MD4 Super-S Combo

4-Bay Rack Mount Chassis (3.5" SATA HDD)

User Manual

December 3, 2008 - v1.0

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1 Introduction

1.1 System Requirements

1.1.1 PC Requirements

- Minimum Intel Pentium III CPU 500MHz, 128MB RAM
- eSATA equipped PC; Windows XP/Vista
- FireWire equipped PC; Windows 2000/XP/Vista
- USB 2.0 (USB 1.1) equipped PC; Windows 2000/XP/Vista

1.1.2 Mac Requirements

- Minimum Apple G4 processor, 128MB RAM
- eSATA equipped Mac; Mac OS 10.3 or above
- FireWire equipped Mac; Mac OS 10.2 or above
- USB 2.0 (USB 1.1) equipped Mac; Mac OS 10.2 or above

1.1.3 Supported Hard Drives

- Up to four 3.5" SATA-I or SATA-II hard drives (1.5Gb/s or 3.0Gb/s)
- 20GB - 1.5TB per HDD
- Hard drives of identical capacities are recommended

1.2 Package Contents

Package content may vary depending on vendor & version.

- MD4 Super-S Combo (no hard drives included)
- Power cord
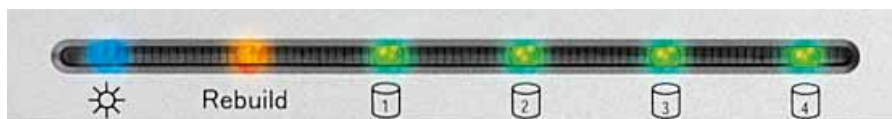- Interface cables
- Manual

1.3 About this Manual

Firmware, images and descriptions may slightly vary between this manual and the actual product you have. Functions and features may change depending on the firmware version. Please read your warranty carefully, as this may vary between different vendors!

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1.4 Detailed View

1.4.1 LED Indication

LED	Status
Power	• OFF = Power off • Blue = Power on
Rebuild	• Blinking orange = Rebuilding RAID array • Steady orange = One or more faulty drive(s)
HDD	• Blinking green = Data access (read/write) • Blinking red = System starting up • Steady red = Error or HDD is not installed

When only 2 or 3 hard drives are installed, the red LED indication for the missing hard drives can be safely ignored.

1.4.2 RAID Selector Switch

Switch Position	Function
0	Not in use (software setting)
1 (SPAN)	Spanning with 2 hard drives
2 (SPAN)	Spanning with 4 hard drives
3 (RAID 0)	RAID 0 Striping with 2 hard drives
4 (RAID 0)	RAID 0 Striping with 4 hard drives
5 (RAID 1)	RAID 1 Mirroring with 2 hard drives
6 (RAID 10)	Mirroring + Striping with 4 hard drives
7 (RAID 5)	RAID 5 with 3 hard drives
8 (RAID 5)	RAID 5 with 4 hard drives
9 (RAID 5)	RAID 5 with 3 hard drives + 1 spare

Changing the RAID mode will require you to re-format the drives. Make sure to backup all data before doing so!

Note: Hard drives of identical capacities are recommended.

1.4.3   Smart Fan

The smart fan automatically regulates the fan speed according to the internal temperature. It will start using low speed from 45 degrees, increase the speed every 5 degrees until 60 degrees and then use full speed above 61 degrees Celsius.

1.4.4   Buzzer

When the jumper on pin J10 is removed, the buzzer will sound an alarm when the fan fails.

1.5 RAID Modes

The difference in performance is only visible for fast interfaces like eSATA. Depending on the RAID mode, only a certain amount of drives can be used (see RAID selector switch).

1.5.1   Disk Spanning

The drives show up as one large single volume but the total size will depend on the drive with the smallest capacity. Spanning is an array (not RAID) that is written sequentially across the drives. By itself, it does not provide any performance or redundancy benefits.

1.5.2   Disk Striping (RAID 0)

The drives show up as one large single volume but the total size will depend on the drive with the smallest capacity. Used where speed is the primary objective but RAID Level 0 (also called striping) is not redundant. This form of array splits each piece of data across the drives in segments; since data is written without any form of parity data-checking, it allows for the fastest data transfer of all other modes. However, if one drive becomes damaged, the whole array can become corrupted.

1.5.3   Disk Mirroring (RAID 1)

The drives show up as one volume but only 50% of the total capacity, depending on the drive with the smallest capacity, can be used. RAID 1 creates an exact copy (or mirror) of a set of data on the second drive. This is useful when reliability and backup are more important than data capacity. When one hard drive fails, it can be replaced and the data rebuilt automatically.
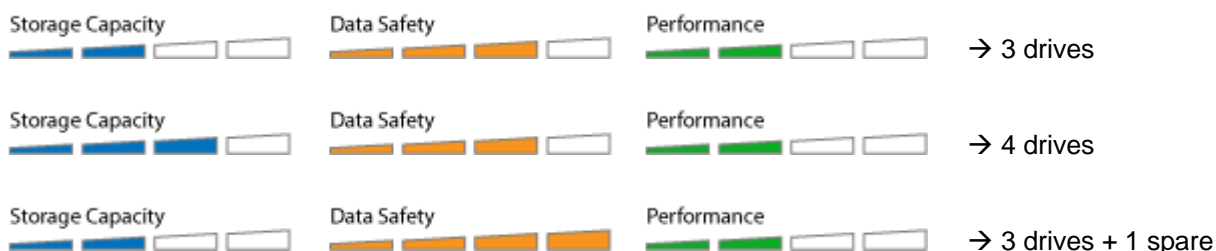
1.5.4 Disk Mirroring with Striping (RAID 10)

The drives show up as one volume but only 50% of the total capacity, depending on the drive with the smallest capacity, can be used. RAID 1 creates an exact copy (or mirror) of a set of data. This is useful when reliability and backup are more important than data capacity. When one hard drive fails, it can be replaced and the data rebuilt automatically.

1.5.5 Disk Striping with parity (RAID 5)

The drives show up as one volume but the total capacity, depending on the drive with the smallest capacity, is the combined size minus the size of one drive. RAID 5 uses block-level striping with parity data distributed across all member disks and therefore provides the perfect balance between high performance and data integrity. When one hard drive fails, it can be replaced and the data rebuilt automatically.

→ 3 drives

→ 4 drives

→ 3 drives + 1 spare

Spare Drive

When 3 hard drives plus 1 spare drive are used, the total capacity will only be as large as two drives. When one drive fails, the data will be rebuilt immediately by using the spare drive, rather than waiting for someone to replace the faulty one.

Note:
Hard drives of identical capacities are recommended. If the capacity is different, the total amount of the space that can be used will depend on the drive with the smallest capacity.

1.5.6 Changing the RAID Mode

Changing the RAID setup will require you to re-format the drives. Make sure you backup all data before doing so!
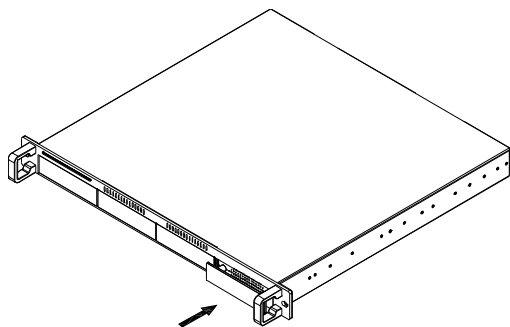
1. Turn off the power and then change the RAID selector switch to the new position.

2. Turn on the power, remove the old partition, create a new one and format the drives.
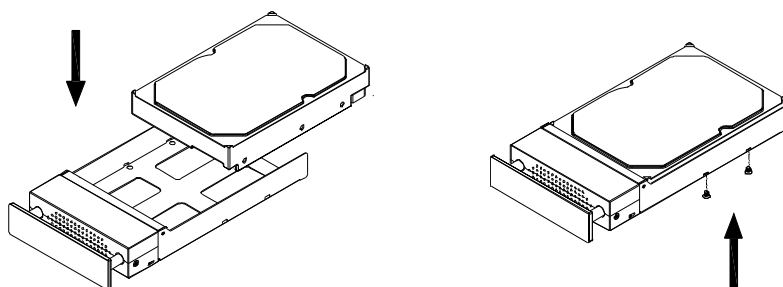
2 System Setup

2.1 Hard Drive Assembly

The drives can be installed at any position, there is no specific order required.

1. Push the front panel of the drive cassette and release it. Grab the cassette and pull it out of the rack-mount chassis.

2. Install the hard drive as illustrated below with the SATA connector facing away from the front. Mount the drive with the four screws from the bottom.

3. Slide the cassette back into the rack-mount chassis and push it lightly into place.

4. Repeat the previous steps for each hard drive cassette you are planning to install.

5. Set the RAID selector switch according to your requirements. Turn on the power, connect the drive to your computer, create a new partition and format the drives.

Note: Be careful not to damage any components, and do not force the drives into place. If they don't slide in properly, make sure the drives have been installed in the correct position and that there is nothing out of place.

Important:
It is not possible to add more drives to an existing RAID array without re-formatting it. To add additional drives at a later point, turn off the power, install the drive(s), change the RAID selector switch to the new position, turn the power back on and then erase the old partition and format the drives again.

2.2 Replacing Hard Drives

When one of the drives fails, the Rebuild LED will light up orange and the corresponding HDD LED will light up red. If only one drive is defective and the RAID mode is set to RAID 1, RAID 5 or RAID 10, the data can still be accessed but we strongly recommend replacing the faulty drive immediately to assure continued backup and data safety.

If more than one drive at the same time fails or if the RAID mode is set to RAID 0 or Spanning, the data will be lost and the system can not be accessed again until the drive(s) have been replaced.

1. Check the HDD LED and replace the faulty drive. The red LED indicates the defective HDD. The power does not have to be turned off when replacing the drive(s).

2. A few seconds after installing the new drive(s) the corresponding LED will turn green.

3. For RAID 1, RAID 5 and RAID 10, the RAID array will be rebuilt automatically. During this process, the Rebuild LED will blink orange. Rebuilding the RAID array will take several hours, depending on drive capacity.

4. For RAID 0 and Spanning, erase the old partition, create a new one and then format the drives again.

Note: We recommend not turning off the power during the rebuild process but if it is interrupted, it will continue rebuilding the data as soon as the power is turned back on.

2.3 Connection to Computer

A few precautions and notes when using your external storage drive:

- Check the cables for visible damage before turning it on
- Do not expose the product to water or humid conditions
- Do not cover the enclosure's ventilation holes
- Only one interface can be used at any given time.
- When more than one cable is connected, the eSATA connection has priority. To use a different interface, disconnect the other cables first, before connecting the new one.
- Before connecting the device, install the hard drives and set your preferred RAID mode.
- For the safe removal of your drive and to assure that no data is lost, always follow the correct unplug procedure for external hardware (e.g.: Eject the drive before removal).
- For volumes larger than 2TB, your Operating System also needs to support it in order to access the drive (e.g. 64-bit System).

3 Appendix

3.1 FAQ

Q: What file system should I choose to format my drive?
A: This will depend on how you want to use the drive but in general, we recommend:

- Windows 2000/XP/Vista → NTFS
- Mac OS X → HFS+ (Mac OS Extended)
- To use it on both PC and Mac → FAT32 (single files size is limited to 4GB)

Q: How many drives can fail before I loose my data?
A: This depends on the RAID mode. For RAID 0 and Spanning, any drive failure will result in the data being lost. For RAID 1, RAID 5 and RAID 10, more than one drive failure at the same time will mean the data can not be recovered anymore.

Q: Will the hard drives spin down when my computer goes into stand-by mode?
A: No, to provide immediate access to your data, the drives will always keep spinning as long as the power is turned on.

Q: Why does the LED indication for some of the drives light up red?
A: If one of the HDD LEDs lights up red and at the same time the Rebuild LED lights up orange, the drive is defective. If less than 4 drives are installed and the Rebuild LED does not light up at the same time, it simply indicates that there is no drive in that bay.

3.2 About Data Backup

To protect your files and help prevent the loss of your data, we strongly recommend that you keep two copies of your data, one copy on your MD4 and a second copy either on your internal drive or another storage media such as CD, DVD, Tape or an additional external drive. Any loss or corruption of data while using the MD4 is the sole responsibility of the user, and under no circumstances will the manufacturer be held liable for compensation or the recovery of this data.