enclosures as evenly as possible across the buses.

Note: On the DPE and DAE, each cable connectors (or ports) include a symbol to denote the direction the cable needs to connect to. The mini-SAS HD cable connector (or port) on the DPE has a double diamond symbol **◆◆**, indicating that it is the output from that device. On the DAE, connect the cable to the mini-SAS cable connectors (or ports) that have a double circle symbol **●●**, indicating the input to that device.

Cabling with two DAEs in a VNXe3200 platform

The following example in [Figure 50](#) shows how to connect two different DAEs, a 2U, 12 disk drive DAE and a 2U, 25 disk drive DAE.

The cables shown in the following illustration are:

Note: The cable colors shown in the example are orange for Bus 0 and blue for Bus 1.

- ◆ Cable 1, orange, DPE to the 2U, 25 DAE (labels SP A SAS 0 to LCC A)
- ◆ Cable 2, orange, DPE to 2U, 25 DAE DAE (labels SP B SAS 0 to LCC B)
- ◆ Cable 3, blue, DPE to 2U, 12 DAE (labels SP A SAS 1 to LCC A)
- ◆ Cable 4, blue, DPE to 2U, 12 DAE (labels SP B SAS 1 to LCC B)

Note: If your VNXe3200 platform was not cabled at the factory, refer to the cable wrap guide (“[Cable label wraps](#)” on [page 58](#)) that came with your VNXe3200 platform for the correct cable labels.

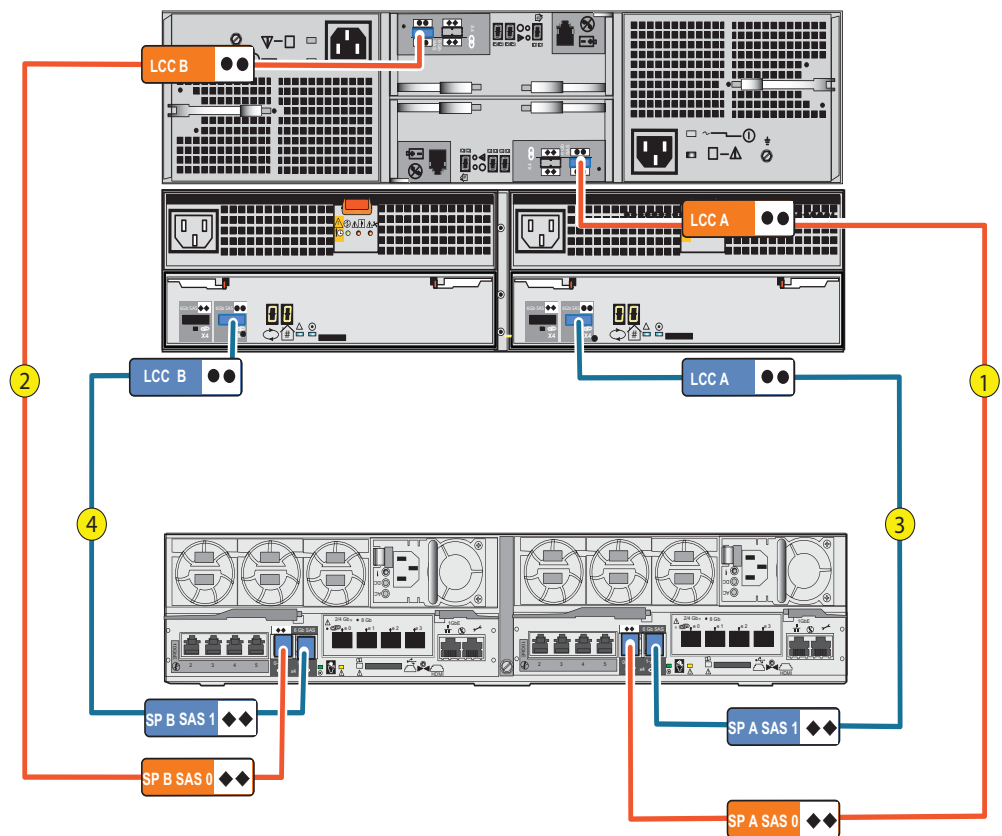


Figure 50 Example of the VNXe3200 platform with two DAEs (2U, 12 disks and 2U, 25 disks) cabling

Note: The cable end on the mini-SAS end has single diamond ◆ symbol indicating it as the output end. While the cable end on the mini-SA HD end does not have a symbol.

Interleaved cabling with five DAEs in a VNXe3200 platform

[Figure 51 on page 62](#) shows a second example of a VNXe3200 platform with five DAEs (all are 2U, 25 disk drive DAEs) or a VNXe3200 platform with a total of 150 disk drives (including the DPE, a 2U, 25 disk drive device).

In the example ([Figure 51 on page 62](#)), the rack accommodates five DAEs (three DAEs for Bus 1 and two DAEs for Bus 0) along with the VNXe3200 system.

As described previously, the mini-SAS HD ports on the VNXe3200 platform DPE are labeled **0** and **1**. Mini-SAS HD port 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since five DAEs are available for a maximum of 125 disk drives, it is recommended that the DAEs be load balanced. To do this, it is recommended that you daisy-chain the DAEs for the most efficient load balancing. So, in [Figure 51 on page 62](#), two buses (Bus 0 and Bus 1) are available with the first DAE on Bus 1 designated as EA0/Bus 1 (blue DAE). The second DAE continues Bus 0 and is designated as EA1/Bus 0 (orange DAE). Then, the rest of the DAEs are intertwined in a daisy-chain. So, the first DAE is daisy-chained to the third DAE designated as EA1/Bus 1, the second DAE is daisy-chained to the fourth DAE designated as EA2/Bus 0, and so on.

The DAEs shown in [Figure 51 on page 62](#) are:

Note: The DAE colors shown in the example are orange for Bus 0 and blue for Bus 1.

- ◆ EA0/Bus 1, blue DAE, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- ◆ EA0/Bus 1, blue DAE, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- ◆ EA1/Bus 0, orange DAE, DPE to 2nd DAE (labels SP A SAS 0 to LCC A)
- ◆ EA1/Bus 0, orange DAE, DPE to 2nd DAE (labels SP B SAS 0 to LCC B)

So, the cabling for Bus 1 is interleaved and daisy-chained through the remaining DAEs starting with:

- ◆ EA1/Bus 1

While the cabling for Bus 0 is interleaved and daisy-chained through the remaining DAEs starting with:

- ◆ EA2/Bus 0

The remaining cabling is daisy-chained for load balancing.

Note: In this example, Bus 0 is indicated with orange DAEs and Bus 1 is indicated with blue DAEs.

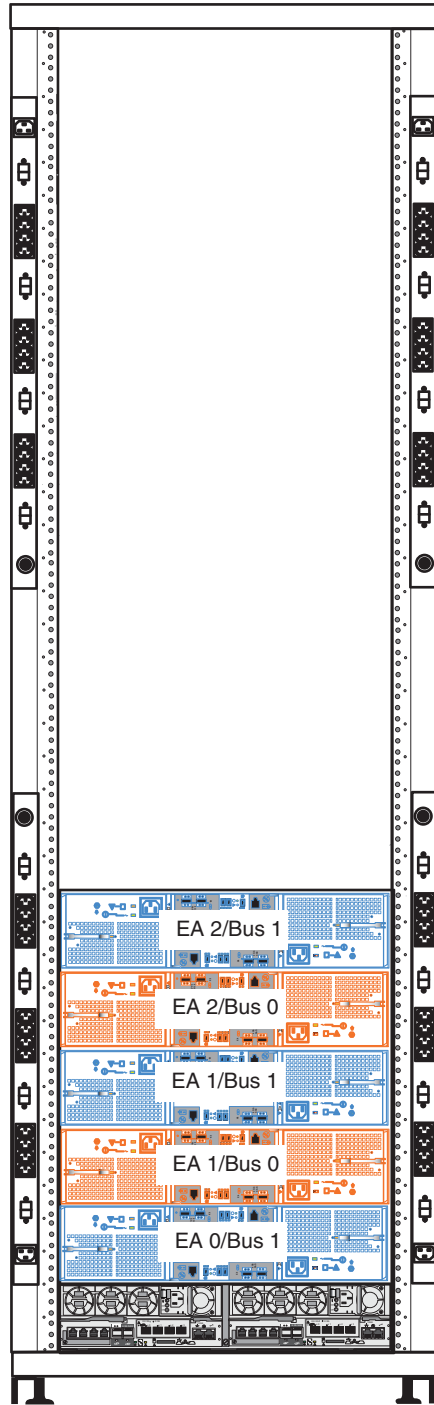


Figure 51 Example of the VNXe3200 platform with five interleaved DAEs (2U, 25 disks)

Stacked cabling with five DAEs in a VNXe3200 platform

[Figure 52 on page 64](#) shows a third example of a VNXe3200 platform with five DAEs (all are 2U, 25 disk drive DAEs) or a VNXe3200 platform with a total of 150 disk drives (including the DPE, a 2U, 25 disk drive device).

In the example ([Figure 52 on page 64](#)), the rack accommodates five DAEs (three DAEs for Bus 1 and two DAEs for Bus 0) along with the VNXe3200 system.

As described previously, the mini-SAS HD ports on the VNXe3200 platform DPE are labeled **0** and **1**. Mini-SAS HD 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since five DAEs are available for a maximum of 125 disk drives, it is recommended that the DAEs be load balanced. To do this, it is recommended that you daisy-chain the DAEs for the most efficient load balancing. So, in [Figure 52 on page 64](#), two buses (Bus 0 and Bus 1) are available with the third DAE on Bus 0 designated as EA1/Bus 0 (orange DAE). The first DAE starts with Bus 1 and is designated as EA0/Bus 1 (blue DAE). Then, the rest of the DAEs are stacked in a daisy-chain. So, the first DAE is daisy-chained to the second DAE designated as EA1/Bus 1, the third DAE is daisy-chained to the fourth DAE designated as EA2/Bus 0, and so on.

The cables shown in [Figure 52 on page 64](#) are:

Note: The DAE colors shown in the example are orange for Bus 0 and blue for Bus 1.

- ◆ EA0/Bus 1, blue DAE, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- ◆ EA0/Bus 1, blue DAE, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- ◆ EA1/Bus 0, orange DAE, DPE to 4th DAE (labels SP A SAS 0 to LCC A)
- ◆ EA1/Bus 0, orange DAE, DPE to 4th DAE (labels SP B SAS 0 to LCC B)

So, the cabling for Bus 1 is stacked and daisy-chained through the remaining DAEs starting with:

- ◆ EA1/Bus 1

While the cabling for Bus 0 is stacked and daisy-chained through the remaining DAEs:

- ◆ EA2/Bus 0

Note: In this example, Bus 0 is indicated with the orange DAEs and Bus 1 is indicated with the blue DAEs.

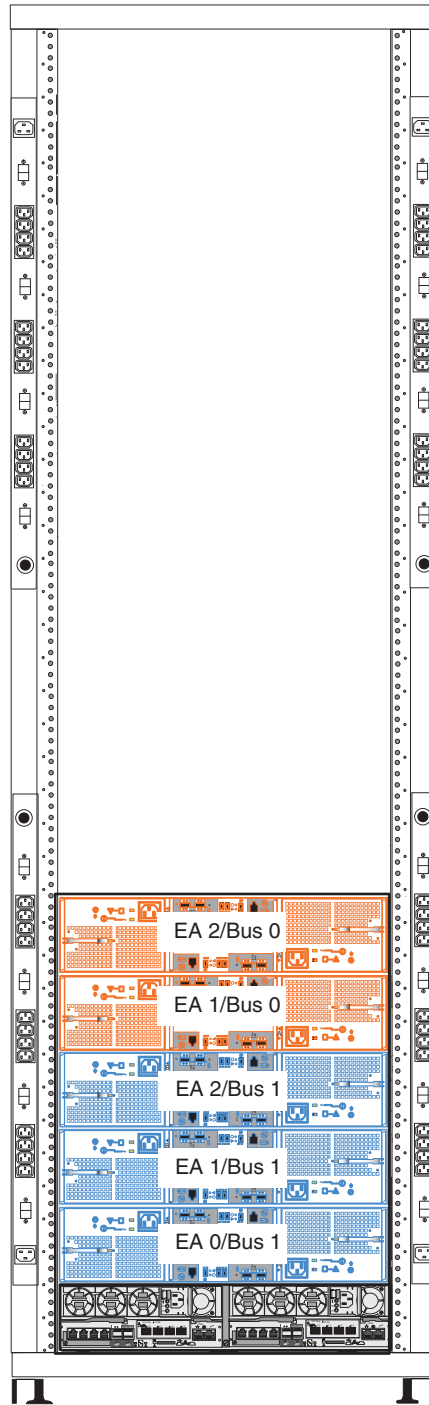


Figure 52 Example of the VNXe3200 platform with five stacked DAEs (2U, 25 disks)

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