

# EMC SYMMETRIX VMAX SE STORAGE SYSTEM WITH ENGINUITY



The EMC® Virtual Matrix Architecture™ is a new way to build storage systems that transcends the physical constraints of all existing architectures by scaling system resources through common building blocks called EMC Symmetrix® VMAX™ engines.

A single VMAX engine provides the complete foundation for a high-availability Symmetrix VMAX system. Each VMAX engine contains two Symmetrix VMAX directors, a cross-director communication path linking the two directors, and redundant interfaces to the EMC Virtual Matrix™ interconnect. Each Symmetrix VMAX director consolidates front-end, global memory, and back-end functions, enabling direct memory access to data for optimized I/O operations.

EMC Symmetrix VMAX SE systems are available in one- to two-bay configurations for 303 terabytes of usable storage capacity in a single system. The Symmetrix VMAX SE system is a new entry point for high-end storage, providing a compact footprint optimized for mainframe and open systems data centers, preserving space, power, and cooling.

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## VMAX SE MAXIMUM SPECIFICATIONS

- One VMAX engine
- Four Quad-core 2.33 GHz Intel® processors
- Up to 128 GB of memory
- Virtual Matrix bandwidth: 24 GB/s

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## CONNECTIVITY

The Symmetrix VMAX SE system is available in configurations supporting one Symmetrix VMAX engine with a maximum of 16 front-end ports. Optimized hardware logic and data protection encoding ensure end-to-end data integrity with automated channel failover for maximum availability and load balancing. Symmetrix VMAX SE systems support all popular hardware and operating system platforms, storage area networks (SANs), and high-availability cluster environments. IPv6, IPsec, and compression support are available with GigE ports. IPv6 support is available with 10 Gb/s Ethernet.

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## PROTOCOL

8 Gb/s Fibre Channel Host/SAN Ports  
8 Gb/s Fibre Channel Remote Replication Ports  
8 Gb/s FICON Host Ports  
4 Gb/s Fibre Channel Host/SAN Ports  
4 Gb/s Fibre Channel Remote Replication Ports  
4 Gb/s FICON Host Ports  
10 Gb/s 10 GigE Remote Replication Ports  
10 Gb/s FCoE Host Ports  
10 Gb/s iSCSI Host Ports  
1 Gb/s GigE Remote Replication Ports  
1 Gb/s iSCSI Ports

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## USABLE SYSTEM PORTS

4–16 per array  
2–4 per array  
4–8 per array  
4–16 per array  
2–4 per array  
4–8 per array  
2–4 per array  
4–8 per array  
4–8 per array  
2–4 per array  
4–8 per array

Mixed combinations of the above port types depend upon the configuration. Refer to the EMC Support Matrix on [www.EMC.com](http://www.EMC.com) or contact your local EMC sales representative for specific configuration support.

## DISK DRIVE AND ENTERPRISE FLASH DRIVE CONNECTIVITY

The Symmetrix VMAX SE drive infrastructure is architected with the latest 4 Gb/s dual-ported Fibre Channel drives, Enterprise Flash drives, SAS drives, and SATA drives, each supported by two independent I/O channels with automatic failover and fault isolation.

### 3.5" FIBRE CHANNEL DRIVES

Capacity	146 GB	300 GB	300 GB	450 GB	450 GB
Rotational Speed (rpm)	15,000	10,000	15,000	10,000	15,000
Form Factor	3.5 in	3.5 in	3.5 in	3.5 in	3.5 in
Interface	4 Gb/s FC	4 Gb/s FC	4 Gb/s FC	4 Gb/s FC	4 Gb/s FC
Internal Data Rate (Mb/s)	685–1,142	1,010–1,840	685–1,142	1,010–1,840	1,051–2,225
Average Seek Time (read/write)	3.4/3.9 ms	3.8/4.4 ms	3.4/3.9 ms	3.8/4.4 ms	3.4/3.9 ms
Raw Capacity	145.7 GB	292.7 GB	292.6 GB	439.0 GB	439.0 GB
Formatted Capacity					
Open Systems	143.5 GB	288.1 GB	288.1 GB	432.2 GB	432.2 GB
Mainframe	139.3 GB	279.7 GB	279.7 GB	419.6 GB	419.6 GB
IBM i	141.7 GB	288.2 GB	288.2 GB	435.1 GB	435.1 GB

### 3.5" FIBRE CHANNEL DRIVES [continued]

Capacity	600 GB	600 GB	1 TB	2 TB
Rotational Speed (rpm)	10,000	15,000	7,200	7,200
Form Factor	3.5 in	3.5 in	3.5 in	3.5 in
Interface	4 Gb/s FC	4 Gb/s FC	4 Gb/s FC	4 Gb/s FC
Internal Data Rate (Mb/s)	1,010–1,840	1,051–2,225	470–1,070	470–1,070
Average Seek Time (read/write)	3.8/4.4 ms	3.4/3.9 ms	8.2/9.2 ms	8.2/9.2 ms
Raw Capacity	585.4 GB	585.4 GB	1000.2 GB	2000.3 GB
Formatted Capacity				
Open Systems	576.3 GB	576.3 GB	984.8 GB	1882.72 GB
Mainframe	559.5 GB	559.5 GB	956.0 GB	1827.67 GB
IBM i	580.1 GB	580.1 GB	n/a	1912.14 GB

### 2.5" SAS DRIVES

Capacity	300 GB	450 GB	600 GB
Rotational Speed (rpm)	10,000	10,000	10,000
Form Factor	2.5 in	2.5 in	2.5 in
Interface	4 Gb/s FC	4 Gb/s FC	4 Gb/s FC
Internal Data Rate (Mb/s)	1219-2029	1219-2029	1219-2029
Average Seek Time (read/write)	3.7/4.2 ms	3.7/4.2 ms	3.7/4.2 ms
Raw Capacity	292.6 GB	439.0 GB	585.4 GB
Formatted Capacity			
Open Systems	288.1 GB	432.2 GB	576.3 GB
Mainframe	279.7 GB	419.6 GB	559.5 GB
IBM i	288.2 GB	435.1 GB	580.1 GB

### ENTERPRISE FLASH DRIVES

Capacity	100 GB*	200 GB	400 GB
Form Factor	3.5 in	3.5 in	3.5 in
Interface	4 Gb/s FC	4 Gb/s FC	4 Gb/s FC
Internal Data Rate (Mb/s)	800-1,600	800–1,600	800–1,600
Raw Capacity	100.0 GB	200.0 GB	400.0 GB
Formatted Capacity			
Open Systems	91.7 GB	196.9 GB	393.8 GB
Mainframe	95.6 GB	191.2 GB	382.3 GB
IBM i	97.5 GB	197.0 GB	389.8 GB

\* Contact your local EMC representative to obtain ordering and availability details on these drives.

## SYSTEM CAPACITIES IN TB

	146 GB Drives		2 TB Drives	
	Min.	Max.	Min.	Max.
Number of Drives	48	360	48	360
Mirrored Capacity				
Open Systems	2.87	25.26	37.65	329.48
Mainframe	2.79	24.52	36.55	197.39
RAID-5 3+1 Capacity				
Open Systems	4.31	37.89	56.48	497.04
Mainframe	4.18	36.79	54.83	252.22
RAID-5 7+1 Capacity				
Open Systems	5.02	44.21	65.90	579.88
Mainframe	4.88	42.92	63.97	307.05
RAID-6 6+2 Capacity				
Open Systems	4.31	37.89	56.48	497.04
Mainframe	4.18	36.79	54.83	296.08
RAID-6 14+2 Capacity				
Open Systems	5.02	44.21	79.07	579.88
Mainframe	4.88	42.92	76.76	307.25

Configurations with mixed drive capacities and speeds are allowed depending upon the configuration. 64 GB of total capacity will be reserved for internal Symmetrix file system use. All capacities are based on 1 GB = 1,000,000,000 bytes. Actual usable capacity may vary depending upon configuration.

## DATA AT REST ENCRYPTION

Data at Rest Encryption is delivered through a new Symmetrix VMAX model with built-in, hardware-based data encryption. Data is encrypted when written to drives and decrypted when read from the drives with no impact on performance or local and remote replication. Symmetrix Data at Rest Encryption addresses security and compliance concerns regarding data exposure when drives are removed or arrays are replaced.

## PHYSICAL AND COOLING SPECIFICATIONS

	Height* (in/cm)	Width (in/cm)	Depth (in/cm)	Front and Rear Service	Weight (lb/kg)	Power (kVA)	Cooling (BTU/hr)
				Area (in/cm)			
System Bay	76.66/194.7	24.0/61.0	41.88/106.4	42.0/106.7	1,730/784.7	4.3	14,200
Storage Bay	76.66/194.7	30.2/76.7	41.88/106.4	42.0/106.7	2,144/972.5	6.1	19,800

All dimensions are cabinet/enclosure size without shipping brackets or securing brackets.

Weight, power, and cooling are maximum for a full configuration.

Cooling is front to rear for system bay and front to top for storage bays.

\*An additional 18 in. (45.7 cm) is recommended for ceiling/top clearance.

## POWER SPECIFICATIONS\*—SYSTEM BAY

	North America	International	North America	International
	3-phase (Delta-4 wire)	3-phase (Wye-5 wire)	Single-phase	Single-phase
Input Voltage (VAC)	200–240	200–240	200–240	200–240
Frequency (Hz)	50–60	50–60	50–60	50–60
Circuit Breaker (Amps), Recommended	50	32	30	32
AC Power Connections	2 per bay	2 per bay	2 per bay	2 per bay
Power Connector*	CS8365C	S52.30	L6-30P	L6-30P
User Connector*	See Note 1	See Note 1	See Note 1	See Note 1

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## POWER SPECIFICATIONS—STORAGE BAY

	North America 3-phase (Delta-4 wire)	International 3-phase (Wye-5 wire)	North America Single-phase	International Single-phase
Input Voltage (VAC)	200–240	200–240	200–240	200–240
Frequency (Hz)	50–60	50–60	50–60	50–60
Circuit Breaker (Amps), Recommended	50	32	30	32
AC Power Connections	2 per bay	2 per bay	4 per bay	4 per bay
Power Connector*	CS8365C	S52.30	L6-30P	L6-30P
User Connector*	See Note 1	See Note 1	See Note 1	See Note 1

\*Specifications given are for the power connectors located inside the Symmetrix VMAX system and storage bays. EMC offers a selection of power cable extensions with different power connectors for connection to the customer's power source. Refer to the "VMAX Series Physical Planning Guide" for details. The power cable extension type desired must be verified at the time of quotation and ordering.

Note 1: Refer to the "VMAX Series Physical Planning Guide."

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## ENVIRONMENTAL SPECIFICATIONS (OPERATING)

Temperature (°F/°C)	50–90/10–32
Altitude (ft/m), max.	7,500/2,286
Humidity (%), Non-condensing	20–80
Raised Floor	Recommended

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