



## PixelStor 300e

MegaPixel Storage

SAS Expansion Enclosure

Hardware Installation Manual



1st Edition  
May 2013

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# About This Manual

**Conventions**

**Safety Symbols**

**Safety Precautions**

**Regulatory and Integration Information**

## About This Manual

### Conventions

To make sure that you perform certain tasks properly, take note of the following symbols used throughout this manual.



---

<b>Warning:</b>	Provides Information to prevent injury in the process of completing a task.
-----------------	---

---



---

<b>Caution:</b>	Provides Information to prevent damage to the components in the process of completing a task.
-----------------	---

---



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<b>Important:</b>	Provides Information required for completing a task.
-------------------	--

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<b>Note:</b>	Provides Tips to aid in completing a task.
--------------	--

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## Safety Symbols

The following symbols are placed on some components of the system to alert the user to potential hazards,



---

**WARNING:** Electric Shock Hazard – To reduce risk of injury from electric shock hazards, do not open this component.



---

**WARNING:** Contains No User or Field Serviceable Parts – To reduce the risk of injury from electric shock hazards, do not open this component.



---

**WARNING:** Hot Surface or Component - To reduce risk of injury from a hot component; allow the surface to cool before touching.



---

**WARNING:** Insert Network Interface Only - Any receptacle (e.g. RJ45) marked with this symbol indicates a network interface connection. To reduce the risk of electric shock, fire or damage to equipment, do not plug telephone or telecommunications connectors into this receptacle



---

**WARNING:** This symbol, on power supplies or systems, indicates that the equipment is supplied by multiple sources of power. To reduce the risk of injury from electric shock, remove all power cords to completely power down the system.



Weight in kg  
Weight in lb

---

**WARNING:** This symbol indicates that the component exceeds the recommended weight for one individual to handle safely. To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

---



## Safety Precautions



### Technician Notes

- Only authorized technicians should attempt to repair this equipment.
- Before installing this system, carefully read all the manuals included with the system.
- All repair procedures allow only module replacement. Because of the complexity of the individual boards and sub-assemblies, no one should attempt to make repairs at the component level or make modifications to any printed wiring board. Improper repairs can create a safety hazard.
- To reduce the risk of personal injury from electric shock and hazardous energy levels, do not exceed the level of repairs specified in these procedures.
- The system is designed to be electrically grounded. To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.



### Electrostatic Discharge Precautions

- Electrostatic discharge (ESD) can damage static sensitive devices or micro circuitry. Proper packaging and grounding techniques are required to prevent damage.
- Keep electrostatic-sensitive parts in their containers until they arrive at a static free work area.
- Use a wrist strap connected to the work surface as well as properly grounded tools and equipment
- Keep the area free of nonconductive materials such as ordinary plastic tools and foam packing.
- Avoid touching pins, leads, or circuitry.
- Always place drives with printed circuit board (PCB) assembly-side down.
- Grasp cards and boards by the edges. Hold drives by the frame. Avoid touching the solder joints or pins.
- If you need to lay the device down while it is out of the antistatic bag, lay it on the antistatic bag. Before picking it up again, touch the antistatic bag and the metal frame of the system unit at the same time.



### Rack Warnings

If you plan to rack mount the PixelStor 300e, please follow the rack manufacturer's safety instructions.

- Install the enclosure only in a rack that has been properly secured in an area with suitable environmental conditions.

- Have someone assist you during physical installation.
- To properly ventilate the system, you must provide at least 7.6 cm of clearance at the front and back of the system.
- To reduce the risk of personal injury or damage to equipment, always ensure that the rack is adequately stabilized prior to extending a component outside the rack. A rack may become unstable if more than one component is extended. Extend only one at a time.
- Do not stand or step on any components in the rack.
- If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T<sub>ma</sub>) specified by the manufacturer.
- Do not overload the AC power supply branch circuit that provides power to the rack. Observe extension cable and power strip ratings. Ensure that the total ampere rating of all equipment plugged into the extension cable or power strip does not exceed 80 percent of the ampere ratings limit for the extension cable or power strip.



#### System Warnings

- Avoid dust, humidity, and extreme temperatures; place the system on a stable surface.
- To reduce the risk of personal injury from hot surfaces, allow the hot-plug disk modules and other system modules to cool before touching them.
- To reduce the risk of electric shock or damage to the equipment, do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Ensure the power cord is inserted into a grounded electrical outlet that is easily accessible at all times. Unplug the power cord from the power supply module to shut off power to the equipment
- Protect the storage system from power fluctuations and temporary power interruptions with a regulating uninterruptible power supply (UPS). This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system operational during a power failure.
- The storage system must always be operated with all hot plug modules installed or slot covers in place to ensure proper cooling.
- Route power cords so that they will not be walked on or pinched by items placed upon or against them. Pay particular attention to the plug, electrical outlet, and the point where the cords exit from the product.

## Regulatory and Integration Information

### Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, this system is assigned a serial number. This system serial number can be found on the product label, along with the required approval markings and information. When requesting certification information for this product, always refer to this serial number. This serial number should not be confused with the marketing name or model number.

### Product Regulatory Compliance

#### Product Safety Compliance

This system complies with the following safety requirements:

Table i Product Safety Requirements

IEC 60950-1	Safety of Information Technology Equipment
EN 60950-1	Safety of Information Technology Equipment Including Electrical Business Equipment, European Committee for Electro-technical Standardization (CENELEC)
UL 60950-1	Safety of Information Technology Equipment
UL 94	Tests for Flammability of Plastic Materials for Parts in Devices & Appliances
GB4943	Safety of Information Technology Equipment

Worldwide Safety approvals can be supplied upon request. Please contact your sales representative for approvals.

#### Product EMC Compliance

This product has been tested and verified to comply with the following electromagnetic compatibility (EMC) regulations.

#### Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules

place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device, as well as additional operating instructions for the user.

The rating label on the device shows which class (A or B) the equipment falls into. Class A devices do not have an FCC logo or FCC ID on the label. Class B devices have an FCC logo or FCC ID on the label. Once the class of the device is determined, refer to the following corresponding statement.

### **Class A Equipment**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

### **Declaration of Conformity for Products Marked with the FCC Logo—United States Only**

This device complies with Part 15 of the FCC Rules Operation and is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. For questions regarding your product, please contact your sales representative.

To identify this product, refer to the Part, Series, or Model number found on the product.

### **European Union Notice**

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low-Voltage Directive (73/23/EEC) issued by the Commission of the European Community. Compliance with these directives implies conformity to the following European Norms (items in brackets are the equivalent international standards):

Table ii European Union Safety Requirements

EN55022 (CISPR 22)	Electromagnetic Interference
EN55024 (IEC61000-4-2,3,4,5,6,8,11)	Electromagnetic Immunity
EN61000-3-2 (IEC61000-3-2)	Power Line Harmonics

## *About This Manual*

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EN61000-3-3 (IEC61000-3-3)	Power Line Flicker
EN60950 (IEC950)	Product Safety

## Canadian Notice (Avis Canadien)

### Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### Japanese Notice

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## Power Cords

The power cord set included in the system meets the requirements for use in the country where the system was purchased. If this system is to be used in another country, contact your sales representative to purchase a power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the cross-sectional area of the wires must be a minimum of 1.00mm<sup>2</sup> or 18AWG, and the length of the cords must be between 1.8m (6 feet) and 3.6m (12 feet). If you have questions about the type of power cord to use, contact your sales representative.

The following statement applies only to rack-installed products that are GS-Marked:

This equipment is not intended for use at workplaces with visual display units, in accordance with §2 of the German ordinance for workplaces with visual display units."

# Chapter 1

## Introduction

**Audience Assumptions**

**About This Guide**

**Packing Checklist**

**Specifications**

**Product Features**

**System Overview**

# 1 Introduction

## 1.1 Audience Assumptions

This manual assumes that you are a service technician or network administrator familiar with computer hardware, data storage and network administration terminology and tasks.

## 1.2 About this Guide

This hardware installation guide provides step by step instructions on how to prepare and install the PixelStor 300e SAS expansion enclosure hardware. This guide also includes information on its use and maintenance. Once the PS300e hardware is ready, you will need to refer to the PixelStor 5000 documentation (included with that system) to provision the storage and set up host access. This manual is generally organized as follows:

Table 1-1 Introduction of the Manual

<b>Introduction</b>	General introduction to the PS300e and its components.
<b>Hardware Installation</b>	Detailed description of each hardware module and instructions for installation and removal.

## 1.3 Packing Checklist

Make sure you have all the components shipped with your system. If any item is damaged or missing, please contact your sales representative for replacement. The PS300e is shipped with the following:

Table 1-2 Packing Checklist

<b>Chassis</b>	➤	2U rack-mounted chassis
<b>SAS IO Modules</b>	➤	One or two SAS IO Modules depending on the configuration
<b>Power Supplies</b>	➤	One or two Power Supply Modules depending on the configuration.
<b>Chassis Brackets</b>	➤	Two chassis brackets for rack installation.
<b>Hard Disk Drives</b>	➤	Up to twelve hot plug 3.5" SATA II drive canisters with or without drives depending on the configuration.



<b>Cables</b>	➤	Two SAS Cables and one RS232 Cable
<b>Power Cords</b>	➤	Two power cords

---

## 1.4 Specifications

The table below is the technical specification for the PixelStor 300e.

Table 1-3 Specifications

<b>Dimensions</b>	➤	Height: 8.75cm
	➤	Width: 43.00cm
	➤	Length: 68.70cm
<b>Weight</b>	➤	Max-weight: 28.96kg±5% (12xDrives)
<b>Temperature</b>	➤	Operating System: +10°C~+35°C
	➤	Non-operating System: -40°C~+70°C
<b>Humidity</b>	➤	Operating System: 20%~80%
	➤	Non-operating System: 10%~95%
<b>Power</b>	➤	100--240Vac input, 50/60Hz
	➤	600 watts
<b>Current</b>	➤	Typical - 5/2.5A max 8.6A

## 1.5 Product Features

This chapter describes the features of this PS300e. It covers each module and the module's features and specifications.

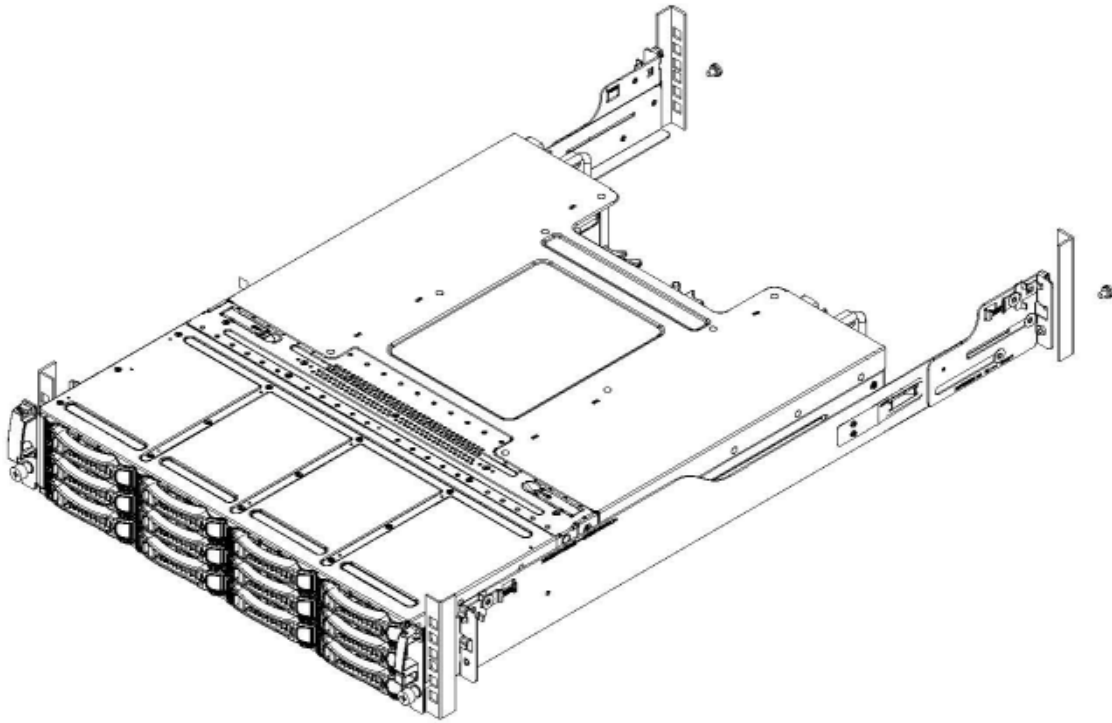


Figure 1-1 PS300e – Front View

Table 1-4 Product Features

<b>Chassis</b>	➤	2U rack-mounted chassis
<b>SAS IO Modules</b>	➤	Support single or dual SAS IO Modules for SAS 2.0 connection with the PixelStor 5000 RAID Array
<b>Power</b>	➤	Support single 600W power supply module or 1+1 redundant power supply module equipped with universal AC input that includes PFC
<b>Storage</b>	➤	Twelve hot-pluggable 3.5" hard disk bays
<b>Backplane</b>	➤	SATAII backplane for connecting 12x3.5" Drive modules

## 1.6 System Overview

The PixelStor 300e is low cost, high performance 2U/12 bay disk expansion enclosure for use with a PixelStor 5000 RAID array system.

The PixelStor 300e can be populated with 12 hot plug SATAII hard disk drives. Up to 5 PixelStor 300e enclosures can be daisy chained to a PixelStor 5000. With the PixelStor 5000 holding 15 disks and each PixelStor 300e holding 12 disks; a fully loaded configuration can hold a total of 72 disk drives.

Each PixelStor 300e enclosure can be configured with one or two hot plug SAS I/O modules for redundancy. Each I/O module on the PS300e comes with 2 24Gbs SAS (2.0) connectors for low cost high performance connectivity with the PixelStor 5000 and additional PS300e enclosures. The enclosure is also equipped with redundant power supplies, fans and a fully passive and serviceable mid-plane.

## 1.6.1 Chassis Layout

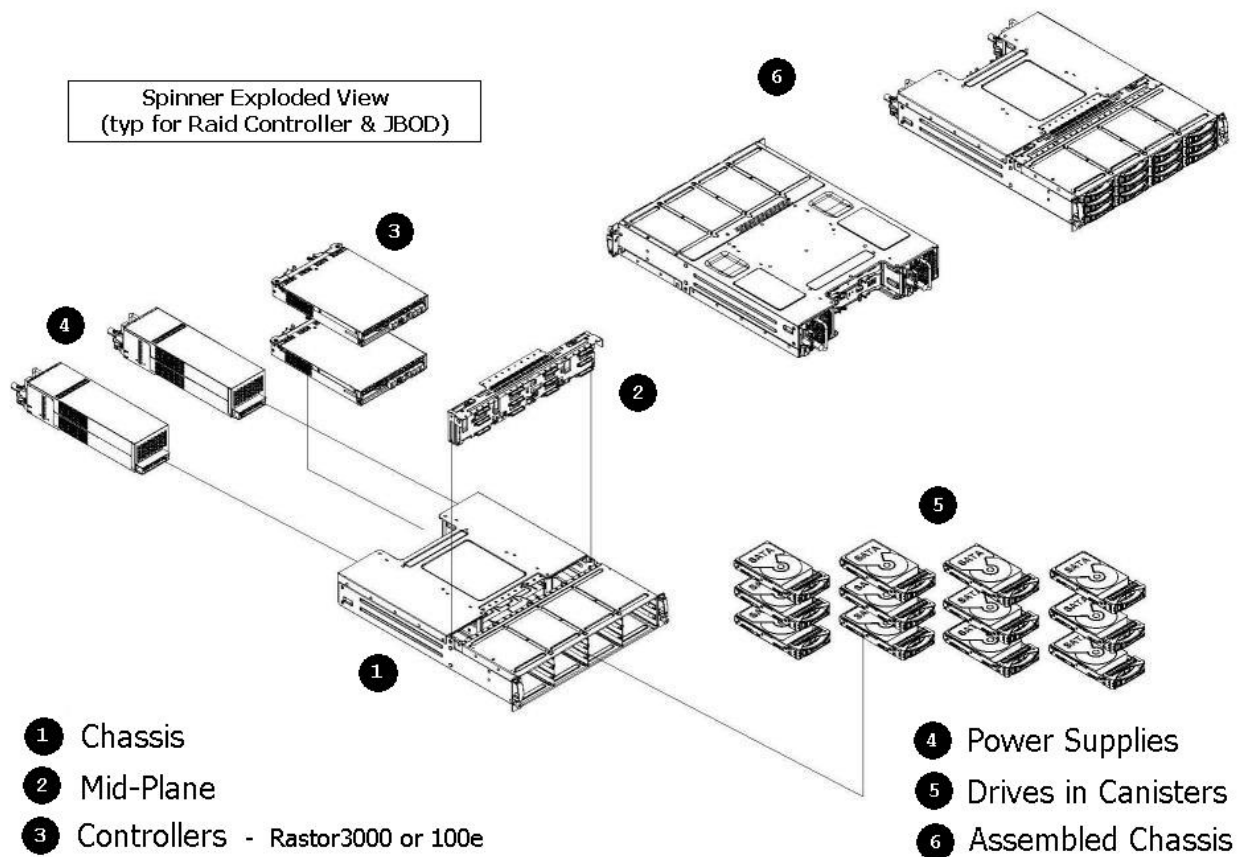


Figure 1-2 Chassis Layout

1 Chassis	4 Power Supplies
2 Mid-Plane	5 3.5" Drives 0-11
3 Controller Modules	6 Assembled Chassis

## 1.6.2 Front View

The front of the PS300e allows easy access to the 12 hot plug drive canisters. Each drive canister has a status LED located to the right of the release handle (see figure 1-4).

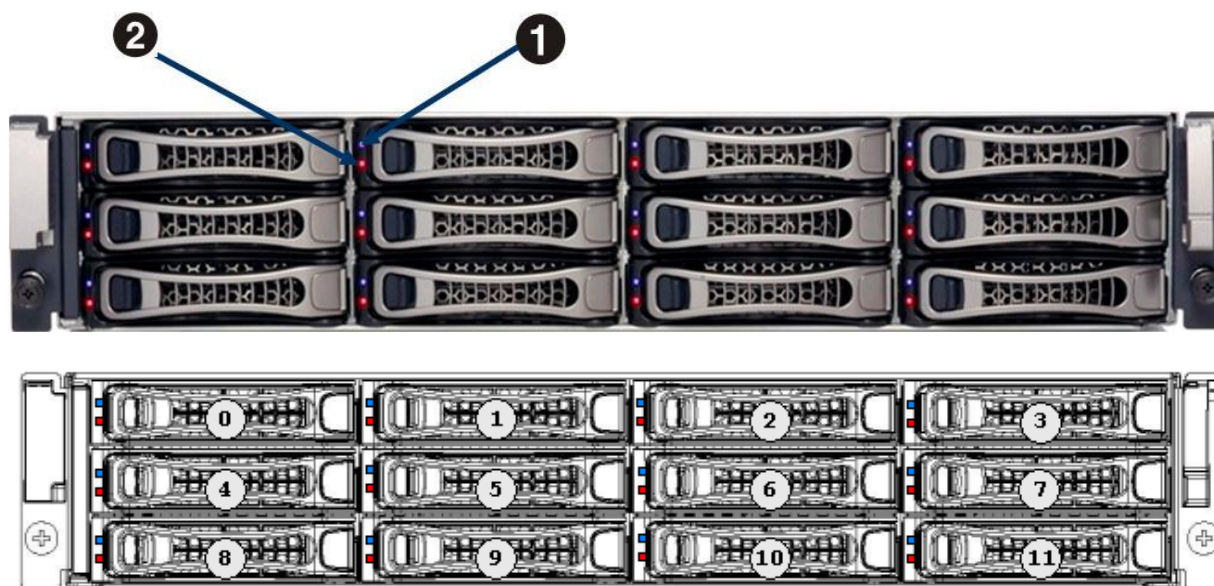


Figure 1-3 Front Panel

Type of LED	Color	Status
HDD Tray LEDs	① Blue (upper)	On: HDD present
		Off: HDD not present
		Blinking: HDD data access
	② Red (lower)	On or Blinking (individually): Drive Faulty
		On or Blinking (all 12 together): System Component failure



Hard disk drives are numbered 0 through 11 as the shown in figure above.

### 1.6.3 Back View

The back of the PS300e provides easy access to the hot plug SAS IO Modules, fans and power supply modules. All of the device and power connections are externally accessible and are located in the back of the system.



Figure 1-4 Back View Hot-plug Modules

- |                         |                         |
|-------------------------|-------------------------|
| ❶ Power Supply Module 0 | ❸ SAS IO Module 0       |
| ❷ SAS IO Module 1       | ❹ Power Supply Module 1 |



Figure 1-5 Back View Connectors

- |                                  |                        |
|----------------------------------|------------------------|
| ❶ AC Power Connector 0           | ❹ Mini-serial          |
| ❷ ◆ SAS OUT - SFF-8470 Connector | ❺ AC Power Connector 1 |
| ❸ ● SAS IN - SFF-8470 Connector  |                        |

### 1.6.4 System LED Information

This system is equipped with LED indicators for all major components of the system. These LEDs provide visual cues to the status of each of these components.



Figure 1-6 Back View LED

Type of LED	Color	Status
Beacon (1)	White	On: Identify Unit Off: Normal
Cache (2)	Yellow	On: Cache contents "Dirty" Off: Normal
[OK] (3)	Blue	On (blinking): Normal (Heart Beat) Off: Controller Problem
!! (4)	Red	On: Controller Fault Off: Normal

The LEDs in the front of the system provide information on the status of each of the 12 hot plug disk drives. The LEDs located in the back of the system provide information on the status of the fans, AC power and system health. Table 1-5 provides detail on the each LED and the different warnings they provide the user.

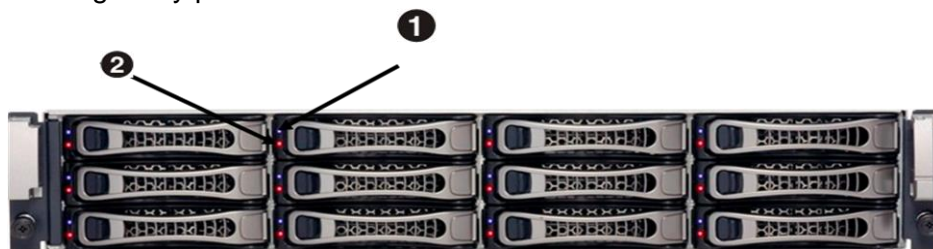


Table 1-5 LED Information

HDD Tray LEDs	① Blue (upper)	On: HDD present
		Off: HDD not present
		Blinking: HDD data access
	② Red (lower)	On or Blinking (individually): Drive Faulty
		On or Blinking (all 12 together): System Component failure



Press the power switch \ to the off position. This will turn off the green AC power LED ❶, AC power fault ❷ and chassis power DC on ❸.



Other Back View LEDs		
AC Power LED ❶	On	AC power is connected
	Off	No AC power is connected
AC Fault LED ❷	On	AC power fault present
	Off	AC power normal
DC Power LED ❸	On	DC power is ON
	OFF	DC power is OFF

# Chapter 2

## Hardware Installation

**SAS IO Modules**

**Power Supply Modules**

**SATA II and SAS Drive Modules**

**Mid-Plane**

**Mounting the System onto a Rack**

**300e SAS Connections**

## 2 Hardware Installation

This chapter describes the hardware setup procedures that you have to perform when removing or replacing system components. The PS300e is designed with tool less modules which allow users to remove or install modules without any tools. The tool less modules are listed below:

- SAS IO Modules
- Power Supply Modules
- Fan Modules
- Mid-plane
- Hard Drives

### 2.1 SAS IO Modules

This PS300e is designed to operate with up to two SAS IO modules. When the PS300e is equipped with dual SAS IO modules, the hot-swappable redundant function is enabled. If one SAS IO module fails, you can replace the failed SAS IO module without powering off the PS300e, because the surviving IO module takes the place of the failed one.

The PS300e SAS IO modules are designed to be hot pluggable. They fit into one of the two IO module slots of the PixelStor 300e. The PS300e SAS IO modules contain firmware that initializes and configures various onboard devices and registers on the IO module. Figure 2-1 SAS IO Module Front Panel - shows the front panel of a SAS IO module.



Figure 2-1 SAS IO Module Front Panel

#### Features:

- Two (x4), 12Gbps SAS connectors - the left SAS connectors is configured for SAS OUT (◆ downstream connectors). The right SAS connector is configured SAS IN (● upstream

connector).

- One serial console port with a mini stereo connector for Serial Terminal Connection.
- Four Module LED status indicator
- Reset button

The location of the SAS IO module on the PS300e is shown below:



Figure 2-2 SAS IO Module Location

**To remove the SAS IO module:**

- ① Carefully insert the controller module into the bay until it completely enters the bay and the latches engage.



Figure 2-3 Release the SAS IO Module

**To install the SAS IO module:**

- ① Pull latches to release controller



Figure 2-4 Securing the SAS IO Module



Make sure that the SAS IO module is fully inserted and locks into place. This insures a proper connection with the backplane.

---

## 2.2 Power Supply Modules

The PS300e contains one or two 600 watt power supply modules to provide redundant power and cooling for the entire enclosure. One power supply provides enough power to boot up and run a fully loaded system. The second power supply serves as a backup in the event of a system failure.

Each power supply module contains two non-removable external fans to cool the power supply module. The module shuts itself down if the specified limit is exceeded for temperature or output current.

### Features:

- On/Off DC Power Switch
- Two Non removable Variable Speed Fans
- AC plug receptacle
- Power Supply status LED

The location of the power supply modules on the PS300e is shown below:



Figure 2-5 Power Supply Module Location



### Reminder

*Before you remove or install the power supply module from the PS300e, disconnect the power supply cords.*

---



Moving the Power On/Off switch to the Off position does not completely remove power from the system. Some portions of the power supply and some internal circuitry remain active. Disconnect all power cords from the PS300e to completely remove power from the system.

---

**To power off the power supply:**

Press the power switch ❶ to the off position. The green power LED ❸ will turn off.

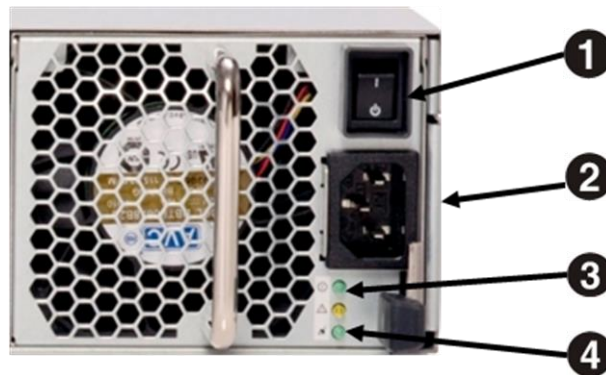


Figure 2-6 Pressing the Power Switch

**To unplug the power cords:**

First unplug the power cords from the AC outlet and then from the PS300e❷. Verify that the LED ❹ will is off.

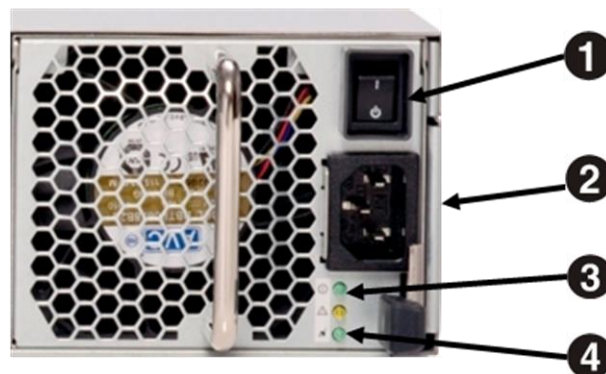


Figure 2-7 Unplugging the Power Cords

**To remove the power supply module:**

❶ Press the latch and pull the handle to remove the Power Supply/Fan assembly.





Figure 2-8 Releasing the Power Supply Module

(The power supply will require steady pressure to remove.)

**To install the power supply module:**

Insert the replacement power supply firmly into the bay. The retaining clip should snap. Connect the AC power to the replacement power supply module.



Figure 2-9 Installing the Power Supply Module



Make sure that the power supply module is fully inserted and locks into place. This insures a proper connection with the backplane.

---



## 2.3 SATA II Drive Modules

This PS300e system supports installation of 3.5" SATAII drives. The drives are housed in SATA hot plug drive canister and can be installed in the following slots on the PS300e:  
The location of drive modules is shown below:

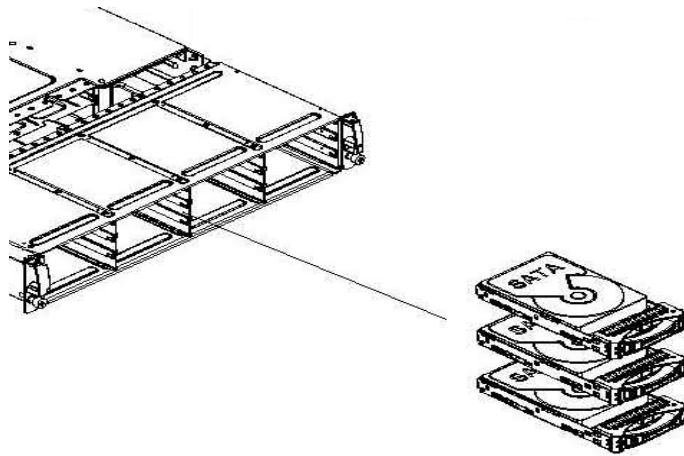


Figure 2-10 Drive Module Location

The layout of drive modules is shown below:

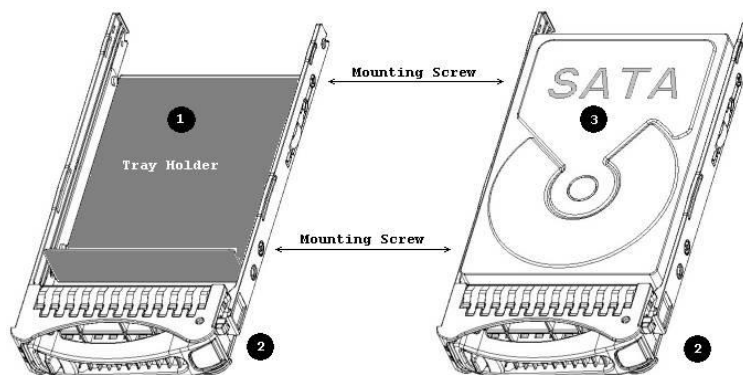


Figure 2-11 Hard Disk Module

- |   |                 |
|---|-----------------|
| ❶ | Tray Holder     |
| ❷ | Drive Carrier   |
| ❸ | Installed Drive |



- The drive must be inserted into the drive slot with the drive label facing up.

### To install the hard drive module

- ❶ Place the HDD onto the HDD tray as shown in Figure 2-11
- ❷ Position the hard drive into the carrier.
- ❸ Secure the drive with four screws.
- ❹ Carefully insert the HDD assembly into the PS5000 chassis as shown below..



Figure 2-12 HDD Assembly installed in Chassis.



There must be a minimum of 2 to 3 drives (depending on RAID type) to configure a Disk Group in the system. (See “Rules for Adding Storage”)

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### To remove the hard drive module

- ❶ Reverse the above process to remove the drive from the chassis.
- ❷ Slide the released button to the right to release the drive handle.
- ❸ Pull the handle to unseat the drive and slide the hard drive module out of the drive bay.



When removing the hard drive module, pull the drive out slightly until disconnected. Do not pull it out completely. Wait at least 30 seconds to allow the drive to stop spinning before remove drive completely.

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### Rules for Adding Storage:

The PixelStor 300e functions as an expansion enclosure for the PixelStor 5000 RAID system. Up to Three PixelStor 300e expansion enclosures can be added to a PixelStor 5000 in a daisy chain fashion using the supplied SAS IO cables to enable a maximum capacity of 72 drives. PixelStor 300e enclosures can be added while the system is running (hot-added). To hot-add a PixelStor

300e to an existing system, the PS300e must be the last enclosure in the daisy chain.

PixelStor 300e enclosures follow the same concept of “disk groups” used for the PixelStor 5000. A “disk group” (DG) is composed of an associated group of disks with similar RAID properties. All DGs must be assigned a RAID level. The system supports RAID 0, 1,5,10. The following rules must be followed when creating DGs for a PixelStor 5000/PS300e:



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To improve the utilization of the available storage capacity and ensure reliability, it is recommended that all disk drive modules within a DG be the same size and from the same manufacturer. This is because for each RAID Group, the system scales down to the size of the smallest drive (except for RAID 0).

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- A DG can span across interconnected PixelStor 5000 and PixelStor 300e systems.
- Drives within a DG can reside in any order across any of the enclosures in a system.
- Capacity of a DG can be expanded by adding disks from the available pool of global spare disks. (Adding disks to a disk group may require multiple disks.)
- DGs can be accessed by either controller, but must be assigned a primary controller.
- Drives not assigned to a disk group will be classified as “Global Spares”
- Global spare(s) can reside on any of the 4 interconnected chassis to protect any DG within the four chassis. A Global Spare cannot be added to RAID 0 DG.
- Failed Disks or disks disassociated from their disk group will be classified as “Orphans” by the system.
- It is recommended not to build a RAID 5 DG beyond 8 drives. The bigger the RAID 5 DG, the higher the probability for multi-drive failures. Multi-drive failure is not protected by RAID 5.
- To build RAID 5 DG bigger than 8 drives, use the systems capacity expansion feature to concatenate a second RAID 5 disk group to the first. You can do this multiple times up to a maximum of 24 drives.

Disk Group (DG) Parameters	RAID 0	RAID 5	RAID 1	RAID 1+0
1. Minimum # of Drives per DG	2	3	2	4
2. Maximum # of Drives per DG	24	24	24	24
3. DGs Allowed per System	1-4	1-4	1-4	1-4
4. RAID Level Allowed per DG	1	1	1	1
5. Drives Must be Added in	Singles	Singles	Pairs	Pairs
6. Global Spare Capability	N/A	Yes	Yes	Yes
7. Access DG by both Controllers	Yes	Yes	Yes	Yes

## Disk Roaming:

The PixelStor 300e has the unique capability of allowing disk groups and their properties to roam with the drives. The user can physically remove the drives that make up a disk group and install in different locations within the same array or in a different array and the system will recognize the disk group configuration including the RAID volume.

Masking and host information are contained in the controller. You will need to reconfigure the masking and host information if you move the disk group to a new controller, as in moving the disk group to a new chassis.

Disk roaming is possible because when a disk group is created, the system automatically creates a small 128MB partition on each drive. This partition contains the disk group configuration. In this way, all the information regarding a disk group can be recognized by any PixelStor 5000 controller during the automatic boot up discovery or during a manual discovery using the PIXELSTOR Storage Manager or CLI.

The drives can be reinserted in different slots and they can be rediscovered while the system is on-line. You can take advantage of this flexibility to arrange your storage for different on-line and off-line tasks. This feature provides a basic and inexpensive way to upgrade a system and retain your data or move drives to another system for basic system recovery.



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All drives in a DG needed for automatic boot up and discovery need to be present for the disk group discovery to take place. A disk group with one missing member can be forced online using the PIXELSTOR Storage Manager or CLI discovery command.

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## Disk Orphans:

If some of the drives from a disk group are not re-inserted or a drive from the disk group goes bad and is not reconstructed before it roams to a new system, the system will not be able to discover the disk group. It will know that one or more drives are missing and will designate the drives in the incomplete disk group as orphans. The data in the incomplete set is maintained, however user intervention is required to reset the drives. This ensures that the data on the remaining drives is not overwritten. If the drives are designated as orphans, the user has the following options:

- **Complete the Set** – You can track down the remaining drives from the disk group, insert them in any order into the same PixelStor 5000/300e enclosure and use the PixelStor Storage Manager to do a discovery. Once the whole set is discovered, the disk group will be

restored.

- **Rebuild a Disk Group** – If the original group is part of a RAID 5, 1 or 10 disk group, a bad drive maybe the reason for an orphan classification by the system. If this is the case, make sure you have a global spare in the system and then use the PIXELSTOR Storage Manager to do forced discovery of the disk group. Once the disk group is discovered and the bad drive is identified, the system will start the RAID rebuild using the global spare. This will restore the disk group.
- **Re-configure the Drives** – If you cannot complete the disk group or rebuild it, then you will not be able to recreate the disk group (RASILIANT recommends you always back up your data to recover from such a scenario). Alternatively you may just want to reuse drives from an old disk group where the data on the drives is no longer needed. In either case you can create a new disk group or turn the drives into global spares by using the PixelStor Storage Manager.

#### Failure Conditions:

- **RAID Controller Failure** – When a RAID controller fails in the PixelStor 5000with redundant controllers, all drives including those on interconnected PixelStor 300e enclosures will fail-over to the surviving controller.
- **Drive Failure** – If a drive fails in a RAID 1, 5 or 10 DG, the DG will go into degraded mode. If a global spare is present in the system, the spare will be automatically added to the DG and a rebuild of the DG will be initiated. (Note: RAID 0 by definition has no protection and therefore cannot be rebuilt.)
- **SAS IO Failure** – When a SAS IO module in one of the interconnected PS300e enclosures fails, the system will treat all drives associated with that IO module as failed. If only one drive is missing from the associated DGs the system one rebuild it using an available global spare. If more that one drive is associated with the affected DGs, all writes to the DG will be suspended and the DG will be made available to the system in read-only state. Once the IO module is replaced, the user can use the system utilities to rebuild/repair the affected disk groups.
- **SAS Cable Disconnect** – If a cable fails or is removed, the system will react as if the SAS IO Module failed. (See the SAS IO Failure section above)

## 2.4 Mid-Plane

The mid-plane consists of the drive backplane and SAS IO backplane joined together by a mid-plane bracket. The drive backplane can support twelve 3.5" SATA II and SAS drives. The design incorporates a hot-swappable feature to allow easy replacement of drives. The system uses a SAS IO backplane to connect the drive backplane with the SAS IO modules and power supply modules.

The location of the mid-plane module on the PS300e is shown below:

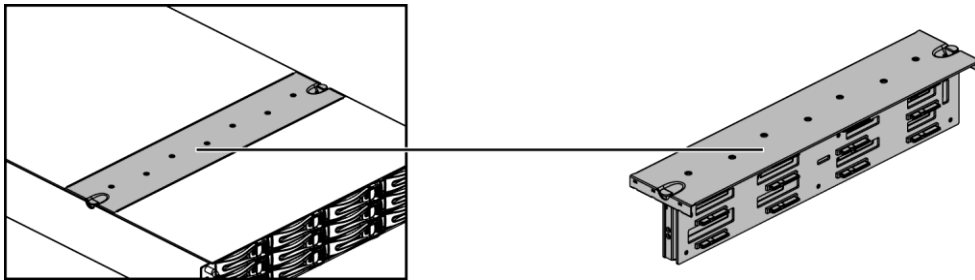


Figure 2-13 Mid-Plane Location



### Reminder

*Before you remove or install the mid-plane, please follow the steps below:*

**Step 1:** Make sure the PS300e is not turned on or connected to the AC power.

**Step 2:** Remove the SAS IO module(s).

**Step 3:** Remove the power supply module(s).

**Step 4:** Remove all the drive modules.

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### To remove the mid-plane module:

- ❶ Push in the locking buttons on both sides of the mid-plane
- ❷ Lift up the mid-plane.

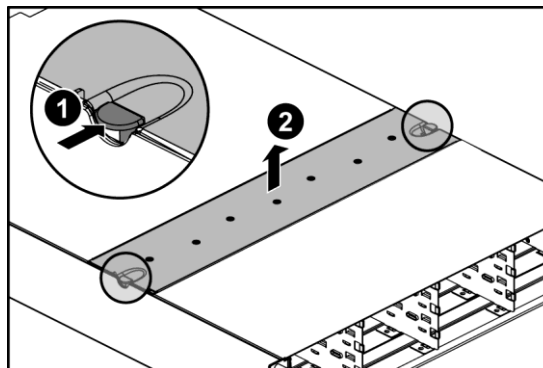


Figure 2-14 Removing the Mid-plane

### To install the mid-plane:

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Insert the mid-plane into the chassis. Insure the mid-plane is fully inserted and the buttons on both sides of the mid-plane lock into place.

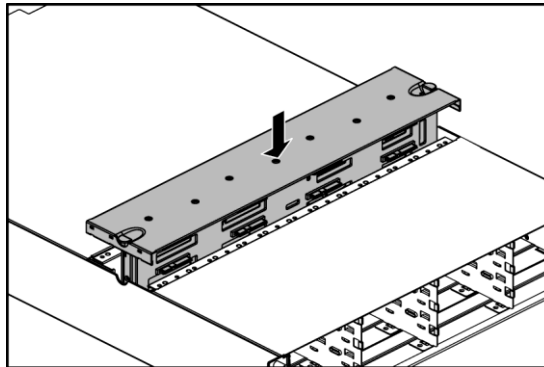


Figure 2-15 Installing the Mid-plane

## 2.5 Mounting the System onto a Rack



- A stabilizer must be attached to the bottom, front of the rack to prevent the rack from tipping forward while the enclosure is being removed or installed. Do not remove or install any enclosure if a stabilizer is not attached to the rack.
- Do not attempt to lift the enclosure by yourself. Ask another person for aid.
- Do not use the handles from the SAS IO or power supply modules to carry the enclosure. These handles are not intended to support the weight of the enclosure.

- 1 Install the brackets as shown in the example below.

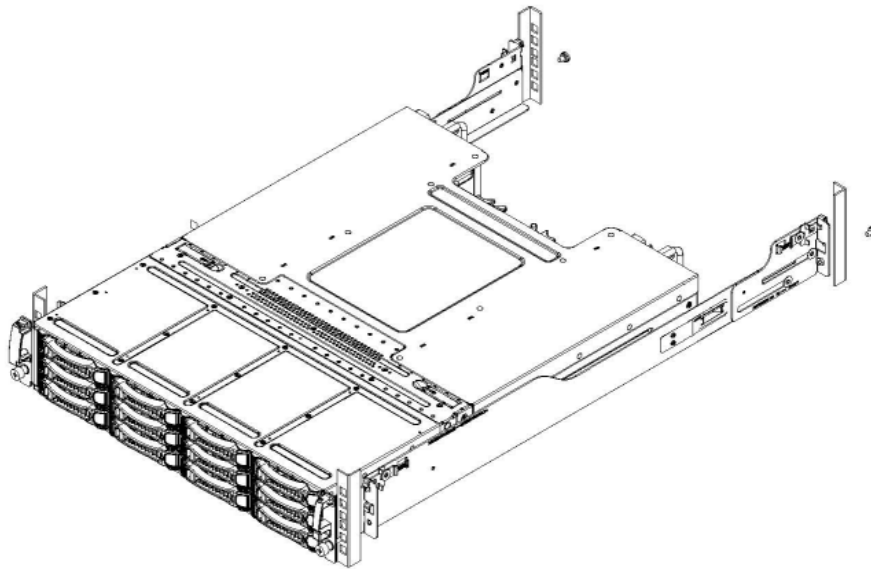


Figure 2-16 Installing the Mounting Brackets in the Rack



- ② The Chassis slides along the support edges of the Bracket.

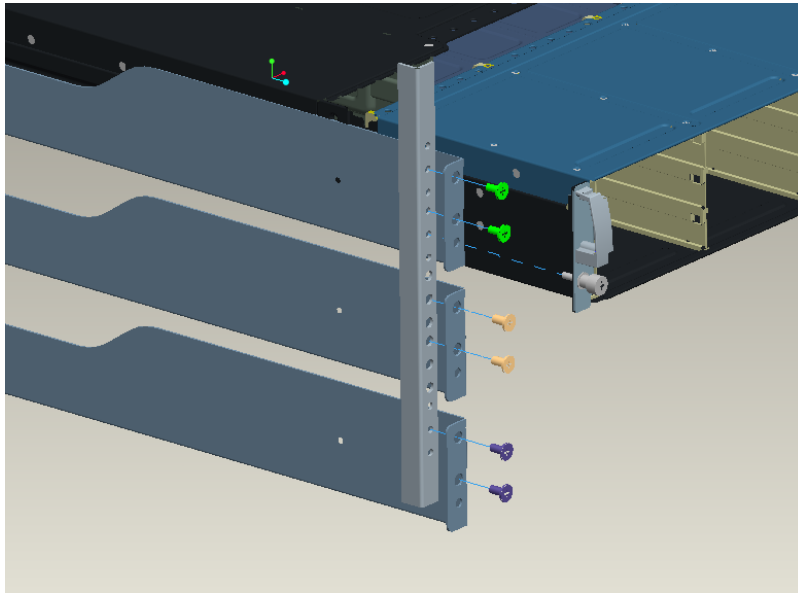


Figure 2-17 Secure the Mounting Brackets

- ③ Lift the system to the desired position on the rack with the help of a second person.
- ④ Each pair of Brackets is supplied with a set of screws: 10-32, 12-24, M6. Use the size appropriate for your Rack. For those Racks with square holes use the included flanged nuts to secure the screws. Note the pair of screws that are attached to the chassis. Use these screws to secure the chassis into the Rack.

## 2.6 PS300e SAS Connections

The PixelStor 300e functions as an expansion enclosure for the PixelStor 5000 RAID system. Up to six PixelStor 300e expansion enclosures can be added to a PixelStor 5000 in a daisy chain fashion using the supplied SAS IO cables to enable a maximum capacity of 72 drives. PixelStor 300e enclosures can be added while the system is running (hot-added).

The 300e is designed with external SAS connectors to connect with the PixelStor 5000 RAID system and to other 300e enclosures. These SAS connectors can be used for upstream connection (subtractive routing) or downstream cascading (table routing). Upstream and downstream connections are required to be connected to different SAS connectors. Please see

the illustration below for details.

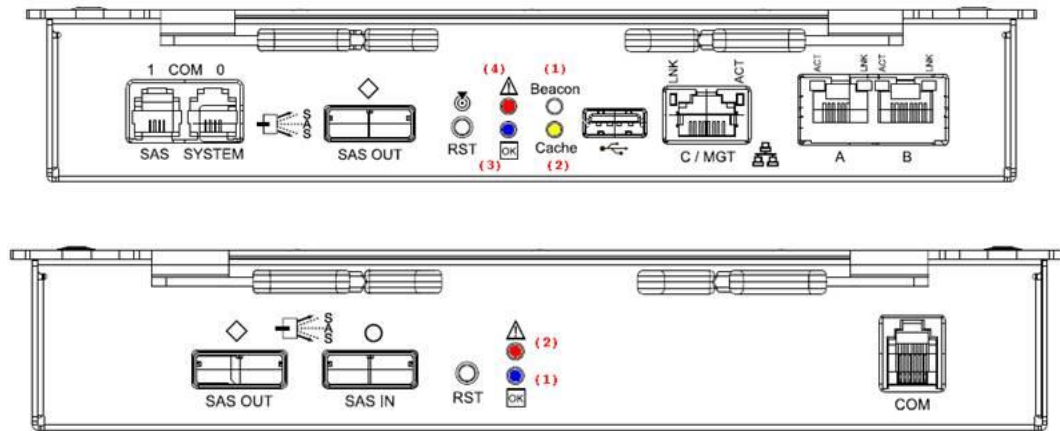


Figure 2-18 SAS Connectors

- 
- ◆ SAS OUT - SFF-8470 Connector
  - SAS IN - SFF-8470 Connector
- 

**Error! Reference source not found.**Figure 2-23 SAS Cable Connections - Shows the supported cabling configuration for PixelStor 5000 RAID system and 300e expansion enclosures. Start from the PixelStor 5000 chassis at the top of the diagram and connect to the first 300e enclosure below it. Then add additional 300e enclosures.

- Each RAID controller on the PixelStor 5000 has a SAS connector marked with the ◆ icon. Connect one end of one of the included SAS cables to SAS connector with ◆ icon on the PixelStor 5000.



◆ icon SAS OUT always connects to ● icon SAS IN.

- Each IO module on the 300e has 2 SAS connectors. One is marked with a ◆ icon (SAS OUT) and one is marked with a ● icon (SAS IN). Connect the other end of the SAS cable from Step 1 to the right-most module SAS connector marked with a ● icon on SAS IO module 0 of the 1st PixelStor 300e.

3. For a dual controller configuration, follow the same exact process described above to connect RAID controller 1 on the PixelStor 5000 to SAS IO module 1 on the 1st 300e. You have now properly connected the PixelStor 5000 RAID system to the 1st 300e expansion enclosure.
4. If you have additional 300e enclosures to add to this RAID system, follow the rest of these steps to daisy chain them to the 1st 300e.
5. Connect one end of another of the included SAS cables to the SAS connector marked with a ◆ icon on the SAS IO module 0 of the 1st 300e expansion chassis. Connect the other end of the SAS cable to the SAS connector marked with a ● icon on SAS IO module 0 of the 2nd 300e expansion enclosure.
6. Follow the same exact instructions above for connecting SAS IO module 1 on the 1st 300e expansion enclosure to SAS IO module 1 on the 2nd 300e expansion enclosure. You have now properly connected a 2nd 300e expansion enclosure to the first 300e enclosure.
7. To add additional 300e expansion enclosures to this RAID array system, repeat steps 5 and 6.

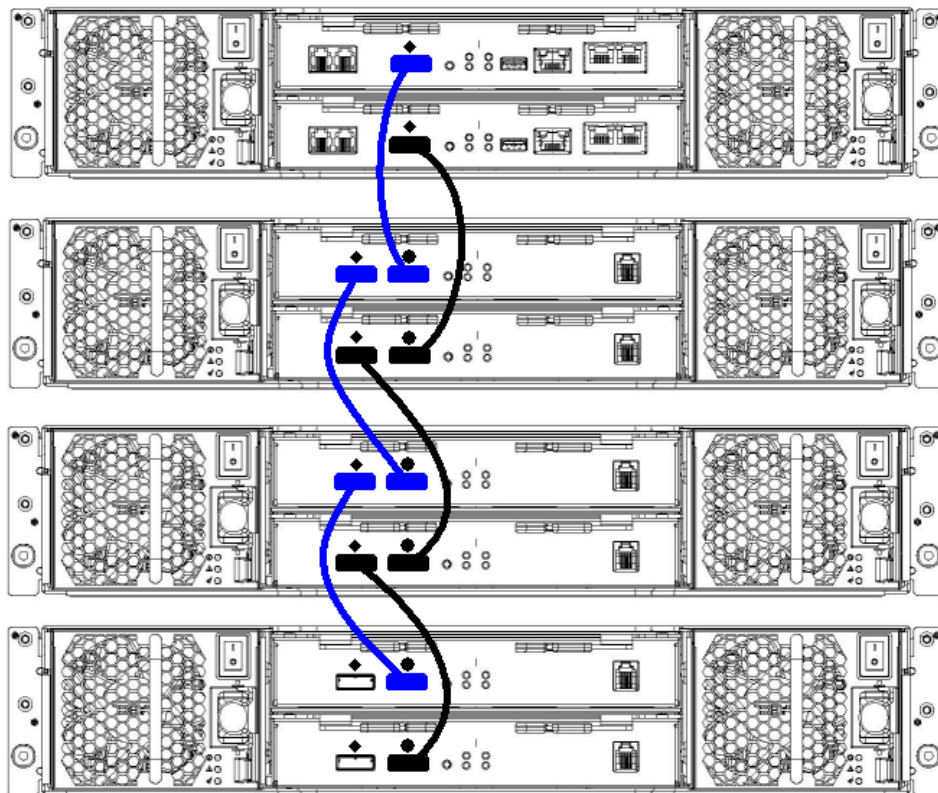


Figure 2-23 SAS Cable Connections