EonStor GSa 5000 Series

Hardware Manual

Infortrend®

Version 1.0
September 2018

Legal information

All Infortrend products, including the product customers have purchased from Infortrend, shall be subject to the latest Standard Warranty Policy available on the Infortrend website:

https://www.infortrend.com/global/Support/terms-conditions

Infortrend may from time to time modify, update or upgrade the software, firmware or any accompanying user documentation without any prior notice. Infortrend will provide access to these new software, firmware or documentation releases from certain download sections of our website or through our service partners. Customer shall be responsible for maintaining updated version of the software, firmware or other documentation by downloading or obtaining from Infortrend, and installing designated updated code, including but not limited to firmware, microcode, basic input/out system code, utility programs, device drivers, and diagnostics delivered with Infortrend product.

Before installing any software, applications or components provided by a third party, customer should ensure that they are compatible and inter-operable with Infortrend product by checking in advance with Infortrend. Customer is solely responsible for ensuring the compatibility and interoperability of the third party's products with Infortrend product. Customer is further solely responsible for ensuring its systems, software, and data are adequately backed up as a precaution against possible failures, alternation, or loss.

For any questions of hardware/ software compatibility, and the update/ upgrade code, customer should contact Infortrend sales representative or technical support for assistance.

To the extent permitted by applicable laws, Infortrend shall NOT be responsible for any interoperability or compatibility issues that may arise when (1) products, software, or options not certified and supported by Infortrend are used; (2) configurations not certified and supported by Infortrend are used; (3) parts intended for one system are installed in another system of different make or model.

Copyright notice

Disclaimer

Infortrend Technology makes no representations or warranties with respect to the contents hereof and specifically disclaim any implied warranties of merchantability or fitness for any particular purpose. Furthermore, Infortrend Technology reserves the right to revise this publication and to make changes from time to time in the content hereof without obligation to notify any person of such revisions or changes. Product specifications are also subject to change without prior notice.

Trademark

Infortrend, the Infortrend logo, EonOne, SANWatch, ESVA, EonStor, EonStor GSa, EonNAS, and EonPath are registered trademarks of Infortrend Technology, Inc. Other names prefixed with "IFT" and "ES" are trademarks of Infortrend Technology, Inc.

- Windows is a registered trademark of Microsoft Corporation.
- Mac OS X is a registered trademark of Apple Computer, Inc.
- Linux is a trademark of Linus Torvalds.

All other names, brands, products or services are trademarks or registered trademarks of their respective owners.

Table of Contents

Safety precaution

Read these instructions carefully before you install, operate, or transport the Infortrend storage systems and expansion systems.

Energy hazards precaution

This equipment is intended to be used in a restricted access location, like a computer room. Only allow access to SERVICE PERSONS or users who have been instructed about the metal chassis of the equipment, which may have hazardous energy that service persons must pay attention or take special protection before touching it. Also, the access is through the use of a key or security identity system. Only the authorized and well-trained personnel can access the restricted access location.

Installation and operation

- Install the rack cabinet and the associated equipment at a site where the ambient temperature (special room cooling equipment may be required) stays lower than 40°C.
- Install the power source socket outlet near the enclosure where it is easily accessible and ground the rack cabinet.
- Secure airflow clearance inside and around the rack cabinet.
    - Secure an 18 to 20 cm clearance on the rear side.
    - Do not cover the enclosure openings.
    - Route the cables inside the rack cabinet.
    - Do not leave drive bays empty as it will affect airflow efficiency.
- Secure each enclosure module using its retention screws.
- Place power cords and other cables away from foot traffic. Do not place items on top of power cords and ensure they do not rest against data cables.
- Install all modules to the enclosure before turning on the systems.
- Ensure that the correct power range is tested before turning on.
- DO NOT remove the covers or replaceable modules if they are not faulty.
- If the system is used for a long period of time, disconnect it from the power outlet to avoid transient over-voltage.

For power source redundancy, please make sure that the two PSUs are plugged into two different power sources (i.e. different circuit breakers).

Service and maintenance

- Keep the faulty module in place until you have a replacement unit; an empty module greatly affects the airflow efficiency within the enclosure.
- During service operation, place the enclosure on a soft and clean surface to prevent exterior damage. Do not place tools or other items on top.
- When transporting the enclosure, repackage all disk drives separately in the original package foam blocks. Replaceable modules can stay in the enclosure if you are using the original package; if not, repackage them separately as well.
- Disconnect the power cords before servicing or cleaning the enclosure.

- Use a slightly moistened paper sheet or cloth for cleaning. Avoid using liquid or sprayed detergent.
- When replacing components, insert them as gently as possible while assuring full engagement. Vibration and shock can easily damage hard drives.
- Only qualified service personnel should open the enclosure.
- Contact service personnel if any of the following situations occurs:
  - The power cord or plug is damaged.
  - The enclosure has been exposed to moisture.
  - The system has not been working properly.
  - The enclosure was dropped against a hard surface.
  - The enclosure shows obvious signs of breakage.
- To move the enclosure, more than one person might be necessary due to its weight. Drives should be removed from the enclosure beforehand.

Important notice

The use of Infortrend certified components is strongly recommended to ensure compatibility, quality, and normal operation with your Infortrend products. Please contact your distributor for a list of Infortrend certified components (e.g. SFP, SFP+, HBA card, iSCSI cable, FC cable, memory module, etc.).

ESD precautions

- Handle the modules by their retention screws, ejector levers, or the module's metal frame/faceplate only. Avoid touching the PCB boards or connector pins.
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or operating the enclosure.
- Avoid dust, debris, carpets, plastic, vinyl, and Styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation takes place.

Drives must not be stacked on top of each other without their protective drive trays. Even when drives are fixed in the drive trays, contacting the exposed PCB or rear-side interface may damage the drives.

About this manual

The manual introduces hardware components of EonStor GSa 5000 Series and expansion enclosures. It also describes how to install, monitor, and maintain them.

- For non-serviceable components, please contact our support sites.
- Firmware operation: Consult the Firmware User Manual on the CD-ROM.
- EonOne software: Consult the EonOne User Manual on the CD-ROM.

Revision history

Version	Date	Description
1.0	September 2018	Initial release

Hardware specifications

Specification summary

Form factor	4U EonStor GSa 5100 4U EonStor GSa 5200
Controller	Dual redundant controllers
Memory	**GSa 5100:** - 32 GB DDR4 - 64 GB DDR4 - 128 GB DDR4 - 256 GB DDR4 - 512 GB DDR4 **GSa 5200:** - 64 GB DDR4 - 128 GB DDR4 - 256 GB DDR4 - 512 GB DDR4 - 1024 GB DDR4 **Note: The installed default memory varies by model, region, and other factors. Contact your local sales representative for details.**
Host ports	**GSa 5100:** - 8 x 10 Gb/s iSCSI ports/ RJ45 (4 per controller) - 8 x 16 Gb/s Fibre Channel ports (4 per controller)* - 8 x 40 Gb/s iSCSI ports/QSFP (4 per controller) - 8 x 56 Gb/s Infiniband ports (4 per controller) - for Linux only - 16 x 1 Gb/s iSCSI ports (8 per controller) - 16 x 8 Gb/s Fibre Channel ports (8 per controller)* - 16 x 10 Gb/s iSCSI ports/ SFP+ (8 per controller) - 16 x 10 Gb/s FCoE ports (8 per controller) - 16 x 16 Gb/s Fibre Channel ports (8 per controller)* - 32 x 12 Gb/s SAS ports (16 per controller) **GSa 5200:** - 32 x 10 Gb/s iSCSI ports/ RJ45 (16 per controller) - 32 x 12 Gb/s SAS ports (16 per controller) - 32 x 16 Gb/s Fibre Channel ports (16 per controller)* - 32 x 40 Gb/s iSCSI ports/QSFP (16 per controller) - 32 x 56 Gb/s Infiniband ports (16 per controller) - for Linux only - 64 x 1 Gb/s iSCSI ports (32 per controller) - 64 x 8 Gb/s Fibre Channel ports (32 per controller)* - 64 x 10 Gb/s iSCSI ports/ SFP+ (32 per controller) - 64 x 10 Gb/s FCoE ports (32 per controller) - 64 x 16 Gb/s Fibre Channel ports (32 per controller)* *** Supports point-to-point and switch mode**
Cache backup technique	BBU + Flash module
Drive connectivity	12 Gb/s SAS connectivity
Supported drives	2.5-inch SATA SSD 2.5-inch SAS SSD **Note: Refer to Compatibility Matrix for the latest compatibility details**

(See next page)

Specification summary

Maximum number of drives (via expansion systems)	1500 (with expansion board)
Drive advanced features	S.M.A.R.T. support, automatic bad sector reassignment, dedicated bandwidth to each connected drive
RAID functionality	Global, dedicated, or enclosure hot spare RAID level supported: 0, 1 (0 + 1), 3, 5, 6, 10, 30 60 Online expansion: - Adding new drives - Copying and replacing drives of larger capacity RAID migration: - Configurable stripe size and write policy per system - Intelligent drive handling • In degraded mode: skips irreparable blocks to continue rebuild • In normal operation: data-block verification and repair
Supported protocols	**File level protocol** - CIFS/SMB - AFP - NFS - FTP - FXP -WebDAV **Block level protocol** - FC - FCoE - iSCSI - InfiniBand - SAS (expansion board) **Object protocol** - RESTful API
Cloud gateway	- Amazon S3 - Microsoft Azure - Alibaba AliCloud - OpenStack
Data protection and service	Thin provisioning Remote replication*: Synchronous or asynchronous for both block level and file level Location replication**: Snapshot, volume copy/mirror *** Optional** **** Available with Standard license and optional Advanced license**
Availability and reliability	- Redundant, hot-swappable hardware modules - CacheSafe technology - Multipathing support (EonPath) - Device mapper support

(See next page)

Specification summary

Management	- Web-based EonOne management software - Automated cache flush and caching mode operation per enclosure status - Module status LED indicators: component presence detection and thermal sensors via I2C bus - Storage Resource Management to analyze history records of resource usage - Automated repeatable management tasks by flexible workflow
OS support	- Windows® Server 2008/R2 - Windows® Server 2012/R2 - Windows® Server 2016* - Red Hat® Enterprise Linux® - SUSE® Linux® Enterprise - Sun® Solaris™ - MacOS® X - HP-UX - IBM® AIX® - VMware®** - Citrix® XenServer® *** Includes Hyper-V** **** NFS protocol running on VMware environment is not supported currently** **Note: Contact your local sales representative for the latest OS support details.**
Service and support	Standard services: - 3-year limited hardware/software warranty - 8 x 5 phone, web, and email support Upgraded/extended services*: - Replacement of part dispatch on the next business day (up to 5 years) - Advanced service of 24/7 phone, web, email support, and on site diagnostics on the next business day - Premium service of 24/7 phone, web, email support, and on site diagnostics in 4 hours ***Optional** **Note: The upgraded/extended services vary by region.**
Power	- Power supply: 2 x Redundant/hot-swappable 1200 W - Frequency: 47 - 63 Hz **AC voltage:** - 100 VAC - 127 VAC/12.47A with PFC (auto-switching) - 200 VAC - 240 VAC/7.08A with PFC (auto-switching)
Environment	**Temperature:** - Operating: 0°C - 40°C without BBU/CBM, 0°C - 35°C with BBU/CBM - Non-operating: -40°C - 60°C **Altitude/Humidity:** - 3048 m (10000 ft) operating, sea level - 12192 m (40000 ft) non-operating, sea level - 5% - 95% non-condensing; operating/non-operating

(see next page)

Specification summary

Regulations	Safety: UL, BSMI, CB Electromagnetic compatibility: CE, BSMI, FCC
Dimension	447 mm x 175 mm x 557 mm **Notes:** **• The dimensions do not include chassis ears/protrusions.** **• The dimension order is W x H x D.**
Package dimension	591 mm x 295 mm x 800 mm **Note: The dimension order is W x H x D.**
Access right management	User account management Group management Folder management - Folder and sub-folder access control Folder quota Comprehensive access control action items - All controls, Read, Read and Run, Write, Modify, List Support Windows Active Directory Authentication - Domain Users Login via CIFS/SMB, AFP, FTP, and file explorer LDAP on Linux
Notification	Various event notification methods including email and SNMP trap.
Network configuration	- IPv6 support - Fixed or dynamic address - Dual Gigabit Ethernet with Jumbo Frame - Port trunking, NIC teaming, Link aggregation (IEEE 802.3ad) - DHCP client - MPIO, MC/S support
Green design	80 PLUS-certified power supplies delivering more than 80% energy efficiency Intelligent multi-level drive spin-down

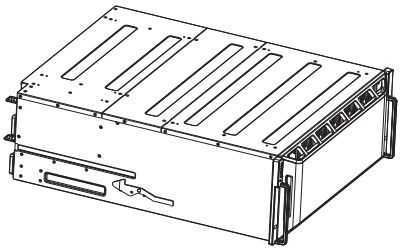
NOTE: For the expansion enclosures, please refer to the data sheet or download it from our official website.

Package contents

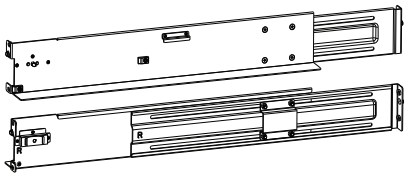
Check the unpacking list for the complete list of contents and exact quantity of the components of your system.

NOTE: The contents and quantity may vary depending on the system model and order requests.

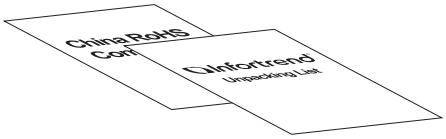
System package



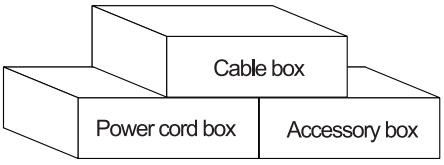
Enclosure chassis



Rackmount kit

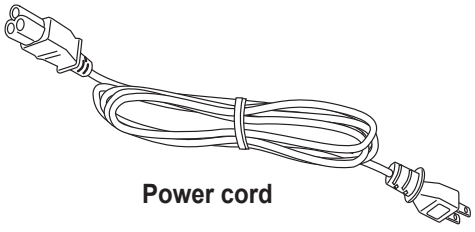


Unpacking list and China RoHS compliance documentation

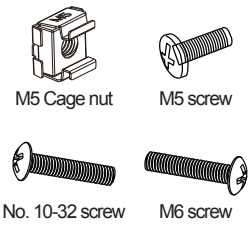


Power cord, cable, and accessory boxes

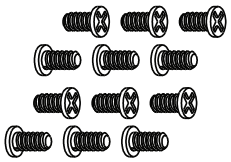
Power cord, cable, and accessory boxes



Power cord



Mounting enclosure screws and nuts

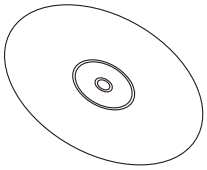


3.5-inch HDD screws

2.5-inch HDD screws

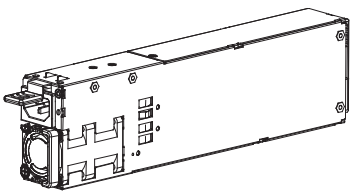
Quick configuration guide

Quick installation guide

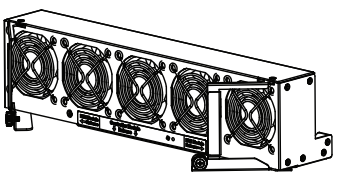


Software CD

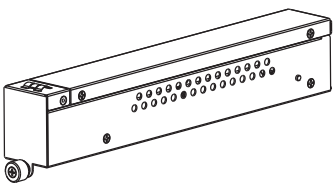
Pre-installed components



PSU



Cooling module



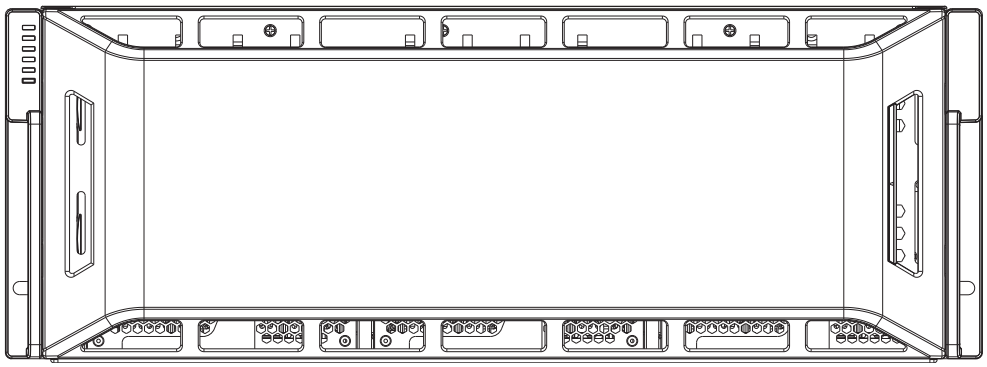
BBU (Battery backup unit)

1 Product introduction

This chapter introduces the look and feel of EonStor GSa 5000 Series systems, features, and the supported components.

1.1 Overview

This manual introduces EonStor GSa 5000 systems, an all flash array systems that support 3 Gbps, 6 Gbps, and 12 Gbps SAS, SATA-II, SATA-III, and Nearline SAS drive interfaces. You can expand its drive capacity by attaching expansion hard drive enclosures.



EonStor GSa 5100 (1-CPU system)

EonStor GSa 5200 (2-CPU system)

1.1.1 Major components

NOTE: Upon receiving the system, check the package contents and compare them to the **Unpacking List**. If one or more of the modules are missing, please contact your system vendor.

Controller and interface

The system has controllers, and each controller comes with pre-installed DIMM modules. It also has a CBM (cache backup module), a module that has a BBU (battery backup unit) and an FBM (flash backup module). With the CBM, the cached data is quickly distributed to the FBM to save the data permanently with the support of the BBU if power outage occurs.

Also, the embedded firmware features earth-friendly and smart algorithms that you can use to customize your system's hardware settings such as power-saving modes, variable fan speeds, and exiled drive handling.

Expansion controller and interface

The expansion enclosure is managed by the expander controllers that distribute data flow to individual disk drives and report operating status through a proprietary enclosure service via in-band protocols. The enclosure, along with other expansion systems, connects to a storage system and serves as a building block of a scalable configuration.

For supported protocols, the firmware supports communications with enclosure devices, SAS/SATA disk drives, and SAN system that features SAS expansion ports.

Power supply unit and cooling module

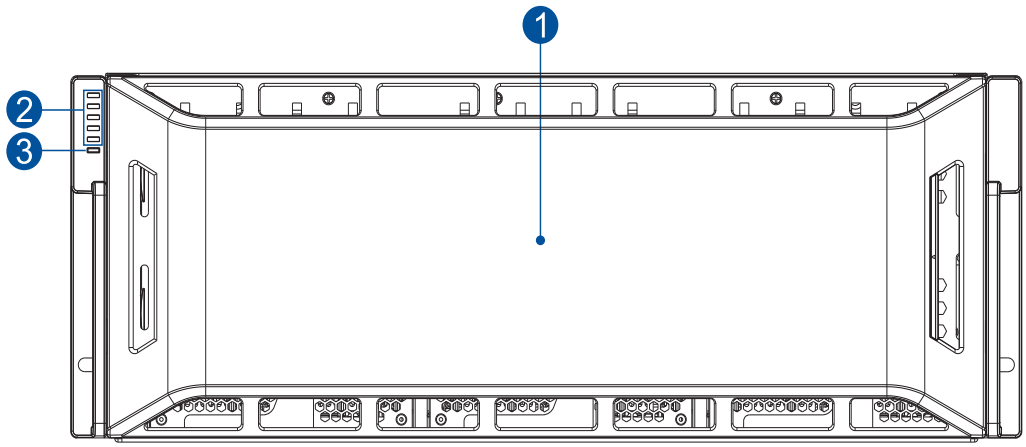
Each PSU has a built-in cooling fan to protect the system from overheating, and at the same time, provide constant power to the system.

The cooling module is a redundant cooling type located at the front of the enclosure, which independently ventilates the system and keep the operating procedures under optimal condition.

1.2 Chassis

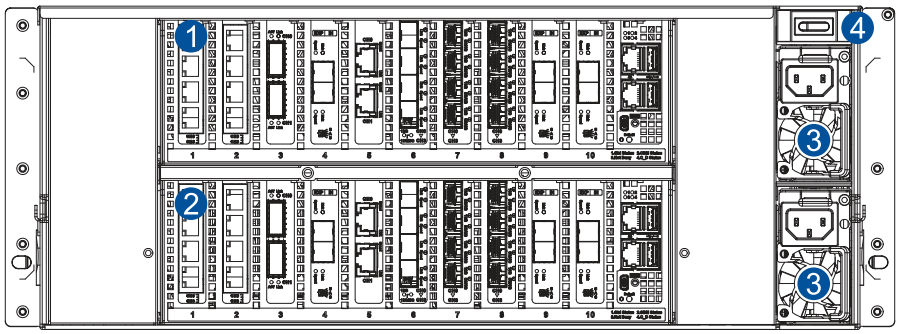
This section describes the front and rear panels of EonStor GSa 5000 Series's rugged storage chassis. The chassis are designed to allow installation to the rack or a cabinet.

1.2.1 Front panel



Number	Part	Description
1	System cover	This cover hides the fans of the system.
2	LED panel	LED panel has service, power, cooling fan, thermal, and system LEDs.
3	Mute button/ Service LED	This button mutes the alarm while the embedded Service LED notifies you that the system requires service.

1.2.2 Rear panel



Number	Part	Description
1	Controller A	This controller module is the primary module, which contains the SAS expansion board which distributes I/O functions to and from the managing RAID system. This also handles the status of the components via the SAS links with the RAID system.
2	Controller B	This part contains the second controller, also called the redundant controller. This controller takes over the system functions when Controller A fails to process.
3	PSU	These hot-swappable PSUs provide power to the system and each PSU has a fan.
4	Power button	This button allows you to turn ON/OFF your storage system.

WARNING! DO NOT remove the redundant components without a replacement on hand.

1.2.3 Internal backplane

The internal backplane is a circuit board that separates the front and rear parts of the chassis. This provides logic level signals and low voltage power paths. The thermal sensors and I²C devices are embedded to detect system temperatures and PSU operating status. This board is comprised of non user-serviceable components.

WARNING!

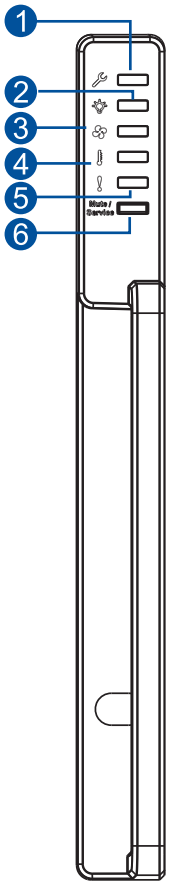
- Accessing the backplane board may lead to serious damage to the system.
- Physical contact with the backplane board may cause electrocution.

1.3 Front panel components

This section describes the front panel components of GSa 5000 system.

1.3.1 LED and buttons panel

The LEDs on this panel allow you to know your system's current status when turned on, while the button has a specific function that you can set.



Number	Part	Description
1	Service LED	This LED provides the status when the system requires service or currently in service.
2	Power LED	This LED provides the status of the system's power.
3	Cooling module status LED	This LED provides the cooling module's status.
4	Temperature status LED	This LED provides the system's temperature status.
5	System fault LED	This LED provides the system's operation status.
6	Mute button/ Service LED	This button mutes the alarm while the embedded Service LED notifies you that the system requires service.

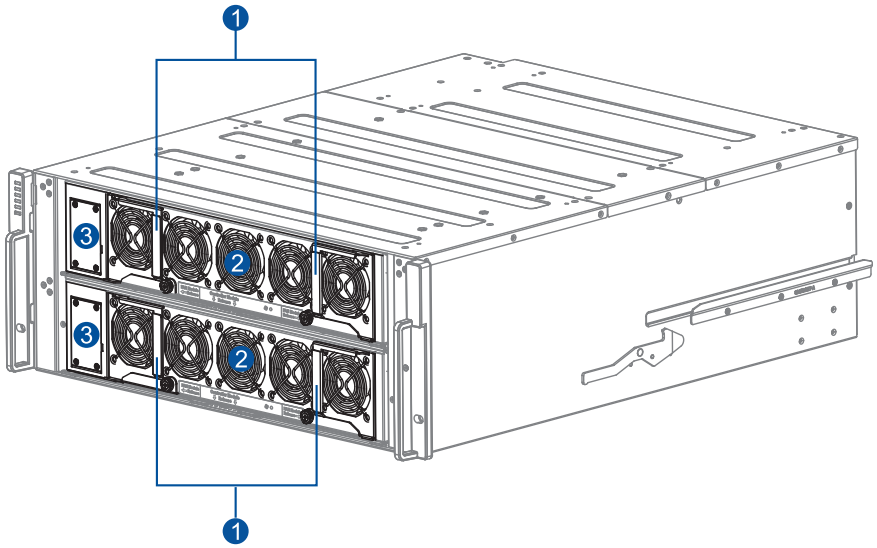
NOTE: For more details regarding the LEDs and their respective status, refer to **3.1.1 LEDs**.

WARNING! If critical faults are indicated on the LED panel, verify the cause of the problem as soon as possible and contact your system vendor for a module replacement.

1.3.2 Cooling module and BBU (battery backup unit)

Each controller of the system has a cooling module and a BBU located at the front panel of the system hidden by the system cover.

The cooling modules help with the ventilation inside the chassis while the BBU provides power when a power outage happens.



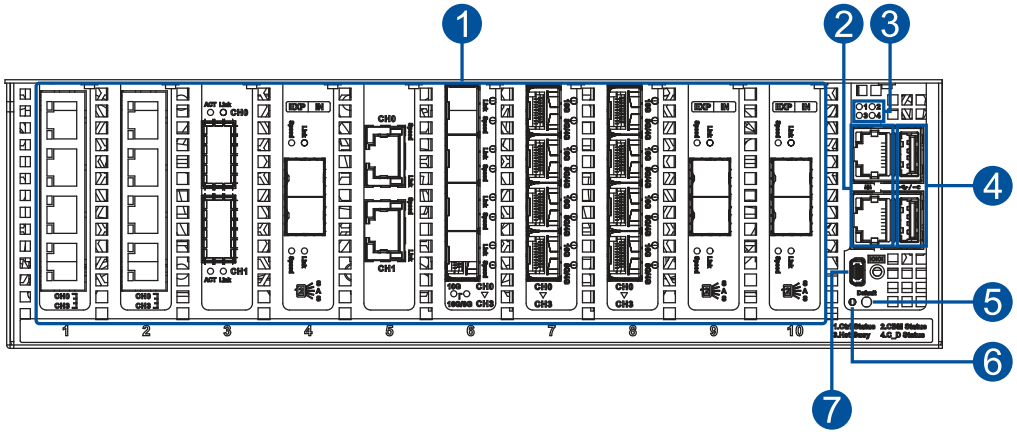
Number	Part
1	Extraction handles
2	Cooling modules
3	BBU

1.4 Rear panel components

This section describes the rear panel components of GSa 5000 Series systems.

1.4.1 Controller module interface

The I/O interfaces of the controller module allow you to connect to other devices and the LEDs allow you to know the status of your controller.



Number	Part
1	Host boards (optional)
2	RJ-45 Ethernet management port
3	Controller status LEDs
4	USB 3.0 ports (for debugging)
5	Restore Default button
6	Restore Default LED
7	Mini USB port (console)

WARNING! The EonStor controller module is built of sensitive and non-replaceable components. When replacing the controller module, you can only remove it from the enclosure when you already have the replacement. Unnecessary tampering may damage the controller.

IMPORTANT! The host boards are add-on components. Contact your local dealer for the compatible host boards.

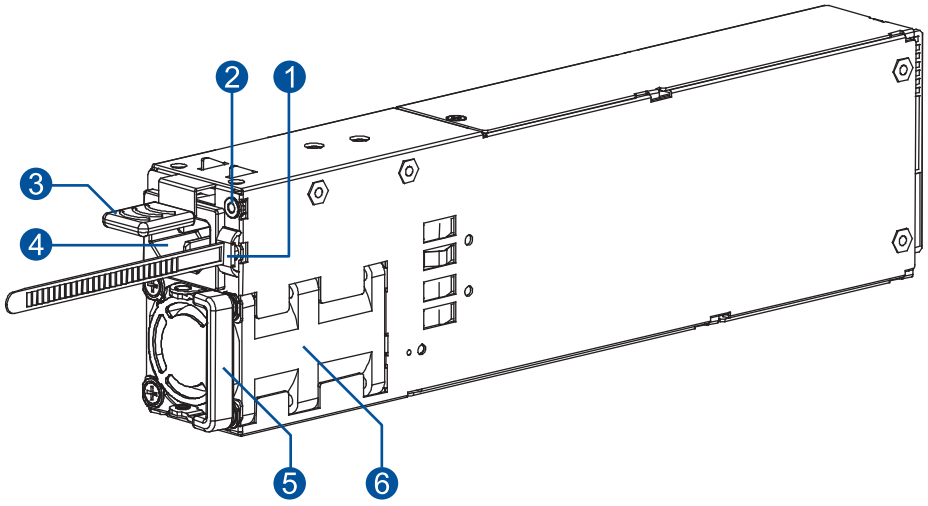
NOTES:

- The Ethernet management port only supports 100 Mb and 1 Gb speeds.
- For more information about BBU and flash backup module, see section **4.1.4 Replacing the CBM (Cache Backup Module) components**.

1.4.2 PSU

The GSa 5000 Series system has redundant hot-swappable PSUs that help with the airflow, providing an efficient ventilation.

PSU



Number	Part
1	Mounting hole (with a mounted cable tie)
2	PSU status LED
3	Retention lever
4	Power socket
5	Extraction handle
6	Fan

When the cooling modules operate under normal conditions, the cooling fans run at a low speed. The cooling fans raise their rotation speed to increase the airflow under the following conditions:

- Component failure: If the cooling module, PSU, or temperature failed.
- Elevated temperature: If the temperature breaches the upper threshold set for any of the interior temperature sensors.

During the initialization stage, the cooling fans operate at a high speed. The speed is lowered when the initialization is completed and no errors are detected.

NOTES:

- The PSUs have specific installation orientations for upper and lower cooling module slots. Refer to the label at the back of the expansion.
- There are two upper temperature thresholds: one for event notification and the other for triggering high fan rotation speed. You can change the preset values for event notification using the firmware-embedded configuration utility. Refer to the firmware operation manual for details.

WARNING!

- If any of the LEDs lights up in red, please contact your local vendor to request for a replacement immediately.
- When removing the PSU, pull the module for about 3 inches then wait for at least 10 seconds before removing the whole module from the enclosure.
- DO NOT run the system with faulty cooling module(s) as it may cause disruption of the airflow resulting in overheating.

CAUTION! Keep your body away from the moving parts of the system.

1.5 System monitoring features

This section describes the different types of system monitoring features that provide the operating status of each component.

1.5.1 Expansion enclosure support

Monitoring system

A managing GSa system is aware of the status of connected expansion system's components such as:

- Expander controller (presence, voltage, and thermal readings)
- PSU
- Cooling module
- Enclosure thermal sensor
- Service (the Service LED signals the specific enclosure)
- Hard disk drives

Expansion system identifier

The managing system sets off the alarm and delivers the warning messages if there is a conflict between the expansion systems.

If more than one expansion system is connected to the managing GSa system, each needs a unique enclosure ID set using the rotary switch on the LED panel. For example, the firmware automatically disconnects the second expansion system if it is connected online and comes with an ID identical to the first expansion system.

> **NOTE:** The expansion system IDs are numbers 1 to 15. For more details, see section **2.3.5 Expansion connections**.

Cooling module speed adjustment

If any of the detected temperature readings breaches the temperature threshold, the firmware running on the managing GSa system automatically increases the rotation speed of all cooling fans.

Expansion enclosure status monitoring

When connecting with expansion systems, you can acquire the component status with other enclosures via a propriety enclosure monitoring service using the in-band connectivity. No additional management connection is required.

I^2C bus

The detection circuitry and temperature sensors are interfaced via a non-user-serviceable I^2C bus. When the expansion systems are connected to GSa controllers, the component status is reported through in-band protocols over expansion links, which is managed by a proprietary enclosure service.

Firmware (FW) and EonOne

- **Firmware:** The firmware (FW) is preloaded and is used to configure the system. Access the FW via a terminal emulation program running on a management computer connected to the system's serial port.
- **EonOne:** EonOne is another browser-based GUI (graphic user interface) software that you can install into a local or remote computer and access via the network. The managing system communicates with the array via connection of the existing host links or the Ethernet link to the array's Ethernet port.

1.5.2 Audible alarms

The system comes with audible alarms that are triggered when certain active components fail or when specific controller or system thresholds exceed. Whenever you hear an audible alarm, you must determine the cause and solve the problem immediately.

Event notification messages indicate the completion or status of array configuration tasks and are always accompanied by two or three successive and prolonged beeps. You can turn off the alarm using the mute button on the front panel.

WARNING! Failure to respond when an audible alarm is set off can lead to permanent damage to the system. When you hear an audible alarm, solve the problem immediately.

1.6 Hot-swappable components

The system has a number of hot-swappable parts that you can change while the system is still online without affecting its operational integrity.

These hot-swappable components are user-maintained:

- PSU
- Controller modules

IMPORTANT! Only remove these hot-swappable components when replacement is needed.

NOTE: A normal airflow ensures sufficient cooling of the system and this can only be attained when all components are properly installed. Remember to only remove the failed component if there is already a replacement. For more information on replacing hot-swappable components, see chapter **System maintenance**.

Hardware installation 2

This chapter describes installing the modular components such as host boards, cards, and other optional installation or connections such as expansions and rackmount.

2.1 Installation prerequisites

Take note of the following installation prerequisites before you start with the installation:

- **Static-free installation environment**

  Install the system in a static-free environment to minimize the possibility of ESD (electrostatic discharge) damage.

- **Component check**

  Before the installation, ensure that you received all required components by verifying the package contents with the **Unpacking List** document. This document is included in the package. If there are items missing and/or damaged, contact your vendor for a replacement.

- **Memory modules**

  If you want to change the pre-installed DIMM modules, ensure that they are compatible and purchased from a qualified vendor. Contact your vendor for the list of compatible DIMMs.

- **Cables**

  All cables that connect the system to the hosts are purchased separately. Contact your vendor for the list of compatible cables.

- **Rackmount equipment**

  The rack slide rails are optional accessories. If you need to install it, see section **2.2.2 Installing the slide rail kit**.

> **IMPORTANT!** Install the system first to the rack or cabinet before installing the hard drives into the system.

Ensure that you are familiar with the exact position of each plug-in module and interface connector. Also, ensure to handle the cables with care when connecting between systems installed in the rack with a correct routing paths carefully planned. DO NOT bend or twist the cables as this may cause emission interference and accidental cable disconnection.

2.2 Installation procedures

This section details the installation procedures of the system, its components, and connections between equipment. The installation procedures in this section are in order, so it is strongly recommended that you follow the said order to reduce the time consumed during installation and prevent installation mistakes, technical mishaps, or physical injuries.

2.2.1 Unpacking the system

When your system package has arrived, check and confirm if the contents of your package are complete by referring to the **Unpacking List** document, which is bundled with in your package.

Accessory box contents

This box contains the following:

- Serial port cable
- Screws
- Quick installation guide
- Support CD (EonOne Management software and manual, firmware operation manual)
- Product utility CD (Hardware manual)

Pre-installed components

Below are the components that are pre-installed in the system:

- Controllers
- LED front panels
- PSUs including the cooling modules
- DIMM modules
- CBM (cache backup module)
- Host board/s

Components that need user installation

You must do the following installation:

- Assembling of the system to the rack/cabinet
- Assembling the hard drives to the hard drive tray
- Cabling in between systems

> **NOTE:** To install the system to the rack/cabinet, see section **2.2.2 Installing the slide rail kit**.

2.2.2 Installing the slide rail kit

This section details the overview of the slide rail kit, its assembly, and installation with the storage system.

IMPORTANT! Please contact our technical support team if you need further help in installing your system/enclosure to the rack.

NOTE: You can also watch this YouTube video on assembling the rackmount kit and installing the system to the rackmount.

Preparing the user-provided tools

Before assembling the slide rail kit, you must prepare the following tools:

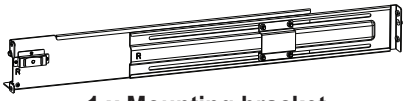
- 1 x Medium-sized Phillips screwdriver
- 1 x Small-sized Phillips screwdriver
- 1 x Medium-sized flat blade screwdriver

Slide rail kit contents

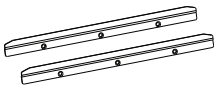
Check your slide rail kit for the following contents.

1 

1 x Mounting bracket assembly, left side

2 

1 x Mounting bracket assembly, right side

3 

2 x Inner glides

4 

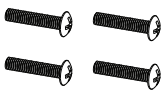
6 x No 6-32 L4 Flathead screws

5 

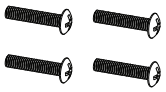
8 x 9.0 mm M5 Truss head screws

6 

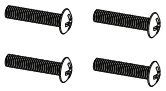
4 x M5 cage nuts

7 

4 x 25 mm M5 screws

8 

4 x 25 mm M6 screws

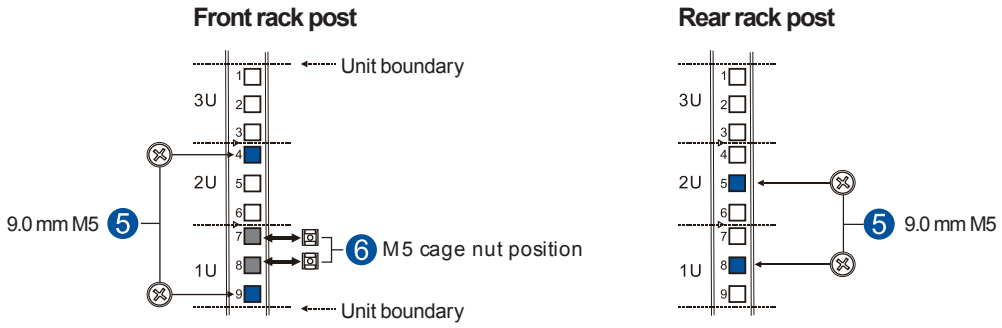
9 

4 x 25.4 mm No. 10-32 screws

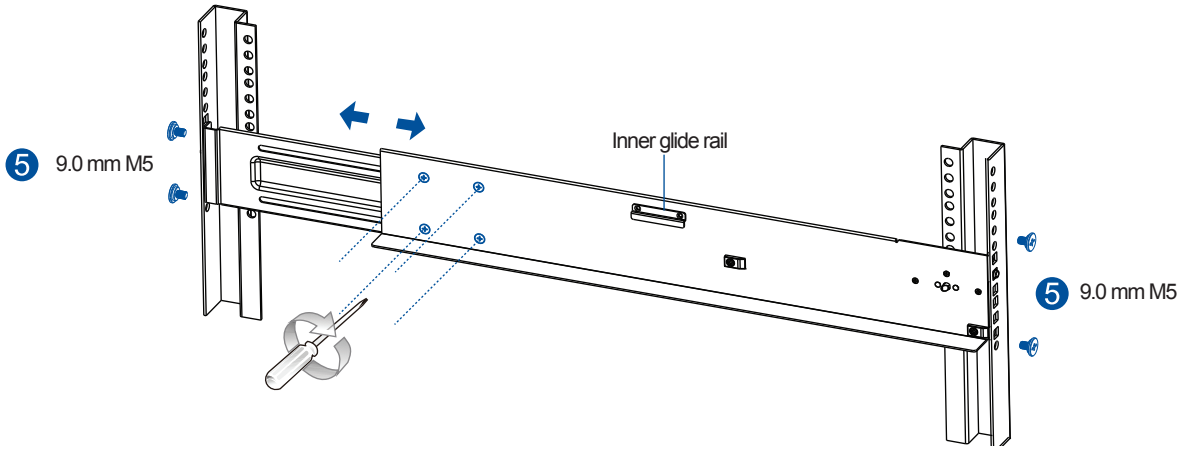
Assembling the slide rail kit

To assemble the slide rail kit:

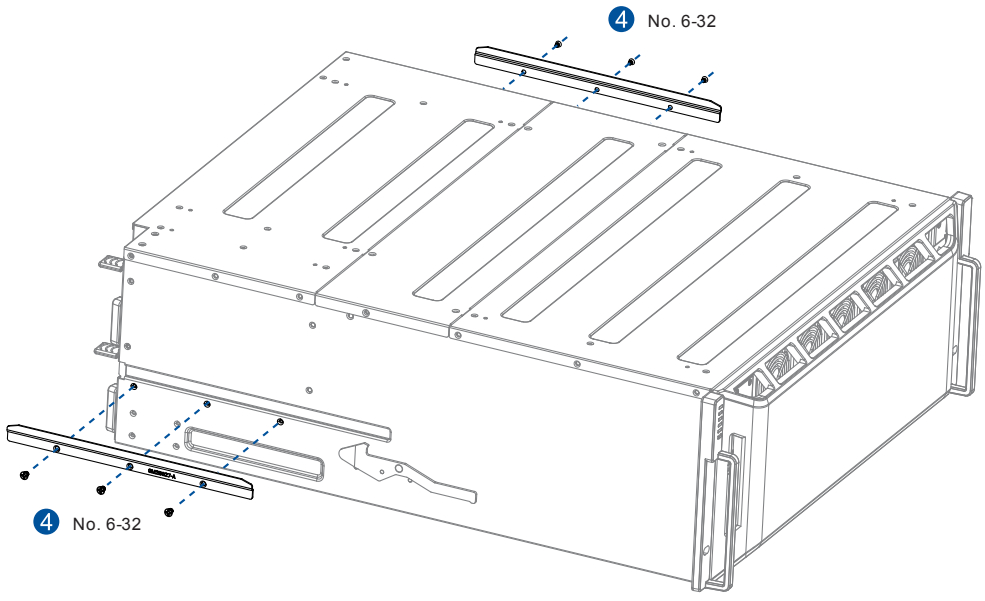
1. Determine the position where the system will be installed to the front and rear rack posts, then insert the cage nuts into the designated holes on the front rack posts.



2. Loosen the four screws on the slide rails then adjust its length. After the length adjustment, secure the slide rails to the front and rear posts with the truss head screws.

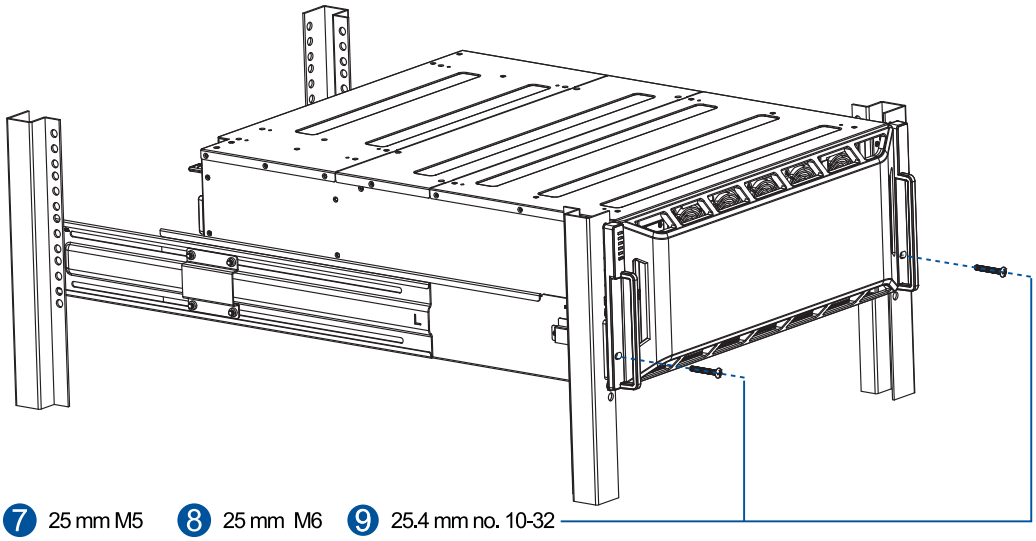


3. Attach the inner glides to both sides of the enclosure using the flathead screws no. 6-32.



4. With the assistance of another person, lift and insert the enclosure onto the slide rail. Ensure that the inner glides on both sides of the enclosure meet the inner glide rail.

5. Secure the enclosure using the M5, M6, or no. 10-32 screws on the front.



When the enclosure is already assembled to the cabinet, you can proceed to the next installation procedures of other components.

2.2.3 Installing the host boards

When installing a host board to the board slots, you must follow the installation priority shown below:

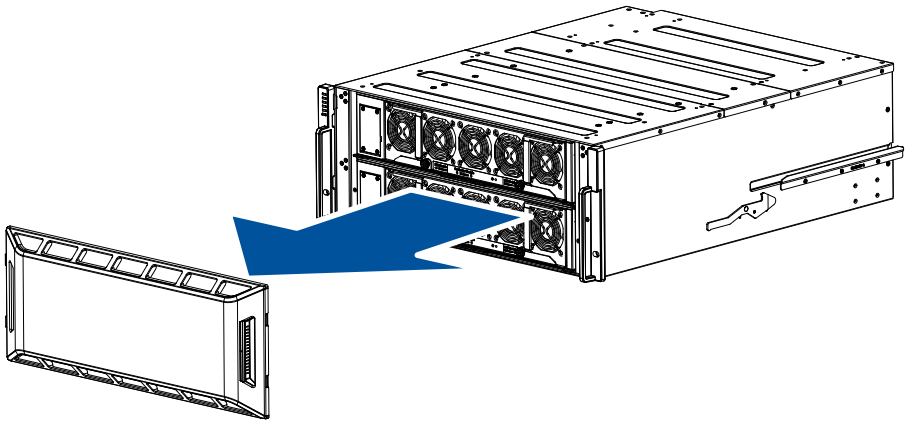
Slot no.	1	2	3	4	5	6	7	8
Priority	3	4	5	7	6	8	1	2

NOTES:

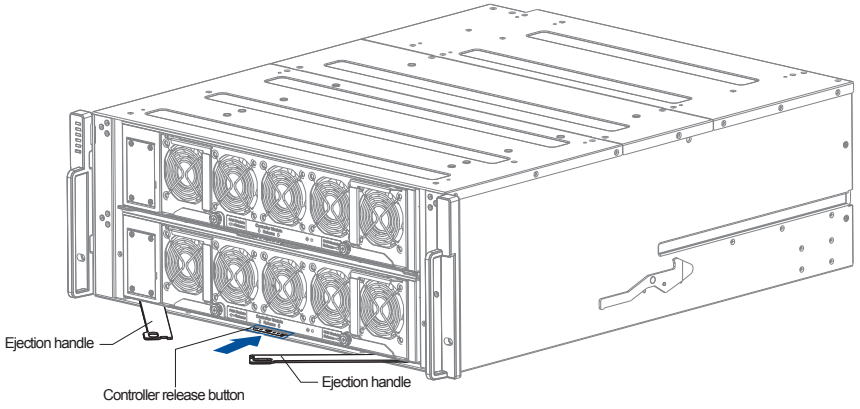
- A downtime may occur when upgrading the controller/host board.
- To add or replace a host board, the firmware automatically restores the default factory settings of your system.

To install a host board:

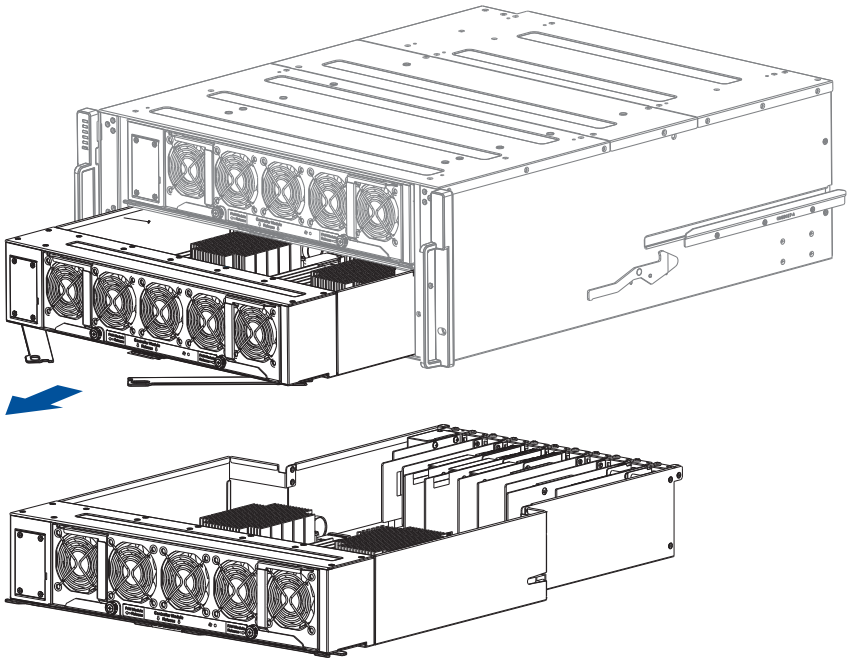
1. Shut down your system and disconnect the cables from the ports on the rear panel.
2. Remove the front cover from the enclosure.



3. Push the controller release button to release the ejection handles.

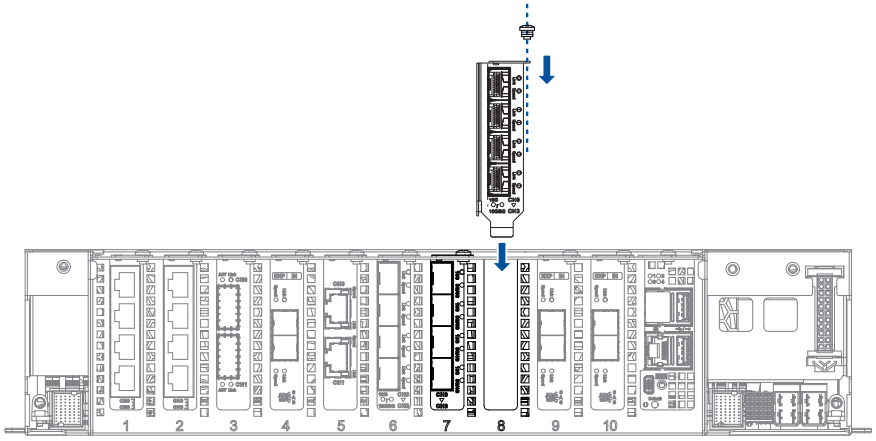


4. Pull the ejection handles to remove the whole controller from the enclosure.

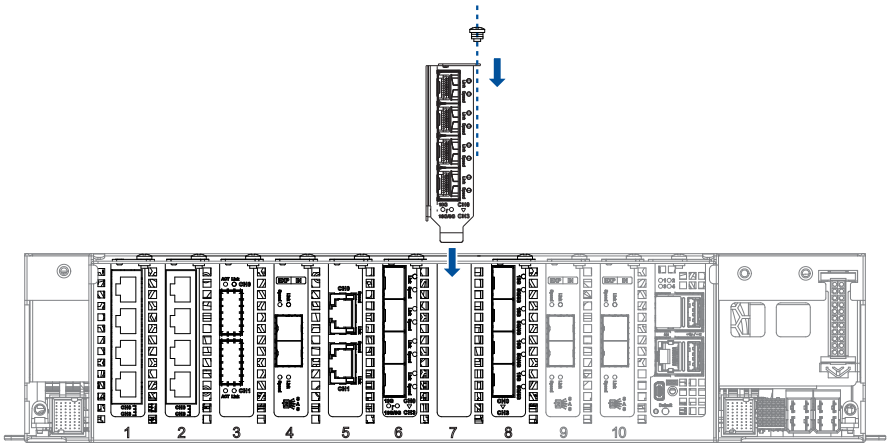


5. Install the host board into the SAS expansion slot, then secure it with a screw.

   a. If your system is GSa 5100, which has only one CPU, install the host boards in slots 7 and 8.



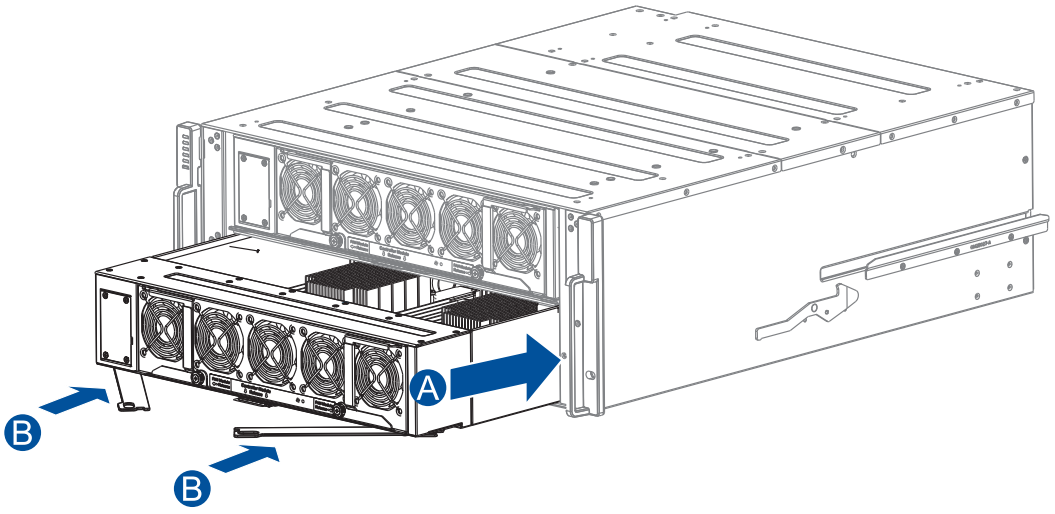
b. If your system is GSa 5200, install the host boards in slots 1 until 8.



NOTES:

- GSa 5100 supports up to 4 host boards (2 per controller).
- GSa 5200 supports up to 16 host boards (8 per controller).
- See section Installing the memory for more details on host board-supported memory.

6. Install back the controller to the system (A). When you feel a contact resistance, use a small but careful force, then push the ejection handles back in place (B).

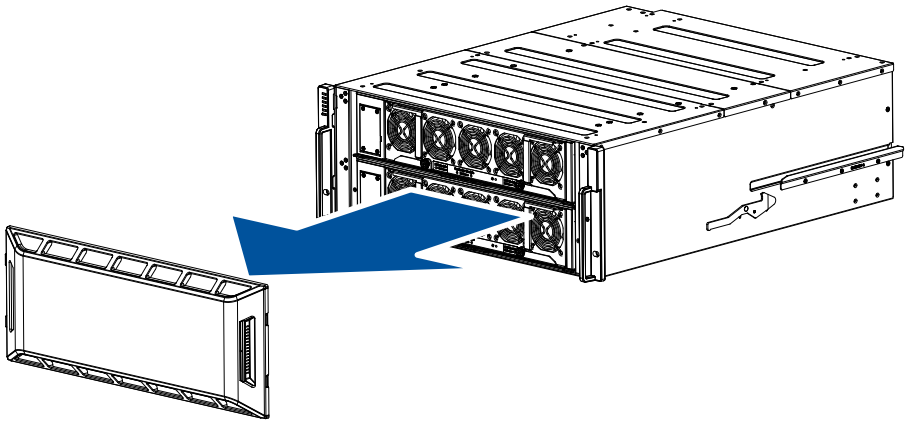


2.2.4 Installing the SAS expansion boards

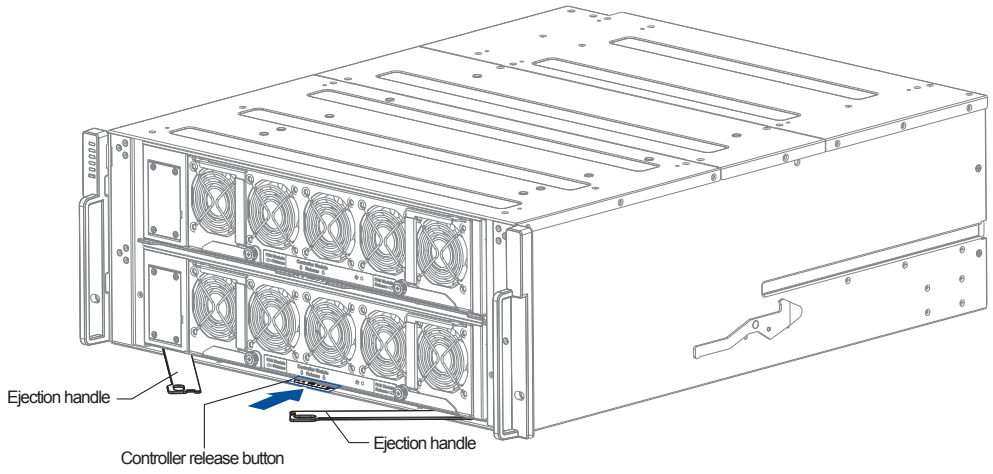
Install the SAS expansion boards in slots 9 and 10.

To install a SAS expansion board:

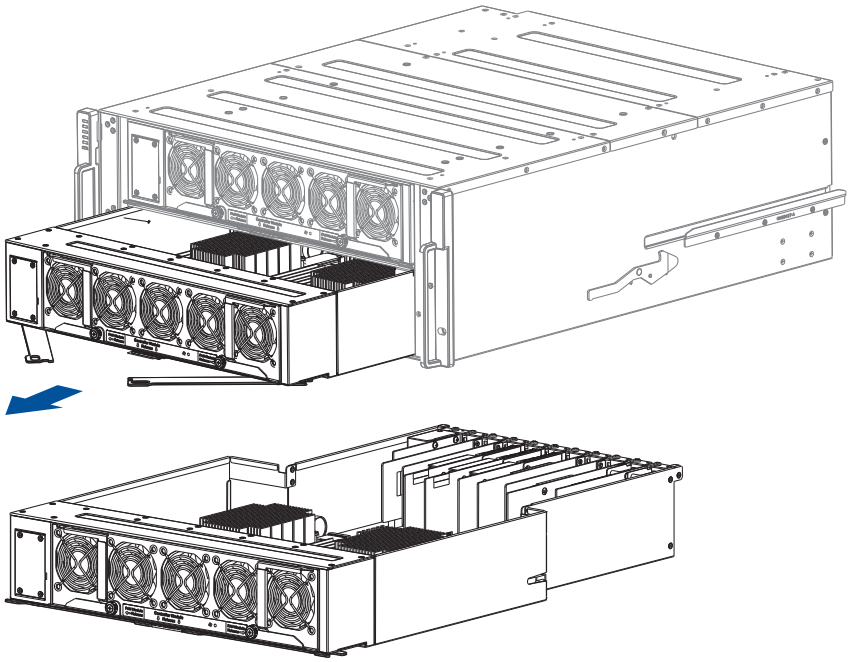
1. Shut down your system and disconnect the cables from the ports on the rear panel.
2. Remove the front cover from the enclosure.



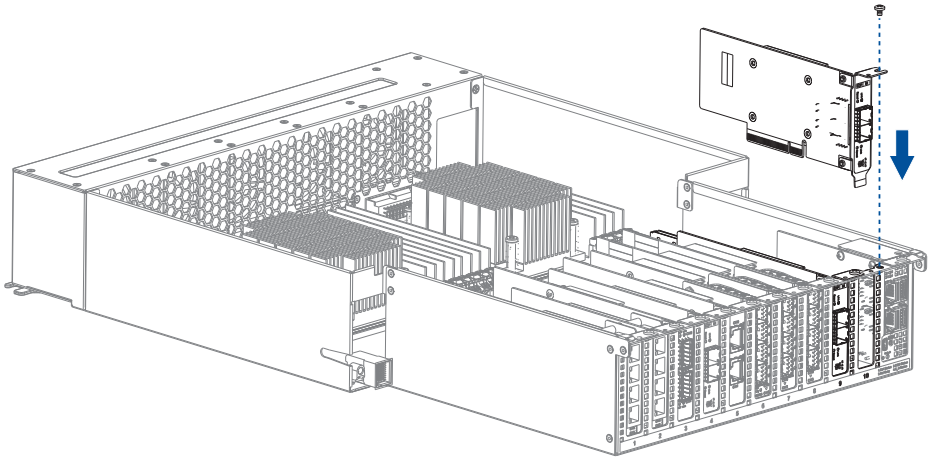
3. Push the controller release button to release the ejection handles.



4. Pull the ejection handles to remove the whole controller from the enclosure.

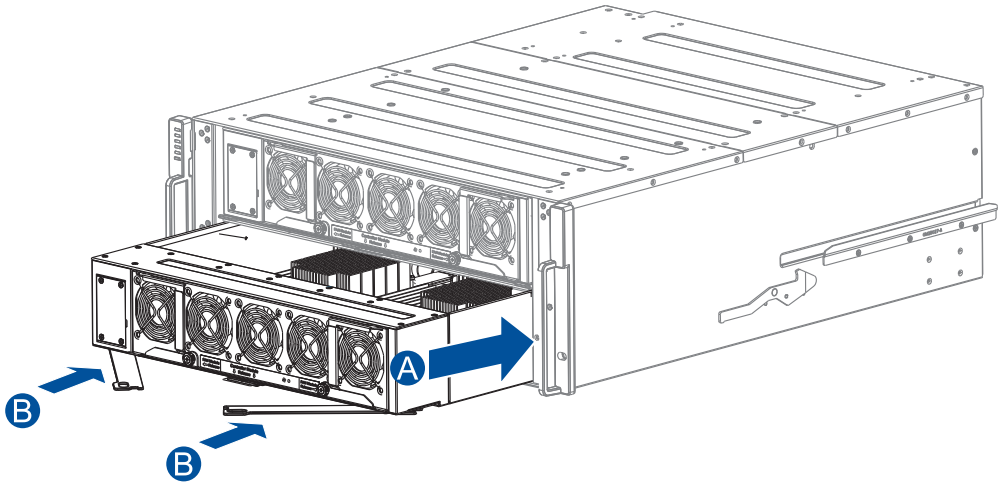


5. Install the expansion board into the SAS expansion slot, then secure it with a screw.



IMPORTANT! If you are using only one SAS expansion host board, you must install it to the host board's slot 10. This slot is located on the rightmost side of the controller.

6. Install back the controller to the system (A). When you feel a contact resistance, use a small but careful force, then push the ejection handles back in place (B).



2.2.5 Installing the memory modules

Before installing the memory modules, you must take note of the memory configuration shown in the table below:

Memory per controller	GSa 5100	GSa 5200
16 GB	2 x 8 GB (default)	
32 GB	4 x 8 GB	4 x 8 GB (default)
64 GB	8 x 8 GB	8 x 8 GB
128 GB	8 x 16 GB	16 x 8 GB
256 GB	8 x 32 GB	16 x 16 GB
512 GB		16 x 32 GB

NOTES:

- GSa 5100 has 8 DIMM slots while GSa 5200 has 16 DIMM slots.
- For GSa 5200, the default 32 GB memory configuration is allocated for 1 to 4 host boards. If you want to install more than 4 host boards, a minimum of 64 GB memory on a single controller is required.

IMPORTANT!

- To install 8 host boards (4 per controller), a 64 GB memory is required.
- To install 16 host boards (8 per controller), at least 128 GB memory is required.

To install a memory module:

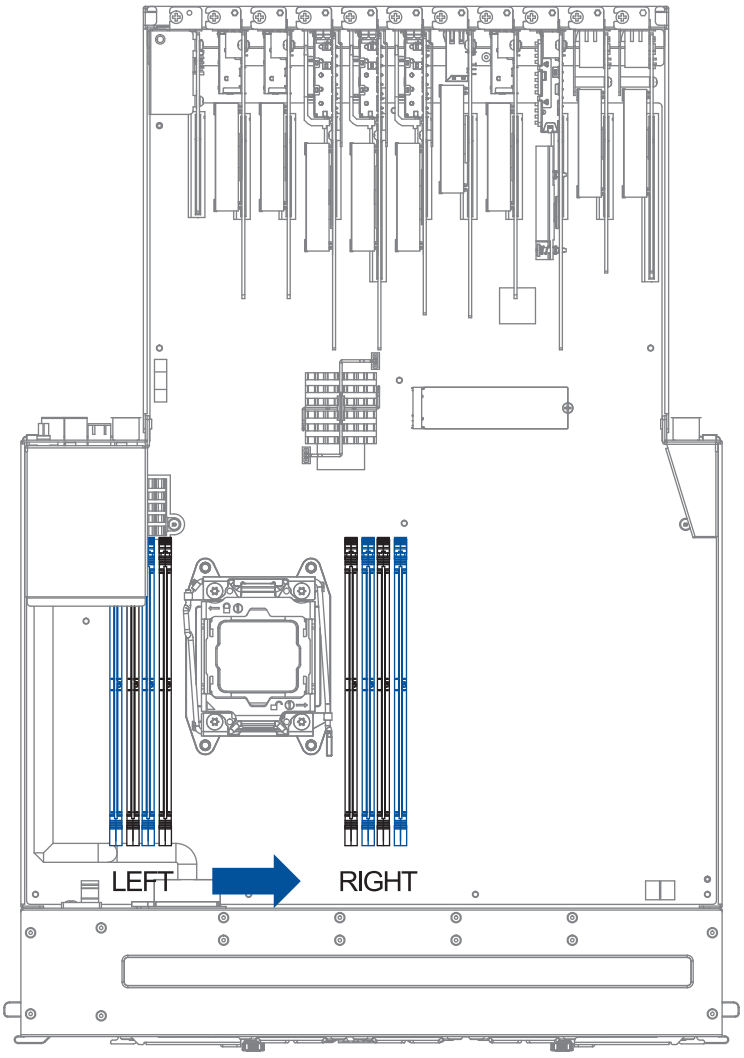
IMPORTANT! You must remove the BBU from the controller before installing the memory modules. See section **Replacing the BBU** for details.

1. Shut down your system and disconnect the cables from the ports on the rear panel.
2. Remove the controller from the enclosure.

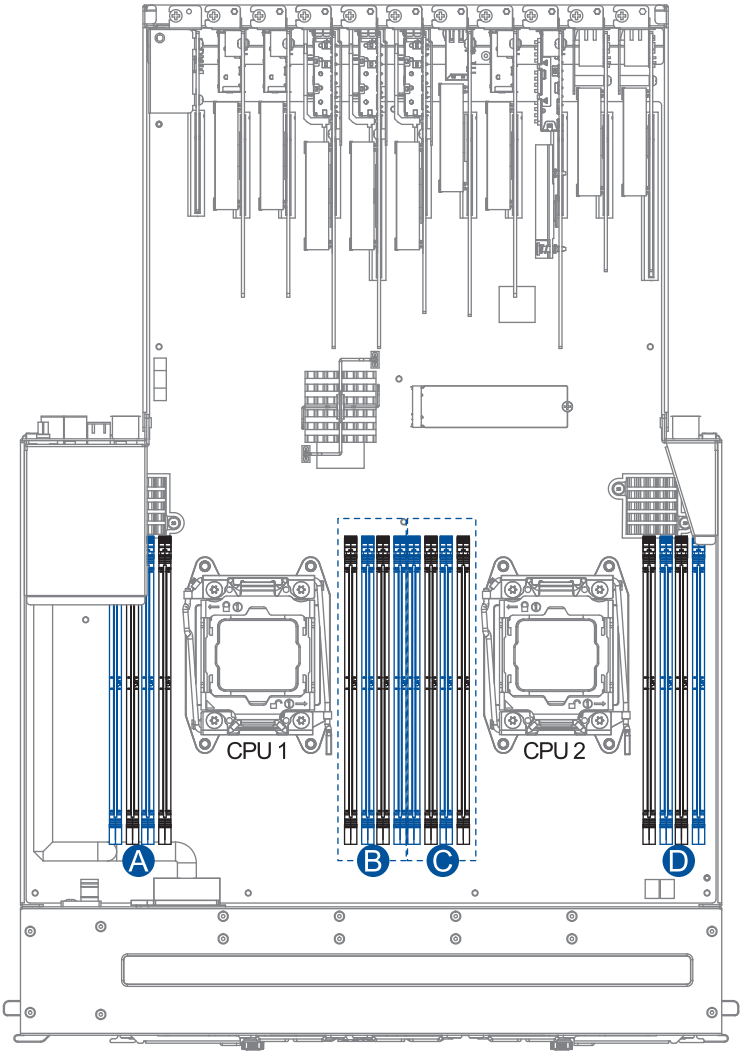
NOTE: See section **2.2.3 Installing the host boards** and follow the steps in removing the controller from the enclosure.

3. Look for the DIMM slots in the controller, then install the memory modules to the slots.

   a. For GSa 5100, insert the memory modules to the blue slots, starting from left to right. If you want to add more memory modules, insert them to the black slots.



b. For GSa 5200, insert the memory modules to the blue slots, starting from section A to section D. If you want to add more memory modules, insert them to the black slots.



4. Insert the BBU back to the controller.

> **NOTE:** See section **Replacing the BBU** for more details.

5. Insert the controller back to the enclosure.

2.3 Connections

This section details the connection procedures of GSa systems to the expansions, power source, connection status, topologies, and other connection configurations.

2.3.1 General considerations in connecting devices

When selecting the number of hard drives to assemble a logical drive, the host channel bandwidth and the performance of each drive must be considered. It is a good practice that you calculate the performance against the host port bandwidth when designing an application topology.

For example, if eight drives are included in a logical drive and is associated with a host ID (LUN mapping), the combined performance of this logical drive must estimate the channel bandwidth. If two 6-drive logical arrays are associated with two IDs residing in a single host channel, there may be a trade-off with the performance.

If your system comes with a total of eight or more host ports, we recommend that you use more disk drives to an expansion so that you can create a host-port that corresponds to 6-member logical drives (RAID 5) or 8-member logical drives (RAID 6). These logical drives bring up the bandwidth of each host.

You must also take note of these considerations:

- A spare drive that carries no data stripes and does not contribute to disk-level performance. For performance data information of your hard drive, refer to its documentation.
- Disk drives in the same logical array must have the same capacity, but it is preferred that all drives in the chassis have the same capacity.
- Disk drives in the same logical drive must have the same capacity, but it is preferred that all disk drives in a chassis have the same capacity. Tiered storage configuration is supported in this setup. However, you must not include both SAS and SATA drives in a logical drive.
- A spare drive must have a minimum capacity equivalent to the largest drive that needs replacement. If the capacity of the spare drive is less than the capacity of the drive to be replaced, the controller will not proceed with the failed drive rebuild.
- When rackmounting, leave enough space for the cables. DO NOT bend them to a diameter of less than 76 mm (3 inches).
- When connecting between devices, follow all the specifications. Pay attention to the signals and avoid electronic noise from adjacent interfaces. DO NOT put power cords on optical cables.
- Route the cables away from places where it can be damaged by other devices such as fan exhaust or foot traffic.
- DO NOT over-tighten, twist, or bend the cables.

Configuring the host-side topologies

When configuring host-side topologies, avoid the points of failure. It is recommended that the host ports are connected to at least two HBAs.

NOTES:

- To manage the fault-tolerant data paths and optimize data throughput on multiple data paths, you must apply MPIO software or other multipathing utilities such as Linux Device Mapper.
- Host port channel designation may vary by system. Refer to the topologies of this manual to create your own connections that suit your needs.

Configuring the host-side parameters

For the host-side parameters, we strongly recommend that you use the default settings of your system. If you need to adjust the host-side parameters, consult your on-site technical personnel or seek technical support from your vendor.

Familiarizing the Maximum Concurrent Host LUN Connection (Nexus in SCSI)

The menu option *Max Number of Concurrent Host-LUN Connection* allows you to set the maximum number of concurrent host LUN connections. This is the arrangement of the controller internal resources to use with a number of current host nexus.

For example, if you have four hosts (A, B, C, and D) and four host IDs/LUNs (IDs 0, 1, 2, and 3) in a configuration, where:

- Host A accesses ID 0 (one nexus)
- Host B accesses ID 1 (one nexus)
- Host C accesses ID 2 (one nexus)
- Host D accesses ID 3 (one nexus)

These connections are queued in the cache, which are called four nexus. If there is an I/O in the cache with these four nexus and another host I/O comes with a nexus different from the four in the cache (e.g. host A accesses ID 3), the controller returns as busy. This happens with the concurrent active nexus. If the cache is cleared, it accepts four different nexus again. Many I/O operations can be accessed via the same nexus.

Knowing the Maximum Queued I/O Count

The menu option *Maximum Queued I/O Count* allows you to configure the maximum number of I/O operations per host channel that can be accepted from the servers. The predefined range is from 1 to 1024 I/O operations per host channel. You can also choose **Auto**, which sets the automatic configuration. The default value is 256 I/O operations.

The appropriate setting for this option depends on how many I/O operations the attached servers are performing. This varies according to the amount of the host memory present as well as the number of drives and their respective sizes. Usually, the optimum performance occurs from using **Auto** or **256** settings.

For more information, refer to the firmware manual that came with your system.

2.3.2 Fibre-Host connections

The Fibre Channel standard allows optical connections. The optical cables are used over long distances and have been proven to be more reliable. Due to the demands of high transfer rates, optical cables are preferred for a 4 Gbps, 8 Gbps, or 16 Gbps fiber connectivity, as they are not vulnerable to EMI.

The fibre host ports are connected to fibre channel host adapters (HBA) that feature SFP interface with full duplex transfer support in a PCIe interface. For the latest certified items, please contact the vendor near you.

WARNING!

- All fibre cables are sensitive and must be handled with care. To avoid interference, the cabling path must be carefully planned without the cables getting bent.
- Lasers are hazardous and may cause blindness or permanent eye damage. Use them with utmost caution. Never look directly when lasers are turned on or operating.

Detecting auto speed

Speed auto-detection is specified by the Fibre channel standard. If a 16 Gbps port is connected to an 8 Gbps port, the speed slows down at 8 Gbps. If there are 16 Gbps ports on both ends of the link, the speed runs at 16 Gbps.

SFP/SFP+ transceivers

An SFP transceiver converts electrical data signals into light signals then transfers these signals transparently via the optical fiber. A transceiver provides bi-directional data links, a laser transmitter (for fiber optic cables), LC connector, and a metal enclosure to lower the EMI.

Other features of a typical SFP transceiver include a single power supply, low power dissipation, and hot-swap capability. It is also important that the transceiver you use meets the FC performance and reliability specifications.

WARNING! The SFP transceiver has a laser diode featuring a Class 1 laser. To ensure safety, DO NOT remove any covers or attempt access of the inside of the device. If problems arise or if you need technical service, contact a qualified personnel.

FC port dust plugs

Each FC port comes with a dust plug. Remove these plugs ONLY when you insert an SFP transceiver.

NOTE: Contact your vendor for the list of compatible SFP/SFP+ transceivers.

Fibre-host topologies

The fibre-host standard supports three topologies:

- **Point-to-point topology**

  A direct connection between two fibre-channel devices, the simplest among the three topologies.

- **FC-AL (Fibre Channel Arbitrated Loop)**

  The fibre-channel devices are all connected to a loop. Each device is assigned to an AL_PA (Arbitrated Loop Physical Address). FC-AL supports 124 devices in a single loop. This is the most commonly-used topology among the three.

- **Fabric switch**

  This topology can support up to 224 fibre-channel devices and allows multiple devices to communicate simultaneously. A fibre switch is required to implement this topology.

> **IMPORTANT!** If different servers need to access your logical drive, file locking, FC switch zoning, port binding, and multipath access control configurations are necessary.

Fibre cabling

Before you set up your fibre cabling connection, you must:

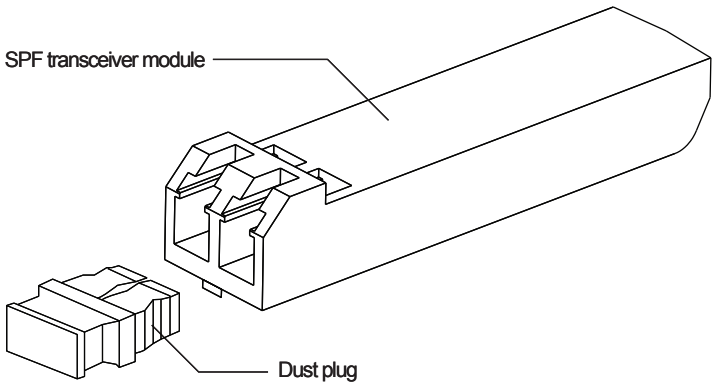
a. Create a configuration plan. In addition to cabling topologies and the list of networking components, you must also include the firmware and software maintenance details.

b. Confirm that your fibre-channel cable's loop measures 6 inches or longer.

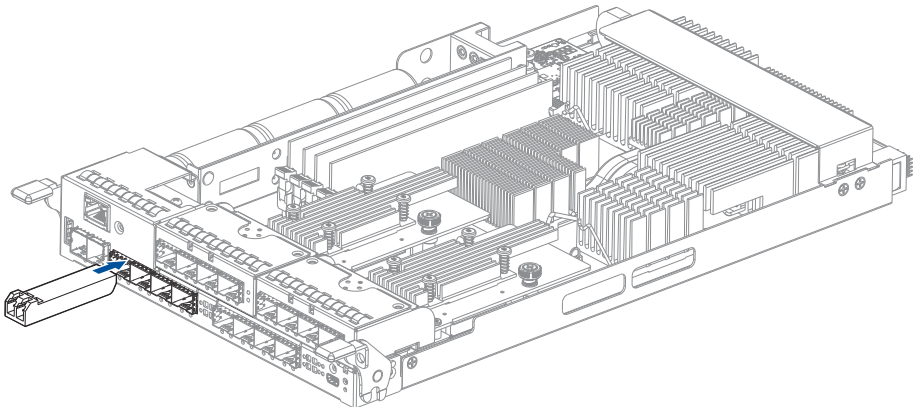
c. Ensure proper airflow and keep the cables away from ventilation outlets.

To connect devices using fibre cable:

1. Take out the SFP transceiver module from the static protective package.
2. Remove the dust plug from the transceiver module.

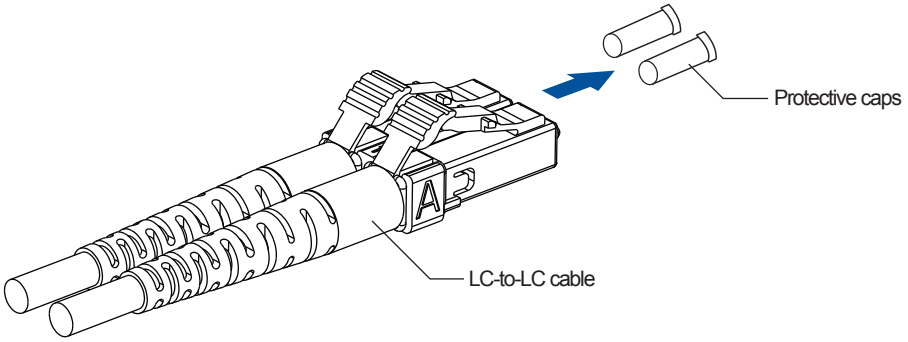


3. Insert the SFP module into one of the system host ports. The module will snap into place.

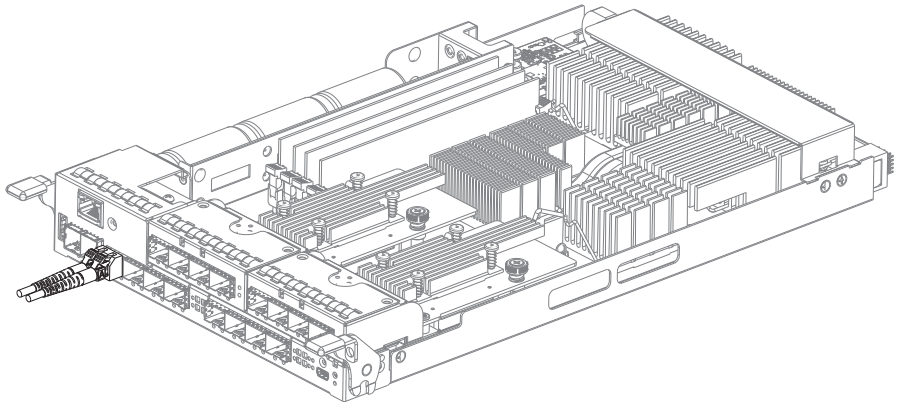


NOTE: The drawing of the controller is for reference only. Look for the actual system host ports in your GSa 5000 system.

4. Remove the two protective caps from the LC-to-LC type cable. Save the protective caps for future use.



5. Insert the LC-to-LC cable to the SFP transceiver module already connected to the system. You can hear a clicking sound, securing the cable in place.



NOTE: The drawing of the controller is for reference only. Look for the actual system host ports in your GSa 5000 system.

6. Remove the protective caps on the other end of the cable, then connect to an SFP transceiver module on a Fibre Channel switch port or a Fibre Channel host bus adapter (HBA) port.

2.3.3 SAS - host connections

This section details about the connections between SAS and host using SAS cables. The SAS cables (8 pairs of 28 mm AWG) are characterized by the following:

- 100 Ohms
- Black color
- UL-approved, lead free 50 cm, 120 cm, or 170 cm in length
- Connectors must be secured to the receptacle of the chassis using a latching mechanism

WARNING! The SAS cables are sensitive and must be handled with care. To prevent interference within the rackmount, the cable routing path must be carefully planned and the cables must not be bent.

NOTE: Contact your local vendor to purchase compatible host-link cables.

2.3.4 Ethernet - host connections

Before performing the connections between Ethernet and host, take note of the following requirements:

- Ethernet cables are user-supplied. We recommend you to use CAT5e shielded STP type network cables or cables with better performance types (important for meeting the requirements imposed by emission standards).
- Use of straight-through Ethernet cables with RJ-45 plugs.
- Use of cross-over cables. These cables are automatically detected and rerouted for a valid connection.

See below the list of connection types:

- Directly to iSCSI initiators (software or hardware) or via the Gigabit Ethernet switches.
- To servers equipped with iSCSI HBA, preferably a hardware TOE (TCP/IP Offload Engine) card, then to client stations with an Ethernet NIC or iSCSI HBA.
- The system presents its logical volumes via SCSI-like IDs and LUNs. These RAID volumes then appear as iSCSI targets via the network.

IMPORTANT! Even though the iSCSI initiator software is a cost-effective way of building an iSCSI SAN, this software initiator adds additional workload to the server CPU. We recommend you to apply iSCSI HBAs that come with TCP/IP offload engines in order to reduce overhead.

Network and host connection topologies

The iSCSI host ports must be connected to Ethernet network devices and iSCSI initiators that comply with IEFT iSCSI standard (RFC 3720). The network connection of the iSCSI ports is flexible. The use of network connecting devices, subnet, name servers, or iSCSI management software varies from case to case.

Note that the host NIC ports and the storage system's iSCSI host ports must be configured in the same subnet, and the following:

- Use the Ethernet Management port for management purposes only such as EonOne or telnet console. This port must not be used for I/O processes.
- Configurations such subnet or virtual LAN can separate iSCSI host links, decrease overhead, and eliminate the impact of link failure.
- Multiple arrays or logical partitions can be created and made available separately via different IDs or LUNs on host ports. Usually, a RAID5 logical drive of 8 members sometimes brings optimal array performance.

2.3.5 Expansion connections

When expanding your system, you can add expansion systems and connect between devices via the SAS ports or the added SAS 12 G host board.

A SAS host link cable is bundled per expansion package. If you need to purchase other cables, or if you need other cables of different lengths, contact your vendor.

Before configuring the expansions, you must take note of the following important points:

- For a cleaner and clutter-free rack system, have a carefully planned routing paths when connecting between systems.
- All SAS cables are sensitive and must be handled with care. DO NOT bend or twist the cables when connecting the systems installed to the rack.

Configuring the SAS expansion

The SAS expansion port of the GSa system connects to the expansion systems. For dual-controller systems, each expansion port connects to a controller of another expansion system, making a fault-tolerant linkage to different SAS domains.

The following principles apply to main storage and expansion system connections:

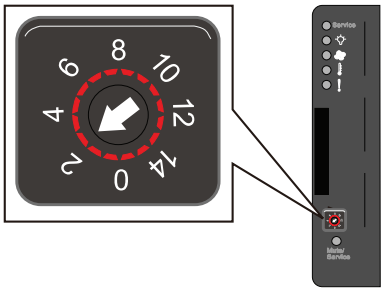
- Dual-controller main storage connects to a single-controller expansion system
- A longer cable is available in making expansion links with a dual-controller configuration. If you need to connect expansion systems from two opposite directions, you may need a longer cable. Routing between two different connections can avoid loss of data links if one expansion fails to operate.

Setting the expansion IDs

Each expansion system must have a unique ID and you can configure the ID via the rotary ID switch. To set the expansion IDs, use a small flat-blade screwdriver.

You must take note of the following when setting the IDs on the expansion system:

- Set the IDs from 1 to 15. The order starts from the expansion enclosure that is closest to the managing GSa enclosure.
- Ensure to set a unique ID on each expansion enclosure so that the SAS WWN addresses of the disk drives are properly assigned. The storage system firmware automatically manages these addresses.



Configuration rules

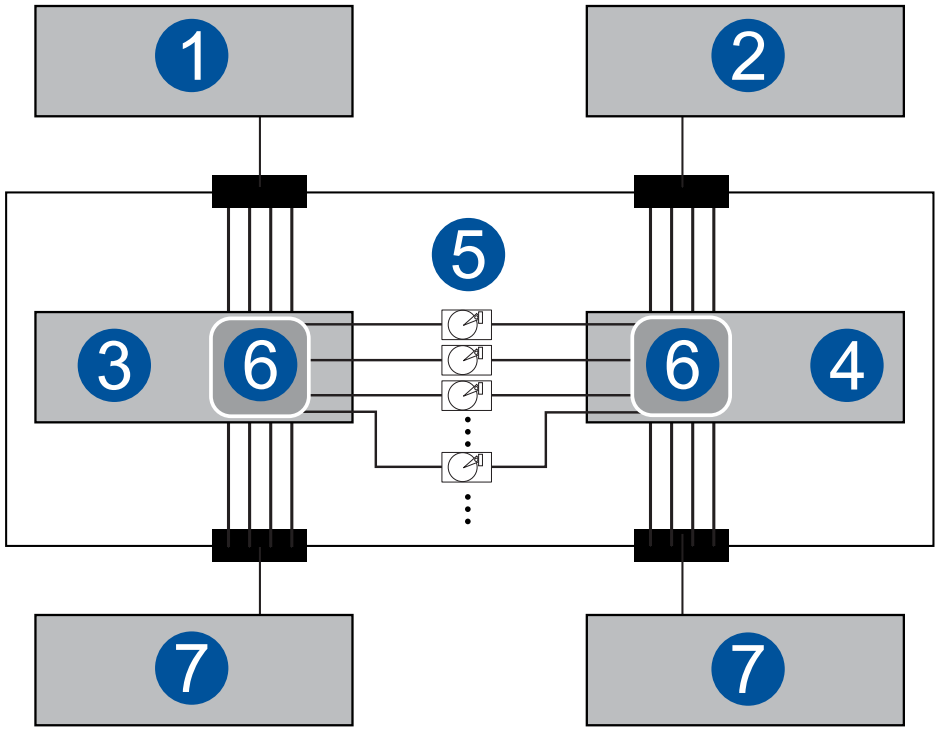
To connect the SAS interfaces across storage and expansion systems, you must take note of the following:

- **Fault-tolerant links in a dual-controller combination**

  Corresponding to the dual-port interfaces of the SAS drives, two physical links are available per disk drive, routed across the backplane board, then to a SAS expander, and interfaced via a 4x wide external SAS port.

- **With data paths via separate SAS domains**

  Access to disk drives can be continued in the event of a failure from a cable link or SAS expansion controller.

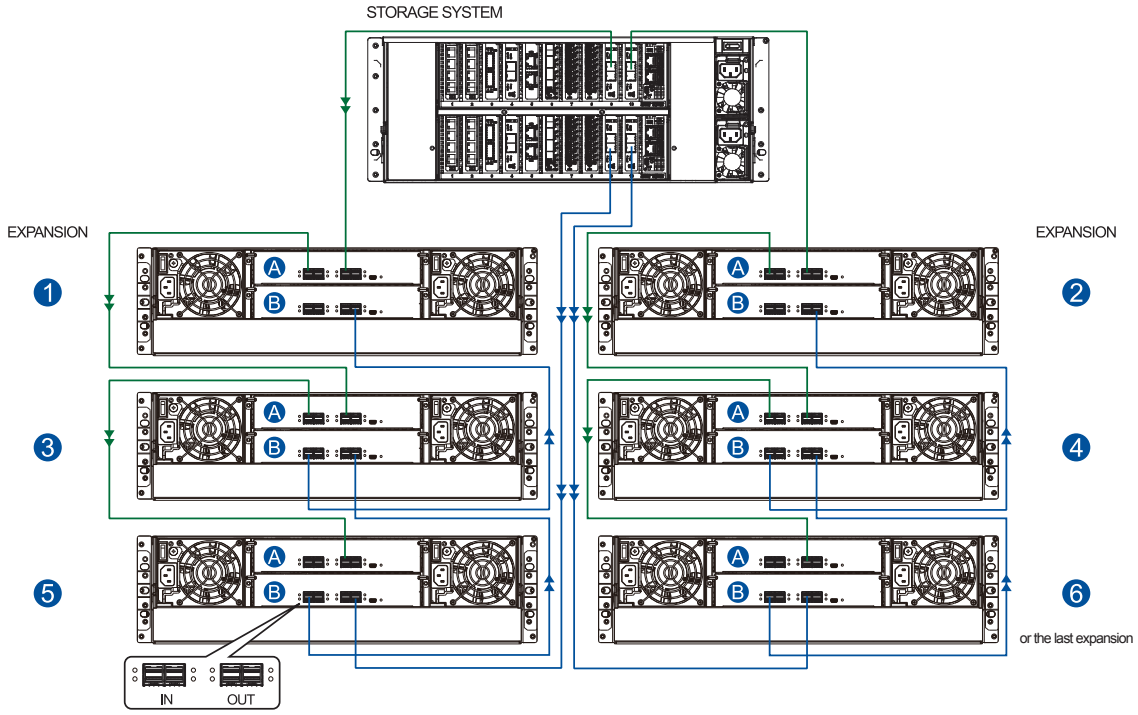


Number	Description
1	RAID controller A
2	RAID controller B
3	Expansion system controller A
4	Expansion system controller B
5	Dual-port SAS drives
6	Expander
7	To another expansion system

- **Fault-tolerant links to SAS disk drives**
  - The SAS expansion cables are bundled with the expansion systems. Take note that if there are many expansion systems connected, a longer SAS external cable, approximately measured 120 cm, may be needed to connect an expansion system from the opposite direction for a higher redundancy.
  - One expansion link connects the expansion system from a storage system with HBA/RAID card to the nearest expansion system, then to the most distant expansion system. Another expansion link connects to the most distant expansion system, from the opposite direction to the first expansion system from the storage system.
  - Each expander controller on the SAS expansion system controls a *SAS domain* that connects to one of the alternative interfaces of the disk drives in the enclosure. For example, one expander unit controls Domain A while the other expander controls Domain B. In a fault-tolerant topology, the SAS external links always connect to the SAS ports of the same SAS domain.
  - Identify the SAS domains by the location of the expanders: the left controller is controller A, the right is controller B.
  - On a storage system, each controller is considered as managing a separate SAS domain. With the help of the port selector mechanism on the MUX boards, the idea of SAS domain applies even when SATA drives are used in a dual-controller expansion system.

Connecting expansion systems

- Connecting dual-controller expansions



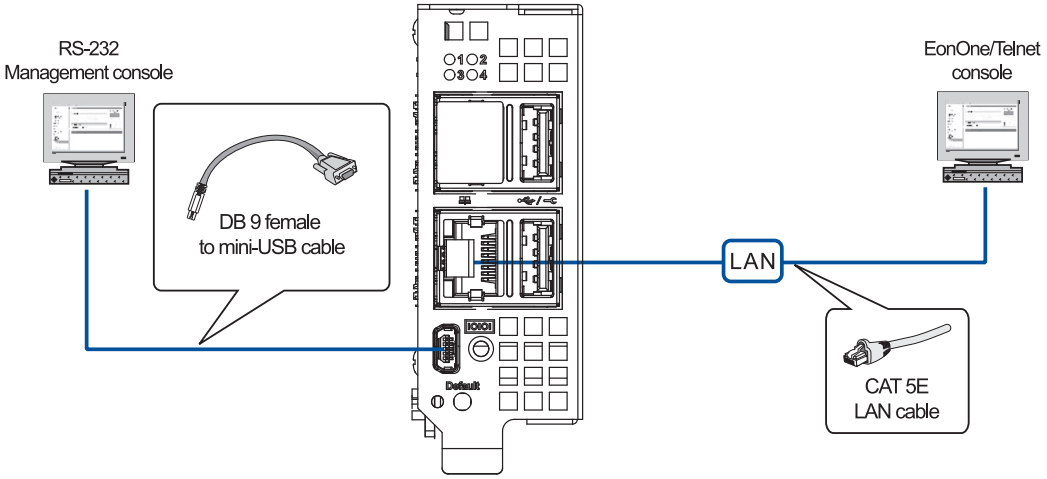
IMPORTANT! To ensure redundancy, a dual-controller SAS expansion must be connected to the opposite ends of the expansions (first and last expansion) set up in daisy-chain connection.

2.3.6 Management console connections

To connect you main storage to external consoles, you need the following:

- DB 9 female to mini-USB cable (bundled with the package)
- CAT 5e LAN cable (user supplied)

Connecting main storage to external consoles



See below table for the list of default values of the serial port.

Baud rate	115200
Data bit	8
Parity	None
Stop bit	1
Flow control	Hardware

IMPORTANT! Always connect to the primary controller (controller A).

NOTES:

- A null modem may be required if you are using a third-party cable.
- For TCP/IP connection and firewall configuration, refer to EonOne, your management software's online help, or user manual. If your network is not running the DHCP server protocols, you can use the default IP **10.10.1.1** if you are accessing for the first time.

2.3.7 Power connection

Before connecting to a power source, ensure that all components are properly installed and the management interfaces are properly connected.

Take a look at the list below and check the following:

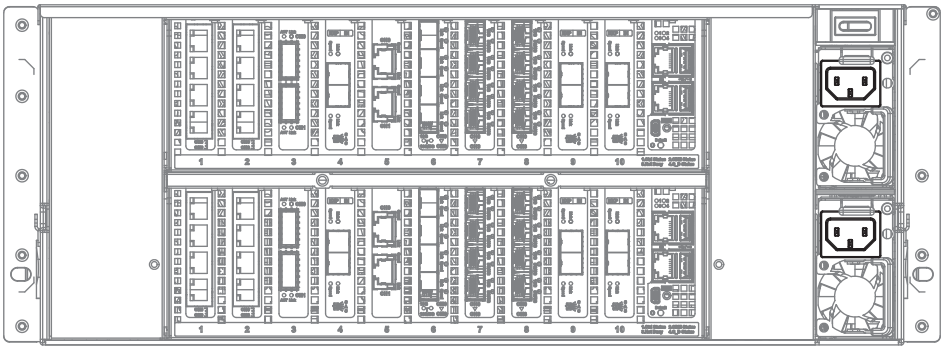
1. The system is connected to host computers, management computers, or external networking devices with the correct cables.

   IMPORTANT! Ensure to use the power cables with at least 1.2 meters in length. DO NOT use extension cables as the power cables are designed to connect **ONLY and DIRECTLY** to relocatable power taps (RPTs) on server cabinets.

2. Ensure that the ambient temperature is not less than 35°C (with CBM).

Connecting to power source

Use the bundled power cables and connect them to the power sockets for both PSUs.

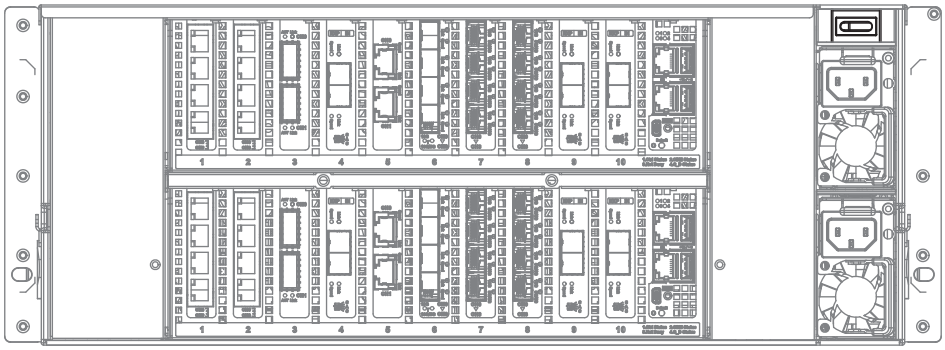


Turning on the system

Before turning on the GSa system, you must turn on the expansion enclosures first if your network configuration consists of multiple arrays.

To turn on the system:

1. Turn on the networking devices.
2. Turn on the JBOD expansion systems.
3. Press the power switch.

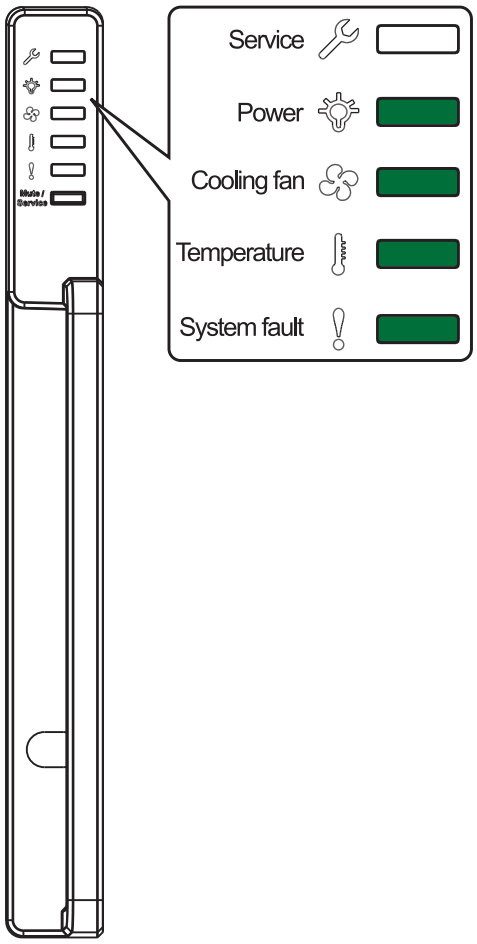


4. Turn on the application servers.

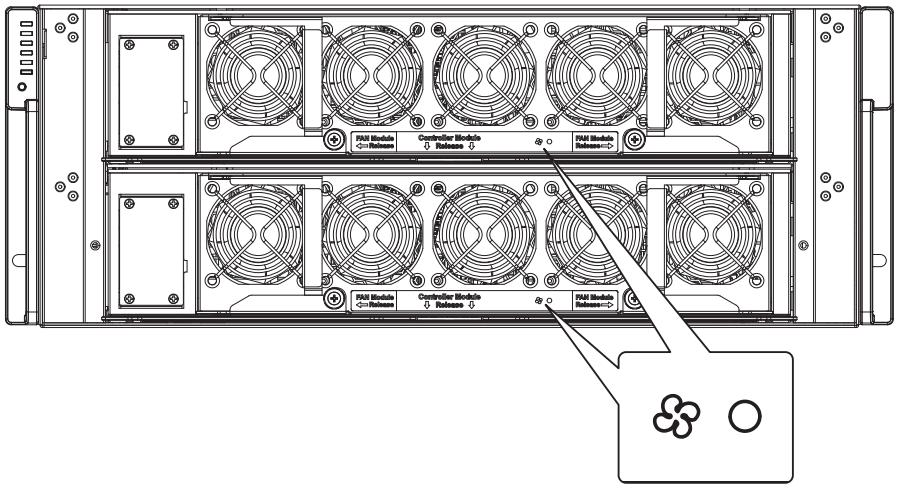
Checking the power status

Once the system is on, no LEDs should light up in red or amber, nor should you hear an alarm from the system. Start verifying the system status via the following interfaces:

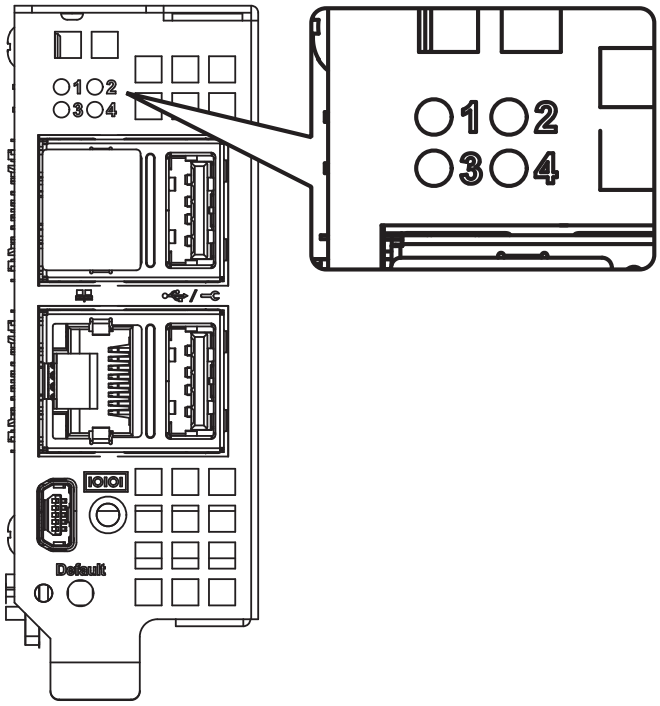
- Front panel LEDs



- Cooling module status LEDs



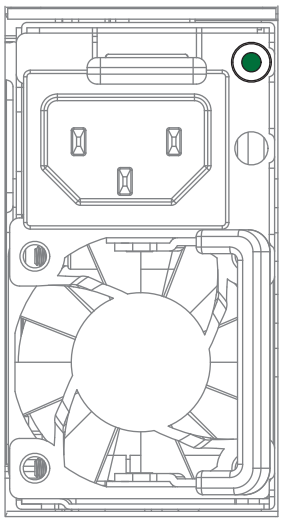
- Controller module LEDs



Number	Name	Status
1	Cache Dirty	**OFF**
2	Host Busy	**OFF**
3	Control Status	**ON**
4	CBM Status	**ON**

NOTE: Refer to chapter **System maintenance** for more information regarding the LED description.

- PSU LED



2.3.8 Turning off the system

Before turning off the system, ensure that no processes are taking place such as **Regenerate Logical Drive Parity** or **Media Scan**.

To turn off the system:

1. Close all applications to stop the I/O access to the system.
2. Flush the cache to clear the DRAM data. If the DRAM contains cached data, the Cache_Dirty LED lights up in amber.
3. Flush all cached data using the controller's shutdown function to prepare the RAID system for a safe power shutdown. Refer to EonOne manual for details.
4. Once the cache is flushed, switch off the system.

3 System monitoring

This chapter details the monitoring features and the status of EonStor GSa 5000 Series.

3.1 Monitoring features

The EonStor GSa 5000 Series is equipped with self-monitoring features the help you keep track of the system's operating status.

You can monitor your system's status with the following features:

- **Firmware**

  The firmware manages the controllers of the system, which is accessible in a terminal program via the serial port. For more details, see the firmware manual in the bundled CD.

- **EonOne**

  EonOne is a browser-based GUI (graphic user interface) software that you can install into a local or remote computer and access via the network. You can refer to EonOne manual in your bundled CD for more information.

- **LEDs**

  The LEDs are indicators that notify you of the system status, events, and errors or failed operations. The LEDs are located on both front and rear panels of the chassis.

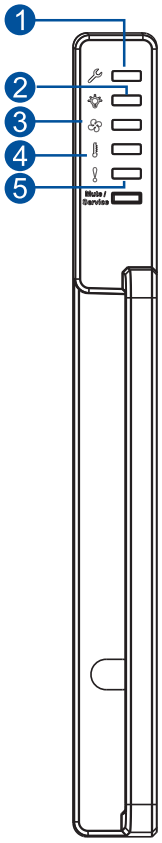
- **Audible alarms**

  The audible alarms are triggered in case of system failures. For more information, see **PSU LED**.

3.1.1 LEDs

This section details the system LEDs and their descriptions.

Front panel LEDs

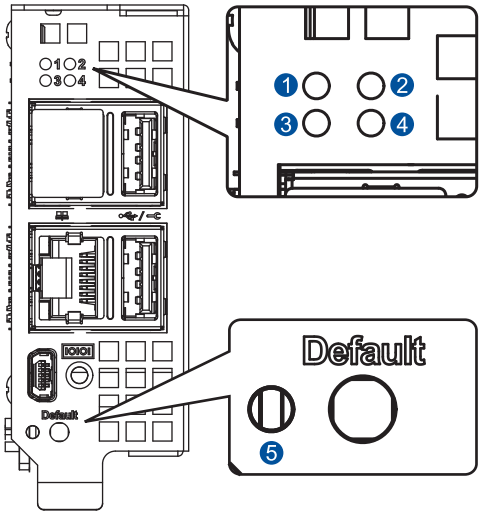


Number	LED name	Color/ Status	Description
1	Service	⚪	The system is being serviced or is requiring services.
		OFF	The system is not being serviced or does not require a service.
2	Power	🟢	The system is powered properly.
		🟠	A power failure occurred in the system.
3	Cooling module status	🟢	The cooling module and fan built with the PSU are running normally.
		🟠	A fan failure occurred.
4	Temperature status	🟢	The internal temperature is normal and within the safety threshold.
		🟠	The internal temperature exceeds the safety threshold.
5	System fault	🟢	The system is operating normally.
		🟠	The system encounters abnormal conditions.

IMPORTANT! If the cooling module status lights up in 🟠, check the cooling module inside the enclosure or the fan built with the PSU.

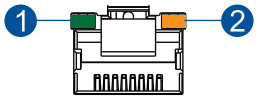
Rear panel LEDs

- **Controller LEDs**



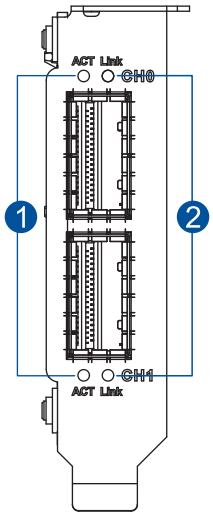
Number	LED name	Color/ Status	Description
1	Control Status	Green	A controller is operating normally.
		Orange	• A component has failed or inappropriate RAID configurations caused system faults. • The controller is initializing.
2	CBM Status	Green	• Both BBU and flash modules are installed in the system. • The CBM is ready for operation.
		Green flashing	• The BBU is charging.
		Orange	• The CBM failed in operating, either the supercapacitor or flash module. • Either the supercapacitor or the flash module is missing in redundant models.
		OFF	• The BBU is not installed in generic models.
3	Host Busy	Green flashing	Traffic going on the host bus.
4	Cache Dirty	Orange	• Cache memory is dirty. • Data in flash backup module is flushed to the cache.
		Orange flashing	The cached data is being transferred to the flash module during a power outage. Once the transfer is done, all LEDs will turn off. This signal is local to each controller.
		OFF	No data found in cache memory.
5	Restore Default	Green	Successfully reset NVRAM default after the press and hold of the Restore Default button.

- **1 G Ethernet management port LEDs**



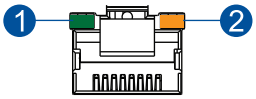
Number	LED name	Status	Description
1	Speed	ON	1 Gb connection is established.
		OFF	• 10/100 Mb connection is established. • No connection is established.
2	Link/Active	ON	A connection is established.
		Flashing	Data I/O is ongoing.
		OFF	No connection is established.

- **InfiniBand 56 G host board LEDs**



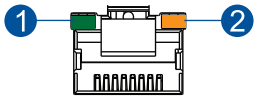
Number	LED name	Color/ Status	Description
1	Speed	●	A connection is established.
		●	Data I/O is ongoing.
		OFF	No connection is established.
2	System fault	ON	A connection is established.
		OFF	No connection is established.

- **10 G Ethernet port LEDs**



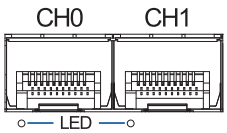
Number	LED name	Color/ Status	Description
1	Speed	●	10 Gb connection is established.
		●	1 Gb connection is established.
		OFF	10/100 Mb connection is established.
2	Link/Active	ON	A connection is established.
		Flashing	Data I/O is ongoing.
		OFF	No connection is established.

- **10 G iSCSI host board port LEDs (RJ-45)**



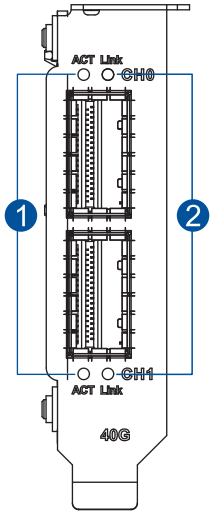
Number	LED name	Color/ Status	Description
1	Speed	●	10 Gb connection is established.
		●	1 Gb connection is established.
		OFF	10/100 Mb connection is established.
2	Link/Active	ON	A connection is established.
		Flashing	Data I/O is ongoing.
		OFF	No connection is established.

- **10 G iSCSI host board port LEDs (Fibre)**



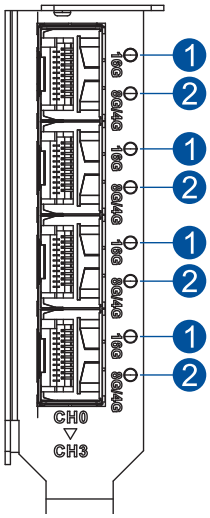
Color/Status	Description
●	A link is established.
●	A link is active.
OFF	A link is not established

- **40 G iSCSI host board LEDs**



Number	LED name	Color/ Status	Description
1	Active		A 40 Gb connection is established.
			Data I/O is ongoing.
		OFF	No connection is established.
2	Link		A connection is established.
		OFF	No connection is established.

- **FC 16 G host board LEDs**



Number	LED name	Color/ Status	Description
1	Speed		A 16 Gb connection is established.
			An 8 Gb connection is established.
		OFF	No connection is established.
2	Link	ON	A connection is established.
		Flashing	Data I/O is ongoing.
		OFF	No connection is established.

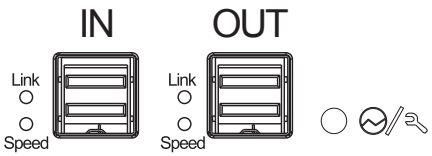
- **8 G Fibre channel host board port LEDs**

  These ports, if your system has them, deliver fast I/O performance for SAN applications. You can use optical cables for long distances, which proved to be reliable for this kind of setup.

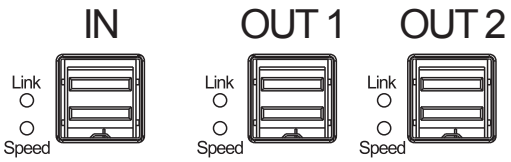
Number	LED name	Color/ Status	Description
1	Link/Active	ON	A connection is established.
		OFF	A link is broken.
2	Speed		8 Gb connection is established.
			4 Gb connection is established.
		OFF	No connection is established.

NOTE: For higher and speedier transfer rates, we suggest you to use optical cables for 4/8 Gb fiber connectivity. These cables are not susceptible to EMI (electromagnetic interference).

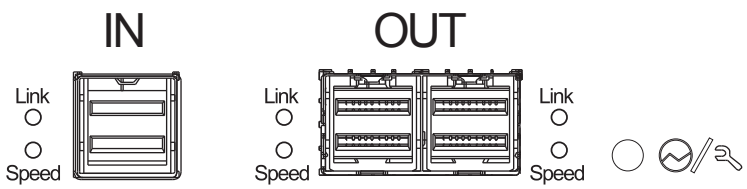
- **12 G SAS expansion controller LEDs**



JB 3000 series



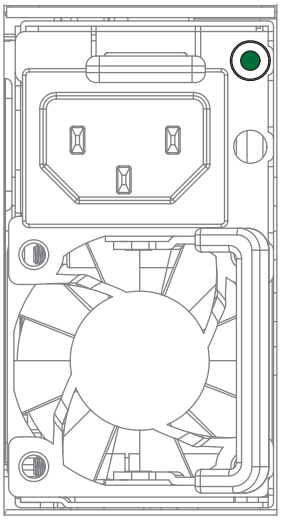
JB 3060L series



JB 3060L series (drawer type)

LED name	Color/Status	Description
Link/Active	ON	All PHYs are validly linked.
	Flashing	One of the PHYs has failed.
	OFF	All PHYs are offline.
Speed	🟢	12 Gb link speed
	🟠	6 Gb/3 Gb link speed
	OFF	No connection
○	🟢	The controller is operating normally.
	🟠	• A component failure occurred. • Initialization is ongoing.

- **PSU LED**



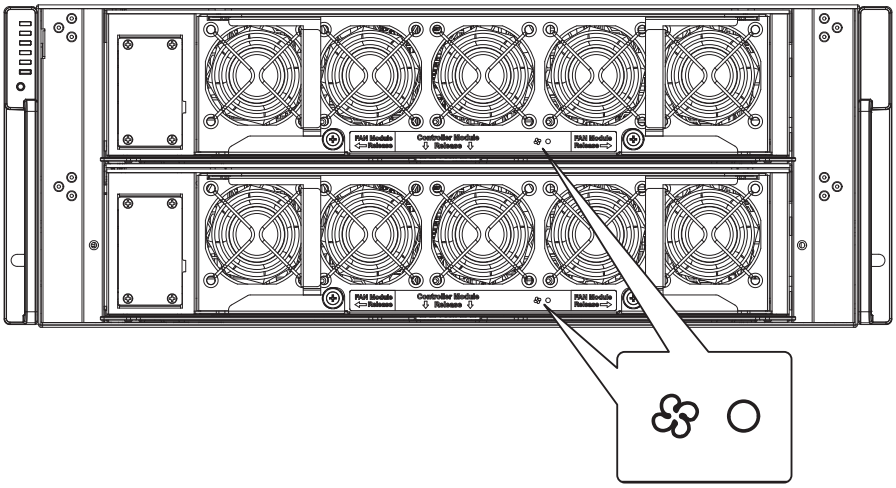
Color/ Status	Description
🟢	The system is connected to the power source but the system is not turned on.
🟢	The PSU is operating normally.
🔴	The PSU is faulty.

The PSU LED alerts you of the current status of your PSU and cooling module components. When either of the components fails, you must replace the PSU immediately.

WARNING! Keep your fingers away from moving parts of the system to prevent technical mishaps and physical injuries.

NOTE: For more details, see section **4.1.1 Replacing the PSU**.

- **Cooling module status LED**



Color/ Status	Description
OFF	The cooling module is operating normally.
●	The cooling module is faulty.

WARNING! Keep your fingers away from moving parts of the system to prevent technical mishaps and physical injuries.

3.1.2 Alarms and I²C bus

This section details the system alarms and I²C bus.

Audible alarms

You will hear an audible alarm if any of the following components fails:

- Cooling modules
- PSU modules
- Hard disk drives
- Sensors or presence detection circuitries

If you hear an audible alarm, ensure to read the error message on the terminal or EonOne screen to determine the cause of the alarm. Take appropriate actions to solve the problem. You can turn off the alarm using the mute button on the front panel. To know more of the alarm beep patterns, see the Troubleshooting Guide included in the bundled CD.

> **NOTE:** When the temperature exceeds the preset threshold, the controller's charger circuits stop charging. You will receive a messages that says *Thermal Shutdown/Enter Sleep Mode*. When the temperature falls back to normal range, the battery resumes charging.

I²C bus

The operating status of the PSU and cooling fan modules are collected via the I²C serial bus. If either of the modules fails, the system detects the failure and you will be notified via the same methods stated in audible alarms.

4 System maintenance

This chapter provides maintenance and replacement procedures of replaceable components of your EonStor GSa 5000 Series.

4.1 Replaceable components

Your EonStor GSa system is comprised of replaceable components:

- PSU module
- Controller module
- Memory module
- CBM
- Host board
- Cooling module

WARNING!

- DO NOT remove a defective component from the system until you have the replacement on hand. Doing so may disrupt the internal airflow.
- Consult with the qualified engineers who are familiar with the system to recommend you of the component replacements.
- DO NOT use excessive force when installing a replaceable module. Forced installation of the module can damage the connector pins of the system, the module, or the internal backplane.

4.1.1 Replacing the PSU

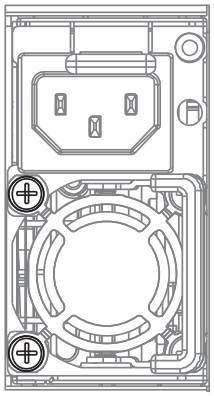
Replace the defective PSU immediately, but only if you have the replacement.

WARNING! Although the system can still operate with a defective PSU, it is not recommended to use it for an extended period of time.

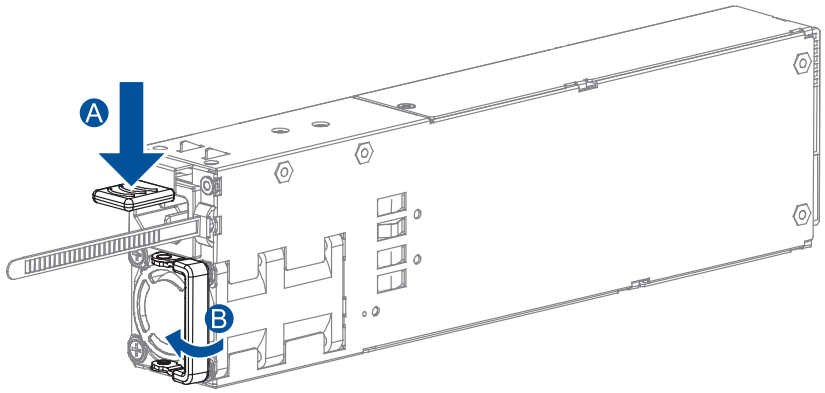
NOTE: Contact your system vendor for more information.

To replace the PSU:

1. Shut down the system, turn off the PSU, then unplug the power cord.
2. Loosen the screw that secures the extraction handle to the chassis.



3. Press down the retention lever (A), then pull out the extraction handle (B).



4. Hold the extraction handle, then pull to remove the PSU from the system.
5. Insert the replacement PSU into the enclosure then push it gently. When you feel a resistance, push the module to lodge it to the backend connectors. Once lodged, the retention lever clicks back into place.
6. Fasten the PSU to the systems using the screws that you removed in step 2.
7. Connect the power cord.
8. Turn on the system.

4.1.2 Replacing the controller module

In replacing a controller in a dual-controller system, ensure that the replacement controller's firmware matches with the controller that you want to get replaced. The replacement provided to you has the firmware version on the label of the packaging.

Use EonOne to find out the firmware version of the present controller. From EonOne GUI, go to **Storage Manager** > **Information** > **Enclosure View**.

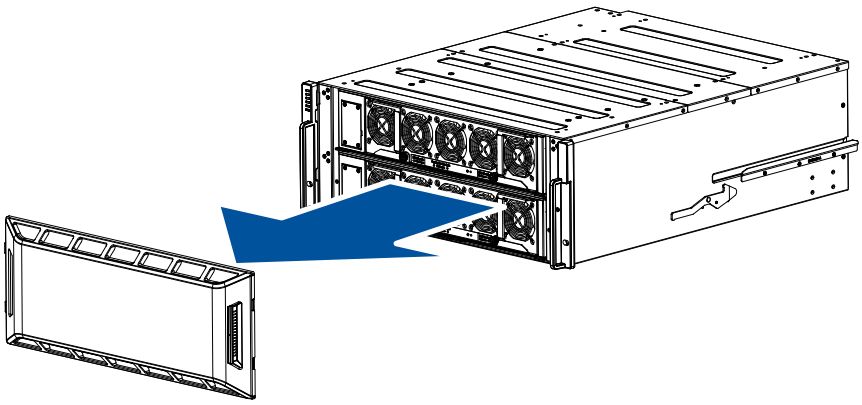
WARNING! DO NOT use the controller modules from different models. Each module has a unique ID which is applied to the host port names. If you insist on using other models' controller modules, you may encounter SAN problems on multiple systems.

IMPORTANT! When removing/installing a controller in a single-controller system, ensure that you shut down the applications and the system.

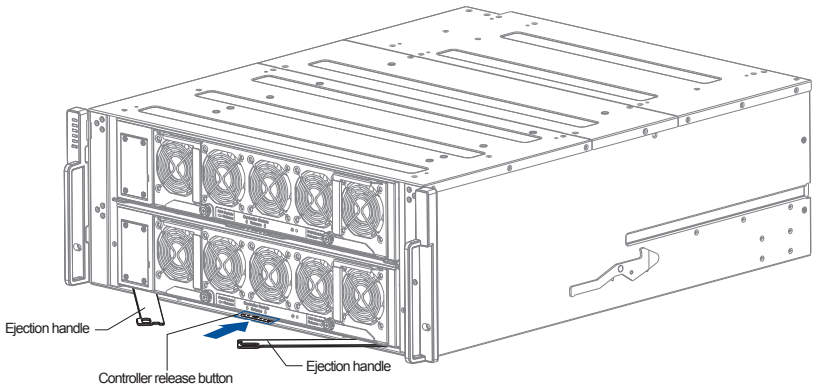
NOTE: Refer to EonOne user manual for more details.

To replace the controller module:

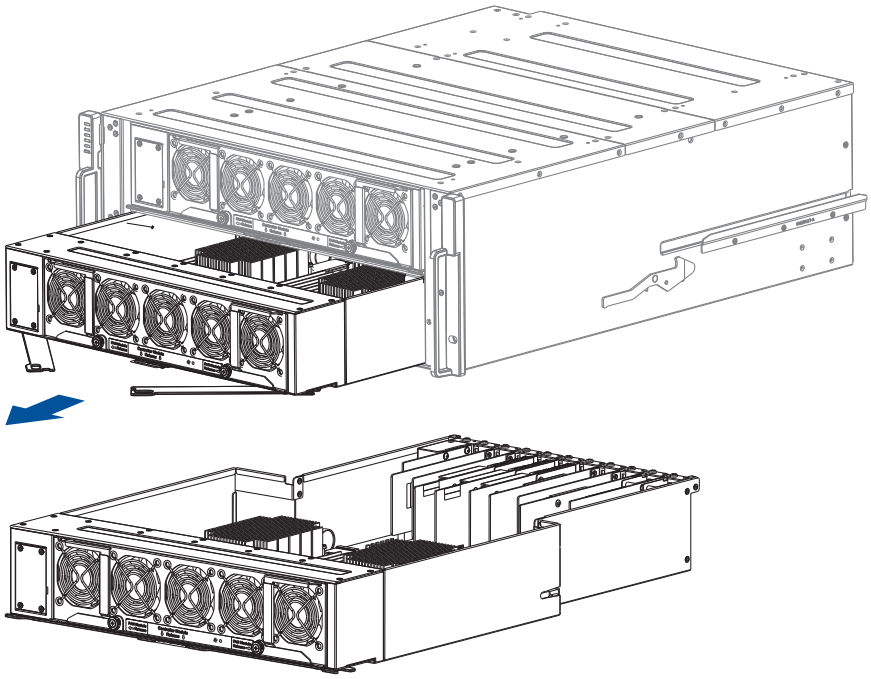
1. From your system's software, go to **Main Menu** > **System Functions** > **Shutdown controller** function to stop all I/O access to the system and the cached data are distributed to the disk drives.
2. Shut down the system, switch off the power buttons, and unplug the power cords from the PSUs.
3. Disconnect all cables from the controller module that you want to be replaced.
4. Remove the front cover from the enclosure..



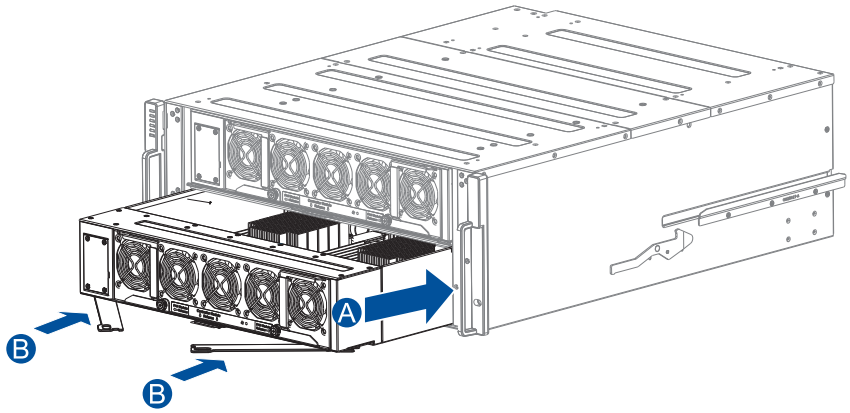
5. Push the controller release button to release the ejection handles.



6. Pull the ejection handles to remove the controller from the enclosure.



7. Install the replacement controller to the system (A). When you feel a contact resistance, use a small but careful force, then push the ejection handles back in place (B).



8. Reconnect the cables, switch on the system, and update the firmware.

NOTE: Refer to EonOne manual or your system's software manual for more details.

4.1.3 Replacing the memory module

The controller comes with a pre-installed DRAM module(s). You can upgrade or replace it when the bundled module malfunctions.

IMPORTANT!

- If your controller has two modules, you must identify the correct module that is no longer working before you proceed with the replacement.
- We strongly recommend you to NOT use the removed DRAM module from a failed controller of a different storage system.
- Contact your system vendor to help you purchase the compatible DRAM modules.

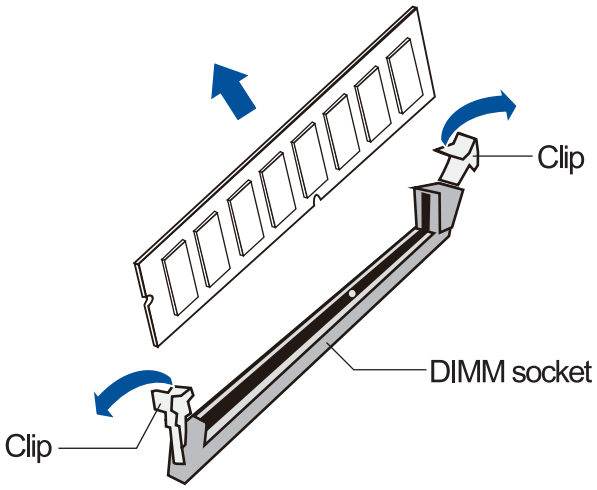
NOTE: Refer to section **ESD precautions** for safety information.

To replace the memory module:

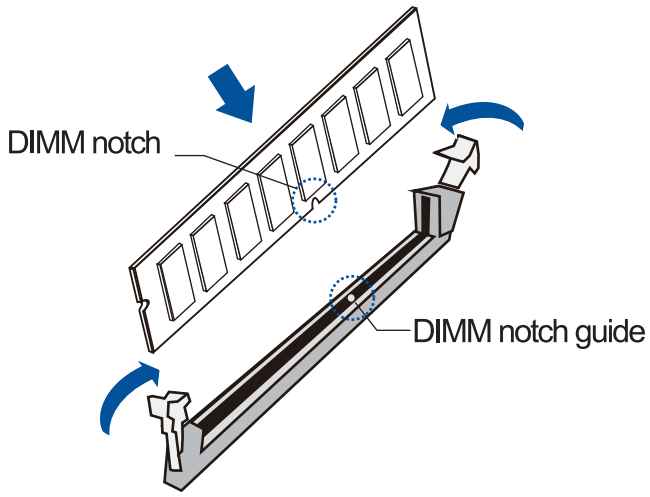
1. Shut down your system, unplug the power cords, then remove the controller. Wait for a minute for the remaining electric current to dissipate.

   NOTE: See section **4.1.2 Replacing the controller module** for details.

2. Determine the memory modules that need replacement, then push down the clips to release the DRAM module from the DIMM socket.



3. Insert the replacement DIMM carefully into the DIMM socket, with the DIMM's notch aligned to the DIMM socket's notch guide.



4. Reinstall the controller module into the chassis, connect the cables and power cords, then switch on the system.

4.1.4 Replacing the CBM (Cache Backup Module) components

The CBM is comprised of a BBU (battery backup unit) and the FBM (flash backup module). The BBU allows your controller to provide more power during a power outage, supporting the controller to save the data to the FBM.

WARNING! Ensure that you have the replacement on hand before replacing your current CBM.

BBU fault conditions and precautions

If a BBU leaks, gives off bad odor, generates heat, becomes discolored or deformed, or appears abnormal when charging or storing, remove it from the system immediately. These issues may be due to the following:

- The temperature sensor on the system's charger circuit reports the temperature that exceeds the preset threshold. The charger circuit enters to a low power and self-protection state.
- A BBU module has been charged for more than 10 minutes. When this occurs, the charger enters a timer fault state. Charging resumes automatically after you remove or reinstall the BBU, or after you reset the system.

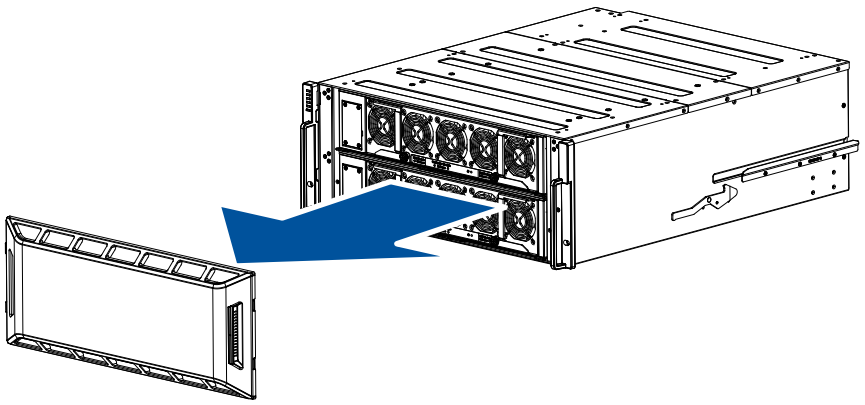
When reinstalling/replacing the BBU, remember these precautions:

- ONLY use a replacement BBU supplied by an authorized distributor. Use of other BBUs voids your system's warranty.
- ONLY dispose your used/defective BBU at an authorized battery disposal sites.
- DO NOT place the BBU near a heat source.
- DO NOT immerse/submerge the BBU in water or other liquids.
- DO NOT disassemble or modify the BBU.
- DO NOT pierce, strike, throw, or exert pressure on the BBU.

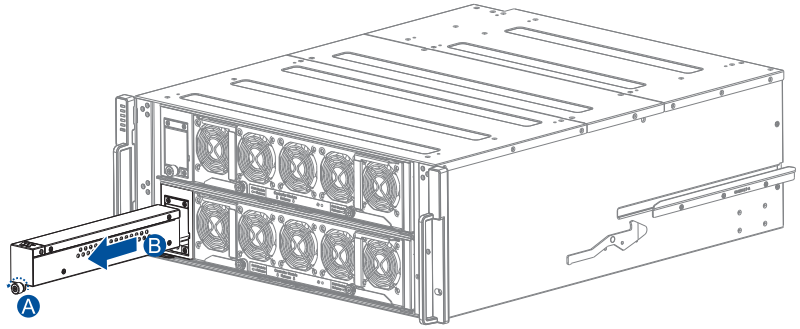
Replacing the BBU

To replace the BBU:

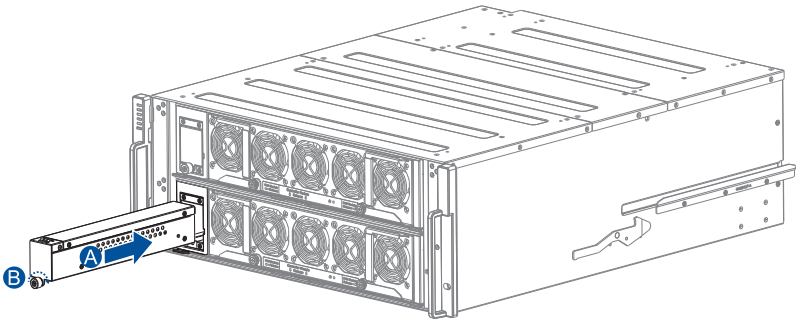
1. Shut down your system, unplug the power cords, then remove the controller. Wait for a minute for the remaining electric current to dissipate.
2. Remove the front cover from the enclosure.



3. Loosen the thumb screw that secures the BBU to the controller (A), then pull to remove from the enclosure (B).



4. Install the replacement BBU to the BBU slot (A), then tighten the thumb screw to secure in place (B).



5. Reconnect the cables and power cords, then switch on the system.

Replacing the FBM (Flash Backup Module)

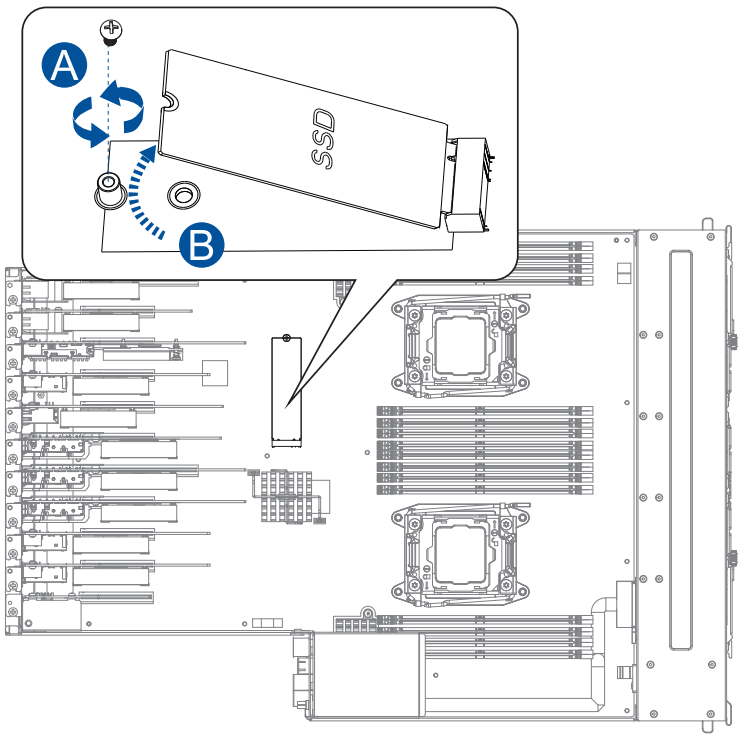
NOTE: Refer to section **4.1.5 Replacing the host board** when replacing/uninstalling a host board.

To replace the FBM:

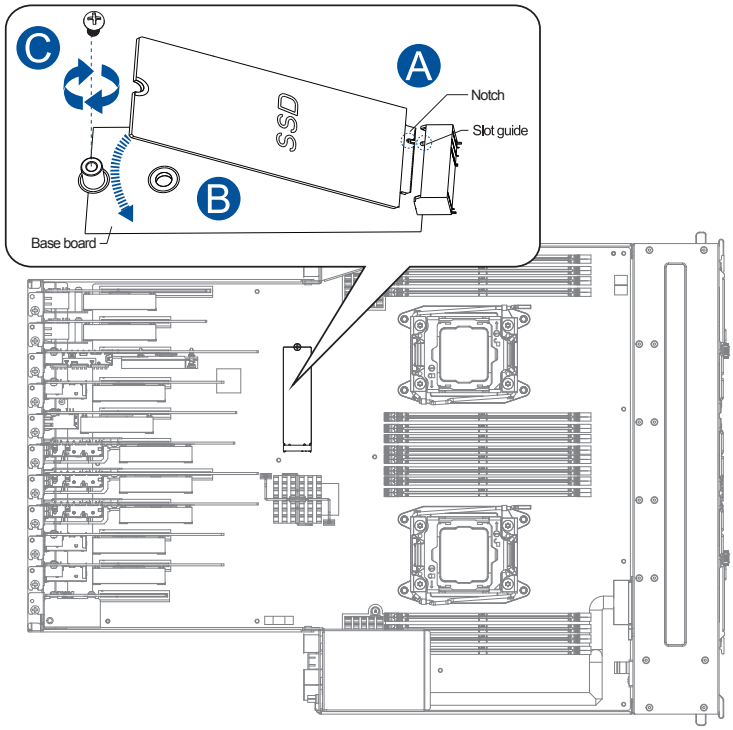
1. Shut down your system, unplug the power cords, then remove the controller. Wait for a minute for the remaining electric current to dissipate.

NOTE: See section **4.1.2 Replacing the controller module** for details.

2. Loosen the screw (A) that secures the FBM to the controller, then lift it up to a 45° angle (B) and remove it from the board.



3. Orient and insert the replacement FBM's notch to the base board's slot guide (A) in a 45° angle, place on top of the base board with the notch on the screw hole (B), then secure the FBM to the board with the screw that you removed in step 2 (C).



4. Insert the controller back to the enclosure.
5. Reconnect the cables and power cords, then turn on the system.

4.1.5 Replacing the host/expansion board

Before replacing the host/expansion board to the controller, you must take note of the following considerations:

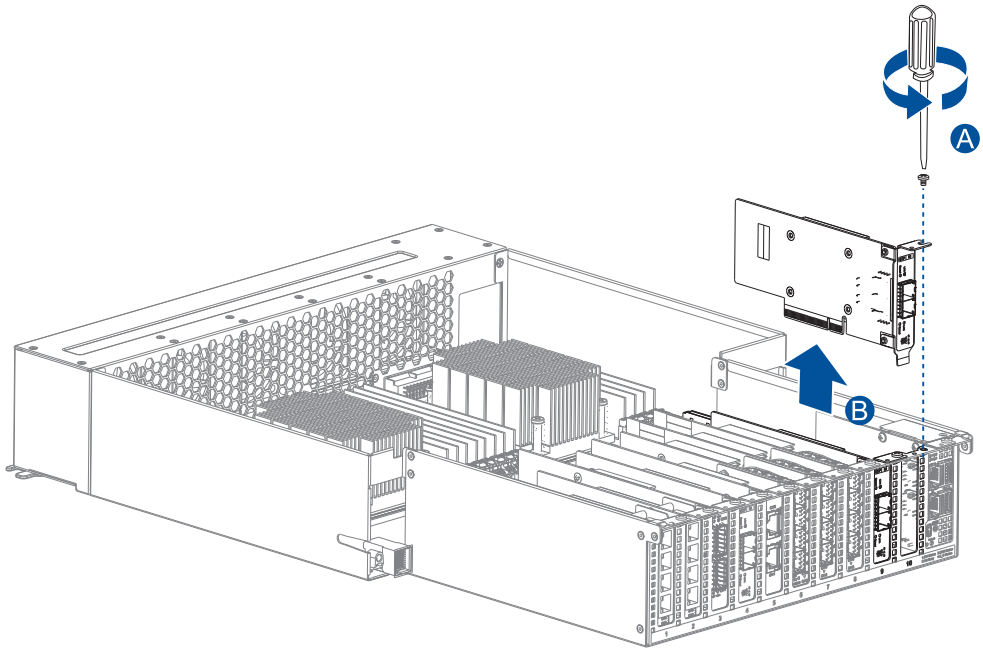
- A controller/host board downtime may occur if you replace a host/expansion board for an upgrade.
- The firmware automatically restores the system to its factory settings when adding or replacing a host board.

To replace the host/expansion board:

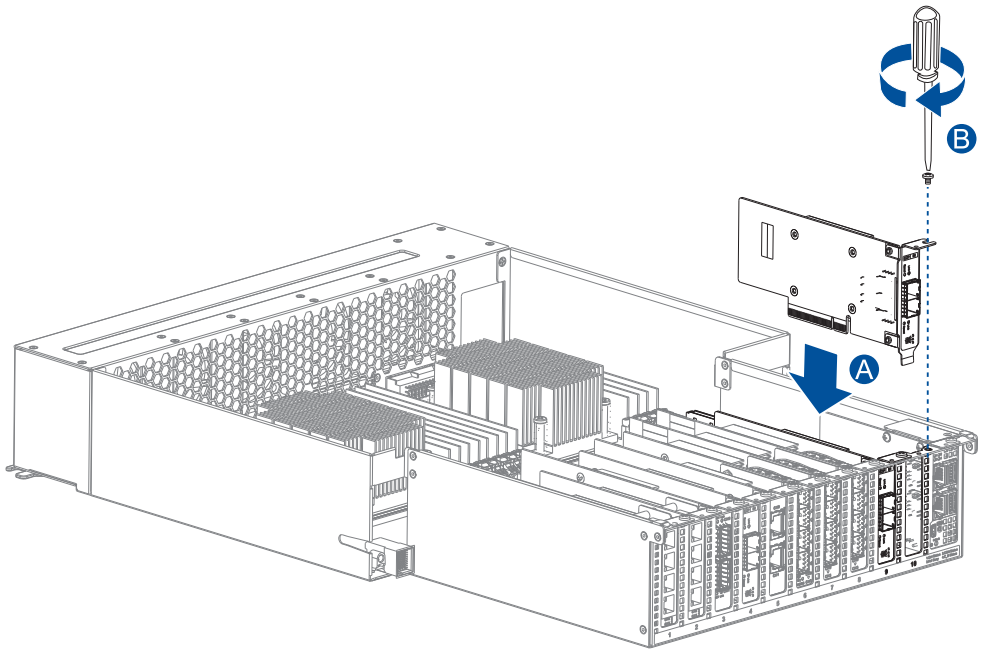
1. Shut down your system, unplug the power cords and cables, then remove the controller. Wait for a minute for the remaining electric current to dissipate.

> **NOTE:** See section **4.1.2 Replacing the controller module** for details.

2. Remove screw that secures the host/expansion board to the controller (A), then carefully lift the host/expansion board (B).



3. Orient the new/replacement host/expansion board to the controller's host/expansion board slot (A), place it carefully, then secure it with the screw you removed in step 2 (B).



4. Insert the controller back to the enclosure.
5. Reconnect the cables and power cords, then turn on the system.

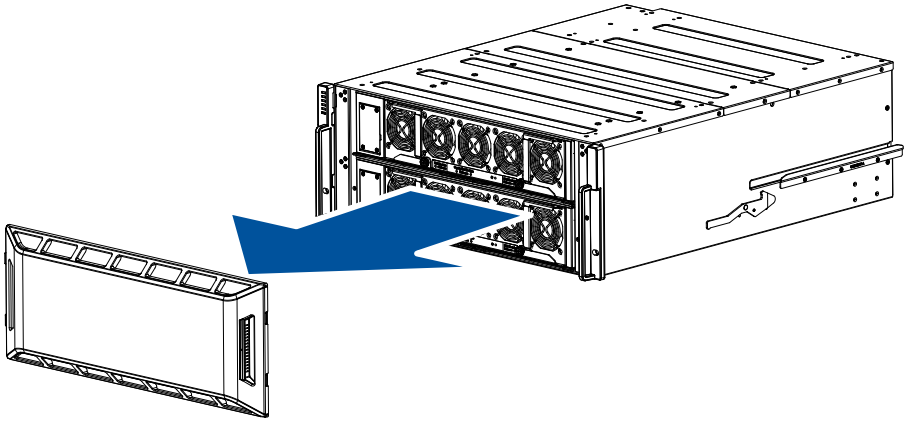
4.1.6 Replacing the cooling module

WARNING! Although the system can operate with a failed cooling module, it is not recommended to run the systems with a failed cooling module for long periods. You must replace the failed cooling module immediately for your system's proper ventilation.

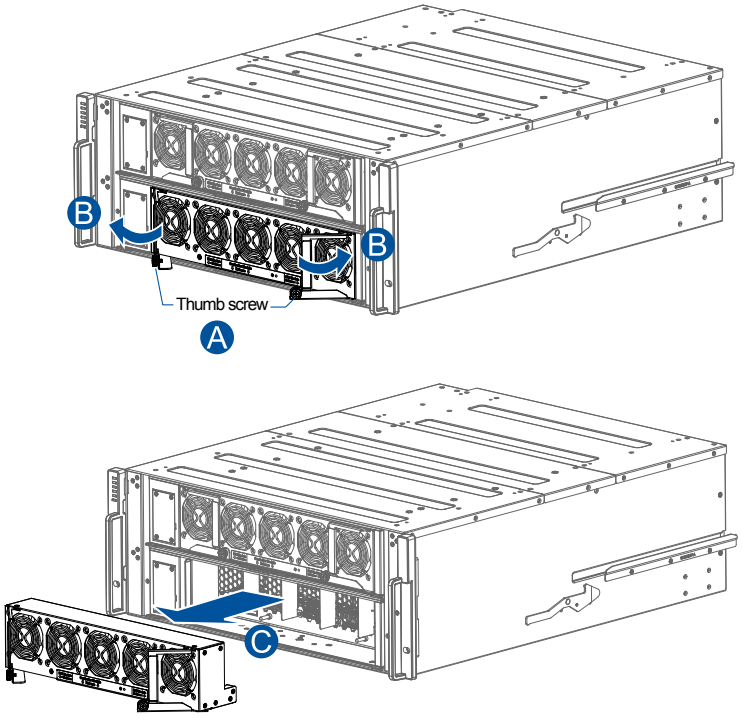
IMPORTANT! Only replace the cooling module when you have the replacement on hand. Contact your local vendor more details.

To replace the cooling module:

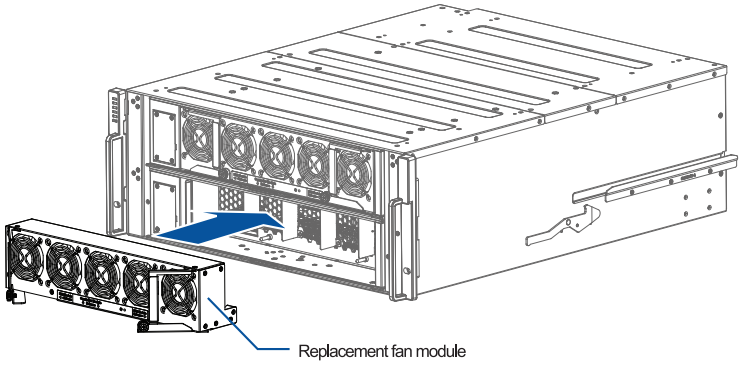
1. Shut down your system and disconnect the cables from the ports on the rear panel.
2. Remove the front cover from the enclosure.



3. Loosen the thumb screws of the cooling module that needs replacement (A), open both handles to the opposite sides (B), then pull to remove the cooling module from the enclosure (C).



4. Orient and align the replacement cooling module to the slot, then insert it to the enclosure.



5. Tighten the thumb screws to secure the newly-replaced cooling module to the enclosure.
6. Place the front cover back to the enclosure.

Appendices

A

Technical specification

Host board interface

Fibre/iSCSI hybrid-host storage systems	
Host interface	• 8 Gbps, 16 Gbps fibre host interface • 8 Gbps, 16 Gbps fibre + 2 onboard iSCSI
Drive interface/ channel	Supports 12, 16, 24 channels of 3 Gbps, 6 Gbps, or 12 Gbps SAS, SATA-II/ SATA-III, Near-line SAS series
SAS/iSCSI hybrid-host storage systems	
Host OS compatibility	Host OS independent
Host interface	3 Gbps, 6 Gbps, 12 Gbps multi-lane SAS
Host channels	Multiple SAS PHYs logically combined into 2 host channels per controller
Drive interface/ channel	Supports 12, 16, 24 channels of 3 Gbps, 6 Gbps, or 12 Gbps SAS, SATA-II/ SATA-III, Near-line SAS series
iSCSI-host storage systems	
Host OS compatibility	Host OS independent, iSCSI offload utilities and hardware
Host interface	RJ-45 Gigabit Ethernet/RJ-45 10 Gb Ethernet/10 Gb FCoE
Drive interface/ channel	Supports 12, 16, 24 channels of 3 Gbps, 6 Gbps, or 12 Gbps SAS, SATA-II/ SATA-III, Near-line SAS series
Expansion enclosure models	
SAS interface	8 SMP PHYs interfaced to 2 or 3 12 Gbps SAS ports
Drive interface/ channel	Supports up to 12, 16, 24, 60 channels of 3 Gbps, 6 Gbps, or 12 Gbps SAS, SATA-II/SATA-III, Near-line series

NOTE: The host board interface and specifications are subject to change without prior notice. For the latest specification and information, visit the official EonStor GSa website: https://www.infortrend.com/global/products/families/GSa/5000.

Certifications

Summary

Safety	UL 60950-1 second edition BSMI CNS 14336-1: 99 年版 CB IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013 EAC TP TC 004/2011, TP TC 020/2011
EMC	CE EN 55032:2012 +AC:2013 / EN61000-3-2:2014 EN 61000-3-3: 2013 / EN 55024:2010+A1:2015 BSMI (CNS 13438) FCC (FCC Part 15, subpart B)
Environment	IEC 60068-2 MIL-STD-810E/883E ISTA ASTM-D3332 IPC-TM-650
Others	ISO7779/3744 RoHS Microsoft WHQL-Windows Server 2003

User warning

This is Class A Information Technology product which may cause radio frequency interference when used in a residential area, in which case the user will be required to take certain appropriate measures/ troubleshooting.

警告使用者

這是甲類資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當對策

사 용 자 안 내 문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

Declaration of the presence condition of the restricted substance marking

設備名稱：儲存器 **Equipment name**	型號（型式）：GSa 5000 Series **Type designation (Type) GSa 5000 Series**					
	限用物質及其化學符號 **Restricted substances and its chemical symbols**					
單元 **Unit**	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr+6)	多溴聯苯 brominated biphenyls (PBB)	多溴二苯醚 brominated diphenyl ethers (PBDE)
外殼 Case	○	○	○	○	○	○
電路板 PCB assembly	-	○	○	○	○	○
電源供應器 Power supply	-	○	○	○	○	○
硬碟 Hard disk	-	○	○	○	○	○
電源線 Power cable	○	○	○	○	○	○
風扇 Fan	○	○	○	○	○	○

備考1.〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note 1: “Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2.〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note 2: “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3.〝－〞係指該項限用物質為排除項目。

Note 3: The “-” indicates that the restricted substance corresponds to the exemption.

Contact information

Infortrend Technology, Inc. (HQ Taiwan)

Address:	8F, No. 102, Section 3, Jhongshan Road, Jhonghe District, New Taipei City 23544, Taiwan
Telephone:	+886-2-2226-0126
Fax:	+886-2-2226-0020
Email:	sales.tw@infortrend.com
Website:	https://www.infortrend.com/tw/Home
Support:	http://support.infortrend.com/Account/Logon

Infortrend Japan, Inc.

Address:	6F Okayasu Bldg., 1-7-14 Shibaura, Minato-Ku, Tokyo, 105-0023 Japan
Telephone:	+81-3-5730-6551
Fax:	+81-3-5730-6552
Email:	sales.jp@infortrend.com
Website:	https://www.infortrend.com/jp/Home
Support:	http://support.infortrend.com/Account/Logon

Infortrend Corporation (Americas)

Address:	435 Lakeside Dr. Sunnyvale, CA. 94085, USA
Telephone:	+1-408-988-5088
Fax:	+1-408-988-6288
Email:	sales.us@infortrend.com
Website:	https://www.infortrend.com/us/Home
Support:	http://support.infortrend.com/Account/Logon

Infortrend Technology, Ltd. (Beijing)

Address:	Room 1804, Block C, Ocean International Center, Dis. Chaoyang, Beijing, China 北京市朝阳区东四环中路远洋国际中心C座1804室
Telephone:	+86-10-6310-6168
Fax:	+86-10-59648252
Email:	sales.cn@infortrend.com
Website:	https://www.infortrend.com/cn/Home
Support:	http://support.infortrend.com/Account/Logon

Infortrend Technology Office (Shanghai)

Address:	Room 2306, 23/F, No. 88, Caoxi North Road, Xuhui District, Shanghai, China 上海市徐汇区漕溪北路88号23层2306室
Telephone:	+86-10-63106168, +86-10-85866916, +86-10-85861801
Fax:	+86-10-59648252
Email:	sales.cn@infortrend.com
Website:	https://www.infortrend.com/cn/Home
Support:	http://support.infortrend.com/Account/Logon

Infortrend Technology Office (Southwest China)

Address: Room 1006, Building 2, Shangding International Building, No. 27 Renmin South Road, Wuhou District, ChengduChina
成都市武侯区人民南路27号商鼎国际大厦2号楼1006室
Telephone: +86-10-63106168, +86-10-85866916, +86-10-85861801
Fax: +86-10-59648252
Email: sales.cn@infortrend.com
Website: https://www.infortrend.com/cn/Home
Support: http://support.infortrend.com/Account/Logon

Infortrend Europe, Ltd. (EMEA)

Address: 57 Tempus Business Centre, Kingsclere Road, Basingstoke RG21 6XG UK
Telephone: +44-1256-305-220
Fax: +44-1256-305-221
Email: sales.es@infortrend.com, cs.eu@infortrend.com
Website: https://www.infortrend.com/uk/Home
Support: http://support.infortrend.com/Account/Logon

Infortrend worldwide sales offices

Spain and Portugal sales offices

Email: sales.es@infortrend.com, cs.eu@infortrend.com
Website: https://www.infortrend.com/es/Home
Support: http://support.infortrend.com/Account/Logon

Czech Republic sales office

Email: sales.cz@infortrend.com, cs.eu@infortrend.com
Website: https://www.infortrend.com/cz/Home
Support: http://support.infortrend.com/Account/Logon

France sales office

Email: sales.fr@infortrend.com, cs.eu@infortrend.com
Website: https://www.infortrend.com/fr/Home
Support: http://support.infortrend.com/Account/Logon

Italy sales office

Email: sales.it@infortrend.com, cs.eu@infortrend.com
Website: https://www.infortrend.com/it/Home
Support: http://support.infortrend.com/Account/Logon

Germany/Deutschland GmbH sales office

Email: sales.de@infortrend.com, cs.eu@infortrend.com
Website: https://www.infortrend.com/de/Home
Support: http://support.infortrend.com/Account/Logon

Poland sales office

Email: sales.pl@infortrend.com, cs.eu@infortrend.com
Website: https://www.infortrend.com/pl/Home
Support: http://support.infortrend.com/Account/Logon

Middle East sales offices

Email: sales.meat@infortrend.com
Website: https://www.infortrend.com/ae/Home
Support: http://support.infortrend.com/Account/Logon

India sales office

Email: sales.in@infortrend.com
Website: https://www.infortrend.com/in/Home
Support: http://support.infortrend.com/Account/Logon

Oceana sales office

Email: sales.aunz@infortrend.com
Website: https://www.infortrend.com/au/Home
Support: http://support.infortrend.com/Account/Logon