Dell EMC PowerEdge MX5016s and MX5000s

Installation and Service Manual

Regulatory Model: E04B Series and E21M Series
Regulatory Type: E04B002 and E21M001
July 2021
Rev. A02

DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1

About this document

This document provides an overview on the storage sled and SAS IOM module, installation, and replacement of the components and their technical specifications.

2

System overview

Topics:

Dell EMC PowerEdge MX5016s sled overview

The PowerEdge MX5016s is a Storage Sled installed in the PowerEdge MX7000 enclosure to provide disk expansion for PowerEdge MX series Compute Sleds. In the PowerEdge MX7000 enclosure, the PowerEdge MX5016s is connected through an internal SAS fabric (Fab-C). The PowerEdge MX5000s provides flexible SAS connectivity between compute sleds, and internal storage sleds connected to the MX7000 enclosure.

PowerEdge MX5016s supports up to:

- 16 hot-swappable 2.5-inch SAS drives
- Two hot-swappable expanders providing dual SAS paths for all drives(HDDs/SSDs)
- Dual x4 SAS links to the MX platform infrastructure
- 12 GB/s SAS support

NOTE: All instances of SAS hard drives and SSDs are referred to as drives in this document, unless specified otherwise.

Inside the sled

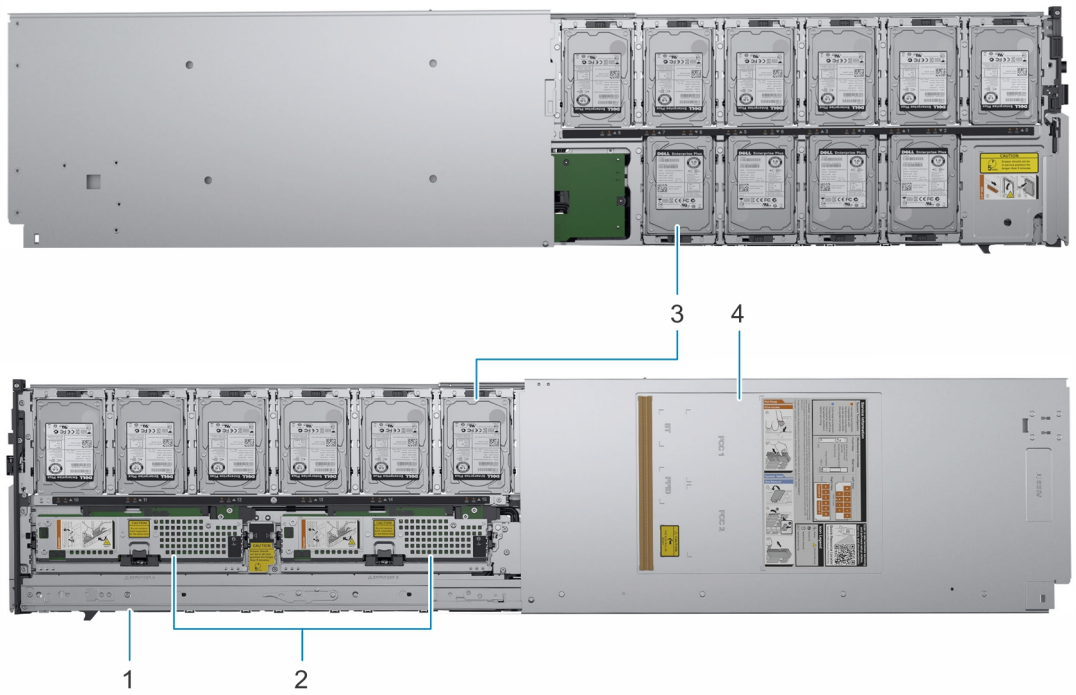


Figure 1. Inside the MX5016s sled

1. Slide rail
2. Expander modules
3. Drives
4. Sled cover

Front view of the sled

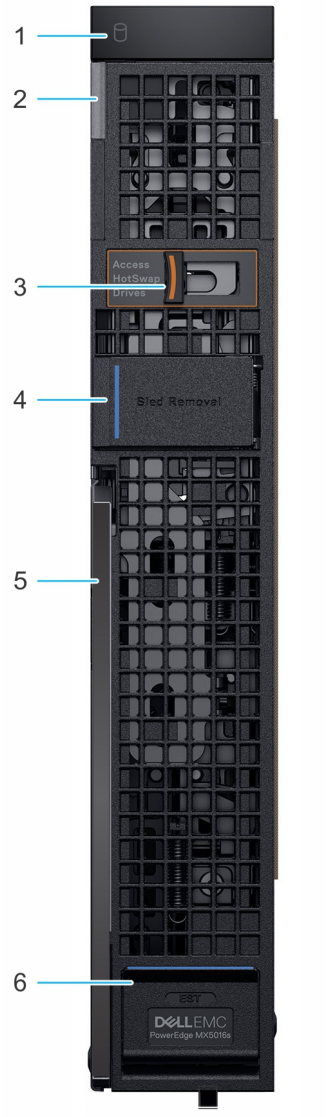


Figure 2. Front view of the sled

1. Drive status indicator
2. System health and system ID indicator
3. Drive drawer release latch
4. Sled removal hatch
5. Sled release lever
6. Information tag panel

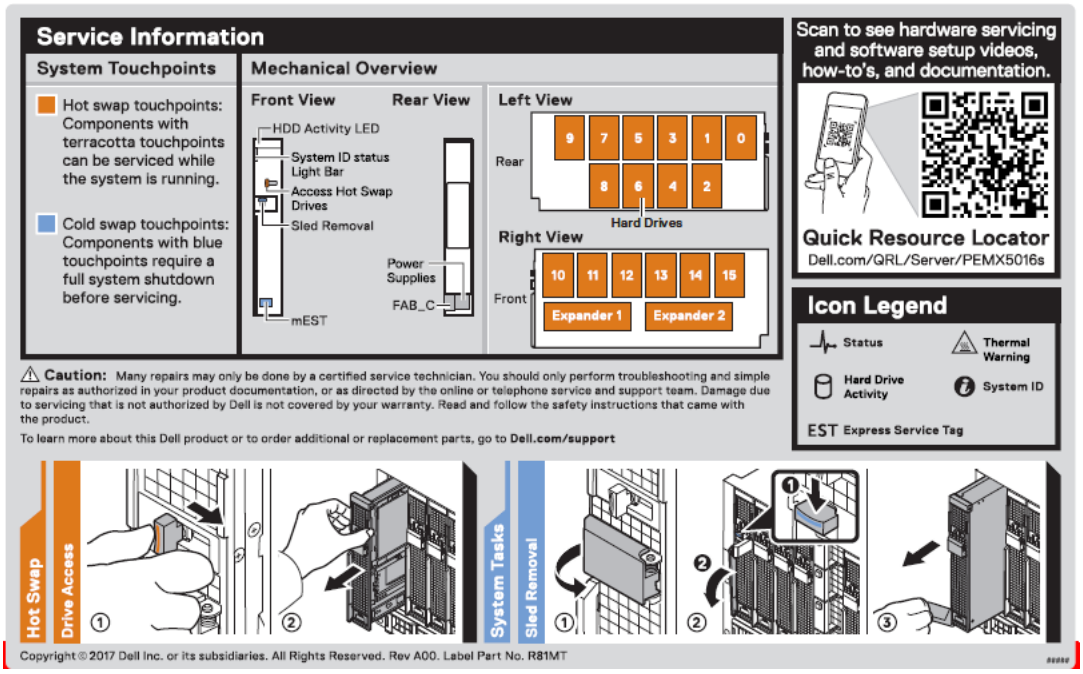
Locating the Service Tag of your system

You can identify your system using the unique Express Service Code and Service Tag. Open the Information tag panel on the front of the system to view the Express Service Code and Service Tag. Dell uses this information to route support calls to the appropriate personnel.

Figure 3. Information tag panel

System information label

Dell EMC PowerEdge MX5016s – Service information



Dell EMC PowerEdge MX5000s SAS IOM overview

The Dell EMC PowerEdge MX5000s is a redundant, hot-swappable SAS switch solution for the Dell EMC PowerEdge MX7000 enclosure.

It is designed to use with the Dell EMC PowerEdge MX5016s storage sleds and SAS controllers that are installed in compute sleds. The IOM facilitates SAS Storage subsystem, drive assignments, reporting health status and event logs for the associated SAS devices. You can manage SAS fabric by using the OpenManage Enterprise-Modular user interface to view inventory, storage event logs and manage drive or enclosure assignments.

Front view of PowerEdge MX5000s module

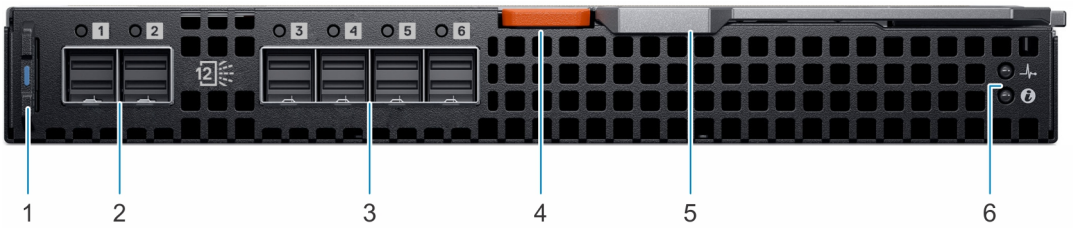


Figure 4. Front view of the PowerEdge MX5000s module

1. Information tag
2. External SAS ports (1 & 2)
3. External SAS ports (3, 4, 5 & 6)
4. Release lever button
5. Release lever
6. LED indicators

3

Initial system setup and configuration for MX5016s

After you receive your PowerEdge MX5016s system, you must set up your system in the enclosure.

NOTE: In order to reduce the chassis weight, Dell Technologies recommends removing the pre-installed storage sled from the enclosure, before installing the enclosure on the rack.

In the PowerEdge MX7000 enclosure, drives inside a Storage Sled map to Compute Sleds. The PowerEdge MX7000 enclosure supports multiple Storage Sled to compute sled-mapping configurations.

Each slot in the MX7000 chassis supports a compute sled or a storage sled, and there are no fixed mappings for the sleds. Using the OpenManage Enterprise-Modular web interface the disks in a storage sled can be mapped to a compute sled with the following options:

- Map an entire storage sled (Enclosure- Assigned Mode) to a compute sled.
- Map a specified group of disks (Drive- Assigned mode).

Mapping requirements and restrictions:

- Each compute or storage sled has two x4 SAS paths, with one path connecting to each of the two Fabric-C IOMs.
- The SAS storage solution requires two MX5000s IOMs installed in Fabric-C to provide redundant path.
- IOM C1 connects to Expander 1 in each of the installed Storage Sleds.
- IOM C2 connects to Expander 2 in each of the installed Storage Sleds.
- Each Expander within a storage sled connects to all 16 SAS drives, providing redundant paths.
- Any compute sled intended to connect to the SAS storage must have a Fab-C mezzanine card installed (either the HBA330 MMZ or the PERC MX745P).
- Compute sleds with the MX745P controller option may also choose to use the internal drives on the compute sled, within the same virtual drive as drives within a mapped storage sled.
- In Drive-Assigned mode, disks are visible to only a single compute sled, and can be assigned in any order or quantity.
- In Enclosure-Assigned mode, all 16 drive slots are mapped to the selected compute sled. In this mode, more than one compute sled can be mapped to the storage sled, which means the disks are visible to more than one compute node simultaneously.

NOTE:

The Enclosure assigned shared mode requires the use of only Windows 2016 operating system and is not supported with the PERC MX745P. The MX5016s is listed on Microsoft's Windows Server Catalog as Storage Spaces capable storage for Windows Server 2016 x64: https://www.windowsservercatalog.com

This is currently the only clustered file system/OS that is supported in Enclosure assigned shared mode.

Topics:

Setting up your system

- For initial setup when the enclosure is powered off, perform the following steps:
  1. Install the Compute Sleds, Storage Sleds, and SAS IOM modules.
  2. Power on the enclosure.

     NOTE: The system is powered on and the initialization of first SAS IOMs, Storage Sleds, and then the Compute Sleds occurs.

3. Log in to the OpenManage Enterprise-Modular user interface to assign the Storage Sleds to the compute sled slots. For more information, see the *OpenManage Enterprise-Modular User's Guide* at www.dell.com/openmanagemanuals > Chassis Management Controllers.

- For initial setup during System Maintenance, when the enclosure is already powered on, perform the following steps:
  1. Power off the compute sleds to which the Storage Sled is to be assigned.
  2. Install the Storage Sled.
  3. Using the systems management software, assign Storage Sled to the Compute Sleds. For more information, see the *OpenManage Enterprise-Modular User's Guide* at www.dell.com/openmanagemanuals > Chassis Management Controllers.

Storage sled mapping configurations

The expander modules within a Storage Sled map the drives in the Storage Sled to Compute Sleds in the enclosure. The PowerEdge MX7000 enclosure supports multiple Storage Sled to compute sled-mapping configurations.

NOTE: Storage Sled configurations map storage sled drive bays to Compute Sleds in the enclosure.

Drive assignment

Each slot in the PowerEdge MX7000 chassis supports a Compute Sled or a Storage Sled, and there are no fixed mappings for the sleds. Using the OpenManage Enterprise-Modular web interface the disks in a storage sled can be mapped to a Compute Sled that gives you the following options:

- Enclosure-Assigned mode
- Drive-Assigned mode

Enclosure-Assigned mode:

- All the drives in the PowerEdge MX5016s are assigned to the selected compute sleds.
- The Fab-C Mezz controller can be either PERC H745P MX, or HBA330 MMZ. Enclosure assignment mode is required if the PowerEdge MX5016s is to be shared between multiple compute sleds (that is clustered). Only HBA330 MMZ controller supports shared assignments.

  NOTE:

  The Enclosure assigned shared mode requires the use of only Windows 2016 operating system and is not supported with the PERC MX745P. The MX5016s is listed on Microsoft's Windows Server Catalog as Storage Spaces capable storage for Windows Server 2016 x64: https://www.windowsservercatalog.com

  This is currently the only clustered file system/OS that is supported in Enclosure assigned shared mode.

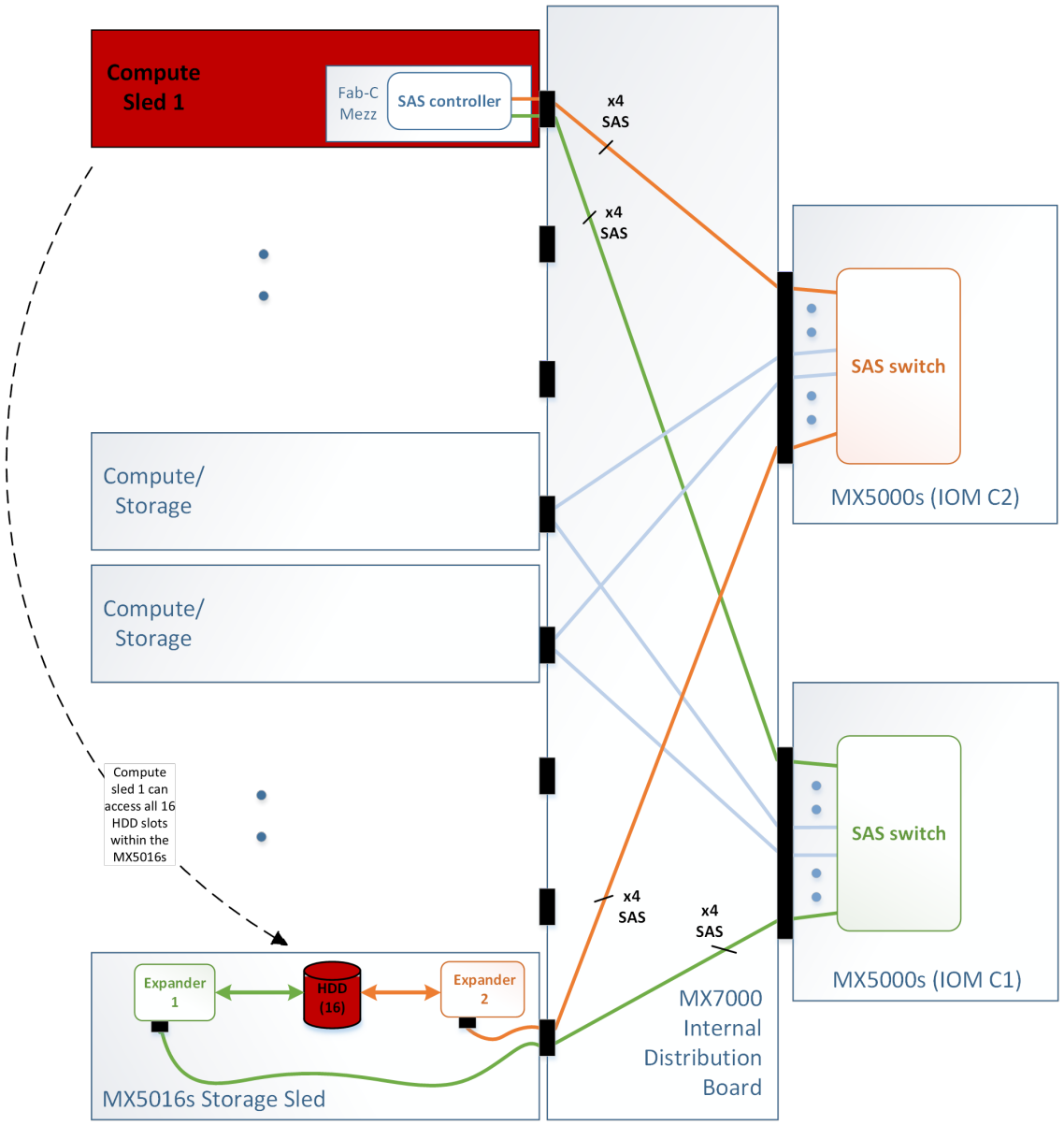


Figure 5. Enclosure-Assigned mode

Drive-Assigned mode:

- A specified group of disks is assigned.
- Drive-Assigned mode assigns the individual drive from the PowerEdge MX5016s to another compute sleds (but cannot be assigned to more than one sled simultaneously). The Fab-C Mezz controller on the mapped compute sled can be either a PERC H745P MX, or HBA330 MMZ.

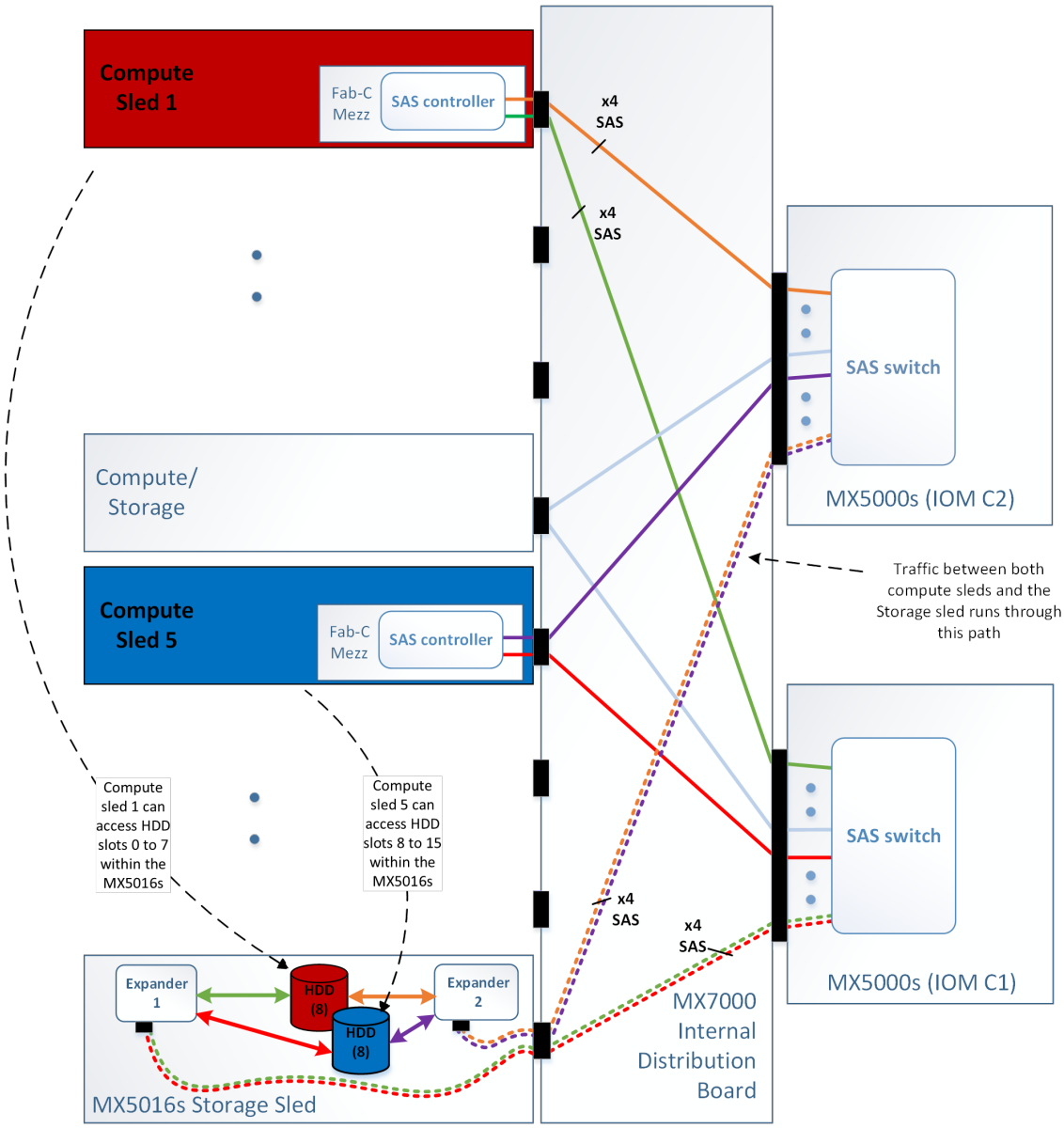


Figure 6. Drive-Assigned mode

4

Installing and removing system components

This section provides information about installing and removing the storage sled components. For information about removing and installing the compute sled components, see the relevant sled *Installation and Service Manual* at www.dell.com/poweredgemanuals.

Topics:

Safety instructions

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that are shipped with your product.

NOTE: It is recommended that you always use an antistatic mat and antistatic strap while working on components inside the system.

CAUTION: To ensure proper operation and cooling, all bays in the system must be populated always with a component or a blank.

Recommended tools

You may need the following items to perform the procedures in this section:

Figure 7. Recommended tools

- Phillips #1 screwdriver
- Wrist grounding strap

Storage sled

Removing the sled from the enclosure

Prerequisites

1. Follow the safety instructions listed in Safety instructions.
2. Turn off the compute sleds to which the storage sled is assigned.

   NOTE:

   a. After compute sleds that are mapped to the storage sled are powered off, the drive status indicator on the storage sled turns off, indicating it is safe to remove the storage sled.

   b. If you are permanently removing the sled, install a sled blank. Operating the enclosure for extended periods of time without a sled blank that is installed can cause the enclosure to overheat.

   c. If the storage sled is not going to be reinstalled, and then Dell EMC recommends clearing the drive or enclosure assignment for that storage sled.

   d. If the same storage sled is reinstalled, the drive assignments are not cleared and restored when the storage sled is detected again.

   e. If the sled is replaced, the previous drive assignments cannot be restored. New drive assignments should be made for a new sled, even if the same drives from the previously assigned sled are used.
3. If applicable, install the I/O connector cover.

   CAUTION: To prevent damage to the I/O connectors, ensure that you cover the connectors when you remove the system from the enclosure.

CAUTION: Removing the storage sled from the enclosure when the storage sled is mapped to a compute sled that is powered on can result in data loss.

Steps

1. Open the sled removal hatch on the front panel of the sled.
2. Press the release button down to release the sled removal handle.
3. Using the sled removal handle, pull the sled out of the enclosure.

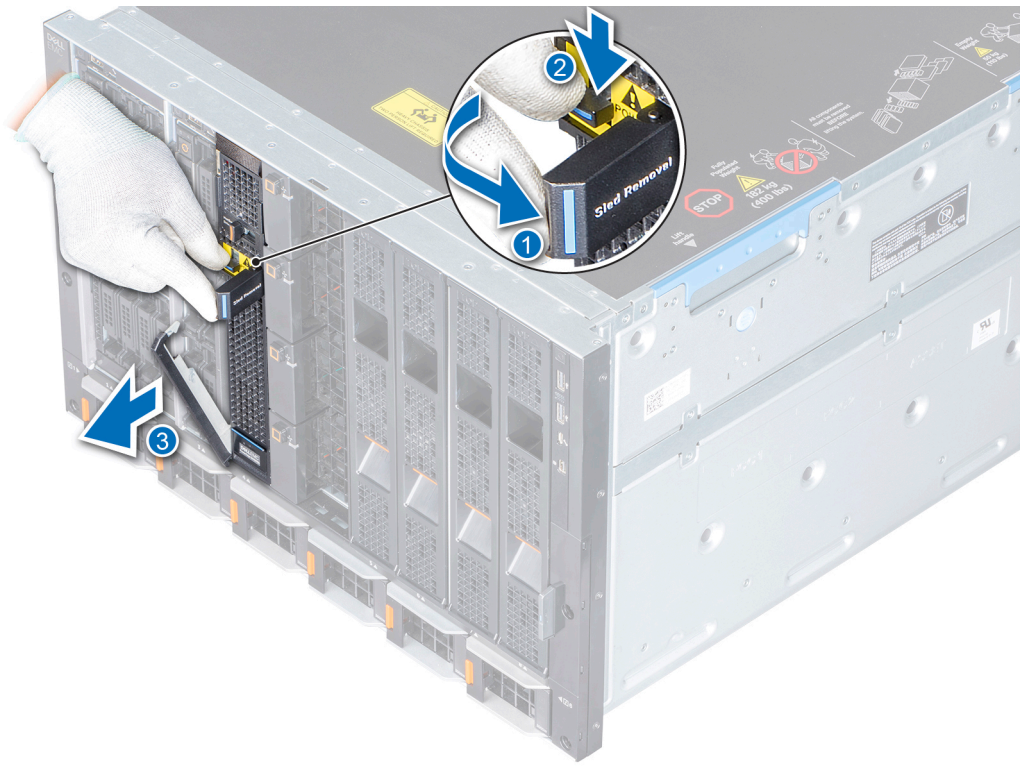


Figure 8. Removing a sled from the enclosure

Next steps

Replace the sled into the enclosure or sled blank.

Installing the sled into the enclosure

Prerequisites

1. Follow the safety instructions listed in Safety instructions.
2. Remove the blank, if installed.
3. Remove the I/O connector cover from the sled, if installed.

CAUTION: To prevent damage to the I/O connectors, do not touch the connectors or the connector pins.

Steps

1. Hold and slide the sled into the enclosure.
2. Lock the sled removal handle to ensure that sled is firmly seated into the enclosure.

Figure 9. Installing the sled into the enclosure

Next steps

Restart the compute sled using the OpenManage Enterprise- Modular interface and assign the storage sled if not already assigned, power on the compute sleds to which the storage sled is mapped.

Drive drawer

NOTE: The enclosure fans may spin at a higher speed, to provide extra cooling when the drive drawer is opened. After five minutes the fans speed increases to their maximum with the storage sled health indicator blinking amber.

CAUTION:

1. **The drive drawer should not be in service position for longer than five minutes at 35°C condition, to maintain proper thermal temperature.**
2. **The drive drawer should not be in service position for longer than three minutes at fresh air environment, to maintain proper thermal temperature.**

Opening the drive drawer

Prerequisites

Follow the safety guidelines listed in Safety instructions.

Steps

1. To unlock the drawe, Slide the drive drawer release latch.
2. Pull the drive drawer out of the sled.

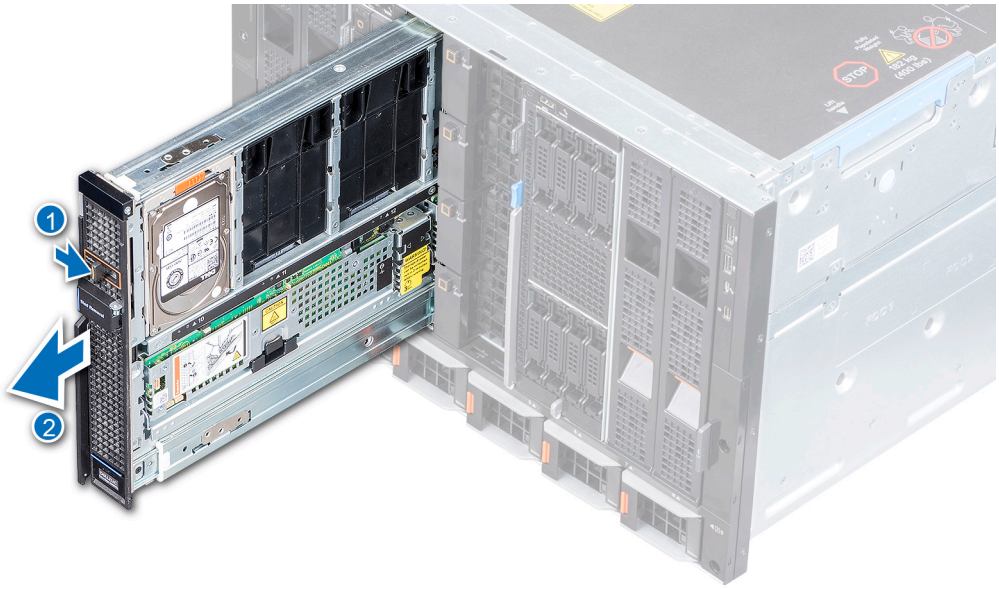


Figure 10. Opening the drive drawer

Next steps

Remove or install the following components as applicable:

- Remove a hard drive blank or install a hard drive blank
- Remove a hard drive carrier or install a hard drive carrier
- Remove an expander module or install an expander module

Closing the drive drawer

Prerequisites

Follow the safety guidelines listed in. Safety instructions

Steps

Slide the drive drawer into the sled until it is fully seated and clicks into place.

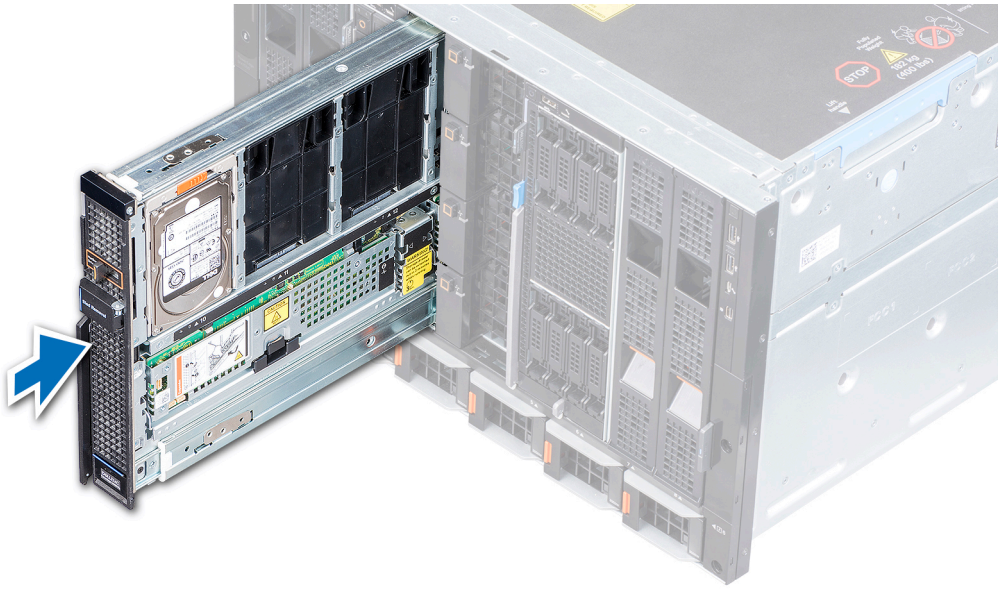


Figure 11. Closing the drive drawer

Drives

MX5016s supports sixteen hot-swappable 2.5-inch SAS drives. Drives numbered 0 to 9 are at the left side of the enclosure, and 10 to 15 are at the right side of the enclosure.

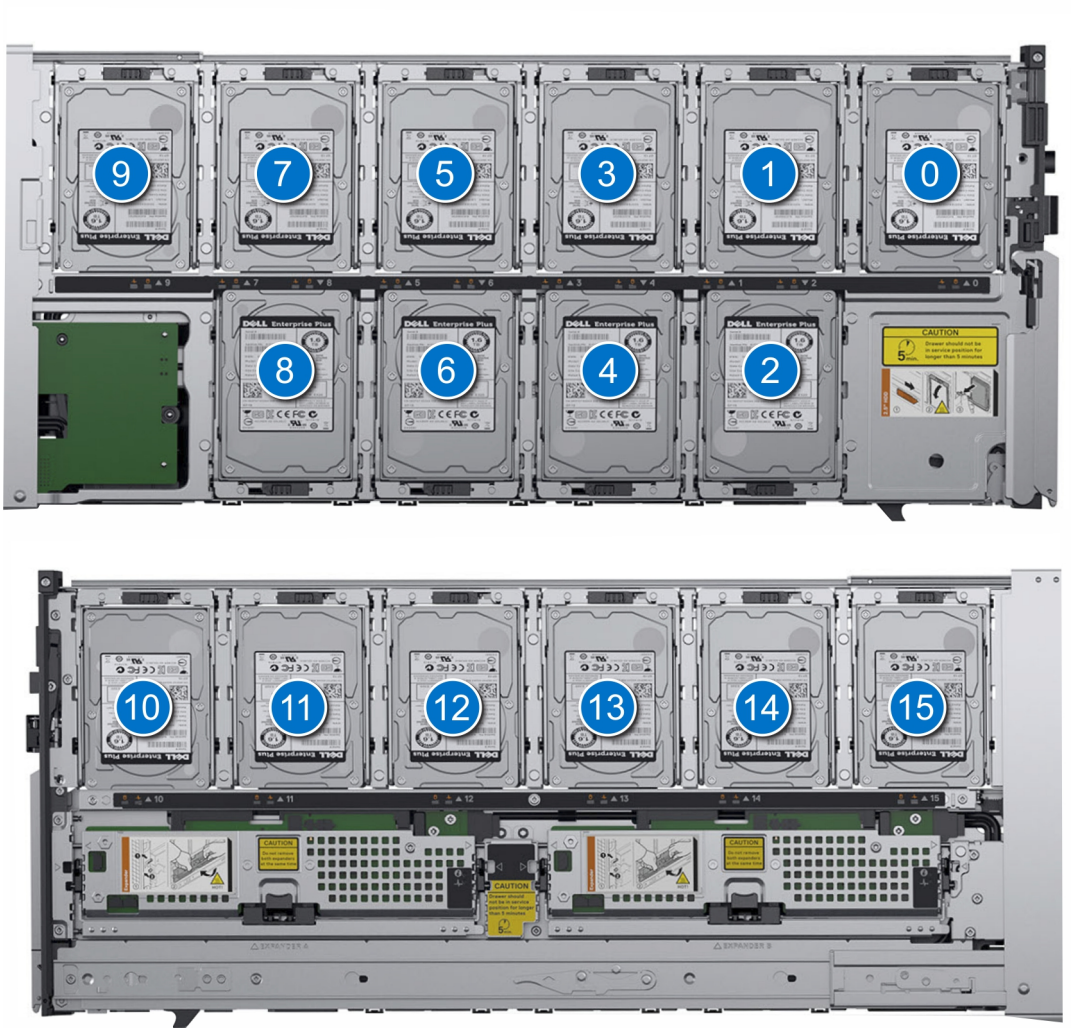


Figure 12. Drive numbering

Removing a drive blank

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.

Steps

1. Hold and press the touch points on the blank to disengage the guides on the blank from the drive slot.
2. Lift the blank away from the drive slot.

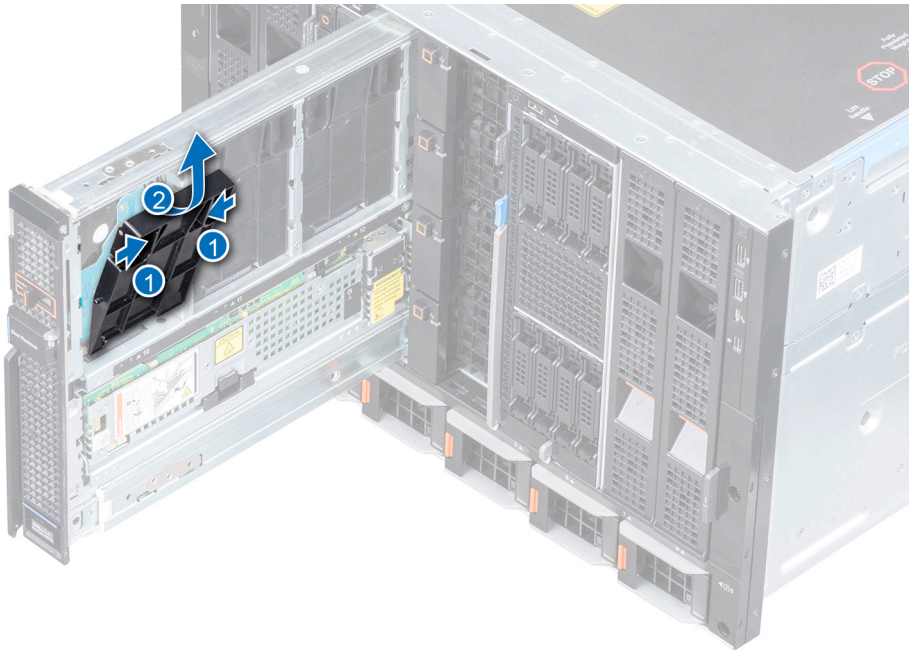


Figure 13. Removing a drive blank

Next steps

Installing a drive carrier.

Installing a drive blank

Prerequisites

NOTE: Ensure that the hard drive blanks are installed for the proper airflow if hard drives are not installed in the sled.

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.

Steps

1. Align and insert the guides on the blank into the drive slot.
2. Push the blank downwards until it is firmly seated in the slot.

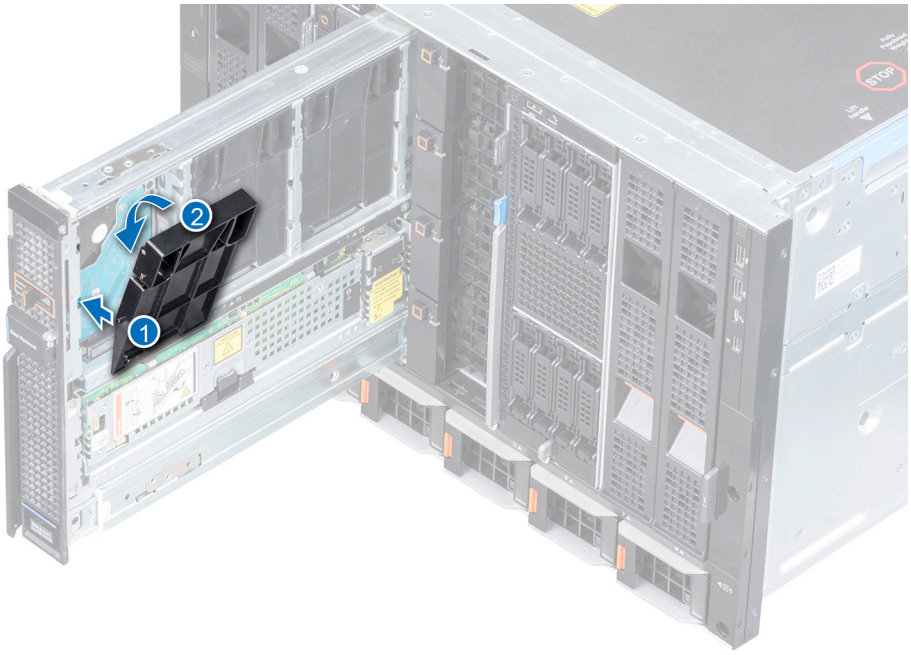


Figure 14. Installing a drive blank

Next steps

Close the drive drawer.

Removing a drive carrier

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.
3. Using the management software, prepare the drive for removal. For more information about management software, see OpenManage Enterprise-Modular User's Guide www.dell.com/openmanagemanuals > Chassis Management Controllers If the drive is online, the drive indicator flashes. You can remove the drive when the drive indicator turns off.

Steps

1. Slide the release tab on the drive carrier to unlock the handle.
2. Using the handle, disconnect the drive from the slot.
3. Using handle, lift the drive carrier out of the drive slot.

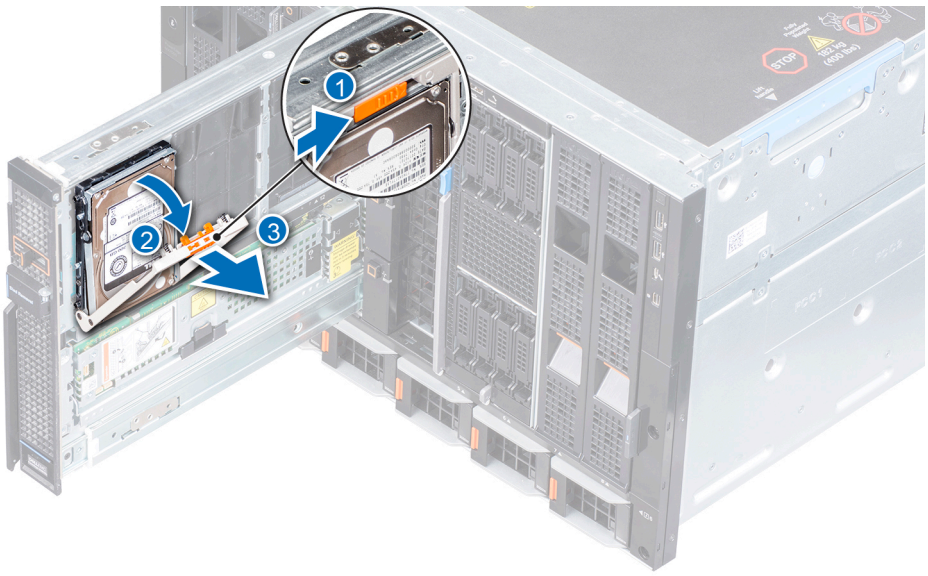


Figure 15. Removing a drive from drive slot

Next steps

1. Install a drive blank
2. Install a drive carrier
3. Close the drive drawer.

CAUTION: Sled drawer should not be open for more than three minutes while the enclosure is on to maintain proper thermal temperature.

Installing a drive carrier

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.
3. Ensure that the drive handle is fully open.
4. Remove the drive blank, if installed.

Steps

1. Using the handle, align the guides on the drive carrier with the slots on the drive drawer.
2. Close the handle to secure the drive in place.

Figure 16. Installing a drive carrier

Removing a drive from the drive carrier

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.
3. If you are replacing an existing drive, use the management software to prepare the drive/SSD for removal. For more information about management software, see the OpenManage Enterprise Modular User's Guide available at www.dell.com/openmanagemanuals > Chassis Management Controllers

   NOTE: If the drive is online, the drive indicator flashes as the drive is turned off. You can remove the drive when the drive indicator turns off.
4. Remove the drive carrier from the drive slot.

Steps

1. Using Phillips #1 screwdriver, remove the four screws that secure the drive carrier to the drive.
2. Lift the drive carrier away from the drive.

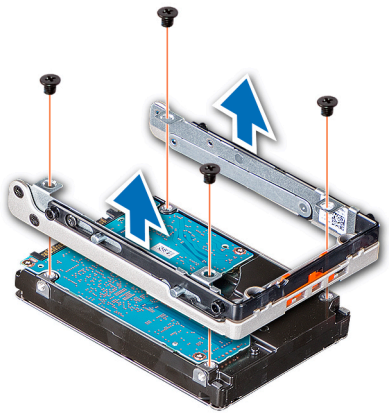


Figure 17. Removing a drive from the drive carrier

Next steps

Replace the drive.

Installing a drive into the drive carrier

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.
3. Remove the drive carrier from the drive slot.

Steps

1. Insert the drive into the drive carrier with the connector end of the drive towards the back of the carrier.
2. Align the screw holes on the drive with the screw holes on the drive carrier.
3. Using the Phillips #1 screwdriver, tighten the screws to secure the drive to the drive carrier.

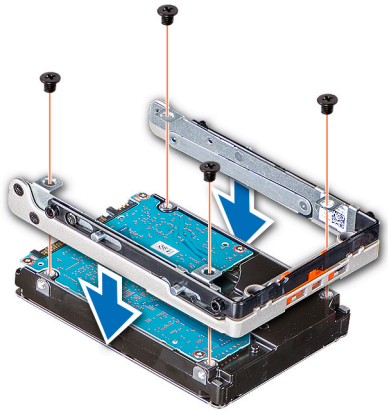


Figure 18. Installing a drive into the drive carrier

Storage expander module

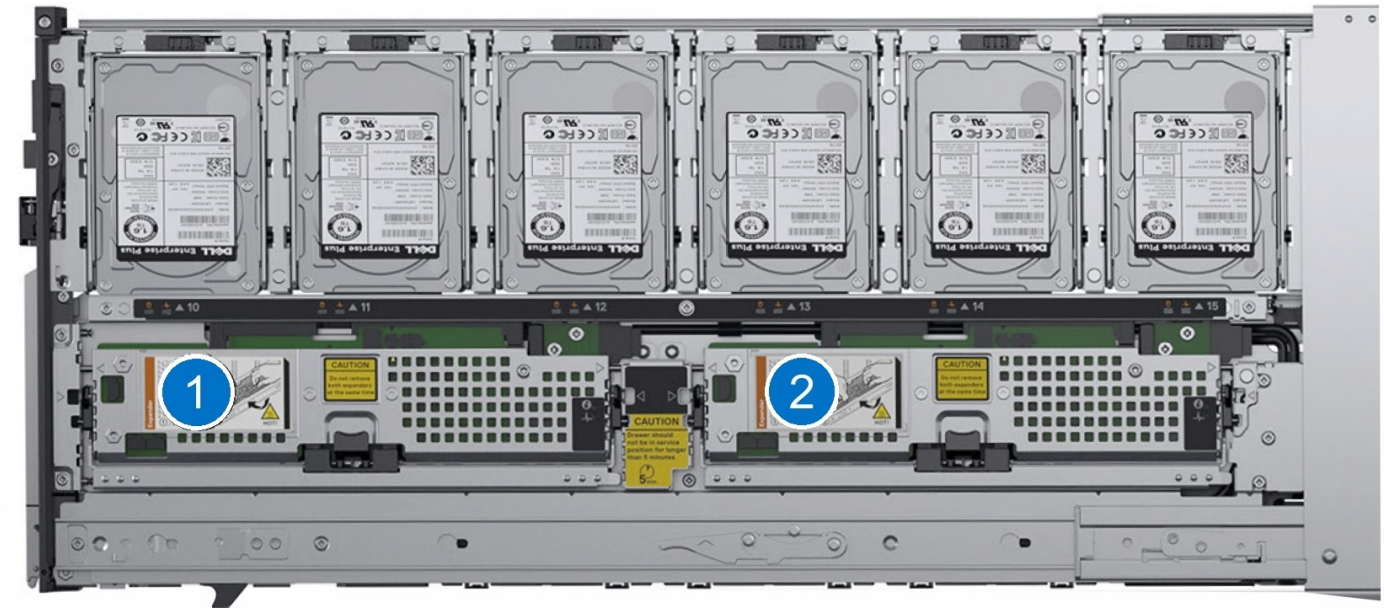


Figure 19. SAS expander modules

Removing an expander module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.

CAUTION: The sled is not designed to function on a single expander module. It is mandatory that both the modules be present in the sled for optimum performance.

CAUTION: Do not remove both expander modules when sled is powered on. Removing both the expander at once causes critical failure of the enclosure which can only be recovered after a power cycle of the storage sled.

CAUTION: Sled should not be open for more than three minutes while the enclosure is on.

CAUTION: Some of the components on the back of the expander may be hot to touch.

NOTE: System health indicator blinks amber to indicate loss of redundancy when an expander module has failed or has been removed.

NOTE: If you remove an expander that is mapped to a compute sled, the ongoing I/O operations are interrupted.

Steps

1. Press the release button to unlock the expander module lever.
2. Lift the expander module lever until the expander module disengages from the module slot.
3. Remove the expander module out of the system.

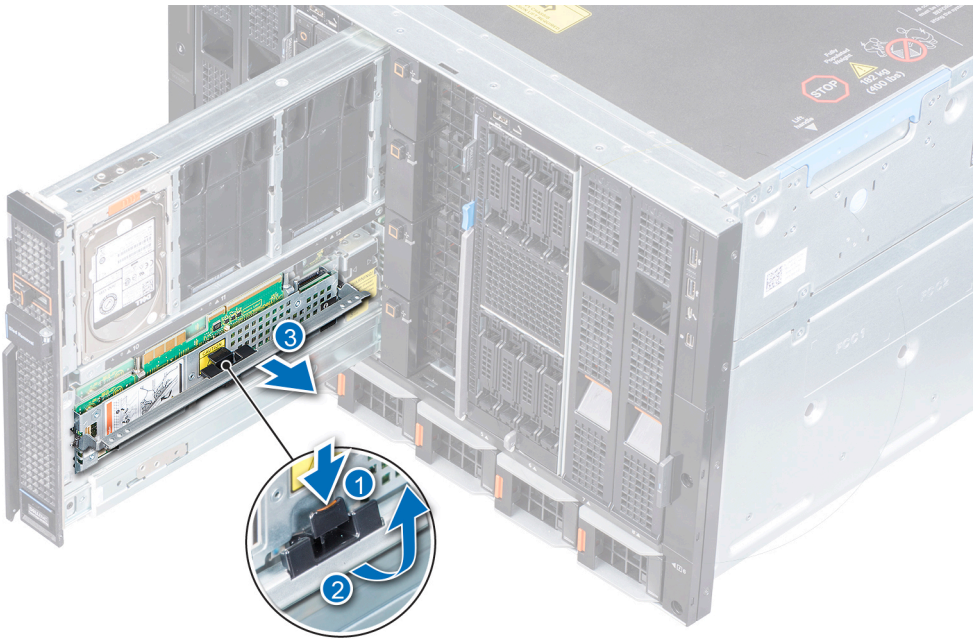


Figure 20. Removing an expander module

Next steps

1. Replace the expander module.
2. Close the drive drawer.

Installing an expander module

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Open the drive drawer.

Steps

1. Align the expander card to the connector slot.
2. Press the expander card lever down until it firmly seats into the expander slot.

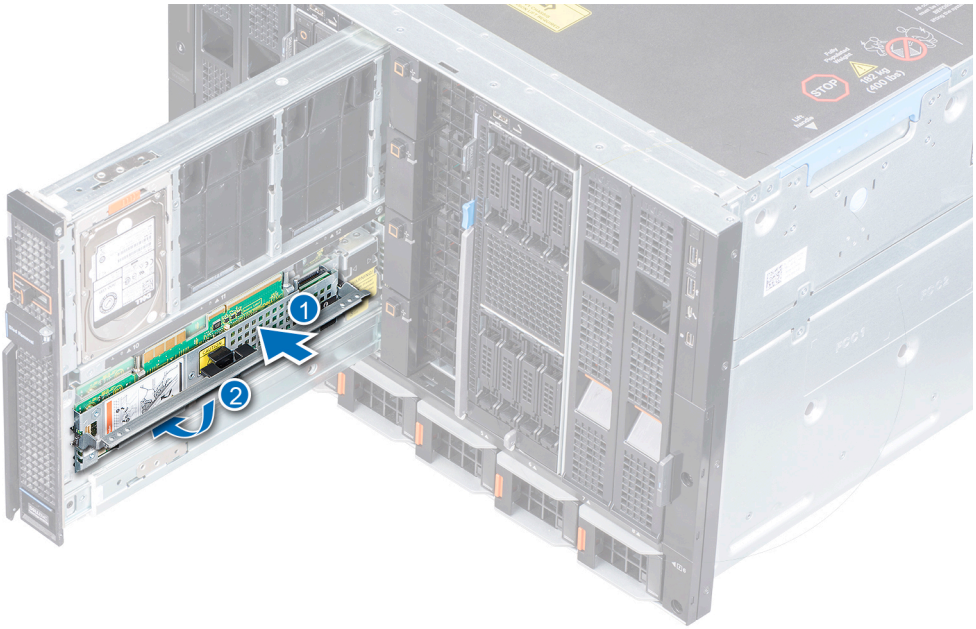


Figure 21. Installing an expander module

Next steps

1. Ensure that the expander modules have the same firmware version. If there is a firmware mismatch, the LED indicator flashes an error sequence. For more information about the Expander LED health indicators, see Expander health status indicators.
2. Close the drive drawer.

SAS IOM module

Removing a MX5016s blank from Fabric C slot

Steps

1. Press the release button to release the blank.
2. Pull the blank out of the enclosure.

NOTE: To maintain proper airflow, ensure that the blanks are installed if the MX5016s is not installed.

Figure 22. Removing a blank from Fabric C slot

Next steps

1. Install the module in the Fabric C slot or a blank.

Installing a MX5016s blank in Fabric C slot

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.
2. Remove the module from Fabric C slot.

Steps

1. Align and insert the blank in the empty slot.
2. Push the blank until it locks into place.

NOTE: If the MX5016s module is not installed, install blanks to maintain proper thermal temperature.

Figure 23. Installing a blank in Fabric C slot

Removing a MX5016s module from Fabric C slot

Prerequisites

NOTE: MX5016s storage sled does not support single SAS IOM configuration.

1. Follow the safety guidelines listed in Safety instructions.
2. If applicable, disconnect the cables that are connected to the modules.

Steps

1. Press the orange release button on the module to open the release lever.
2. Hold the release lever, and pull the I/O module out of the enclosure.

   NOTE: Ensure that you install MX5016s blank if you are removing a module permanently.

Figure 24. Removing a MX5016s module from Fabric C slot

Next steps

1. Install a module into Fabric C or Install a blank.
2. Connect the cables to the module.

Installing a MX5016s module into Fabric C slot

Prerequisites

1. Follow the safety guidelines listed in Safety instructions.

Steps

1. Align and push the I/O module into the enclosure.
2. Close the release lever to lock the module in place.

Figure 25. Installing a MX5016s module into Fabric C slot

Next steps

1. Connect the cables to the module.

NOTE: Ensure that the SAS IOMs have the same firmware version. The OpenManage-Enterprise modular allows you to view the firmware details. For more information, see *OpenManage Enterprise-Modular User's Guide*.

5

Technical specifications

The technical and environmental specifications of your system are outlined in this section.

Topics:

Sled dimensions

Table 1. System dimensions of the Dell EMC PowerEdge MX5016s

System	Height	Width	Depth(handle closed)
PowerEdge MX5016s	250.2 mm (9.85 inches)	42.15 mm (1.65 inches)	600.00 mm (23.62 inches)

Sled weight

Table 2. Dell EMC PowerEdge MX5016s system weight

System	Maximum weight
PowerEdgeMX5016s	12 kg (26.45 lbs)

Supported operating systems

The Dell EMC PowerEdge MX5016s supports the following operating systems:

Red Hat Enterprise Linux
Novell SUSE Linux Enterprise Server
Microsoft Windows Server
Ubuntu
VMware ESXi
Citrix Xen Server

For more information about the specific versions and additions, go to https://www.dell.com/support/home/Drivers/SupportedOS/poweredge-MX5016s

Storage expander specifications

The storage expander modules provide the storage subsystem for the drives in the PowerEdge MX5016s. The SAS expanders each connect to ports on all 16 HDDs. The first expander connects to port A of the first eight HDDs and port B of the second

eight HDDs. The second expander is the opposite and connects to port B of the first eight HDDs and port A of the other eight HDDs. There is also a SAS link between the expanders to facilitate communication/synchronization between the two expanders.

Drive specifications

The Dell EMC PowerEdge MX5016s supports the following drive types:

- Support for 10,000 RPM and 15,000 RPM 2.5-inch SAS drives.
- Support for 2.5-inch SAS SSD.
- Support for 7.2 K RPM 2.5-inch NearLine SAS drives.

NOTE: SATA and NVMe drives are not supported but mixing of rotational and SSD SAS drives is supported.

Module dimensions

Table 3. Dimensions of the Dell EMC PowerEdge MX5016s and MX5000s

System	Height	Width	Depth(handle closed)
PowerEdge MX5000s	27.50 mm (1.08 inches)	214.50 mm (8.44 inches)	208.30 mm (8.20 inches)
PowerEdge MX5016s	250.2 mm (9.85 inches)	42.15 mm (1.65 inches)	600.00 mm (23.62 inches)

Module weight

Table 4. Dell EMC PowerEdge MX5000s module weight

System	Maximum weight
PowerEdge MX5000s	1.5 kg (3.30 lb)

Environmental specifications

NOTE: For additional information about environmental measurements for specific system configurations, see **Dell.com/environmental_datasheets**.

Table 5. Temperature specifications

Temperature	Specifications
Storage	–40°C to 65°C (–40°F to 149°F)
Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°F) with no direct sunlight on the equipment.
Maximum temperature gradient (operating and storage)	20°C/h (68°F/h)

Table 6. Relative humidity specifications

Relative humidity	Specifications
Storage	5% to 95% RH with 33°C (91°F) maximum dew point. Atmosphere must be noncondensing always.
Operating	10% to 80% relative humidity with 26°C (78.8°F) maximum dew point.

Table 7. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.26 G_{rms} at 5 Hz to 350 Hz (all operation orientations).
Storage	1.87 G_{rms} at 10 Hz to 500 Hz for 15 min (all six sides tested).

Table 8. Maximum shock specifications

Maximum shock	Specifications
Operating	One shock pulse in the positive z axis of 31 G for 2.6 ms in the operational orientation.
Storage	Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71 G for up to 2 ms.

Table 9. Maximum altitude specifications

Maximum altitude	Specifications
Operating	3048 m (10,000 ft)
Storage	12,000 m (39,370 ft)

Table 10. Operating temperature de-rating specifications

Operating temperature de-rating	Specifications
Up to 35°C (95°F)	Maximum temperature is reduced by 1°C/300 m (1°F/547 ft) above 950 m (3,117 ft).
35°C to 40°C (95°F to 104°F)	Maximum temperature is reduced by 1°C/175 m (1°F/319 ft) above 950 m (3,117 ft).
40°C to 45°C (104°F to 113°F)	Maximum temperature is reduced by 1°C/125 m (1°F/228 ft) above 950 m (3,117 ft).

Expanded operating temperature

Table 11. Expanded operating temperature specifications

Expanded operating temperature	Specifications
Less than or equal to 10% of annual operating hours	5°C to 40°C at 5% to 85% RH with 29°C dew point. **NOTE:** Outside the standard operating temperature (10°C to 35°C), the system can operate continuously in temperatures as low as 5°C and as high as 40°C. For temperatures between 35°C and 40°C, de-rate maximum allowable dry bulb temperature by 1°C per 175 m above 950 m (1°F per 319 ft).
Less than or equal to 1% of annual operating hours	–5°C to 45°C at 5% to 90% RH with 29°C dew point. **NOTE:** Outside the standard operating temperature (10°C to 35°C), the system can operate down to –5°C or up to 45°C for a maximum of 1% of its annual operating hours. For temperatures between 40°C and 45°C, de-rate maximum allowable temperature by 1°C per 125 m above 950 m (1°F per 228 ft).

NOTE: When operating in the expanded temperature range, system performance may be impacted.

NOTE: When operating in the expanded temperature range, ambient temperature warnings maybe reported on the LCD panel and in the System event Log.

Particulate and gaseous contamination specifications

The following table defines the limitations that help avoid any equipment damage or failure from particulate and gaseous contamination. If the levels of particulate or gaseous pollution exceed the specified limitations and result in equipment damage or failure, you may must rectify the environmental conditions. Remediation of environmental conditions is the responsibility of the customer.

Table 12. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit. **NOTE:** This condition applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor. **NOTE:** Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles. **NOTE:** This condition applies to data center and nondata center environments.
Corrosive dust	• Air must be free of corrosive dust. • Residual dust present in the air must have a deliquescent point less than 60% relative humidity. **NOTE:** This condition applies to data center and nondata center environments.

Table 13. Gaseous contamination specifications

Gaseous contamination	Specifications
Copper coupon corrosion rate	<300 Å/month per Class G1 as defined by ANSI/ISA71.04-1985.
Silver coupon corrosion rate	<200 Å/month as defined by AHSRAE TC9.9.

NOTE: Maximum corrosive contaminant levels measured at ≤50% relative humidity.

6

System diagnostics and indicator codes

The diagnostic indicators on the system front panel display system status during system startup.

Topics:

PowerEdge MX5016s System diagnostics and indicators

System health indicator codes

The system health indicator is located on the front panel of the sled. The status indicators indicate the health condition of the PowerEdge MX5016s storage sled.

Table 14. Health status indicators codes

System health indicator codes	Condition
Solid blue	Indicates that the system is powered on, system is healthy, and system ID mode is not active.
Blinking blue	Indicates that the system ID mode is active.
Blinking amber	Indicates that the system is experiencing a fault. Check the System event log or the LCD panel, if available on the bezel, for specific error messages. For more information about error messages, see the *Dell Event and Error Messages Reference Guide* at www.dell.com/openmanagemanuals > **OpenManage software**.

Drive status LED indicators

Table 15. Drive status LED indicator

Drive status LED indicators	Condition
OFF	Indicates that the storage sled is not mapped to any compute sled, or that all compute sleds to which it is mapped are powered off. The storage sled is safe to remove in this case.
Solid green	Indicates that the storage sled is mapped to one or more compute sleds and that any of the mapped compute sleds is powered on.
Blinking green	Indicates that the storage sled is mapped to a compute sled and there is activity on any of the internal drives of the storage sled.

Table 15. Drive status LED indicator (continued)

Drive status LED indicators	Condition	
Blinking amber	Indicates that a drive within the storage sled has been marked as failed by the disk controller on a mapped compute sled.	

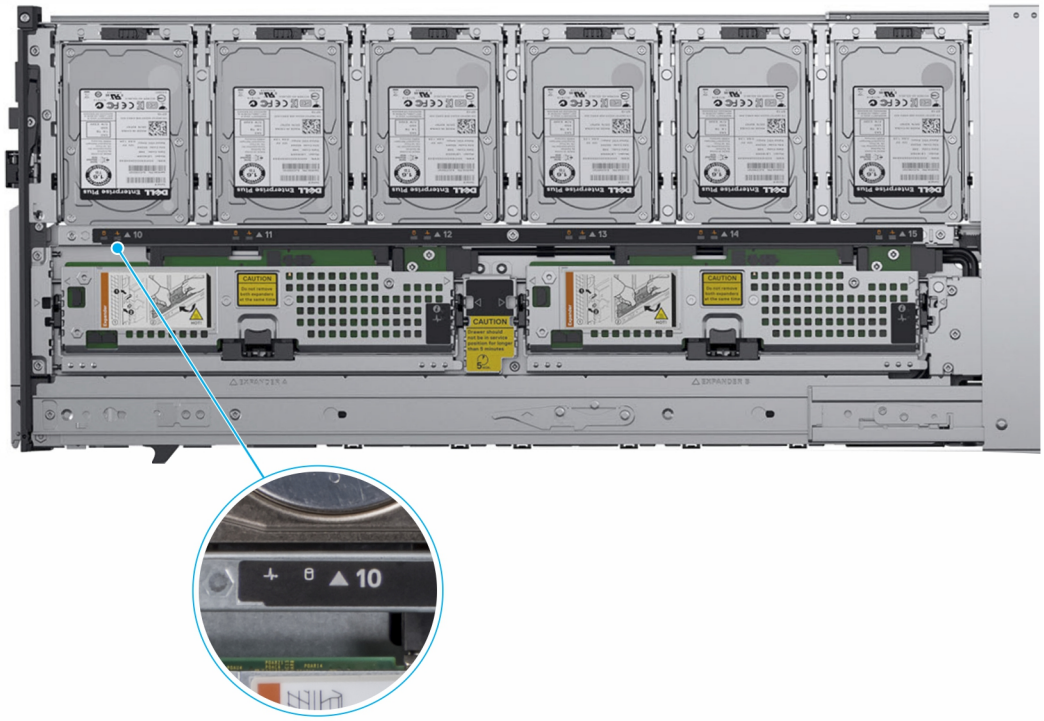


Figure 26. Drive status LED indicator

Table 16. Drive status LED indicator

Drive status indicators	Condition
Blinks green (On 250 ms Off 250 ms)	Identifying drive or preparing for removal
Off	Slot empty
Blinks green (500 ms), amber (500 ms), and turns off one second	Predicted drive failure
Blinks amber (On 150 ms Off 150 ms)	Drive failed
Blinks green (On 400 ms Off 100 ms)	Drive rebuilding
Solid green	Drive online
Blinks green three seconds, turns off three seconds, blinks amber three seconds, and turns off three seconds	Drives rebuild aborted

Expander health status indicators

Expander health status indicator indicates the health condition of the expander module and identification indicator helps to locate a particular expander card within the storage sled.

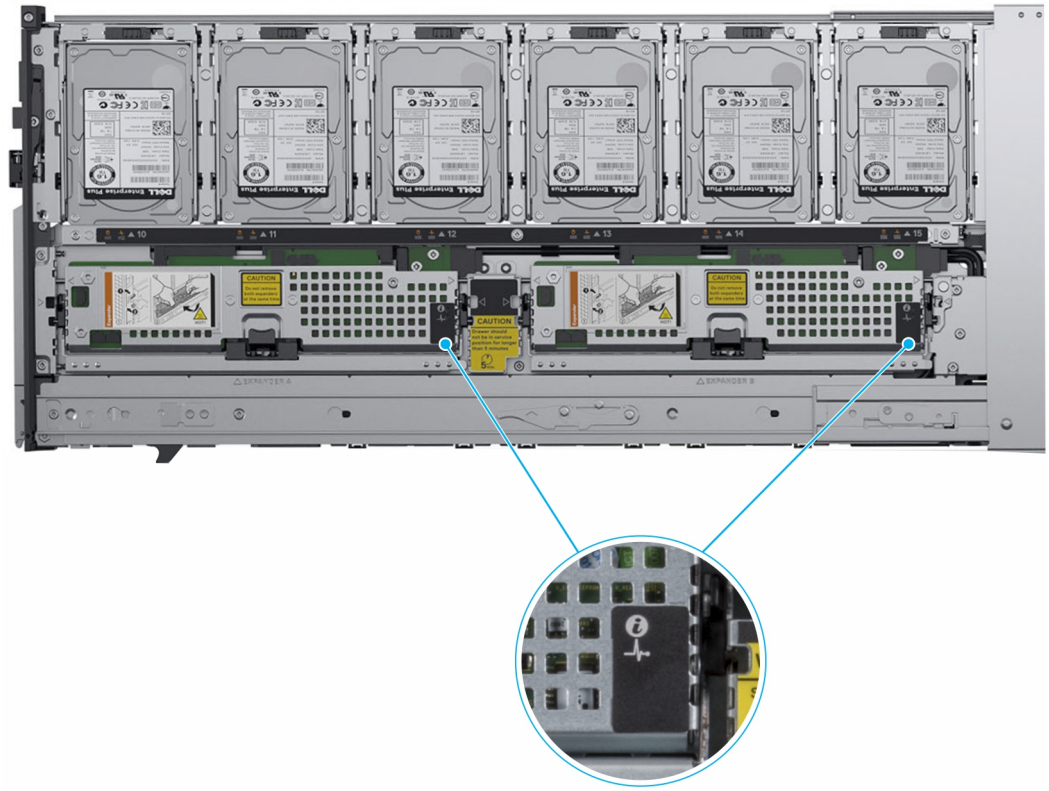


Figure 27. Expander health indicators

Table 17. Expander health status indicators

Indicator, Button, or Connector	Icon	Description	Condition
Identification indicator		Flashes blue for one second and then turns off. **NOTE:** LED is OFF, when no Identification in progress.	Identify
Diagnostic indicator		Green	Expander card in good health
		Flashes amber for two seconds and turns off.	Expander card failure
		Flashes continuous green for 5 times and then turns off for two seconds.	Expander firmware mismatch

PowerEdge MX5000s System diagnostics and indicator codes

LED indicators

The Dell EMC PowerEdge MX5000s LED indicators indicate the health condition of the PowerEdge MX5000s module and identification indicator helps to locate a particular PowerEdge MX5000s module.

Figure 28. Dell EMC PowerEdge MX5000s LED indicators

Table 18. Dell EMC PowerEdge LED indicators

Indicator, Button, or Connector	Icon	Description	Condition
Identification indicator		Flashes blue for one second and then turns off. **NOTE:** LED is OFF, when no Identification is in progress.	Indicates that the MX5000s module is active.
Diagnostic indicator		Green	Indicates that the MX5000s module in good health.
		Flashes amber for two seconds and turns off.	Indicates that the MX5000s module card failure.
		Flashes continuous green for five times and then turns off for two seconds.	Indicates that the MX5000s module firmware mismatch

7

Documentation resources

This section provides information about the documentation resources for your system.

To view the document that is listed in the documentation resources table:

- From the Dell EMC support site:
  1. Click the documentation link that is provided in the Location column in the table.
  2. Click the required product or product version.

     NOTE: To locate the product name and model, see the front of your system.
  3. On the Product Support page, click **Manuals & documents**.
- Using search engines:
  - Type the name and version of the document in the search box.

Table 19. Documentation resources

Task	Document	Location
Setting up your system	For more information about installing and securing the system into a rack, see the Rail Installation Guide included with your rack solution. For information about setting up your system, see the *Getting Started Guide* document that is shipped with your system.	https://www.dell.com/poweredgemanuals
Configuring your system	For information about the iDRAC features, configuring and logging in to iDRAC, and managing your system remotely, see the Integrated Dell Remote Access Controller User's Guide. For information about understanding Remote Access Controller Admin (RACADM) subcommands and supported RACADM interfaces, see the RACADM CLI Guide for iDRAC. For information about Redfish and its protocol, supported schema, and Redfish Eventing implemented in iDRAC, see the Redfish API Guide. For information about iDRAC property database group and object descriptions, see the Attribute Registry Guide. For information about Intel QuickAssist Technology, see the Integrated Dell Remote Access Controller User's Guide.	https://www.dell.com/poweredgemanuals
	For information about earlier versions of the iDRAC documents. To identify the version of iDRAC available on your system, on the iDRAC web interface, click **?** > **About**.	https://www.dell.com/idracmanuals

Table 19. Documentation resources (continued)

Task	Document	Location	
	Managing your system	For information about system management software offered by Dell, see the Dell OpenManage Systems Management Overview Guide.	https://www.dell.com/poweredgemanuals
		For information about setting up, using, and troubleshooting OpenManage, see the Dell OpenManage Server Administrator User's Guide.	www.dell.com/openmanagemanuals > OpenManage Server Administrator
For information about installing, using, and troubleshooting Dell OpenManage Enterprise, see the Dell OpenManage Enterprise User's Guide.		https://www.dell.com/openmanagemanuals	
For information about installing and using Dell SupportAssist, see the Dell EMC SupportAssist Enterprise User's Guide.		https://www.dell.com/serviceabilitytools	
For information about partner programs enterprise systems management, see the OpenManage Connections Enterprise Systems Management documents.		https://www.dell.com/openmanagemanuals	
Working with the Dell PowerEdge RAID controllers	For information about understanding the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card and deploying the cards, see the Storage controller documentation.	www.dell.com/storagecontrollermanuals	
Understanding event and error messages	For information about the event and error messages generated by the system firmware and agents that monitor system components, go to qrl.dell.com > **Look Up** > **Error Code**, type the error code, and then click **Look it up**.	www.dell.com/qrl	
Troubleshooting your system	For information about identifying and troubleshooting the PowerEdge server issues, see the Server Troubleshooting Guide.	https://www.dell.com/poweredgemanuals	

8

Getting help

Topics:

Contacting Dell EMC

Dell EMC provides several online and telephone based support and service options. If you do not have an active internet connection, you can find contact information about your purchase invoice, packing slip, bill, or Dell EMC product catalog. Availability varies by country and product, and some services may not be available in your area. To contact Dell EMC for sales, technical assistance, or customer service issues:

Steps

1. Go to www.dell.com/support/home.
2. Select your country from the drop-down menu on the lower right corner of the page.
3. For customized support:
   a. Enter your system Service Tag in the **Enter your Service Tag** field.
   b. Click **Submit**.
   The support page that lists the various support categories is displayed.
4. For general support:
   a. Select your product category.
   b. Select your product segment.
   c. Select your product.
   The support page that lists the various support categories is displayed.
5. For contact details of Dell EMC Global Technical Support:
   a. Click Contact Technical Support.
   b. Enter your system Service Tag in the **Enter your Service Tag** field on the Contact Us webpage.

Documentation feedback

You can rate the documentation or write your feedback on any of our Dell EMC documentation pages and click **Send Feedback** to send your feedback.

Accessing system information by using QRL

You can use the Quick Resource Locator (QRL) located on the information tag in the front of the system, to access the information about the PowerEdge system.

Prerequisites

Ensure that your smartphone or tablet has the QR code scanner installed.

The QRL includes the following information about your system:

- How-to videos
- Reference materials, including the Installtion and Service Manual, LCD diagnostics, and mechanical overview

- Your system service tag to quickly access your specific hardware configuration and warranty information
- A direct link to Dell to contact technical assistance and sales teams

Steps

1. Go to www.dell.com/qrl and navigate to your specific product or
2. Use your smartphone or tablet to scan the model-specific Quick Resource (QR) code on your system or in the Quick Resource Locator section.

Quick Resource Locator for the PowerEdge MX5016s system

Figure 29. Quick Resource Locator for the PowerEdge MX5016s

Receiving automated support with SupportAssist

Dell EMC SupportAssist is an optional Dell EMC Services offering that automates technical support for your Dell EMC server, storage, and networking devices. By installing and setting up a SupportAssist application in your IT environment, you can receive the following benefits:

- **Automated issue detection** — SupportAssist monitors your Dell EMC devices and automatically detects hardware issues, both proactively and predictively.
- **Automated case creation** — When an issue is detected, SupportAssist automatically opens a support case with Dell EMC Technical Support.
- **Automated diagnostic collection** — SupportAssist automatically collects system state information from your devices and uploads it securely to Dell EMC. This information is used by Dell EMC Technical Support to troubleshoot the issue.
- **Proactive contact** — A Dell EMC Technical Support agent contacts you about the support case and helps you resolve the issue.

The available benefits vary depending on the Dell EMC Service entitlement purchased for your device. For more information about SupportAssist, go to www.dell.com/supportassist.