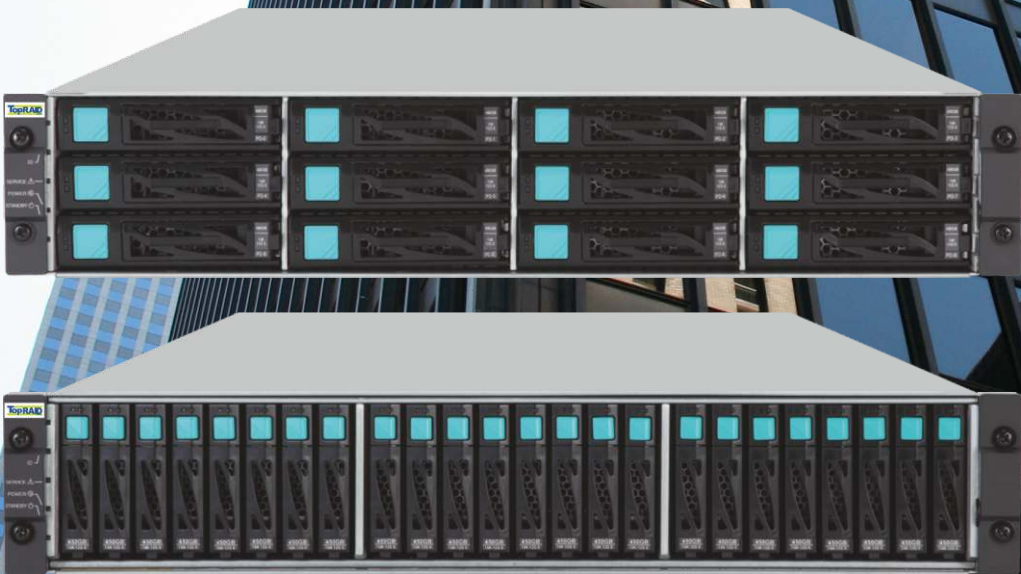


TopRAID M Series Storage Systems

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





TopRAID M Series Storage Systems

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

Key Features at a glance

High Performance & High Availability

- Super-Phoenix for cold restart and diagnosis for single HDDs
- Advanced dynamic pool, expanding the capacity and performance simply by adding HDD
- Firmware updates without downtime
- Supports Self-encrypting drives
- ANSI T10 DIF (512Byte data and 8Byte CRC)

Easy Installation & Operation

- Thin Provisioning, Snapshots, In-Box-Replication inclusive
- optional: Local- and Remote-Copy (via GUI/CLI), performance monitor, WORM
- VMware ESXi 5.5 U1/ 5.5 certified, vCenter plugin, VAAI-Support
- Microsoft System Center Virtual Machine Manager (SCVMM 2012 SP1) SMI-S Management Support
- FalconStor NSS V7 certified (TRM100, TRM300 and TRM500 with FC host)

IT Cost Optimization

- Bundled management software with TopRAID M100

Advanced Eco-friendly Function

- Management workload can be reduced with virtualized system operations
- Eco-friendly redundant 80+ PSU
- MAID function
- Low noise

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.

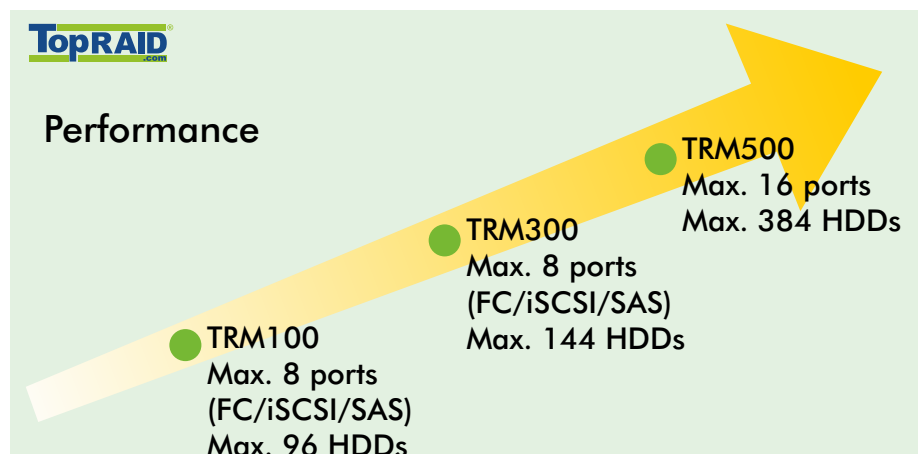
M Series offers a product lineup consisting of basic model TRM100 Disk Array and high performance models TRM300 Disk Array and TRM500 Disk Array Controller that achieves a scalable storage integration by utilizing advanced virtualization technologies such as data allocation optimization with a high-speed Solid State Drive (SSD) and Thin Provisioning, all developed to respond to the needs of the next generation.

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



TopRAID M100/M300/M500 Series is certified for VMware ESXi 5.5 U1 and FalconStor NSS V7* (* Fibre Channel host)



TopRAID M Series - Models

M100

M300



M100/M300
with iSCSI/FC host



M100/M300
with FC host



TopRAID M100/M300 Series with 24 x 3.5 LFF drive bays



TopRAID M100/M300 Series with 24 x 2.5 SFF drive bays

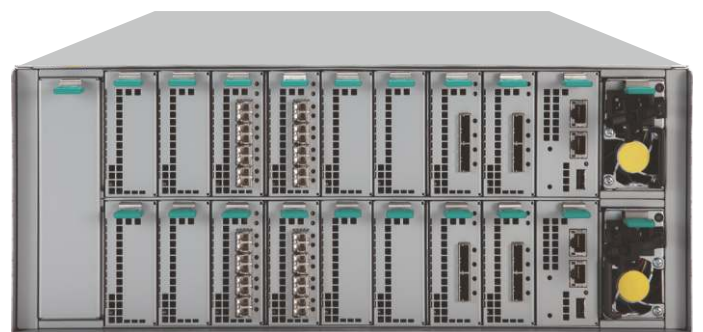


M500 with
iSCSI/FC host

M500



TopRAID M500 Series with 24 x 2.5 SFF JBOD



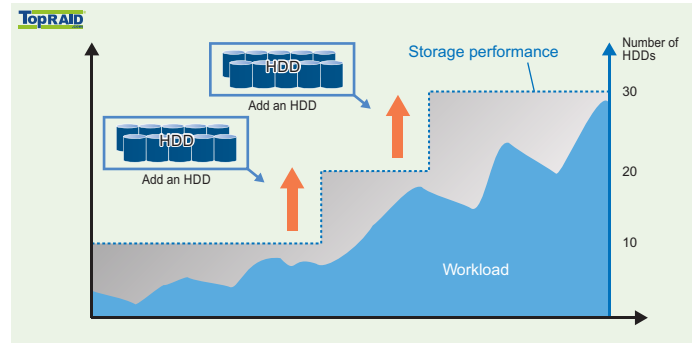
TopRAID M500 Series with 16x Fibre Channel ports

Innovate virtualization with TopRAID M Series

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.

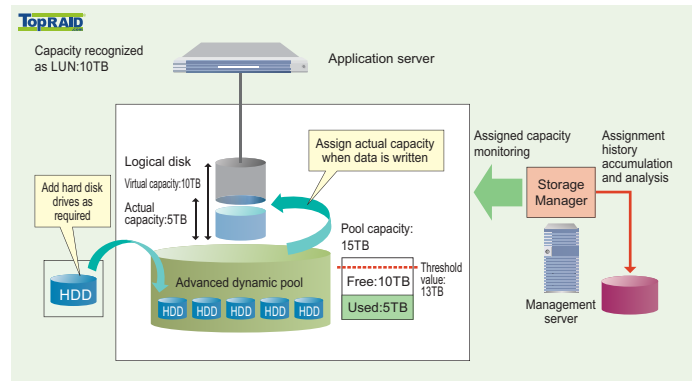
M100 M300 M500



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.

M100 M300 M500



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

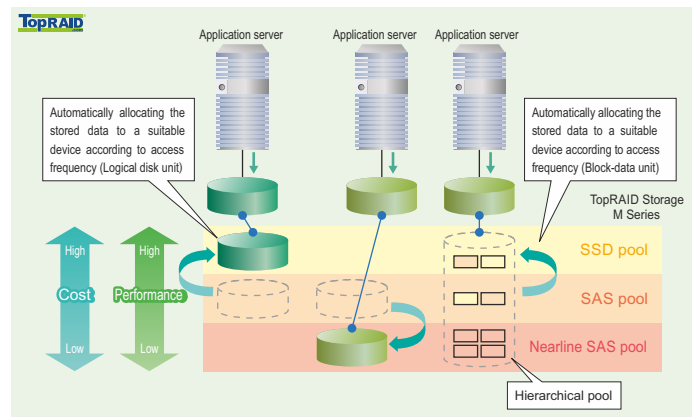
M Series supports VMware vStorage APIs for Array Integration (VAAI), a storage API provided by VMware, Inc. by incorporating this API, operations that were processed on a server in the past can be processed on the M Series product itself. These operations include the replication and migration of virtual 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.

M100 M300 M500

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.

M100 M300 M500



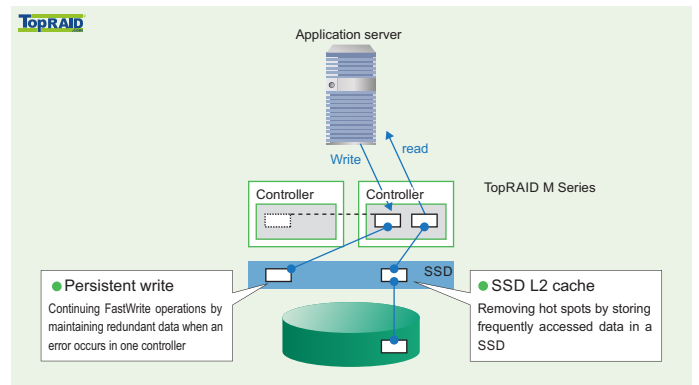
SSD L2 cache & persistent write, ensuring stable, high-speed performance

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.

M100

M300

M500



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.

M100

M300

M500

Innovate interoperability with TopRAID M Series

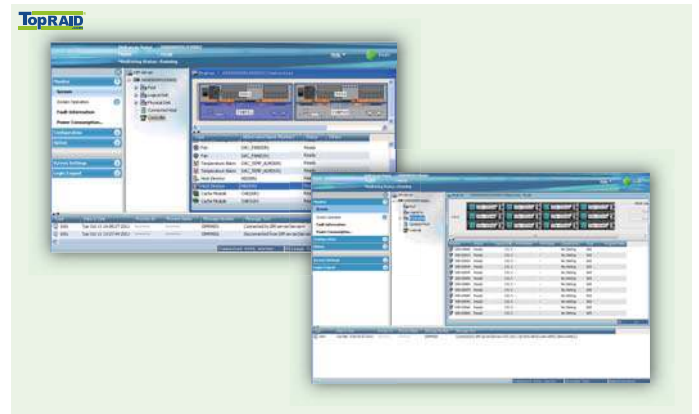
Intuitive GUI allows even first-time users to easily manage the storage unit

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.

M100

M300

M500



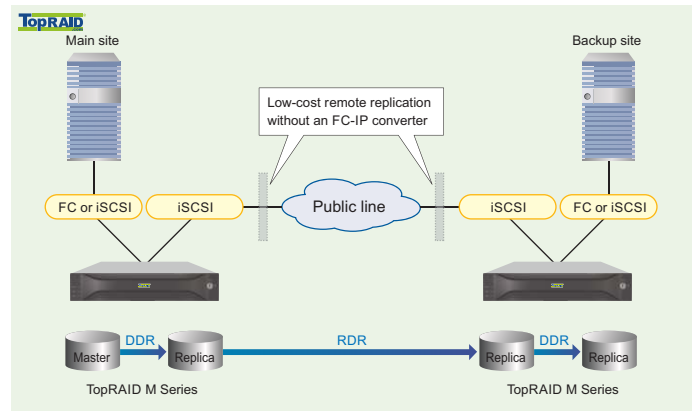
iSCSI RDR economically counters disaster through remote replication

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.

M100

M300

M500



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 PLATINUM (TRM500) 80PLUS GOLD (TRM100 and TRM300) 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.

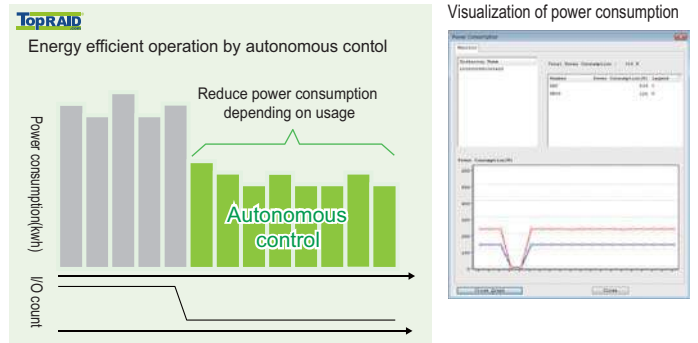


M100 M300 M500

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.

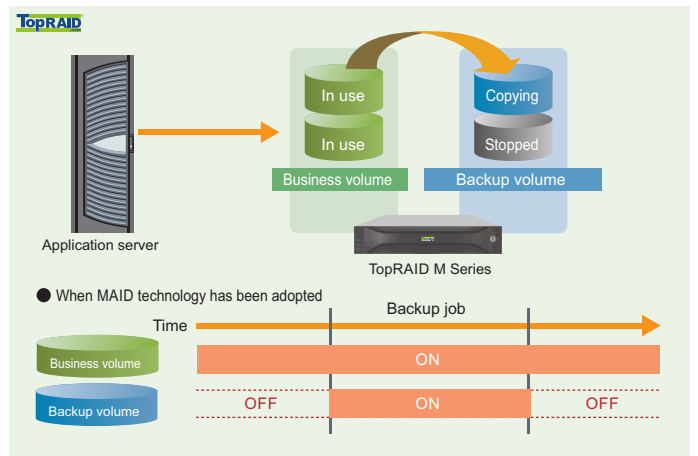
M100 M300 M500



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.

M100 M300 M500

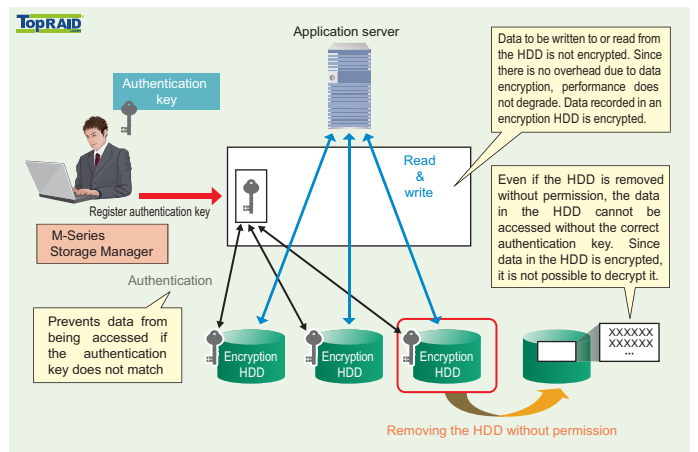


Innovate security with TopRAID M Series

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.

M100 M300 M500



TRM100 technical specifications

Models	TRM100-12	TRM100-24
Chassis Structure	Up to 7 (seven) 3.5 LFF/2.5 SFF Disk JBODs can be connected to the Disk Array under the condition that the total number of slots is 96 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 Gbit/s), iSCSI (10 Gbit/s), SAS (6 Gbit/s)	
Number of Host Port, dual Controller	8x Fibre Channel ; 8x SAS x4 ; 4x 10 GbE iSCSI	
Number of Host Port, single Controller	4x Fibre Channel ; 4x SAS x4 ; 2x 10 GbE iSCSI	
Cache Memory Capacity	4 GB per Controller	
Cache Memory Backup method	Save to flash memory	
RAID level	RAID 0, 1, 5, 6, 10, 50, 60, TM (Triple Memory)	
Drives Interface	SAS (6 Gbit/s)	
Drives Type/Capacity		
- SAS HDD	300/450/600 (15,000 rpm)	300/450/600/900 GB (10,000 rpm)
- Nearline SAS HDD	1/2/3/4 ^{(*)4} TB (7,200 rpm)	1 TB (7,200 rpm)
- SAS SSD	100/400 GB	100/400 GB
- Encryption SAS HDD	600 GB (15,000 rpm)	600 GB (10,000 rpm)
Max. Storage Capacity ^{(*)1}		
- SAS HDD	44.5 TB	90.6 TB
- Nearline SAS HDD	226.5 TB (about 300 TB with 4 TB HDDs ^{(*)4})	76.1 TB
- SAS SSD ^{(*)2}	6.7 TB	6.7 TB
- Encryption SAS HDD	44.5 TB	44.5 TB
Number of Drives ^{(*)2}	3-96	3-96
Support OS ^{(*)3}	Windows, Linux, VMware	
Chassis Dimensions (w x d x h)	482.0 x 545.2 x 87.8 mm (2U, with front bezel)	
Weight Disk Array	31 kg or less	
Weight Disk JBOD	29 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	485 W / 400 W	485 W / 395 W
- Disk Array with Nearline SAS HDD	420 W / 335 W	450 W / 365 W
- Disk JBOD with SAS HDD	315 W / 265 W	310 W / 260 W
- Disk JBOD with Nearline SAS HDD	250 W / 200 W	275 W / 225 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

*4 : Q2 2013



TopRAID M100/M300 Series with dual Fibre Channel Controller

TRM300 technical specifications

Models	TRM300-12	TRM300-24
Chassis Structure	Up to 7 (seven) 3.5 LFF/2.5 SFF JBODs can be connected to the Disk Array under the condition that the total number of slots is 96 (M300-12), 144 (M300-24) or less	
HDD slots in a chassis	12 x 3.5 LFF	24 x 2.5 SFF
RAID controller	Dual	
Host Interface	Fibre Channel (8 Gbit/s), iSCSI (1/10 Gbit/s), SAS (6 Gbit/s)	
Number of Host Port	8x Fibre Channel ; 8x SAS x4 ; 4x iSCSI ; Hybrid (4x FC + 4x iSCSI)	
Cache Memory Capacity	8 GB or 16 GB (4 GB or 8 GB per controller)	
Cache Memory Backup method	Save to flash memory	
RAID level	RAID 0, 1, 5, 6, 10, 50, 60, TM (Triple Memory)	
Drives Interface	SAS (6 Gbit/s)	
Drives Type/Capacity		
- SAS HDD	300/450/600 (15,000 rpm)	300/450/600/900 GB (10,000 rpm)
- Nearline SAS HDD	1/2/3/4 ^(*) TB (7,200 rpm)	1 TB (7,200 rpm)
- SAS SSD	100/400 GB	100/400 GB
- Encryption SAS HDD	600 GB (15,000 rpm)	600 GB (10,000 rpm)
Max. Storage Capacity ^(*)		
- SAS HDD	44.5 TB	135.9 TB
- Nearline SAS HDD	226.5 TB (about 300 TB with 4 TB HDDs ^(*))	114.2 TB
- SAS SSD	53.0 TB	79.5 TB
- Encryption SAS HDD	44.5 TB	66.7 TB
Number of Drives	3-96	3-144
Support OS ^(*)	Windows, Linux, VMware, HP-UX, Solaris	
Chassis Dimensions (w x d x h)	482.0 x 545.2 x 87.8 mm (2U, with front bezel)	
Weight Disk Array	31 kg or less	
Weight Disk JBOD	29 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	510 W / 420 W	505 W / 420 W
- Disk Array with Nearline SAS HDD	445 W / 360 W	470 W / 385 W
- Disk JBOD with SAS HDD	315 W / 265 W	310 W / 260 W
- Disk JBOD with Nearline SAS HDD	250 W / 200 W	275 W / 225 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 : Q2 2013



TopRAID M100/M300 Series with front bezel

TRM500 technical specifications

Models	TRM500 Supporting 3.5" Drive	TRM500 Supporting 2.5" Drive
Chassis Structure	Up to 32 3.5 LFF/2.5 SFF JBODs can be connected to the Disk Array Controller under the condition that the total number of slots is 384 or less	
HDD slots in a TRM500 chassis	0	
HDD slots in a JBOD	12 x 3.5 LFF	24 x 2.5 SFF
RAID controller	Dual	
Host Interface	Fibre Channel (8 Gbps), iSCSI (1 Gbps or 10 Gbps)	
Number of Host Port	8-16x Fibre Channel ; 4-8x iSCSI ; Hybrid (8x FC + 4x iSCSI)	
Cache Memory Capacity	12 GB, 24 GB or 48 GB (6 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 (Triple Memory)	
Drives Interface	SAS (6 Gbps)	
Drives Type/Capacity		
- SAS HDD	300/450/600 (15,000 rpm)	300/450/600/900 GB (10,000 rpm)
- Nearline SAS HDD	1/2/3/4 ^{(*)3} TB (7,200 rpm)	1 TB (7,200 rpm)
- SAS SSD	400 GB	100/400 GB
- Encryption SAS HDD	600 GB (15,000 rpm)	600 GB (10,000 rpm)
Max. Storage Capacity ^{(*)1}		
- SAS HDD	178 TB	355.9 TB
- Nearline SAS HDD	906.1 TB (about 1,200 TB with 4 TB HDDs ^{(*)3})	304.6 TB
- SAS SSD	212.1 TB	212.1 TB
- Encryption SAS HDD	178 TB	178 TB
Number of Drives	3-384	
Support OS ^{(*)2}	FC: Windows, Linux, VMware, HP-UX, Solaris iSCSI: Windows, Linux, VMware	
Chassis Dimensions (w x d x h)	480 x 602.5 x 175.4 mm (4U, without front bezel); 480 x 639 x 175.4 (4U, with front bezel)	
Weight Disk Array	48 kg or less	
Weight Disk JBOD	29 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 Controller	610 W	610 W
- Disk JBOD with SAS HDD	315 W	310 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 : Q2 2013



TopRAID M500 Series with JBOD

MAIN Software for TopRAID M Series Disk Arrays

Software Product Name	TRM100	TRM300	TRM500	Description
Device management				
Manager	yes	obligatory	obligatory	Basic functions to enable integrated storage operations management
Performance management				
PerformanceMonitor	yes	yes	yes	Functions to monitor storage performance in real-time and accumulate monitoring data
PerformanceNavigator	yes	yes	yes	Functions to streamline the analysis of storage performance data
PerformanceMonitor Suite	yes	yes	yes	Package product including both Performance Monitor and Performance Navigator
Replication management				
ReplicationNavigator Suite	yes	yes	yes	Functions to simplify the procedures for constructing a backup system of databases, file servers, and virtual machines.
Storage control				
BaseProduct		obligatory	obligatory	Basic functions to control storage
Manager Express	yes ²	yes ¹	yes ¹	Basic functions to enable storage operations management
ControlCommand	yes	yes	yes	CLI functions to perform operations such as replication and data protection on an application Server
Replication				
DynamicDataReplication	yes ¹⁺³	yes	yes	Functions to create a fully replicated volume in the same storage unit
RemoteDataReplication	yes ³	yes	yes	Functions to create a fully replicated volume in a remote storage unit
RemoteDataReplication Asynchronous	yes ³	yes	yes	Functions to asynchronously create a fully replicated volume in a remote store unit by using a low-speed line
DynamicSnapVolume	yes ¹⁺⁵	yes ⁵	yes ⁵	Functions to create a differential replicated volume
ReplicationControl SQL Option	yes	yes	yes	Option to enable non-disruptive backup of Microsoft SQL Server
ReplicationControl FileSystem Option	yes	yes	yes	Option to enable non-disruptive backup of file systems
Disaster recovery				
RemoteDataReplication/DisasterRecovery			yes	Functions to perform the remote replication essential for a disaster prevention and response system
Resource control				
VirtualCachePartitioning		yes	yes	Functions to divide storage resources and manage the divided storage resources as virtual storage
Thin Provisioning	yes ²	yes ¹	yes ¹	Functions to enhance the capacity usage efficiency by setting the virtual logical capacity and reducing the physical capacity to be allocated
PowerConServer	yes ²	yes ¹	yes ¹	Functions to reduce the power consumption of a storage unit by controlling the running and stopping of a HDD
PerforOptimizer	yes	yes	yes	Functions to optimize performance by distributing the volume load and changing physical volume allocations without stopping jobs
PerforCache	yes	yes	yes	Functions to use a SSD as cache memory
VolumeProtect	yes	yes	yes	Functions to protect data from tampering and guarantee data integrity for each volume
High availability				
PathManager	yes	yes	yes	Functions to automatically switch paths and distribute the I/O loads

1: Bundled with BaseProduct

2: Bundled with TRM100

3: Not supported by a single controller model

4: DynamicDataReplication Express is bundled for TRM100

5: Bundled with DynamicDataReplication



TopRAID is a registered trademark. All other brands and product names appearing in this document are trademarks or registered trademarks of their respective holders.

The information contained in this document is subject to change without notice. V-2015-09-29-BM