

FUSION™ R400 RAID USB 3.0

1U Rackmount 4-Drive Hardware RAID 5 SATA Storage System with USB 3.0 Interface

User's Guide



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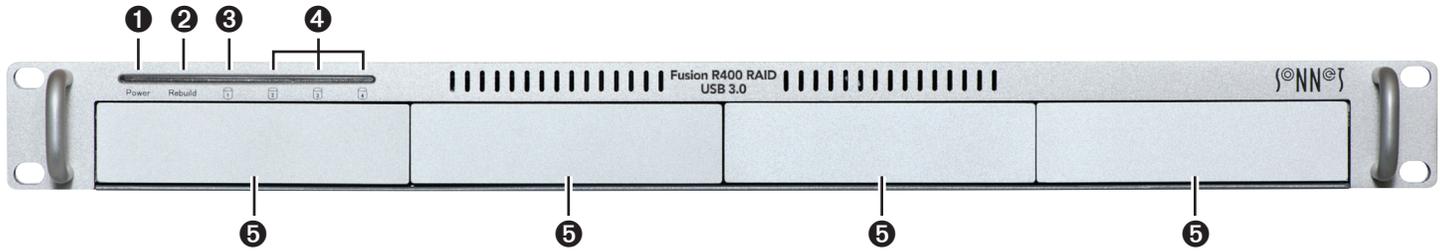


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1 – Fusion R400 RAID USB 3.0 Features



1 – Power Indicator LED

This blue LED lights when the Fusion R400 RAID USB 3.0 is powered.

2 – Rebuild Indicator LED

This orange LED lights when the Fusion R400 RAID USB 3.0 is rebuilding the data on a RAID 5 or 10 RAID set.

3 – Mode Change Confirmation; Drive 1 Presence, Activity, and Fault Indicator LED

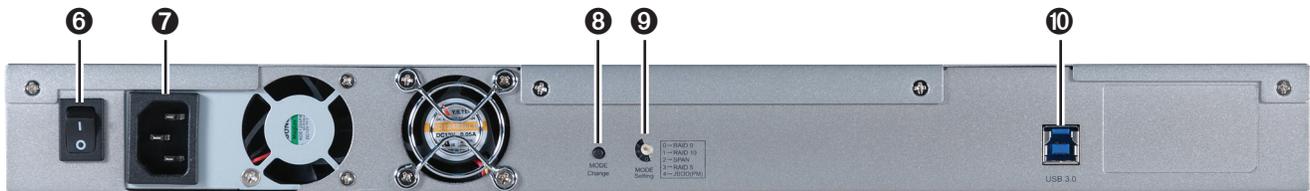
This LED lights red when the Drive Mode Change Switch is pressed. It also indicates Drive 1's ready state (solid green), read and write activity (flashes green), and fault status (OFF). Note that the LED will remain off if the drive in drive bay 1 is not recognized.

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 (or if no drive is installed).

5 – Drive Tray

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



6 – Power Switch

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.

9 – Drive Mode Setting Switch

Select the drive mode setting using this switch.

10 – USB 3.0 Interface Port

This port is compatible with the included Sonnet USB 3.0 cable and other USB 3.0 cables. It is also compatible with USB 2.0 cables. *However, when a USB 2.0 cable is used, the R400 RAID USB 3.0's performance will be reduced by as much as 85 percent.*



WARNING: Once you press and hold the Mode Change Switch for more than three seconds while the R400 RAID USB 3.0 is powered, any files stored on the system are lost and cannot be recovered!

2 – Drive Installation and Enclosure Setup

Install Drives

1. Remove the Fusion R400 RAID USB 3.0 from its packaging, and then place it on a flat, level surface.
2. If you intend to use the Fusion enclosure in a rack and need to be able to slide the enclosure in and out of the 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

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

WARNING: When handling computer products, take care to prevent components from being damaged by static electricity; avoid working in carpeted areas. Handle hard drives only by their edges and avoid touching connector traces and component pins.

4. Remove a SATA drive from its packaging and set it in on a flat, level surface with the label side down. Open the supplied tube of threadlocker and apply a single drop inside each of the four screw holes on the bottom of the drive (Figure 2).
5. Turn the tray upside down and lay it on top of the drive, with the back of the tray facing toward the drive's connectors (Figure 3).
6. Using four of the supplied screws, secure the drive tray to the drive; tighten each screw to secure the tray snugly to the drive; **do not overtighten the screws** (Figure 3).

WARNING: When securing the trays to the hard drives, you must verify the screw heads are flush with the tray. Otherwise, a screw may catch on the enclosure and prevent you from removing it.

7. Carefully slide the drive module (label side up) 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 4).
8. Repeat steps 3 – 7 for the remaining drives, and then install the Fusion R400 RAID USB 3.0 into the rack or set it on the surface which it will reside.

Connect the Fusion R400 RAID USB 3.0 to Computer and Power Outlet

1. Using the supplied USB 3.0 cable, connect the Fusion R400 RAID USB 3.0 to a USB 3.0 port on your computer.

Support Note: The Fusion R400 RAID USB 3.0 requires a USB 3.0 cable and a USB 3.0 port on your computer to achieve full performance. Connecting the Fusion storage system to your computer using a USB 2.0 cable, or connecting it to a USB 2.0 port will result in reduced performance.

2. Connect the supplied power cable between the Fusion R400 RAID USB 3.0 and a grounded wall outlet or power strip; **verify the cable is plugged in securely.**

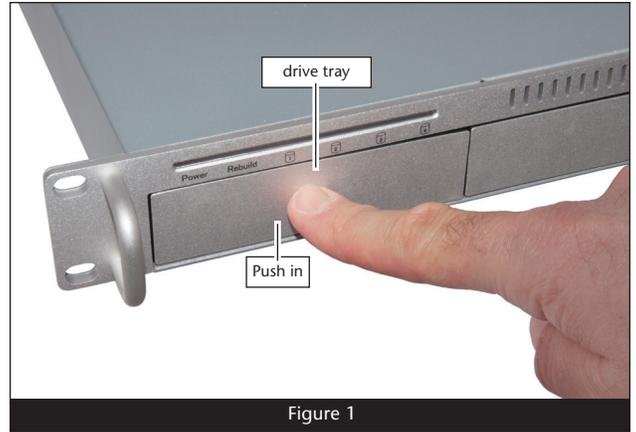


Figure 1

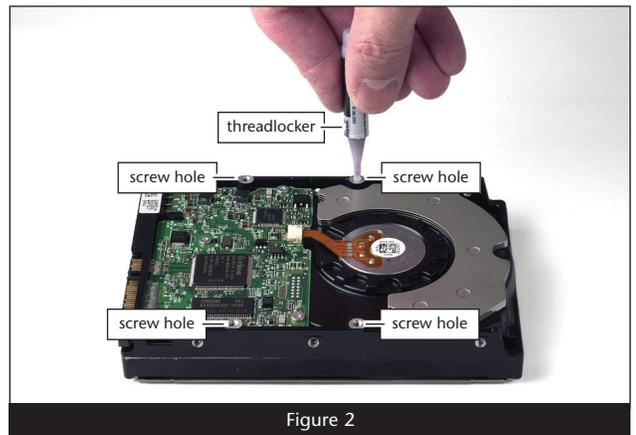


Figure 2

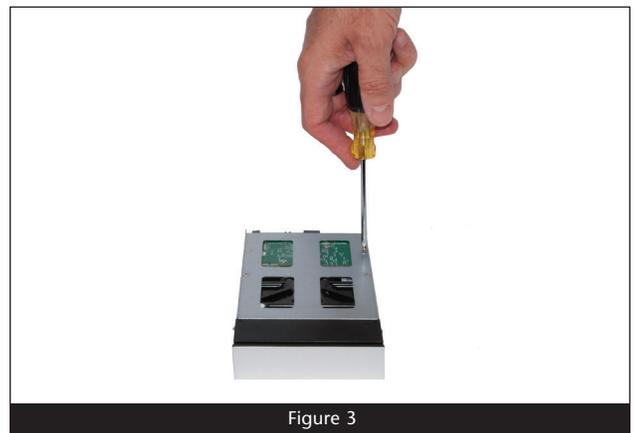


Figure 3

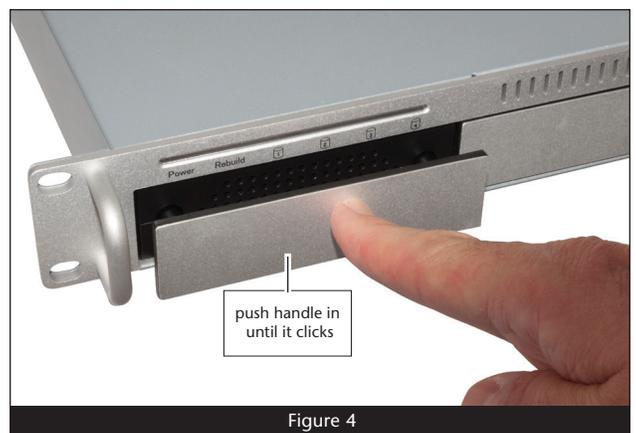


Figure 4

3 – Drive Mode Descriptions

The following two pages describe the various drive modes supported by the R400 RAID USB 3.0. To configure the Fusion R400 RAID USB 3.0's drives, refer to Select Drive Mode on page 5.



Support Note: In all modes except JBOD, Sonnet strongly recommends you use four identical drives in the Fusion R400 RAID USB 3.0. Due to varying operating characteristics, the use of different drives may lead to issues ranging from reduced total capacity, to louder operation, to RAID failures.

RAID 0: Striping, No Redundancy

RAID 0 (striping) is based on the concept 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. Although RAID 0 is typically used by applications requiring high performance for non-critical data, when used in the R400 RAID USB 3.0 it's only advantage next to RAID 5 is increased formatted capacity. RAID 0 provides no data protection; if one drive fails, all data within that stripe set is lost. See Figure 5.

When configured as a RAID 0 volume, the volume size is equal to the full capacity of the drives.



WARNING: RAID 5 and 10 configuration improves data accessibility and reliability during normal operations. However, you still need a good backup strategy for long-term protection of your 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. Any *one* of the four drives can fail, and the volume will continue to function. RAID 10 is used in applications requiring higher performance and redundancy, combining the attributes of RAID Levels 1 and 0. See Figure 6.

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 7. Span mode provides no data protection.

When configured as a spanned volume, the total volume size depends on the drive with the smallest capacity.

RAID 0: Striping, No Redundancy

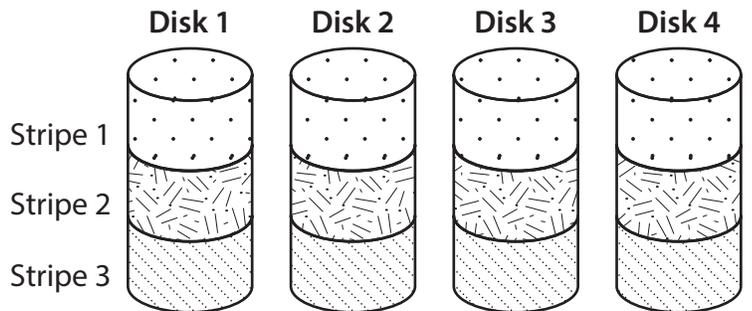


Figure 5

RAID 10: Striping, Mirror Spans Two Drives

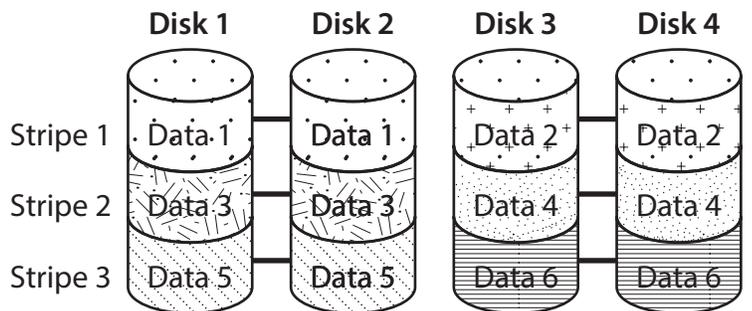


Figure 6

Span (Concatenation, Big)



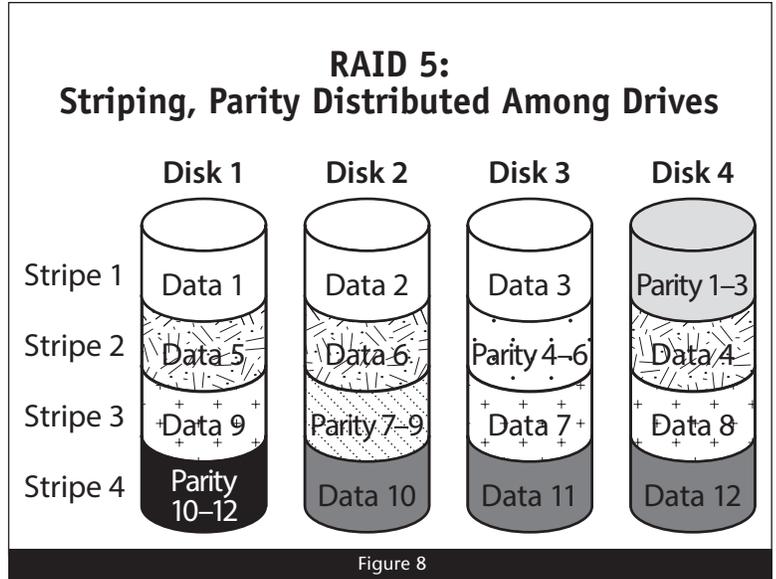
Figure 7

3 – Drive Mode Descriptions

RAID 5: Striping, Parity Distributed Among Drives

RAID 5 configuration increases reliability while using fewer drives than RAID 10 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 8. When the failed drive is replaced, the parity data on the three other drives is used to rebuild the RAID volume with data spread across all four drives.

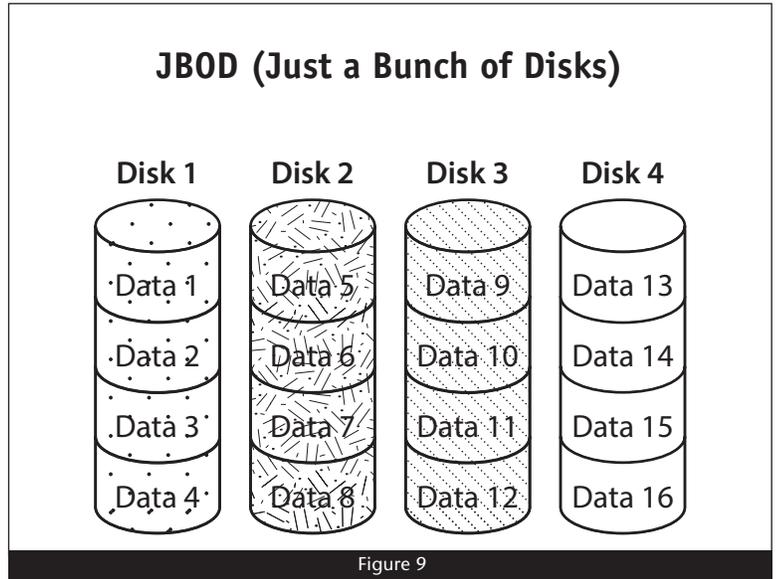
In the R400 RAID USB 3.0, RAID 5 configuration offers 75% of the four drives' total capacity. For example, if your system has four 4TB drives, the total unformatted capacity is 16TB. After configuring the drives in RAID 5 mode, approximately 12TB is available for storage, with the other 4TB set aside for parity.



JBOD: Just a Bunch of Disks

JBOD mode enables all four drives to be available individually at the same time for normal storage operations. See Figure 9. JBOD provides no data protection.

JBOD offers the full capacity of each of the drives.



4 – Drive Mode Configuration Instructions

General Information

Drives installed into the Fusion R400 RAID USB 3.0 must be configured first by the enclosure itself (drive mode), and then by your computer's operating system. Select the drive mode following the directions below.

Select Drive Mode

1. With drives installed, power up the Fusion R400 RAID USB 3.0 enclosure.
2. 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 10**).

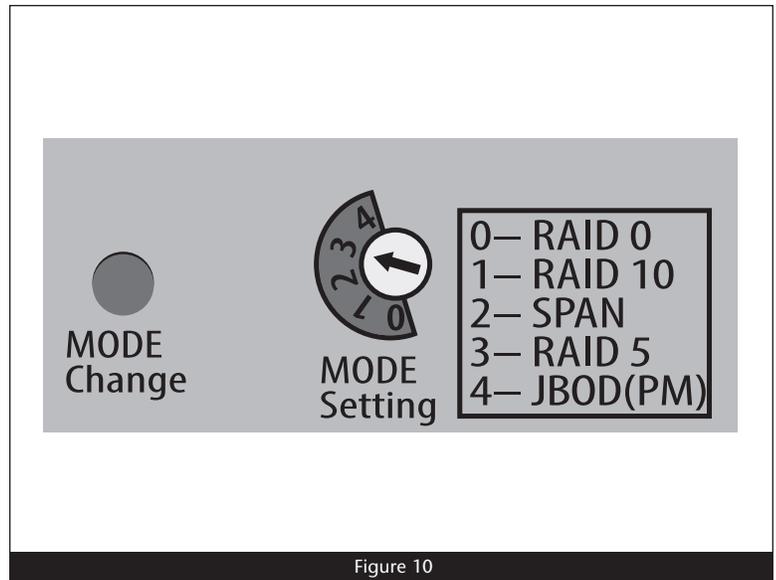


Figure 10

3. Press and hold the MODE Change switch for more than three seconds (**Figure 11**); the Drive 1 LED will light red, while the LEDs for Drives 2 – 4 will light green until you release the button (**Figure 11**). Once you release the button, all four drive LEDs will flash green as the mode change takes place.

WARNING: Reconfiguring the drives in your Fusion R400 RAID USB 3.0 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.

4. Turn on your computer; you may now format the drives using your computer's operating system drive formatting application; go to the next page.

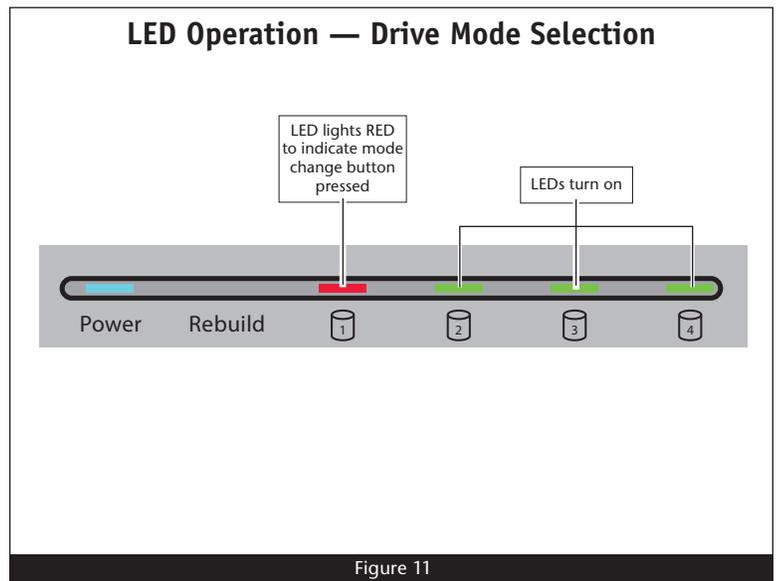


Figure 11

5 – Drive Formatting Instructions

OS X® Users' Instructions

1. After the Fusion R400 RAID USB 3.0 finishes configuring the drives, a *Disk Insertion* window will appear stating that there is an unreadable volume; click Initialize, and then Disk Utility will open. Note that if you configured the drives as JBOD, multiple *Disk Insertion* windows will open; clicking Initialize on the first window will cause Disk Utility to launch.
2. In the *Disk Utility* window, RAID 0-, RAID 10-, Span-, and RAID 5-configured drives will appear as a single volume; JBOD-configured drives will each appear as a single volume. Select the volume, and then click the Erase tab at the top of the window.
3. Select a drive format and name for the volume, and then click the Erase button; a window will appear asking you to approve your choice.
4. Click Erase; the R400 RAID USB 3.0 volume will appear on your computer's desktop.
5. Repeat steps 2 – 4 as necessary if the drives were JBOD-configured. Otherwise, close Disk Utility; the R400 RAID USB 3.0 is ready for use.

Windows® 8/7/Vista and Server 2012/2008 Users' Instructions

1. Click the Start button, and then right-click Manage; the *Computer Management* window opens.
2. In the *Computer Management* window, click Storage on the left, and then double-click Disk Management.
3. When the *Initialize Disk* window appears, select the RAID volume you created. Select the MBR partition style if you need to access your RAID storage from a computer running Windows XP Professional or 32-bit Windows Server 2003; otherwise, select GPT. Click OK.
4. In the *Disk Management* window, the Fusion R400 RAID USB 3.0's drives will appear (listed as "unallocated") as a single volume (unless they were configured as JBOD). Right-click where the word "unallocated" appears, and then select New Simple Volume.
5. When the Welcome to the *New Simple Volume Wizard* window appears, click next to start the process.
6. Follow the remaining steps to complete the process.

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

7. When the *Assign Drive Letter or Path* window appears, select Assign the following drive letter, choose a letter, and then click Next.
8. 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.
9. When the next window appears, click Finish.
10. Repeat steps 4 – 9 as necessary if the drives were JBOD-configured.
11. Depending on how you configured the drives, the volume may already be available to the system. Once the volume has been formatted and finishes building, the R400 RAID USB 3.0 is ready for use.

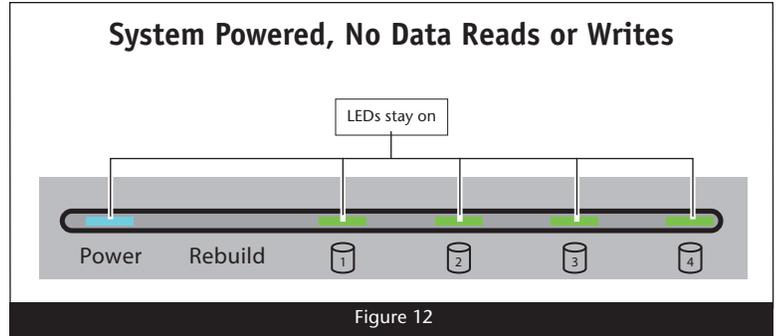
Linux Users' Information

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

6 – Status LED Indications

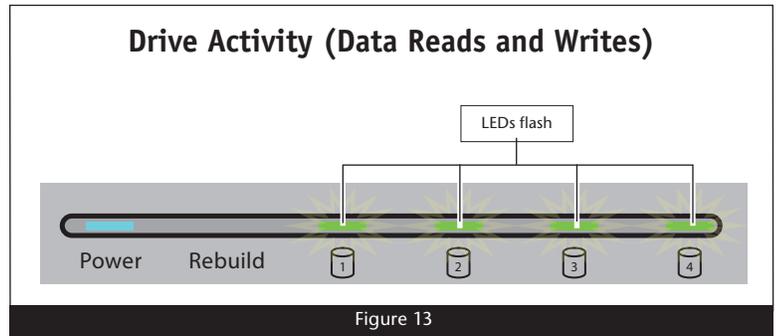
System Powered, No Data Reads or Writes

When the Fusion R400 RAID USB 3.0 is powered on, and no data is being written or read, the Power and Drive LEDs turn on (Figure 12).



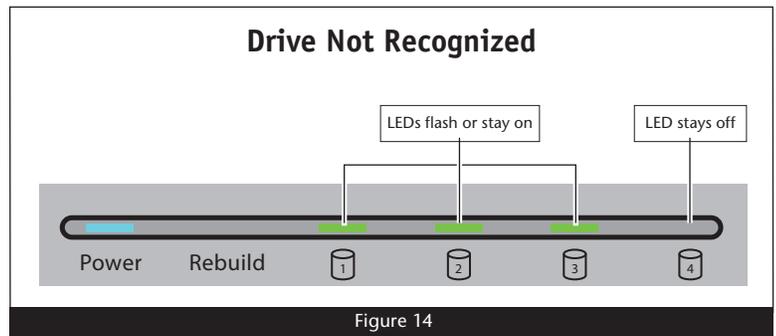
Drive Activity

When data is being read from or written to a drive, its corresponding LED will flash during read and write activity (Figure 13).



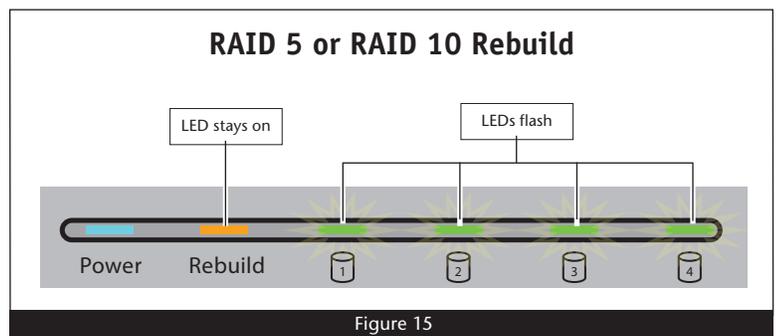
Drive Not Recognized

When one or more drive LEDs is off while the others remain lit, the corresponding drive(s) is not recognized (Figure 14). 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.



RAID 5 or RAID 10 Rebuild

After inserting a drive into the R400 RAID USB 3.0 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 15). Once the rebuild is complete, the Rebuild LED turns off. Please note that a RAID 5 or RAID 10 rebuild operation may take several hours to complete.



7 – Specifications, Warnings, and Additional Information

Specifications

Compatibility	Compatible with Mac, Windows, and Linux computers with an eSATA interface
External Connector	One USB 3.0
Data Transfer Speed	Up to 250 MB/s, depending on interface used and drive configuration
OS Support	Platform independent
Supported Drive Configurations	Hardware-based RAID 0, 5, and 10; span, and JBOD
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	14.85 lbs (6,74 kg)
RoHS Compliant	Yes
Package Contents	<ul style="list-style-type: none">• Rackmount disk enclosure• Four 3.5" drive trays• One USB 3.0 cable• Power cord• User's guide• Tube of threadlocker• Drive mounting screws

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.

FCC Compliance

Fusion R400 RAID USB 3.0 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may not cause harmful interference, AND this device must accept any interference received, including interference that may cause undesired operation.

Contacting Customer Service

The Sonnet Web site located at www.sonnettech.com has the most current support information and technical updates. Before you call 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 Customer Service, have the following information available so the customer service staff can better assist you:

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

USA Customers

If further assistance is needed, please contact **Sonnet Customer Service** at:

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.