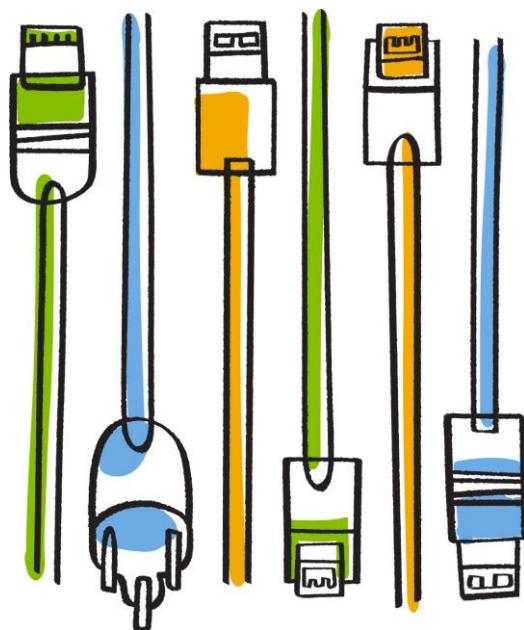




NetApp® SteelStore Cloud Integrated Storage

xx30 Series Hardware Owner's Guide



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Preface

Welcome to the *NetApp SteelStore Cloud Integrated Storage xx30 Series Hardware Owner's Manual*. Read this preface for an overview of the information provided in this guide and for an understanding of the documentation conventions used throughout. This preface contains the following sections:

- [“About This Guide” on page 1](#)
- [“Electrostatic Discharge Guidelines” on page 2](#)
- [“Documentation and Release Notes” on page 2](#)
- [“How to Send Your Comments” on page 2](#)

About This Guide

This guide describes SteelStore xx30 system components, including rack installation, how to replace and upgrade components, and technical specifications.

For information about the SteelStore xx30 series expansion shelves, refer to the *NetApp SteelStore Cloud Integrated Storage xx30 Series Expansion Shelf Hardware Owner's Guide*.

For information about the SteelStore xx10 series appliance, refer to the *Upgrade and Maintenance Guide*.

NetApp has acquired the SteelStore product line. Any references to Riverbed Technology in the attached are in error and should be assumed to be NetApp. For more information, see www.netapp.com.

Types of Users

This guide is written for storage and network administrators managing networks with NetApp products.

Document Conventions

This manual uses the following standard set of typographical conventions to introduce new terms, illustrate screen displays, describe command syntax, and so forth.

Convention	Meaning
<i>italics</i>	Within text, new terms and emphasized words appear in italic typeface.
boldface	Within text, CLI commands and GUI controls appear in bold typeface.
Courier	Code examples appear in Courier font: <pre>amnesiac > enable amnesiac # configure terminal</pre>

Electrostatic Discharge Guidelines

Follow these ESD guidelines to ensure that your equipment is not damaged from improper handling:

- When you install or perform maintenance tasks, you must wear a grounded ESD anti-static strap to protect the system hardware against electrostatic discharge. Make sure that the strap makes skin contact prior to handling equipment.
- Periodically check the resistance value of the anti-static strap to ensure it is functioning properly.
- If you remove or replace system components, you must transport the unit in a conductive container or an ESD bag that has been grounded or neutralized.
- Store any system components in their protective packaging until you are ready to install them.
- Do not touch the electronic components on system hardware.

Documentation and Release Notes

To obtain the most current version of all NetApp documentation, go to the NetApp Support site at <https://mysupport.netapp.com>.

If you need more information, see the NetApp Knowledge Base for any known issues, how-to documents, system requirements, and common error messages. You can browse titles or search for keywords and strings. For more information, see the NetApp Support site at <https://mysupport.netapp.com>.

Each software release includes release notes. The release notes identify new features in the software as well as known and fixed problems. To obtain the most current version of the release notes, go to the Software and Documentation section of the NetApp Support site at <https://mysupport.netapp.com>.

Examine the release notes before you begin the installation and configuration process.

How to Send Your Comments

You can help us to improve the quality of our documentation by sending us your feedback.

Your feedback is important in helping us to provide the most accurate and high-quality information. If you have suggestions for improving this document, send us your comments by email to *doccomments@netapp.com*. To help us direct your comments to the correct division, include in the subject line the product name, version, and operating system.

You can also contact us in the following ways:

- NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.
- Telephone: +1 (408) 822-6000
- Fax: +1 (408) 822-4501
- Support telephone: +1 (888) 463-8277

Chapter 1

Safety

Follow the safety precautions outlined in this chapter and in the *Safety and Compliance Guide* when installing and setting up your equipment.

Important Failure to follow these safety guidelines can result in injury or damage to the equipment. Mishandling of the equipment voids all warranties. Read and follow safety guidelines and installation instructions carefully.

Many countries require the safety information to be presented in their national languages. If this requirement applies to your country, consult the *Safety and Compliance Guide*. Before you install, operate, or service the NetApp products, you must be familiar with the safety information. Refer to the *Safety and Compliance Guide* if you do not clearly understand the safety information provided in the product documentation.

1.1 Safe Handling



Caution

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

All plug-in modules and blanking plates are part of the fire enclosure and must only be removed when they can be immediately replaced. The system must not be run without all units in place. To comply with applicable safety, emission and thermal requirements, no covers should be removed and all bays must be fitted with plug-in modules.

Permanently unplug the unit if you think that it has become damaged in any way.

Unplug the unit before moving it.



Warning

A fully assembled SteelStore can weigh up to 32 kg (71 lb) or 18 kg (40 lb) without drives installed. Do not try to lift it by yourself.



Table 1–1 Lifting Warning Label



The removal of the enclosure top cover or the power supply mounting cage must only be performed by a service person. Potential hazards include rotating fans and hot surfaces.

The top cover must be secured when the enclosure is in normal use by rotating the lock 90° to the “locked” position (this is to prevent users/operators from accessing service areas).

1.2 Safety

The SteelStore must only be operated from a power supply input voltage range of 100 to 240 VAC, 50 to 60 Hz.

Make sure that the socket outlets are located near the equipment and are easily accessible.

This equipment is intended to operate with two working Power Supply Units (PSUs) housed in a power supply mounting cage. Before removal/replacement of a PSU, disconnect all supply power for complete isolation.

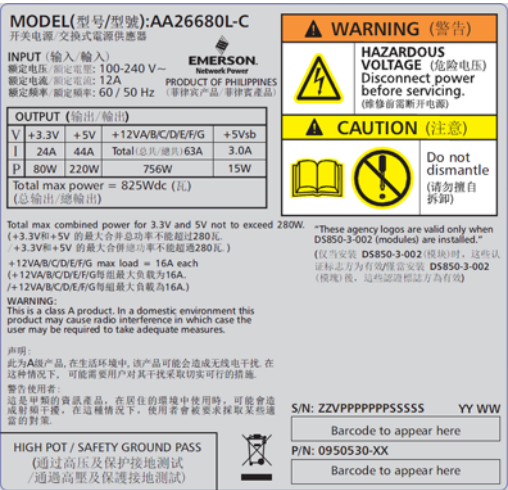


Figure 1–1 Power Supply Mounting Cage Warning Label

A faulty PSU must be replaced with a fully operational PSU within 24 hours. Refer to section [A.3, “Environment”](#) on page 62.

A safe electrical earth connection must be provided to the power cord. Check the grounding of the enclosure before applying power.



Figure 1–2 Warning Label – Earthed Mains Socket

Provide a suitable power source with electrical overload protection to meet the requirements laid down in the technical specification.

Bifurcated power cords **MUST NOT** be used with the SteelStore – they are not supported.

Hot surfaces (heatsinks) are exposed when the enclosure top cover is removed. Disconnect power and allow the enclosure to cool before working inside the system.

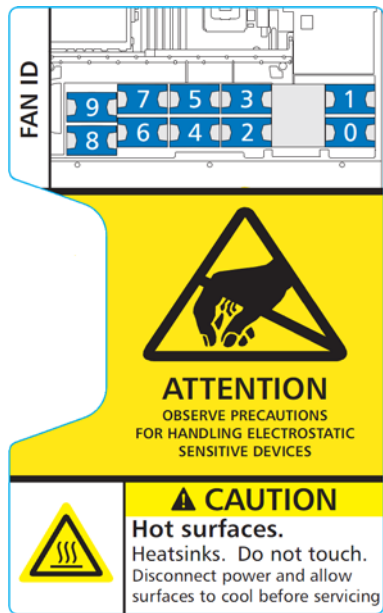


Figure 1–3 SAS Expander Cover Warning Label

Rotating fan blades are exposed when the top cover is removed.

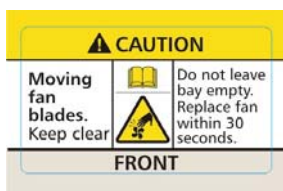


Figure 1-4 Fan Caution Label

When pulled out from the rack, the enclosure must not be used as a shelf to support any other object.



Figure 1-5 Shelf Caution Label



Warning

Do not remove covers from the PSU: there is a danger of electric shock inside. Return faulty PSUs to NetApp for repair.

1.2.1 Battery Precautions



Warning

There is a danger of explosion if the battery is replaced by an incorrect type.

Dispose of used batteries in accordance with the manufacturer's instructions and national regulations.

1.2.2 Equipment Handling Precautions

Important

Operation of the enclosure with ANY drive carrier modules missing will disrupt the airflow and the system will not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the unit. Dummy drive carrier modules must be fitted to unused drive bays.

The RJ45 sockets on the motherboard/PCI cards are for Ethernet connection only and must not be connected to a telecommunications network.

Drives are fragile and must be handled with care during removal/replacement.

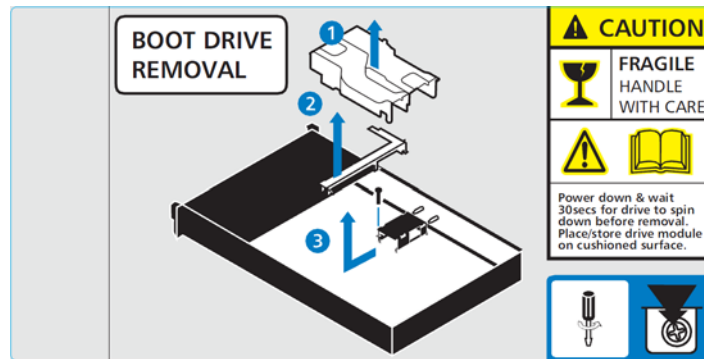


Figure 1-6 Boot Drive Caution Label

1.2.3 Ethernet Cable

It is recommended that STP Ethernet cables are used for enhanced EMC performance, but this is not essential for compliance.

1.3 Rack System Safety Precautions

The rack construction must be capable of supporting the total weight of the installed enclosure and the design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.

When loading a rack with the units, fill the rack from the bottom up and empty the rack from the top down.

Before loading the chassis into a rack, remove all PSU modules and drives to minimize weight.



Warning

To avoid danger of the rack toppling over, under no circumstances should more than one enclosure be drawn out of the cabinet at any one time.

The back pressure created by rack doors and obstacles must not exceed 5 pascals (0.5mm water gauge).

The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 35°C.

The rack should have a safe electrical distribution system. It must provide over-current protection for the unit and must not be overloaded by the total number of units installed in the rack. When addressing these concerns, consider the electrical power consumption rating shown on the product.

The electrical distribution system must provide a reliable earth for each unit and for the rack.

Each Power Supply Unit has an earth leakage current of 1.4mA. The design of the electrical distribution system must take into consideration the total earth leakage current from all the power supplies in all the

units. The rack requires labeling with the following: “HIGH LEAKAGE CURRENT. Earth connection essential before connecting supply.”

When configured, the rack must meet the safety requirements of UL 60950-1:2005 (2nd edition) and IEC 60950-1 2nd edition.

Chapter 2

Overview

2.1 The SteelStore System

The SteelStore xx30 Series appliance is a 2U sized disk drive enclosure, housing up to twelve low profile (1 inch high), 3.5 inch form factor drives of the following type:

- 3.0/6.0Gb/s SAS (up to 15000 rpm).

Each individual disk drive is hot pluggable and field replaceable.

[Figure 2–1](#) shows a front view of an SteelStore appliance while [Figure 2–2](#) depicts a rear view with the lid removed, showing those areas accessible to service personnel only.



Figure 2–1 SteelStore Appliance – Front View

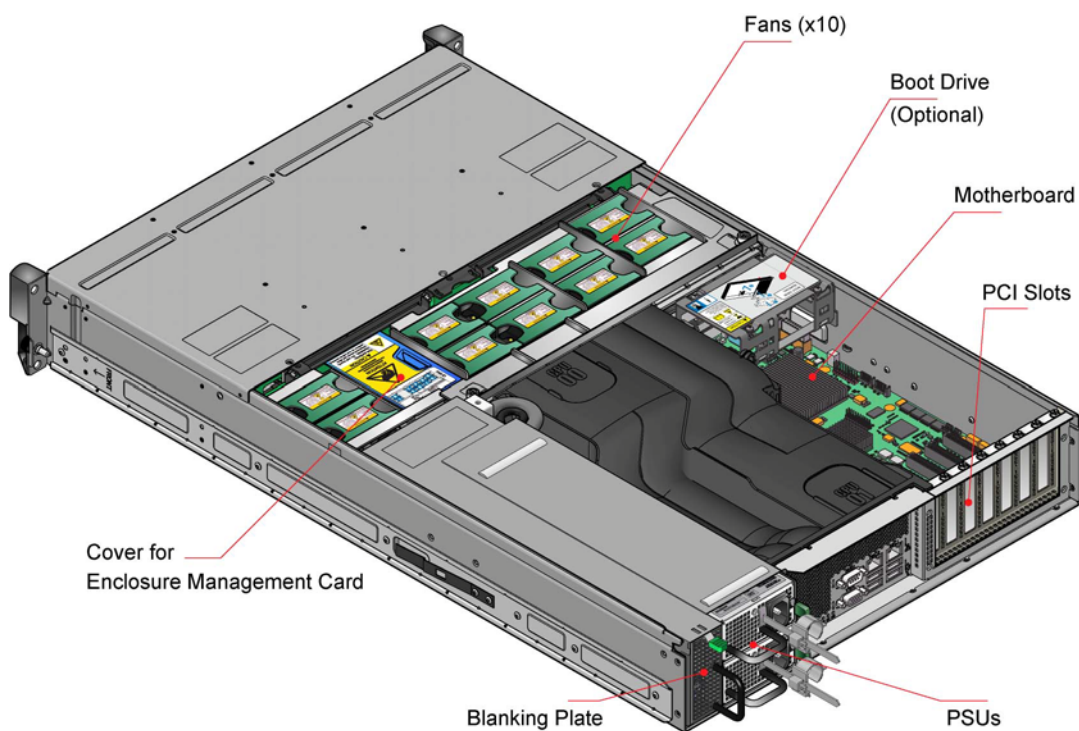


Figure 2–2 SteelStore Appliance – rear view showing service areas

2.2 The Core Product

The SteelStore xx30 Series appliance is an enclosure subsystem together with a set of plug-in modules and comprises:

- An enclosure chassis comprising:
 - A backplane PCB.
 - An Enclosure Management Card (EM Card).
 - An integral Operator's (Ops) Panel.
 - An integral rear panel, incorporating an Appliance ID LED (see [Figure 2-10](#)).
 - A power supply mounting cage containing two 850W, 100-240V AC auto-ranging, plug-in Power Supply Units (see [Figure 2-8](#)).
- An ATX server subsystem. Refer to section [2.4 on page 14](#) for details.
- A cooling cage, containing 10 high speed single rotor axial fans which are individually pluggable.
- Up to 12 drive carrier modules with 3.5-inch drives installed (see [Figure 2-10](#)). Dummy drive carrier modules must be fitted in all unused drive bays.
- A rack mounting rail kit for mounting the appliance in a 19-inch rack.

The high speed serial architecture of the SteelStore storage system provides three 4-lane connections from the EM Card to the HBA.

Module and major component locations are shown in [Figure 2-3](#).

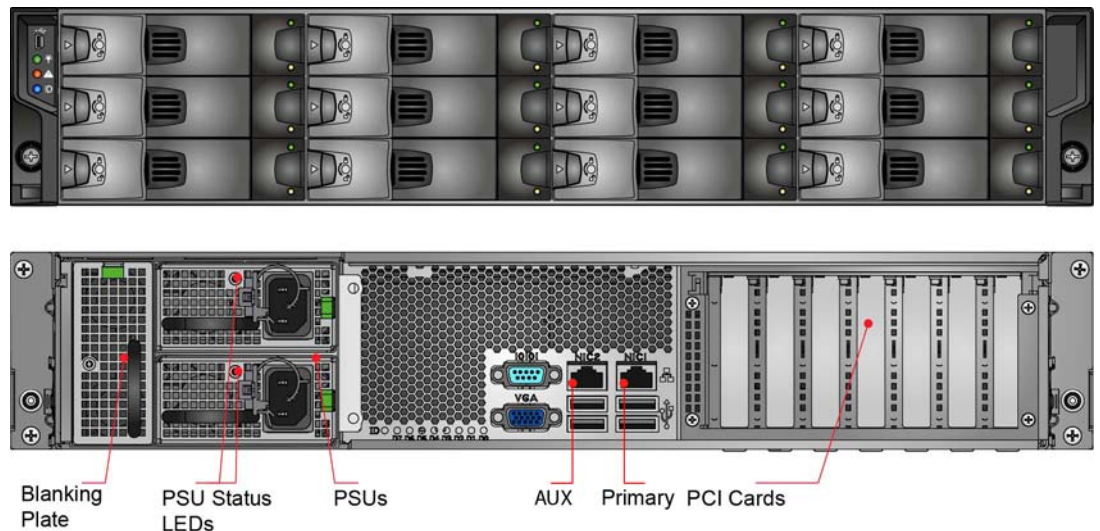


Figure 2-3 Module Locations

2.3 Appliance Chassis

The chassis consists of a sheet metal enclosure assembly containing an integrated backplane PCB, Enclosure Management Card (with audible alarm) and drive carrier runner system. A bezel is attached to the front.

The chassis is fitted with 19-inch rack mounting features which enables it to be fitted to standard 19-inch racks and uses 2U (3.5 inches) of rack space.

The backplane PCB provides 12 direct dock SAS connectors to the drives and acts as the connectivity hub of the appliance, connecting to the EM Card.

The ten cooling fans are connected to the system through the EM Card.

There are 12 drive bays at the front of the appliance. Each drive bay accommodates a plug-in drive carrier module which houses low profile (1 inch) high 3.5-inch form factor drives.

Note A bay is defined as the space required to house a single 1.0" high 3.5-inch disk drive in its carrier module.

At the rear, the chassis assembly accommodates two Power Supply Units and the ATX server subsystem.

The top cover on the appliance provides access to the cooling fans and the ATX server subsystem.

Important The cover should only be removed by service personnel as it provides access to a service area. Upon replacement, the cover **MUST** be secured by turning the lock mechanism to the "locked" position with a screwdriver (see [Figure 2-4](#)).

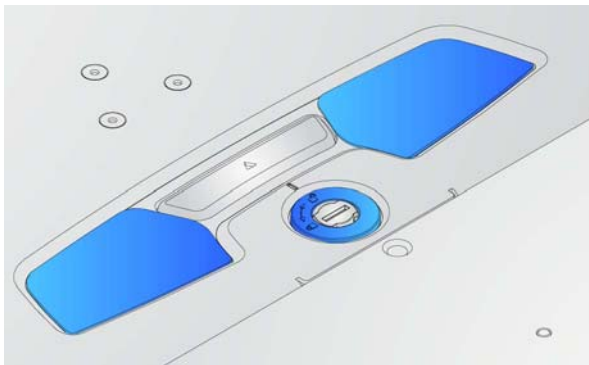


Figure 2-4 Lid Set to the "Locked" position

2.4 ATX Server Subsystem

The ATX server subsystem comprises:

- A SteelStore-ATX motherboard.

- Slots for up to 7 low profile PCI Express cards. Blank PCI plates are fitted in the empty slots.

2.4.1 ATX Server I/O Panel Connectors

The ATX server I/O panel incorporates the following connectors:

- 1 x serial port.
- 1 x VGA video port.
- 2 x RJ45 gigabit Ethernet ports. Boot from LAN capability (PXE) is available on these ports.
Note: It is recommended that STP Ethernet cables are used for enhanced EMC performance, but this is not essential for compliance.
- 4 x USB 2.0 ports. Only shielded USB cables should be used in these ports.

The connectors are shown in [Figure 2–5](#).

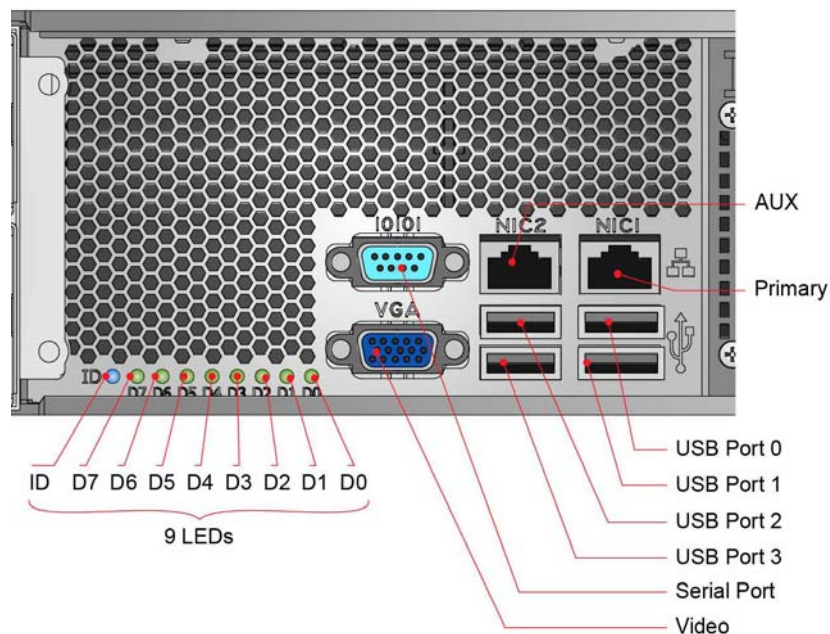


Figure 2–5 ATX Server I/O Components

2.4.2 PCI Express Slots

The motherboard has seven PCI Express slots, as detailed in [Table 2–1](#).

Table 2–1 PCI Express Slots

Slot Number	Color	Type	Connector
1	Blue	Gen2 x8	x8
2	White		
3	Blue		
4	Black	Gen2 x4	x8
5			
6			
7	White	Gen1 x4	x8

The slots are numbered 1 to 7, with slot 1 on the right end and slot 7 on the left when looking at the rear of the appliance.

SteelStore cards must be in specific slots. The following table shows the mapping of the slot numbers to PCI cards.

Slot Number	PCI Card
1	LSI 9280-8e (optional)
2	LSI 9260-4i
3	Four-Port Copper Gigabit (standard) or Two-Port LR/SR Fiber 10 Gigabit card (optional)
4	Empty
5	Empty
6	Battery backup Unit for 9260-4i card
7	Battery backup unit for 9280-8e card (optional)

The following illustration shows the PCI slot numbers as seen from the rear of the appliance.

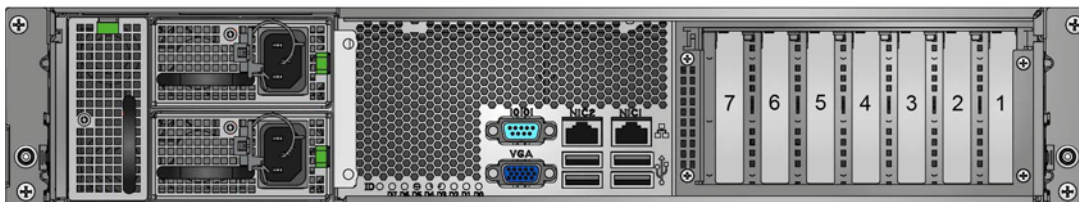


Figure 2–6 PCI Slot Numbering

2.4.2.1 Initial Configuration

SteelStores ship with a single 4 port Copper GigE or a 10G fiber Ethernet card, an LSI 4i 9260 hardware RAID card, and a Battery Backup Unit (BBU) attached to the card. The following table shows the initial configuration.

Slot Number	PCI Card
1	Empty
2	LSI 9260-4i
3	Four-Port Copper Gigabit (standard) or Two-Port LR/SR Fiber 10 Gigabit card (optional)
4	Empty
5	Empty
6	Battery backup Unit for 9260-4i card
7	Empty

Note that slot 1 is empty. You cannot move the cards to different slots. If the card is not in the correct slot, the software will not perform the disk naming correctly and might fail to start.

2.4.2.2 Upgrade with Shelf Configuration

If you upgrade the system with an expansion shelf, you need to add the LSI 9280-8e PCI card and an additional BBU. The 8e card must be installed into slot 1. The BBU goes in slot 7 and not any other slot. There are both performance and thermal implications if you do not follow these requirements.

For more information, see the *NetApp SteelStore Cloud Integrated Storage Installation Guide*.

2.4.3 Memory Slots

The SteelStore appliance provides 12 memory slots, 6 per CPU, divided into 3 channels of up to 2 modules each.

You must use NetApp approved memory modules. Contact NetApp Support at <https://mysupport.netapp.com> to obtain the correct memory modules.

2.4.4 ATX Server LEDs

2.4.4.1 Server Status LEDs

The ATX Server I/O panel, shown in [Figure 2–5](#), contains diagnostic LEDs to help you identify failed and failing components and to help you identify the server from among several servers. Section [4.4.6.1 on page 37](#) summarizes the LED states.

2.4.4.2 Network Port LEDs

The network port LEDs provide the information shown in [4.4.6.2 on page 38](#).

2.4.4.3 ID LED

This is the appliance identification LED (there is a duplicate LED on the Ops Panel).

2.5 Operator's (Ops) Panel

The appliance front panel incorporates an Operator's (Ops) Panel, shown in [Figure 2–7](#).

Important **The Ops Panel is an integral part of the appliance chassis assembly and is not field replaceable.**

This assembly incorporates a USB socket, three LEDs and three buttons, with the following functions:

- LEDs:
 - Green: The appliance is powered on.
 - Amber: The appliance has detected a fault.
 - Blue: Appliance identification LED.
- Buttons:
 - On/off: Powers the system on or off (if held down for at least four seconds). However, note that the system should be shut down using the procedure in [4.2 on page 34](#).
 - System reset: Reboots the hardware and firmware. Use the tip of a ballpoint pen to press the recessed button.
 - ID LED: Toggles the blue appliance identification LED; mutes the audible alarm.
- USB port. This port is for service personnel only.

Refer to section [4.4.1, “Ops Panel LEDs and Switches” on page 35](#) for a full description of the LED and switch functions.

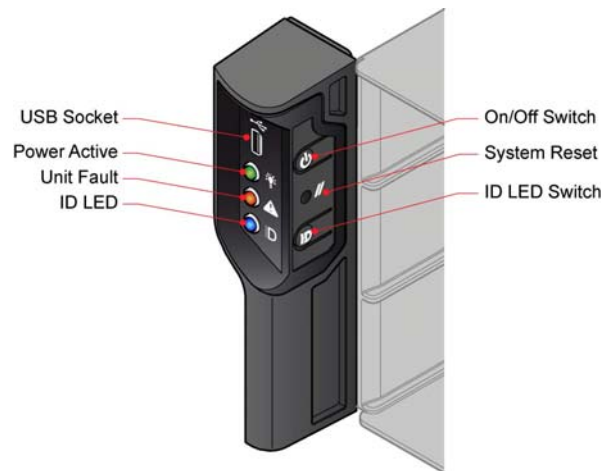


Figure 2–7 Appliance Front Operator's Panel

2.6 Appliance Rear Panel

The appliance assembly includes an integral rear panel, incorporating an appliance ID LED (blue), shown in [Figure 2–5 on page 15](#). This LED is activated by the button on the Ops Panel or by system software, and can be used to identify the server from among other units.

Important The Rear Panel is an integral part of the appliance chassis assembly and is not field replaceable.

2.7 Power Supply Unit

AC/DC power is provided by two commercial dual-redundant Power Supply Units.

A Power Supply Mounting Cage is fitted in the rear of the appliance. The cage houses two individually hot-pluggable 850W AC Power Supply Units (PSUs), each with its own IEC inlet connector and failure indicator.

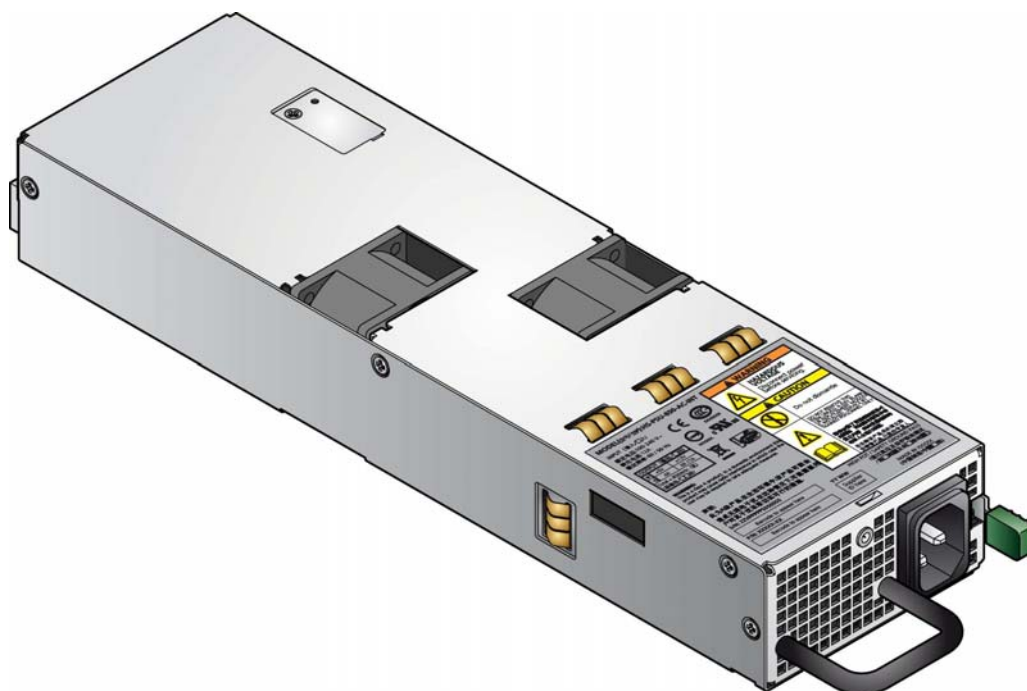


Figure 2–8 Power Supply Unit

PSU voltage operating ranges are nominally 100V to 240V AC, selected automatically. A typical PSU is shown in [Figure 2–8](#).

2.7.1 Multiple Power Supply Units

The SteelStore appliance includes two PSUs fitted in the Power Supply Mounting Cage, providing dual power sources for the system so that if one PSU fails the other maintains the power supply and appliance operation is not affected while the faulty unit is replaced.

PSU replacement should only take a few minutes to perform but must be completed within 10 minutes of removing the failed PSU.

Important Operation of the appliance with ANY modules missing will disrupt the airflow and the system will not receive sufficient cooling. It is **ESSENTIAL** that all apertures are filled before operating the unit.

2.8 Cooling Fans

The cooling fans are high speed single rotor axial fans. Ten fans are housed in a cooling cage, located centrally within the appliance, between the drive bays and the motherboard, as shown in [Figure 2–3 on page 13](#). This allows maximum airflow through the system and minimizes noise.

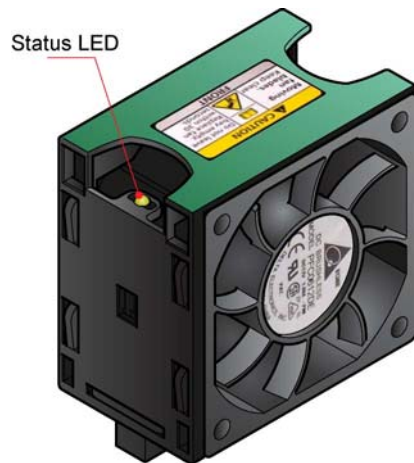


Figure 2–9 Cooling Fan Module

Airflow is from front to rear, with cooling air being drawn across the drives, through the fans and pressurizing the rear of the appliance. The pressurized rear allows the PSU to draw the air that it requires, and perforations at the rear of the chassis allow cooling airflow over the processor heatsinks, memory, motherboard, and PCI cards.

Back pressure created by rack doors and obstacles is not to exceed 5 pascals (0.5mm water gauge).

The cooling system provides sufficient airflow to make sure that drive maximum temperatures are not exceeded when the appliance is at 35°C ambient (sea level) and one fan has failed.

The cooling cage contains ten individual high speed single rotor axial fans, individually connected to and interfacing with the EM Card. This interface provides power and speed control to the fans and returns tachometer output from each fan.

2.9 Drive Carrier Module

The drive carrier module comprises a hard disk mounted in a carrier. Each drive bay houses a single low profile 1 inch high, 3.5–inch form factor disk drive in its carrier. The carrier has mounting locations for SAS drives.

Each disk drive is enclosed in a sheet steel carrier which provides excellent thermal conduction, radio frequency, and electro-magnetic induction protection and affords the drive physical protection.

The front cap features an ergonomic handle which provides the following functions:

- Inserting carrier into drive bays and removing carrier from drive bays.
- Positive “spring loading” of the drive/backplane connector.



Figure 2–10 Drive Carrier Module

2.9.1 Drive Status Indicator

Disk drive status is monitored by green and amber LEDs mounted on the front of each drive carrier module (see [Figure 2–11](#)). Refer to section 4.4.3 on page 36 for a description of the LED states.

2.9.2 Anti-Tamper Locks

Anti-tamper locks are fitted in the drive carrier handles ([Figure 2–11](#)) and are accessed through the small cutout in the latch section of the handle. These are provided to disable the normal ‘pinch’ latch action of the carrier handle.

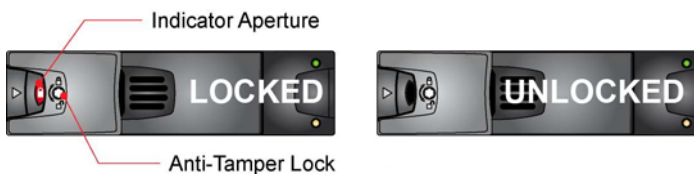


Figure 2–11 Anti-Tamper Lock

2.9.3 Dummy Drive Carrier Modules

Dummy drive carrier modules are provided for fitting in all unused drive bays. They are designed as integral drive module front caps with handles and must be fitted to all unused drive bays to maintain a balanced airflow.

2.9.4 Blanking Plates

Blanking plates must be fitted in any vacant PSU bay or PCI card slots at the rear of the appliance to maintain airflow and allow correct operation.



Warning

Operation of the appliance with ANY modules missing will disrupt the airflow and the drives will not receive sufficient cooling.

Chapter 3

Installation

3.1 Introduction

In this chapter, you are shown how to install the SteelStore into an industry standard 19-inch rack cabinet.

Note

SteelStore appliances are supplied and delivered fully populated with drive carrier modules pre-installed.

**Warning**

The SteelStore appliance is too heavy for a single person to easily install into a rack cabinet with all its component parts installed.

The following procedures describe the installation of the SteelStore appliance and highlight any critical requirements and good handling practices that you must follow to comply with the warranty.

**Caution**

Make sure that you have fitted and checked a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling SteelStore modules and components. Avoid contact with the backplane, motherboard, PCI card components, module connectors, and such.

**Caution**

When connecting the SteelStore system, use only the power cords supplied or cords that match the specification quoted in section [B.7 on page 67](#).

3.2 Pre-Installation

3.2.1 System Components

Before you begin installation you should become familiar with the configuration requirements of your SteelStore system. The correct locations of each of the plug-in modules are shown in [Figure 3-1](#).

Important Installation procedures should be performed by service personnel only.

Table 3-1 SteelStore Configuration

Module	Location
Drive Bays	ALL drive bays must be fitted with a drive carrier module. No bays should be left completely empty.
Power Supply Modules	Two Power Supply Units must be fitted. When two PSUs are installed in the Power Supply Module, full power redundancy is provided while a faulty PSU is replaced.
Cooling Fans	Ten fans, housed in a cooling cage, are located centrally within the appliance, installed between the drive bays and the ATX motherboard.

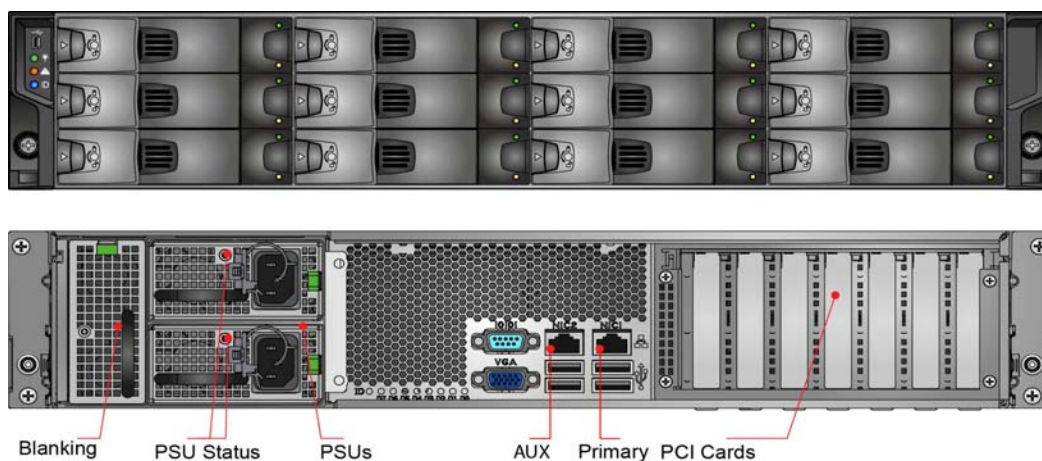


Figure 3-1 Module locations

3.2.2 Preparation of Site

Before you begin, make sure that the site where you intend to set up and use your SteelStore storage system has standard AC power from an independent source or a rack Power Distribution Unit with a UPS (uninterrupted power supply).

3.2.3 Rack Precautions

The following safety requirements must be considered when the unit is mounted in a rack:

- The rack design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.
- When loading a rack with the units, fill the rack from the bottom up and empty from the top down.
- The rack should have a safe electrical distribution system. It must provide over-current protection for the unit and must not be overloaded by the total number of units installed in the rack. Consideration of the electrical power consumption rating shown on the unit's nameplate should be used when addressing these concerns.
- The electrical distribution system must provide a reliable earth for each unit in the rack.
- Each power supply in each unit has an earth leakage current of 0.75mA. The design of the electrical distribution system must take into consideration the total earth leakage current from all the power supplies in all the units. The rack will require labelling with "HIGH LEAKAGE CURRENT. Earth connection essential before connecting supply".
- The rack, when configured with the units, must meet the safety requirements of UL 60950-1:2005 (2nd edition) and IEC 60950-1 2nd edition.

3.2.4 Rack Installation Pre-Requisites

The SteelStore appliance is designed for installation into an industry standard 19-inch rack cabinet subject to the following requirements:

- There must be a minimum depth of 707 mm (27.83 inches) from rack posts to maximum extremity of appliance (excluding rear cabling).
- The rack must be able to support appliances weighing up to 32 kg (71 lb).
- There must be a minimum gap of 25 mm (1 inch) between the rack cover and front of the appliance.
- There must be a minimum gap of 50 mm (2 inches) between the rear of the appliance and the rear of the rack to maintain the correct air flow around the appliance.
- Use in a fully enclosed rack installation is not recommended.
- The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 35°C.
- The system must be operated with low pressure rear exhaust installation. The back pressure created by rack doors and obstacles must not exceed 5 pascals (0.5mm water gauge).



Warning

Operation of the appliance with ANY modules missing will disrupt the airflow and the system will not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the unit. Dummy drive carriers and/or blanking plates are available for this purpose.

3.3 Unpacking the System



Warning

An appliance can weigh up to 32 kg (71 lb). Do not try to lift it by yourself. Do not lift the appliance by the handles on the modules – they are not designed to take the weight.

- 1 Inspect the packaging for crushes, cuts, water damage or any other evidence of mishandling during transit. If any damage appears present, photograph the packaging for reference before opening.
- 2 Unpack the system (see [Figure 3–2](#)).

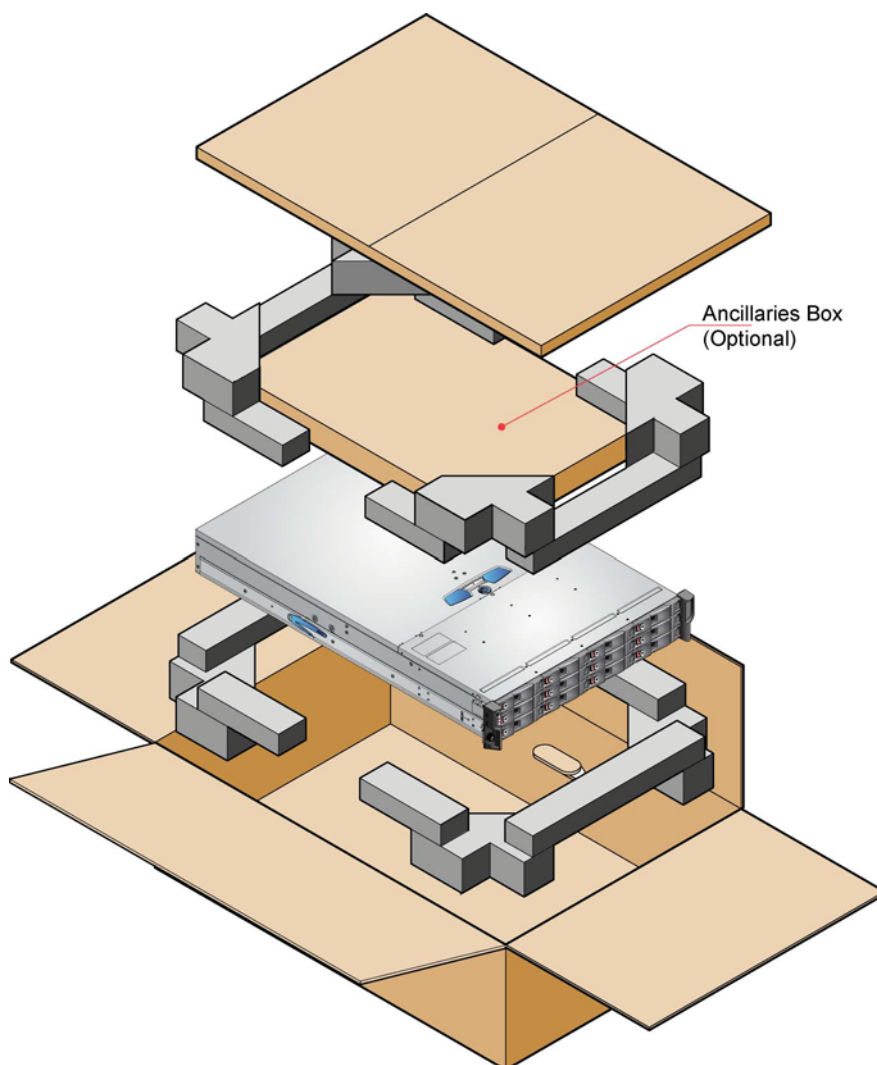


Figure 3–2 Unpacking the System

3.4 Installation

3.4.1 Equipment

The following equipment is required for installation:

- The chassis, including the following:
 - Backplane PCB.
 - ATX motherboard.
 - Enclosure Management Card (EM Card).
 - Ops Panel.
 - Blanking plates covering empty PCI slots.
- Power cord.
- Rack kit (if installing within a rack).
- The Accessory Box contains the power cords and other accessories.
- Flat blade screwdriver (not supplied).
- Torx T10 screwdriver (for drive module locks), included with each appliance.

3.4.2 Mounting the System into a Rack

The rail kit is suitable for 19-inch racks with square and round holes only.

- The minimum distance between vertical rack posts is 24 inches (610 mm)
- The maximum distance between vertical rack posts is 36 inches (914 mm)

Tools required:

- No.2 Phillips screwdriver or flat bladed screwdriver.

Installation procedure:

- 1 Remove the rack mounting rail kit from the accessory box and check for damage.
- 2 Ensure the pre-assembled rail is at its shortest length.
- 3 Locate the rail location pins inside the front of the rack post (see [Figure 3–3](#)). (The rail location pins are pre-assembled to suit square hole or round hole racks. These pins should not be removed.)
- 4 Extend the rail to enable the rear location pins to locate in the rear rack post.

- 5 Ensure the pins are securely located at both the front and rear, so that any load on the rail is transferred to the rack posts.

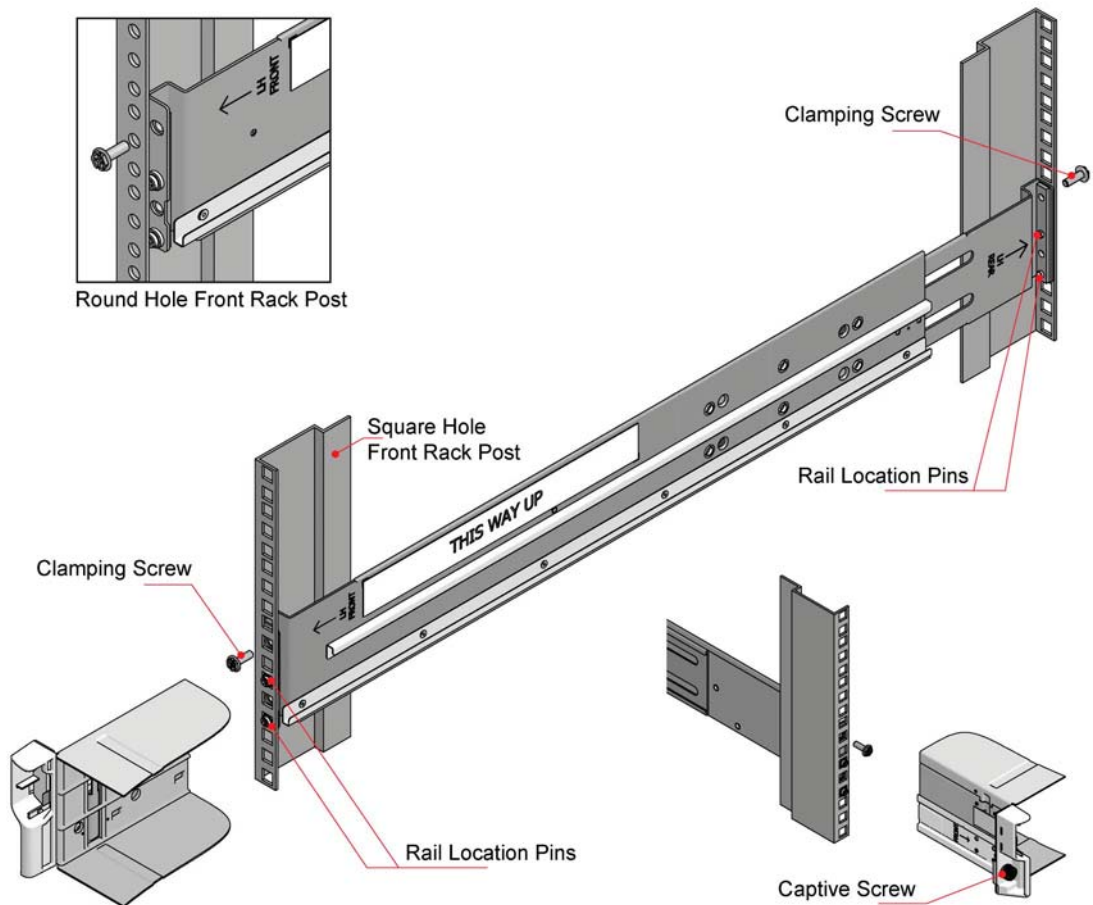


Figure 3-3 Securing Brackets to Rack

- 6 Install the front and rear clamping screws, marked in [Figure 3-3](#). There are 4 screws in total – left and right sides, front and rear. The screws should be left loose enough to allow the rail to move sideways in its slots.
- 7 Slide the chassis fully home on the rails ([Figure 3-4](#)).
- 8 Withdraw the chassis approximately 200 mm and fully tighten the front and rear rail clamping screws.
- 9 Fasten the front of the chassis using the two captive screws.

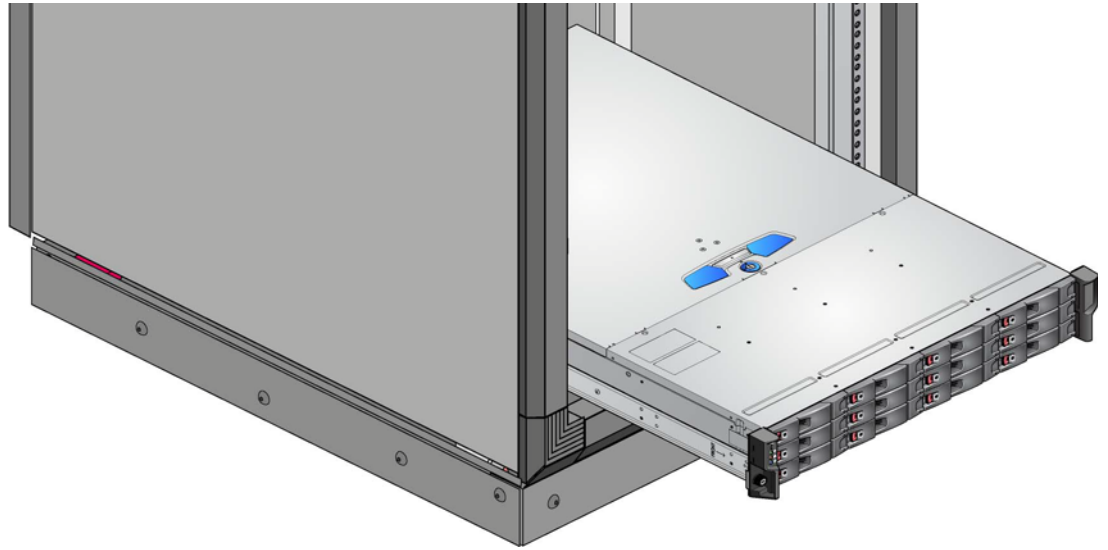


Figure 3-4 Mounting the System into a Rack

Important Chassis rails have features to restrict chassis withdrawal while allowing access to fans. If it becomes necessary to remove the chassis completely, pull the chassis out until it reaches its stops, then press in the latches on the side of the appliance (see [Figure 3-5](#)) before continuing to fully withdraw the chassis.



Figure 3-5 Latch Position

3.4.3 Installing the Modules

SteelStore appliances are supplied and delivered populated with all components and plug-in modules installed.

For information on removal/replacement of plug-in modules, refer to [Chapter 6, “Module Replacement” on page 43](#).

Important Dummy drive carrier modules must be fitted in all unused drive bays to maintain a balanced airflow.

Important Blanking plates must be fitted in any vacant PSU bay or PCI card slots at the rear of the appliance to maintain airflow and allow correct operation. Operation of the appliance system with ANY modules missing will disrupt the airflow and the drives will not receive sufficient cooling.

3.4.4 Connecting the Power Cords

- 1 Attach the power cords to the two Power Supply Units.

Important To provide AC power failure redundancy the two power cords must be connected to separate and independent AC power sources.

- 2 The Power On LED on each PSU indicates whether AC mains power is present (flashing green).



Caution

The power connections must always be disconnected prior to removal of the Power Supply Unit from the appliance.

Important If bifurcated power cords are used, there will be no independent power source redundancy.

3.4.5 Grounding Checks



Warning

The product must only be connected to a power source that has a safety electrical earth connection.

Before switching on, the earth connection to the rack must be checked by an electrical engineer who is qualified to the appropriate local and national standards to perform the check.

3.4.6 For More Information

See the *NetApp SteelStore Cloud Integrated Storage Installation Guide* for more information and next steps.

Chapter 4

Operation

4.1 Powering On the Appliance

**Caution**

Do not operate the system until the ambient temperature is within the specified operating range. If the drives have been recently installed make sure they have had time to acclimatize before operating them.

- 1 Before powering up the appliance make sure that all the modules are firmly seated in their correct bays.
- Important** All drive and PSU apertures must be filled for the appliance to receive sufficient cooling. If a drive or PSU is not present, the aperture must be filled with a blank.
- 2 Apply AC mains power to the appliance.
 - 3 Press the on/off switch (see section [4.4.1 on page 35](#)). The Power Active LED on the Ops Panel should be lit (green) when the power button is pressed (and the disk drive motors should start).

All drives in the appliance should automatically start. If this does not occur, one of the following conditions might exist:

- There may be a power problem (an alarm and power fault indication would normally be indicated – see [Chapter 5, “Troubleshooting” on page 39](#)).
- If there is only one PSU present, the drive motors will spin up in a delayed sequence.

Important If mains power is lost for any reason, on restoration of power the appliance will re-start automatically (unless configured otherwise in the BIOS).

4.2 Powering Off the Appliance

- 1 Shut down any applications that are running on the server.
- 2 Shut down the operating system on the server.
- 3 Remove all AC power cords from the appliance.

Note Until the AC power cords are removed, the system will still be running in standby mode.

Important The appliance will not be completely isolated from the power source unless both power cords are disconnected.

4.3 Drive Anti-Tamper Locks

Anti-tamper locks are fitted in the drive carrier handles.

4.3.1 Activating the Locks

- 1 Carefully insert the key (a Torx T10 screwdriver provided with the appliance) into the anti-tamper lock in the handle (see [Figure 4-1](#)).
- 2 Rotate the key in a clockwise direction until the indicator is visible in the aperture beside the key.

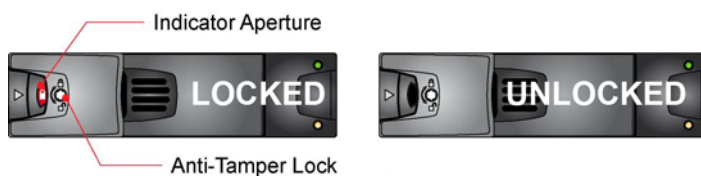


Figure 4-1 Activating the Anti-Tamper Lock

- 3 Remove the key.

4.3.2 De-Activating the Locks

- 1 Carefully insert the key (a Torx T10 screwdriver provided with the appliance) into the anti-tamper lock in the handle.
- 2 Rotate the key in a counterclockwise direction until the indicator is no longer visible in the aperture beside the key.
- 3 Remove the key.

Note A drive carrier cannot be installed if its anti-tamper lock is activated outside the appliance.

4.4 LEDs and Controls

4.4.1 Ops Panel LEDs and Switches

The Ops Panel LEDs (Figure 4–2) fault and status conditions are defined in Table 4–1 while the functions of the push-button switches are defined in Table 4–2.

Refer to Chapter 5, “Troubleshooting” on page 39 for details of any fault indication.



Figure 4–2 Ops Panel LEDs and Switches

Table 4–1 Ops Panel LEDs

LED	Status
Power Active	<ul style="list-style-type: none"> Constant green: system has full power and is running. Off: system is off or in standby mode.
Unit Fault	Constant amber: there is a fault with the appliance.
Appliance ID	Blue: only when activated via the ID LED switch or the appliance firmware.

Table 4–2 Ops Panel Switches

Push-Button Switches	Definition
On/Off	<ul style="list-style-type: none"> Powers the appliance on if currently off. Powers the appliance off if currently on (hold the switch down for at least four seconds).
System Reset	Resets the appliance hardware and firmware. The button is recessed and must be activated with a ball-point pen or similar implement.
ID LED	Toggles the state of the blue ID LEDs on the Ops Panel and the back of the appliance. Also mutes the audible alarm if it is sounding.

Note The Ops Panel is supplied as an integral part of the appliance core product and is not user replaceable.

4.4.2 Power Supply Unit LEDs

The PSU incorporates a green LED, as shown in [Figure 4-3](#).

Table 4-3 Power Supply Unit LEDs

LED	Status
Power	<ul style="list-style-type: none"> Flashing green: the PSU is connected to a mains supply. Standby power is present. Constant green: the PSU is powered on. Flashing amber: power supply failure – over current or under voltage. Constant Amber: power supply failure – over voltage, over temperature or fan failure.

Power Supply LEDs are shown in [Figure 4-3](#).

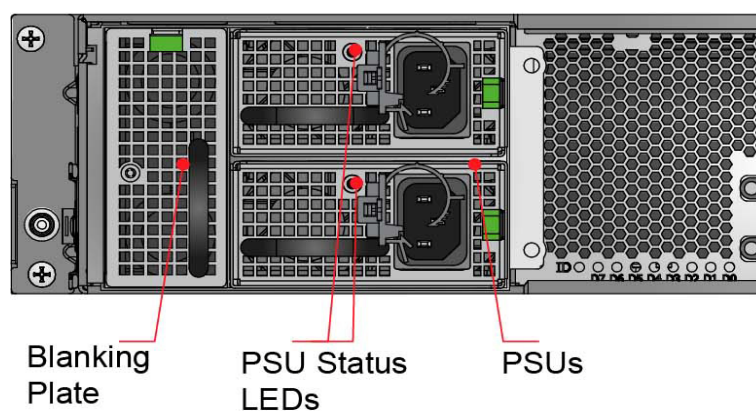


Figure 4-3 Appliance Rear View showing Switches and Connections

4.4.3 Drive Carrier LEDs

Each drive carrier module incorporates a green and amber LED, shown in [Figure 4-4](#).

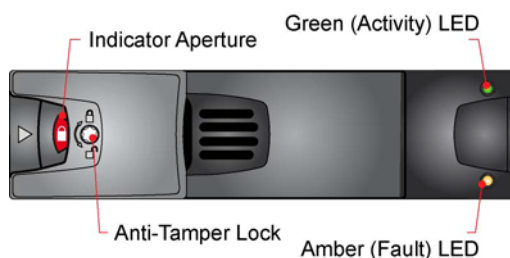


Figure 4-4 Drive Carrier LEDs

Table 4-4 Disk Drive LEDs

LED	Definition
-----	------------

Table 4–4 Disk Drive LEDs

Activity	<ul style="list-style-type: none"> • Flickering green: the drive is powered and has active I/O. • Constant green: the drive is powered and idle.
Fault	<ul style="list-style-type: none"> • Off: the drive is functioning correctly. • Flashing amber. • Constant amber: the drive is faulty.

4.4.4 Cooling Fan LEDs

The cooling fans feature a single amber status LED, as shown in [Figure 2–9 on page 21](#).

Table 4–5 Cooling Fan LEDs

LED	Status
Status	<ul style="list-style-type: none"> • Off: the fan is operating correctly. • Flashing amber: this is used to identify the fan and can be achieved through the firmware. • Constant amber: the fan has a fault.

4.4.5 Rear Panel LED

The rear panel LED (shown in [Figure 4–3 on page 36](#)) is used to identify the appliance in the same way as the ID LED described in section [4.4.1 on page 35](#).

Table 4–6 Rear Panel LEDs

LED	Status
Appliance ID	Blue: only when activated via the ID LED switch.

4.4.6 ATX Server LEDs

4.4.6.1 Server Status LEDs

The ATX motherboard I/O panel contains eight LEDs labelled D7 to D0 (from left to right). These LEDs indicate the status. If you are experiencing problems with the system, contact NetApp Support with LED status.

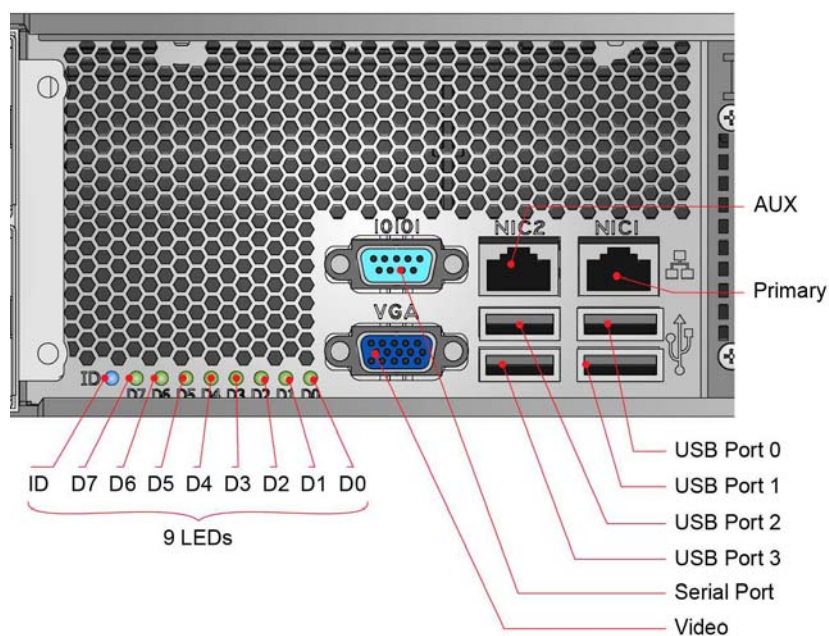


Figure 4-5 ATX Server I/O Components

4.4.6.2 Network Port LEDs

The network port LEDs are defined in [Table 4-7](#).

Table 4-7 Network Port LEDs

LED	LED State	Description
Left	Off	No network connection
	Solid green	Network connection is active
	Blinking green	Transmit / receive activity is occurring
Right	Off	10 Mbps connection (if left LED is on or blinking)
	Solid amber	100 Mbps connection
	Solid green	1000 Mbps connection

Chapter 5

Troubleshooting

5.1 Overview

The SteelStore appliance includes an Appliance Services Processor and associated monitoring and control logic to enable it to diagnose problems within the EM Card, Ops Panel, CPU(s) and DIMM(s).

The sensors for power and cooling conditions are housed within the power supplies and cooling fans. There is independent monitoring for each unit.

5.1.1 Continuous Operation During Replacement

If a disk unit fails, it can normally be replaced without interrupting the use of the system.

If an appliance contains two power supply units, either of them can maintain power to the subsystem while the other is replaced.

5.1.2 Replacing Modules

Make sure that you have obtained a replacement module of the same type *before* removing any faulty module. Refer to [Chapter 6](#) for instructions on how to replace modules.



Warning

If the SteelStore system is powered up and you remove any module, its replacement must be inserted immediately. If the system is used with modules or module blanks missing for more than a few minutes, the appliance can overheat, causing power failure and data loss. Such use will invalidate the warranty.

- Replace a faulty drive with a drive of the same type and equal or greater capacity.
- All drive bays must be fitted with a drive carrier module to maintain a balanced air flow.

- All the supplied plug-in power supply units, electronics modules and blank modules must be in place for the air to flow correctly around the cabinet.



Caution

Observe all conventional ESD precautions when handling SteelStore modules and components. Avoid contact with backplane components and module connectors, etc.

Important

The top cover of the appliance covers a service area which should be accessed by service personnel only. When the cover is replaced it *MUST* be secured by turning the lock mechanism to the “locked” position.

5.2 Start-Up Problems

5.2.1 Faulty Power Cords

- 1 Make sure that the power source to the appliance is switched on.
- 2 Check that all power cords are inserted into PSUs. The PSU LEDs (see [4.4.2 on page 36](#)) should flash green when an active power cord is inserted (or be constant green if the appliance has been powered on).

Contact NetApp Support if any of the following are true:

- Cords are missing or damaged.
- Plugs are incorrect.
- Cords are too short.

5.2.2 The Motherboard Doesn't Recognize the Drives

- 1 Check that the LEDs on all installed drive carrier modules are illuminated (amber). Note that the drive LEDs will not be lit during drive spinup.
- 2 Check that all drive carrier modules have been correctly installed.
- 3 Check the SAS interconnect cables between the HBA and the EM Card.

5.3 LED Alarm Interpretation

The following tables summarize the various states of the LEDs and their meaning. Some states are duplicated in this section to make it easier to search for the cause of a problem.

The LED states in the following tables are defined as:

- Slow blink – The LED is on for 0.5 seconds in every 4 seconds.
- Fast blink – The LED is on for 0.5 seconds in every 1 second.

- Constant – The LED is on constantly (no blinking).

Table 5–1 Ops Panel Fault LED

Ops Panel Fault LED	Other LED	Meaning and Required Action
Off		No warnings or faults.
Slow blink	No fan/drive fault LEDs constant	Warning state (usually approaching temperature threshold): check ambient temperature and increase if too cold or decrease if too hot. If this does not work, check for fan failure.
	Fan LED constant	Fan broken or out of tolerance: replace faulty fan.
	Drive LED constant	Drive fault – replace faulty drive.
Fast blink	No fan LEDs constant	Critical state (usually temperature near edge of operating realm): check ambient temperature and increase if too cold or decrease if too hot immediately. If this does not work check for fan failure that has a broken light too.
	Two or more fan LEDs constant or one PSU fan LED constant	Fans broken or out of tolerance: replace fans immediately.
Constant	No fan LEDs constant	Failure state (temperature in range where damage could occur): check ambient temperature and increase if too cold or decrease if too hot immediately. If this does not work check for fan failure that has a broken light too.
	Multiple fan LEDs constant	Fans broken or out of tolerance: replace fans immediately and decrease ambient temperature.

Table 5–2 Fan Fault LED

Fan Fault LED	Other LED	Meaning and Required Action
Flashing		Fan identification has been turned on
Constant	Chassis fault LED constant.	The fan broken or out of tolerance: replace fan immediately.

Table 5–3 Drive Fault LED

Drive Fault LED	Other LED	Meaning and Required Action
Flashing		Drive identification has been turned on.
Constant	Chassis fault LED constant.	Fan broken or out of tolerance: replace fan immediately.

Chapter 6

Module Replacement

6.1 Overview

The SteelStore appliance includes an Appliance Services Processor and associated monitoring and control logic to enable it to diagnose problems within the power, cooling, and drive systems.

The sensors for power and cooling conditions are housed within the EM Card, Ops Panel, CPUs and DIMMs. There is independent monitoring for each unit.

6.2 ESD Precautions

**Caution**

It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling SteelStore plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

6.3 Replacing a Module

**Caution**

Whenever replacing a module never leave an empty bay in the rear of the appliance – obtain a replacement before removing the problem part.

**Warning**

Upon module replacement, the appliance top cover **MUST be secured by turning the lock mechanism to the “locked” position with a screwdriver.**

Locations of the principal replaceable components are shown in [Figure 6–1](#).

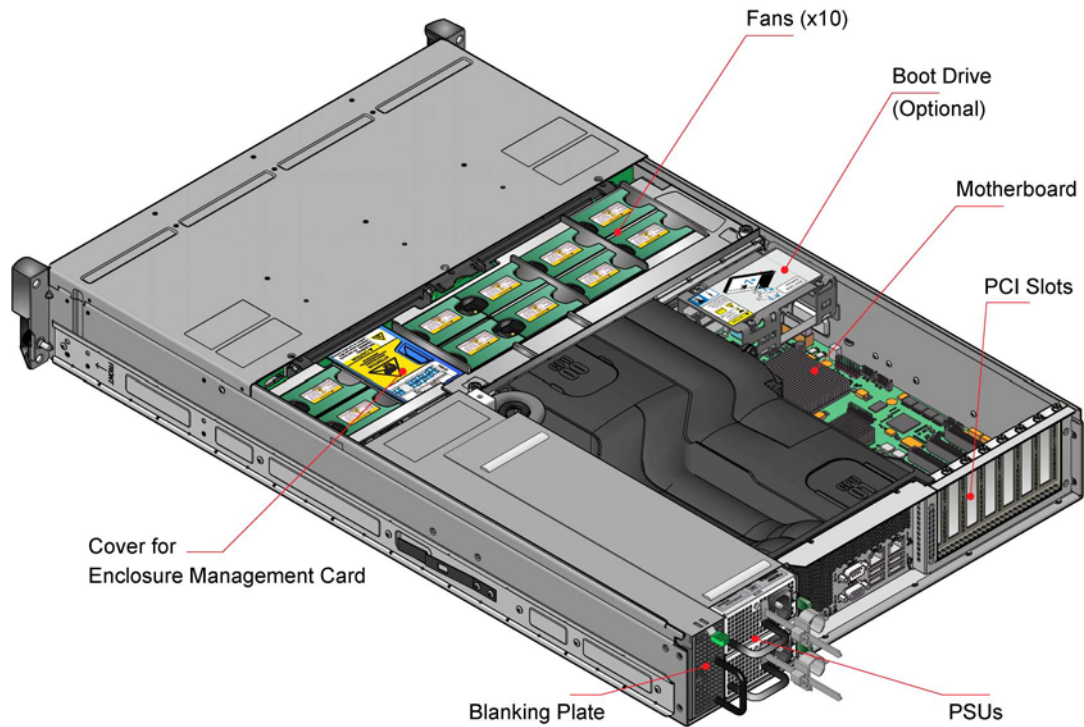


Figure 6–1 ATX Server Component Locations

6.3.1 Power Supply Units

The SteelStore appliance system incorporates two PSUs housed in a mounting cage. PSU modules are individually installed.

Important A faulty PSU must be replaced by a fully operational PSU within 24 hours.



Warning

Do not remove covers from the Power Supply Unit (PSU): there is a danger of electric shock inside. Return the PSU to your supplier for repair.

6.3.1.1 Removing a Power Supply Unit



Warning

The removal of the appliance top cover or a Power Supply Unit must only be performed by a service person. Potential hazards include rotating fans and hot surfaces.

Important Prior to removing the PSU from the mounting cage in the appliance, disconnect the power from the power supply, by either the mains switch (where present) or by physically removing the power source, to make sure your system has warning of an imminent power shutdown.

- 1 Make sure that you identify the faulty PSU correctly.
- 2 Disconnect the power cord (there is no need to turn off the PSU).

- 3 Squeeze the locking tab to the left (Figure 6-2).

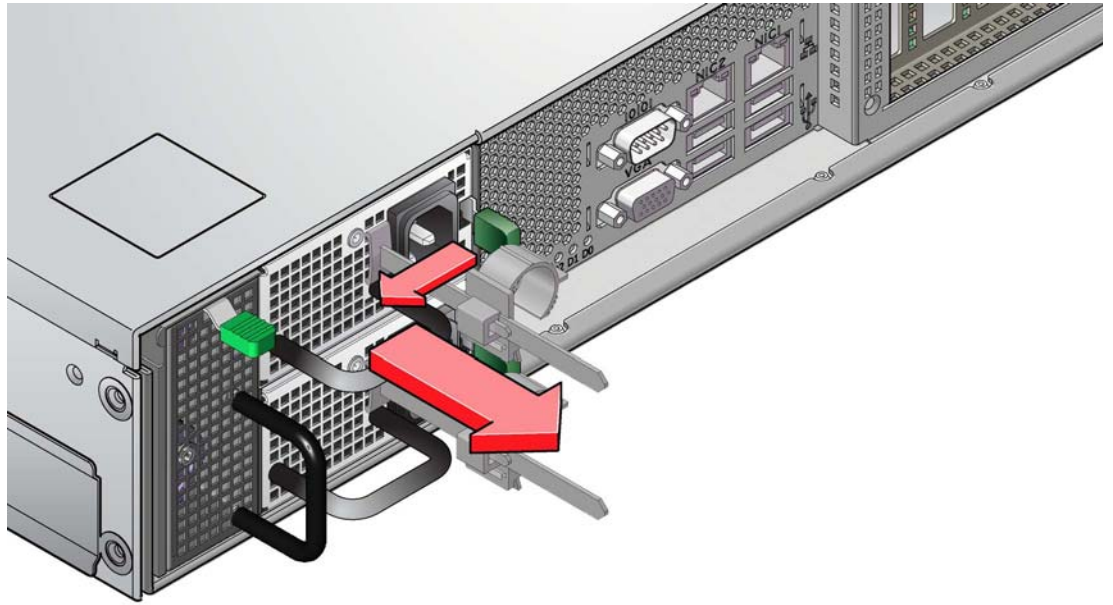


Figure 6-2 Removing a PSU (1)

- 4 Grip the handle and withdraw the PSU from the mounting cage (Figure 6-3).

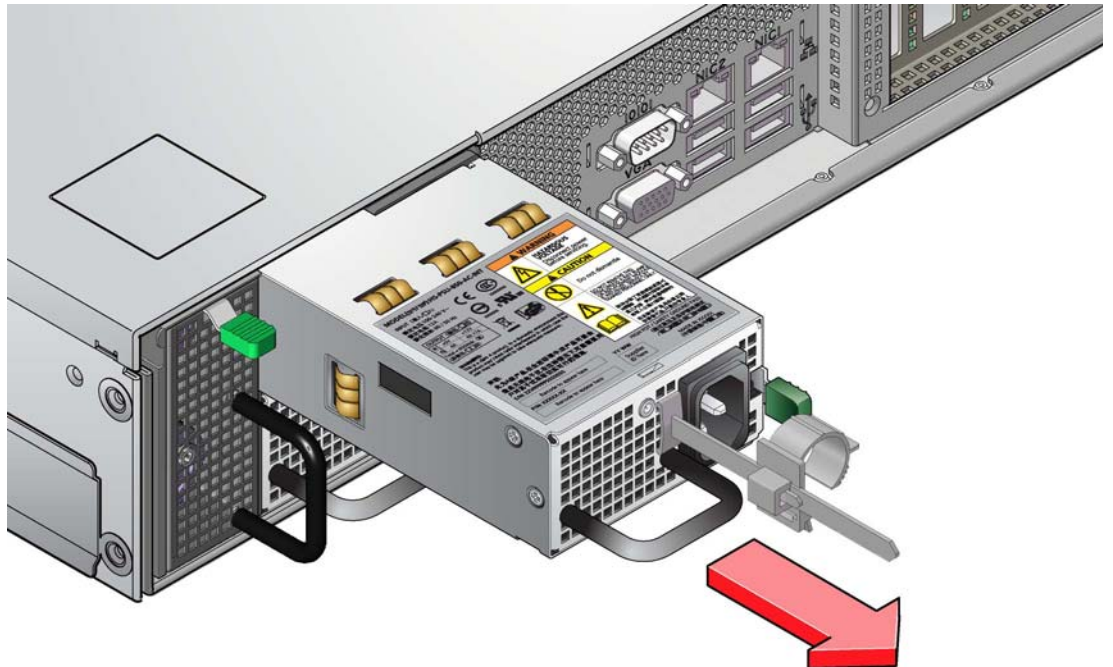


Figure 6-3 Removing a PSU (2)

6.3.1.2 Installing a Power Supply Unit



Warning

This procedure should be performed by Service Personnel only.

Two PSUs can be installed in the mounting cage at the rear of the appliance, see [Figure 3–1 on page 26](#).

Important

Two PSUs must be fitted. Operation of the appliance with ANY modules missing will disrupt the airflow and the system will not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the unit.



Warning

Do not remove covers from the PSUs: there is a danger of electric shock inside. If a PSU is faulty you must return it to NetApp for repair.

- 1 Check for damage, especially to the rear connector on the supply.



Caution

Handle the PSU carefully and avoid damaging the connector pins. Do not install the PSU if any pins appear to be bent.

- 2 Slide the PSU into the mounting cage ([Figure 6–4](#)). A click indicates when the securing spring engages.

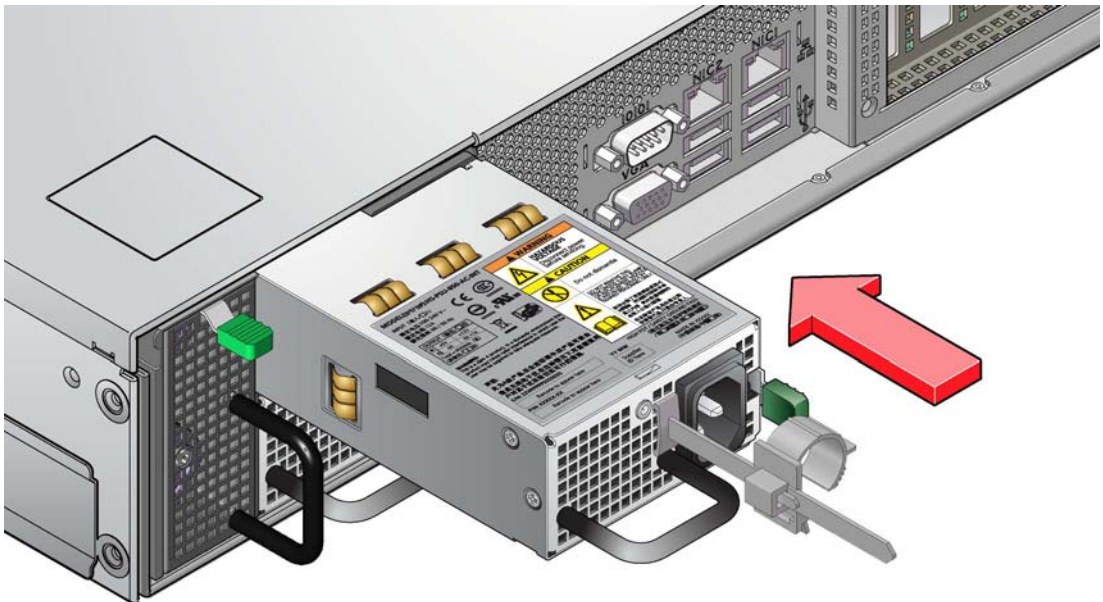


Figure 6–4 Installing a Power Supply Unit (1)

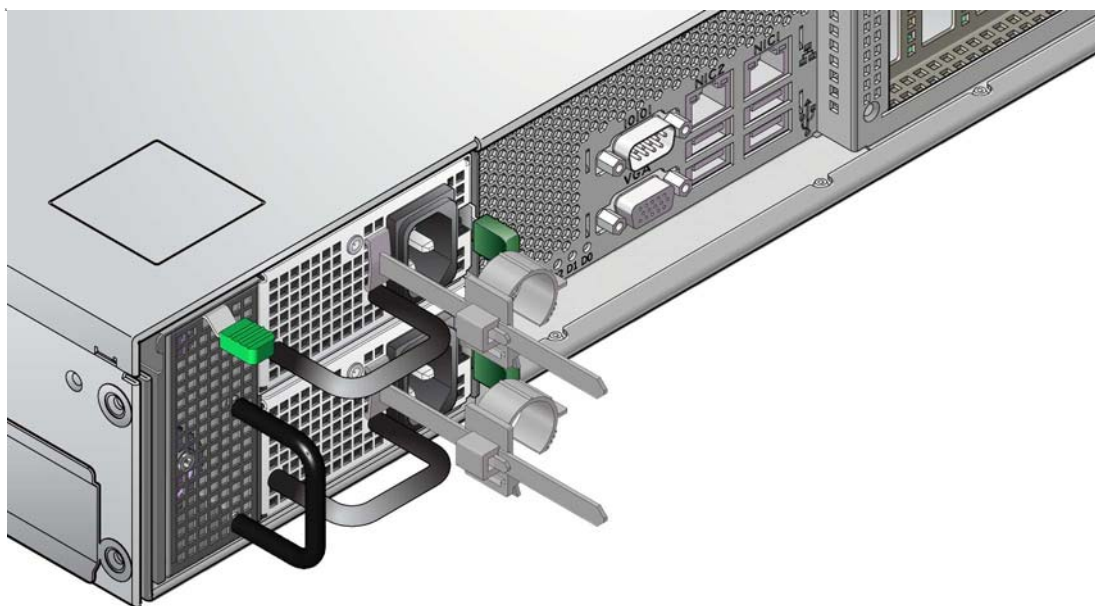


Figure 6-5 Installing a Power Supply Unit (2)

- 3 You are ready to connect the power cords to the power sources and switch on the power source. Refer to section [3.4.4 on page 32](#).

6.3.2 Cooling Fans

The SteelStore appliance system incorporates ten cooling fans, housed in a cooling cage. Fan modules are individually installed.

Important A faulty cooling fan must be replaced by a fully operational fan within 72 hours. Do not remove the faulty module until you have a replacement module of the same type available.

6.3.2.1 Removing a Cooling Fan



Warning

The appliance top cover should only be opened by service personnel as it provides access to a service area. Potential hazards include rotating fans and hot surfaces.



Warning

Upon module replacement, the appliance top cover **MUST** be secured by turning the lock mechanism to the “locked” position with a screwdriver.

- 1 To access the ten cooling fans, release the appliance top cover by turning the lock mechanism to the “unlocked” position and slide the cover back until it stops (see [Figure 6-6](#)).



Warning

Make sure the fan has stopped rotating before you attempt to remove it: there is a risk of trapping or cutting fingers.

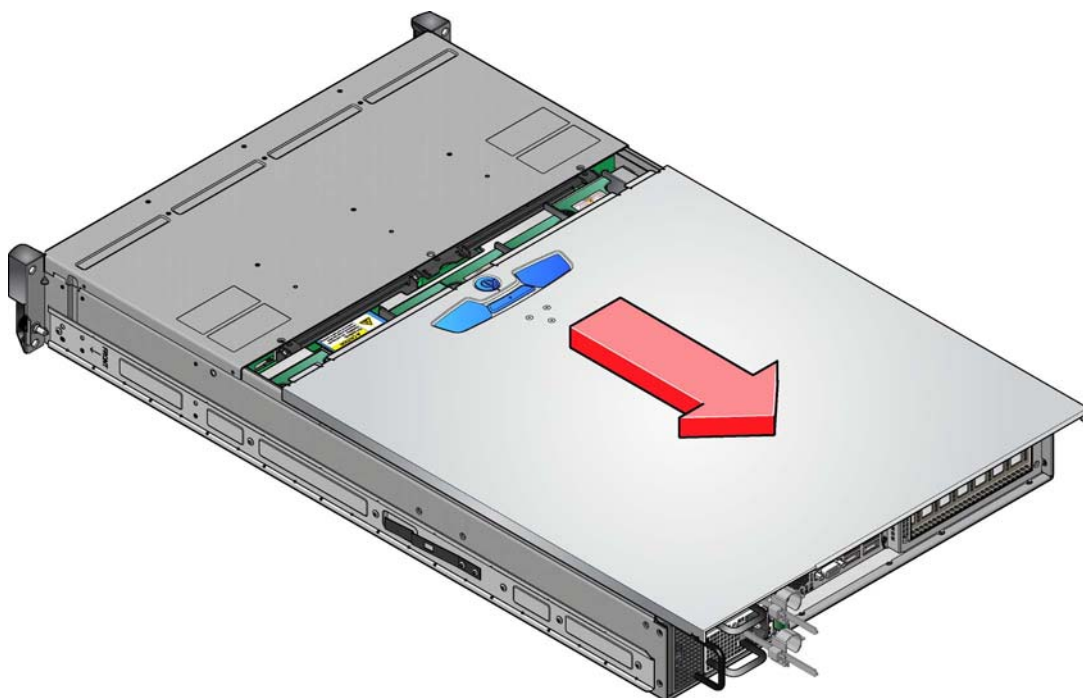


Figure 6-6 Removing the Appliance Cover

- 2 Grip the faulty fan module with finger and thumb and pull it upward to unplug it from the EM Card and remove it from the appliance (see [Figure 6-7](#)).

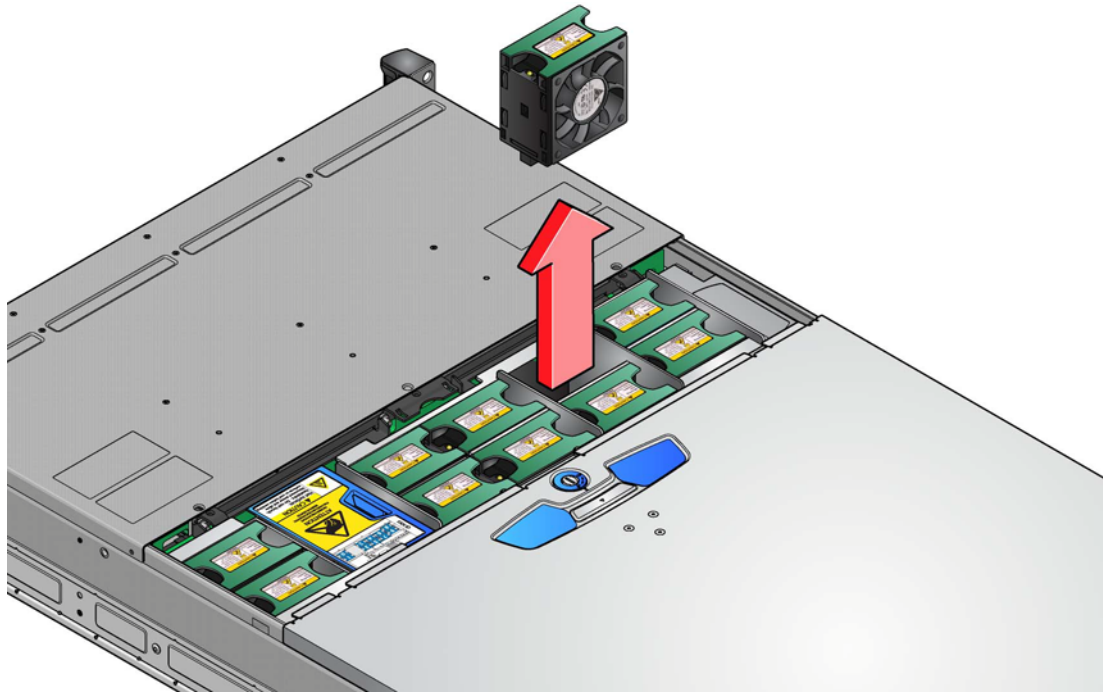


Figure 6–7 Removing a Cooling Fan

6.3.2.2 Installing a Cooling Fan

- 1 Check the fan for damage. Do not install if there are any visible signs of damage.
- 2 Grip the fan and push it all the way into the appliance until it fits firmly and is level with the other fans (see [Figure 6–8](#)). The fan plugs into the EM Card.
- 3 Make sure that the fan LED extinguishes within 10 seconds of installation.
- 4 Repeat the procedure for each fan to be fitted.

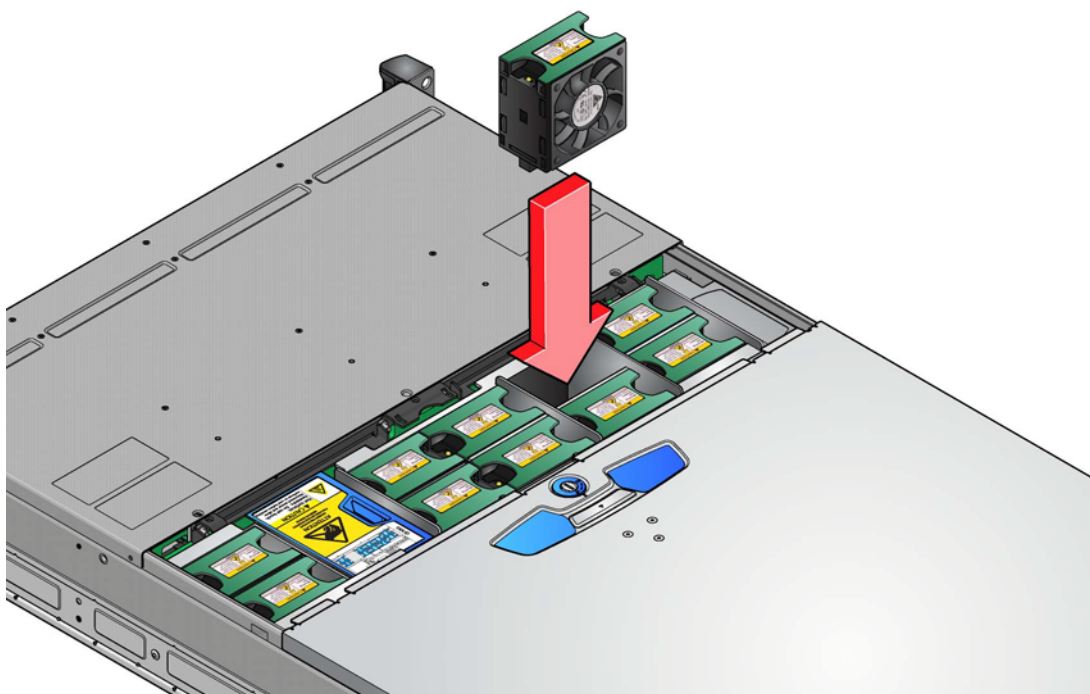


Figure 6–8 Cooling Fan Installation

- 5 Close the appliance cover and secure by turning the lock mechanism to the “locked” position.

6.3.3 Drive Carrier Module



Warning

Observe all conventional ESD precautions when handling SteelStore modules and components. Avoid contact with backplane components and module connectors.

6.3.3.1 Removing a Drive Carrier

Important

Damage can occur to a drive if it is removed while spinning. If possible, use the operating system to spin down the drives prior to removal. If this is not possible we recommend that you perform all steps of the following procedure to make sure that the drive has stopped prior to removal.

- 1 Open the bezel to display the disks.
To release the bezel, press the tabs on each side of the bezel and pull toward you. The bezel remains attached to the system on hinges.
- 2 If the anti-tamper lock has been activated, de-activate it by inserting the key into its socket and rotating it in a counterclockwise direction until the indicator is no longer visible in the aperture beside the key (see section [4.3.2 on page 34](#)). The key is a Torx T10 screwdriver provided with the appliance.
- 3 Release the carrier handle by pressing the latch in the handle towards the handle hinge (toward the front of the appliance). See [Figure 6–9](#).

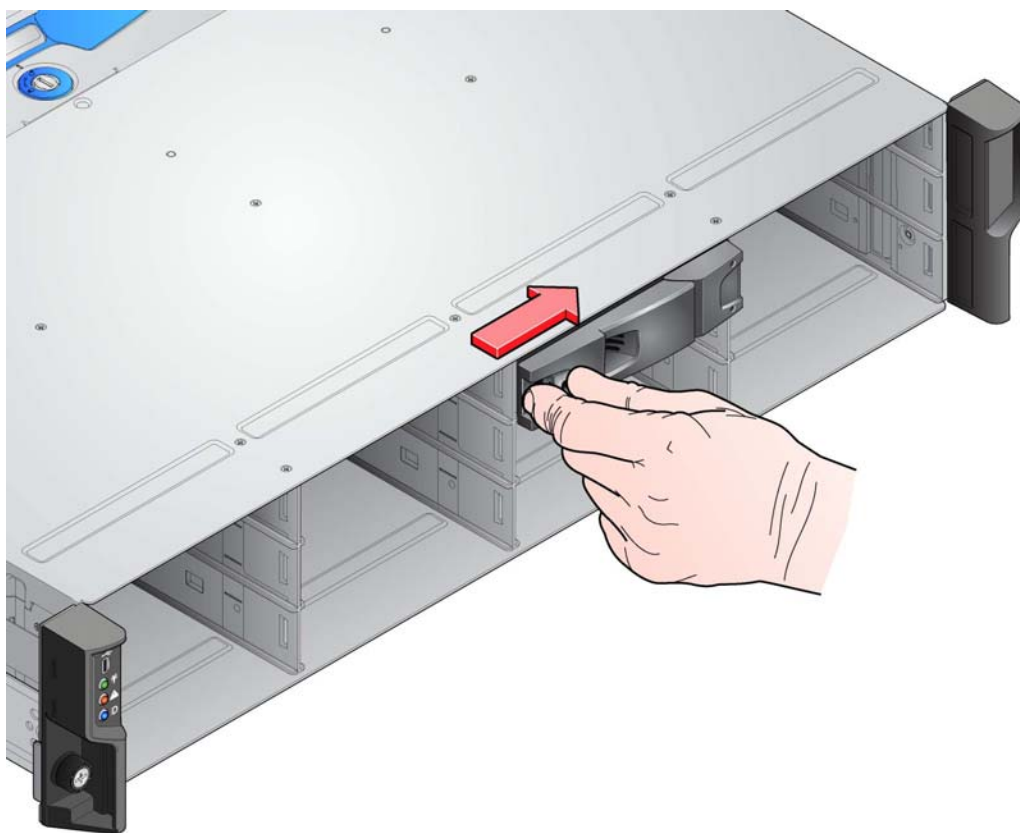


Figure 6–9 Removing a Drive Carrier Module (1)

- 4 Gently withdraw the drive carrier module approximately 1 inch (25 mm), and wait 30 seconds (see [Figure 6–10](#)).

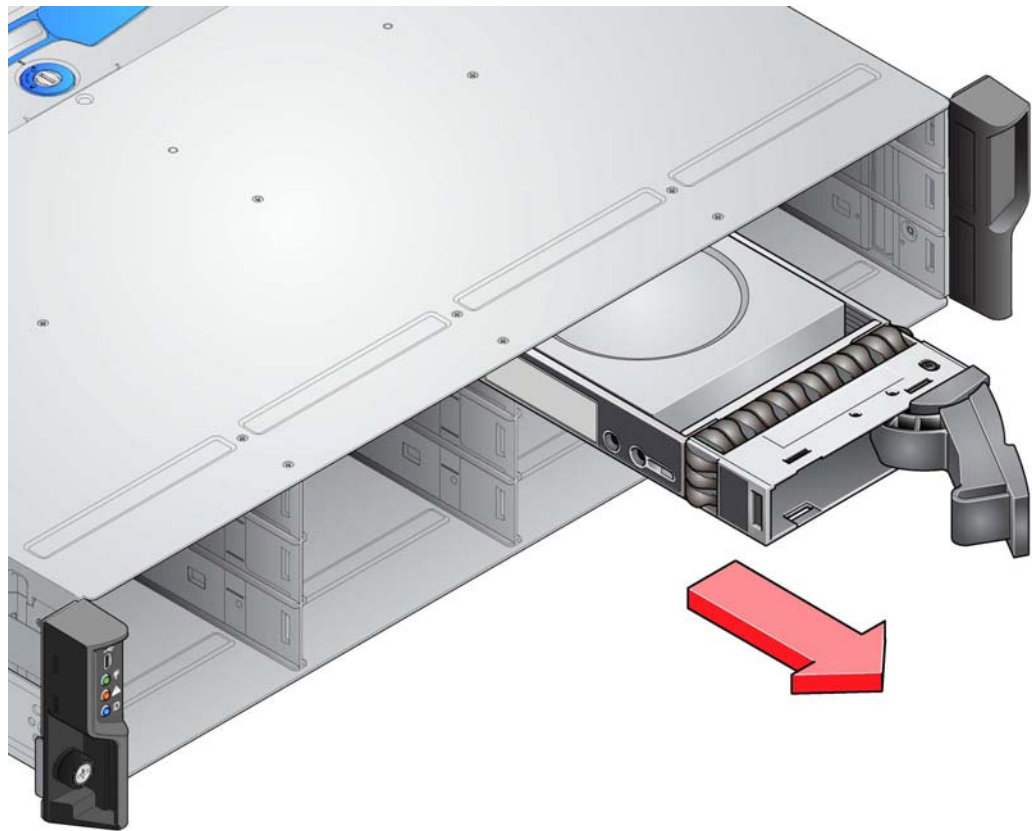


Figure 6–10 Removing a Drive Carrier Module (2)

- 5 Withdraw the module from the drive bay.



Caution

*Dummy drive carrier modules **MUST** be fitted to ALL unused drive bays. There will be inadequate drive cooling if any are left open.*

6.3.3.2 Installing a Drive Carrier

Important A drive carrier module cannot be installed if its anti-tamper lock is activated while the unit is outside the appliance. Refer to [section 4.3.2 on page 34](#) for the de-activation procedure.

- 1 Release the drive carrier handle, by depressing the latch in the handle (see [Figure 6–11](#)).



Figure 6-11 Installing a Drive Carrier Module (1)

- 2 Insert the drive carrier into the appliance ([Figure 6-12](#)).

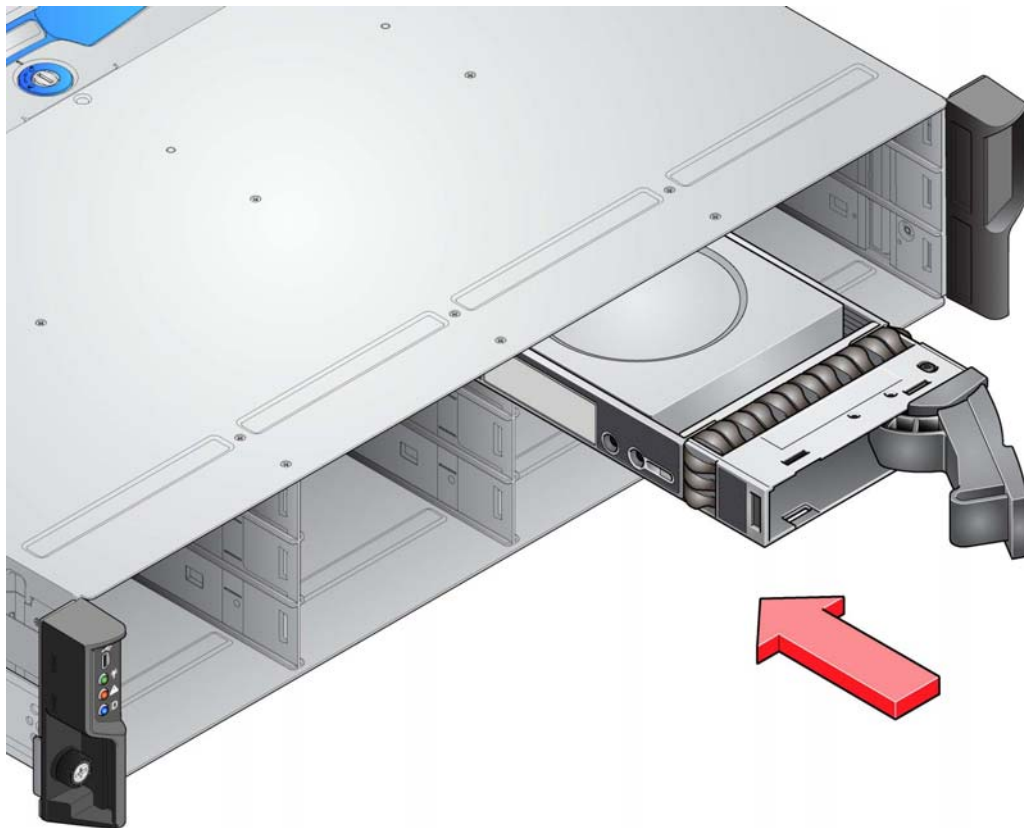


Figure 6-12 Installing a Drive Carrier Module (2)

Important Make sure that the carrier is orientated so that the drive is uppermost and the handle opens from the left, as shown in [Figure 6-12](#).

- 3 Gently slide the drive carrier all the way into the appliance.
- 4 Cam the drive carrier home. The camming foot on the base of the carrier will engage into a slot in the appliance. Continue to push firmly until the handle fully engages. A click indicates when the latch engages and holds the handle closed.



Caution

Make sure that all drive carriers are fully engaged in the appliance by firmly pushing each one home into the slot, as shown in [Figure 6-13](#).

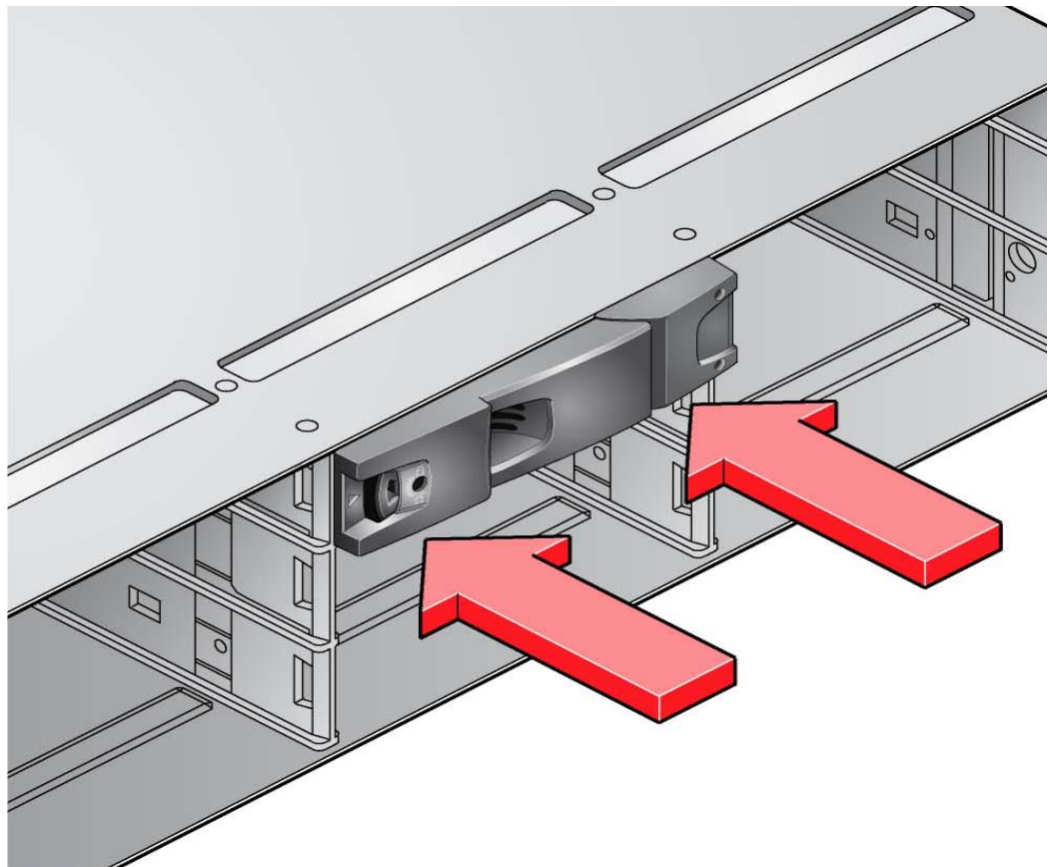


Figure 6-13 Engaging a Drive Carrier Module in an Appliance

6.4 Replacing Components on the Motherboard

Although some components on the ATX motherboard can be replaced, the motherboard itself cannot. In the event of a motherboard failure, contact your supplier.

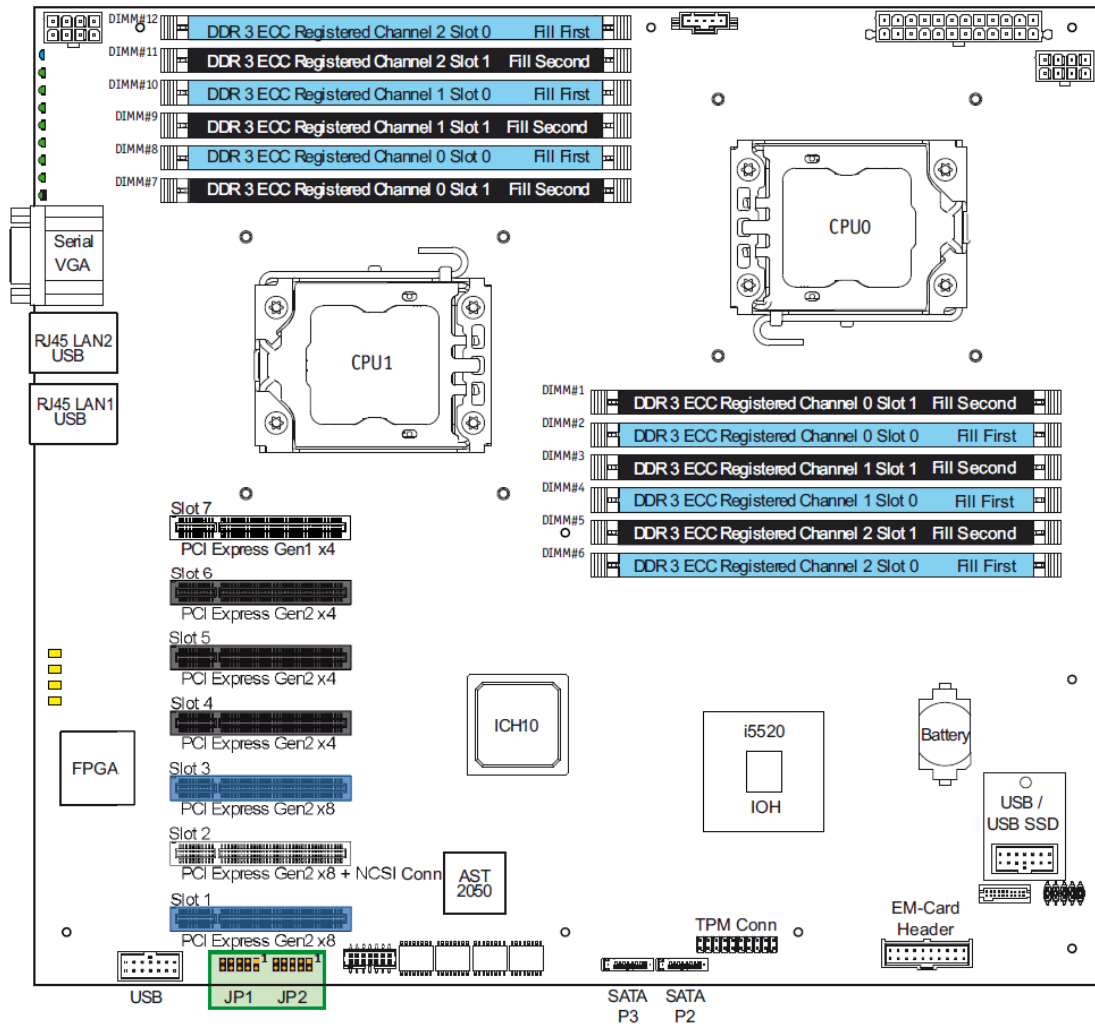


Figure 6-14 Motherboard Layout and Components

6.4.1 Replacing Memory Modules

Note This procedure is only for authorized customers using authorized parts.

The SteelStore has 12 memory slots, 6 per CPU, divided into 3 channels of 2 modules. When replacing memory modules, refer to [Figure 6-14 on page 56](#).

SteelStore models require specific placement of the memory as indicated in the following table.

Appliance	Memory	Required Slot Locations
SteelStore 730	6 x 4 GB	Slots 2, 4, 6, 8, 10, 12
SteelStore 2030	6 x 8 GB	Slots 2, 4, 6, 8, 10, 12
SteelStore 3030	6 x 16 GB	Slots 2, 4, 6, 8, 10, 12

In general, populate as many Slot 0 (blue) slots first, before starting to populate any Slot 1 (black) slots.

Important Replacing the existing memory module with a module of a different size causes the system to fail. You must use approved memory modules. Contact NetApp Support at <https://mysupport.netapp.com> to obtain the correct memory modules.

- 1 Remove the installed module by pushing both retaining clips sideways and pulling the module out of the slot.

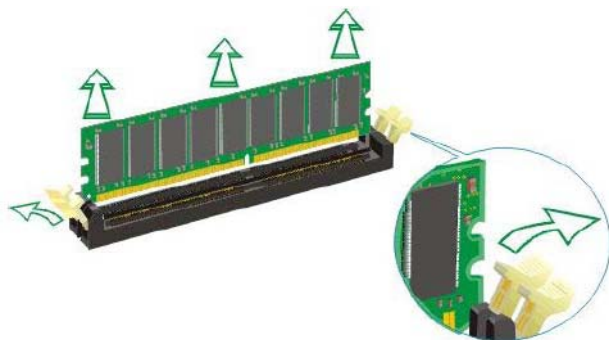


Figure 6–15 Removing a RAM Module

- 2 Insert the module into the correct slot, aligning the notch on the module with the socket.
- 3 Push the module down until the retaining clips lock on each side.

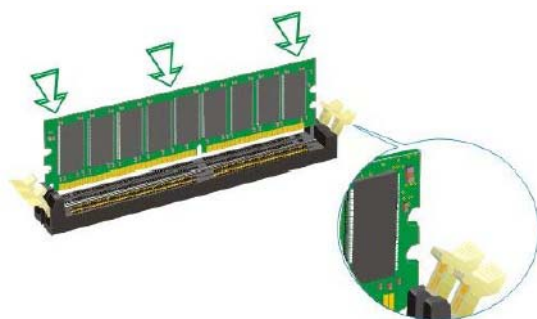


Figure 6–16 Inserting a RAM Module

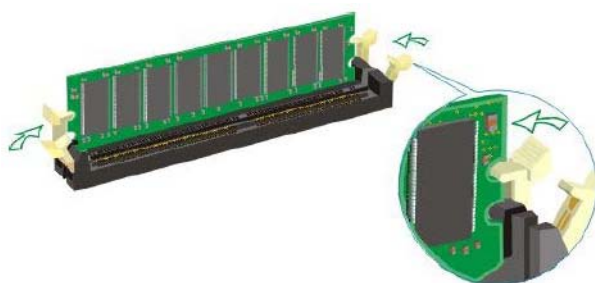
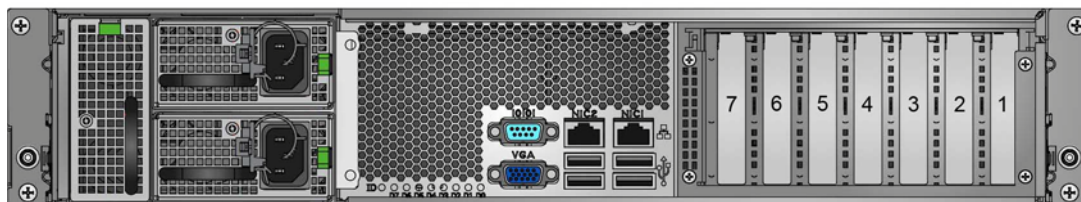


Figure 6–16 Inserting a RAM Module

6.5 Replacing PCI Cards

Note This procedure is only for authorized customers using authorized parts.

PCI cards for SteelStore must be in specific slots. See [2.4.2, “PCI Express Slots,” on page 15](#) for more information about the slot location requirements for each type of card.



Slot 7	
	PCI Express Gen1 x4
Slot 6	
	PCI Express Gen2 x4
Slot 5	
	PCI Express Gen2 x4
Slot 4	
	PCI Express Gen2 x4
Slot 3	
	PCI Express Gen2 x8
Slot 2	
	PCI Express Gen2 x8 + NCSI Conn
Slot 1	
	PCI Express Gen2 x8

Figure 6–17 PCI Slots

- 1 To access a PCI card, release the appliance top cover by turning the lock mechanism to the “unlocked” position and slide the cover back until it stops (see [Figure 6–6 on page 48](#)).
- 2 Slide the cover forward, lifting at the same time to completely remove the cover.

- 3** To remove a PCI card, release the screw in the retaining bracket at the back of the appliance, disconnect all cables and lift the card upwards and out of the appliance.
- 4** Replace the card.
- 5** Reconnect the cables.
- 6** Close the appliance cover and secure it by turning the lock mechanism to the “locked” position.

Appendix A

Specification

A.1 Dimensions

Table A-1 Dimensions

Rack Appliance	Inches	Millimeters
Height	3.46	87.9
Width across mounting flange	19.01	483
Width across body of appliance	17.68	449
Depth from rack posts to rear of PCI bulkhead	26.82	681.3
Depth from rack posts to maximum extremity of appliance	27.83	707
Depth from flange to furthest extremity at front of Ops covers	1.18	30

A.2 Weight

Table A-2 Weights

Weight	Kilograms	Pounds
Maximum configuration	32	71
Appliance without drives installed	17.5	39

A.3 Environment

Table A–3 Ambient Temperature and Humidity

	Temperature Range	Relative Humidity	Max. Wet Bulb
Operational	5°C to 35°C	20% to 80% non-condensing	23°C
Non-Operational	1°C to +50°C	8% to 80% non-condensing	27°C
Storage	1°C to +60°C	5% to 80% non-condensing	29°C
Shipping	-40°C to +60°C	5% to 100% non-precipitating	29°C

Table A–4 Environment

Airflow	System must be operated with low pressure rear exhaust installation. Back pressure created by rack doors and obstacles must not exceed 5 pascals (0.5mm Water gauge)
Altitude, Operational	0 to 2133 m (0 to 7,000ft)
Altitude, Non-Operational	-305 to 12,192m (-1000 to 40,000ft)
Shock, Operational	Vertical axis 5g peak 1/2 sine, 10ms
Shock, Non-Operational	20g 10ms 1/2 sine (test with drives) 30g 10ms 1/2 sine (test without drives)
Vibration, Operational	0.2grms 5-500 Hz random
Vibration, Non-Operational	0.8grms 2-200 Hz random (test with drives) 1.04grms 2-200 Hz random (test without drives)
Vibration, Relocation	0.15g 2-200 Hz sine (test with drives) 0.3g 2-200 Hz sine (test without drives)
Acoustics	Operating sound pressure at 20°C with all fans running at 46%: less than 58 dB LpA average measured at the bystander positions (the 4 bystander positions are 1m horizontal and 1.5m off the floor positioned front, back, left and right. The unit under test will be measured on the floor).
Orientation and Mounting	19-inch Rack mount (2EIA Units) Rack rails to fit 800 mm depth racks compliant with IEC 297 Back pressure not to exceed 5 pascals (0.5mm water gauge)

A.4 AC Power Module (2 x 850W PSU)

Table A-5 AC Power Modules

Voltage Range	100 - 240 VAC Rated
Voltage Range Selection	Full Range PSU
Frequency	50/60 Hz
Input Current	12 A
Power Factor Correction	95% at 110V full load
Harmonics	Meets EN61000-3-2
Output	+5 V aux: 4A, +12 V: 70A max
Output Rails	6
Dimensions	84mm H x 107mm W x 371mm D (3.3in x 4.2in x 1.46in)

A.5 Cooling Fan

Table A-6 Cooling Fans

Number	10
Type	Single Rotor High Speed Axial
Speed Control	PWM Speed Control in 5 banks of 2
Connection	Hot pluggable connector to Appliance Management Card
Tacho Outputs	Individual tacho outputs for each fan
Power	Operated from resettable fused 12V from supply rail

A.6 Drive Carrier Module Specification

Important Operating the SteelStore appliance with non-approved drives may invalidate the warranty.

Table A-7 Drive Carrier Modules

Module Dimensions	26.6 mm H x 106.5 mm W x 220.2 mm D
Weight	0.8 kg (1.0 inch 300 GB drive)

Table A–7 Drive Carrier Modules

Operating Temperature	5° C to 35° C
Power Dissipation	18 Watts maximum

A.7 Drives

Important Drives should be UL Approved.

A.7.1 Data Drives

3.5-inch SAS (up to 15000 rpm)

A.8 Motherboard

Standard ATX form factor with integral I/O panel.

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