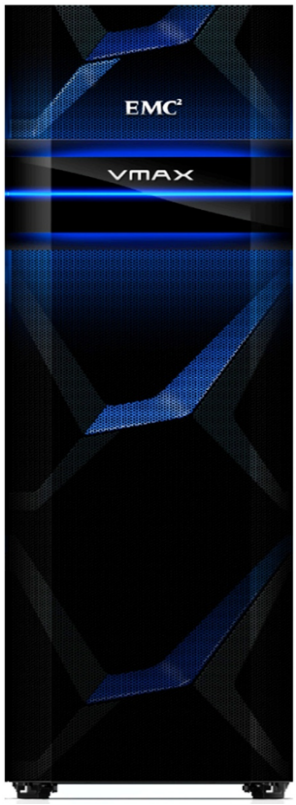
EMC VMAX3 FAMILY
VMAX 100K, 200K, 400K



The EMC VMAX3™ family delivers the latest in Tier-1 scale-out multi-controller architecture with unmatched consolidation and efficiency for the enterprise. With completely redesigned hardware and software, the VMAX 100K, 200K, and 400K arrays provide unprecedented performance and scale. Ranging from a single engine VMAX 100K to an 8-engine VMAX 400K, these enhanced arrays offer dramatic increases in floor tile density by consolidating high capacity disk enclosures for both 2.5" and 3.5" drives and engines in the same system bay. VMAX 100K, 200K, and 400K arrays can be configured as either hybrid or all flash configurations. In addition, the ground breaking VMAX3 Hypervisor enables the VMAX3 family to offer unified block and file support through Embedded NAS (eNAS), eliminating the need for corresponding physical hardware. Embedded Management is also now available, eliminating the need for the customer to allocate and manage an external server to run Unisphere for VMAX. Data at Rest Encryption is available on all VMAX3 models, for those applications that demand the highest level of security in a Tier 1 converged platform. FAST.X™ extends VMAX3 data services capabilities with SLO provisioning to external arrays including XtremIO, Cloud Array, and other 3rd Party systems. VMAX3 now offers an even wider range of choices for the datacenter with the addition of FICON support for our Mainframe customers, along with support for Fibre Channel, iSCSI and FCoE Front End protocols. And, VMAX3 has now received VASA Provider Certification by VMware to support VVol storage.

This revolutionary VMAX3 architecture delivers Virtual Matrix Bandwidth of 175GB/s per engine and up to 1400GB/s across an eight engine VMAX3 array. All VMAX3 models come fully pre-configured out of the factory to significantly shorten the time to first I/O during installation.

Specifications

UNMATCHED ARCHITECTURE

The Dynamic Virtual Matrix Architecture enables IT departments to build storage systems that transcend the physical constraints of competing array architectures. This architecture allows scaling of system resources through common and fully redundant building blocks called VMAX3 engines. VMAX3 engines provide the complete foundation for high-availability storage arrays. Each engine contains two VMAX directors and redundant interfaces to the Dynamic Virtual Matrix dual InfiniBand® fabric interconnect. Each director consolidates front-end, global memory, and back-end functions, enabling direct memory access to data for optimized I/O operations. Depending on the array chosen, up to eight (8) VMAX3 engines can be interconnected via a set of active fabrics that provide scalable performance and high availability. The revolutionary VMAX3 Hypervisor provides the framework for currently supported and future embedded applications.

The VMAX3 arrays support the use of native 6Gb/s SAS 2.5” drives, 3.5” drives, or a mix of both drive types in the array. Individual system bays can house either one or two engines and up to the per engine maximum of 6 High Density Disk Array Enclosures (DAEs) available in either 3.5” (60 slot) or 2.5" (120 slot) formats. As a result, each system bay can support up to 720 2.5" drives or up to 360 3.5" drives, or a mix of the two. In addition, all new arrays support system bay dispersion of up to 25 meters from the first system bay. All members of the family also support 3rd party racking. Detailed specifications and a comparison of the three VMAX3 arrays follow.

VMAX3 FAMILY SPECIFICATIONS

COMPONENTS	VMAX 100K	VMAX 200K	VMAX 400K
ENGINE			
Number of Engines supported	1 to 4[1]	1 to 4	1 to 8
Engine Enclosure	4u	4u	4u
CPU	Intel Xeon E5-2620-v2 2.1 GHz 6 core	Intel Xeon E5-2650-v2 2.6 GHz 8 core	Intel Xeon E5-2697-v2 2.7 GHz 12 core
Dynamic Virtual Matrix BW	700GB/s	700GB/s	1400GB/s
# Cores per CPU/per Engine/per System	6/24/96	8/32/128	12/48/384
Dynamic Virtual Matrix Interconnect	InfiniBand Dual Redundant Fabric: 56Gbps per port	InfiniBand Dual Redundant Fabric: 56Gbps per port	InfiniBand Dual Redundant Fabric: 56Gbps per port
CACHE			
Cache-System Min (raw)	512GB	512GB	512GB
Cache-System Max (raw)	4TBr (with 1024GB engine)	8TBr (with 2048GB engine)	16TBr (with 2048GB engine)
Cache-per Engine Options	512GB, 1024GB	512GB, 1024GB, 2048GB	512GB, 1024GB, 2048GB
XtremCache Support	Yes	Yes	Yes
VAULT			
Vault Strategy	Vault to Flash	Vault to Flash	Vault to Flash
Vault Implementation	2 to 4 Flash SLICs / Engine	2 to 8 Flash SLICs / Engine	2 to 8 Flash SLICs / Engine
FRONT END I/O MODULES			
Maximum Front-End I/O Modules/engine	8	8	8
Front-End I/O Modules and Protocols Supported	FC: 4 x 8Gbs (FC, SRDF) FC: 4 x 16Gbs (FC, SRDF) FICON: 4 x 16Gbs (FICON) FCoE: 4 x 10GbE (FCoE) iSCSI: 4 x10GbE (iSCSI) GbE: 2/2 Opt/Cu (SRDF) 10GbE: 2 x 10GbE (SRDF)	FC: 4 x 8Gbs (FC, SRDF) FC: 4 x 16Gbs (FC, SRDF) FICON: 4 x 16Gbs (FICON) FCoE: 4 x 10GbE (FCoE) iSCSI: 4 x10GbE (iSCSI) GbE: 2/2 Opt/Cu (SRDF) 10GbE: 2 x 10GbE (SRDF)	FC: 4 x 8Gbs (FC, SRDF) FC: 4 x 16Gbs (FC, SRDF) FICON: 4 x 16Gbs (FICON) FCoE: 4 x 10GbE (FCoE) iSCSI: 4 x10GbE (iSCSI) GbE: 2/2 Opt/Cu (SRDF) 10GbE: 2 x 10GbE (SRDF)
eNAS I/O MODULES			
Max eNAS I/O Modules/ Software Data Mover	2 (min of 1 Ethernet I/O module required)	3 (min of 1 Ethernet I/O module required)	3 (min of 1 Ethernet I/O module required)
eNAS I/O Modules Supported	GbE: 4 x 1GbE Cu 10GbE: 2 x 10GbE Cu 10GbE: 2 x 10GbE Opt FC: 4 x 8Gbs (NDMP Back-up) (max 1/Software Data Mover)	GbE: 4 x 1GbE Cu 10GbE: 2 x 10GbE Cu 10GbE: 2 x 10GbE Opt FC: 4 x 8Gbs (NDMP Back-up) (max 1/Software Data Mover)	GbE: 4 x 1GbE Cu 10GbE: 2 x 10GbE Cu 10GbE: 2 x 10GbE Opt FC: 4 x 8Gbs (NDMP Back-up) (max 1/Software Data Mover)
eNAS SOFTWARE DATA MOVERS			
Max Software Data Movers	2 (1 Active + 1 Standby)	4 (3 Active and 1 Standby)	8 (7 Active and 1 Standby)
Max NAS Capacity/Array (Terabytes Usable)	256	1536	3584

[1]Standard offering for VMAX 100K is 1 or 2 engines. Support of 3rd or 4th engine is via approved RPQ only.

COMPONENTS	VMAX 100K	VMAX 200K	VMAX 400K
CAPACITY, DRIVES			
Max Capacity per Array	1.13PBu	2.34PBu	4.41PBu
Max Drives per System	2880	2880	5760
Max Drives per System Bay	720	720	720
Min Spares per System	1	1	1
Min Drive Count (1 engine)	4 + 1 spare	4 + 1 spare	4 + 1 spare
DRIVES			
3.5" SAS Drives	3.5" Drives:	3.5" Drives:	3.5" Drives:
10K RPM SAS	300GB,[1] 600GB,[1] 1.2TB[1] 10K RPM	300GB,[1] 600GB,[1] 1.2TB[1] 10K RPM	300GB,[1] 600GB,[1] 1.2TB[1] 10K RPM
15K RPM SAS	300GB[1] 15K RPM	300GB[1] 15K RPM	300GB[1] 15K RPM
7.2K RPM SAS	2TB[1] 7.2K RPM	2TB[1] 7.2K RPM	2TB[1] 7.2K RPM
7.2K RPM SAS	4TB[1] 7.2K RPM	4TB[1] 7.2K RPM	4TB[1] 7.2K RPM
Flash SAS	200GB,[1][3] 400GB,[1][3] 800GB,[1][3] 1.6TB[1][3] Flash	200GB,[1][3] 400GB,[1][3] 800GB,[1][3] 1.6TB[1][3] Flash	200GB,[1][3] 400GB,[1][3] 800GB,[1][3] 1.6TB[1][3] Flash
2.5" SAS Drives	2.5" Drives:	2.5" Drives:	2.5" Drives:
10K RPM SAS	300GB,[2] 600GB,[2] 1.2TB[2] 10K RPM	300GB,[2] 600GB,[2] 1.2TB[2] 10K RPM	300GB,[2] 600GB,[2] 1.2TB[2] 10K RPM
15K RPM SAS	300GB[1] 15K RPM	300GB[1] 15K RPM	300GB[1] 15K RPM
Flash SAS	200GB,[1][3] 400GB,[1][3] 800GB,[1][3] 1.6TB[1][3] Flash	200GB,[1][3] 400GB,[1][3] 800GB,[1][3] 1.6TB[1][3] Flash	200GB,[1][3] 400GB,[1][3] 800GB,[1][3] 1.6TB[1][3] Flash
Flash SAS	960GB,[2][3] 1.92TB[2][3] Flash	960GB,[2][3] 1.92TB[2][3] Flash	960GB,[2][3] 1.92TB[2][3] Flash
BE Interface	6Gbps SAS	6Gbps SAS	6Gbps SAS
RAID Options	RAID 1 All drives	RAID 1 All drives	RAID 1 All drives
	RAID 5 (3 +1) RAID 5 (7 +1) All drives	RAID 5 (3 +1) RAID 5 (7 +1) All drives	RAID 5 (3 +1) RAID 5 (7 +1) All drives
	RAID 6 (6 +2) RAID 6 (14 +2) All drives	RAID 6 (6 +2) RAID 6 (14 +2) All Drives	RAID 6 (6 +2) RAID 6 (14 +2) All Drives

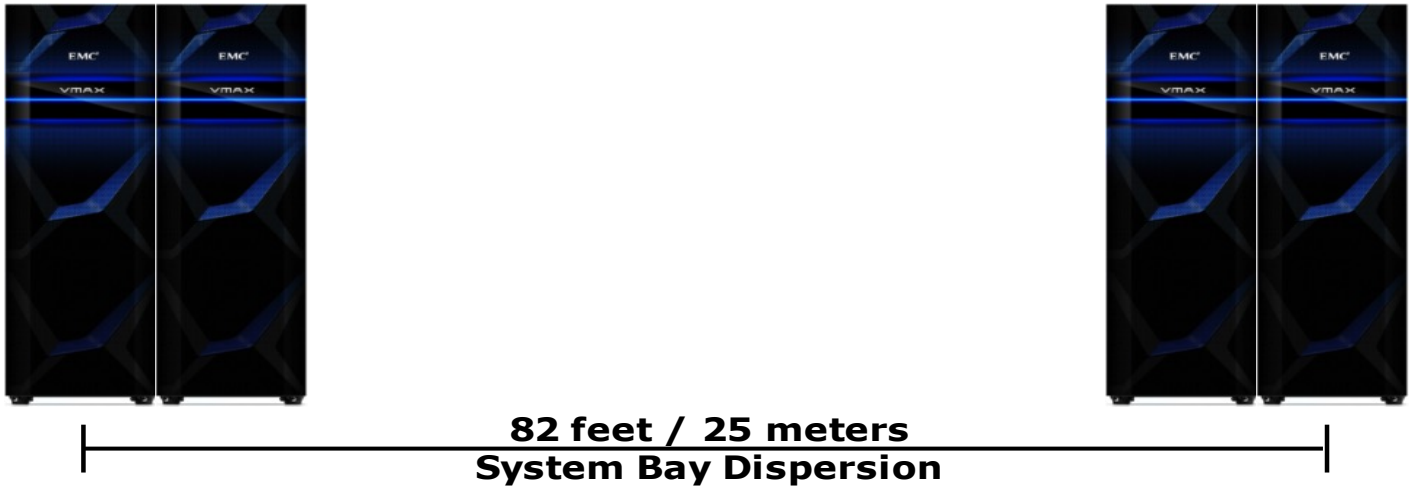
[1]Capacity points and drive formats available for upgrades
[2]Capacity points and drive formats available on new systems and upgrades
[3]Mixing of 200GB, 400GB, 800GB, or 1.6TB Flash capacities with 960GB, or 1.92TB Flash capacities on the same array is not currently supported.

COMPONENTS	VMAX 100K	VMAX 200K	VMAX 400K
SYSTEM CONFIGURATION TYPES			
All 2.5" DAE Configurations	4 Bays 2880 Drives	4 Bays 2880 Drives	8 Bays 5760 Drives
All 3.5" DAE Configurations	4 Bays 1440 Drives	4 Bays 1440 Drives	8 Bays 2880 Drives
Mixed Configurations	4 Bays 2640 Drives	4 Bays 2640 Drives	8 Bays 5280 Drives
DISK ARRAY ENCLOSURES			
120 x 2.5” Drive DAE	Yes	Yes	Yes
60 x 3.5” Drive DAE	Yes	Yes	Yes
CABINET CONFIGURATIONS			
Standard 19" bays	Yes	Yes	Yes
Single Bay System Configuration	Yes	Yes	Yes
Dual Engine System Bay Configuration	Yes	Yes	Yes
Third Party Rack Mount Option	Yes	Yes	Yes
DISPERSION			
System Bay Dispersion	Up to 82 feet (25m) between System Bay 1 and any other System Bay	Up to 82 feet (25 m) between System Bay 1 and any other System Bay	Up to 82 feet (25) between System Bay 1 and any other System Bay
PRE-CONFIGURATION			
100% Virtually Provisioned	Yes	Yes	Yes
Preconfigured in the Factory	Yes	Yes	Yes
HOST SUPPORT			
Open Systems	Yes	Yes	Yes
Mainframe (CKD 3380 and 3390 emulation)	Yes	Yes	Yes
IBM i Series Support (D910 only)	Yes	Yes	Yes
HARDWARE COMPRESSION SUPPORT OPTION (SRDF)			
GbE/10 GbE	Yes	Yes	Yes
8Gb/s FC	Yes	Yes	Yes
16Gb/s FC	Yes	Yes	Yes
POWER OPTIONS			
Power	Single or Three Phase Delta or Wye	Single or Three Phase Delta or Wye	Single or Three Phase Delta or Wye

VMAX3 FAMILY CONNECTIVITY

I/O PROTOCOLS	VMAX 100K	VMAX 200K	VMAX 400K
8 Gb/s FC Host/SRDF Ports			
Maximum/engine	32	32	32
Maximum/array	128	128	256
16 Gb/s FC Host/SRDF Ports			
Maximum/engine	32	32	32
Maximum/array	128	128	256
16 Gb/s FICON Ports			
Maximum/engine	32	32	32
Maximum/array	128	128	256
10 GbE iSCSI Ports			
Maximum/engine	32	32	32
Maximum/array	128	128	256
10 GbE FCoE Ports			
Maximum/engine	32	32	32
Maximum/array	128	128	256
10 GbE SRDF Ports			
Maximum/engine	16	16	16
Maximum/array	64	64	128
GbE SRDF Ports			
Maximum/engine	32	32	32
Maximum/array	128	128	256
EMBEDDED NAS PORTS			
GbE Ports			
Max ports/Software Data Mover	8	12	12
Maximum ports/array	16	48	96
10 GbE (Cu or Optical) Ports			
Max ports/Software Data Mover	4	6	6
Maximum ports/array	8	24	48
8 Gb/s FC NDMP Back-up Ports			
Max ports/Software Data Mover	1	1	1
Maximum ports/array	2	4	8

SYSTEM BAY DISPERSION



System Bay Dispersion allows customers to separate any individual or contiguous group of system bays by up to a distance of 82 feet (25 meters) from System Bay 1. This provides unsurpassed datacenter flexibility in solving floor loading constraints or working around obstacles that mighty preclude fully contiguous configurations.

DISK DRIVE SUPPORT

The VMAX 100K, 200K, and 400K support the latest 6Gb/s dual ported native SAS drives. All drive families (Enterprise Flash, 10K, 15K and 7.2K RPM) support two independent I/O channels with automatic failover and fault isolation. Check with your EMC sales representative for the latest list of supported drives and types. Configurations with mixed-drive capacities and speeds are allowed depending upon the configuration. All capacities are based on 1 GB = 1,000,000,000 bytes. Actual usable capacity may vary depending upon configuration.

2.5" DISK DRIVES

PLATFORM SUPPORT	**VMAX 100K, 200K, 400K**									
NOMINAL CAPACITY (GB)	200[1][3]	400[1][3]	800[1][3]	960[2][3]	1600[1][3]	1920[2][3]	300[1]	300[2]	600[2]	1200[2]
SPEED (RPM)	Flash	Flash	Flash	Flash	Flash	Flash	15K	10K	10K	10K
AVERAGE SEEK TIME (READ/WRITE MS)	N/A	N/A	N/A	N/A	N/A	N/A	2.8/3.3	3.7/4.2	3.7/4.2	3.7/4.2
RAW CAPACITY (GB)	200	400	800	960	1600	1920	292.6	292.6	585.4	1200.2
OPEN SYSTEMS FORMATTED CAPACITY (GB)	196.9	393.8	787.6	939.4	1578.8	1880.1	288.1	288.1	576.3	1181.7
MAINFRAME FORMATTED CAPACITY	191.2	382.3	764.7	939.3	1549.7	1879.7	279.8	279.8	559.5	1147.2

[1]Capacity points and drive formats available for upgrades

[2]Capacity points and drive formats available on new systems and upgrades

[3]Mixing of 200GB, 400GB, 800GB, or 1.6TB Flash capacities with 960GB, or 1.92TB Flash capacities on the same array is not currently supported.

3.5" DISK DRIVES

PLATFORM SUPPORT	VMAX 100K, 200K, 400K									
NOMINAL CAPACITY (GB)	200[1][3]	400[1][3]	800[1][3]	1600[1][3]	300[1]	300[1]	600[1]	1200[1]	2000[1]	4000[1]
SPEED (RPM)	Flash	Flash	Flash	Flash	15K	10K	10K	10K	7.2K	7.2K
AVERAGE SEEK TIME (READ/WRITE MS)	N/A	N/A	N/A	N/A	2.8/3.3	3.7/4.2	3.7/4.2	3.7/4.2	8.2/9.2	8.2/9.2
RAW CAPACITY (GB)	200	400	800	1600	292.6	292.6	585.4	1200.2	1912.1	4000
OPEN SYSTEMS FORMATTED CAPACITY (GB)	196.9	393.8	787.6	1578.8	288.1	288.1	576.3	1181.7	1882.7	3939.2
MAINFRAME FORMATTED CAPACITY	191.2	382.3	764.7	1549.7	279.8	279.8	559.5	1147.2	1827.7	3824.0

[1]Capacity points and drive formats available for upgrades
[2]Capacity points and drive formats available on new systems and upgrades
[3]Mixing of 200GB, 400GB, 800GB, or 1.6TB Flash capacities with 960GB or 1.92TB Flash capacities on the same array is not currently supported.

POWER CONSUMPTION AND HEAT DISSIPATION AT AMBIENT INPUT TEMPERATURES

COMPONENTS	VMAX 100K		VMAX 200K		VMAX 400K	
Power dissipation at temperatures >/= 35° C will be higher based on adaptive cooling	Maximum Total power consumption (kVA)	Maximum Heat dissipation (Btu/Hr)	Maximum Total power consumption (kVA)	Maximum Heat dissipation (Btu/Hr)	Maximum Total power consumption (kVA)	Maximum Heat dissipation (Btu/Hr)
SYSTEM BAY 1, SINGLE ENGINE	10.8	35,731	10.9	36,398	11.1	36,936
SYSTEM BAY 2, SINGLE ENGINE[1]	10.4	34,595	10.6	35,262	10.7	35,650
SYSTEM BAY 1, DUAL ENGINE	8.8	28,715	9.1	30,048	9.4	30,975
SYSTEM BAY 2, DUAL ENGINE[1]	N/A	N/A	8.8	28,912	9.0	29,688

[1]Power Values for System Bay 2 and all subsequent System Bays where applicable

PHYSICAL SPECIFICATIONS

COMPONENTS	HEIGHT (IN/CM)	WIDTH (IN/CM)	DEPTH (IN/CM)	WEIGHT (MAXIMUM LBS/KG)
SYSTEM BAY, SINGLE ENGINE	75/190	24/61	47/119	2065/937
SYSTEM BAY, DUAL ENGINE	75/190	24/61	47/119	1860/844

INPUT POWER REQUIREMENTS

SINGLE-PHASE NORTH AMERICAN, INTERNATIONAL, AUSTRALIAN

Specification	North American 3 wire connection (2 L & 1 G)[1]	International and Australian 3 wire connection (1 L & 1 N & 1 G)[1]
Input nominal voltage	200 – 240 VAC +/- 10% L- L nom	220 – 240 VAC +/- 10% L - N nom
Frequency	50 – 60 Hz	50 – 60 Hz
Circuit breakers	30 A	32 A
Power zones	Two	Two
Power requirements at customer site (min)	• Three 30A, single phase drops per zone. • Two power zones require 6 drops, each drop rated for 30A	

[1] L = line or phase, N = neutral, G = ground

THREE-PHASE NORTH AMERICAN, INTERNATIONAL, AUSTRALIAN

Specification	North American (Delta) 4 Wire Connection (3 L & 1 G)[1]	International (WYE) 5 Wire Connection (3 L & 1 N & 1 G)[1]
Input voltage[2]	200 – 240 VAC +/- 10% L- L nom	220 – 240 VAC +/- 10% L - N nom
Frequency	50 – 60 Hz	50 – 60 Hz
Circuit breakers	50 A	32 A
Power zones	Two	Two
Power requirements at customer site (min)	Two 50 A, three-phase drops per bay	Two 32 A, three-phase drops per bay

[1] L = line or phase, N = neutral, G = ground

[2] An imbalance of AC input currents may exist on the three-phase power source feeding the array, depending on the configuration. The customer's electrician must be alerted to this possible condition to balance the phase-by-phase loading conditions within the customer's data center

RADIO FREQUENCY INTERFERENCE

Electro-magnetic fields which include radio frequencies can interfere with the operation of electronic equipment. EMC Corporation products have been certified to withstand radio frequency interference in accordance with standard EN61000-4-3. In Data Centers that employ intentional radiators, such as cell phone repeaters, the maximum ambient RF field strength should not exceed 3 Volts /meter.

REPEATER POWER LEVEL (WATTS)	RECOMMENDED MINIMUM DISTANCE (FEET/METERS)
1	9.84 FT (3M)
2	13.12 FT (4 M)
5	19.69 FT (6M)
7	22.97 FT (7M)
10	26.25 FT (8M)
12	29.53 FT (9M)
15	32.81 FT (10M)

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CONTACT US

To learn more about how EMC products, services, and solutions can help solve your business and IT challenges, contact your local representative or authorized reseller—or visit us at the EMC Store.