INSTALLATION GUIDE

# RMX-8268

This guide describes the RMX-8268, lists what you need to get started, and explains how to set up and get started with your hardware.

## Contents



## Safety Information

The following section contains important safety information that you must follow when installing and using the hardware.

**Caution** When this symbol is marked on a product, refer to the hardware documentation for information about precautions to take.

NATIONAL INSTRUMENTS

**Electric Shock** When this symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.

**Hot Surface** When this symbol is marked on a product, it denotes a component that may be hot. Touching this component may result in bodily injury.

Do not operate the hardware in a manner not specified in this document and in the user documentation. Misuse of the hardware can result in a hazard. You can compromise the safety protection if the hardware is damaged in any way. If the hardware is damaged, return it to National Instruments for repair.

**Caution** Multiple power sources. To completely remove power, disconnect all power cords.

Clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

Do not substitute parts or modify the hardware except as described in this document. Use the hardware only with the chassis, modules, accessories, and cables specified in the installation instructions or specifications. You must have all covers and filler panels installed during operation of the hardware.

This equipment is for use in Restricted Access Locations only.

To obtain the safety certification(s) for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

# Rack Mount Safety Information

**Caution** Due to the device weight, two people should work together to mount the device in a rack.

**Caution** When installing modules in a rack, install the heaviest modules at the bottom and progressively lighter modules toward the top. This keeps the rack's center of gravity as low as possible and helps prevent tipping when moving the rack.

Follow these safety guidelines when installing the device in a rack:

- **Elevated Operating Ambient**—If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, you should install the equipment in an environment compatible with the maximum ambient temperature ($T_{ma}$) of 45 °C.
- **Reduced Air Flow**—When installing the equipment in a rack or cabinet, do not compromise the amount of airflow required for safe operation of the equipment.
- **Mechanical Loading**—When mounting the equipment in the rack or cabinet, avoid uneven mechanical loading that could create a hazardous condition.

- **Circuit Overloading**—When connecting the equipment to the supply circuit, avoid overloading the circuits. Refer to equipment nameplate ratings to avoid damaging over current protection and supply wiring.
- **Protective Earthing**—Maintain protective earthing of rack-mounted equipment, especially when using supply connections other than direct connections to the branch circuit (for example, power strips).
- **Redundant Power Supplies**—Where redundant power supplies are provided with the equipment, connect each power supply to a separate circuit to optimize the equipment redundancy.
- **Servicing**—Prior to servicing the equipment, disconnect all power supplies.

# Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is not intended for use in industrial locations.

Any modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

**Notice** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

# Sicherheitshinweise

Im folgenden Abschnitt finden Sie wichtige Sicherheitshinweise, die bei der Inbetriebnahme und der Verwendung des Geräts unbedingt zu beachten sind.

**Vorsicht!** Welche Vorsichtsmaßnahmen bei Produkten mit diesem Symbol zu treffen sind, wird in der Dokumentation zu Ihrem Gerät erläutert.

**Elektrischer Schock** Wenn ein Produkt mit diesem Symbol gekennzeichnet ist, besteht die Gefahr eines elektrischen Schlags.

**Heiße Oberfläche** Bei Produkten mit diesem Symbol kann eines der Bauteile heiß werden. Bei Berührung besteht Verletzungsgefahr.

Verwenden Sie das Gerät nicht anders als in diesem Dokument und der Benutzerdokumentation angegeben. Beim unsachgemäßen Umgang mit dem Gerät kann es zu Schäden kommen. Beispielsweise können bei falscher Handhabung des Geräts die eingebauten Sicherheitsvorrichtungen versagen. Alle defekten Geräte sollten daher an National Instruments zurückgesendet und umgetauscht werden.

**Vorsicht!** Mehrere Stromquellen. Ziehen Sie alle Netzkabel ab, um die Stromversorgung vollständig zu unterbrechen.

Das Gerät sollte mit einer weichen, nicht metallischen Bürste gereinigt werden. Bevor es nach der Reinigung wieder genutzt wird, muss es vollständig trocken und frei von Verschmutzungen sein.

Soweit nicht anders beschrieben, dürfen keine Änderungen an dem Gerät vorgenommen werden. Das Gerät darf nur zusammen mit den in der Installationsanleitung oder in den Spezifikationen aufgeführten Chassis, Modulen, Kabeln und Zubehörteilen genutzt werden. Beim Betrieb des Geräts müssen alle Blenden und Abdeckungen angebracht sein.

Dieses Gerät darf nur an Standorten mit eingeschränktem Zugriff verwendet werden.

Für die Suche nach Sicherheitszertifikaten besuchen Sie `ni.com/certification`, geben Sie die Nummer des betreffenden Modells oder die Produktlinie ein und klicken Sie in der Spalte "Certification" auf den gewünschten Link.

# Sicherheitshinweise zum Einbau in einen Gestellrahmen

**Vorsicht!** Wegen seines Gewichts sollte das Gerät immer zu zweit in einen Gestellrahmen eingebaut werden.

**Vorsicht!** Wenn Sie Module in einem Gestellrahmen installieren, installieren Sie die schwersten Module unten und die leichteren Module mit abnehmendem Gewicht weiter oben. Dies hält den Schwerpunkt des Gestellrahmens möglichst tief und verhindert ein Umkippen beim Anstoßen.

Beim Einbau in einen Gestellrahmen sind folgende Sicherheitsrichtlinien zu befolgen:

- **Betriebstemperatur**—In einem geschlossenen Gestell oder einem Gestell für mehrere Geräte kann die Betriebstemperatur des Geräts höher als die Umgebungstemperatur sein. Daher sollte das Gerät nur dort eingebaut werden, wo die maximale Umgebungstemperatur ($T_{ma}$) 45 °C nicht übersteigt.
- **Belüftung**—Sorgen Sie beim Einbau in ein Gestell oder Gehäuse für genügend Belüftung, um den sicheren Betrieb des Geräts zu gewährleisten.
- **Lastverteilung**—Sorgen Sie beim Einbau in ein Gehäuse oder Gestell für gleichmäßige Lastverteilung.
- **Überlast**—Achten Sie beim Anschließen des Geräts an die Stromversorgung darauf, dass die maximal zulässigen Werte für Strom und Spannung nicht überschritten werden. Die technischen Daten finden Sie auf dem Etikett des Geräts. Bei Überlastung können die Überstromschaltung und die Kabel beschädigt werden.
- **Erdung**—Achten Sie darauf, dass alle in Gestelle eingebauten Geräte ordnungsgemäß geerdet sind. Das gilt insbesondere, wenn die Geräte nicht direkt an die Stromversorgung angeschlossen sind, sondern beispielsweise über Mehrfachsteckdosen.

- **Redundante Stromversorgung**—Wenn es für das Gerät mehrere Netzteile gibt, schließen Sie jedes Netzteil zur Steigerung der Ausfallsicherheit an einen separaten Stromkreis an.
- **Instandhaltung**—Alle Geräte sind vor der Instandhaltung von der Stromversorgung zu trennen.

# Introduction

The RMX-8268 is a 2U RAID array specifically designed for record/playback applications. It leverages a commercially available enterprise class RAID controller and solid state hard drives. It connects to the host using a Gen3 x8 Cabled PCI Express link.

This chassis supports up to 24 enterprise class SATA or solid-state drives. The system is preconfigured as RAID 0. The RAID card also supports additional modes such as RAID 1, RAID 5, RAID 6, RAID 10, RAID 50, RAID 60, and JBOD, but NI has not specifically validated these RAID modes for performance. Refer to the LSI RAID controller user manual on `ni.com` for more information about these modes.

The RAID array is typically connected to the host using a PXIe-8394, PXIe-8399, or PCI-8398.

**Note** The remainder of the manual describes systems connecting the RMX-8268 to the PXIe-8394, but the information is also applicable to systems using the PXIe-8399 and PCIe-8398.

## RMX-8268 Gen3 x8 System

The RAID system consists of a PXIe-8394 in a PXI Express or CompactPCI Express chassis, connected to the RMX-8268. This system can use the full bandwidth of Gen3 x8 MXI (Generation 3) technology. To achieve maximum throughput, the PXI Express host controller and the PXI Express chassis must support Gen3 x8 PXI Express devices. The RMX-8268 works with non-Gen3 PXI Express controllers and chassis, but at a reduced speed.

# What You Need to Get Started

To set up and use your RMX-8268 for PXI Express, you need the following hardware and software to use with your PXI Express chassis and controller:

- Host: PXI Express controller and chassis
- RAID array: RMX-8268
- Host connection: PXIe-8394, PXIe-8399, or PCIe-8398
- Cable: Gen3 x8 MXI

# Unpacking

Your RMX-8268 system is preassembled and preconfigured for maximum bandwidth (RAID 0). You need only to remove the RMX-8268 RAID storage chassis from the shipping box and assemble your system. There is no need to open your RMX-8268 chassis. The system is preconfigured and sealed.

**Notice** Your RMX-8268 system is sensitive to electrostatic damage (ESD). ESD can damage several components on the system.

**Notice** *Never* touch the exposed pins of connectors. Doing so may damage the device.

To avoid such damage in handling the device, take the following precautions:

- Ground yourself using a grounding strap or by holding a grounded object.
- Touch any antistatic packaging to a metal part of the chassis before removing the device from the package.

# Hardware Installation and Use

This section explains how to install and use the RMX-8268 for PXI Express.

## Hardware Installation for Gen3 x8 PXI Express Solution

The following are general instructions for installing the RMX-8268 for PXI Express system. Consult your computer user manual or technical reference manual for specific instructions and warnings.

### Installing a PXIe-8394

Complete the following steps to install the PXIe-8394 in your PXI Express or CompactPCI Express chassis:

1. Power off your PXI Express or CompactPCI Express chassis, but leave it plugged in while installing the PXIe-8394. The power cord grounds the chassis and protects it from electrical damage while you install the module.
2. Locate an available PXI Express or CompactPCI Express slot in the chassis. The PXIe-8394 must *not* be installed in the controller slot (slot 1 in a PXI Express chassis).

**Caution** To protect both yourself and the chassis from electrical hazards, leave the chassis off until you finish installing the PXIe-8394.

3. Remove or open any doors or covers blocking access to the slot where you intend to install the PXIe-8394.
4. Touch the metal part of the case to discharge any static electricity that might be on your clothes or body.
5. Make sure the injector/ejector handle is in its downward position. Be sure to remove all connector packaging and protective caps from retaining screws on the module. Align the PXIe-8394 with the card guides on the top and bottom of the system controller slot.

**Caution** Do *not* raise the injector/ejector handle as you insert the PXIe-8394. It will not insert properly unless the handle is in its downward position so that it does not interfere with the injector/ejector rail on the chassis.

6. Hold the handle as you slowly slide the module into the chassis until the handle catches on the injector/ejector rail.
7. Raise the injector/ejector handle until the module firmly seats into the backplane receptacle connectors. The front panel of the PXIe-8394 should be even with the front panel of the chassis.
8. Tighten the bracket-retaining screws on the top and bottom of the front panel to secure the PXIe-8394 to the chassis.
9. Replace or close any doors or covers to the chassis.

## Cabling

Connect the Gen3 x8 MXI cable to both the PXIe-8394 and the RMX-8268 chassis. The cables have no polarity, so you can connect either end to either the card or chassis.

**Caution** Do *not* remove the cable after the system is powered on. Doing so can hang or cause errors in applications communicating with devices. If a cable becomes unplugged, plug it back into the system. (You may need to restart your computer.)

**Note** Refer to the *Cable Options* section for cable specifications.

## Powering Up the RMX-8268 for PXI Express System

To power up the RMX-8268 for PXI Express system, power-on the host. The RMX-8268 chassis now should turn on.

## Powering Down the RMX-8268 for PXI Express System

Because operating systems and drivers commonly make the assumption that PCI devices are present in the system from power-up to power-down, it is important *not* to power off the RMX-8268 chassis independently. Powering off the RMX-8268 chassis while the host is still on can cause data loss, crashes, or hangs. When you shut down the host controller, the RMX-8268 is sent a signal over the cabled PCI Express link to shut down.

# Driver Installation

When installing RAID drivers, make sure your host system is connected to the internet, which allows the OS to download the RAID driver automatically. If that does not work, go to `ni.com` and search for *Drivers for RAID*.

For more information about driver installation, consult the driver installation chapter of the RAID controller user manual on `ni.com`.

**Note** The RMX-8268 is supported on Windows 10 only.

# Partitioning and Formatting

## Instructions for Formatting the RAID Volume

Complete the following steps to format the RAID volume:

1. Open your disk management console by pressing <Windows-R>.
2. Enter `diskmgmt.msc` and press <Enter>. The Initialize Disk window opens.
3. Choose **GPT** and click **OK**. Your disk now shows up as unallocated in the Disk Management utility with a black bar across the top.
4. Right-click on the unallocated disk.
5. Select **New Simple Volume** to launch the New Simple Volume Wizard.
6. In **Specify Volume Size**, the maximum volume size is chosen by default. Click **Next**.
7. In **Assign Drive Letter or Path**, you may assign a drive letter to your new volume. Choose a drive letter and click **Next**.
8. In **Format Partition**, change the **Allocation Unit** size to 64 KB, which improves performance in sequential read and write applications.
9. Ensure that **Perform a quick format** is selected and click **Next**.
10. Click **Finish** to exit the New Simple Volume Wizard.

**Note** Powering off the RMX-8268 chassis while the host still is on can cause data loss, crashes, or hangs. When you shut down your host computer, your RMX-8268 turns off.

# Virtual Disk Configuration

## Reconfiguring the RMX-8268 Virtual Disk for PXI Express Systems

The RMX-8268 systems are preconfigured and validated using RAID0. The RAID card supports additional RAID modes; however, NI has not specifically validated the sustained performance and reliability of these additional RAID modes.

**Caution** Reconfiguring your RAID arrays erases all data on your system. Back up all data before reconfiguring.

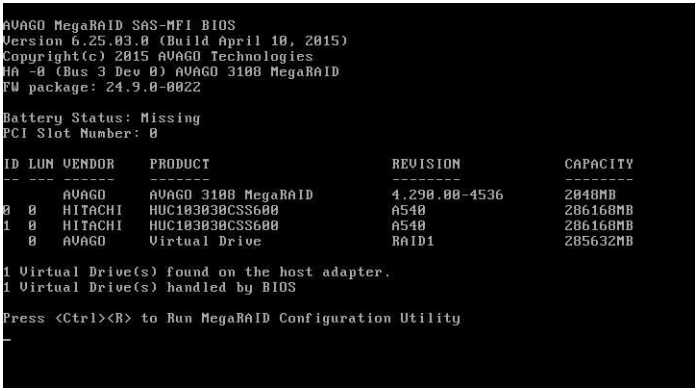
**Caution** If you need to reset your RMX-8268 to factory default settings, complete the steps described in the following sections when creating your virtual disk. Unless otherwise noted below, leave other settings at their default values.

You can reconfigure the RAID arrays using the ROM configuration menu or the RAID management utility, as described in the following sections.

## Reconfiguring RAID Arrays Using the ROM Configuration Menu

### Starting the Avago MegaRAID Configuration Utility

To start the Avago MegaRAID Configuration Utility, power on the system and press <Ctrl-R> to enter the utility when the following screen displays.




### The Avago MegaRAID Main Screen

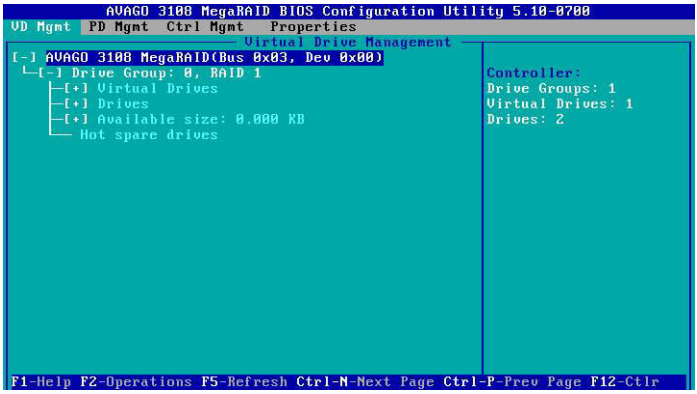
As shown in the following figure, at the top of the Avago MegaRAID main screen are the following configurable menu items:

- **VD Mgmt** (Virtual Drive Management)
- **PD Mgmt** (Physical Management)
- **Ctrl Mgmt** (Controller Management)
- **Properties**
- **Foreign View**

**Note** The **Foreign View** menu item displays only when a foreign configuration is connected to the controller.

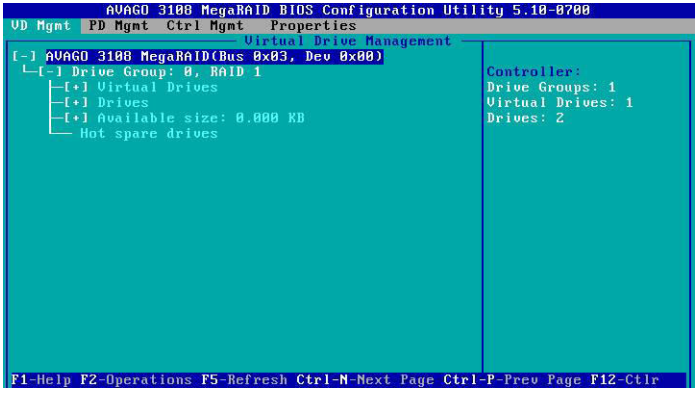
Press <Ctrl-N> or <Ctrl-P> to select the desired menu item.

**Note** Drive size, capacity, and manufacturer may vary from those shown in the following images.

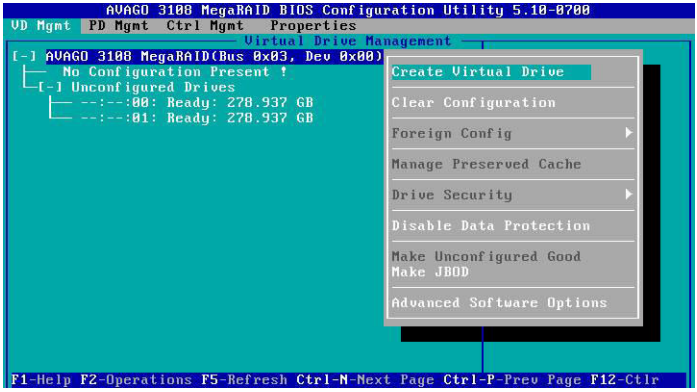



## VD Mgmt (Virtual Drive Management)

When you enter the MegaRAID Configuration Utility, **VD Mgmt** is the first screen that displays, as shown below. This screen provides information about the configuration of controllers, drive groups, and virtual drives. The right panel displays information about the selected device. To select a submenu item, use the up and down arrow keys. Use the right arrow key to open a submenu and the left arrow key to close a submenu.

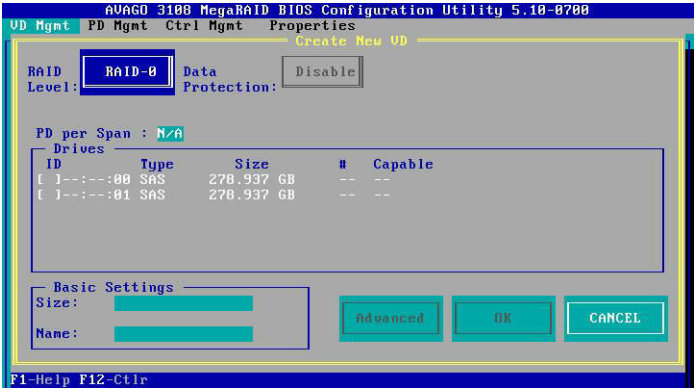


Move the cursor to select the controller and press <F2>. Press <Enter> to create new virtual drives when the following screen displays.

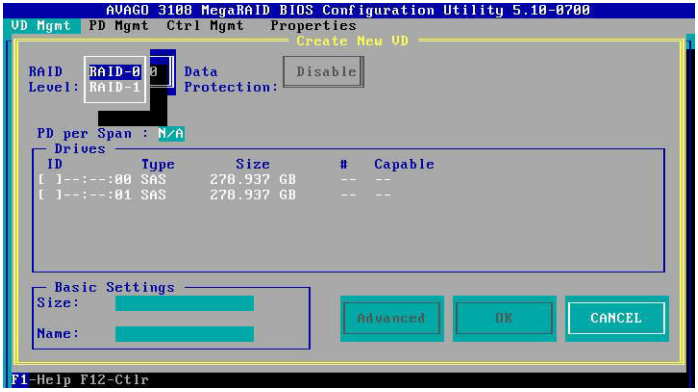



**Note** You can use the up and down arrow keys to select enabled commands, highlighted in white, such as **Create Virtual Drive** or **Clear Configuration**.

Press <Enter> for the RAID level selection when the following screen shows. You also can use this screen to select the new virtual drive's parameters using the up or down arrow keys or <Tab>.



Use the up or down arrow keys to select the RAID level, as shown below, and press <Enter>.

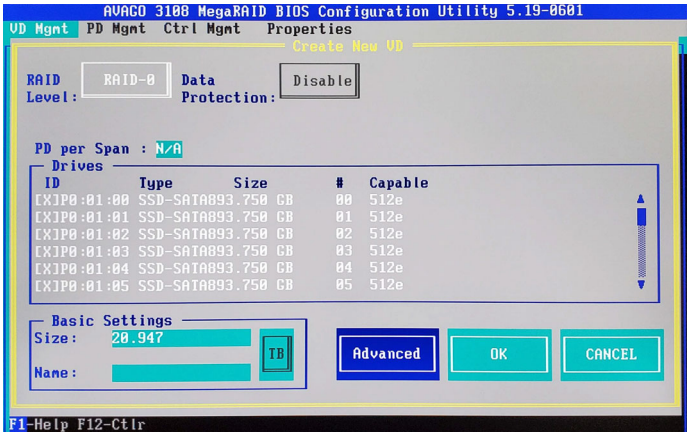



**Note** The corresponding RAID level(s) displayed are based on the number of hard drives connected to the selected controller, as shown in Table 1.

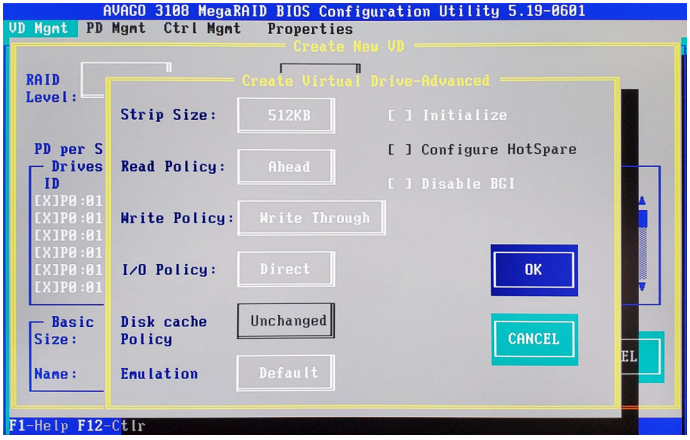
**Table 1.** Minimum Number of Hard Drives Required for RAID Levels

| RAID | Minimum Number of Hard Drives |
|---|---|
| RAID 0 | 2 |
| RAID 1 | 2 |
| RAID 5 | 3 |
| RAID 6 | 3 |
| RAID 10 | 4 (2 RAID 1 Arrays) |
| RAID 50 | 6 (2 RAID 5 Arrays) |
| RAID 60 | 6 (2 RAID 6 Arrays) |

Press **Enter** to select all drives. Tab to the **Advanced** menu, as shown below.




In the **Advanced** menu, set **Strip Size** to 512 KB and **Write Policy** to Write Through, as shown below. Leave all other settings at default.

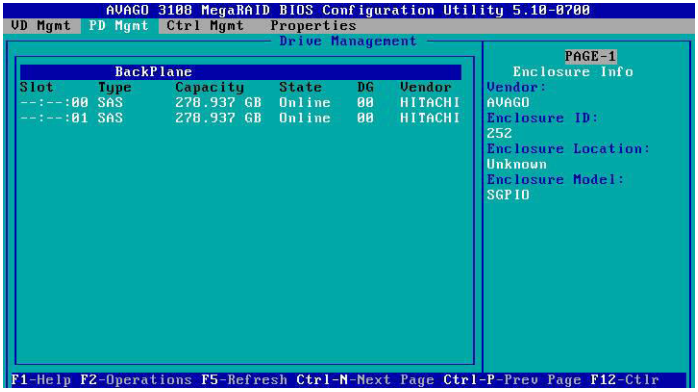


Click **OK** to skip initialization, as shown below.


You now have created the virtual drive. Refer to *Partitioning and Formatting* for the next step.

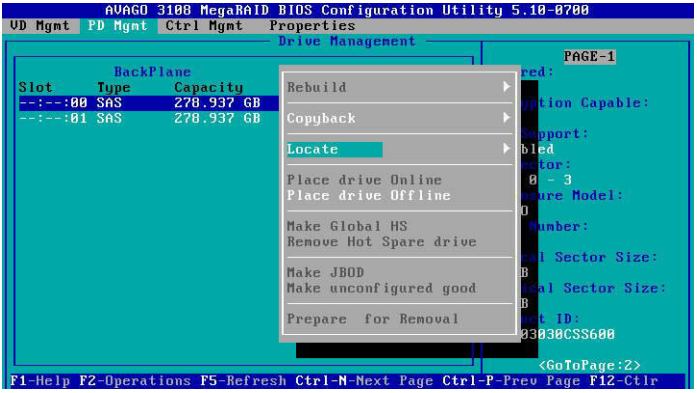
## PD Mgmt (Physical Drive Management)

Press <Ctrl-N> or <Ctrl-P> to select the **PD Mgmt** menu item, as shown below. The **PD Mgmt** screen provides information about hard drives connected to the selected controller. The right panel shows information about the selected device.



To select a device, use the up or down arrow keys or <Tab> and press <F2>.

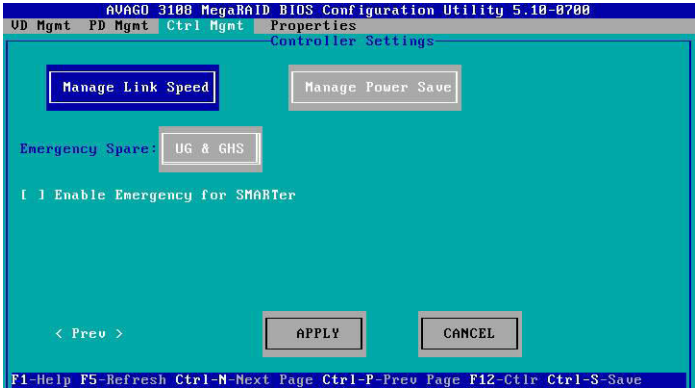
Press <Enter> to perform a command such as rebuilding a failed drive, locating a drive, or making a drive offline, as shown below.




## Ctrl Mgmt (Control Management)

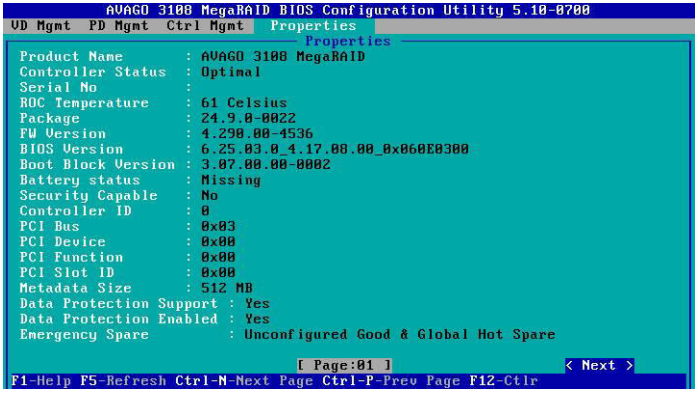
Press <Ctrl-N> or <Ctrl-P> to select the **Ctrl Mgmt** menu item, as shown below. The **Ctrl Mgmt** screen provides information about the selected controller's settings. On this screen, use the up or down arrow or <Tab> to move the cursor. To apply changes, navigate to **APPLY** and press <Enter>.

Navigate to **Next** and press <Enter> to open the second screen, as shown below. Use the following screen to view and change settings such as the link speed or power save.

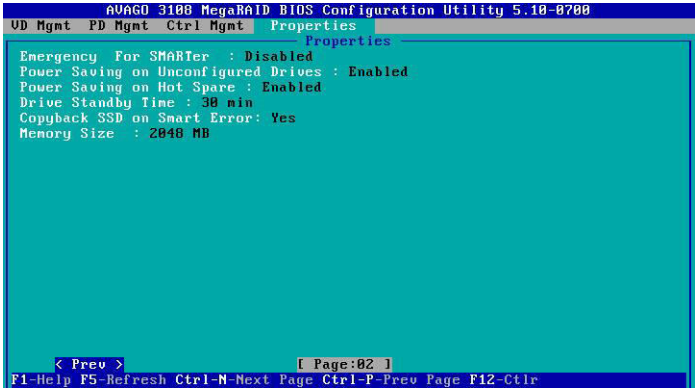



## Properties

Press <Ctrl-N> or <Ctrl-P> to select the **Properties** menu item, as shown below. The **Properties** screen provides read-only information about the selected controller's properties.



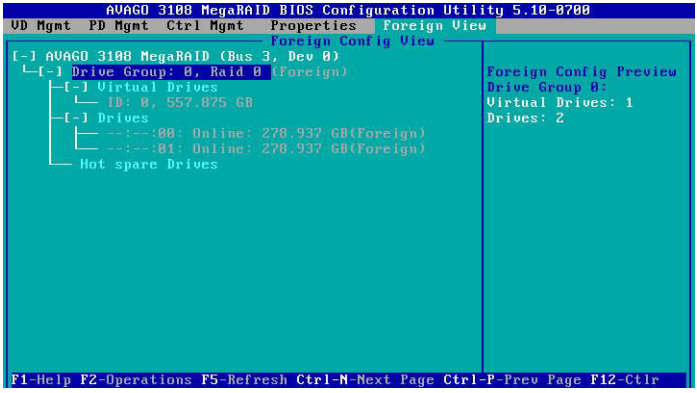
Navigate to **Next** and press <Enter> to open the second screen to view more properties, as shown below. To return to the first screen, navigate to **Prev** (Previous) and press <Enter>.




## Foreign View

**Note** The **Foreign View** menu item displays only when a foreign configuration is connected to the controller.

Press <Ctrl-N> or <Ctrl-P> to select the **Foreign View** menu item, as shown below. The **Foreign View** screen provides information about the foreign configurations, such as drive groups, virtual drives, physical drives, and hot spare drives. You also can use this menu to import or clear the foreign configurations.




## Reconfiguring RAID Arrays Using the RAID Management Utility

Install the RAID management software from within Windows. The RAID management utility is on the included CD and the RAID controller manufacturer's website.

## Reconfiguring the RMX-8268 to Its Default State

To reconfigure your RMX-8268 to its default state of RAID0, complete the following steps. These instructions use the MegaRAID Storage Manager browser-based RAID management console. Refer to the RAID controller user manual at `ni.com` for more information about using this software.

1. Open the MegaRAID Storage Manager.
2. Enter the PXI Express Host **User Name** and **Password** (use your Windows username and password).
3. Under the **Logical** tab, right-click **Controller0** and select **Create Virtual Drive**.
4. Select **Advance** and click **Next**.
5. Select RAID0 from the **RAID Level** pull-down menu.
6. Select all drives (<CTRL-A>).
7. Click **ADD** and then **Next**.
8. Make the following changes on the Virtual Drive properties page and leave everything else at default:
   - **Stripe Size (KB)**—512 KB
   - **Write cache**—Write Through
9. Select **Create Virtual Drive**.
10. Click **OK** at the warning about Write Through Mode.
11. Select **Finish**.

Follow the instructions in this guide under the *Partitioning and Formatting* section to configure your new virtual disk for use with your Windows operating system.

# Rackmount Installation

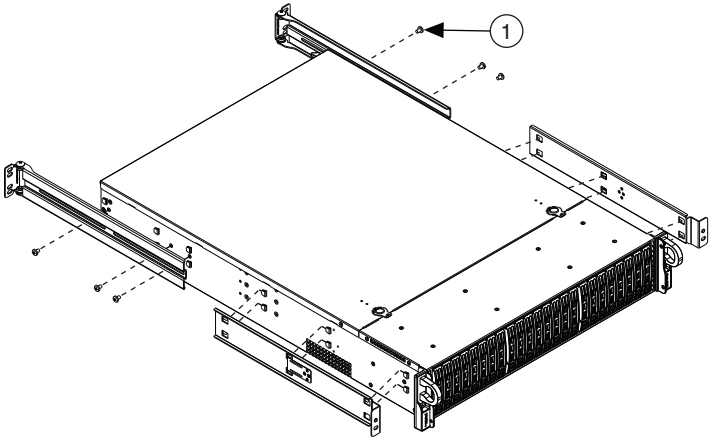
Complete the following steps to install the RMX-8268 into a rack using the provided rackmount kit:

1. Attach a rear rail to each side of the RMX-8268 using the provided #8-32 x 1/4 in. fasteners, as shown in Figure 1.

**Note** Do not fully tighten the fasteners. The rails need to slide to allow for final adjustments within the rack.

2. Attach a front rail to each side of the RMX-8268, as shown in Figure 1. These parts snap lock into place. The parts are marked LH and RH for left hand and right hand; the orientation is relative to the unit when you look toward the hard drive bays.

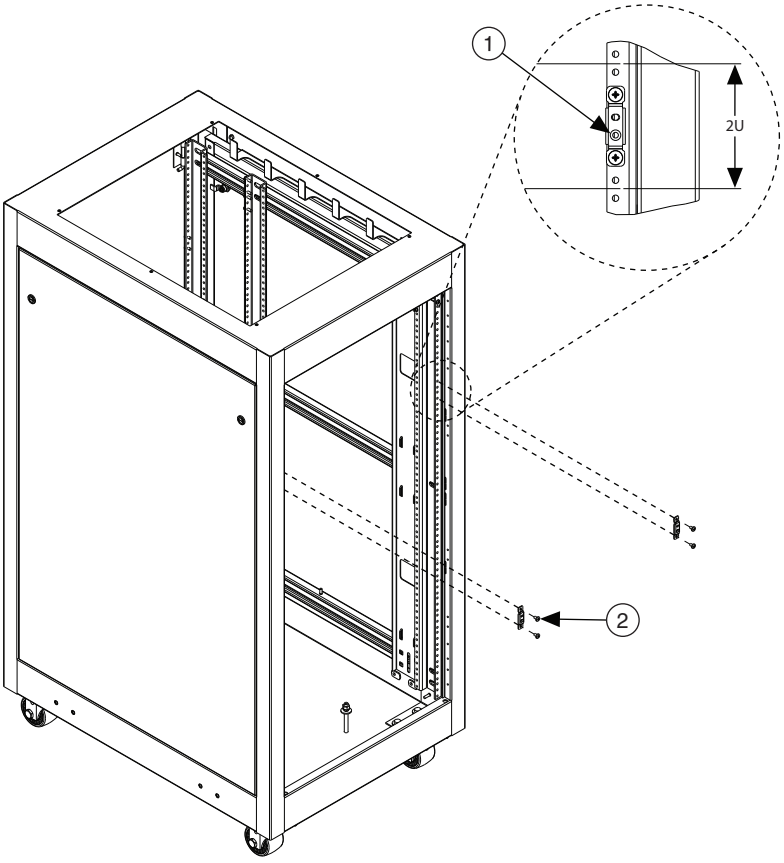
**Figure 1.** Attaching the Rails to the RMX-8268




1 #8-32 x 1/4 in. Fastener (x6)

3. Install a front bracket on each side of the rack using the provided #10-32 x 5/16 in. fasteners, as shown in Figure 2. Refer to the following figure for placement of the front brackets on the rails relative to the 2U space that the RMX-8268 will occupy. Install the front bracket with the threaded hole oriented downward.

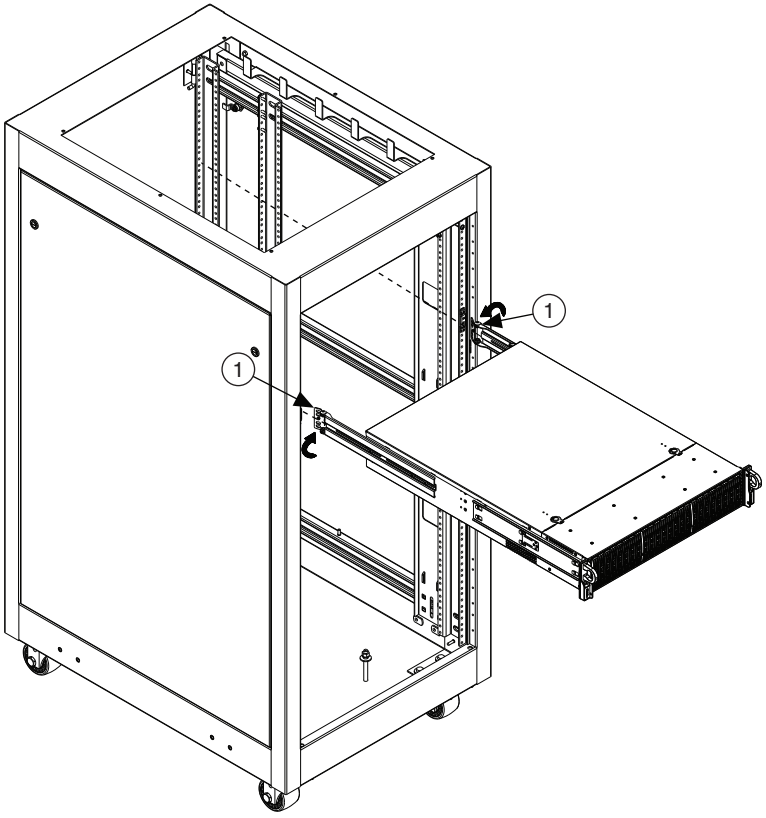
**Figure 2.** Installing the Front Brackets on the Rack




| | | | |
|---|---|---|---|
| 1 | Threaded Hole (Oriented Downward) | 2 | 10-32 x 5/16 in. Fastener (x4) |

4. Slide the RMX-8268 into a 2U space within the rack, as shown in Figure 3. (Two people should support the unit during this step.) Be sure the rear hinges are rotated inward to prevent collision with the rack.

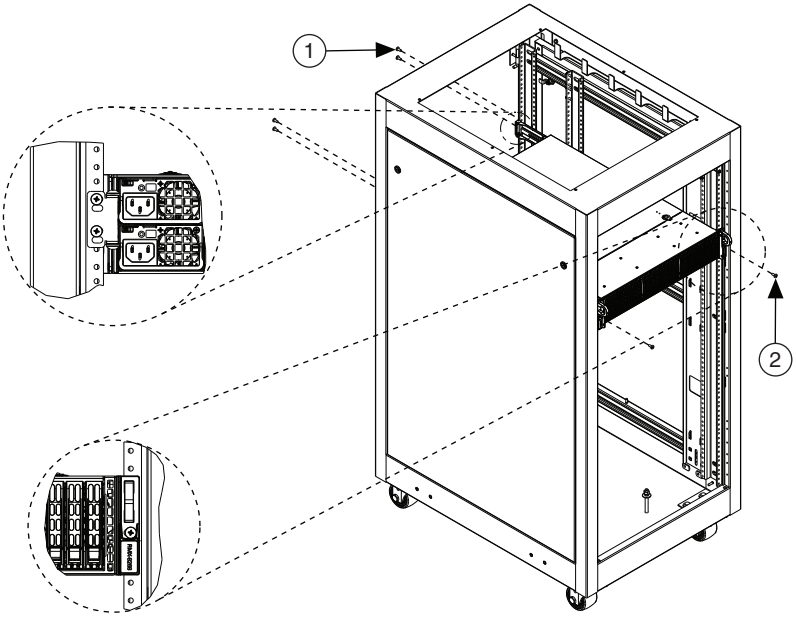
**Figure 3.** Sliding the RMX-8268 into the Rack




1 Hinged Bracket (Rotated)

5. Secure the rear of the rackmount to the rack using the provided #10-32 x 7/16 in. fasteners, as shown in Figure 4.
6. Secure the front of the RMX-8268 to the rack using the provided #10-32 x 7/16 in. fasteners, as shown in Figure 4. (Align the front screws to the bracket as shown in the enlargement.)

**Figure 4.** Securing the RMX-8268 to the Rack




| | | | |
|---|---|---|---|
| 1 | Rear Bracket Installation with #10-32 x 7/16 in. Fasteners (x4) | 2 | Front Bracket Installation with #10-32 x 7/16 in. Fasteners (x2) |

7. Fully tighten the #8-32 x 1/4” fasteners (installed in step 1) on each side of the RMX-8268. (You may need to remove the rack side covers to access the fasteners.)

# Hardware Overview

This section presents an overview of RMX-8268 hardware functionality and explains the operation of each functional unit.

## LED Indicators

The LEDs on PXIe-8394 cards give status information about power supplies and link state. The back of the RMX-8268 has two LEDs on the ECA card, one for power supply status and one for link state.

Table 2 describes the meaning of the LEDs on the back of the RMX-8268.

**Table 2.** RMX-8268 Back Panel Status LED Messages

| LED | Color | Meaning |
|---|---|---|
| LINK | Off | Link not established |
| | Green | Link established |
| PWR | Off | Power off |
| | Green | Power on |

## RAID Card Manufacturer

Manufacturer ..... Supermicro

Model..... AOC-S3108L-H8iR

Website ..... `www.supermicro.com`

## Cable Options

The RMX-8268 system supports only the cable specified in Table 3. If any other Gen3 x8 cable is used, the RMX-8268 may not operate per its specifications.

**Table 3.** National Instruments x8 Cable for Use with PXIe-8394 and RMX-8268

| Cable Length (Meters) | Description |
|---|---|
| 3 m | X8 MXI Express cable (part number 787326-03) |

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378080B-01 Jul20