

# Dell EMC PowerVault ME484 JBOD Storage Enclosure

## Deployment Guide

## 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.

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# Before you begin

This document is focused on ME484 JBOD configurations.

Dell EMC supports using the ME484 as a direct-attached JBOD connected to PowerEdge servers with SAS HBAs. The maximum number of drives that are supported when multiple ME484 JBODs are connected to host servers is 336 drives.

All other supported ME4 Series configurations are described in the *Dell EMC PowerVault ME4 Series Storage System Deployment Guide*.

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## Topics:

- [Introduction](#)
- [System requirements](#)
- [Other Information You May Need](#)

## Introduction

When an ME484 enclosure is accessed from a host server using I/O Modules (IOMs), it is called an ME484 JBOD storage enclosure. The ME484 JBOD storage enclosure includes various hardware components such as physical disk drives, IOMs, fans, and Power Supply Units (PSUs).

**CAUTION:** See the **Safety, Environmental, and Regulatory Information** document for important safety information before following any procedures listed in this document.

**NOTE:** In this document, I/O modules are called IOMs. Other Dell EMC documentation might contain references to Enclosure Management Modules (EMMs). For ME484 JBODs, these two terms are interchangeable; they refer to the same module.

PowerTools Server Hardware Manager software running on a host server is used to manage an ME484 JBOD. On the host server, the management software and the storage enclosure communicate management requests and event information by using in-band SAS connections. You can also establish multiple data paths between the host and the storage enclosure. Multiple paths prevent the loss of any single path from resulting in the loss of access to data on the storage enclosure.

The deployment process includes:

- Hardware installation
- Initial system configuration
- PowerTools Server Hardware Manager installation

The PowerTools Server Hardware Manager tools enable an administrator to monitor and update the storage enclosure for optimum usability. The PowerTools Server Hardware Manager is supported on Microsoft Windows and Linux operating systems. For more information about specific supported operating systems, see the *Dell EMC PowerVault ME484 JBOD Storage Enclosure Support Matrix* on [Dell.com/support](http://Dell.com/support).

## System requirements

Before installing and configuring the ME484 JBOD hardware and software, ensure that a supported operating system is installed on the host server and the minimum system requirements are met.

The ME484 JBOD supports Windows and Linux operating systems.

**NOTE:** For information about the specific operating systems that the ME484 JBOD supports, see the *Dell EMC PowerVault ME484 JBOD Storage Enclosure Support Matrix* on [Dell.com/support](http://Dell.com/support).

# Failover issue when a large number of LUNs are attached to a Linux host

When a large number of LUNs (84 LUNs) are attached to a Linux host, the LUNs might fail to reattach to the host after a failover. This issue affects hosts running Red Hat Enterprise Linux 8 and SUSE Linux Enterprise Server 15.

The following sections contain workarounds for this issue:

## Red Hat Enterprise Linux 8

Before mapping LUNs to the host, edit the `/etc/fstab` file and add a device timeout setting of 0 to all the `x-systemd.device-timeout` entries for ME484 JBOD LUNs..

- If the value `defaults` is displayed in the `<options>` column, replace the value `defaults` with a device timeout setting of 0.
- If the `<options>` column already contains device timeout settings, add a comma to the end of the last setting and add a device timeout setting of 0.

## SUSE Linux Enterprise Server 15

1. Attach the ME484 JBOD to the host.
2. Configure the `multipath.conf` file.
3. Run the following commands to enable multipath when the host boots:

```
dracut --force --add multipath
dracut -f -v
dracut -v -f --add multipath
```

4. Reboot the host.

## Other Information You May Need

The product documentation for the ME484 JBOD includes:

- The *Dell EMC PowerVault ME4 Series Storage System Owner's Manual* provides information about ME4 Series system hardware features and describes how to troubleshoot the system and install or replace system components.
- The *Dell EMC Storage PowerTools Server Hardware Manager Administrator's Guide* describes how to use the Server Hardware Manager software to manage an ME484 JBOD.
- The *Dell EMC PowerVault ME484 JBOD Storage Enclosure Support Matrix* and *Dell EMC Storage PowerTools Server Hardware Manager Support Matrix* provide information about the software and hardware compatibility requirements for the Server Hardware Manager software.

 **NOTE:** For additional documentation about the ME484 JBOD, go to [Dell.com/support](https://Dell.com/support).

# Mount the enclosures in the rack

This section describes how to unpack the ME484 JBOD, prepare for installation, and safely mount the enclosures into the rack.

## Topics:

- [Rackmount rail kit](#)
- [Install the ME484 JBOD](#)

## Rackmount rail kit

Rack mounting rails are available for use in 19-inch rack cabinets.

The rails have been designed and tested for the maximum enclosure weight. Multiple enclosures may be installed without loss of space in the rack. Use of other mounting hardware may cause some loss of rack space. Contact Dell EMC to ensure that suitable mounting rails are available for the rack you plan to use.

## Install the ME484 JBOD

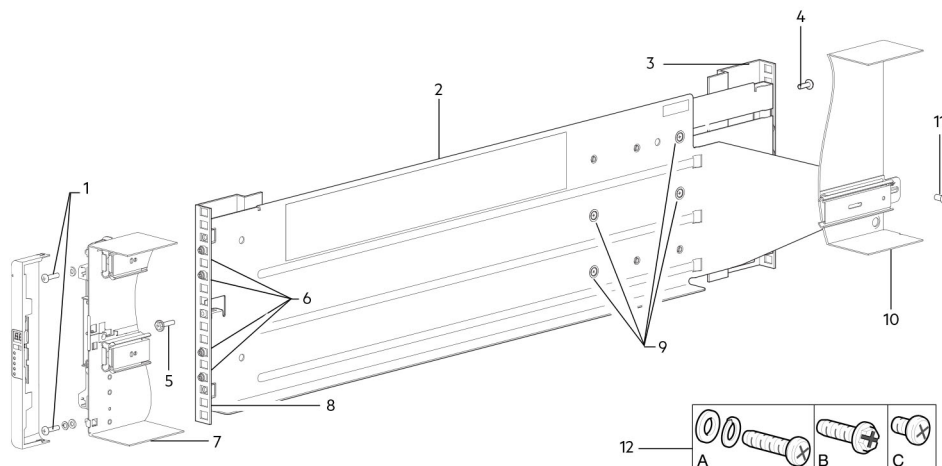
The ME484 JBOD is delivered without the disks installed.

**i** **NOTE:** Due to the weight of the enclosure, install it into the rack without DDICs installed, and remove the rear panel CRUs to decrease the enclosure weight.

The adjustment range of the rail kit from the front post to the rear post is 660 mm–840 mm. This range suits a one-meter deep rack within Rack Specification IEC 60297.

1. Remove the rail kit from the accessories box, and examine for damage.
2. Ensure that the preassembled rails are the correct length for the rack.
3. Use the following procedure to install the rail in the rack:
  - a. Loosen the position locking screws on the rail.
  - b. Identify the rack holes for installing the rails in the rack and insert the rail pins into the rear rack post.
  - c. Extend the rail to fit between the front and rear rack posts and insert the rail pins into the front rack post.
 


**i** **NOTE:** Ensure that the rail pins are fully inserted in the rack holes in the front and rear rack posts.
  - d. Use the clamping screws to secure the rail to the rack posts and tighten the position locking screws on the rail.
  - e. Ensure the four rear spacer clips (not shown) are fitted to the edge of the rack post.



**Figure 1. Install the rail in the rack (left hand rail shown for 5U enclosure)**

**Table 1. Install the rail in the rack**

Item	Description	Item	Description
1	Enclosure fastening screws (A)	7	ME484 JBOD chassis section shown for reference
2	Left rail	8	Front rack post (square hole)
3	Rear rack post (square hole)	9	Position locking screws
4	Clamping screw (B)	10	ME484 JBOD chassis section shown for reference
5	Clamping screw (B)	11	Enclosure fastening screw (C)
6	Rail pins (quantity 4 per rail)	12	Rail kit fasteners used in rackmount installation (A= fastening; B= clamping; C= fastening)

- f. Repeat the previous steps to install the other rail in the rack.
- 4. Install the enclosure into the rack:
  - a. Lift the enclosure and align it with the installed rack rails.  
 **CAUTION: A mechanical lift is required to safely lift the enclosure for positioning in the rack.**
  - b. Slide the enclosure onto the rails until it is fully seated.
  - c. Fasten the front of the enclosure to the rack using the fastening screws.
  - d. Fix the rear of the enclosure to the sliding bracket with the rear enclosure fastening screws.

Reinsert the rear panel modules and install the DDICs into the drawers. See the instructions in the *Dell EMC PowerVault ME4 Series Storage System Owner's Manual*.

- Installing an IOM
- Installing a fan cooling module
- Installing a PSU
- Installing a DDIC

# Disk Drive Module Installation

The disk drive module used in ME484 JBOD storage enclosures is referred to as a Disk Drive in Carrier (DDIC).

## Topics:

- [DDIC in a ME484 JBOD Storage Enclosure](#)
- [Populating drawers with DDICs](#)

## DDIC in a ME484 JBOD Storage Enclosure

Each disk drive is installed in a DDIC that enables secure insertion of the disk drive into the drawer with the appropriate SAS carrier transition card.

The DDIC features a slide latch button with directional arrow. The slide latch enables you to install and secure the DDIC into the disk slot within the drawer. The slide latch also enables you to disengage the DDIC from its slot, and remove it from the drawer. The DDIC has a single Drive Fault LED, which illuminates amber when the disk drive has a fault.

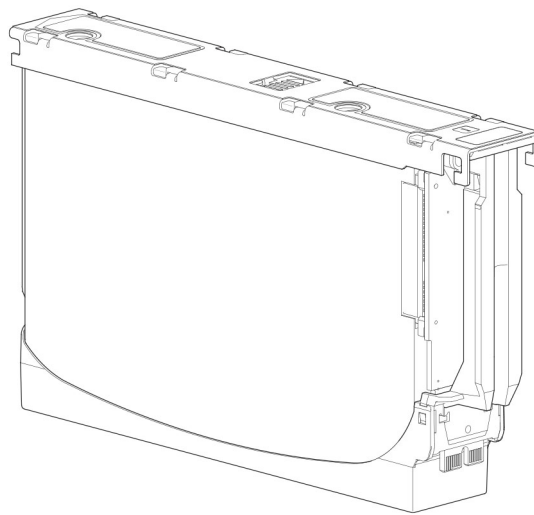


Figure 2. 3.5" disk drive in a DDIC

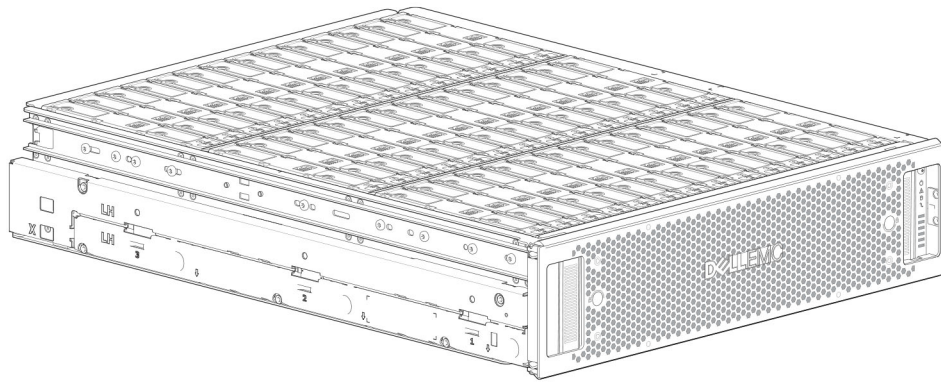
## Populating drawers with DDICs

The ME484 JBOD storage enclosure does not ship with DDICs installed. Before populating drawers with DDICs, ensure that you adhere to the following guidelines:

- The minimum number of disks that are supported by the enclosure is 28, 14 in each drawer.
- DDICs must be added to disk slots in complete rows (14 disks at a time).
- Beginning at the front of each drawer, install DDICs consecutively by number, and alternately between the top drawer and the bottom drawer. For example, install first at slots 0–13 in the top drawer, and then 42–55 in the bottom drawer. After that, install slots 14–27, and so on.
- The number of populated rows must not differ by more than one row between the top and bottom drawers.
- Hard disk drives (HDD) and solid-state drives (SDD) can be mixed in the same drawer.
- HDDs installed in the same row should have the same rotational speed.

The following figure shows a drawer that is fully populated with DDICs:





**Figure 3. ME484 JBOD drawer fully populated with DDICs**

# Cable host servers to the ME484 JBOD storage enclosure

This section describes the different ways that host servers can be connected to a ME484 JBOD storage enclosure.

## Topics:

- [Cabling considerations](#)
- [Cabling your ME484 JBOD storage enclosure](#)
- [Label the back-end cables](#)

## Cabling considerations

There are several methods to cable an ME484 JBOD storage enclosure to host servers and to other ME484 JBOD storage enclosures.

The specific configuration used depends on storage capacity, level of resiliency of both the host server and enclosure, and the operating system being used.

## Cable requirements for expansion enclosures

Observe the following cabling guidelines when connecting an ME484 to a host server:

- When connecting SAS cables to JBOD modules, use only supported HD mini-SAS x4 cables.
- Qualified HD mini-SAS to HD mini-SAS 0.5 m (1.64 ft.) cables are used to connect cascaded enclosures in the rack.
- The maximum enclosure cable length that is allowed in any configuration is 2 m (6.56 ft.).
- When adding more than two expansion enclosures, you may need to purchase additional cables, depending upon the number of enclosures and cabling method used.
- You may need to order additional or longer cables when reverse-cabling a fault-tolerant configuration.

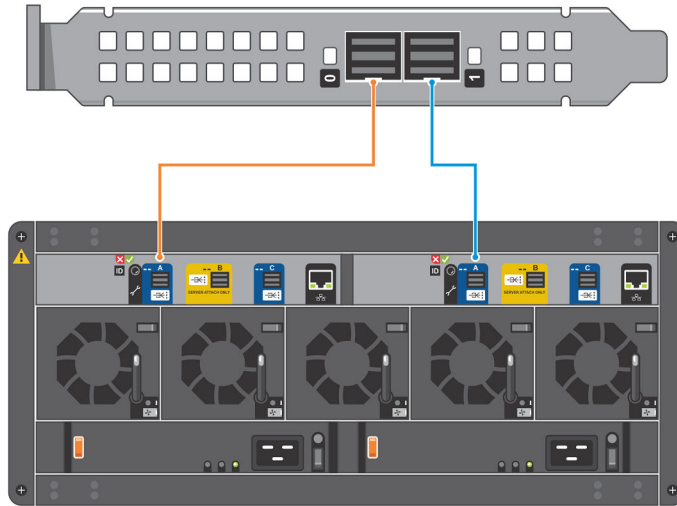
## Cabling your ME484 JBOD storage enclosure

You can cable an ME484 JBOD storage enclosure to host systems and to other ME484 JBOD storage enclosures in three different configurations:

- Single-path configuration – Uses a simplified cabling scheme, but does not provide redundancy or fault-tolerance. Use this cabling scheme when the operating system or a higher-level application is being used for data resiliency.
- Symmetric multipath configuration – Uses a cascading configuration that provides path redundancy, but does not provide against enclosure loss.
- Asymmetric multipath configuration – A high availability configuration that enables the host server to reach any enclosure if a path or single enclosure is lost.

## Single HBA and one ME484 JBOD storage enclosure

This configuration is valid with or without path redundancy on HBA port 1.



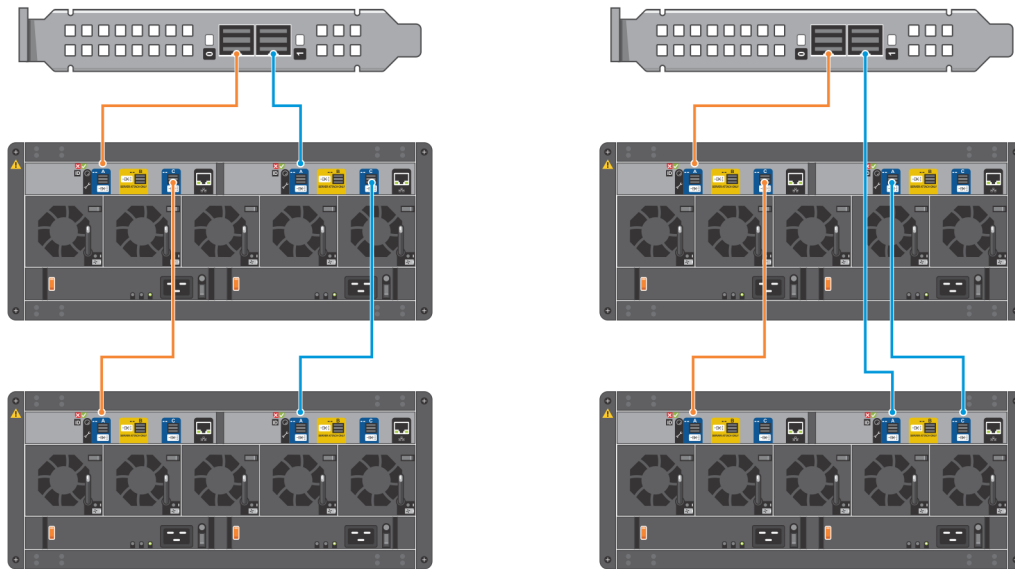
**Figure 4. Single HBA and one JBOD**

## Single HBA and multiple ME484 JBOD storage enclosures

This configuration is valid with or without path redundancy on HBA Port 1.

- Maximum of two ME484 JBOD storage enclosures per HBA
- Maximum of two HBAs per server

**NOTE:** The left side of this figure is a symmetric configuration and the right side is an asymmetric configuration.



**Figure 5. Single HBA and multiple JBODs**

## Single server, dual HBAs, and multiple ME484 JBOD storage enclosures

This configuration supports a maximum of four ME484 JBOD storage enclosures.

**NOTE:** The left side of this figure is a symmetric configuration and the right side is an asymmetric configuration.

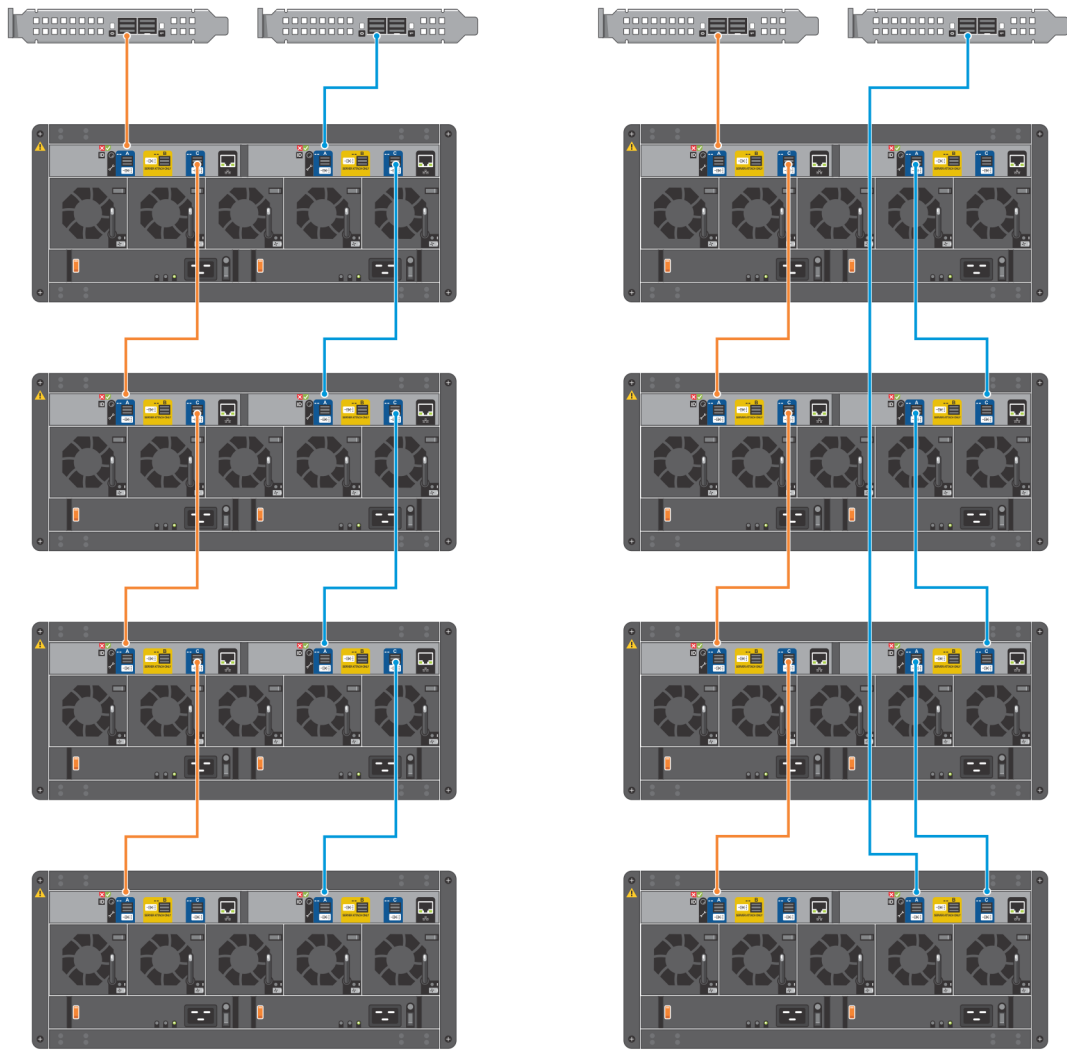


Figure 6. Single server, dual HBAs, and multiple JBODs

## Label the back-end cables

Dell EMC recommends labeling the back-end SAS cables that connect the host server.

# LEDs

LED colors are used consistently throughout the enclosure and its components for indicating status:

- Green – Good or positive indication
- Blinking green/amber – Non-critical condition
- Amber – Critical fault
- Blue – Controller module or IOM identification

## Topics:

- ME484 JBOD storage enclosure LEDs
- 12 Gb/s expansion module LEDs
- DDIC LEDs
- Drawer LEDs
- Fan cooling module LEDs
- Ops panel
- PSU LEDs

## ME484 JBOD storage enclosure LEDs

When the ME484 JBOD storage enclosure is powered on, all LEDs turn on for a short period to ensure that they are working.

**NOTE:** This behavior does not indicate a fault unless LEDs remain lit after several seconds.

## 12 Gb/s expansion module LEDs

ME484 JBOD storage enclosures are configured with dual expansion modules.

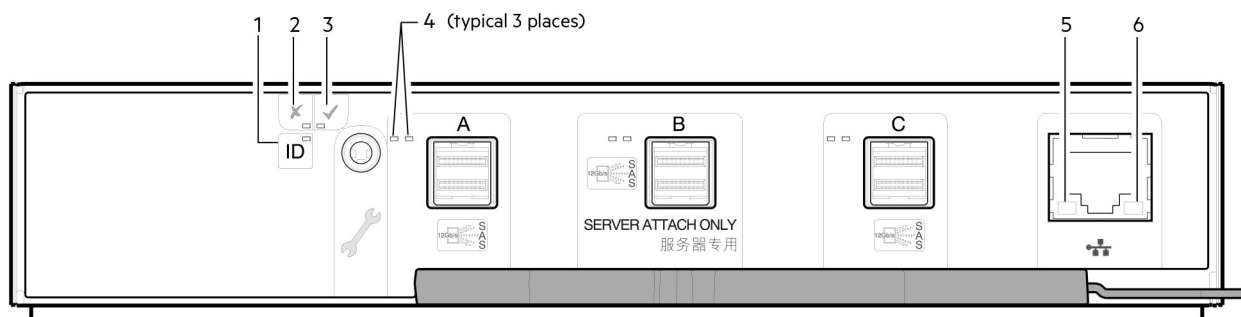


Figure 7. ME484 JBOD storage enclosure expansion module LEDs

Table 2. ME484 JBOD storage enclosure LED descriptions

LED	Description	Definition
1	Identify	Blue – Expansion module is being identified.
2	Fault	<ul style="list-style-type: none"> <li>• Off – The expansion module is operating normally.</li> <li>• Amber – A fault has been detected or a service action is required.</li> </ul>
3	OK	<ul style="list-style-type: none"> <li>• Green – The expansion module is operating normally.</li> <li>• Blinking green – System is booting.</li> <li>• Off – The expansion module is powered off.</li> </ul>

**Table 2. ME484 JBOD storage enclosure LED descriptions (continued)**

LED	Description	Definition
4	HD mini-SAS connector LEDs (A/B/C)	See <a href="#">ME484 JBOD storage enclosure LED activity states</a> on page 14 for Activity (green) and Fault (amber) LED states.
5	Ethernet Port Link/Active Status (Left)	Not used in this configuration.
6	Ethernet Port Link Speed (Right)	Not used in this configuration.

The following table provides additional information about the LED states of the SAS port expansion ports:

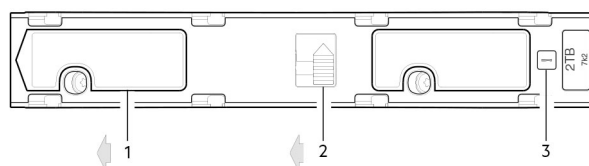
**Table 3. ME484 JBOD storage enclosure LED activity states**

Condition	Activity (Green)	Fault (Amber)
No cable present	Off	Off
Cable present – All links up/no activity.	On	Off
Cable present – All links up/with aggregate port activity.	Blinking	Off
Critical fault – Any fault causing operation of the cable to cease or fail to start (for example, over-current trip).	Off	On
Non-critical fault - Any fault that does not cause the connection to cease operation (for example, not all links are established; over temperature).	Blinking	Blinking 1 s on/1 s off

## DDIC LEDs

The DDIC supports LFF 3.5" and SFF 2.5" disks.

The following figure shows the top panel of the DDIC as viewed when the disk drive is inserted into a drawer slot:



**Figure 8. DDIC LEDs – ME484 JBOD disk slot in drawer**

1. Slide latch (slides left)
2. Latch button (shown in the locked position)
3. Drive fault LED

**Table 4. Drawer LED descriptions**

Fault LED (Amber)	Status/description*
Off	Off (disk module/enclosure)
Off	Not present
Blinking: 1 s on/1 s off	Identify
Any links down: On	Drive link (PHY lane) down
On	Fault (leftover/failed/locked-out)

**Table 4. Drawer LED descriptions (continued)**

<b>Fault LED (Amber)</b>	<b>Status/description*</b>
Off	Available
Off	Storage system: Initializing
Off	Storage system: Fault-tolerant
Off	Storage system: Degraded (non-critical)
Blinking: 3 s on/1 s off	Storage system: Degraded (critical)
Off	Storage system: Quarantined
Blinking: 3 s on/1 s off	Storage system: Offline (dequarantined)
Off	Storage system: Reconstruction
Off	Processing I/O (whether from host or internal activity)
*If multiple conditions occur simultaneously, the LED behaves according to the conditions that are listed in this table. The LED states occur in the order that is displayed in the table from top to bottom.	

Each DDIC has a single Drive Fault LED. A disk drive fault is indicated when the Drive Fault LED is lit amber. In the event of a disk drive failure, follow the procedure in the *ME484 JBOD Storage System Owner's Manual* to replace the DDIC.

## Drawer LEDs

See the *ME484 JBOD Storage System Owner's Manual* for a visual description of the LEDs on each drawer bezel.

**Table 5. Drawer LED descriptions**

<b>LED</b>	<b>Status/description</b>
Sideplane OK/Power Good	Green if the sideplane card is working and there are no power problems.
Drawer Fault	Amber if a drawer component has failed. If the failed component is a disk, the LED on the failed DDIC lights amber. Follow the procedure in the <i>ME484 JBOD Storage System Owner's Manual</i> to replace the DDIC. If the disks are OK, contact your service provider to identify the cause of the failure, and resolve the problem.
Logical Fault	Amber (solid) indicates a disk fault. Amber (blinking) indicates that one or more storage systems are in an impacted state.
Cable Fault	Amber indicates the cabling between the drawer and the back of the enclosure has failed. Contact your service provider to resolve the problem.
Activity Bar Graph	Displays the amount of data I/O from zero segments lit (no I/O) to all six segments lit (maximum I/O).

## Fan cooling module LEDs

See the *ME484 JBOD Storage System Owner's Manual* for a visual description of the LEDs on each Fan Cooling Module (FCM).

**Table 6. FCM LED descriptions**



<b>LED</b>	<b>Status/description</b>
Module OK	Constant green indicates that the FCM is working correctly. Off indicates that the fan module has failed. Follow the procedure in <i>ME484 JBOD Storage System Owner's Manual</i> to replace the fan controller module.
Fan Fault	Amber indicates the fan module has failed. Follow the procedure in <i>ME484 JBOD Storage System Owner's Manual</i> to replace the fan controller module.

## Ops panel

The front of the ME484 JBOD storage enclosure has an Ops panel that is located on the left ear flange of the chassis.

The Ops panel is an integral part of the enclosure chassis, but is not replaceable on site. See the *ME484 JBOD Storage System Owner's Manual* for a visual description of the Ops panel.

**Table 7. Ops panel functions**

Indicator/LED	Status/description
Unit identification display (UID)	Dual seven-segment display that shows the numerical position of the ME484 JBOD storage enclosure in the cabling sequence.
System power on/ Standby LED	<ul style="list-style-type: none"> <li>• Constant green: power is available (operational).</li> <li>• Constant amber: system in standby (not operational).</li> </ul>
Module fault LED	Constant or blinking amber: system hardware fault present  <b>NOTE:</b> This LED helps you identify the component causing the fault, which can be associated with a Fault LED on an IOM, PSU, FCM, DDIC, or drawer.
Logical status LED	Constant or blinking amber: change of status or fault present  <b>NOTE:</b> The LED is typically associated with a DDIC. Use the LEDs at each disk position within a drawer to identify the DDIC affected.
Top drawer fault LED	Constant or blinking amber: fault present in drive, cable, or sideplane
Bottom drawer fault LED	Constant or blinking amber: fault present in drive, cable, or sideplane

 **CAUTION:** The sideplanes on the enclosure drawers are not hot swappable or customer serviceable.

## PSU LEDs

See the *ME484 JBOD Storage System Owner's Manual* for a visual description of the Power Supply Unit (PSU) module faceplate.

**Table 8. PSU LED states**

CRU Fail (Amber)	AC Missing (Amber)	Power (Green)	Status
On	Off	Off	No AC power to either PSU
On	On	Off	PSU present, but not supplying power or PSU alert state. (usually due to critical temperature)
Off	Off	On	Mains AC present, switch on. This PSU is providing power.
Off	Off	Blinking	AC power present, PSU in standby (other PSU is providing power).
Blinking	Blinking	Off	PSU firmware download in progress
Off	On	Off	AC power missing, PSU in standby (other PSU is providing power).
On	On	On	Firmware has lost communication with the PSU module.
On	--	Off	PSU has failed. Follow the procedure in the <i>ME484 JBOD Storage System Owner's Manual</i> to replace the PSU.



# PowerTools Server Hardware Manager software setup

To connect the storage enclosure to a PowerEdge server with PowerTools Server Hardware Manager software, the server must have a supported SAS HBA installed.

See the *Dell EMC Storage PowerTools Server Hardware Manager Support Matrix* for information about supported SAS HBAs.

If the host is connected to the storage enclosure using multiple paths (two or more SAS connections), multipathing must be configured on the server. For more information about multipathing, see the documentation that is related to the server operating system.

ME484 JBOD storage enclosures are compatible with Windows and Linux operating systems. For more information about the specific operating systems supported, see the *Dell EMC Storage Enclosure Support Matrix* at [Dell.com/support](http://Dell.com/support).


## Topics:

- [PowerTools Server Hardware Manager Installation on Windows](#)
- [PowerTools Server Hardware Manager Installation on Linux](#)

## PowerTools Server Hardware Manager Installation on Windows

MPIO must be configured on the Windows server to enable the PowerTools Server Hardware Manager software to recognize the hardware.

For more information about MPIO configuration procedures, see Microsoft documentation related to MPIO.

 **NOTE:** Dell EMC recommends using the Failover Only policy.

## Graphical installation

Installing the PowerTools Server Hardware Manager software on Windows requires Administrator privileges.

1. Download the PowerTools Server Hardware Manager software installation package from [Dell.com/support](http://Dell.com/support).
2. Navigate to the download directory of the installer.
3. Double-click the installation program: `ServerHardwareManager-x.x.x.x-windows-installer.exe`.
4. Follow the on-screen instructions and accept the End User License Agreement.

## Command-line silent installation

1. Download the PowerTools Server Hardware Management Software installation package from [Dell.com/support](http://Dell.com/support).
2. Open the command prompt as an administrator.
3. Go to the download directory of the installer.
4. Run the command: `ServerHardwareManager-x.x.x.x-windows-installer.exe --mode unattended`.

This command installs the PowerTools Server Hardware Management Software with all the default settings. The default installation directory is `C:\Program Files\Dell\ServerHardwareManager`.


## Command-line silent uninstallation

1. Open the command prompt as an administrator.
2. Navigate to the installation directory.  
The default directory is `C:\Program Files\Dell\ServerHardwareManager`.
3. Run the command `ServerHardwareManagemer_uninstall.exe --mode unattended`.

# PowerTools Server Hardware Manager Installation on Linux

Device Mapper Multipath must be configured on the Linux server to enable the PowerTools Server Hardware Manager software to recognize the hardware.

See the Linux documentation for proper Device Mapper Multipath configuration.

 **NOTE:** Dell EMC recommends using the Failover policy.

## Graphical Installation

Installing the PowerTools Server Hardware Manager software on Linux requires full root user permissions.

1. Download the PowerTools Server Hardware Manager software installation package from [Dell.com/support](https://Dell.com/support)  
The name of the installation package is `ServerHardwareManager-version-OS-installer.tar.gz`, where *version* is the version number of the software and *OS* is the operating system.
2. Navigate to the download directory of the installer and extract the archive.
3. Double click on the installer file named `./ServerHardwareManager-version-OS-installer`.
4. Follow the on-screen instructions and accept End User License Agreement.

## Console Installation

1. Download the PowerTools Server Hardware Manager software installation package from [Dell.com/support](https://Dell.com/support)  
The name of the installation package is `ServerHardwareManager-version-OS-installer.tar.gz`, where *version* is the version number of the software and *OS* is the operating system.
2. Navigate to the download directory of the installer and extract the archive.
3. Open a terminal session and change directories to the installation package directory.
4. Run the following command to start the installation:  
`./ServerHardwareManager-version-OS-installer`
5. Follow the on-screen instructions and accept End User License Agreement.

## Silent console installation

1. Download the PowerTools Server Hardware Manager software installation package from [Dell.com/support](https://Dell.com/support)  
The name of the installation package is `ServerHardwareManager-version-OS-installer.tar.gz`, where *version* is the version number of the software and *OS* is the operating system.
2. Navigate to the download directory of the installer and extract the archive.
3. Open a terminal session and change directories to the installation package directory.
4. Run the following command:  
`./ServerHardwareManager-version-OS-installer --mode unattended`

This command installs the PowerTools Server Hardware Management Software with all the default settings. The default installation directory is `/opt/dell/ServerHardwareManager`.

## Silent console uninstallation

1. Open a terminal session and change directories to the installation directory.  
The default installation directory is `/opt/dell/ServerHardwareManager`.
2. Run the following command:  

```
./ServerHardwareManagemer_uninstall --mode unattended
```