

# FUSION™ QR

4-Drive Hardware RAID 5 SATA Disk Enclosure with Quad Interface

## User's Guide



For Windows

Creativity Stored Here™





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## 1 – Fusion QR Features



### 1 – Power Indicator

This blue LED lights when the Fusion QR is powered.

### 2 – Presence, Activity, and Fault Indicators — Drives A – C

These LEDs indicate the ready state (solid green), read and write activity (flashes green), and fault status (OFF or red) for drives A – C. An LED will remain off if the corresponding drive is not recognized, and will turn red if the drive is recognized but can't be used.

### 3 – Mode Change Confirmation; Drive D Presence, Activity, and Fault Indicator

When setting the drive mode, this LED stays off, or lights green, orange, or red depending on the mode selected. It also indicates drive D's ready state (solid green), read and write activity (flashes green), and fault status (OFF or red). The LED will remain off if the corresponding drive is not recognized, and will turn red if the drive is recognized but can't be used.

### 4 – Drive Mode Selection Switch

Select the drive mode setting using this switch.

### 5 – Erase and Set Mode Switch

Press and hold this switch for three or more seconds upon powering the system to activate the selected drive mode.

### 6 – Drive Trays

To remove a drive tray, turn the thumbscrew counter-clockwise until it pops out, and then pull out the entire tray. To place a drive tray, insert it into the drive bay until it stops, push in the thumbscrew until it stops, and then turn it clockwise until it stops; **do not overtighten the thumbscrew.**

### 7 – Inner Chassis Lock Switch

Slide this switch to the left to allow you to remove and replace the front cover.

### A – Security Slot

This slot works with Kensington® brand and similar security locks to secure the Fusion enclosure and deter theft.

### B – Power Switch

### C – Locking eSATA Interface Port

This port is compatible with the included Sonnet locking eSATA data cable and standard eSATA data cables.

### D – FireWire 800 Interface Ports

In addition to FireWire 800, these ports support FireWire 400 connections on computers and adapter cards when used with a FireWire 400-to-FireWire 800 adapter or adapter cable.

### E – USB 3.0 Interface Port

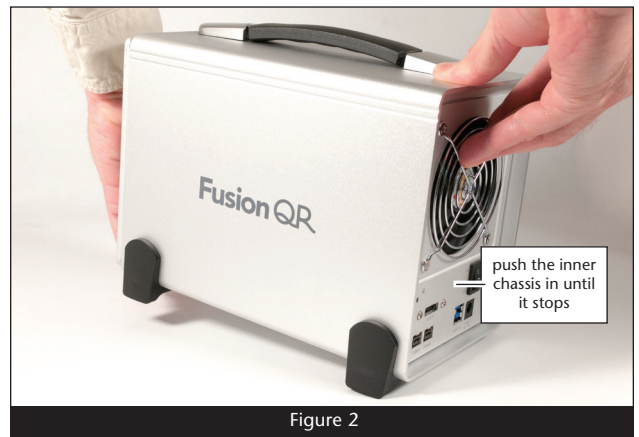
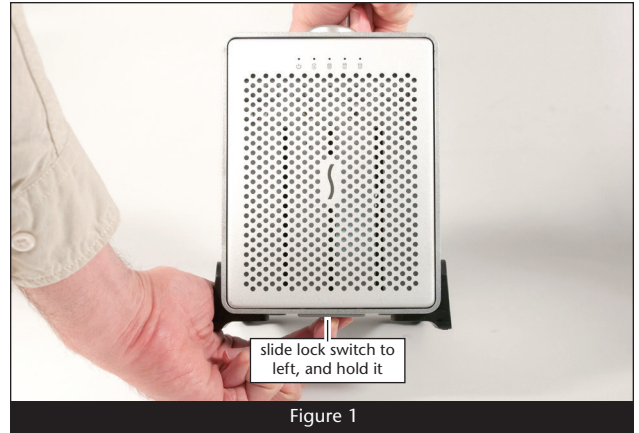
### F – 19V DC Power Socket

Connect the included DC power adapter between this socket and the included power cord.

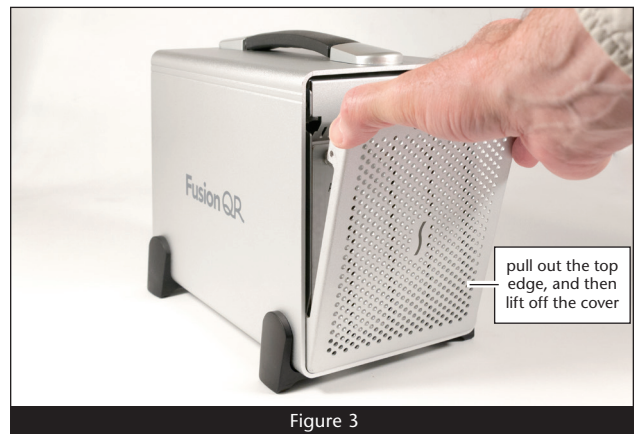
## 2 – Drive Installation and Enclosure Setup

### Install Drives

1. Remove the Fusion QR from its packaging, and place it on a flat, level surface, with the front panel facing you.
2. Lift up the front of the enclosure, slide the inner chassis lock switch to the left and hold it (**Figure 1**), and then push the inner chassis from the back until it stops (**Figure 2**).



3. Pull the front panel toward you, and then lift it off of the enclosure (**Figure 3**). Set the panel aside.



4. Turn a drive tray's thumbscrew counter-clockwise until it pops out, and then pull out the tray by the thumbscrew (**Figure 4**).



## 2 – Drive Installation and Enclosure Setup

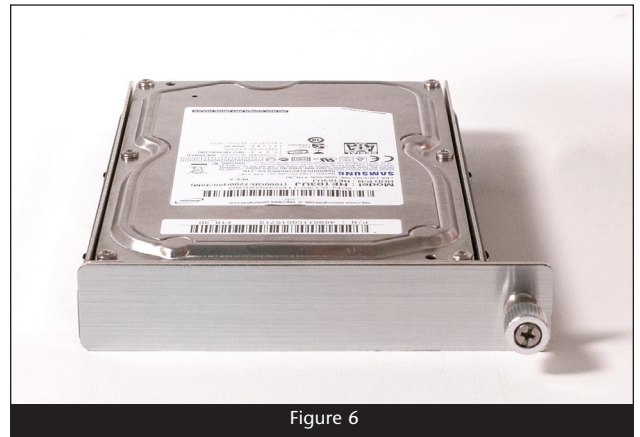


**WARNING:** When handling computer products, take care to prevent components from being damaged by static electricity; avoid working in carpeted areas. Handle hard drives only by their edges and avoid touching circuit boards and connector pins.

5. Remove a drive from its packaging and set it in on a flat, level surface with the label side up. Open the supplied tube of threadlocker, and then apply a *single* drop on the threads of each of the six screw holes on the sides of the drive (Figure 5).



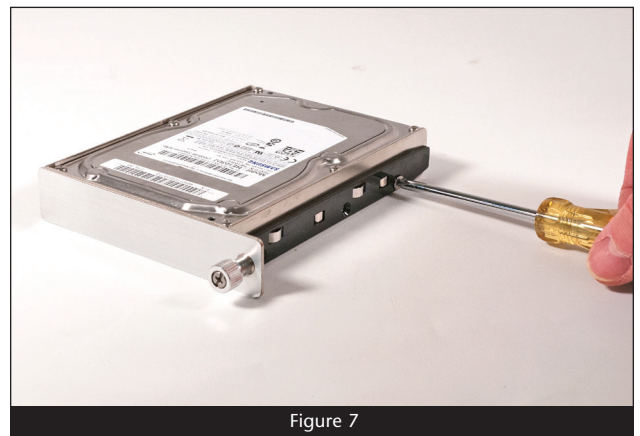
6. Turn the drive so that the connectors face away from you. With the thumbscrew on the right, place the tray around the drive as shown, lining up the holes on the tray with the screw holes on the drive (Figure 6).



7. Using six of the supplied screws, secure the drive tray to the drive; do not overtighten the screws (Figure 7).



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



8. Carefully slide the drive module into the enclosure until it stops, push in the thumbscrew, and then turn it clockwise to secure the module in place; do not overtighten the screw (Figure 8).

9. Repeat steps 5 – 8 for each remaining drive.



## 2 – Drive Installation and Enclosure Setup

### Connect the Fusion QR to Computer and Power Outlet

1. Using *one* of the supplied cables (eSATA, FireWire 800, USB 3.0), connect the Fusion QR to your computer. For maximum performance, connect the QR to a SATA host controller card (Figure 9).



**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 connector. If necessary, you may remove the locking mechanism from the connector by removing the screws securing the two halves.

2. Connect the included power cord between a wall outlet or power strip and the power adapter; verify the connector is plugged in securely; **verify the cable is plugged in securely (Figure 9).**
3. Connect the power adapter cable to the Fusion QR's 19V power socket; **verify the cable is plugged in securely (Figure 9).**
4. Do not turn on the QR's power yet; you must first follow the instructions to select the drive mode. Go to the next page for descriptions of the various configuration modes available, or skip to page 7 for directions on how to set the drive mode.

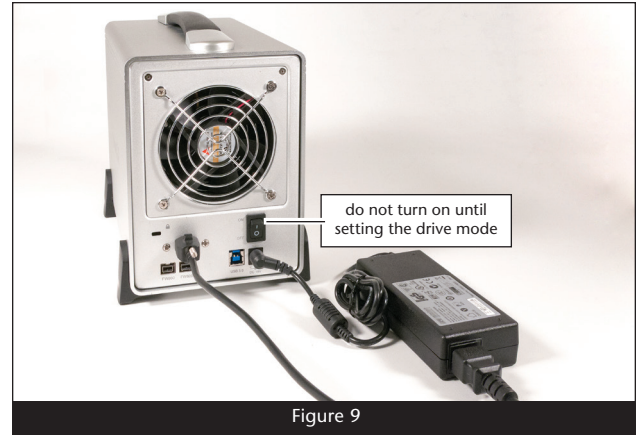


Figure 9



### 3 – Drive Mode Descriptions

The following two pages describe the drive modes supported by the QR. To configure the Fusion DE400-QR's drives, refer to Drive Mode Configuration Instructions on page 7.

#### RAID 0: Striping, No Redundancy



**Support Note:** In all modes except JBOD, Sonnet strongly recommends you use four identical drives in the Fusion QR. 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) 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 QR it's only advantage next to RAID 5 is increased capacity. RAID 0 provides no data protection; If one drive fails, all data within that stripe set is lost. See Figure 10.

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

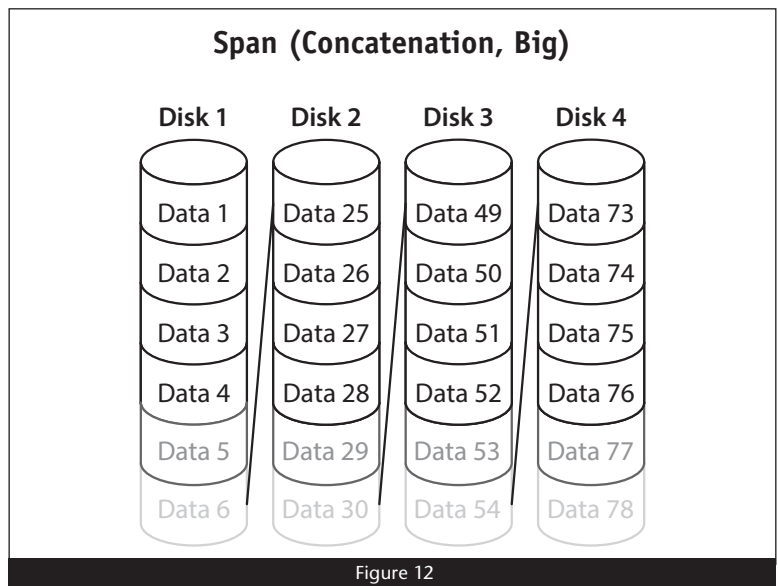
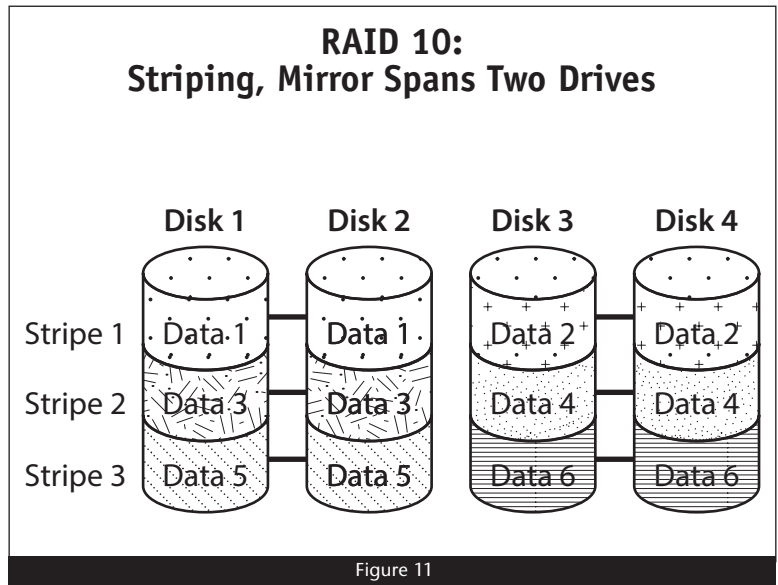
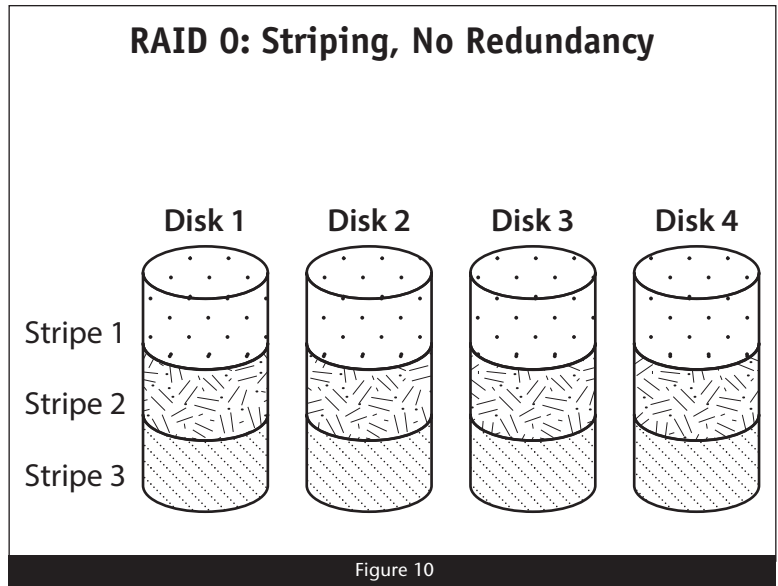
RAID 10 increases data transfer rates while ensuring security by writing the exact same data simultaneously to two or more different drives. Any *one* of the four drives can fail, and the volume will continue to function. RAID 10 is used in applications requiring higher performance and redundancy, combining the attributes of RAID Levels 1 and 0. See Figure 11.

RAID 10 offers 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 12. Span mode provides no data protection.

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

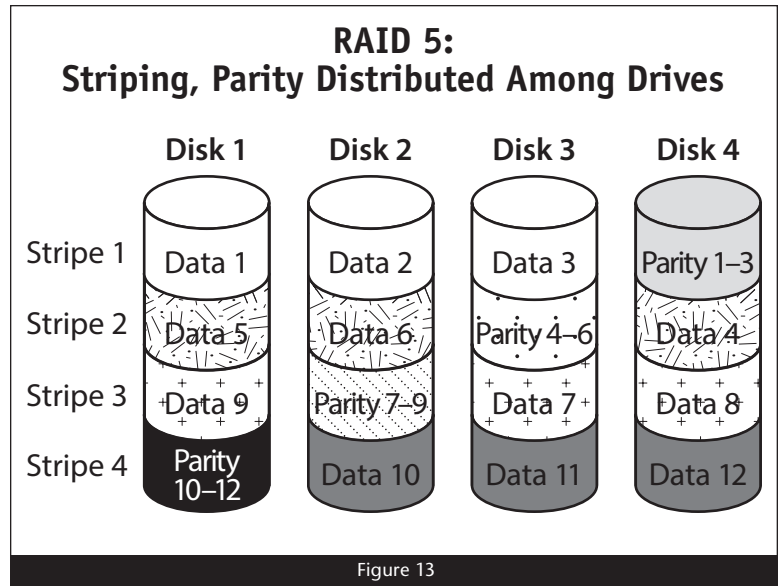


### 3 – Drive Mode Descriptions

#### 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 13**. 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.

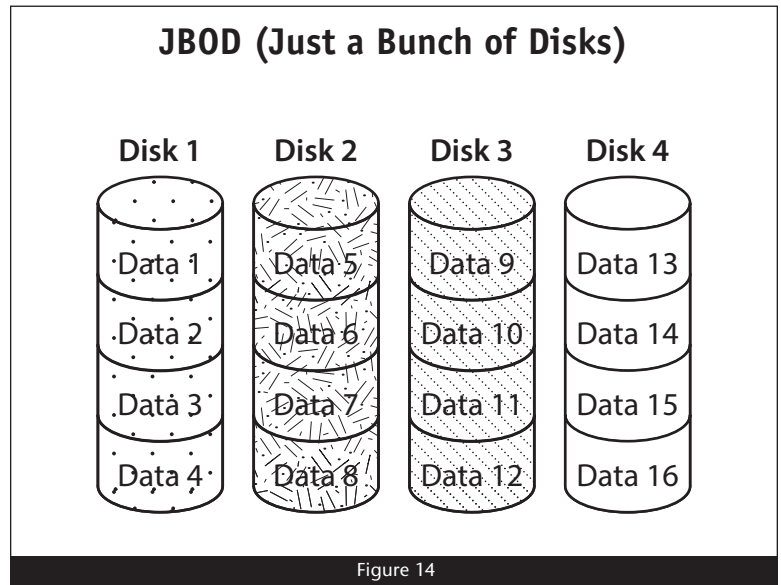
In the QR, RAID 5 configuration offers 75% of the four drives' total capacity. For example, if your system has four 4TB drives, the total unformatted capacity is 16TB. After configuring the drives in RAID 5 mode, approximately 12TB is available for storage, with the other 4TB set aside for parity.



#### 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 14**. *Note that when you connect the QR to your computer via eSATA connection, the eSATA controller to which the storage system is connected must offer port multiplier support; refer to the eSATA controller's documentation or the manufacturer's Website for information. If the eSATA controller does not offer 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.



## 4 – Drive Mode Configuration Instructions

### Initial Drive Mode Configuration

When you first turn on the Fusion QR after installing the hard drives, you must select a mode to configure the drives before using your operating system to format them and make them ready for use. **In order to complete the initial drive configuration steps, the QR must be connected to your computer, and the computer must be powered on.**



**WARNING:** Configuring the drives in your Fusion QR enclosure results in them having to be reformatted. **Reformatting the drives will erase any data on them!** If there is any data on them, back it up first outside of the Fusion system before configuring the drives.

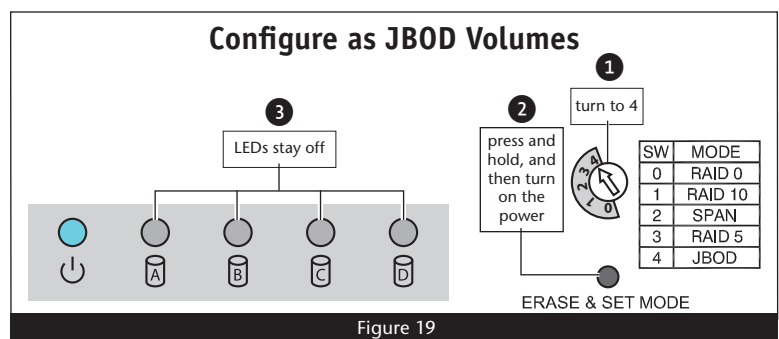
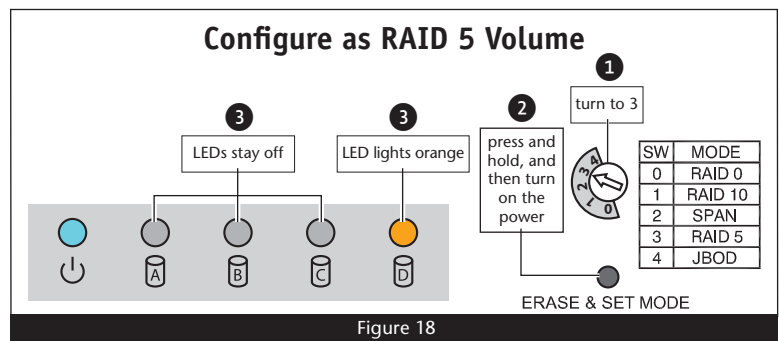
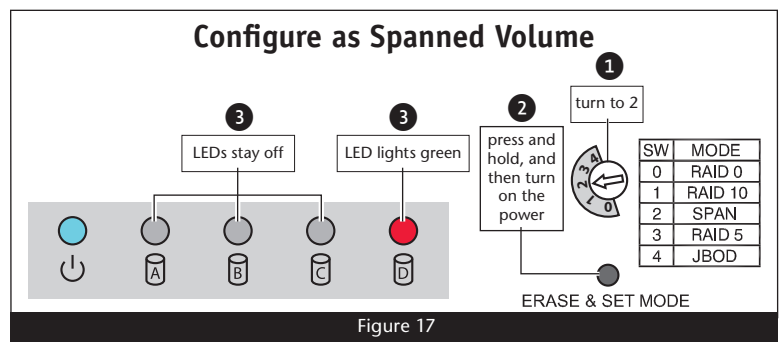
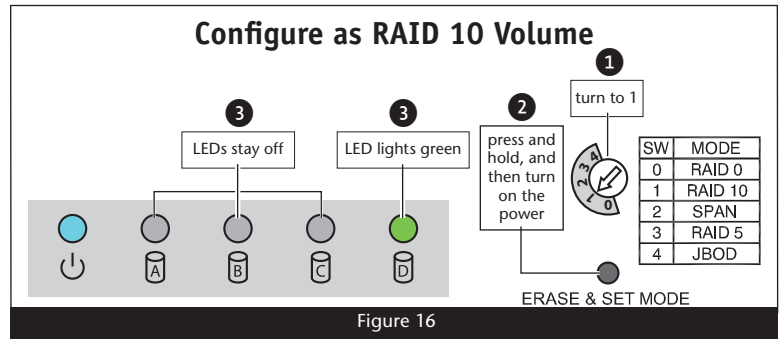
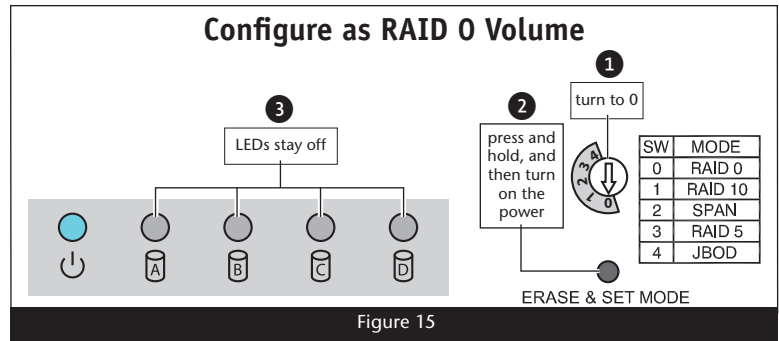
1. Choose a configuration and turn the Drive Mode Selection switch:
  - to the 0 position for RAID 0 (Figure 15)
  - to the 1 position for RAID 10 (Figure 16)
  - to the 2 position for Span (Figure 17)
  - to the 3 position for RAID 5 (Figure 18)
  - to the 4 position for JBOD (Figure 19)
2. Press and hold the Erase & Set Mode switch; while continuing to hold it in, flip the power switch on the back of the enclosure to ON. Continue holding in the Erase & Set Mode switch for three seconds, or until the drive LEDs start flashing, and then release the switch. Once the LEDs stop flashing, drive configuration is complete. You may now format the drives using your computer's operating system drive formatting application; go to page 8.

### Change Drive Mode

You may change the drive mode from its initial state to another by following the steps listed in Initial Drive Mode Configuration above.



**WARNING:** Reconfiguring the drives in your Fusion QR 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 changing the drive modes.



## 5 – Drive Formatting Instructions

### OS X Users' Instructions

1. After the Fusion QR 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 QR 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 QR 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 QR'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.

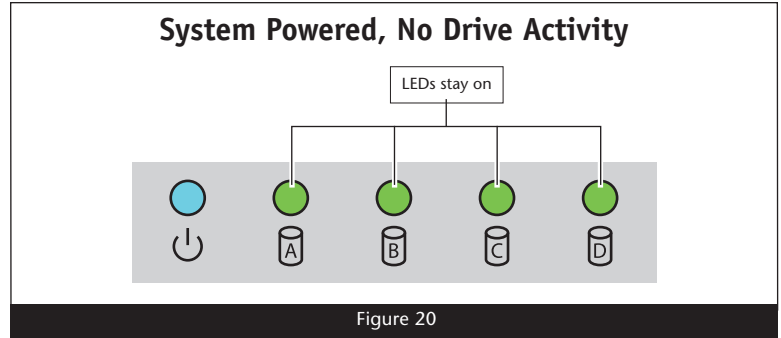
**Note:** *If you do not select the quick format option, this process will take much longer to complete.*

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 QR is ready for use.

## 6 – Status LED Indications

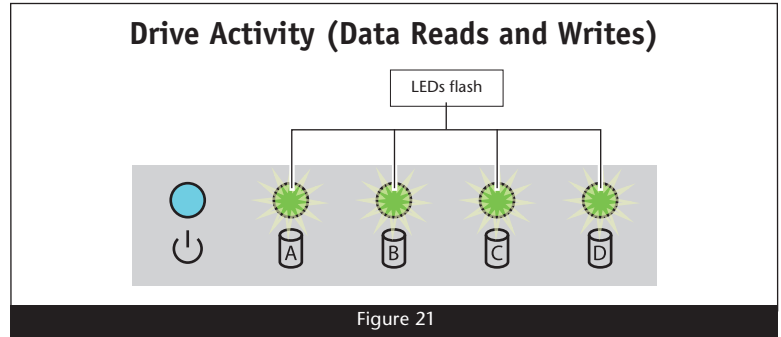
### System Powered, No Drive Activity

When the Fusion QR is powered on, and no data is being written to or read from the drives, the Power and Drive LEDs stay on (Figure 20).



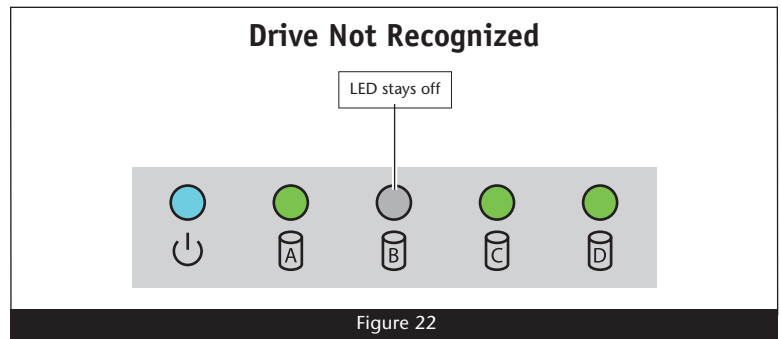
### Drive Activity

When data is being read from or written to a drive, its corresponding LED will flash (Figure 21).



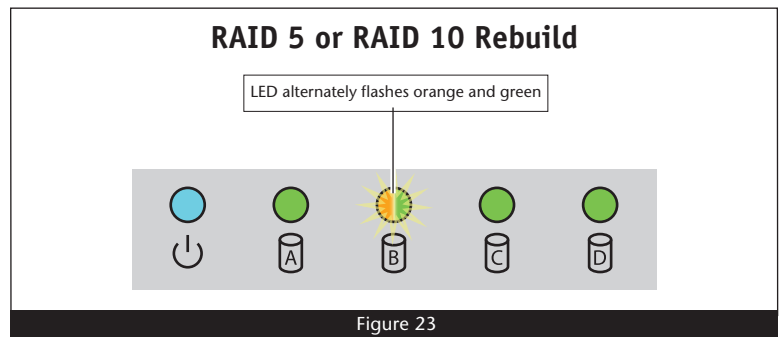
### Drive Not Recognized

When a drive LED stays off while the others remain lit, the corresponding drive(s) is not recognized (Figure 22). 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. If reseating the drive does not fix the situation, replace the drive as soon as possible.



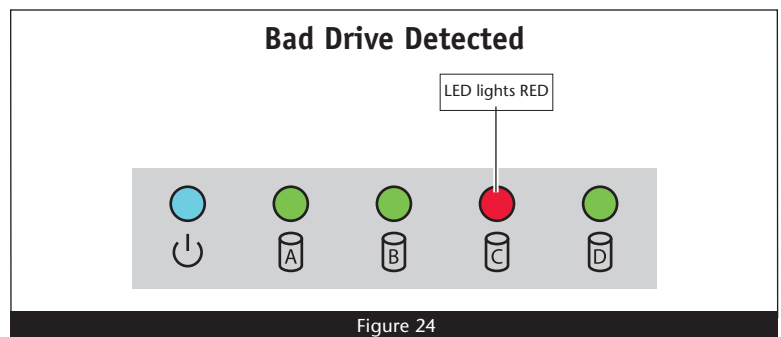
### RAID 5 or RAID 10 Rebuild

After inserting a drive into the QR enclosure to replace a failed drive from a RAID 5 or RAID 10 group, the corresponding LED alternately flashes orange and green until the RAID has been rebuilt (Figure 23). Once the rebuild is complete, the LED returns to normal operation.



### Bad Drive Detected

When the QR determines a drive has gone bad, the corresponding LED lights red continuously (Figure 24). Causes for this condition include the drive's failure to spin up, too many physical errors on the drive, drive BIOS failure, etc. Replace the drive as soon as possible.



## 7 – Specifications, Warnings, and Additional Information

### Specifications

|                                |   |
|--------------------------------|---|
| External Connectors            | USB 3.0, eSATA, two FireWire 800  |
| Drives Supported               | Up-to-date compatible hard drives listed on our Certified Hard Drive Compatibility Chart  |
| Data Transfer Speed            | Up to 250 MB/s, depending on interface used and drive configuration   |
| Supported Drive Configurations | Hardware-based RAID 0, 10, 5, Spanned, and JBOD <sup>(1)</sup>  |
| Power Adapter                  | Universal 90W, 100–240V AC, 50–60Hz   |
| Operating Temperature          | 32° F to 95° F<br>(0° C to 35° C)   |
| Dimensions WxDxH               | 5.93 x 9.57 x 7.76 in.<br>(15.1 x 24.3 x 19.7 cm)   |
| RoHS Compliant                 | Yes   |
| Package Contents               | <ul style="list-style-type: none"><li>• Desktop disk enclosure</li><li>• Four 3.5" drive trays</li><li>• One locking eSATA data cable</li><li>• One USB 3.0 cable</li><li>• One FireWire 800 cable</li><li>• Power adapter</li><li>• Power cord</li><li>• Tube of threadlocker</li><li>• Drive mounting screws</li><li>• User's guide</li></ul> |

1. When connected via eSATA, JBOD configuration requires the use of an eSATA controller with port multiplier support.

### 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 or any of its drive modules; dropping or mishandling of the enclosure or drive modules may result in a malfunction.
- Do not insert your fingers or foreign objects inside the enclosure; take particular care when small children are present.
- 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 QR 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](http://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
- Date and place of purchase
- Computer model
- Hard drive models
- Operating system version
- 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](mailto: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/](http://www.sonnettech.com/support/). Register your product online at <http://registration.sonnettech.com> to be informed of future upgrades and product releases.