



SAN Storage Product Family M Series Disk Array M110 / M310

The New SAN.
The Next Generation of Storage.



TopRAID M Series Storage Systems

For high performance and virtual environments, powered by **NEC**

Responding to ballooning data, preparing for virtualization and cloud environments, and responding to environmental and power-saving needs. The drastically changing environment of IT infrastructure requires a storage unit that meets these needs. M Series has been developed to satisfy these needs by bringing together the high reliability technology and innovative ability of NEC. The new SAN storage infrastructure leads the ever-evolving virtualization and cloud computing age.

TopRAID M Series has superior characteristics for next-generation SAN storage units. These features address the need for high performance and high availability to support business continuity, advanced eco-friendly performance, easy installation and operations that reduce the management workload and economic efficiency that reduces the TCO to store and archive data.

Demands on Storage Units

- Reduce the workload required for storage management by using virtualization technology
- Efficiently manage data according to its usage frequency
- Dramatically reduce the power consumption of storage units for environmental conservation and power saving
- Ensure the continuous operations in the face of unforeseen failures
- Reduce the cost of storing ever-increasing data at businesses
- Improve the operating efficiency by integrating a server virtualization environment
- Construct a disaster response site to prepare for earthquakes and fires
- Improve problematic backup systems

High Performance & High Availability

M Series ensures the protection of data at businesses and provides high performance and high availability to support high-speed access

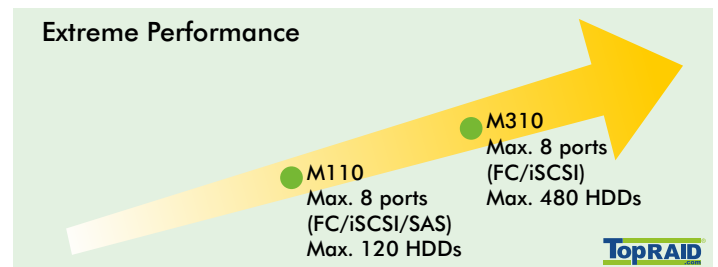
- High-speed components and interfaces such as SSD are supported.
- Data can automatically be allocated to a suitable device according to its access frequency.
- Main components are made redundant and protected.
- Original high availability technologies such as Super Phoenix technology are adopted.
- Superior security functions such as self-encrypting drives are supported.

Easy Installation & Operation

M Series reduces the workload of managing storage by offering autonomous operations utilizing virtualization technologies and easy-to-use GUI.

- The advanced dynamic pool enables the expansion of capacity and performance without stopping operations.
- Thin Provisioning optimally allocates storage capacity in a virtual environment.
- A backup site can be easily and economically constructed by using an iSCSI interface.
- Data can be migrated and moved between storage units without using an FC switch.
- The user-friendly GUI makes storage management and operation easy.

M Series offers a product lineup consisting of basic model M110 Disk Array and high performance model M310 Disk Array that achieves a scalable storage integration by utilizing advanced virtualization technologies such as data allocation optimization with a high-speed Solid State Drive (SSD) and Thin Provisioning, all developed to respond to the needs of the next generation.



TopRAID M110/M310 Series is certified for VMware ESXi 6.0

Advanced Eco-friendly Function

M Series promotes environmental conservation by actively adopting eco-friendly components that save power.

- The eco-friendly design employs the 80PLUS GOLD certified high-efficiency power supplies as well as low-power processors.
- M Series can be used even in 40°C(104°F) environments, contributing to a reduced electricity cost.
- Power consumption is reduced by providing a visualization of the power consumption and implementing the autonomous MAID function.

IT Cost Optimization

M Series contributes to the reduction of TCO by optimizing the investment cost and making daily operations highly efficient.

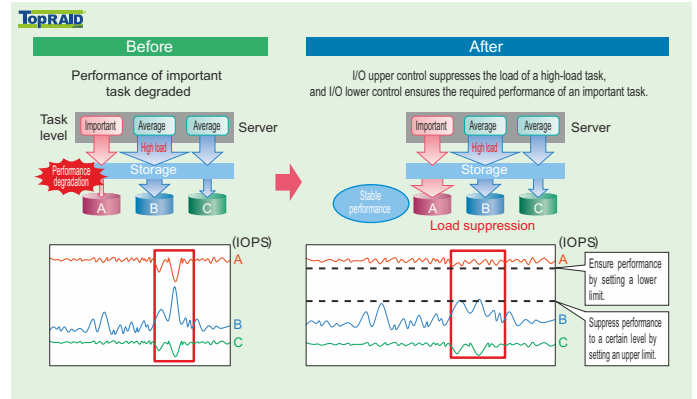
- Devices (SAS, nearline SAS, and SSD) and interfaces (FC, iSCSI, and SAS) can be selected according to your purpose, optimizing the investment cost.
- The management software is bundled with M110.
- The management workload can be reduced with virtualized system operations.

Innovate virtualization with TopRAID M Series

Assuring business performance through automatic optimization based on SLA*

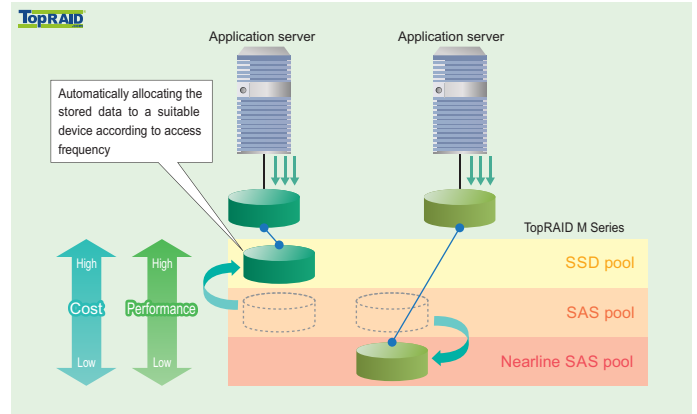
In a server virtualization environment, a single task placing a high load on the server can prevent other tasks from obtaining sufficient resources, leading to degraded server performance. To assure stable performance, M series sets upper and lower limits to each logical disk to control the amount of I/O. Setting a small value as the upper limit of a task whose priority is low allows resources to be fairly allocated to other tasks. On the other hand, setting a large value as the lower limit of an important task allows that task to preferentially acquire the resources it needs. By prioritizing tasks and optimizing resource allocation automatically, the M series stabilizes the operations of the entire system, allowing you to meet the demands of SLAs that guarantee Quality of Service.

* SLA: Service Level Agreement



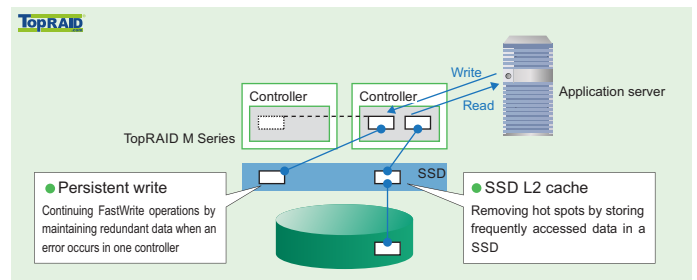
Automatically allocating data to a suitable device according to access frequency

M Series enables the creation of layers of different types of devices such as SSD that allows high-speed data access, high-performance SAS HDD, and high-capacity and low bit-cost nearline SAS HDD. The stored data is automatically re-allocated in suitable storage layers by routine monitoring so that frequently accessed data is moved to a SSD pool and infrequently accessed data is moved to a nearline SAS pool. This maximizes storage performance and optimizes the investment cost of the storage units.



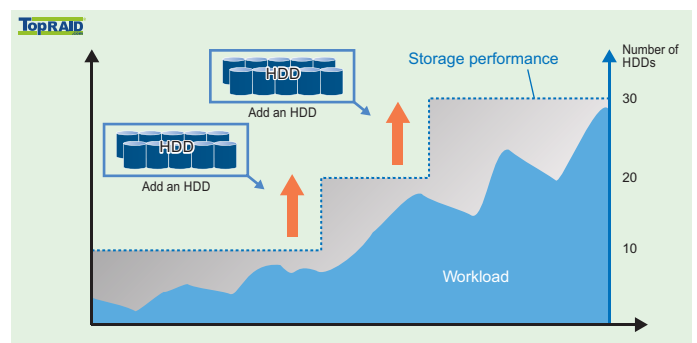
SSD L2 cache & persistent write, ensuring stable, high-speed performance

M Series was developed to achieve higher levels of performance through utilization of SSD. The throughput of frequently accessed data was improved to remove hot spots by using SSD, which has a readout performance of superior speed, as an L2 cache. In addition, a persistent write cache can continue FastWrite operations by storing redundant data in SSD when an error occurs in one controller.



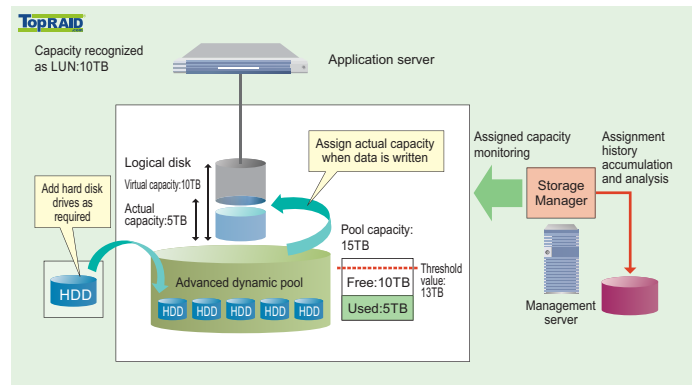
Advanced dynamic pool, expanding the capacity and performance simply by adding HDD

The flexibility to respond to a sudden increase in data is vital in this age of constant change. TopRAID M Series offers an advanced dynamic pool that was recently developed by elevating the level of existing virtual pools. The advanced dynamic pool enables the automatic increase in pool capacity during capacity shortages simply by adding HDD, and improved performance of the entire pool by automatically optimizing data allocation to distribute data.



Thin Provisioning, optimally allocating storage capacity in a virtualized environment

The Thin Provisioning feature virtually allocates the capacity of a physical volume to a logical volume and adds HDD when the capacity of physical volume is insufficient. The storage usage is maximized because you can minimize the difference between the used space and the physical volume capacity. The initial investment cost and power consumption can also be reduced. In addition, it is not necessary to stop operations or adjust a schedule to change the capacity because HDD can be added without stopping jobs.



Improving the operating efficiency of a server virtualization environment by integrating with a VMware environment

M Series supports VMware vStorage APIs for Array Integration (VAAI), a storage API provided by VMware, Inc. by incorporating this API, operations that were processed on a server in the past can be processed on the M Series product itself. These operations include the replication and migration of virtual machines, initialization of new virtual machines, and exclusive control of storage areas. Performing these operations enhances the operational efficiency of the entire virtualization environment, and increases overall performance.

Innovate business continuity with TopRAID M Series

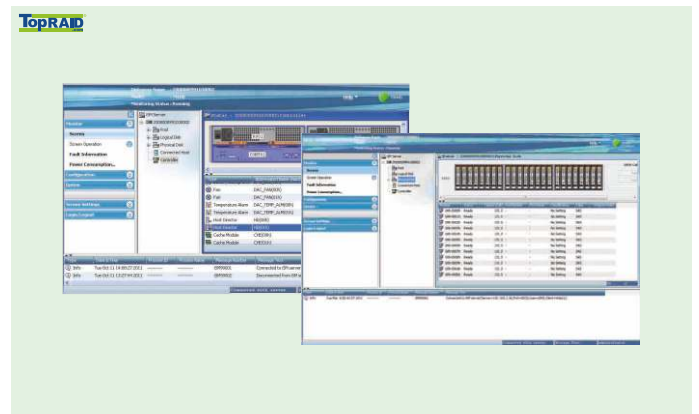
RAID protects against double failures, handling increasing data capacities

The HDD capacity is becoming larger as business information rapidly increases. There is also a risk of data loss because the second HDD can fail while recovering a damaged HDD. M Series supports triple mirror feature that achieves the high-speed performance of RAID-1 and the reliability of RAID-6 in addition to the double parity configuration of RAID-6, responding to demands for both large capacities and high reliability. M Series can maintain its performance during failures with its design that duplicates main components, establishing a level of reliability equivalent to high-end models of storage units.

Innovate interoperability with TopRAID M Series

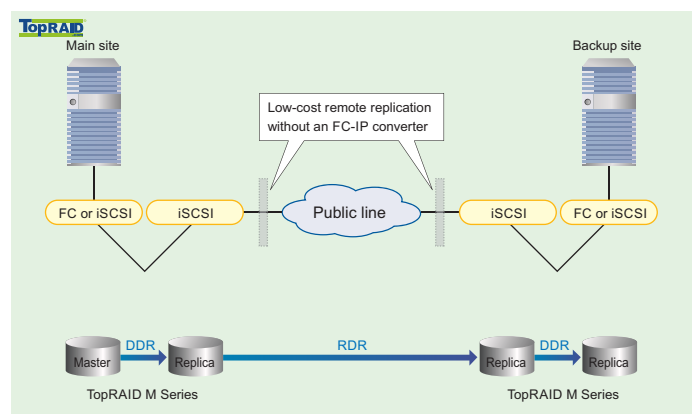
Intuitive GUI allows even first-time users to easily manage the storage unit

The storage capacity, disk load, and operational status of each component, such as a connected server, can be checked in a visual web browser window. Navigation windows show the methods for specifying the replication settings, changing the capacity, and responding to failures. The easy-to-understand GUI environment eliminates errors during operation.



iSCSI RDR economically counters disaster through remote replication

Constructing a backup site to protect valuable data against disasters such as earthquakes and fires can cost a great deal of money and resources. With M Series, an IP line is used with iSCSI, making an FC-IP converter unnecessary and enabling the development of cost-efficient disaster prevention and response measures. In addition, low-cost operation is possible due to a reduction of line cost.



Green innovation with TopRAID M Series

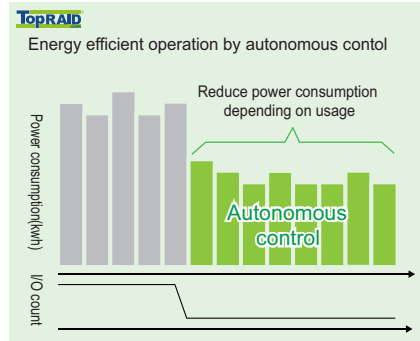
Reducing power consumption with advanced power saving technology

To offer top-class eco-friendly storage units, M Series was developed by applying advanced energy saving technology so that its power consumption is significantly less than previous models. It promotes power saving of the entire storage unit by incorporating a low-power processor as its CPU and enabling autonomous control. For the power supply, M Series employs the 80PLUS GOLD certified high-efficiency power supplies. In addition, M Series incorporates as many power saving components as possible, and achieves a significant reduction in the total number of components. M Series can be used in 40°C (104°F) environments, reducing the power consumed by air conditioning.

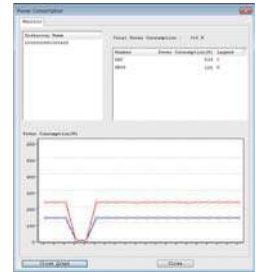


Realizing low-power operations by visualization of power consumption and autonomous device control

The power consumption of all M Series units in the same infrastructure environment can be managed with real-time visualizations. In addition, components such as CPU, fan and HDD can autonomously control power consumption based on storage unit usage. Energy efficient operations are promoted by reducing unnecessary power consumption as much as possible when the storage unit is idle.

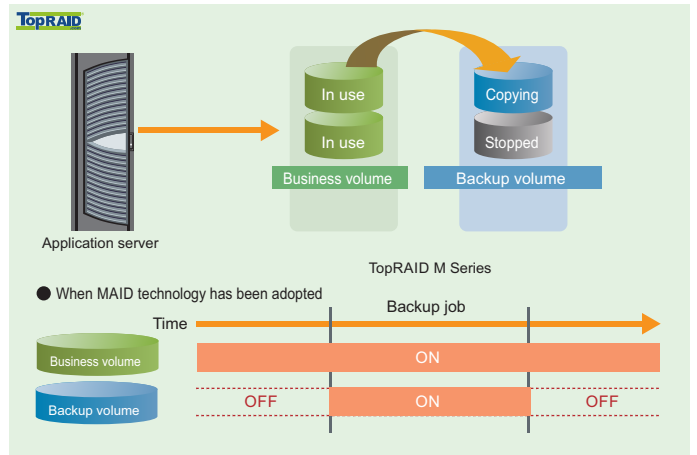


Visualization of power consumption



Saving power resources with the autonomous MAID function

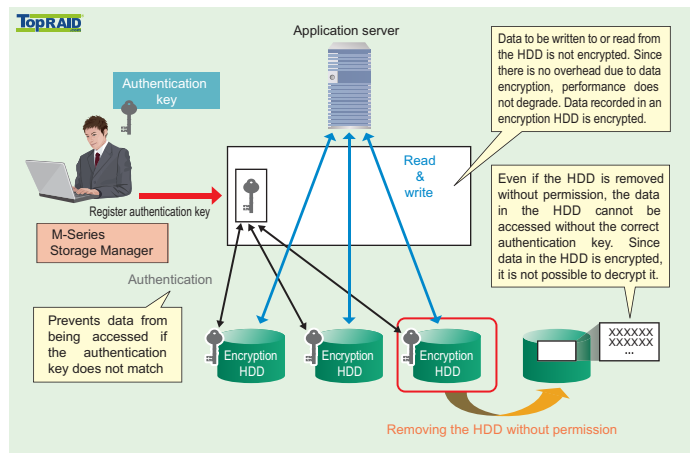
The larger the system is, the more power is consumed and the more the running cost is increased. M Series adopts MAID (Massive Array of Inactive Disks) technology to promote energy efficiency. For example, by managing a job schedule in pool units with dedicated software, the motor of a backup disk drive that is not being used is turned off to save power.



Innovate security with TopRAID M Series

Advanced security functions such as data encryption and personal information leakage prevention

The security of storage units that store confidential business data is always threatened. M Series uses a Self-encrypting drive (SED) to encrypt data. This function prevents data leakage when the HDD is inappropriately removed, lost, stolen, or damaged. Furthermore, M Series features a variety of security functions, including restrictions on access to logical disks, audit of logs and other records, and prevention of erroneous operations.





TopRAID M110-24

M110 technical specifications

Models	TRM110-12	TRM110-24
Chassis Structure	Up to 9 disk enclosures supporting 3.5 LFF drives, or up to 4 disk enclosures with 2.5 SFF can be connected to the Disk Array under the condition that the total number of slots is 120 or less.	Up to 4 disk enclosures supporting 2.5 SFF drives, or up to 8 disk enclosures with 3.5 LFF can be connected to the Disk Array under the condition that the total number of slots is 120 or less.
HDD slots in a chassis	12 x 3.5 LFF	24 x 2.5 SFF
RAID controller	Dual/Single	
Host Interface	Fibre Channel (8 Gbps or 16 Gbps), iSCSI (1 Gbps or 10 Gbps), SAS (12 Gbps)	
Number of Host Ports, dual Controller	4/8x FC; 4/8x 10 GbE iSCSI; 8x SAS x4; Hybrid (4x FC + 4x 10 GbE iSCSI)	
Number of Host Ports, single Controller	2/4x FC; 2/4x 10 GbE iSCSI; 4x SAS x4; Hybrid (2x FC + 2x 10 GbE iSCSI)	
Cache Memory Capacity	up to 8 GB per Controller	
Cache Memory Backup method	Save to flash memory	
RAID level	RAID 0, 1, 5, 6, 10, 50, 60, TM	
Drives Interface	SAS 3.0 (12 Gbps)	
Drives Type/Capacity		
- SAS HDD		600 GB/1.2 TB/1.8 TB (10,000 rpm) 300 GB/600 GB (15,000 rpm)
- Nearline SAS HDD	2 TB/4 TB/6 TB (7,200 rpm)	
- SAS SSD	200 GB/400 GB/1.6 TB	200 GB/400 GB/1.6 TB
- Encryption SAS HDD	4 TB (7,200 rpm)	600 GB (10,000 rpm or 15,000 rpm)
Max. Storage Capacity ^{(*)1}		
- SAS HDD		170 TB
- Nearline SAS HDD	566.4 TB	
- SAS SSD	13.2 TB	13.2 TB
- Encryption SAS HDD	379.1 TB	55.6 TB
Number of Drives ^{(*)2}	3-120	
Support OS ^{(*)3}	Windows, Linux, VMware	
Chassis Dimensions (w x d x h)	482.0 x 566.0 x 87.4mm (2U with front bezel)	
Weight Disk Array	33 kg or less	29 kg or less
Weight Disk JBOD	29 kg or less	26 kg or less
Power Requirements	AC100 – 240 V single phase 50/60 Hz	
Power Consumption (Max. at 25 °C)		
- Disk Array with SAS HDD		520 W / 425 W
- Disk Array with Nearline SAS HDD	465 W / 370 W	
- Disk JBOD with SAS HDD		350 W / 295 W
- Disk JBOD with Nearline SAS HDD	295 W / 230 W	
Temperature	Operating: 5 to 40 degrees Celsius (41 to 104 degrees Fahrenheit) Non-operating: -10 to 60 degrees Celsius (14 to 140 degrees Fahrenheit)	
Relative Humidity	Operating : 10 to 80% RH Non-operating : 5 to 80% RH	
Warranty	3 years (optional 5 years)	

*1 : Calculated on "1 GB=1,024 TB,"1 TB=1,024 bytes" basis.

*2 : Up to 12 SSD can be installed.

*3 : There might be some restrictions on the OS when connected with disk arrays



ENERGY STAR is an international voluntary program led by the U.S. Environmental Protection Agency (EPA) to identify and promote energy-efficient products, practices, and services in order to protect our environment.

Being established in 1992, the ENERGY STAR program now covers the storage products. The requirements for Data Center Storage was released and took effect in December 2013, and TopRAID M110 meets the criteria and certified as an ENERGY STAR product.



TopRAID M310-24

M310 technical specifications

Models	TRM310-12	TRM310-24
Chassis Structure	Up to 19 (nineteen) 3.5 LFF/2.5 SFF JBODs can be connected to the Disk Array.	
HDD slots in a chassis	12 x 3.5 LFF	24 x 2.5 SFF
RAID controller	Dual	
Host Interface	Fibre Channel (8 Gbps or 16 Gbps), iSCSI (1 Gbps or 10 Gbps)	
Number of Host Port	8x Fibre Channel ; 8x 10 GbE iSCSI ; Hybrid (4x Fibre Channel + 4x 10 GbE iSCSI)	
Cache Memory Capacity	24 GB or 48 GB (12 GB or 24 GB per controller)	
Cache Memory Backup method	Save to flash memory	
RAID level	RAID 0, 1, 5, 6, 10, 50, 60, TM	
Drives Interface	SAS 3.0 (12 Gbps)	
Drives Type/Capacity		
- SAS HDD		600 GB/1.2 TB/1.8 TB (10,000 rpm) 300 GB/600 GB (15,000 rpm)
- Nearline SAS HDD	2 TB/4 TB/6 TB (7,200 rpm)	
- SAS SSD	200 GB /400 GB/1.6 TB	200 GB/400 GB/1.6 TB
- Encryption SAS HDD	4 TB (7,200 rpm)	600 GB (10,000 or 15,000 rpm)
Max. Storage Capacity ^(*)		
- SAS HDD		680.2 TB
- Nearline SAS HDD	1132.8 TB	
- SAS SSD	265.5 TB	531.0 TB
- Encryption SAS HDD	758.2 TB	222.5 TB
Number of Drives ^(**)	up to 480	
Support OS ^(**)	Fibre Channel: Windows, Linux, VMware, HP-UX, Solaris iSCSI: Windows, Linux, VMware	
Chassis Dimensions (w x d x h)	482.0 x 556.0 x 87.4 mm (2U, with front bezel)	
Weight Disk Array	33 kg or less	29 kg or less
Weight Disk JBOD	29 kg or less	26 kg or less
Power Requirements	AC100 – 240 V single phase 50/60 Hz (redundant Power Supply Unit)	
Power Consumption (Max. at 25 °C)		
- Disk Array with SAS HDD		565 W / 455 W
- Disk Array with Nearline SAS HDD	510 W / 400 W	
- Disk JBOD with SAS HDD		
- Disk JBOD with Nearline SAS HDD	295 W / 230 W	
Temperature	Operating: 5 to 40 degrees Celsius (41 to 104 degrees Fahrenheit) Non-operating: -10 to 60 degrees Celsius (14 to 140 degrees Fahrenheit)	
Relative Humidity	Operating : 10 to 80% RH Non-operating : 5 to 80% RH	
Warranty	3 years (optional 5 years)	

*1 : Calculated on "1 GB=1,024 TB,"1 TB=1,024 bytes" basis.

*2 : There might be some restrictions on the OS when connected with disk arrays

*3 : One disk array and up to 19 JBODs

MAIN Software for TopRAID M Series Disk Arrays

Software Product Name	Description
Device management	
Manager	Basic functions to enable integrated storage operations management
Manager Integration Base	Functions to achieve integrated storage operations by in collaboration with Sigma System Center
Manager Suite	Package product including both Manager and Manager Integration Base
Performance management	
Performance Monitor	Functions to monitor storage performance in real-time and accumulate monitoring data
Performance Navigator	Functions to streamline the analysis of storage performance data
Performance Monitor Suite	Package product including both Performance Monitor and Performance Navigator
Replication management	
Replication Navigator Suite	Functions to simplify the procedures for constructing a backup system of databases, file servers, and virtual machines
Storage control	
Base Product	Basic functions to control storage
Manager Express	Basic functions to enable storage operations management
Control Command	CLI functions to perform operations such as replication and data protection on an application Server
Replication	
Dynamic Data Replication ¹	Functions to create a fully replicated volume in the same storage unit
Remote Data Replication ^{1 + *5}	Functions to create a fully replicated volume in a remote storage unit
Remote Data Replication Asynchronous ^{1 + *5}	Functions to asynchronously create a fully replicated volume in a remote store unit by using a low-speed line
Dynamic Snap Volume ^{1 + *2}	Functions to create a differential replicated volume
Replication Control SQL Option	Option to enable non-disruptive backup of Microsoft SQL Server
Replication Control File System Option	Option to enable non-disruptive backup of file systems
Resource control	
Virtual Cache Partitioning	Functions to divide storage resources and manage the divided storage resources as virtual storage
Thin Provisioning	Functions to enhance the capacity usage efficiency by setting the virtual logical capacity and reducing the physical capacity to be allocated
Power ConServer	Functions to reduce the power consumption of a storage unit by controlling the running and stopping of a HDD
Perfor Optimizer	Functions to optimize performance by distributing the volume load and changing physical volume allocations without stopping jobs
Perfor Cache	Functions to use a SSD as cache memory
Data Migration ^{*3 + *4}	Functions to migrate data from an existing storage unit to a new one
Volume Protect	Functions to protect data from tampering and guarantee data integrity for each volume
High availability	
Path Manager	Functions to automatically switch paths and distribute the I/O loads

1: Not supported by a single controller model

2: Bundled with Dynamic Data Replication

3: Storage Manager Suite recommended

4: only FC

5: only FC & iSCSI

Software features for TopRAID M110 and M310

M110	M310
Included software features	Included software features
Access Control ControlCommand Storage Power Conserver Storage Manager Express Storage Control Software DynamicDataReplication Express ThinProvisioning DataMigration Path Manager - -	Access Control ControlCommand Storage Power Conserver Storage Manager Express Storage Control Software - ThinProvisioning DataMigration - Storage Manager Integration Base
The purchase of the Storage Manager Suite adds the following software features	
Storage Manager Integration Base	
Free of charge options if Storage Manager Suite is purchased	Free of charge options
VASA Provider Replication Adapter VMware vCenter Plugin	VASA Provider Replication Adapter VMware vCenter Plugin
Storage Manager Suite further allows the purchase of the following options	Following options are available for purchase
PerformanceMonitor Suite - - - Analyzer for VMware vCenter Operations IO Load Manager PerforOptimizer PerforCache DynamicDataReplication RemoteDataReplication RemoteDataReplication Asynchronous ReplicationControl SQL Option ReplicationControl FileSystem Option VolumeProtect SecureEraser	PerformanceMonitor Suite Path Manager for Windows Path manager for Linux Virtual Cache Partitioning Analyzer for VMware vCenter Operations IO Load Manager PerforOptimizer PerforCache DynamicDataReplication RemoteDataReplication RemoteDataReplication Asynchronous ReplicationControl SQL Option ReplicationControl FileSystem Option VolumeProtect SecureEraser
Note	

The use of IO Load Manager, PerforOptimizer and Analyzer for VMware vCenter Operations requires Performance Monitor Suite.