![Addonics Technologies logo]

User Guide
1U RAID Rack with eSATA /U3 /FW800
(R1ESU3F)
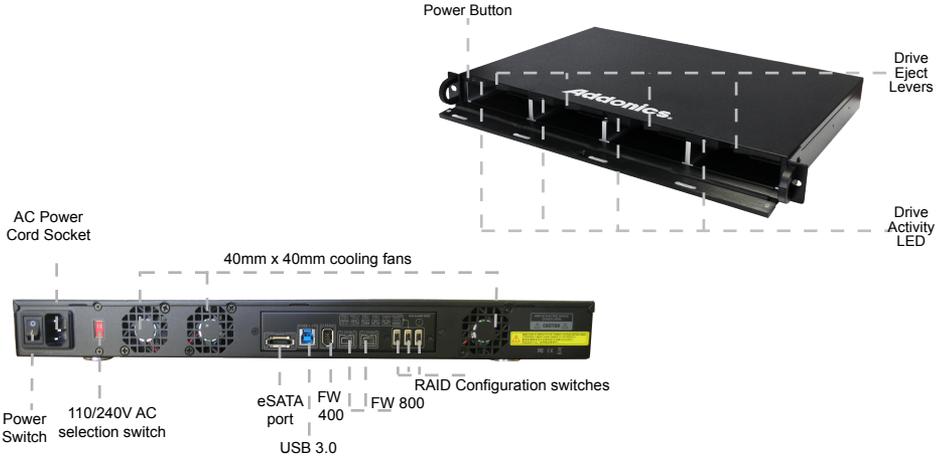
www.addonics.com

v6.1.11

Technical Support
If you need any assistance to get your unit functioning properly, please have your product information ready and contact Addonics Technical Support at:

Hours: 8:30 am - 6:00 pm PST
Phone: 408-453-6212
Email: http://www.addonics.com/support/query/

Unpacking and Overview

Power Button

Drive Eject Levers

Drive Activity LED

AC Power Cord Socket

40mm x 40mm cooling fans

Power Switch

110/240V AC selection switch

eSATA port

USB 3.0

FW 400

FW 800

RAID Configuration switches

WARNING: Please remember to set the power supply to your local outlet voltage prior to plugging in the power cord. Failure to do so may damage the power supply.
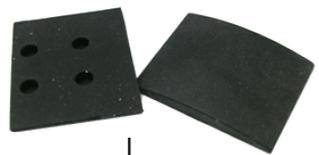
Power Cord
(US Version Shown)

100 cm eSATA cable

Front Door keys

Rack Mounting kit

Desktop accessories

FW 400 Cable

FW 800 Cable

Installation

1. Use the provided key to unlock the front door if needed and open it.
2. Insert a drive into each bay as desired, SATA connectors first, label side up as shown, then press the drive firmly into place.
3. Connect one Host cable to a computer. The unit can only use one host connection at a time.
4. Make sure the AC input switch is set correctly, then connect the power cord to an AC outlet.
5. Set the AC power switch on the rear to ON, then press the power button behind the front door to turn on the unit.

To remove a drive, pull the Eject Lever until the drive disengages from the internal connector then pull the drive out.

Hot Swapping drives

The R1ESU3F unit supports hot swapping (inserting or removing drives while the drives are running and connected to a computer). In JBOD Mode, the eSATA controller on the computer must also support hot swapping - be sure to confirm this before attempting to insert or remove drives while the system is running. Also be sure to practice the appropriate safe removal procedure before proceeding. Failure to practice safe removal procedures will result in loss or corruption of data.

Port Multiplier Compatibility

When configured as a set of individual drives and connected to an eSATA host adapter, the Port Multiplier will only work with a Port Multiplier aware host. This includes setting up the unit with more than one array. Identify your host controller and check with its hardware manufacturer if you are unsure. Addonics offers several Port Multiplier aware host adapters.

Using identical drives for all settings other than JBOD or LARGE is strongly recommended. Creating a LARGE array using drives that have different proper-ties will use all space on all members, and performance will match that of the member in use during any particular I/O operation. Creating a RAID using drives that are not all the same size will result in all members using only as much space as the smallest member. Creating a RAID using drives that have different performance will degrade the overall performance of the array.

Port Multiplier Modes

The Port Multiplier supports individual drives (JBOD Mode), several types of RAID and some non-RAID drive sets. Each configuration has different properties and requirements, as follows:

JBOD Mode (Individual Drives)

Number of drives: at least 1
Unit capacity: N/A (100% of each individual drive)
Spares: no
Fault tolerance: none
JBOD mode offers all connected units to the host adapter, no RAID is defined at all.
NOTE: JBOD mode requires a SATA controller featuring Port Multiplier support for eSATA connections.
NOTE: Optical drives can only be configured as JBOD using an eSATA connection.

RAID 0 (Stripe set)

Number of drives: at least 2
Unit capacity: size of each member times number of members.
Spares: no
Fault tolerance: none - if any member is lost all data is lost.
RAID 0 "stripes" the file system across the array by placing "chunks" of data sequentially between drives in a specific order.

RAID 1 or 10 (Mirror set, Stripe of mirror sets)

Number of drives: 2 (RAID 1) or 4 (RAID 10).
Unit capacity: size of one member (RAID 1) or size of two members (RAID 10).
Spares: yes – if EZ mode is not disabled and 3 (RAID 1) or 5 (RAID 10) drives are present, the array will be initialized with a spare.
Fault tolerance: RAID 1 can withstand the loss of one drive without losing data. RAID 10 can withstand the loss of one drive from each mirror set without losing data.
RAID 1 works by duplicating the exact same data on two drives.
RAID 10 works by using two RAID 1 sets configured as members of a RAID 0. Disks 1 and 2 are mirrored, disks 3 and 4 are mirrored, and the two mirror sets are striped together.

RAID 3 (Stripe set with dedicated parity)

Number of drives: at least 3
Unit capacity: size of one member times number of members minus one.
Spares: yes
Fault tolerance: can withstand the loss of one drive without losing data.
RAID 3 works by striping data for individual I/O blocks across all members except one, which contains parity data for the stripe set computed internally by the Port Multiplier. In the event of failure, the missing information can be calculated using the parity information.

RAID 5 (Stripe set with striped parity)
Number of drives: at least 3
Unit capacity: size of one member times number of members minus one.
Spares: yes
Fault tolerance: can withstand the loss of one drive without losing data.
RAID 5 works by striping entire I/O blocks across all members of the set, with each member taking turns carrying parity data computed by the Port Multiplier. In the event of failure, the missing information can be calculated using the parity information.

CLONE (Mirror set)
Number of drives: at least 2
Unit capacity: size of one member.
Spares: yes
Fault tolerance: can withstand the loss of any number of drives without losing data as long as at least one complete member remains online. CLONE mode works the same way as RAID 1, by maintaining a complete copy of the entire set of data on each drive.

LARGE (Spanned set)
Number of drives: at least 2
Unit capacity: 100% of all drives together regardless of differences in size
Spares: no
Fault tolerance: cannot withstand the loss of any drives without losing data. However, some data may be recovered as long as the drive(s) carrying the file system data (boot record, directory, etc.) remain online. LARGE mode is neither a RAID nor is it a JBOD. It works by declaring the sum of all available space of the member drives as a single unit, without striping the data. As each member is filled, new data is stored on the next.

Notes about Spare Drives
If any kind of array is defined, all individual drives not configured as array members will be offered to the host adapter as separate units. Only the fault-tolerant modes (RAID 1, 10, 3, 5 or CLONE) will make use of a spare – individual drives will not be used at all and are not accessible with RAID 0 or LARGE.

To create an array with one or more spares, set or modify the RAID mode while the spares are disconnected from the Port Multiplier. Afterward, any individual drives connected when an array is present are considered spare. Spare drives must be equal to or larger in size than the smallest member.

When a drive fails on a fault-tolerant RAID, if a spare is present the Port Multiplier will automatically begin rebuilding the array onto the spare.

Configuring the Port Multiplier Using Switches

Resetting the RAID
NOTE: This procedure destroys all RAID data. It should not harm individual drives or their contents; however, creating backups of all data is strongly recommended before proceeding.

Be sure the port multiplier is connected to an active host before proceeding. The port multiplier will not complete the process if it has no host connection.

1. Power down the unit and set the switches to the desired RAID Mode.
2. While holding the SET/RESET button, turn the unit on. A long beep will sound from the Port Multiplier. The SET/RESET button may be released once the long beep starts.

Shortly after releasing the button, the port multiplier should "chirp" to indicate the process is complete. If instead of a chirp the Port Multiplier sounds a series of short beeps, an error has occurred during the process.

Setting or Modifying the RAID Mode
NOTE: Setting or modifying the RAID mode destroys all data.

Be sure the port multiplier is connected to an active host before proceeding. The port multiplier will not complete the process if it has no host connection.

1. Follow the procedure for resetting the RAID Mode.
2. Power down the unit and set the dip switch to the desired RAID Mode.
3. While holding the SET/RESET button with a ballpoint pen, turn the unit on. A long beep will sound from the Port Multiplier. The button may be released once the long beep starts.

Shortly afterward, the port multiplier should "chirp" to indicate the process is complete. If instead of a chirp the Port Multiplier sounds a series of short beeps, an error has occurred during configuration of the array.

RAID Mode Switches (SW1:3 – SW1-5)
The RAID Mode switches define what type of RAID will be initialized when the unit is powered up while the button is held down, as follows:

Switch Position	1	2	3
JBOD (Individual Drives) *** FACTORY DEFAULT SETTING**	OFF	OFF	OFF
RAID 0	ON	ON	ON
RAID 1 OR 10	ON	ON	OFF
RAID 3	ON	OFF	OFF
RAID 5	OFF	ON	OFF
CLONE	OFF	ON	ON
LARGE	ON	OFF	ON

Configuring the Port Multiplier Using the JMicron RAID Manager

Windows users may install the JMicron HW RAID Manager application located on the SATA Controller CD, or download it from http://addonics.com/drivers/driver_list.php. In the CD, browse to Configuration Utilities → JMB393.

Mac and Linux users may download those versions of the same utility from http://addonics.com/drivers/driver_list.php under "Port Multiplier & Hub." The JMicron RAID Manager can be used to create, modify, and monitor the health status of the RAID drives, and provide status alerts with dialog boxes and even email. When configuring the RAID mode using the RAID Manager application, it is strongly recommended to leave the dip switch in the factory default setting.

Setting or Modifying the RAID Mode

This procedure briefly describes the steps for using the Jmicron RAID Manager's Basic Mode to create an array. The example shown is a LARGE set. There are other options available in the Advanced Modes, including building arrays using specified drives, setting up email notifications, and updating the firmware – which are not discussed in this user guide.

After starting the Jmicron RAID Manager, the first screen will show the status of any Port Multipliers detected and any drives connected. Shown below is a Port Multiplier with a variety of five drives connected:

On the left pane is "Controller 1" which is the first port multiplier detected by the software. Shown in a tree view are the five drives, listed as P0-P4. These are currently individual drives. On the right pane is a listing of the drives and below that is a graphical view of each drive. "Disk 1" through "Disk 4" indicate which physical port the drive is connected to. For the AD5HPMSXA, AD5HPMRXA-E, and AD5HPMREU this refers to ports P0-P4. On the CPR5SA unit, this refers to HD0-HD4. On the AD5EHPMEU3 this refers to D1-D5. On RAID Tower products this relates to the drives mounted left to right or top to bottom, except in cases where a drive map is included showing otherwise.

Next, click the Basic RAID Configuration tab and select the type of RAID desired. Note that RAID 1 is currently disabled as an option since more than two individual drives are available, and DELETE ALL RAID is disabled since there are currently no arrays to delete. Shown below is the same set of drives being selected as a LARGE array.

Finally, click Apply. The Jmicron RAID Manager will confirm the operation with a reminder that existing data on the drives will be lost, then perform the RAID configuration and report with a dialog box when it is complete.

The RAID and Disk Information screen (shown when the program was launched) will now show the Port Multiplier with an Array. The drives are now listed as M0-M4, indicating they are members of the array. If spares are present (individual drives added later, and the EZ switch is in the OFF position), they would be listed as S0, S1, etc. On the right pane, the RAID Level, status, capacity and members that are online are listed. Status will show "Normal" (all members on line), "Degraded" (a fault-tolerant array with a drive failure needing service), "Rebuilding" (a fault-tolerant array in the process of reconstructing lost data onto a spare) or "Broken" (an array that has lost all data).

In the event of a drive failure, the Jmicron RAID Manager will present a dialog box such as the one shown below, even if it is currently minimized to the system tray:

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