Dell EMC PowerVault MD32XX/36XX Series

Support Matrix

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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

Introduction

This document provides information about supported software and hardware for Dell EMC PowerVault MD3200, MD3220, MD3200i, MD3220i, MD3600i, MD3600f, MD3620i, MD3620f, MD3260, MD3260i, MD3660i, and MD3660f storage arrays, and usage considerations, recommendations, and rules.

(i) **NOTE: Unless specified, all information in this document is applicable to the latest RAID controller firmware version available at Dell.com/support.**

Topics:

- [Changes in version A24](#)

Changes in version A24

- Updated the URLs in the **Dell EMC PowerVault MD Series storage array rules** and **Supported operating systems sections**

Supported data protocols

Table 1. Dell EMC PowerVault MD-Series Models and supported Data protocols

Dell PowerVault MD Array Model [3]	Data protocol
MD3200 [1]	6 Gbps direct attached SAS storage array with 12 drives (3.5 inches)
MD3220 [1]	6 Gbps direct attached SAS storage array with 24 drives (2.5 inches)
MD3200i [1]	1 Gbps iSCSI network storage array with 12 drives (3.5 inches)
MD3220i [1]	1 Gbps iSCSI network storage array with 24 drives (2.5 inches)
MD3600i [1]	10 Gbps iSCSI network storage array with 12 drives (3.5 inches)
MD3620i [1]	10 Gbps iSCSI network storage array with 24 drives (2.5 inches)
MD3600f [1]	8 Gbps Fibre Channel network storage array with 12 drives (3.5 inches)
MD3620f [1]	8 Gbps Fibre Channel network storage array with 24 drives (2.5 inches)
MD3260 [2]	6 Gbps direct Attached SAS storage dense array
MD3260i [2]	1 Gbps iSCSI network storage dense array
MD3660i [2]	10 Gbps iSCSI network storage dense array
MD3660f [2]	8 Gbps Fibre Channel network storage dense array

ⓘ **NOTE:**

1. **Dell EMC PowerVault MD3200, MD3220, MD3200i, MD3220i, MD3600i, MD3620i, MD3600f, and MD3620f models support 120 physical disk drive slots in base configuration. With premium feature activation, 192 physical disk drive slots are supported.**
2. **Dell EMC PowerVault MD3x60i/f dense array has default 120 drive slots support (with 20 drives minimum, four in first row of each drawer), and 180 drive slots support with PFK.**
3. **Premium Feature Key (PFK) is optional on all models.**

Dell EMC PowerVault MD Series storage array rules

This section contains both general and model-specific connectivity and consideration rules for Dell EMC PowerVault MD storage arrays. The rules listed in Table 2 apply to all storage array models. For rules applying to specific Dell EMC PowerVault MD models, see Table 3 and Table 4.

(i) **NOTE: Dell EMC PowerVault MD3260, MD3260i, MD3660i, and MD3660f platforms are supported in dual-RAID controller (duplex) configurations only.**

Table 2. Dell EMC PowerVault MD Series storage array rules for all models

Rule	Dell EMC PowerVault MD32x0 series	Dell EMC PowerVault MD32x0i series	Dell EMC PowerVault MD36x0i series	Dell EMC PowerVault MD36x0f series
	6 Gbps SAS	**1 Gbps iSCSI**	**10 Gbps iSCSI**	**8 Gbps Fibre Channel**
Maximum number of host servers a single storage array can connect to with one RAID controller module installed	4	2	64	64
Maximum number of host servers a single storage array can connect to with two RAID controller modules installed	8 (4, if using high availability)	32	64	64
Maximum number of Dell EMC 6 Gb SAS HBA cards supported in a single host server attached to single array. (Dell EMC recommends that you use two Dell EMC 6 Gb SAS HBA cards for all redundant cabling configurations.)	2 (each card has two ports)	N/A	N/A	N/A
Unused ports on a Dell EMC 6 Gb SAS HBA card already connected to a PowerVault MD3260 cannot connect to another device (such as a tape drive or other model storage array).	Yes	N/A	N/A	N/A
Maximum number of PowerVault MD Series Storage Arrays a host server may connect to:	2 (HA)	4	4	4
A hot-spare for a disk group must be a physical disk drive of equal or greater disk space than any of the member drives.	Yes	Yes	Yes	Yes
When using out-of-band management with SMcli by specifying the RAID controller management port IP addresses on the Dell EMC PowerVault MD Storage Array, SMcli commands that change the attributes of a virtual disk, virtual disk copy, or snapshot virtual disk, must have management access to the owning RAID controller module. Dell EMC recommends that you specify both management port IP addresses on the SMcli invocation: SMcli 192.168.128.101 192.168.128.102-c.	Yes	Yes	Yes	Yes
On Linux systems Device Mapper, multipath drivers are required for multipath support.	Yes	Yes	Yes	Yes
Coexistence of several Linux multi-path drivers is not supported. When using a Dell EMC PowerVault MD3200 or MD3600 series array with Linux host servers, only the Linux Device Mapper failover driver is supported.	Yes	Yes	Yes	Yes
Virtual disks on Dell EMC PowerVault MD Series storage arrays cannot be used for booting.	Yes	Yes	Yes	Yes

Table 2. Dell EMC PowerVault MD Series storage array rules for all models (continued)

Rule	Dell EMC PowerVault MD32x0 series	Dell EMC PowerVault MD32x0i series	Dell EMC PowerVault MD36x0i series	Dell EMC PowerVault MD36x0f series
	6 Gbps SAS	1 Gbps iSCSI	10 Gbps iSCSI	8 Gbps Fibre Channel
Disk Groups can be migrated between a Dell EMC PowerVault MD3260/3260i/3660i/3660f by following the appropriate disk group migration procedure.	Yes	Yes	Yes	Yes
Maximum size of a virtual disk in a dynamic disk pool is 64 TB.	Yes	Yes	Yes	Yes
Disk pools cannot be migrated.	Yes	Yes	Yes	Yes
Maximum disk space per array for dynamic disk pooling.	1024 TB	256 TB	256 TB	1024 TB
Maximum SSD cache size allowed depends on the installed RAM per controller: · 2 GB RAM per controller supports up to 2 TB SSD read cache · 4 GB RAM per controller supports up to 4 TB SSD read cache	Yes	Yes	Yes	Yes
All iSCSI Host ports on a controller have to be at the same port speed.	N/A	Only 1 Gbps Supported	Yes	N/A
iSCSI Host ports will only auto-negotiate to the port speed set in MDSM.	N/A	Only 1 Gbps Supported	Yes	N/A
If the iSCSI initiators are connected to Dell EMC PowerVault MD3200i and/or MD3600i series through the network switches, ensure that your switches support IEEE 802.3x flow control, and the flow control is enabled for both sending and receiving on all switch ports and server NIC ports. If you do not enable the flow control, your iSCSI storage array may experience the degradation of the I/O performance. Alongside enabling the Ethernet IEEE 802.3x flow control, Dell EMC recommends that you disable unicast broadcast storm control on the switch ports connected to the iSCSI initiators and target arrays and turn on the "PortFast" mode of the spanning tree protocol (STP) on the switch ports connected to the iSCSI initiators and target arrays. Note that turning on the "PortFast" mode is different from turning off the whole operation of STP on the switch. With "PortFast" on, the STP is still enabled on the switch ports. Turning STP off may affect the entire network and can leave the network vulnerable to physical topology loops.	N/A	Yes	Yes	N/A
For optimal I/O performance, avoid having more than one iSCSI session originating from one host iSCSI port to the same controller. Ideally, connect the iSCSI host NIC to only one iSCSI target port on the storage subsystem.	N/A	Yes	Yes	N/A
For Dell EMC-Oracle tested and validated solutions on the Dell EMC PowerVault MD arrays, see https://www.dell.com/support/article/en-us/sln310461/compatibility-matrices-and-validated-reference-architectures?lang=en.	Yes	Yes	Yes	Yes
The number of VD copies is limited to a maximum of 511 with a maximum of 8 concurrent copies (applicable to RAID controller firmware version 07.84.xx.xx)	Yes	Yes	Yes	Yes

Table 2. Dell EMC PowerVault MD Series storage array rules for all models (continued)

Rule	Dell EMC PowerVault MD32x0 series	Dell EMC PowerVault MD32x0i series	Dell EMC PowerVault MD36x0i series	Dell EMC PowerVault MD36x0f series
	6 Gbps SAS	1 Gbps iSCSI	10 Gbps iSCSI	8 Gbps Fibre Channel
Remote Replication is not supported in simplex mode.	N/A	Yes	Yes	Yes
Maximum number of iSCSI sessions.	N/A	192 per port	448 per port	N/A
Online Physical Disk Firmware Upgrade is supported.	Yes	Yes	Yes	Yes
When using physical disks of 6 TB or larger capacity, it is recommended to use either a RAID 6 Disk Group or a Dynamic Disk Pool (DDP). Due to the increased amount of time taken to reconstruct and copy-back, the chances for a second drive failure increases on either a RAID 1/10 or a RAID 5 Disk Group.	Yes	Yes	Yes	Yes

Table 3. Dell EMC PowerVault MD-Series storage array rules for non-dense, 2U models only (MD3200, MD3220, MD3200i, MD3220i, MD3600i, MD3620i, MD3600f and MD3620f)

Rule	Dell EMC PowerVault MD3200 series	Dell EMC PowerVault MD3200i series	Dell EMC PowerVault MD3600i series	Dell EMC PowerVault MD3600f series
	6 Gbps SAS	1 Gbps iSCSI	10 Gbps iSCSI	8 Gbps Fibre Channel
Support for up to 120 physical disk drive slots (system default configuration). You can attach up to nine Dell EMC MD1200 and/or MD1220 series expansion enclosures to a Dell EMC PowerVault MD storage array. Any mixture of MD1200 and MD1220 enclosures supports up to 120 physical slots.	Yes	Yes	Yes	Yes
Support for up to 192 physical slots through a premium feature option. You can attach up to 15 Dell EMC MD1200 and/or MD1220 series expansion enclosures to a Dell EMC PowerVault MD storage array. Any mixture of MD1200 and MD1220 enclosures for a total of 192 physical slots is supported.	Yes	Yes	Yes	Yes
Maximum number of physical disk drives in a RAID5 or RAID6 disk group is 30. There is no limitation with RAID0 and RAID10 disk groups.	Yes	Yes	Yes	Yes
Attached MD1200 series expansion enclosures must be run in unified mode.	Yes	Yes	Yes	Yes
The number of snapshots pre 07.84.xx.xx controller firmware is limited to: · Maximum of 256 snapshots per array · Maximum of 16 per VD	Yes	Yes	Yes	Yes
The number of remote replicas (legacy) is limited to maximum of 16 pairs.	N/A	N/A	N/A	Yes
The number of snapshots starting with 07.84.xx.xx controller firmware code is limited to: · Maximum of 512 snapshots per array · Maximum of 128 snapshots per VD · Maximum of 32 snapshots per snapshot group	Yes	Yes	Yes	Yes
The number of remote replicas is limited to the maximum of 32 for each array.	N/A	Yes	Yes	Yes

Table 4. Dell EMC PowerVault MD-Series storage array rules for dense, 4U models only

Rule	MD3260 series	MD3260i series	MD3660i series	MD3660f series
	6 Gbps SAS	1 Gbps iSCSI	10 Gbps iSCSI	8 Gbps Fibre Channel
Support for up to 120 physical disk drive slots (system default configuration). You can attach one Dell EMC MD3060e enclosure to a Dell EMC PowerVault MD dense storage array.	Yes	Yes	Yes	Yes
Support for up to 180 physical slots through a premium feature option. You can attach up to two Dell EMC MD3060e enclosures to a Dell EMC PowerVault MD dense storage array, for a total of 180 physical slots.	Yes	Yes	Yes	Yes
Maximum number of physical disk drives in a RAID5 or RAID6 disk group is 30. There is no limitation with RAID0 and RAID10 disk groups.	Yes	Yes	Yes	Yes
A minimum of 20 SAS HDDs or SSDs are required in each MD3x60 enclosure (4 in front of each drawer)	Yes	Yes	Yes	Yes

Default IPv4 settings for management ports on Dell EMC PowerVault MD series storage arrays

ⓘ **NOTE: No default gateway is set.**

By default, the management ports on the storage array are set to DHCP. If DHCP fails, the following IPv4 settings are used:

Table 5. Default IPv4 Management Port Addresses

Controller	IPv4 address	Subnet mask
Controller 0	192.168.128.101	255.255.255.0
Controller 1	192.168.128.102	255.255.255.0

Topics:

- Default IPv4 settings for iSCSI ports on Dell EMC PowerVault MD36x0i array
- Default IPv4 settings for iSCSI ports on Dell EMC PowerVault MD32x0i storage array

Default IPv4 settings for iSCSI ports on Dell EMC PowerVault MD36x0i array

ⓘ **NOTE: No default gateway is set.**

By default, the iSCSI ports on the storage array are set to the static IPv4 settings listed in Table 6.

Table 6. Default iSCSI Port IPv4 Addresses on MD36x0i Storage Arrays

Controller/port	IPv4 address	Subnet mask	Port #
Controller 0, Port 0	192.168.130.101	255.255.255.0	3260
Controller 0, Port 1	192.168.131.101	255.255.255.0	3260
Controller 1, Port 0	192.168.130.102	255.255.255.0	3260
Controller 1, Port 1	192.168.131.102	255.255.255.0	3260

Default IPv4 settings for iSCSI ports on Dell EMC PowerVault MD32x0i storage array

Table 7. Default iSCSI Port IPv4 Addresses on Dell EMC PowerVault MD32x0i Storage Arrays

Controller/Port	IPv4 address	Subnet mask	Port #
Controller 0, Port 0	192.168.130.101	255.255.255.0	3260
Controller 0, Port 1	192.168.131.101	255.255.255.0	3260
Controller 0, Port 2	192.168.132.101	255.255.255.0	3260

Table 7. Default iSCSI Port IPv4 Addresses on Dell EMC PowerVault MD32x0i Storage Arrays (continued)

Controller/Port	IPv4 address	Subnet mask	Port #
Controller 0, Port 3	192.168.133.101	255.255.255.0	3260
Controller 1, Port 0	192.168.130.102	255.255.255.0	3260
Controller 1, Port 1	192.168.131.102	255.255.255.0	3260
Controller 1, Port 2	192.168.132.102	255.255.255.0	3260
Controller 1, Port 3	192.168.133.102	255.255.255.0	3260

Supported RAID controller firmware and NVSRAM

ⓘ **NOTE:**

- **Dell EMC recommends that you collect support information before performing any firmware upgrade.**
- **Drivers and firmware released only by Dell EMC are supported. For the latest driver and firmware that is releases, see the downloads section at Dell.com/support.**

Table 8. Latest RAID controller firmware and NVSRAM versions

Software	Version
RAID controller firmware	08.20.24.60
RAID controller NVSRAM	N26X0-820890-008 for Dell EMC PowerVault MD32xx and MD32xxi(SAS and 1 Gbps iSCSI storage arrays) N26X0-820890-908 for Dell EMC PowerVault N26X0-820890-908 for Dell EMC PowerVault MD36xxi and MD36xxf (10 Gbps iSCSI and Fibre Channel storage arrays)

Supported SAS host bus adapters

Go to **Dell.com/support** to download the latest supported version of the 6 Gbps SAS HBA firmware and drivers for your specific server hardware platform.

Table 9. Supported SAS HBAs

Vendor	Model	Notes
Dell EMC	6 Gbps SAS HBA	This HBA is not supported in 13th generation Dell EMC PowerEdge servers.
Dell EMC	12 Gbps SAS HBA	This HBA is only supported in13th generation Dell EMC PowerEdge servers.

ⓘ **NOTE: Dell EMC 12 Gbps SAS HBA auto negotiates to 6 Gbps speeds when connected to a Dell EMC PowerVault MD32xx series SAS array.**

Supported iSCSI software initiators

Table 10. Supported iSCSI initiators

Operating System	SW initiator vendor	SW initiator version	Notes
Windows Server OS	Microsoft	RTM or later	Included with OS
Red Hat Enterprise Linux	Red Hat	RTM or later	Included with OS
SUSE Linux Enterprise Server	SUSE	RTM or later	Included with OS
VMware vSphere	VMware	RTM or later	Included with OS
Citrix XenServer	Citrix	RTM or later	Included with OS

(i) **NOTE: For more information about OS support, refer to the Supported operating systems section of this document.**

Supported protocol offload adapters

Standard Gigabit and 10 Gigabit Ethernet adapters are supported when used with supported software iSCSI initiators. Hosts must have a standards compliant iSCSI initiator to access MD Series storage. Initiator support is provided by the initiator or operating system vendor. Dell EMC PowerVault does not support Converged Network Adapters (CNA) in Converged mode. Although PowerVault does not endorse or support initiators directly, this support matrix provides some useful configuration information for common initiators.

Dell EMC's PowerVault MD Series Arrays work with any RFC 3720 iSCSI compliant initiators. The initiator must support all mandatory iSCSI features (IPSec is not required). This information is subject to change without notice. Dell EMC is not responsible for any errors in this information. Hardware initiators are not supported by Dell EMC.

Also, ensure that you read the initiator documentation and release notes from the particular vendors, and the Dell EMC PowerVault MD Series release notes for up-to-date configuration recommendations.

Fibre Channel SFP+ Transceiver support

Table 11. Supported Fibre Channel SFP+ transceivers

Description	Manufacturer	Mfr. Part number
8G FC SFP+	JDSU	PLRXPL-VC-SH4-23-N
8G FC SFP+	Finisar	FTLF8528P2BCV-LS
8G FC SFP+	Avago	AFBR-57D7APZ

Supported physical disks

> (i) **NOTE: Only the physical disk drives with a Dell EMC part number listed in Table 12 are supported.**

For the latest available physical disk drive firmware, refer to the Dell EMC PowerVault MD3200/MD3600/MD3660i/MD3660f *Drivers and Downloads* section on **Dell EMC.com/support**.

Table 12. Supported physical disk drive models

Dell EMC P/N	Form Factor	Model	Capacity	Speed	Vendor	SED	Firmware
X1MCH	2.5"	LB150S	149 GB	SSD	Pliant (SanDisk)	No	D012
6R5R8	2.5"	LB206M	200 GB	SSD	Pliant (SanDisk)	No	D339
8C38W	2.5"	LB406M	400 GB	SSD	Pliant (SanDisk)	No	D339
DPF1J	2.5"	LB806M	800 GB	SSD	Pliant (SanDisk)	No	D339
D3K4J	2.5"	LB406R	400 GB	SSD	Pliant (SanDisk)	No	D339
5Y05N	2.5"	LB806R	800 GB	SSD	Pliant (SanDisk)	No	D339
F06P1	2.5"	LB1606R	1.6 TB	SSD	Pliant (SanDisk)	No	D339
TPWNJ	2.5"	LB206S	200 GB	SSD	Pliant (SanDisk)	No	D339
8NW1H	2.5"	LB406S	400 GB	SSD	Pliant (SanDisk)	No	D339
2XR0K	2.5"	LT0200MO	200 GB	SSD	SanDisk	No	D416
C06VX	2.5"	LT0400MO	400 GB	SSD	SanDisk	No	D416
989R8	2.5"	LT0800MO	800 GB	SSD	SanDisk	No	D416
JDTGX	2.5"	LT1600MO	1.6 TB	SSD	SanDisk	No	D416
J19XM	2.5"	LT0800RO	800 GB	SSD	SanDisk	No	D416
2M61G	2.5"	LT1600RO	1.6 TB	SSD	SanDisk	No	D416
M7KYX	2.5"	LT0200WM	200 GB	SSD	SanDisk	No	D416
T2TPF	2.5"	LT0400WM	400 GB	SSD	SanDisk	No	D416
FHFNJ	2.5"	LT0800WM	800 GB	SSD	SanDisk	No	D416
MFC6G	2.5"	MZILS400HEGR0D3	400 GB	SSD	Samsung	No	DWL7
HF06W	2.5"	MZILS800HEHP0D3	800 GB	SSD	Samsung	No	DWL7
W5PP5	2.5"	MZILS1T6HEJH0D3	1.6 TB	SSD	Samsung	No	DWL7
8RC8K	2.5"	MZILS3T2HMLH0D3	3.2 TB	SSD	Samsung	No	DWL7
8Y64H	2.5"	MZILS480HEGR0D3	480 GB	SSD	Samsung	No	DSL7
7FNRX	2.5"	MZILS960HEHP0D3	960 GB	SSD	Samsung	No	DSL7
086DD	2.5"	MZILS1T9HEJH0D3	1.92 TB	SSD	Samsung	No	DSL7
JR1HP	2.5"	MZILS3T8HMLH0D3	3.84 TB	SSD	Samsung	No	DSL7
R1ND2	2.5"	MZILT960HAHQ0D3	960 GB	SSD	Samsung	No	DWF8

Table 12. Supported physical disk drive models (continued)

F0VFY	2.5"	MZILT1T9HAJQ0D3	1.92 TB	SSD	Samsung	No	DWF8
X8F87	2.5"	MZILT3T8HALS0D3	3.84 TB	SSD	Samsung	No	DWF8
D9NCK	2.5"	MZILT800HAHQ0D3	800 GB	SSD	Samsung	No	DSF8
DR0HX	2.5"	MZILT1T6HAJQ0D3	1.6 TB	SSD	Samsung	No	DSF8
5H9RV	2.5"	MZILT3T2HALS0D3	3.2 TB	SSD	Samsung	No	DSF8
6K55X	2.5"	MK2001GRZB	200 GB	SSD	Toshiba	No	A008
R2PJ7	2.5"	MK4001GRZB	400 GB	SSD	Toshiba	No	A008
K41XJ	2.5"	PX02SMF020	200 GB	SSD	Toshiba	No	A3B3
HKK8C	2.5"	PX02SMF040	400 GB	SSD	Toshiba	No	A3B3
TC2MH	2.5"	PX02SMF080	800 GB	SSD	Toshiba	No	A3B3
G4V45	2.5"	PX02SMB160	1.6 TB	SSD	Toshiba	No	A3B3
CV6W8	2.5"	PX02SSF020	200 GB	SSD	Toshiba	No	A4B3
2H9WV	2.5"	PX02SSF040	400 GB	SSD	Toshiba	No	A4B3
PG19T	2.5"	PX02SSB080	800 GB	SSD	Toshiba	No	A4B3
N9PTK	2.5"	PX03SNF080	800 GB	SSD	Toshiba	No	A5B3
0MXR2	2.5"	PX03SNB160	1.6 TB	SSD	Toshiba	No	A5B3
GM5R3	2.5"	PX04SMB040	400 GB	SSD	Toshiba	No	AM07
M91TJ	2.5"	PX04SMB080	800 GB	SSD	Toshiba	No	AM07
77K16	2.5"	PX04SMB160	1.6 TB	SSD	Toshiba	No	AM07
63GYR	2.5"	PX04SMB320	3.2 TB	SSD	Toshiba	No	AM07
N5Y85	2.5"	PX04SVB048	480 GB	SSD	Toshiba	No	AM07
YYC10	2.5"	PX04SVB096	960 GB	SSD	Toshiba	No	AM07
4XC39	2.5"	PX04SVB192	1.92 TB	SSD	Toshiba	No	AM07
GYMY9	2.5"	PX04SVB384	3.84 TB	SSD	Toshiba	No	AM07
06VJ7	2.5"	PX04SRB048	480 GB	SSD	Toshiba	No	AM07
4KG4X	2.5"	PX04SRB096	960 GB	SSD	Toshiba	No	AM07
R87FK	2.5"	PX04SRB192	1.92 TB	SSD	Toshiba	No	AM07
M09K5	2.5"	PX04SRB384	3.84 TB	SSD	Toshiba	No	AM07
HPNDJ	2.5"	PX04SHB020	200 GB	SSD	Toshiba	No	AM07
YT53C	2.5"	PX04SHB040	400 GB	SSD	Toshiba	No	AM07
RVCY3	2.5"	PX04SHB080	800 GB	SSD	Toshiba	No	AM07
Y9VX5	2.5"	PX04SHB160	1.6 TB	SSD	Toshiba	No	AM07
43PCJ	2.5"	PX05SVB048Y	480 GB	SSD	Toshiba	No	AS0E
503M7	2.5"	PX05SVB096Y	960 GB	SSD	Toshiba	No	AS0E
V0K7V	2.5"	PX05SVB192Y	1.92 TB	SSD	Toshiba	No	AS0E
3DDFT	2.5"	PX05SVB384Y	3.84 TB	SSD	Toshiba	No	AS0E
JGXK2	2.5"	PX05SRB048Y	480 GB	SSD	Toshiba	No	AS0E

Table 12. Supported physical disk drive models (continued)

MWGK7	2.5"	PX05SRB096Y	960 GB	SSD	Toshiba	No	AS0E
0FYFW	2.5"	PX05SRB192Y	1.92 TB	SSD	Toshiba	No	AS0E
XCRDV	2.5"	PX05SRB384Y	3.84 TB	SSD	Toshiba	No	AS0E
5VHHG	2.5"	PX05SMB040Y	400 GB	SSD	Toshiba	No	AS0E
CN3JH	2.5"	PX05SMB080Y	800 GB	SSD	Toshiba	No	AS0E
GVTYD	2.5"	PX05SMB160Y	1.6 TB	SSD	Toshiba	No	AS0E
R1YFC	2.5"	PX05SMB320Y	3.2 TB	SSD	Toshiba	No	AS0E
3YPRY	2.5"	KPM5XVUG400G	400GB	SSD	Toshiba	No	B018
JG6X1	2.5"	KPM5XVUG800G	800GB	SSD	Toshiba	No	B018
GT1JH	2.5"	KPM5XVUG1T60	1.6TB	SSD	Toshiba	No	B018
X8HTD	2.5"	KPM5XVUG3T20	3.2TB	SSD	Toshiba	No	B018
3PR5C	2.5"	KPM5XVUG480G	480GB	SSD	Toshiba	No	B018
WFGTH	2.5"	KPM5XVUG960G	960GB	SSD	Toshiba	No	B018
2WVYG	2.5"	KPM5XVUG1T92	1.92TB	SSD	Toshiba	No	B018
91W3V	2.5"	KPM5XVUG3T84	3.84TB	SSD	Toshiba	No	B018
9YWG8	2.5"	KPM5XRUG480G	480GB	SSD	Toshiba	No	B018
H8X3X	2.5"	KPM5XRUG960G	960GB	SSD	Toshiba	No	B018
TDNP7	2.5"	KPM5XRUG1T92	1.92TB	SSD	Toshiba	No	B018
N85XX	2.5"	KPM5XRUG3T84	3.84TB	SSD	Toshiba	No	B018
WGP72	2.5"	KPM5XMUG400G	400GB	SSD	Toshiba	No	B018
DHRVV	2.5"	KPM5XMUG800G	800GB	SSD	Toshiba	No	B018
W9G88	2.5"	KPM5XMUG1T60	1.6TB	SSD	Toshiba	No	B018
8038H	2.5"	KPM5XMUG3T20	3.2TB	SSD	Toshiba	No	B018
X143K	2.5"	MBD2147RC	146 GB	10 K	Fujitsu	No	D80A
U706K	2.5"	MBD2300RC	300 GB	10 K	Fujitsu	No	D80A
R727K	2.5"	MBE2073RC	73 GB	15 K	Fujitsu	No	D906
W328K	2.5"	MBE2147RC	146 GB	15 K	Fujitsu	No	D906
T6TWN	2.5"	HUC101212CSS600	1.2 TB	10 K	HGST	No	U850
K9VCF	2.5"	HUC101830CSS204	300 GB	10 K	HGST	No	FJ39
10DR3	2.5"	HUC101860CSS204	600 GB	10 K	HGST	No	FJ39
87GNY	2.5"	HUC101812CSS204	1.2 TB	10 K	HGST	No	FJ39
RF9T8	2.5"	HUC101818CS4204	1.8 TB	10 K	HGST	No	FK39
VTHDD	2.5"	HUC101818CS4204	1.8 TB	10 K	HGST	No	FK39
RDKH0	2.5"	HUC101830CSS204	300 GB	10 K	HGST	No	FJ39
P6GJX	2.5"	HUC101860CSS204	600 GB	10 K	HGST	No	FJ39
9XNF6	2.5"	HUC101812CSS204	1.2 TB	10 K	HGST	No	FJ39
5VNKK	2.5"	HUC101830CSS200	300 GB	10 K	HGST	No	FU39

Table 12. Supported physical disk drive models (continued)

6DWVP	2.5"	HUC101860CSS200	600 GB	10 K	HGST	No	FU39
0KV02	2.5"	HUC101812CSS200	1.2 TB	10 K	HGST	No	FU39
851GV	2.5"	HUC156030CSS204	300 GB	15 K	HGST	No	EJ39
4J5P1	2.5"	HUC156060CSS204	600 GB	15 K	HGST	No	EJ39
0N0T4	2.5"	HUC156030CSS204	300 GB	15 K	HGST	No	EJ39
TRCN6	2.5"	HUC156060CSS204	600 GB	15 K	HGST	No	EJ39
1P08J	2.5"	HUC156030CSS200	300 GB	15 K	HGST	No	EU39
5PNGD	2.5"	HUC156060CSS200	600 GB	15 K	HGST	No	EU39
T855K	2.5"	HUC103014CSS600	146 GB	10 K	Hitachi	No	J516
U709K	2.5"	HUC103030CSS600	300 GB	10 K	Hitachi	No	J516
YJ0GR	2.5"	HUC106030CSS600	300 GB	10 K	Hitachi	No	A440
8WP8W	2.5"	HUC106060CSS600	600 GB	10 K	Hitachi	No	A440
CXF82	2.5"	HUC109030CSS600	300 GB	10 K	Hitachi	No	N440
G76RF	2.5"	HUC109060CSS600	600 GB	10 K	Hitachi	No	N440
H5WGN	2.5"	HUC109090CSS600	900 GB	10 K	Hitachi	No	N440
R730K	2.5"	HUC151473CSS600	73 GB	15 K	Hitachi	No	K774
W330K	2.5"	HUC151414CSS600	146 GB	15 K	Hitachi	No	K774
745GC	2.5"	ST9300605SS	300 GB	10 K	Seagate	No	CS0C
R72NV	2.5"	ST9600205SS	600 GB	10 K	Seagate	No	CS0C
8JRN4	2.5"	ST9900805SS	900 GB	10 K	Seagate	No	CS0C
XRRVX	2.5"	ST9900605SS	900 GB	10 K	Seagate	Yes	CSFB
7T0DW	2.5"	ST9600204SS	600 GB	10 K	Seagate	No	FM0C
8MP93	2.5"	ST9600104SS	600 GB	10 K	Seagate	Yes	FMF5
X160K	2.5"	ST9146803SS	146 GB	10 K	Seagate	No	FS66
T871K	2.5"	ST9300603SS	300 GB	10 K	Seagate	No	FS66
148J7	2.5"	ST9300503SS	300 GB	10 K	Seagate	Yes	FSF9
PGHJG	2.5"	ST300MM0006	300 GB	10 K	Seagate	No	LS0C
7YX58	2.5"	ST600MM0006	600 GB	10 K	Seagate	No	LS0C
2RR9T	2.5"	ST900MM0006	900 GB	10 K	Seagate	No	LS0C
TNX32	2.5"	ST900MM0036	900 GB	10 K	Seagate	Yes	LSF7
3P3DF	2.5"	ST900MM0007	900 GB	10 K	Seagate	No	IS06
RMCP3	2.5"	ST1200MM0007	1.2 TB	10 K	Seagate	No	IS06
4RYFR	2.5"	ST1200MM0027	1.2 TB	10 K	Seagate	Yes	ISF5
W345K	2.5"	ST973452SS	73 GB	15 K	Seagate	No	HT66
X162K	2.5"	ST9146852SS	146 GB	15 K	Seagate	No	HT66
89TH4	2.5"	ST9146752SS	146 GB	15 K	Seagate	Yes	HTF6
YJ2KH	2.5"	ST300MM0088	300 GB	15 K	Seagate	No	TT31

Table 12. Supported physical disk drive models (continued)

R95FV	2.5"	ST600MM0088	600 GB	15 K	Seagate	No	TT31
WXPCX	2.5"	ST1200MM0088	1.2 TB	15 K	Seagate	No	TT31
NCT9F	2.5"	ST300MP0026	300 GB	15 K	Seagate	No	KT37
FPW68	2.5"	ST600MP0036	600 GB	15 K	Seagate	No	KT37
XTH17	2.5"	ST900MP0026	900 GB	15 K	Seagate	No	KT37
N9WXC	2.5"	ST900MP0126	900 GB	15 K	Seagate	Yes	KSC6
RT8MY	2.5"	DL900MP0136	900 GB	15 K	Seagate	No	KT55
V2KWT	2.5"	ST1200MM0108	1.2 TB	10 K	Seagate	Yes	TSC9
43N12	2.5"	ST1800MM0018	1.8 TB	10 K	Seagate	No	TS27
WHR0G	2.5"	ST1800MM0078	1.8 TB	10 K	Seagate	Yes	TSE1
VJ7CD	2.5"	ST1800MM0168	1.8 TB	10 K	Seagate	No	2S24
2M5JK	2.5"	ST300MM0078	300 GB	10 K	Seagate	No	BS04
D1F14	2.5"	ST600MM0238	600 GB	10 K	Seagate	No	BS04
FR6W6	2.5"	ST1200MM0198	1.2 TB	10 K	Seagate	No	UT71
RVDCJ	2.5"	ST1800MM0198	1.8 TB	10 K	Seagate	No	2T51
JY57X	2.5"	DL1800MM0159	1.8 TB	10 K	Seagate	No	ST51
XXTRP	2.5"	ST600MM0069	600 GB	10 K	Seagate	No	ST31
G2G54	2.5"	ST1200MM0099	1.2 TB	10 K	Seagate	No	ST31
DMP3R	2.5"	ST1200MM0069	1.2 TB	10 K	Seagate	Yes	SSC1
7FJW4	2.5"	ST300MP0005	300 GB	15 K	Seagate	No	VT33
4HGTJ	2.5"	ST600MP0005	600 GB	15 K	Seagate	No	VT33
4X0XG	2.5"	ST600MP0025	600 GB	15 K	Seagate	Yes	VSC6
61XPF	2.5"	ST9146853SS	146 GB	15 K	Seagate	No	YS0D
H8DVC	2.5"	ST9300653SS	300 GB	15 K	Seagate	No	YS0D
81N2C	2.5"	ST9300453SS	300 GB	15 K	Seagate	Yes	YSFD
55RMX	2.5"	ST91000640SS	1 TB	7.2 K	Seagate	No	AS0D
9W5WV	2.5"	ST9500620SS	500 GB	7.2 K	Seagate	No	AS0D
XKGH0	2.5"	ST91000642SS	1 TB	7.2 K	Seagate	Yes	ASFE
R734K	2.5"	ST9500430SS	500 GB	7.2 K	Seagate	No	DS67
NV0G9	2.5"	ST9500431SS	500 GB	7.2 K	Seagate	Yes	DSF4
XY986	2.5"	ST2000NX0273	2 TB	7.2 K	Seagate	No	NS29
56M6W	2.5"	ST1000NX0453	1 TB	7.2 K	Seagate	No	NS02
FVX7C	2.5"	ST2000NX0433	2 TB	7.2 K	Seagate	No	NS02
Y6W8N	2.5"	ST2000NX0453	2 TB	7.2 K	Seagate	Yes	NSF1
D4N7V	2.5"	ST1000NX0473	1 TB	7.2 K	Seagate	No	NT32
TMVN7	2.5"	ST2000NX0463	2 TB	7.2 K	Seagate	No	NT32
740Y7	2.5"	MBF2300RC	300 GB	10 K	Toshiba	No	DA0B

Table 12. Supported physical disk drive models (continued)

5R6CX	2.5"	MBF2600RC	600 GB	10 K	Toshiba	No	DA0B
MTV7G	2.5"	AL13SEB300	300 GB	10 K	Toshiba	No	DE11
5TFDD	2.5"	AL13SEB600	600 GB	10 K	Toshiba	No	DE11
RC34W	2.5"	AL13SEB900	900 GB	10 K	Toshiba	No	DE11
GP3FR	2.5"	AL14SEB18EQ	1.8 TB	10 K	Toshiba	No	DN03
2TRM4	2.5"	AL14SEB18EQY	1.8 TB	10 K	Toshiba	No	EB02
3NKW7	2.5"	AL14SEB030N	300 GB	10 K	Toshiba	No	DM06
453KG	2.5"	AL14SEB060N	600 GB	10 K	Toshiba	No	DM06
N9VVV	2.5"	AL14SEB090N	900 GB	10 K	Toshiba	No	DM06
89D42	2.5"	AL14SEB120N	1.2 TB	10 K	Toshiba	No	DM06
KT5V6	2.5"	AL14SEB030N	300 GB	10 K	Toshiba	No	DH01
GTYCR	2.5"	AL14SEB060N	600 GB	10 K	Toshiba	No	DH01
R0MWH	2.5"	AL14SEB120N	1.2 TB	10 K	Toshiba	No	DH01
FF02R	2.5"	AL14SEB030NY	300 GB	10 K	Toshiba	No	EA04
G3MWJ	2.5"	AL14SEB060NY	600 GB	10 K	Toshiba	No	EA04
3K30N	2.5"	AL14SEB120NY	1.2 TB	10 K	Toshiba	No	EA04
6DFD8	2.5"	MK1401GRRB	146 GB	15 K	Toshiba	No	DB08
NWH7V	2.5"	MK3001GRRB	300 GB	15 K	Toshiba	No	DB08
4GN49	2.5"	AL13SXB300N	300 GB	15 K	Toshiba	No	DF0B
990FD	2.5"	AL13SXB600N	600 GB	15 K	Toshiba	No	DF0B
0RVDT	2.5"	AL13SXB30EN	300 GB	15 K	Toshiba	No	DK05
DYDW0	2.5"	AL13SXB60EN	600 GB	15 K	Toshiba	No	DK05
YFKXK	2.5"	AL13SXB30ENY	300 GB	15 K	Toshiba	No	EC02
GK6JN	2.5"	AL13SXB60ENY	600 GB	15 K	Toshiba	No	EC02
377CF	2.5"	AL14SXB30ENY	300 GB	15 K	Toshiba	No	EE05
1W7HC	2.5"	AL14SXB60ENY	600 GB	15 K	Toshiba	No	EE05
YKT0W	2.5"	AL14SXB90ENY	900 GB	15 K	Toshiba	No	EE05
GWFRY	2.5"	AL15SEB030NY	300 GB	10 K	Toshiba	No	EF03
4WX8Y	2.5"	AL15SEB060NY	600 GB	10 K	Toshiba	No	EF03
01M0D	2.5"	AL15SEB120NY	1.2 TB	10 K	Toshiba	No	EF03
0WRRF	2.5"	AL15SEB18EQY	1.8 TB	10 K	Toshiba	No	EF03
X79H3	2.5"	WD3000BKHG	300 GB	10 K	Western Digital	No	D1VD
C5R62	2.5"	WD6000BKHG	600 GB	10 K	Western Digital	No	D1VD
CWHNN	2.5"	WD3001BKHG	300 GB	10 K	Western Digital	No	D1S6
96G91	2.5"	WD6001BKHG	600 GB	10 K	Western Digital	No	D1S6
4X1DR	2.5"	WD9001BKHG	900 GB	10 K	Western Digital	No	D1S6
F9KW8	2.5"	WD3002BKTG	300 GB	10 K	Western Digital	No	D1P3

Table 12. Supported physical disk drive models (continued)

V1TX2	2.5"	WD6002BKTG	600 GB	10 K	Western Digital	No	D1P3
99NCV	2.5"	WD9002BKTG	900 GB	10 K	Western Digital	No	D1P3
WTJVY	3.5"	HUS724020ALS640	2 TB	7.2 K	HGST	No	W350
MY58D	3.5"	HUS724030ALS640	3 TB	7.2 K	HGST	No	W350
7J9RN	3.5"	HUS724040ALS640	4 TB	7.2 K	HGST	No	W350
XP99D	3.5"	HUS726020ALS214	2 TB	7.2 K	HGST	No	KJ03
TX8WW	3.5"	HUS726040ALS214	4 TB	7.2 K	HGST	No	KJ03
VH6FW	3.5"	HUS726020ALS210	2 TB	7.2 K	HGST	No	KU27
X4FKY	3.5"	HUS726040ALS210	4 TB	7.2 K	HGST	No	KU27
PYM8J	3.5"	HUS726060AL5214	6 TB	7.2 K	HGST	No	KK34
43V7V	3.5"	HUH728080AL5204	8 TB	7.2 K	HGST	No	GK23
KRDKK	3.5"	HUH721008AL5200	8 TB	7.2 K	HGST	No	LS15
07FPR	3.5"	HUH721010AL5200	10 TB	7.2 K	HGST	No	LS15
NT1X2	3.5"	HUS726T4TALS200	4TB	7.2K	HGST	No	PU01
XDN2G	3.5"	HUS726T6TAL5200	6TB	7.2K	HGST	No	PS02
44YFV	3.5"	HUS728T8TAL5200	8TB	7.2K	HGST	No	RS01
X150K	3.5"	HUS156030VLS600	300 GB	15 K*	Hitachi	No	E820
T857K	3.5"	HUS156045VLS600	450 GB	15 K*	Hitachi	No	E820
W348K	3.5"	HUS156060VLS600	600 GB	15 K*	Hitachi	No	E820
VYRKH	3.5"	HUS723020ALS640	2 TB	7.2 K	Hitachi	No	M440
CWJ92	3.5"	HUS723030ALS640	3 TB	7.2 K	Hitachi	No	M440
R752K	3.5"	ST3600002SS	600 GB	10 K*	Seagate	No	ER66
M525M	3.5"	ST3300657SS	300 GB	15 K*	Seagate	No	ES68
H995N	3.5"	ST3450857SS	450 GB	15 K*	Seagate	No	ES68
J762N	3.5"	ST3600057SS	600 GB	15 K*	Seagate	No	ES68
D32VD	3.5"	ST3450757SS	450 GB	15 K*	Seagate	Yes	ESF7
5XTFH	3.5"	ST3600957SS	600 GB	15 K*	Seagate	Yes	ESF7
U717K	3.5"	ST3500414SS	500 GB	7.2 K	Seagate	No	KS6B
U738K	3.5"	ST31000424SS	1 TB	7.2 K	Seagate	No	KS6B
R755K	3.5"	ST32000444SS	2 TB	7.2 K	Seagate	No	KS6B
X164K	3.5"	ST31000425SS	1 TB	7.2 K	Seagate	Yes	KSF4
W350K	3.5"	ST32000445SS	2 TB	7.2 K	Seagate	Yes	KSF4
6VNCJ	3.5"	ST500NM0001	500 GB	7.2 K	Seagate	No	PS0B
740YX	3.5"	ST1000NM0001	1 TB	7.2 K	Seagate	No	PS0B
67TMT	3.5"	ST2000NM0001	2 TB	7.2 K	Seagate	No	PS0B
02DK1	3.5"	ST2000NM0041	2 TB	7.2 K	Seagate	Yes	PSF9
1D9NN	3.5"	ST32000645SS	2 TB	7.2 K	Seagate	No	RS17

Table 12. Supported physical disk drive models (continued)

91K8T	3.5"	ST33000650SS	3 TB	7.2 K	Seagate	No	RS17
698PM	3.5"	ST33000652SS	3 TB	7.2 K	Seagate	Yes	RSFF
FNW88	3.5"	ST1000NM0023	1 TB	7.2 K	Seagate	No	GS15
1P7DP	3.5"	ST2000NM0023	2 TB	7.2 K	Seagate	No	GS15
55H49	3.5"	ST3000NM0023	3 TB	7.2 K	Seagate	No	GS15
529FG	3.5"	ST4000NM0023	4 TB	7.2 K	Seagate	No	GS15
6P85J	3.5"	ST4000NM0063	4 TB	7.2 K	Seagate	Yes	GSFB
NWCCG	3.5"	ST6000NM0034	6 TB	7.2 K	Seagate	No	MS2E
PRNR6	3.5"	ST6000NM0034	6 TB	7.2 K	Seagate	No	MS85
GWD7D	3.5"	ST1000NM0005	1 TB	7.2 K	Seagate	No	MS06
R7FKF	3.5"	ST2000NM0005	2 TB	7.2 K	Seagate	No	MS06
XWM1W	3.5"	ST4000NM0005	4 TB	7.2 K	Seagate	No	MS06
DGNTV	3.5"	ST1000NM0045	1 TB	7.2 K	Seagate	No	DS04
K7VW5	3.5"	ST2000NM0045	2 TB	7.2 K	Seagate	No	DS04
YXG4K	3.5"	ST4000NM0025	4 TB	7.2 K	Seagate	No	DS04
RHVWG	3.5"	ST6000NM0095	6 TB	7.2 K	Seagate	No	DS23
FCHXF	3.5"	ST4000NM0135	4 TB	7.2 K	Seagate	Yes	DSF2
H0R8N	3.5"	ST1000NM0085	1 TB	7.2 K	Seagate	No	DT31
7RCGV	3.5"	ST2000NM0155	2 TB	7.2 K	Seagate	No	DT31
5JH5X	3.5"	ST4000NM0295	4 TB	7.2 K	Seagate	No	DT31
GKWHP	3.5"	ST8000NM0075	8 TB	7.2 K	Seagate	No	PS26
PDFHC	3.5"	ST8000NM0135	8 TB	7.2 K	Seagate	Yes	PSE4
M40TH	3.5"	ST8000NM0185	8 TB	7.2 K	Seagate	No	PT51
YF87J	3.5"	ST10000NM0256	10 TB	7.2 K	Seagate	No	TT54
GPP3G	3.5"	MG03SCA100	1 TB	7.2 K	Toshiba	No	DG09
829T8	3.5"	MG03SCA200	2 TB	7.2 K	Toshiba	No	DG09
14X4H	3.5"	MG03SCA300	3 TB	7.2 K	Toshiba	No	DG09
12GYY	3.5"	MG03SCA400	4 TB	7.2 K	Toshiba	No	DG09
7KXJR	3.5"	MK1001TRKB	1 TB	7.2 K*	Toshiba	No	DCAD
WDC07	3.5"	MK2001TRKB	2 TB	7.2 K*	Toshiba	No	DCAD
GDM8H	3.5"	MG04SCA20EN	2 TB	7.2 K	Toshiba	No	DS07
0F9W8	3.5"	MG04SCA40EN	4 TB	7.2 K	Toshiba	No	DS07
3PRF0	3.5"	MG04SCA60EE	6 TB	7.2 K	Toshiba	No	DR07
HHX14	3.5"	MG04SCA20ENY	2 TB	7.2 K	Toshiba	No	EG03
1MVTT	3.5"	MG04SCA40ENY	4 TB	7.2 K	Toshiba	No	EG03
M7D8Y	3.5"	MG04SCA20EN	2 TB	7.2 K	Toshiba	No	DJ01
HNX0W	3.5"	MG04SCA40EN	4 TB	7.2 K	Toshiba	No	DJ01

Table 12. Supported physical disk drive models (continued)

0V8G9	3.5"	WD1000FYYG	1 TB	7.2 K	Western Digital	No	D1BH
YY34F	3.5"	WD2000FYYG	2 TB	7.2 K	Western Digital	No	D1BH
440RW	3.5"	WD1001FYYG	1 TB	7.2 K	Western Digital	No	D1R7
37MGT	3.5"	WD2001FYYG	2 TB	7.2 K	Western Digital	No	D1R7
DPTW9	3.5"	WD3001FYYG	3 TB	7.2 K	Western Digital	No	D1R7
202V7	3.5"	WD4001FYYG	4 TB	7.2 K	Western Digital	No	D1R7

(i) **NOTE:**

- **3.5" 15 K RPM drives, 3.5" 10 K RPM drives, and 3.5" 7.2 K RPM utility drives marked with (∗) are not supported on Dell EMC PowerVault MD dense arrays such as Dell EMC PowerVault MD3260, MD3260i, MD3660i, and MD3660f.**
- **The MD32/MD36 series arrays can utilize 12 GBps HDD or SSD, but will negotiate to a speed of 6 GBps.**
- **Encrypted SSD drives (SED-SSD) and 4 Kn Sector drives are not supported on the MD32/MD36 series arrays.**

Supported expansion enclosures

Dell EMC PowerVault MD 3x60 Series Dense Storage Arrays support a maximum of 180 physical disk drive slots (with premium feature activation). For a system without premium feature activation, the physical disk drive slots limit is 120. The additional slot support can only be provided by up to two Dell EMC PowerVault MD3060e expansion enclosures.

Table 13. Expansion enclosures supported on dense (4U) storage arrays

Enclosure model	Minimum firmware version
Dell PowerVault MD3060e	03.9F

Dell EMC PowerVault MD32xx/36xx series storage arrays support a maximum of 192 physical disk drive slots (with premium feature activation). For a system without premium feature activation, the physical disk drive limit is 120. You can provide the additional slots with up to 15 MD1200 expansion enclosures, seven MD1220 expansion enclosures, or a combination of both. When you use a combination of expansion enclosures, the total number of physical disk drive slots in the system cannot exceed 192.

Table 14. Expansion enclosures supported on non-dense (2U) storage arrays

Enclosure model	Minimum firmware version
Dell PowerVault MD1200	1.06
Dell PowerVault MD1220	1.06

ⓘ **NOTE: Attaching a 4U (dense) expansion enclosure to a 2U (non-dense) RAID storage array is not supported. Alternately, you cannot attach a 2U expansion enclosure to a 4U RAID storage array. All EMMs in an expansion stack must be at the same firmware level.**

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Supported management software

The Dell EMC PowerVault MD Storage software is composed of the Modular Disk Storage Manager (MDSM) and the Modular Disk Configuration utility (MDCU). These management utilities are available on the resource DVD provided with your system and online at Dell.com/support. The Dell EMC PowerVault MD storage software is supported on all operating systems and guest operating systems listed in the Error! Reference source not found. section. The management station must meet the following minimum requirements:

- 5 GB of free disk space
- For MDSM and MDCU, a graphical user interface (GUI) is required

The Dell EMC PowerVault MD-Series resource DVD and other supported management software details are shown in the following tables:

Table 15. Supported management software (Windows)

Software component	Version	Notes
Dell EMC PowerVault MD32/36 Series Storage Arrays resource DVD	6.5.0.1	
Modular Disk Storage Manager	11.25.0306.0026	
Modular Disk Configuration utility	2.1.0.68	Supported on iSCSI only
Dell EMC PowerVault MD32/36 series hardware provider VDS/VSS Providers*	D1.20.0G06.0004/S1.20.0G06.0004	Dell EMC is discontinuing support of the VSS and VDS hardware providers. For information about deprecation, see the *Dell EMC MD Series Storage Arrays Information Update.*
Dell EMC PowerVault MD Storage Array vCenter plug-in	See Supported management software (VMware vCenter plug-in).	
Dell EMC PowerVault MD Storage Array VASA Provider (iSCSI and Fibre Channel only)	See Supported management software (VASA provider support).	Supported on: • Windows Server 2008 R2 SP1(64-bit version only) • Windows Server 2012 • Windows Server 2012 R2
Dell EMC PowerVault MD Storage Array Storage Replication Adapter (SRA) (Fibre Channel only)	See Supported management software (Storage Replication Adapter Support).	

* Maximum number of concurrent back ups supported while using the hardware provider VSS provider with clustered shared volumes is two.

Table 16. Supported management software (Linux)

Software Component	Version	Notes
Dell EMC PowerVault MD Series Dense Storage Arrays resource DVD	6.5.0.1	
Modular Disk Storage Manager	11.25.0A06.0026	
Modular Disk Configuration utility	2.1.0.68	Supported with iSCSI storage arrays only.

Table 17. Supported management software (VMware vCenter plug-in)

vCenter plug-in version	VMware version supported	Notes
3	All protocols:	This is compatible only with firmware 08.20.11.60 or later. The Host to Storage

Table 17. Supported management software (VMware vCenter plug-in) (continued)

vCenter plug-in version	VMware version supported	Notes
	• vSphere 6.5 • vSphere 6.0 • vSphere 5.5 U2	Wizard that is used to automatically discover the HBA WWNs is not supported after VMware vCenter server 6.0 Update2 Build 3620759 or on any of the VMware vCenter server 6.5 releases.
2.7	All protocols: • vSphere 5.5 • vSphere 5.1	This is compatible only with firmware 7.84.56.60 or later.

Table 18. Supported management software (VASA provider support)

VASA version	VMware supported version	Notes
5.5	vSphere Client 5.5/6.0/6.5 vCenter Server 5.5/6.0/6.5 Site Recovery Manager (SRM) 5.1 or later	Supported on 08.20.05.60 firmware or later.

ⓘ **NOTE: Supported on Fibre Channel and iSCSI arrays only.**

Table 19. Supported management software (Storage Replication Adapter Support)

SRA Version	VMware version supported	Notes
5.6	vSphere Client 5.1/ 5.5/6.0/6.5 vCenter Server 5.0/5.1/5.5 Site Recovery Manager (SRM) 5.1/5.5/6.0/6.1	This is compatible only with firmware 08.20.11.60 or later.
5.5	vSphere Client 5.1/5.5 vCenter Server 5.1 Site Recovery Manager (SRM) 5.1/5.5	For more information, see the MD Storage Array VMware Storage Replication Adapter 5.0 Installation and Configuration Guide.

ⓘ **NOTE: Supported on Fibre Channel and iSCSI arrays only.**

Supported operating systems

Where clustering is supported by the operating system, it is also supported on the Dell EMC PowerVault MD3200, MD3200i, MD3600i, MD3600f, MD3260, MD3260i, MD3660i, and MD3660f series storage arrays, subject to the following limitations:

Windows Server 2008 R2 - Windows Server 2016:

- Maximum iSCSI nodes are 16
- Maximum SAS nodes is 4
- Maximum FC nodes is 16

Table 20. Dell EMC PowerVault MD-Series operating system support

Operating system	SAS host server	iSCSI host server	Management station	Fibre Channel host server	Notes & required hotfixes
Windows Server 2016*					
Standard server (core and desktop experience)	Yes	Yes	Yes	Yes	The Microsoft MPIO feature musts installed prior to installing the Module Disk Storage Manager (MDSM) located on the resource DVD available on Dell.com/support. Failure to do so will require MDSM to be installed a second time.
Data center server (core and desktop experience)	Yes	Yes	Yes	Yes	The Microsoft MPIO feature musts installed prior to installing the Module Disk Storage Manager (MDSM) located on the resource DVD available on Dell.com/support. Failure to do so will require MDSM to be installed a second time.
Windows Server 2012 R2 (U1)*					
Standard server and core	Yes	Yes	Yes	Yes	KB2966870
Data center server and core	Yes	Yes	Yes	Yes	KB2966870
Foundation server and core	Yes	Yes	Yes	Yes	KB2966870
Windows Server 2008 R2 SP1*					
Windows 2008 R2 SP1 Enterprise and Core	Yes	Yes	Yes	Yes	KB2522766 KB2637197
Windows 2008 R2 SP1 Data center and Core	Yes	Yes	Yes	Yes	KB2522766 KB2637197
Windows 2008 R2 SP1 Foundation and Core	Yes	Yes	Yes	Yes	KB2522766 KB2637197
Windows 2008 R2 SP1 Web and Core			Yes		KB2522766 KB2637197
Windows 2008 Storage Server R2 SP1 all editions	Yes	Yes	Yes	Yes	KB2522766 KB2637197
Windows 2008 R2 SP1 HPC Server	Yes	Yes	Yes	Yes	KB2522766 KB2637197
Red Hat Enterprise Linux (RHEL)					
Red Hat Enterprise Linux 7.3 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)

Table 20. Dell EMC PowerVault MD-Series operating system support (continued)

Operating system	SAS host server	iSCSI host server	Management station	Fibre Channel host server	Notes & required hotfixes
Red Hat Enterprise Linux 7.2 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)
Red Hat Enterprise Linux 7.1 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum) The Linux sg driver has been disabled by default in RHEL 7.1 and is required for in-band management. To workaround this, manually issue modprobe sg or add it to an init script. After the driver is loaded, in-band management will be available. For more information about this issue, refer to RHEL 7.1 Release Notes, issue BZ#1186462.
Red Hat Enterprise Linux 7 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)
Red Hat Enterprise Linux 6.9 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)
Red Hat Enterprise Linux 6.8 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)
Red Hat Enterprise Linux 6.7 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)
Red Hat Enterprise Linux 6.6 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)
Red Hat Enterprise Linux 6.5 (x64 only)	Yes	Yes	Yes	Yes	Basic Server install (Minimum)
SUSE Linux Enterprise Server (SLES)					
SUSE® Linux Enterprise Server 12.2 (x64 only)	Yes	Yes	Yes	Yes	
SUSE® Linux Enterprise Server 12.1 (x64 only)	Yes	Yes	Yes	Yes	
SUSE® Linux Enterprise Server 12 (x64 only)	Yes	Yes	Yes	Yes	
SUSE® Linux Enterprise Server 11.4(x64 only)	Yes	Yes	Yes	Yes	
Virtualization Hosts / Hypervisors**					
VMware vSphere 6.5	Yes	Yes		Yes	• For supported array firmware versions, see VMware https://www.vmware.com/resources/compatibility/search.php • Direct attached iSCSI connection is not supported with VMware vSphere • Supported path policies: MRU • RR
VMware vSphere 6.0 (U1, U2, U3)	Yes	Yes		Yes	• For supported array firmware versions, see VMware https://www.vmware.com/resources/compatibility/search.php • Direct attached iSCSI connection is not supported with VMware vSphere • Supported path policies: MRU • RR

Table 20. Dell EMC PowerVault MD-Series operating system support (continued)

Operating system	SAS host server	iSCSI host server	Management station	Fibre Channel host server	Notes & required hotfixes
VMware vSphere 5.5 (U3)	Yes	Yes		Yes	• For supported array firmware versions, see VMware https://www.vmware.com/resources/compatibility/search.php • Direct attached iSCSI connection is not supported with VMware vSphere • Supported path policies: MRU • RR
VMware vSphere 5.1 (U3)	Yes	Yes			• For supported array firmware versions, see VMware https://www.vmware.com/resources/compatibility/search.php • Direct attached iSCSI connection is not supported with VMware vSphere • Supported path policies: MRU • RR
Citrix XenServer	Yes	Yes		Yes	For supported XS releases see http://hcl.xensource.com/
Microsoft Hyper-V Server 2016	Yes	Yes	Yes	Yes	
Microsoft Hyper-V Server 2012 R2	Yes	Yes	Yes	Yes	
Microsoft Hyper-V Server 2008 R2 SP1	Yes	Yes	Yes	Yes	
Windows Server 2008 R2 SP1 with Hyper-V	Yes	Yes	Yes	Yes	
Windows Desktop operating systems					
Windows 10 (x64 only) Pro Enterprise			Yes		
Windows 8.1 (x64 only) Pro Enterprise			Yes		
Windows 8 (x64 only) Pro Enterprise			Yes		
Windows 7 (x86, x64)			Yes		

(i) **NOTE:**

- **Core editions Windows servers can only manage storage arrays by using the SMcli client.**
- **The VMware Hardware Compatibility List only shows support for RAID controller firmware version _07.84_. However, this indicates support for all firmware versions 07.84.xx.xx or later.**

Windows ODX support

The MD32XX or MD36XX Series Storage Arrays support Windows ODX for Windows Server 2012 or later.

ⓘ **NOTE: ODX is disabled by default and must be enabled using a SMcli command. For more information, refer to the** *Dell EMC PowerVault MD 32XX/34XX/36XX/38XX Series Storage Arrays CLI Guide* **on Dell.com/support.**

ALUA support on host operating systems

The following operating systems supported by your MD Series storage arrays support ALUA natively. Configuration steps are not required to enable ALUA on these operating systems.

- Microsoft Windows 2008 R2 SP1 and later
- Microsoft Windows 2012 R2 and later
- Microsoft Windows 2016 and later
- Red Hat Enterprise Linux 6.5 and later
- SUSE Linux Enterprise Server 11.4 and later
- VMware vSphere ESXi 5.1 and later

For more information about the ALUA configuration, see the *MD Series Administrator's Guide* available at Dell.com/support.

Device mapper software

Table 21. Supported device mapper software

Operating system	Component	Supported version
SUSE Linux Enterprise Server 12.2	Native	Native
SUSE Linux Enterprise Server 12.1	Native	Native
SUSE Linux Enterprise Server 12	Native	Native
SUSE Linux Enterprise Server 11.4	Native	Native
Red Hat Enterprise Linux 7.4	Native	Native
Red Hat Enterprise Linux 7.3	Native	Native
Red Hat Enterprise Linux 7.2	Native	Native
Red Hat Enterprise Linux 7.1	Native	Native
Red Hat Enterprise Linux 7	Native	Native
Red Hat Enterprise Linux 6.9	Native	Native
Red Hat Enterprise Linux 6.8	Native	Native
Red Hat Enterprise Linux 6.7	Native	Native
Red Hat Enterprise Linux 6.5	Native	Native

Supported Fibre Channel host bus adapters

Table 22. Supported Fibre Channel HBAs

Host bus adapter name	Fabric configuration	Direct-attach configuration
QLogic*		
QLE2660/62	Yes	Yes
QLE2560/62	Yes	Yes
QLE2460/62/64	Yes	Yes
QLE220**	Yes	Yes
QME2662	Yes	Yes
QME2572	Yes	Yes
QME2472	Yes	Yes
Emulex*		
LPe16000/2	Yes	
LPe12000/2	Yes	Yes
LPe 11002	Yes	Yes
LPe 1150	Yes	Yes
LPe 1105-M4	Yes	Yes
LPe 1205-M	Yes	Yes
LPe 16002-M	Yes	Yes
Brocade*		
BR815/BR825	Yes	Yes

* See Required Timeout Settings for Fibre Channel host bus adapters for required timeout settings by manufacturer.

Required timeout settings for Fibre Channel host bus adapters

This table lists required timeout settings for all Dell EMC-supported Fibre Channel (FC) HBAs, by manufacturer and OS. Ensure that any FC HBA connected to your MD36xxf storage array has these timeout values set as listed in Table 23.

Use one of these manufacturer utilities to set these values on your HBA:

- Brocade command line utility (BCU)
- Emulex HBAnyware or OneCommand Manager
- QLogic SANsurfer FC HBA Manager

Table 23. Fibre Channel HBA timeout values (by manufacturer)

HBA manufacturer	Timeout parameter	Required value (in seconds)	
	QLogic		
Windows Server 2008 R2 SP1	LinkDownTimeout	10	
	PortDownRetryCount	10	
Linux only	qlport_down_retry	10	
	Emulex		
Windows only	LinkTimeout	10	
	NodeTimeout	10	
Linux only	lpfc_devloss_tmo	10	
	Brocade		
Windows and Linux	pathtov	10	

Supported Fibre Channel switches

Supported only on Fibre Channel storage arrays running the most current RAID firmware versions.

Table 24. Supported Fibre Channel Switches

Switches	Description
Brocade	
200E	Brocade 4 Gb 16-port FC switch
4100	Brocade 4 Gb 32-port FC switch
4100	Brocade 4 Gb 64-port FC switch
4900	Brocade 4 Gb 64-port FC switch
4900	Brocade 4 Gb 64-port FC switch
5000	Brocade 4 Gb 32-port FC switch
5000	Brocade 4 Gb 32-port FC switch
300	Brocade 8 Gb 24-port FC switch
5100	Brocade 8 Gb 40-port FC switch
5300	Brocade 8 Gb 80-port FC switch
6505	Brocade 16 Gb 24-port FC switch
6510	Brocade 16 Gb 48-port FC switch
DCX & DCX-4S	Director class switch chassis
DCX8510-4	Director class switch chassis
DCX8510-8	Director class switch chassis
FC8-48	48-port 8 Gb FC blade module for DCX and DCX8510 chassis
FC8-32	32-port 8 Gb FC blade module for DCX and DCX8510 chassis
FC8-16	16-port 8 Gb FC blade module for DCX and DCX8510 chassis
FC16-32	32-port 16 Gb FC blade module for DCX8510 chassis
FC16-48	48-port 16 Gb FC blade module for DCX8510 chassis
Dell EMC	
Dell EMC PowerConnect B-DCX-4S	Dell EMC PowerConnect Director class switch chassis
Dell EMC PowerConnect DCX8510-4	Director class switch chassis
Dell EMC PowerConnect DCX8510-8	Director class switch chassis
Dell EMC Networking S5000	48-port unified switch
FC8-48	48-port 8 Gb FC blade module
FC8-16	16-port 8 Gb FC blade module
FC16-32	32-port 16 Gb FC blade module
FC16-48	48-port 16 Gb FC blade module

Table 24. Supported Fibre Channel Switches (continued)

Switches	Description
Cisco	
Nexus 5548UP	8 Gbps 48-port FC switch
Nexus 5596UP	8 Gbps 96-port FC switch
Nexus 5010	8 Gbps FC switch
Nexus 5020	8 Gbps FC switch
9148	8 Gbps 48-port FC switch
9506	8 Gbps 192-port FC switch
9509	8 Gbps 48-port FC switch
9513	8 Gbps 528-port FC switch
9710	Director class switch chassis

Supported Dell EMC M1000e Fibre Channel IOMs

Table 25. Supported Fibre Channel I/O modules

Fibre Channels IOMs	Firmware	Description
M6505	FOS 7.0.1	Brocade 16 Gb 24-port FCs witch module
M5424	FOS 6.4.1a	24-port 8 Gb or 4 Gb FC blade switch module
	FOS 6.4.2	
	FOS 7.0.1	
M5424-N	FOS 6.4.1a	24-port 8 Gb or 4 Gb FC SAN module
	FOS 7.0.1	
FC8PT		16-port 8 Gb FC pass-through module

Tested Brocade, Cisco, and QLogic Fibre Channel routers

Table 26. Supported Fibre Channel routers

FCIP routers	Description
Brocade	
7500	Brocade 7500 Extension switch
7800	Brocade 7800 Extension switch
Cisco	
9216i	MDS 9216i Multilayer Fabric Switch
QLogic	
6142	SANbox 6142