



User Guide

External Port Multiplier Ultra (AD5EHPMEU3)

www.addonics.com

v8.1.11

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

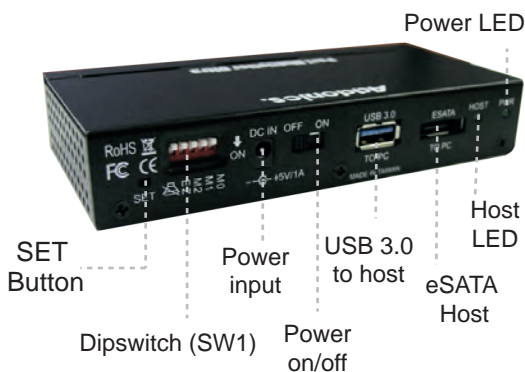
Phone: 408-453-6212

Email: <http://www.addonics.com/support/query/>

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Unpacking and Overview

D1 – D5: Refers to Device 1 - 5



Drive Activity LED:

LED will light up. If the drive is being accessed, the green LED will blink.

eSATA Ports: This is where you connect your eSATA devices (like your eSATA drive enclosure)

Power input: Connects to 5V Power supply or USB power cable.

Power on/off: This turns the port multiplier ON or OFF. When the power switch is in the OFF position, the port multiplier will be powered by a USB host, if connected. When the power switch is in the ON position, the port multiplier will be powered by the power input.

eSATA Host: Connects to eSATA controller card on a computer.

USB 3.0 Host: Connects to USB 2.0 or 3.0 port on a computer.

NOTE: Do not connect USB and eSATA at the same time.

Host LED: Glows to indicate an active connection from USB or eSATA to a host adapter, blinks to indicate activity.

Dipswitch and SET Button: Used to control the Port Multiplier RAID Mode setting.



USB Power Cable

Power Supply



Driver Disk

Port Multiplier Compatibility

When configured as a set of individual drives and connected to a SATA or 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 properties 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

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 EZ mode is disabled (SW1:2 ON), all individual drives not configured as array members will be offered to the host adapter as separate units.

To create an array with one or more spares, set or modify the RAID mode while the spares are disconnected from the Port Multiplier. When EZ mode is enabled (SW1:2 OFF), 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 any type of array is defined, individual units will be considered spare.

Configuring the Port Multiplier Using Dipswitches

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 dip switch to the desired RAID Mode.
2. While holding the SET button, turn the unit on. A long beep will sound from the Port Multiplier. The SET button may be released once the long beep starts.

Shortly after releasing the SET 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 button with a ballpoint pen, turn the unit on. A long beep will sound from the Port Multiplier. The SET 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.

BZS Switch (SW1:1):

The BZS switch is used to silence the audible alarm buzzer. The OFF position permits the audible alarm, and the ON position silences the audible alarm. The BZS switch has immediate effect.

EZ Switch (SW1:2):

The EZ (spare) switch inhibits spares when ON. When in the OFF position, all individual drives (not defined as members of an array) are considered spare and are not offered to the operating system. Should a RAID become degraded, when the EZ switch is in the OFF position a spare drive will be used automatically to rebuild the RAID, if present. EZ mode is determined when the unit is powered up. Changing the switch will have no effect until the unit has been re-powered.

Warning: turning off the EZ switch to rebuild an array will consider any drives not declared array members to be eligible for rebuild as a spare. Rebuilding will destroy all existing data on that drive and the drive chosen is not predictable.

Disconnect any individual drives with valuable data on them before enabling EZ Mode.

RAID Mode Switches M2, M1, M0 (SW1:3 – SW1-5)

The RAID Mode switches define what type of RAID will be initialized when the unit is powered up while the RAID Mode button is held down. Each type of RAID has different properties and requirements, as follows:

Dipswitch Position	1 (BZS) ¹	2 (EZ)	3 (M2)	4 (M1)	5 (M0)
JBOD (Individual Drives) * FACTORY DEFAULT SETTING	OFF	OFF ²	OFF	OFF	OFF
RAID 0	OFF	ON ³	ON	ON	ON
RAID 1 OR 10	OFF	OFF	ON	ON	OFF
RAID 3	OFF	OFF	ON	OFF	OFF
RAID 5	OFF	OFF	OFF	ON	OFF
CLONE	OFF	OFF	OFF	ON	ON
LARGE	OFF	ON	ON	OFF	ON

NOTES:

1. Audible Alarm is recommended at all times.
2. EZ mode has no effect when no array is defined.
3. Disabling EZ for RAID 0 and LARGE is strongly recommended.

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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