FUSION™ R400S RAID

1U Rackmount 4-Drive Hardware RAID 5 SATA Storage System with eSATA Interface

User's Guide

SERIAL ATA 3 Gb/s

Mac For Windows

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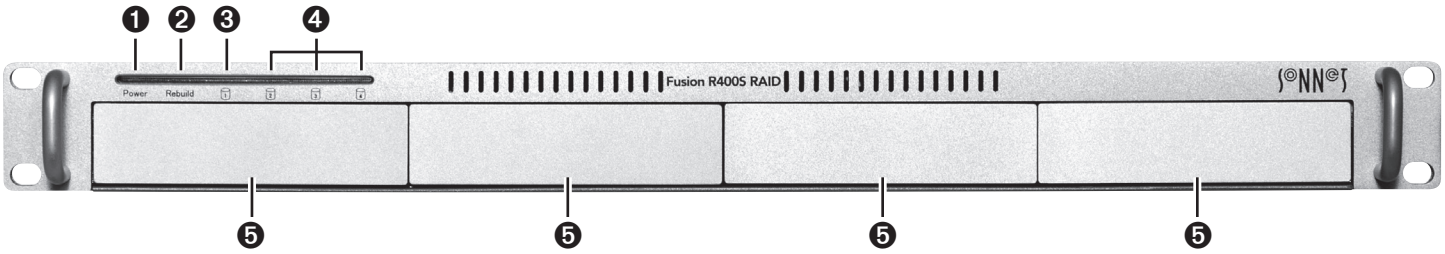
Fusion R400S RAID Features



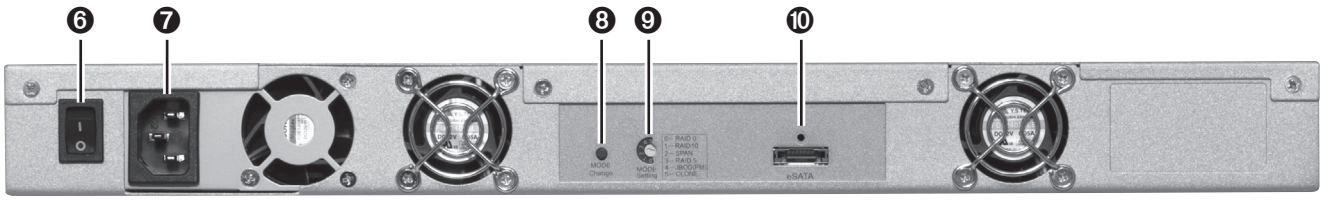
1 – Power Indicator LED
This blue LED lights when the Fusion R400S RAID is powered

2 – Rebuild Indicator LED
This orange LED lights when the Fusion R400S RAID is rebuilding the data on a RAID 5 or 10 RAID set, or cloning one drive to another drive when the system is set to Clone mode

3 – Mode Change Confirmation; Drive 1 Presence, Activity, and Fault Indicator LED
This LED lights red when the Drive Mode Change Switch is pressed for more than three seconds. It also indicates Drive 1's ready state (solid green), read and write activity (flashes green), and fault status (OFF). Note that the LED will remain off if the drive in drive bay 1 is not recognized

4 – Presence, Activity, and Fault Indicator LEDs for Drives 2 – 4
These LEDs indicate the ready state (solid green), read and write activity (flashes green), and fault status (OFF) for drives 2 – 4. Note that an LED will remain off if the corresponding drive is not recognized

5 – Drive Modules
To remove a drive module, press its handle in until it pops out, then pull out the entire module. To insert a drive module, insert it into the drive bay until it stops, and then push its handle in until it latches closed



6 – Power Button

7 – Power Cord Socket

8 – Drive Mode Change Switch
Press and hold this switch for three or more seconds to activate the selected drive mode

WARNING: Once you press and hold the Mode Change Switch for more than three seconds while the R400S RAID is powered, any files stored on the system are lost and cannot be recovered!

9 – Drive Mode Setting Switch
Select the drive mode setting using this switch

10 – Locking eSATA Interface Port
This port is compatible with the included Sonnet locking eSATA data cable and standard eSATA data cables as well

Drive Installation and Enclosure Setup

1. Remove the Fusion R400S RAID from its packaging, and place it on a flat, level surface.

2. If you intend to use the Fusion enclosure in a rack, install the Sonnet rack slide set (or equivalent), sold separately:

   - **FUS-RSS-P** for 17–21.5" deep racks
   - **FUS-RSS-S** for 23–26.5" deep racks
   - **FUS-RSS** for 27–30.5" deep racks
   - **FUS-RSS-L** for 29–32.5" deep racks

Support Note: It is possible that the drive modules may have shifted during shipping. To ensure good connections between the drives and their connectors, remove and reinstall each drive module before powering on the enclosure.

3. Push in the drive module's handle until it pops out **(Figure 1)**. Pull the handle toward you to slide out and remove the drive module.

4. Carefully slide the drive module back into the enclosure until it stops, and then push the handle in until it clicks to secure the drive module inside the enclosure **(Figure 2)**.

5. Repeat steps 3 and 4 for the remaining drives.

6. Install the Fusion R400S RAID into the rack or set it on the surface which it will reside.

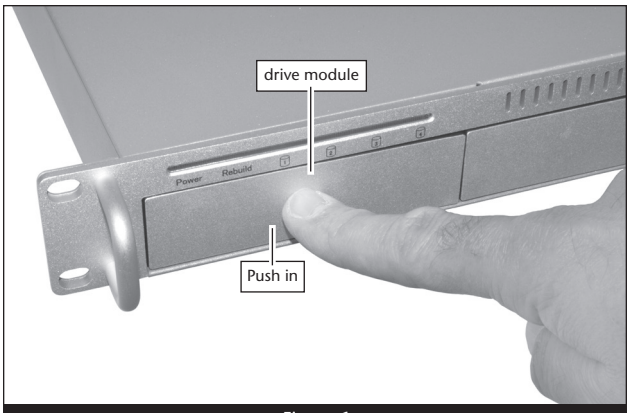


Figure 1

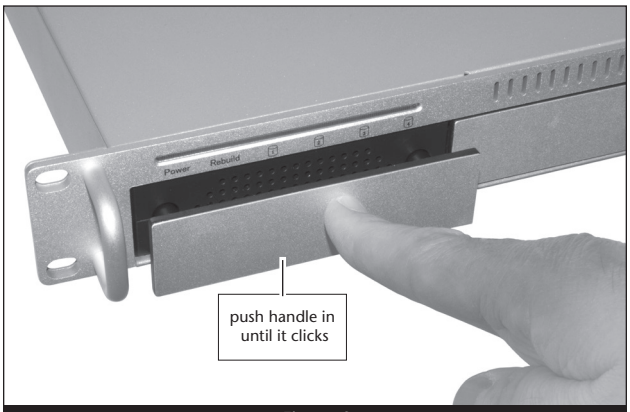


Figure 2

Connect Fusion R400S RAID to Computer and Power Outlet

1. Using the supplied locking eSATA cable, connect the Fusion R400S RAID to your computer.

Support Note: The supplied Sonnet locking eSATA cable is compatible with all eSATA ports and provides a far more secure connection when used with Sonnet drive enclosures and host controller cards with the matching port. If necessary, you may remove the locking mechanism from the connector by removing the screws securing the two halves.

2. Connect the supplied power cable between the Fusion R400S RAID and a grounded wall outlet or power strip; **verify the cable is plugged in securely**.

Drive Mode Selection Instructions

General Information

The drives included with Fusion R400S RAID are configured as a RAID 5 group and Mac OS Extended-formatted. The following information may help you to decide whether you need to reformat the drives:

- OS X® users wishing to use the Fusion R400S RAID as configured may start using the product immediately; the drives will appear on the desktop as a single volume.
- OS X users wishing to use the R400S RAID in another mode (RAID 0, RAID 10, etc.) must change the mode following the directions below, and then format the drives as described on the next page.
- Windows® and Linux® users must select the mode following the directions below, and then format the drives as described on the next two pages.

Support Notes: For more information on the drive configuration modes you may choose from on the R400S RAID, skip to page 7.

If you wish to configure the drives in JBOD mode, your eSATA controller MUST support port multiplier functionality, otherwise, only one drive will appear to the system.

Select Drive Mode

WARNING: Reconfiguring the drives in your Fusion R400S RAID enclosure requires you to reformat them. **Reformatting the drives will erase any data on them!** If there is any data on them, back it up before configuring the drives.

1. Power up the Fusion R400S RAID enclosure.
2. If the R400S RAID is connected to a Windows or Linux computer, skip to the next step. If the R400S RAID is connected to a Mac®, wait until the drive mounts to the desktop, and then eject it (select the drive, and then press command+E, or drag the icon to the eject icon in the dock).
3. Using a small screwdriver, turn the MODE Setting switch on the back of the enclosure to the position that matches the mode you wish to use **(Figure 3)**.
4. Press and hold the MODE Change switch for more than three seconds **(Figure 3)**; the Drive 1 LED will light red, while the LEDs for Drives 2 – 4 will light green until you release the button **(Figure 4)**. Once you release the button, all four drive LEDs will flash green as the mode change takes place.
5. Turn on your computer (or restart it if it was already on); you may now format the drives using your computer's operating system drive formatting application; go to the next page.

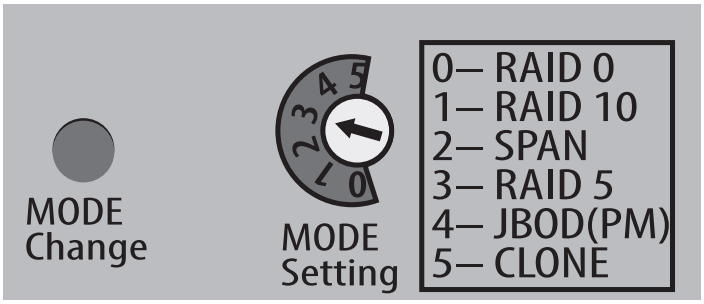


Figure 3

LED Operation — Drive Mode Selection

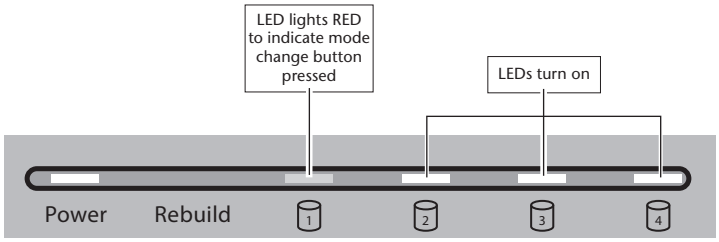


Figure 4

OS Formatting Instructions

OS X Users' Instructions

1. After changing the disk mode and turning on or restarting your computer, a *Disk Insertion* window will appear stating that there is an unreadable volume; click Initialize, and then Disk Utility will open.

2. In the *Disk Utility* window, the RAID group will appear as a single volume (or four volumes if the drive mode was set to JBOD). Select the volume, and then click the Erase tab at the top of the window.

3. Type in a name for the volume, and then click Erase; a window will appear asking you to approve your choice.

4. Click Erase; the Fusion R400S RAID volume will appear on your computer's desktop.

5. If the drives were configured in any mode other than JBOD, skip to the next step. If the drives were configured in JBOD mode, repeat steps 2 – 4 for the remaining three drives.

5. Close Disk Utility; the Fusion R400S RAID is ready for use.

Windows 8/7/Vista/Server 2008 Users' Instructions

1. Click Start, then right-click Computer, and then click Manage.

2. In the *Computer Management* window, click Storage in the left pane to expand the list (if necessary), and then click Disk Management.

3. If you are using Windows Vista, an *Initialize Disk* window will appear; skip to step 4. If you are using Windows 8, 7, or Server 2008, when the disks are displayed, the R400S RAID's drives will appear as a single volume when configured in any mode other than JBOD (or as four drives if configured as JBOD), and listed as "unallocated". Right-click where the words "Not Initialized" appear and select Initialize Disk.

4. In the *Initialize Disk* window, select GPT, and then Click OK.

5. Back in the *Computer Management* window, right-click where the word "Unallocated" appears, and then select New Simple Volume.

6. When the *New Simple Volume Wizard* window appears, click Next.

7. When the *Specify Volume Size* window appears, click Next if you want all of the R400S RAID's capacity to remain as one block (volume). Otherwise, adjust the volume size to meet your needs, and then click Next.

8. When the *Assign Drive Letter or Path* window appears, select Assign the following drive letter, choose a letter, and then click Next.

9. When the *Format Partition* window appears, enter a new name for the volume, select "Perform a quick format", and then click Next.

Note: *If you do not select the quick format option, this process will take much longer to complete.*

10. If the drives were configured in any mode other than JBOD, when the next window appears, click Finish; once "Healthy (Primary Partition)" appears, the R400S RAID is ready for use. If the drives were configured in JBOD mode, repeat steps 4 – 10 with the remaining three drives.

Windows XP/Server 2003 Users' Instructions

Support Note for Windows XP Users: Windows XP 32-bit does not support volumes greater than 2TB. Windows XP x64, Windows Vista Ultimate/Enterprise (32- bit and 64-bit editions), and Windows Server 2003 support volumes greater than 2TB, but must be formatted using the GPT file system, which is not accessible by Windows XP 32-bit systems.

1. Select Computer Management From the Windows Start menu. If it is not available in the Start Menu, select Start > Settings > Control Panel > Administrative Tools. In the *Administrative Tools* window, double-click Computer Management.

2. In the *Computer Management* window, click Storage on the left, and then double-click Disk Management.

3. When the *Initialize and Convert* window appears, click OK.

4. When the *Select Disks to Initialize* window appears, select the RAID volume or individual drive, and then click Next.

5. When the next window appears, click Finish.

6. In the *Disk Management* window, the Fusion R400S RAID's RAID group will appear (listed as "unallocated") as a single volume, or as four volumes if the drives were configured in JBOD mode. Right-click where the word "unallocated" appears, and then select New Partition.

7. When the Welcome to the *New Partition Wizard* window appears, click Next.

8. When the *Select Partition Type* window appears, select Primary Partition, and then click Next.

9. When the *Specify Partition Size* window appears, click next.

10. When the *Assign Drive Letter or Path* window appears, select Assign the following drive letter, choose a letter, and then click Next.

Drive Mode Selection and OS Formatting

11. When the Format Partition window appears, enter a new name for the volume table if you'd like. Select Perform a quick format, and then click Next.

12. When the next window appears, click Finish.

Note: *If you do not select the quick format option, this process will take much longer to complete.*

13. If the drives were configured in any mode other than JBOD, once the RAID group has been formatted and finishes building, it is ready to use. If the drives were configured in JBOD mode, repeat steps 4 – 12 with the remaining three drives.

Linux Users's Information

For Linux drive formatting information, please contact your Linux/Unix vendor.

Status LED Indications

System Powered, No Data Reads or Writes

When the Fusion R400S RAID is powered on, and no data is being written or read, the Power and Drive LEDs turn on **(Figure 5)**.

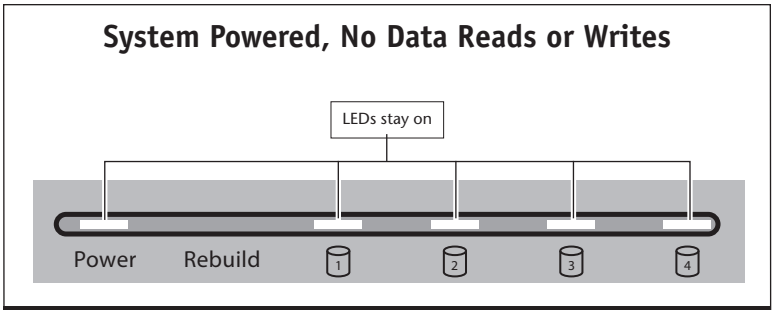


Figure 5

Drive Activity

When data is being read from or written to a drive, its corresponding LED will flash during read and write activity **(Figure 6)**.

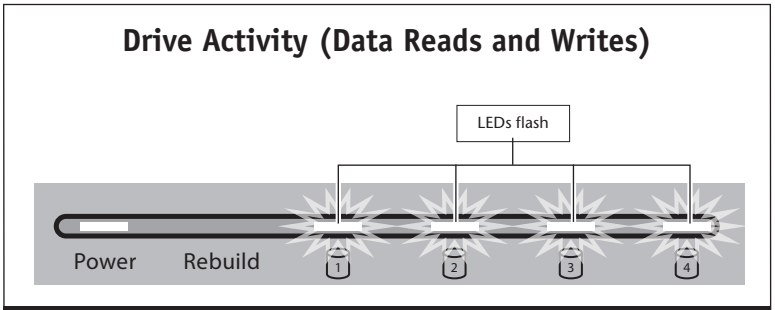


Figure 6

Drive Not Recognized

When one or more drive LEDs is off while the others remain lit, the corresponding drive(s) is not recognized **(Figure 7)**. There are a few possible causes for a drive to not be recognized, including: the corresponding drive module is not plugged securely into the enclosure or the drive itself has failed. There is a small chance that the enclosure is defective.

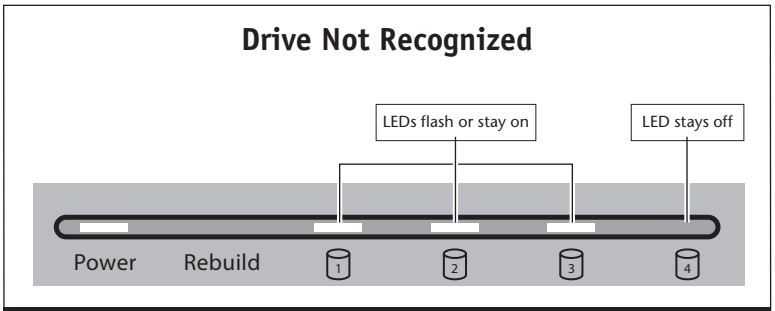


Figure 7

Clone, RAID 5, or RAID 10 Rebuild

After inserting a drive into the R400S RAID enclosure to replace a failed drive from a RAID 5 or RAID 10 group (or putting in a new drive to be cloned to), the Rebuild LED lights up orange, and the Drive LEDs flash with activity until the RAID has been rebuilt or the clone copy completed **(Figure 8)**. Once the rebuild is complete, the Rebuild LED turns off.

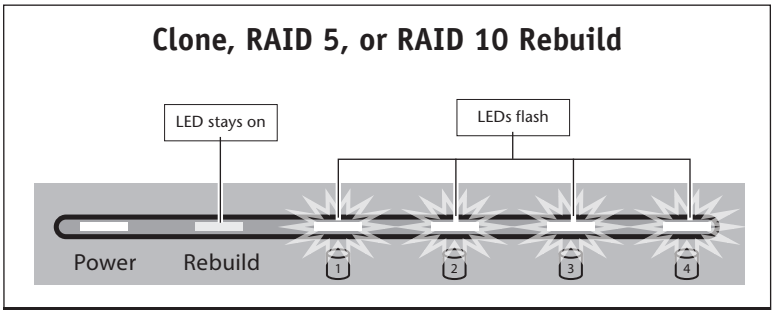


Figure 8

Drive Mode Descriptions

WARNING: RAID 5 and 10 formatting improves data accessibility and reliability during normal operations, however, you still need a good backup strategy for long-term protection of your data.

To configure the Fusion R400S RAID's drives, refer to Select Drive Mode on page 5.

The following pages describe the drive configuration modes supported by this Sonnet product.

RAID 0: Striping, No Redundancy

RAID 0 (striping) is based on the fact that increased performance can be achieved by simultaneously accessing data across multiple drives, increasing data transfer rates while reducing average access time by overlapping drive seeks. Drives are accessed alternately, as if stacked one on top of the other. **RAID 0 provides no data protection, but offers the full capacity of the drives. If one drive fails, all data within that stripe set is lost**. See **Figure 9**.

RAID Level 0 is used by applications requiring high performance for non-critical data.

RAID 10: Striping, Mirror Spans Two Drives

RAID 10 increases data transfer rates while ensuring security by writing the exact same data simultaneously to two or more different drives. RAID 10 is used in applications requiring higher performance and redundancy, combining the attributes of RAID Levels 1 and 0. See **Figure 10**.

RAID 10 offer 50% of the total capacity of the four drives.

Span: Concatenation, Volume Spans Four Drives

Span mode creates a single, large volume that spans all four drives, writing files to the capacity of the first drive, then the second drive, and so on. See **Figure 11**. **Span mode provides no data protection**.

Span formatting offers the full capacity of the four drives.

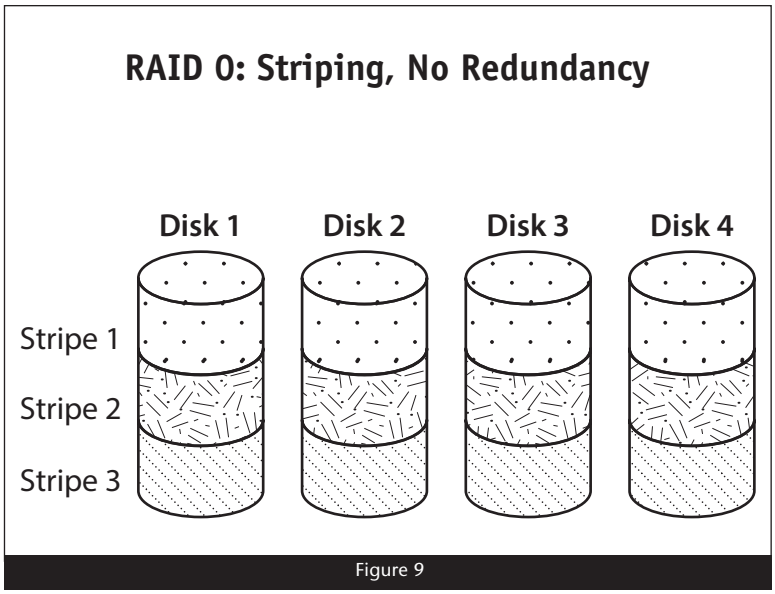


Figure 9

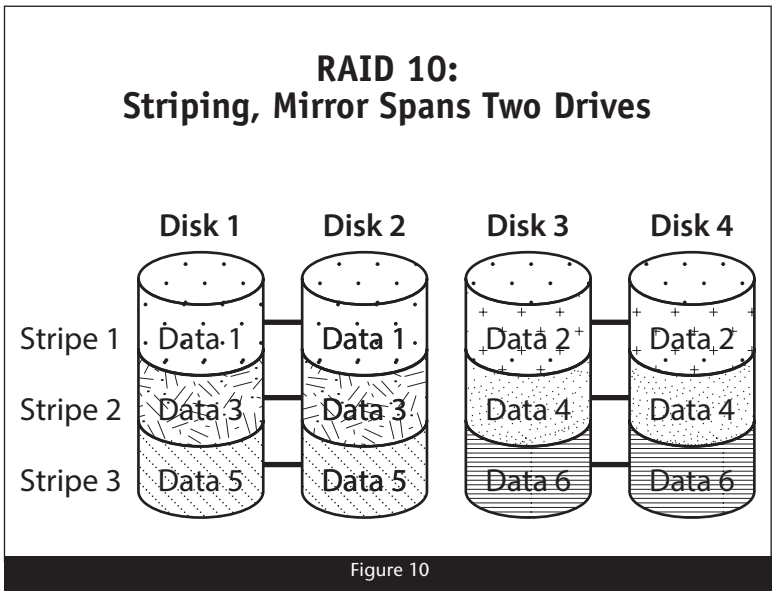


Figure 10

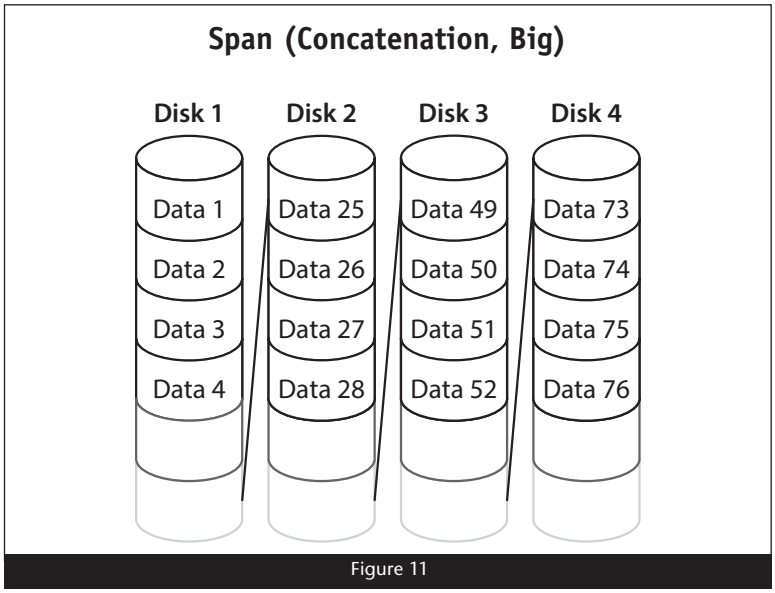


Figure 11

Drive Mode Descriptions

RAID 5: Striping, Parity Distributed Among Drives

RAID 5 increases reliability while using fewer drives than mirroring by using parity redundancy: parity is distributed across multiple drives. Any one of the four drives can fail, and the volume will continue to function. See **Figure 12**.

RAID 5 formatting offers 75% capacity of the four drives' total capacity. For instance, if your system has four 2TB drives, the total unformatted capacity is 8TB. After RAID 5 formatting, approximately 6TB is available for storage, with the other 2TB used for parity.

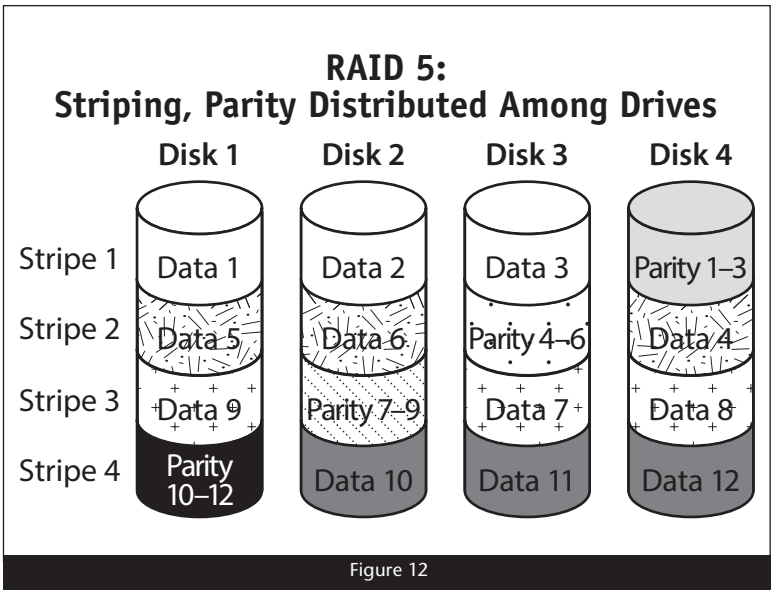


Figure 12

JBOD (PM): Just a Bunch of Disks

JBOD configuration enables all four individual drives to be available for normal storage operations with no special data protection by combining several drives into one large drive. See **Figure 13**. Note that for JBOD operation, the R400S RAID requires the use of an eSATA controller that offers port multiplier support; refer to the eSATA controller's documentation or the manufacturer's Website for information. If you format the drives as JBOD and use the R400S RAID with an eSATA controller with no port multiplier support, only one of the four drives will be accessible. JBOD provides no data protection.

JBOD offers the full capacity of each of the drives.

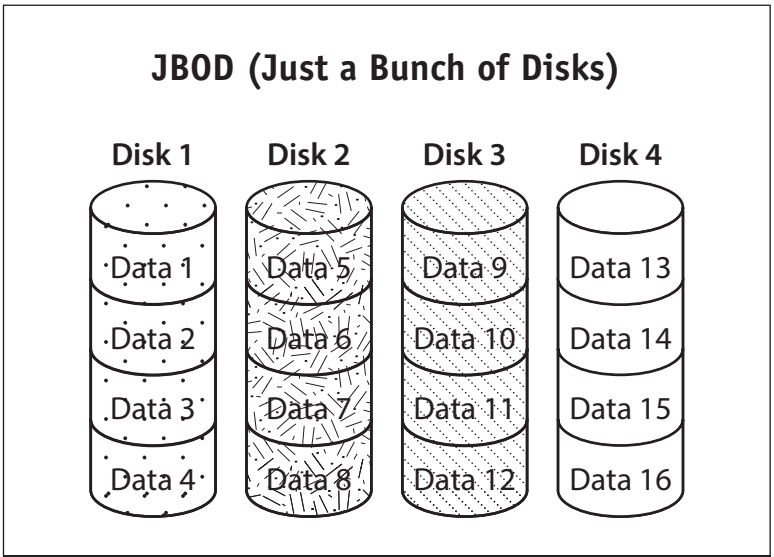


Figure 13

Clone: Data Mirrored on All Four Drives

Clone mode enables all four drives to store the same files. You may remove one of the four drives and replace it with another drive; the data will be copied without further action from you. Depending on the capacity of the drives you've installed, this process may take hours to complete.

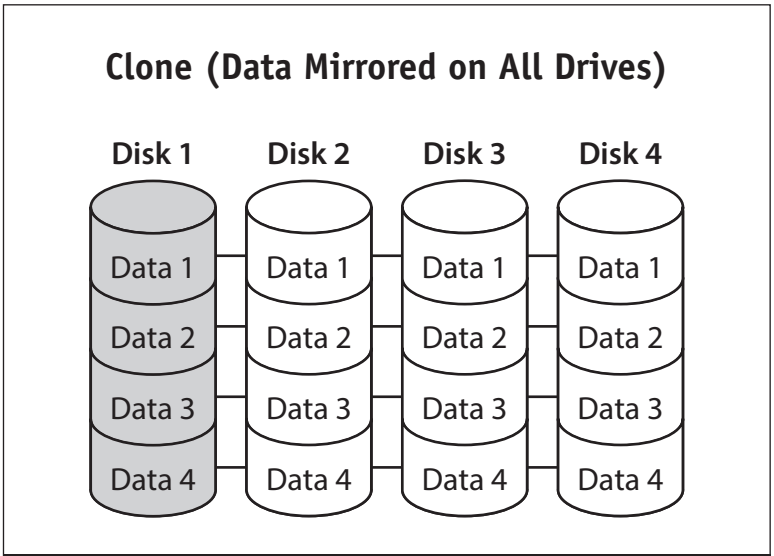


Figure 14

Tips and Additional Information

Specifications

Compatibility	Compatible with Mac, Windows, and Linux computers with an eSATA interface
External Connector	One locking eSATA
Data Transfer Speed	Up to 240 MB/s, depending on interface used and drive configuration
OS Support	Platform independent
Supported Drive Configurations	Hardware-based RAID 0, 5, and 10; span, clone, and JBOD[1]
Power Supply	Universal 220W, 100–240V AC, 50–60Hz
Operating Temperature	32 to 104˚ F (0˚ C to +40˚ C)
Dimensions (WxDxH)	17.0 x 16.25 x 1.75 in. (43.2 x 41.3 x 4.4 cm)
Weight (with drives, approximate)	20.2 lbs (9,16 kg)
RoHS Compliant	Yes
Package Contents	• Rackmount disk enclosure • Four 3.5" drive trays drive modules • One locking eSATA data cable • Power cord • User's guide

1. JBOD operation requires the use of an eSATA controller with port multiplier support.

SAFETY PRECAUTIONS

Please read this section carefully before proceeding. These precautions explain the correct and safe use of this device, thereby helping to prevent injury to you or others, and also help you to minimize the risk of damaging the device.

Warnings

Always follow the basic warnings listed here to avoid the risk of serious injury or death from electrical shock, short-circuiting, fire, and other hazards. These warnings include, but are not limited to:

- With the exception of the user-swappable parts, do not attempt to disassemble or modify the enclosure. If this device appears to be malfunctioning, contact your reseller or local distributor.
- Do not drop the enclosure; dropping or mishandling of the enclosure or adapter card may result in a malfunction leaving the product inoperable.
- Do not expose the device to rain, use it near water or containers that contain liquids which might spill into any openings, or in damp or wet conditions.
- If unusual smells, sounds, or smoke come from the device, or if liquids enter it, switch it off immediately and unplug it from the electrical outlet.
- Follow the instructions in this manual carefully; contact your reseller or local distributor for additional advice not covered in this User's Guide.

Contacting Sonnet Customer Service

USA Customers

The Sonnet Web site located at www.sonnettech.com has the most current support information and technical updates. Before you call Sonnet Customer Service, please check our Web site for the latest updates and online support files, and check this User's Guide for helpful information. When you call Sonnet Customer Service, have the following information available so our customer service staff can better assist you:

- Product name
- Date and place of purchase
- Hard drive model(s)
- Computer model
- Operating system
- Software/firmware versions

If further assistance is needed, please contact **Sonnet Customer Service** at:
Online Service Form: http://serviceform.sonnettech.com
Tel: 1-949-472-2772
(Monday–Friday, 7 a.m.–4 p.m. Pacific Time)
E-mail: support@sonnettech.com

For Customers Outside the USA

For support on this product, contact your reseller or local distributor.

Visit Our Web Site

For the most current product information and online support files, visit the Sonnet Web site at www.sonnettech.com/support/. Register your product online at http://registration.sonnettech.com to be informed of future upgrades and product releases.

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