



User Guide

1U RAID Rack with HPM, AES 256-bit encryption (R14HPCCES)

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:

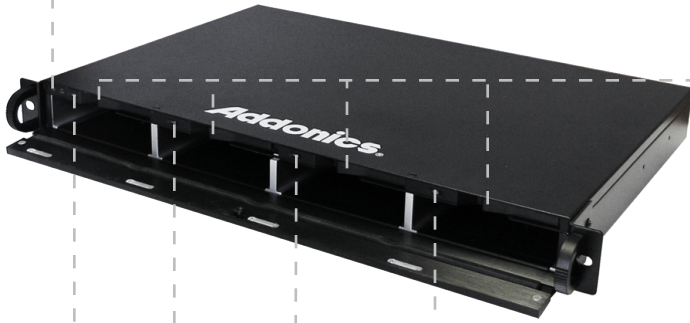
Hours: 8:30 am - 6:00 pm PST

Phone: 408-453-6212

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

Unpacking and Overview

Power Button



Drive Eject Levers

Drive Activity LED

Cipher Reset Button

Cipher LED



Power Switch

AC Input Switch

AC Input

Cipher Connector

eSATA Connector



Power Cord
(US Version Shown)



100 cm eSATA cable (2)

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.



Cipher Keys

Cipher Chain Module

The Cipher hardware in the R14CCES is activated by either powering up the unit or pressing the Cipher Reset button with the Cipher Key inserted. Without activating the Cipher hardware, no drives in the Raid Rack will be visible to the computer. Once the Cipher hardware is activated, the amber Cipher LED will glow and the drives will be available, and the Cipher key may be removed. If the Raid Rack is powered down or the Cipher Reset button is pressed, the key will need to be reinserted and the Raid Rack powered up or the reset button pressed while the key is inserted for the unit to resume normal operation. All I/O operations are encrypted so drives must be partitioned and formatted as if they were blank once installed in the Raid Rack. Should a drive with encrypted data be removed from the Raid Rack and installed elsewhere, it will appear to be completely blank with no partition table or file system.

Port Multiplier Compatibility

The R14HPCCES unit only supports configuring the drives in RAID configuration. For JBOD installations, the R14CCES unit is recommended instead. When configured as RAID, the controller is not required to support port multipliers.

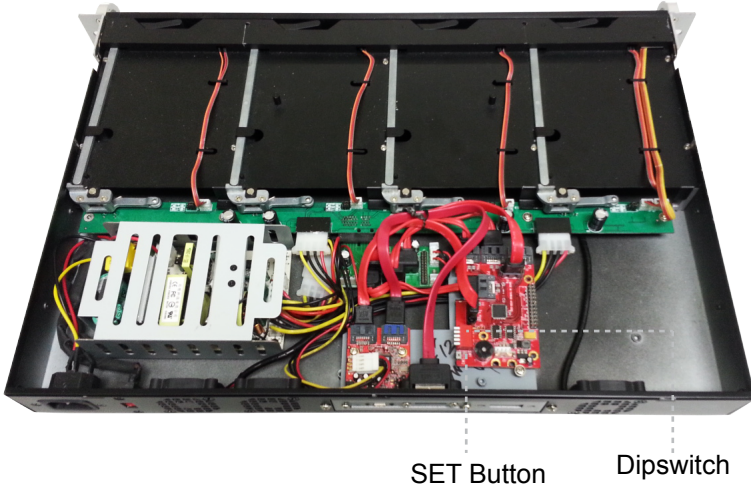
Using identical drives for all settings other than JBOD or LARGE is strongly recommended. Creating a LARGE array using drives that have different properties will use all space on all members, and performance will match that of the member in use during any particular I/O operation. Creating a RAID using 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.

Hot Swapping drives

The R14HPCCES unit supports hot swapping (inserting or removing drives while the drives are running and connected to a computer). 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.

Installation (RAID)

The Cipher hardware prevents the use of software to configure or manage the Port Multiplier. Configuring a RAID mode must be done using the dipswitches and SET button on the port multiplier itself, located inside the unit at the rear of the chassis.



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 the Host eSATA cable to a computer. If desired, connect an external eSATA drive to the Drive eSATA connector.
4. Make sure the AC input switch is set correctly, then connect the power cord to an AC outlet.
5. Insert the Cipher Key into the Cipher Keyhole.
6. Set the AC power switch on the rear to ON, then press the power button behind the front door to turn on the unit.
7. After the unit has been powered up, the Cipher Key may be removed.



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

Port Multiplier Modes

The Port Multiplier supports 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 is not supported on the R14HPCCES.

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.

RAID 0 and LARGE arrays are not fault-tolerant and spare drives will not be useful; therefore, disabling EZ for these arrays is recommended. When a spare drive is present and a fault-tolerant RAID (1, 10, 3, or 5) is defined, EZ mode will automatically rebuild any available spares into the array to replace a failed member.

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 using the AC power switch on the rear, then 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. After releasing the SET button, turn on the drives by pressing the power button on the front of the unit. Once the drives are ready, 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 using the AC power switch on the rear, then set the dip switch to the desired RAID Mode.
3. 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. After releasing the SET button, turn on the drives by pressing the power button on the front of the unit. Once the drives are ready,, 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, 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.

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