

# Rugged FlashDisk® RAID

## Ruggedized RAID Disk Array For Military Environments



*Ruggedized unit holds up to 12 drives secured with unique lockdown thumbscrews to meet military standard shock and vibration requirements.*

### Ruggedized FlashDisk Advantages

#### Ruggedization

- Meets MIL-STD-810E & MIL-STD-461D
- Lock-down drive carrier thumbscrews
- Sturdy, lightweight aluminum chassis
- Redundant 215 cfm 6" cooling fans
- Dual disk drive heating elements
- EMI dust filters & shielding gaskets
- MIL-SPEC AC connector

#### High Performance

- Up to 32,000 disk I/Os per second
- Up to 460 MB/sec sustained throughput
- Up to 128 MB cache
- Up to 2 host channels

#### High Capacity

- SATA disks to 2 TB each
- SAS disks to 1 TB each
- Fibre Channel disks to 600 GB each
- Up to 12 disks per enclosure
- On-line automatic capacity expansion

#### High Reliability

- Hot-swap disk drives
- RAID 0, 1, 3, 5, 1+0, 15 protection
- Hot-spare on-line drive rebuild
- Remote diagnostic capability
- Individual drive key locks and IDs
- Fail alarm -- visual/audible/remote
- Up to 1.6 million hour MTBF drives

#### Compatibility

- U320 SCSI, SAS or Fibre Channel
- No software drivers required
- 100% compatible with SUN, HP, IBM, SGI, Intel, Compaq, Mac . . .
- Any O/S: UNIX, Windows NT, HP/UX, Linux, AIX, Solaris . . .
- SNMP, 10BaseT, TELNET option

FlashDisk has it all – sturdy construction, ultra-high speed, superb reliability yet is available at “COTS” (Commercial Off The Shelf) prices. This rugged FlashDisk RAID array is designed to meet the requirements of the most severe and harshest environments. FlashDisk is built to go the distance, whether your need is for tracked or wheeled mobility on the ground, or transportable applications shipboard or airborne.

#### Ruggedization

FlashDisk has been put to the test passing MIL-STD-810-E for environmental compliance and MIL-STD-461-D for Electromagnetic Interference (EMI). The solid seam welded sturdy aluminum construction throughout is designed to withstand any vigorous handling. The hinged front panel is part of a 1" solid aluminum frame for added strength and drive protection and is secured with only four thumbscrews. The drop-down design provides easy access to the “hot-swap” drive carriers minimizing maintenance and repair time.

Lock-down thumbscrews and individual drive keylocks secure each drive to the chassis to minimize vibration avoiding potential read/write errors. With this sturdy protection, FlashDisk has been approved by the U.S. Army for use in the Humvee land vehicles for strategic terrain mapping systems.

#### Environmental

Dual disk drive heating elements with individual temperature controls insure fail-safe operation during low temperature environments. Dual redundant 6" variable speed cooling fans are included with automatic shut-off at low temperature, and individual thermal control circuitry to eliminate any disaster as a result of extreme varied temperatures. FlashDisk has identical and easily replaceable dust filters

the front and rear panels of the unit to minimize downtime for routine maintenance. FlashDisk also has 45 degree louvers on both front and rear panels to achieve drip-proof protection of your valuable data from any harsh environmental conditions.

#### Electromagnetic Interference (EMI)

EMI gaskets of conductive elastomer are permanently adhered in the grooved top cover, and front and rear vent covers, for maintaining EMI immunity requirements and data integrity. Front and rear air vents are protected by honeycomb filters to maximize airflow and EMI protection. AC power line filters & a Mil-Spec AC connector are used to insure EMI compliance.

The Ruggedized FlashDisk RAID array has also undergone HEMP testing and has been approved by Aberdeen Proving Ground meeting MIL-STD-2169B.

#### RAID Data Protection

FlashDisk rackmounts are typically configured as RAID 5 arrays or as RAID 1+0 arrays (striped mirror sets). With an optional “hot-spare” drive, FlashDisk automatically rebuilds data on the “hot-spare” if a drive ever fails or when the controller *anticipates* a drive failure.



*Sturdy lock-down drive carriers minimize vibration protecting your valuable data. Drop-down door provides easy access to drives.*

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# Rugged FlashDisk® RAID

## Overall Performance

Max. sustained I/O rate 32,000 read/write operations per second  
Host ports Up to 2 U320 SCSI, SAS or Fibre Channel

## Rackmount Models

Max. drives/Max. capacity 12 drives; 24 TB  
Removable drive trays Hot-swap all-metal carriers, key lock, drive ID  
Power Supply 1,000 W, UL & MIL-STD compliant  
Fans Dual redundant 6" variable speed @ 215 cfm  
Non-volatile cache Redundant Ni-CAD batteries - min. 80 hours

## Disk Drives

Disk form factor and interface Low profile Ultra 320 SCSI, SAS or Fibre Channel  
Capacity per drive SATA to 2 TB/SAS to 1 TB/Fibre Channel to 600 GB  
Rotational speed 7,200, 10,000, 15,000 rpm  
Access time 3.7 to 7.5 msec.  
Disk MTBF 1,200,000 to 1,600,000 hours

## Controller:

RAID levels supported 1, 3, 5, 1+0, 15  
On-line capacity expansion Automatically adds new drives to existing array  
Cache algorithms Intelligent multi-threaded, write-back and write-through caching algorithms with dynamic read lookahead for multi-user/multi-tasking servers

Cache memory capacity Up to 128 MB  
Max. logical units 8; flexible binding/partitioning of physical disks  
Number channels 6 total, up to 2 for host connections  
Disk channels Ultra 320 SCSI, SAS or Fibre Channel  
Host channels Ultra 320 SCSI, SAS or Fibre Channel  
Max. external cable length 80 ft.; 10 kilometers with optical Fibre Channel  
LCD front panel 2x16 character display, push button controls  
Operating consoles LCD front panel, local terminal  
Operating console functions View and edit logical RAID/physical drives, setup hot-spare drives, enable write-back cache, rebuild failed drive  
Performance monitoring Display cache and disk read/write statistics  
Controller firmware FlashEPROM -- loaded from RS-232 port

## Compatibility

Operating systems supported WinNT/2K, NetWare, Solaris, Solaris x86, FreeBSD,  
**(No software drivers required)** HP-UX, AIX, Linux, Tru64 UNIX, SCO, IRIX, AT&T  
Unix, MacOS, OpenVMS...  
Platforms supported SUN UltraSPARC, HP 9000, IBM RS/6000, Intel,  
Mac, SGI, Alpha, VAX, NCR, Unisys...  
Cluster Options WinNT/2K, Solaris, HP/UX, Linux  
Remote monitoring port RS-232  
Communication options SNMP, 10BaseT, TELNET, TCP/IP  
SCSI compliance ANSI standard SCSI-1, SCSI-2, SCSI-3

## General

AC power 90 - 260 VAC, auto-ranging, 10 amps peak  
Rackmount dimensions 7" (4U) H x 19" W x 23" D, aluminum enclosure  
Rackmount weight 75 lbs. to 80 lbs. loaded  
Standard Warranty One year, next day on-site and "800-Hotline" in U.S.  
Installation and service On-site installation & 24x7 service available in U.S.

## Environmental Specifications MIL-STD-810E

### Vibration

Transport in wheeled & tracked vehicles

### Altitude

Operating: 15,000 ft  
Non-Operating: 40,000 ft

### Temperature

Operating: 0° F to 120° F  
Non-Operating: -25° F to 150° F

### Temperature Shock

0° F to 70° F and 120° F to 70° F  
in 10 minutes

### Rain Test

Operates in conditions of blown precipitation and spillage

### Humidity

10% to 95% (mist & fog)

### Inclination

30° on any axis

### Bench Handling

30° rotation drop from each bottom edge

## Electromagnetic Interference MIL-STD-461-D

CE102, CS101, CS114, RE102 & RE103

## HEMP MIL-STD-2169B

Tested by Aberdeen Proving Ground



Rear view of recessed I/O panel with protective rain flap.

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