Dell PowerVault ME4 Series Storage System

Support Matrix

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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.

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Introduction

This document provides information about supported software and hardware for Dell PowerVault ME4012, ME4024, and ME4084 storage systems, and usage considerations, recommendations, and rules.

The Support Matrix contains the latest compatibility and interoperability information. If you observe inconsistencies between this information and other documentation, consider this document superseding.

NOTE: Unless specified, all information in this document is applicable to the latest RAID controller firmware version available at www.dell.com/support.

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Supported data protocols

This section lists the supported data protocols for ME4 Series storage systems.

NOTE: ME4 Series storage systems do not support changing or converting from one data protocol to another data protocol.

Table 1. ME4 Series storage systems and supported data protocols

ME4 Series storage system	Data protocol and drives
ME4012 (SAS)	12 Gbps direct attached SAS storage system with 12 drives (3.5 inch)
ME4024 (SAS)	12 Gbps direct attached SAS storage system with 24 drives (2.5 inch)
ME4084 (SAS)	12 Gbps direct attached SAS storage system with 84 drives (3.5 inch)
ME4012 (10GBase-T iSCSI)	10 Gbps iSCSI network storage system with 12 drives (3.5 inch)
ME4024 (10GBase-T iSCSI)	10 Gbps iSCSI network storage system with 24 drives (2.5 inch)
ME4084 (10GBase-T iSCSI)	10 Gbps iSCSI network storage system with 84 drives (3.5 inch)
ME4012 (CNC)	16 Gbps Fibre Channel (FC) and/or 10 Gbps iSCSI network storage system with 12 drives (3.5 inch)
ME4024 (CNC)	16 Gbps Fibre Channel (FC) and/or 10 Gbps iSCSI network storage system with 24 drives (2.5 inch)
ME4084 (CNC)	16 Gbps Fibre Channel (FC) and/or 10 Gbps iSCSI network storage system with 84 drives (3.5 inch)

NOTE:

- ME4012 and ME4024 storage systems support up to nine ME412/ME424 expansion enclosures or three ME484 expansion enclosures. A combination of ME412/ME424 and ME484 expansion enclosures is not supported.
- ME4084 storage systems support up to three ME484 expansion enclosures.
- Deploying a drive on a system writes metadata to the drive that is not compatible between ME Series storage systems. ME4 Series storage systems do not support drives that have already been deployed either internally on an ME5 Series base system or on an expansion enclosure that has been used on an ME5 Series storage system. The reverse is also true: a drive that has been deployed on an ME4 Series storage system (internally or on an expansion) cannot beused in an ME5 Series system.

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ME4 Series storage system rules

This section contains both general and model-specific connectivity and consideration rules for ME4 Series storage systems. The rules that are listed in the following table apply to all ME4 Series storage system models. For rules applying to specific ME4 storage system models, see Rules for ME4012 and ME4024 storage systems and Rules for ME4084 storage systems.

NOTE: The ME4084 storage system is supported in dual-controller module configurations only.

Table 2. Rules for all ME4 Series storage systems

Rule	SAS	10GBase-T iSCSI	CNC
Deploying a drive on a system writes metadata to the drive that is not compatible between ME Series storage systems. For this reason, ME4 Series storage systems do not support drives that have already been deployed either internally on an ME5 Series base system or on an expansion enclosure that has been used on an ME5 Series storage system. The reverse is also true: a drive that has been deployed on an ME4 Series storage system (internally or on an expansion) cannot be used in an ME5 Series system.	✓	✓	✓
Maximum number of host servers that a single storage system can connect to with one RAID controller module installed	4	256	256
Maximum number of host servers that a single storage system can connect to with two RAID controller modules installed	8 (4, if using high availability or redundancy)	256	256
Maximum number of Dell 12 Gbps SAS HBA cards that are supported in a single host server that is attached to single storage system. Dell recommends that you use two Dell 12 Gb SAS HBA cards for all redundant cabling configurations.	2 (each card has two ports)	N/A	N/A
Unused ports on a Dell 12 Gbps SAS HBA card already connected to an ME4 SAS storage system cannot connect to another device (such as a tape drive or other model storage system)	✓	N/A	N/A
Maximum number ME4 Series storage system to which a host server can connect	2 (HA)	4	4
A hot spare for a disk group must be a drive of equal or greater size than any of the member disks	✓	✓	✓
On Linux systems, Device Mapper multipath is required for multipath support	✓	✓	✓
Coexistence of several Linux multipath drivers is not supported. For an ME4 series storage system with Linux host servers, only the Linux Device Mapper failover driver is supported	✓	✓	✓
Virtual disks on ME4 Series storage system cannot be used for booting	✓	✓	✓
Disk Groups can be migrated between a ME4 Series storage systems by following the appropriate disk pool migration procedure	✓	✓	✓
Maximum SSD cache size that is allowed is two SSDs	✓	✓	✓
All iSCSI host ports on a controller must have the same port speed	N/A	✓	✓
Maximum 12 Gbps SAS cable length that is supported is 4 m	✓	✓	✓
iSCSI network rules:	N/A	✓	✓

Table 2. Rules for all ME4 Series storage systems (continued)

Rule	SAS	10GBase-T iSCSI	CNC
• If the iSCSI initiators are connected to ME4 Series storage systems 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 may experience degradation of the I/O performance • In addition to enabling the Ethernet IEEE 802.3x flow control, Dell recommends that you disable unicast broadcast storm control on the switch ports that are connected to the iSCSI initiators and target storage systems. Dell also recommends turning on the "PortFast" mode of the spanning tree protocol (STP) on the switch ports that are connected to the iSCSI initiators and target system • Turning on the PortFast mode is different from turning off the whole operation of STP on the switch. With PortFast on, STP is still enabled on the switch ports. Turning off STP may affect the entire network and can leave the network vulnerable to physical topology loops.			
For optimal I/O performance, avoid having more than one iSCSI session originating from one host iSCSI port to the same controller. Ideally, the iSCSI host NIC must connect to only one iSCSI target port on the storage subsystem	N/A	✓	✓
The FC can connect at either or 8 Gbps and 16 Gbps, however 16 Gbps is recommended **NOTE:** Only 16 Gbps adapters are supported. See Supported Fibre Channel host bus adapters.	N/A	N/A	✓
The 10GBaseT iSCSI controller module can auto-negotiate to 1 Gbps. The CNC requires a 10 Gbps connection	N/A	✓	✓
Remote replication is not supported when the replication connection is directly connected. It must be in a switch topology	N/A	✓	✓
Replication within iSCSI topology between ME4 series storage systems is supported regardless of connection speed. Replication between iSCSI and FC topology is not supported	N/A	✓	N/A
Replication within FC topology between ME4 storage systems is supported regardless of connection speed. Replication between iSCSI and FC topology is not supported	N/A	N/A	✓
Online Drive firmware upgrade is not supported and might cause hosts to lose connectivity with the storage system	✓	✓	✓
When using drives that are 6 TB or larger, it is recommended to use either a RAID 6 Disk Group or an ADAPT Disk Pool. Due to the increased amount of time that is 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	✓	✓	✓
Data Assurance capable drives are supported in the storage system, however the Data Assurance feature is not available for these storage systems	✓	✓	✓
To create an NRAID, RAID 0, or RAID 3 (linear-only) disk group, you must use the CLI. For more information, see the *Dell EMC PowerVault ME4 Series Storage System CLI Guide*.	✓	✓	✓
Disk groups and pools • Maximum virtual pools per controller module = 1 • Maximum usable virtual pool size per controller module = 512 TiB with the large pools feature disabled in the CLI and 1 PB with the large pools feature enabled in the CLI **NOTE:** Active snapshots and replications use a substantial amount of the reserved space and undesired effects might occur if the reserved space is	✓	✓	✓

Table 2. Rules for all ME4 Series storage systems (continued)

Rule	SAS	10GBase-T iSCSI	CNC
completely consumed. Use the CLI command `show snapshot-space` to monitor space usage. • Maximum disk group size = Unlimited (non-ADAPT); 1 PB (ADAPT) • Maximum disk groups per pool = 16 • Maximum virtual disk groups per controller module = 16 • Maximum linear disk groups per controller module = 32 • Maximum dedicated spares per linear disk group = 4 • Maximum global spares per system = 64 • Maximum ADAPT groups per controller module = 4 • Maximum ADAPT single disk size = 64 TiB • ADAPT stripe width = 8+2			
Minimum and maximum disks per virtual disk group: • NRAID (non-RAID):1/1 (read cache only) • RAID 0: 2/2 (read cache only) • RAID 1: 2/2 • RAID 3 Not supported • RAID 5: 3/16 • RAID 6: 4/16 • RAID 10: 4/16 • RAID 50: Not supported • ADAPT: 12/128	✓	✓	✓
Minimum and maximum disks per linear disk group: • NRAID (non-RAID):1/1 • RAID 0: 2/16 • RAID 1: 2/2 • RAID 3: 3/16 • RAID 5: 3/16 • RAID 6: 4/16 • RAID 10: 4/16 • RAID 50: 6/32 • ADAPT: 12/128	✓	✓	✓
Volumes, Initiators, hosts, and mapping: • Maximum virtual volumes per system = 1024 • Maximum linear volumes per system = 512 (recommended) • Maximum volume size of a virtual volume = 128 TiB (approximately 140 TB) • Maximum volume size of a linear volume = equal to the maximum size limit of the disk group • Maximum mappable volumes (LUNs) per disk group = 128 • Maximum mappable virtual volumes (LUNs) per pool = 512 • Maximum mappable linear volumes (LUNs) per pool = 128 • Maximum mappable volumes (LUNs) per controller module = 512 • Maximum virtual volumes per pool = 1024 (512 base volumes and 512 snapshots) **NOTE:** Active snapshots and replications use a substantial amount of the reserved space and undesired effects might occur if the reserved space is completely consumed. Use the CLI command `show snapshot-space` to monitor space usage. • Maximum linear volumes per pool = 1024 • Maximum virtual volumes per volume group = 1024 • Maximum volume groups per controller module = 256	✓	✓	✓

Table 2. Rules for all ME4 Series storage systems (continued)

Rule	SAS	10GBase-T iSCSI	CNC
• Maximum volumes per host port = 1024 (Microsoft Windows limits access to 256) • Maximum initiators per host port = 1024 • Maximum initiators per controller module = 4096 • Maximum initiators per host = 128 • Maximum hosts per host group = 256 • Maximum host groups per system = 32 • Maximum commands per LUN (preferred path = 4096 • Maximum queue depth per host port = 1024			
Supported FC/iSCSI module host-port configurations per controller module: • 4 ports FC • 4 ports iSCSI • 2 ports FC and 2 port iSCSI	N/A	N/A	✓

Virtual volume snapshots:
• Maximum snapshots per pool = 512
• Maximum base volumes per system = 1024
• Maximum base snapshots per volume
  ○ 254 in the volume snapshot tree with a license and the large pools feature disabled in the CLI
  ○ 8 in the volume snapshot tree with the large pools feature enabled in the CLI
• Maximum mappable snapshots per system = 1024
NOTE: Active snapshots and replications use a substantial amount of the reserved space and undesired effects might occur if the reserved space is completely consumed. Use the CLI command `show snapshot-space` to monitor space usage.
	✓	✓	✓

Virtual volume replication: • Maximum number of peer connections per system = 4 • Maximum number of replicated volumes per system = 32 • Maximum number of replicated sets for a volume = 1 • Maximum number of volumes for a replicated volume group = 16, if no other volumes belong to a replication set • Minimum replication frequency that can be scheduled = 1	N/A	✓	✓
Maximum SCSI reservations • Per controller module = 1024 • Per LUN = 1	✓	✓	✓
Maximum SCSI registrations for virtual storage • Per system: 32768 • Per LUN: 4096	✓	✓	✓
Maximum SCSI registrations for linear storage • Per system: 32768 • Per FC LUN: 128 • Per iSCSI LUN: 85-128 depending on IQN length • Per SAS LUN: 128	✓	✓	✓
• Presenting the same volume (LUN) through FC AND iSCSI to one or more hosts or host groups is not supported.	N/A	N/A	✓

Table 3. Rules for ME4012 and ME4024 storage systems

Rule	SAS	10GBaseT iSCSI	CNC
System maximum is up to 4 PB or 336 disk drives, whichever comes first. For example: ● 336 disk drives x 12 TB = 4 PB ● 252 disk drives x 16 TB = 4 PB ● 224 disk drives x 18 TB = 4 PB	✓	✓	✓
Up to nine additional ME412/ME424 expansion enclosures or three ME484 expansion enclosures are supported. A combination of ME412/ME424 and ME484 expansion enclosures is not supported. ● 2U12 storage system + nine 2U12 expansion enclosures = 120 disk drives ● 2U12 storage system + nine 2U24 expansion enclosures = 228 disk drives ● 2U12 storage system + three 5U84 expansion enclosures = 264 disk drives ● 2U24 storage system + nine 2U12 expansion enclosures = 132 disk drives ● 2U24 storage system + nine 2U24 expansion enclosures = 240 disk drives ● 2U24 storage system + three 5U84 expansion enclosures = 276 disk drives	✓	✓	✓
Embedded SMI-S provider: ● Maximum mapping paths (where a path is a volume that is presented through a host port to an initiator) = 250 ● SMI-S is not supported for a system with 5U84 enclosures	✓	✓	✓
● Presenting the same volume (LUN) through FC AND iSCSI to one or more hosts or host groups is not supported.	N/A	N/A	✓

Table 4. Rules for ME4084 storage systems

Rule	SAS	10GBaseT iSCSI	CNC
System maximum is up to 4 PB or 336 disk drives, whichever comes first. For example: ● 336 disk drives x 12 TB = 4 PB ● 252 disk drives x 16 TB = 4 PB ● 224 disk drives x 18 TB = 4 PB	✓	✓	✓
Support for up to three ME484 additional expansion enclosures: ● 5U84 storage systems + three 5U84 expansion enclosures = 336 disk drives	✓	✓	✓
Disk drive blanks are not required for empty drive slots	✓	✓	✓
Minimum number of disks in an enclosure is 28 ● The number of rows must not differ by more than 1 between the top and bottom drawers. ● The rows should be populated from front to rear of drawer	✓	✓	✓
SMI-S is not supported for a system with 5U84 expansion enclosures	✓	✓	✓

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Default IPv4 Settings for management ports

NOTE: No default gateway is set.

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

Table 5. Default IPv4 Management Port Addresses

Controller/Port	IPv4 Address	Subnet Mask
Controller 0	10.0.0.2	255.255.255.0
Controller 1	10.0.0.3	255.255.255.0

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Default IPv4 settings for iSCSI ports

By default, the iSCSI ports on the storage system are set to 0.0.0.0 static IP address.

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Supported RAID controller firmware

NOTE:

- Dell recommends gathering support information before performing any firmware update.
- Only drivers and firmware released by Dell are supported. For the latest driver and firmware releases, see the Drivers & Downloads section at https://www.dell.com/support.

Table 6. Latest RAID controller firmware version

Software	Version
RAID controller firmware	GT280R011-01

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Supported iSCSI software initiators

Table 7. Supported iSCSI Initiators

Operating System	SW Initiator Vendor	SW Initiator Version	Notes
Windows Server OS	Microsoft	RTM or later	Included with OS
Citrix XenServer	Citrix	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

NOTE: For more information about Operating System support, see Supported operating systems.

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Supported protocol offload (TOE/iSCSI) 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 ME4 Series storage. Initiator support is provided by the initiator or operating system vendor. However, ME4 Series storage systems do not support Converged Network Adapters (CNA) in Converged mode.

Dell does not endorse or support initiators directly, but this support matrix does provide some useful configuration information for common initiators. ME4 Series storage systems 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 is not responsible for any errors in this information.

CAUTION: Hardware initiators are not supported by ME4 Series storage systems.

Read the initiator documentation and Release Notes from the particular vendors, and the *Dell EMC PowerVault ME4 Series Storage System Release Notes* for up-to-date configuration recommendations.

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Supported Fibre Channel and iSCSI SFP+ transceivers

This following table lists the Fibre Channel and iSCSI transceivers that have been tested for use with ME4 Series storage systems:

Table 8. Supported Fibre Channel and iSCSI SFP+ transceivers

Description	Manufacturer Part Number	Dell Part Number
16 Gb SFP+ short-wavelength transceiver (FC)	FTLF8529P3BCVA	TDTCP
16 Gb SFP+ short-wavelength transceiver (FC)	FTLF8529P4BCV-D2	NKX77
16 Gb SFP+ short-wavelength transceiver (FC)	AFBR-57F5MZ-FT2	NKX77
10GBASE-SR 850 nm SFP+ short-range transceiver (iSCSI)	FTLX8574D3BCL-DL	C5RNH
10GBASE-SR 850 nm SFP+ short-range transceiver (iSCSI)	AFBR-709SMZ-FT2	C5RNH

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Supported SAS and Twinax direct-attach cables

The following tables list the SAS and Twinax direct-attach cables that have been tested for use with ME4 Series storage systems:

Table 9. Supported 12 Gbps SAS cables

Vendor	Model	Dell Part Number
Dell	12 Gb HD-Mini to HD-Mini SAS Cable, 0.5 M	WTCFX
Dell	12 Gb HD-Mini to HD-Mini SAS Cable, 2 M	GYK61
Dell	12 Gb HD-Mini to HD-Mini SAS Cable, 4 M	85W3R

CAUTION: ME4 Series storage systems only support passive Twinax direct-attach cables. ME4 Series storage systems do not support active Twinax direct-attach cables.

Table 10. Supported Passive Twinax direct-attach cables

Vendor	Model	Dell Part Number
Dell	Dell Networking, Cable, SFP+ to SFP+, 10 GbE, Copper Twinax Direct Attach Cable, 0.5 M	C6Y7M
Dell	Dell Networking, Cable, SFP+ to SFP+, 10 GbE, Copper Twinax Direct Attach Cable, 1 M	V250M
Dell	Dell Networking, Cable, SFP+ to SFP+, 10 GbE, Copper Twinax Direct Attach Cable, 3 M	53HVN
Dell	Dell Networking, Cable, SFP+ to SFP+, 10 GbE, Copper Twinax Direct Attach Cable, 5 M	358VV

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Supported hard drives

ME4 Series storage systems support the hard drives that are listed in the following table:

To use self-encrypting drive (SED) functionality, all the hard drives in the storage system must be SEDs.

NOTE: ME4 Series Storage Systems do not support 4Kn sector size hard drives.

CAUTION: ME4 Series storage systems only support hard drives with the Dell part numbers that are listed in the following table. Hard drives purchased from Dell with part numbers that are not listed in the table are not supported. To access the latest available hard drive firmware, search for the hard drive model and firmware version on https://www.dell.com/support.

CAUTION: Deploying a drive on a system writes metadata to the drive that is not compatible between ME Series storage systems. ME4 Series storage systems do not support drives that have already been deployed either internally on an ME5 Series base system or on an expansion enclosure that has been used on an ME5 Series storage system.

Table 11. Supported hard drives

Dell P/N	Form Factor	Model	Capacity	Speed	Vendor	Firmware	SED
R1ND2	2.5"	MZILT800HAHQ0D3	960GB	SSD	Samsung	DSF8	No
F0VFY	2.5"	MZILT1T6HAJQ0D3	1.92TB	SSD	Samsung	DSF8	No
K74WN	2.5"	MZILT960HBHQ0D3	960GB	SSD	Samsung	DSA4	No
TMTW9	2.5"	MZILT1T9HBJR0D3	1.92TB	SSD	Samsung	DSA4	No
CRNPH	2.5"	MZILT3T8HBLS0D3	3.84TB	SSD	Samsung	DSA4	No
GW8T1	2.5"	MZILT800HBHQ0D3	800GB	SSD	Samsung	DWA4	No
H8DG4	2.5"	MZILG960HCHQAD3	960GB	SSD	Samsung	DSG5	No
NRR34	2.5"	MZILG1T9HCJRAD3	1.92TB	SSD	Samsung	DSG5	No
9N32F	2.5"	MZILG3T8HCLSAD3	3.84TB	SSD	Samsung	DSG5	No
3CHC8	2.5"	MZILG800HCHQAD3	800GB	SSD	Samsung	DWG5	No
88YMD	2.5"	XS960SE70114	960GB	SSD	Seagate	3D03	No
D4VFW	2.5"	XS1920SE70114	1.92TB	SSD	Seagate	3D03	No
KXDCD	2.5"	XS3840SE70114	3.84TB	SSD	Seagate	3D03	No
43PCJ	2.5"	PX05SVB048Y	480GB	SSD	Toshiba	AS10	No
N5PK6	2.5"	PX05SVB048Y	480GB	SSD	Toshiba	AS10	No
MWGK7	2.5"	PX05SRB096Y	960GB	SSD	Toshiba	AS10	No
24YF3	2.5"	PX05SRB096Y	960GB	SSD	Toshiba	AS10	No
0FYFW	2.5"	PX05SRB192Y	1.92TB	SSD	Toshiba	AS10	No
HDGG4	2.5"	PX05SRB192Y	1.92TB	SSD	Toshiba	AS10	No
1N61H	2.5"	PX05SVQ192B	1.92TB	SSD	Toshiba	AX0B	Yes
6K9P2	2.5"	PX05SVQ192B	1.92TB	SSD	Toshiba	AX0B	Yes
3PR5C	2.5"	KPM5XVUG480G	480GB	SSD	Toshiba	B026	No

Table 11. Supported hard drives (continued)

Dell P/N	Form Factor	Model	Capacity	Speed	Vendor	Firmware	SED
H8X3X	2.5"	KPM5XRUG960G	960GB	SSD	Toshiba	B026	No
TDNP7	2.5"	KPM5XRUG1T92	1.92TB	SSD	Toshiba	B026	No
N85XX	2.5"	KPM5XRUG3T84	3.84TB	SSD	Toshiba	B026	No
DJY51	2.5"	KPM5WVUG1T92	1.92TB	SSD	Toshiba	B322	Yes
6N7KY	2.5"	KPM6XRUG960G	960GB	SSD	Kioxia	BA48	No
4CN85	2.5"	KPM6XRUG1T92	1.92TB	SSD	Kioxia	BA48	No
H9TT5	2.5"	KPM6XRUG3T84	3.84TB	SSD	Kioxia	BA48	No
DHWH5	2.5"	KPM6WVUG1T92	1.92TB	SSD	Kioxia	BA48	Yes
JTKH5	2.5"	KPM6XVUG800G	800GB	SSD	Kioxia	BA48	No
C9R60	2.5"	KPM6XRUG960G	960GB	SSD	Kioxia	BA48	No
VRTN9	2.5"	KPM6XRUG1T92	1.92TB	SSD	Kioxia	BA48	No
2XVX2	2.5"	KPM6XRUG3T84	3.84TB	SSD	Kioxia	BA48	No
NNGV4	2.5"	KPM6XVUG800G	800GB	SSD	Kioxia	BA48	No
1081V	2.5"	KPM6WVUG1T92	1.92TB	SSD	Kioxia	BD48	Yes
KRVY1	2.5"	KPM7XRUG960G	960GB	SSD	Kioxia	C10A	No
6K35K	2.5"	KPM7XRUG1T92	1.92TB	SSD	Kioxia	C10A	No
MT0R5	2.5"	KPM7XRUG3T84	3.84TB	SSD	Kioxia	C10A	No
X96H8	2.5"	KPM7XVUG800G	800GB	SSD	Kioxia	C10A	No
XTH17	2.5"	ST900MP0026	900GB	15K	Seagate	KT3A	No
N9WXC	2.5"	ST900MP0126	900GB	15K	Seagate	KSC9	Yes
G2G54	2.5"	ST1200MM0099	1.2TB	10K	Seagate	ST36	No
JY57X	2.5"	DL1800MM0159	1.8TB	10K	Seagate	ST5C	No
RWR8F	2.5"	DL2400MM0159	2.4TB	10K	Seagate	ST5C	No
8YWH3	2.5"	ST2400MM0149	2.4TB	10K	Seagate	SSEA	Yes
1D0F5	2.5"	BL2400MM0159	2.4TB	10K	Seagate	SBS4	No
4GDNY	2.5"	CL2400MM0149	2.4TB	10K	Seagate	SBT4	Yes
TMVN7	2.5"	ST2000NX0463	2TB	7.2K	Seagate	NT32	No
Y6W8N	2.5"	ST2000NX0453	2TB	7.2K	Seagate	NSF2	Yes
YKT0W	2.5"	AL14SXB90ENY	900GB	15K	Toshiba	EE0A	No
01M0D	2.5"	AL15SEB120NY	1.2GB	10K	Toshiba	EF06	No
0WRRF	2.5"	AL15SEB18EQY	1.8TB	10K	Toshiba	EF06	No
F9NWJ	2.5"	AL15SEB24EQY	2.4TB	10K	Toshiba	EF06	No
07FPR	3.5"	HUH721010AL5200	10TB	7.2K	HGST	LS21	No
9HXK6	3.5"	HUH721212AL5200	12TB	7.2K	HGST	NS10	No
0JHTD	3.5"	HUH721212AL5205	12TB	7.2K	HGST	NM10	Yes
NT1X2	3.5"	HUS726T4TALS200	4TB	7.2K	HGST	PU07	No
44YFV	3.5"	HUS728T8TAL5200	8TB	7.2K	HGST	RS07	No

Table 11. Supported hard drives (continued)

Dell P/N	Form Factor	Model	Capacity	Speed	Vendor	Firmware	SED
5JH5X	3.5"	ST4000NM0295	4TB	7.2K	Seagate	DT34	No
W5M2R	3.5"	ST4000NM0295	4TB	7.2K	Seagate	DT34	No
M40TH	3.5"	ST8000NM0185	8TB	7.2K	Seagate	PT55	No
VFP4M	3.5"	ST8000NM0185	8TB	7.2K	Seagate	PT55	No
YF87J	3.5"	ST10000NM0256	10TB	7.2K	Seagate	TT56	No
HV5CH	3.5"	ST10000NM0598	10TB	7.2K	Seagate	RSL5	No
YMN53	3.5"	ST12000NM0158	12TB	7.2K	Seagate	RSL5	No
KRM6X	3.5"	ST4000NM017A	4TB	7.2K	Seagate	CSJA	No
0N660	3.5"	ST8000NM014A	8TB	7.2K	Seagate	CSLD	No
10N7R	3.5"	ST4000NM019B	4TB	7.2K	Seagate	LW0A	No
F7DTR	3.5"	DL4000NM019B	4TB	7.2K	Seagate	LBW3	No
C5HD0	3.5"	ST8000NM024B	8TB	7.2K	Seagate	LS0C	No
RJT6H	3.5"	ST10000NM011G	10TB	7.2K	Seagate	ESL7	No
7KT9W	3.5"	ST12000NM009G	12TB	7.2K	Seagate	ESL7	No
CNXPV	3.5"	ST16000NM010G	16TB	7.2K	Seagate	ESL7	No
M1C0T	3.5"	ST12000NM006J	12TB	7.2K	Seagate	PSLB	No
41DXR	3.5"	ST16000NM006J	16TB	7.2K	Seagate	PSLB	No
5HYG2	3.5"	ST18000NM006J	18TB	7.2K	Seagate	PSLB	No
0J4R9	3.5"	ST18000NM007D	18TB	7.2K	Seagate	GS07	No
1MVTT	3.5"	MG04SCA40ENY	4TB	7.2K	Toshiba	EG03	No
FV725	3.5"	MG06SCA800EY	8TB	7.2K	Toshiba	EH0D	No
24HF9	3.5"	MG08SCA16TEY	16TB	7.2K	Toshiba	EJ09	No
4N7V0	3.5"	MG08SCA16TEY	16TB	7.2K	Toshiba	EJ09	No
VF206	3.5"	WUH721818AL5200	16TB	7.2K	WD	US06	No
R20GG	3.5"	WUH721818AL5200	18TB	7.2K	WD	US06	No
HNHWC	3.5"	WUH721816AL5205	16TB	7.2K	WD	UM06	Yes

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Supported expansion enclosures

ME4 Series storage systems can support a maximum of 336 drive slots depending on the base system and the additional expansion enclosures.

ME4012 and ME4024 storage systems support up to nine additional 2U (non-dense) ME412/ME424 expansion enclosures or three 5U (dense) ME484 expansion enclosures. ME4012 and ME4024 storage systems do not support a combination of ME412/ME424 and ME484 expansion enclosures.

ME4084 storage systems support up to three 5U (dense) ME484 expansion enclosures.

Deploying a drive on a system writes metadata to the drive that is not compatible between ME Series storage systems. ME4 Series storage systems do not support drives that have already been deployed either internally on an ME5 Series base system or on an expansion enclosure that has been used on an ME5 Series storage system.

Table 12. Supported 2U (non-dense) expansion enclosures

Enclosure Model	Minimum Firmware Version
ME412	52A0
ME424	52A0

Table 13. Supported 5U (dense) expansion enclosures

Enclosure Model	Minimum Firmware Version
ME484	52A0

NOTE: Expansion enclosures are not supported on ME4 Series storage systems with a single controller module.

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Supported management software

ME4 Series management software is built into the storage system and is accessible by using a web browser connected to the Management Ethernet port.

The ME4 Series management software details are shown in the following tables:

Table 14. Supported web browsers for the ME4 Series management software

Software component	Minimum Firmware Version	Notes
Microsoft Internet Explorer	10 or 11	• Set the local-intranet security option in the browser to medium or medium-low • Add the management network IP address of each controller as a trusted site • Ensure that security is set to use TLS 1.2
Google Chrome	57.x.x.x (64-bit) or later	-
Mozilla Firefox	57.x.x (64-bit) or later	-
Apple Safari	10.1 or later	-

NOTE: Microsoft Edge is not supported.

Table 15. Supported version of the VMware vCenter plug-in

vCenter Plug-in version	VMware version supported	Notes
1.2.1.26	• VMware vSphere 6.5, 6.7, and 7.0 • vCenter Server 6.5 to 7.0	Linux support only

Table 16. Supported version of the Storage Replication Adapter (SRA)

SRA version	VMware version supported	Notes
8.3.0.8	• VMware vSphere 6.5, 6.7, and 7.0 • vCenter Server 6.5 to 7.0 • Site Recovery Manager (SRM) 8.2, 8.3, 8.4, 8.5	Fibre Channel and iSCSI support only

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Supported operating systems

ME4 Series storage systems support Windows, Red Hat Enterprise Linux, SUSE Linux Enterprise Server,

NOTE: Where clustering is supported by the operating system, it is also supported on ME4 Series storage systems, subject to the following limitations:

Windows Server 2012 R2 through Windows Server 2022

- Maximum number of FC hosts is 64
- Maximum number of iSCSI hosts is 64
- Maximum number of SAS hosts is 4

Table 17. Supported ME4 Series operating systems

Operating System	SAS host server	Fibre Channel host server	iSCSI host server	Notes & required hotfixes
Windows Server 2022				
Standard server (Server Core* and Desktop Experience)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series storage systems. BitLocker Drive Encryption is not supported.
Datacenter server (Server Core* and Desktop Experience)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series storage systems. BitLocker Drive Encryption is not supported.
Windows Server 2019				
Standard server (Server Core* and Desktop Experience)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series Storage Systems. BitLocker Drive Encryption is not supported.
Datacenter server (Server Core* and Desktop Experience)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series Storage Systems. BitLocker Drive Encryption is not supported.
Windows Server 2016				
Standard server (Server Core* and Desktop Experience)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series Storage Systems.

Table 17. Supported ME4 Series operating systems (continued)

Operating System	SAS host server	Fibre Channel host server	iSCSI host server	Notes & required hotfixes
				BitLocker Drive Encryption is not supported.
Datacenter server (Server Core* and Desktop Experience)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series Storage Systems. BitLocker Drive Encryption is not supported.
Windows Server 2012 R2 (U1)				
Standard edition (Server Core* mode supported)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series Storage Systems. BitLocker Drive Encryption is not supported.
Datacenter edition (Server Core* mode supported)	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series Storage Systems. BitLocker Drive Encryption is not supported.
Foundation edition	✓	✓	✓	The Microsoft MPIO feature needs to be installed prior to connecting to ME4 Series Storage Systems.
Red Hat Enterprise Linux (RHEL)				
Red Hat Enterprise Linux 8.5 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 8.4 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 8.3 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 8.2 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 8.1 (x64 only)	✓	✓	✓	• Basic Server install (Minimum)

Table 17. Supported ME4 Series operating systems (continued)

Operating System	SAS host server	Fibre Channel host server	iSCSI host server	Notes & required hotfixes
				• Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 8.0 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 7.9 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 7.8 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 7.7 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 7.6 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 7.5 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 7.4 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
Red Hat Enterprise Linux 6.9 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support.
SUSE Linux Enterprise Server (SLES)				
SUSE Linux Enterprise Server 15 SP3 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support
SUSE Linux Enterprise Server 15 SP2 (x64 only)	✓	✓	✓	• Basic Server install (Minimum)

Table 17. Supported ME4 Series operating systems (continued)

Operating System	SAS host server	Fibre Channel host server	iSCSI host server	Notes & required hotfixes
				• Device Mapper multipath is required for multipath support
SUSE Linux Enterprise Server 15 SP1 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support
SUSE Linux Enterprise Server 15 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support
SUSE Linux Enterprise Server 12.3 (x64 only)	✓	✓	✓	• Basic Server install (Minimum) • Device Mapper multipath is required for multipath support
Virtualization Hosts / Hypervisors				
Citrix XenServer 7.6	✓	✓	✓	Dynamic multipathing support is available for Fibre Channel and iSCSI hosts
Citrix XenServer 7.5	✓	✓	✓	Dynamic multipathing support is available for Fibre Channel and iSCSI hosts
Citrix XenServer 7.1 CU2	✓	✓	✓	Dynamic multipathing support is available for Fibre Channel and iSCSI hosts
VMware vSphere 7.0 U3	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR **NOTE:** For information about ATS Initialization failing for SAS Storage using 7.0 U2, see VMware KB article 83249.
VMware vSphere 7.0 U2	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR **NOTE:** For information about ATS Initialization failing for SAS Storage using 7.0 U2, see VMware KB article 83249.
VMware vSphere 7.0 U1	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR

Table 17. Supported ME4 Series operating systems (continued)

Operating System	SAS host server	Fibre Channel host server	iSCSI host server	Notes & required hotfixes
VMware vSphere 7.0	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR
VMware vSphere 6.7 U3	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR
VMware vSphere 6.7 U2	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR
VMware vSphere 6.7 U1	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR
VMware vSphere 6.7	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR
VMware vSphere 6.5 U1	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR
VMware vSphere 6.5	✓	✓	✓	For supported firmware versions, see VMware HCL Supported path policies: MRU and RR

NOTE: Server Core editions of Windows server can only manage ME4 Series storage systems using the CLI client.

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Operating systems with ALUA support

ALUA is supported natively on the following operating systems:

NOTE: Configuration steps are not required to enable ALUA on these operating systems.

- Microsoft Windows Server 2022
- Microsoft Windows Server 2019
- Microsoft Windows Server 2016
- Microsoft Windows Server 2012 R2
- Citrix XenServer 7.1 CU2 or later
- Red Hat Enterprise Linux 8.0 or later
- Red Hat Enterprise Linux 7.4 or later
- Red Hat Enterprise Linux 6.9 or later
- SUSE Linux Enterprise Server 15.0 or later
- SUSE Linux Enterprise Server 12.3 or later
- VMware vSphere 7.0 or later
- VMware vSphere 6.7 or later
- VMware vSphere 6.5 or later

NOTE: For more information about the ALUA configuration, see the *Dell EMC PowerVault ME4 Series Storage System Administrator's Guide* available at https://www.dell.com/support.

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Supported device mapper software

Table 18. Supported device mapper software

Operating System	Component	Supported Version
SUSE Linux Enterprise Server 15.0 or later	Native	Native
SUSE Linux Enterprise Server 12.3 or later	Native	Native
Red Hat Enterprise Linux 8.0 or later	Native	Native
Red Hat Enterprise Linux 7.4 or later	Native	Native
Red Hat Enterprise Linux 6.9 or later	Native	Native

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Supported SAS host bus adapters

This chapter lists the server HBAs that have been tested for use with ME4 Series storage systems. However, it does not imply that these HBAs are supported by any or all server vendors.

ME4 Series storage systems support the following HBAs:

- Dell HBA355e
- Dell 12 Gbps SAS

You can download the supported drivers and firmware for the HBAs from https://www.dell.com/support. To determine if a PowerEdge server supports an adapter, see the support matrix for that server.

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Supported Fibre Channel host bus adapters

The following table lists the HBAs that have been tested for use within ME4 Series storage systems:

NOTE: This table does not imply that all of the HBAs and their driver/firmware stacks are supported by any or all server vendors. You must ensure that the HBA and its associated drivers are included on the hardware compatibility list of the vendor. This recommendation also applies to Dell PowerEdge server products. Inclusion in this HBA compatibility tables should not be interpreted as that the HBA and driver/firmware combination as being supported by any vendor for use with their server products.

Table 19. ME4 Series Fibre Channel HBAs

Host bus adapter name	Direct-attach configuration	Fabric configuration	Dell Part Number	Available From
QLogic				
QLE2660v2	✓	✓	H28RN (full height) 4MNKF (low-profile)	Dell
QLE2662v2	✓	✓	H8T43 (full height) 3PCN3 (low-profile)	Dell
QLE2690	✓	✓	P8PCK (full height) P3T0T (low-profile)	Dell
QLE2692	✓	✓	CK9H1 (full height) WVT0T (low-profile)	Dell
QLE2692v2	✓	✓	YCVFG (full height) TCK3G (low-profile)	Dell
QLE2670	✓	✓	N/A	https://driverdownloads.qlogic.com/
QLE2672	✓	✓	N/A	https://driverdownloads.qlogic.com/
QLE2560	✓	✓	N/A	https://driverdownloads.qlogic.com/
QLE2562	✓	✓	N/A	https://driverdownloads.qlogic.com/
Emulex				
LPe16000v3	✓	✓	61M2K (full height) 11H8D (low-profile)	Dell
LPe16002v3	✓	✓	F3VJ6 (full height) 6VK2R (low-profile)	Dell
LPe31000	✓	✓	3T3T7 (full height) 6CWM6 (low-profile)	Dell
LPe31002	✓	✓	RXNT1 (full height) VGJ12 (low-profile)	Dell

Table 19. ME4 Series Fibre Channel HBAs (continued)

Host bus adapter name	Direct-attach configuration	Fabric configuration	Dell Part Number	Available From
LPe12000	✓	✓	N/A	https://www.broadcom.com/support/emulex
LPe12002	✓	✓	N/A	https://www.broadcom.com/support/emulex

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Supported Fibre Channel and iSCSI direct-attach configuration operating systems

ME4 Series storage systems support Fibre Channel and iSCSI direct-attached configurations on the following operating systems:

- Microsoft Windows Server 2022
- Microsoft Windows Server 2019
- Microsoft Windows Server 2016
- Microsoft Windows Server 2012 R2
- Citrix XenServer 7.1 CU2 or later
- Red Hat Enterprise Linux 8.0 or later
- Red Hat Enterprise Linux 7.4 or later
- Red Hat Enterprise Linux 6.9 or later
- SUSE Linux Enterprise Server 15.0 or later
- SUSE Linux Enterprise Server 12.3 or later
- VMware vSphere 7.0 or later
- VMware vSphere 6.7 or later
- VMware vSphere 6.5 or later

NOTE: Hyper-V supports direct-attach configurations if Hyper-V is installed as an application on Windows Server 2019. Hyper-V Server 2019 does not support direct-attach configurations.

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Dell EMC Storage Support Policy

Level 1: Full Contractual Support

For tested devices listed in this Support Matrix, (and for the specific version listed), Dell EMC will provide solution support, under an active support contract assuming that all other components in the storage solution are also under contracted support with their respective manufacturers and that documented recommended design best practices are followed.

Level 2: Conditional Support

In addition to the product versions tested by Dell EMC and listed in this Support Matrix, the compatibility of comparable hardware models and newer firmware versions can be projected based upon the results for the systems actually tested and will be designated as "conditionally supported".

Dell EMC will provide full contractual support for the storage solution under an active support contract, assuming that all components in the storage solution are also under contracted support with their respective manufacturers and that documented recommended design best practices are followed.

Resolution of functional and/or performance issues may be out of Dell EMC's control. In such cases, these issues will need to be addressed by the applicable device or software/firmware vendor. Dell EMC may require, in its sole discretion, as a condition of continuing support, that the customer replace the component with one that was tested and/or upgrade/downgrade to a supported software version.

Examples of Conditional Support situations include, but are not limited to:

- If a switch or server adapter shares the same underlying ASIC or chipset and is from the same vendor as a tested configuration, then it may produce similar results.
- If a component is an identical model of a component listed, but differs in firmware version, then it may produce similar results for any firmware and/or drivers that are newer than those listed. For example, if version X of firmware has been tested and is listed as compatible, then versions newer than version X are expected to continue to work.

Failure of a "conditionally supported" component to provide the same service level as the similar device listed, unless Dell EMC has communicated end of support or a specific incompatibility for a particular product, firmware or software version, would be treated as a bug that needs to be fixed by the device or software/firmware vendor.

Level 3: Commercially Reasonable Effort

For components not listed within this Support Matrix, OR where customer has not, or is not willing to apply accepted Dell EMC recommended best practices for the specific storage family's SAN design and implementation, as long as the customer has an active support contract with the appropriate vendor(s), and an active support contract, Dell EMC will provide storage solution support for any untested component of the configuration, until such time as it is determined, in Dell EMC's sole discretion, that a problem lies within the untested component(s) or the way they interoperate with Dell EMC.

Once an untested component has been determined to be the source of the issue, Dell EMC will only provide support for the storage solution on a Commercially Reasonable Effort (CRE) basis. CRE support may be limited to certain days of the week and during normal business hours only.

Dell EMC does not guarantee that issues undertaken on a CRE basis will be resolved in a timely fashion, or at all. There is a possibility that the customer would need to replace an untested component or take the affected system out of production to resolve the issues.