PAC Storage PS/GSe U.2 Series Hardware Manual

Version 1. 9 (April 2024)

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User Warning

UL Caution, Safety, and Warning Markings

Safety Precautions

Read these instructions carefully before you install, operate, or transport the PAC Storage 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 35°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 not 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 dean 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 doth 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.
- If there is any removal/insertion/change of type of a host board, the system will reset to default system and NAS settings to prevent previous settings from creating unexpected behavior with the new hardware change. Therefore, please export the NVRAM before making any changes.

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 PAC Storage 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.

Rackmount Safety Instructions

The storage enclosure is intended to be rack-mounted. Following concerns should be heeded when mounting the enclosure into a rack cabinet:

- An enclosure without disk drives can weigh over 30 kilograms. Two (2) people are required to install or relocate the subsystem. Drives should be removed from the endosure before moving the subsystem.
- The enclosure is to be installed for operation in an environment with maximum ambient temperature (Tma) below 35°C.
- Installation of the enclosure in a rack should be such that the amount of air flow required for safe operation of the enclosure is not compromised.

- The openings on the enclosure are for air circulation to protect it from overheating. DO NOT cover or obstruct the openings.
- Carefully mount the enclosure into the rack in such a manner that the enclosure will not be hazardous due to uneven mechanical loading.
- Consideration should be given to the connection of the enclosure to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Proper grounding, over-current protection, and stability features should be provided with the rack cabinet into which the system is mounted.
- Maintain reliable earthing of a rackmounted enclosure. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

About this Manual

The manual introduces hardware components of the PS/PSe U.2 series storage systems and expansion enclosures. It also describes how to install, monitor, and maintain them.

- For non-serviceable components, please contact us at our support site.
- For information about the web-based software EonOne, consult the **EonOne Software User Manual** on our official website (at **Support> Technical Support> Unified Storage> Downloads).**

Revision History

Version	Date	Description
1.0	September 2021	Initial release
1.1	February 2022	- Added a section on scale-out cluster - Updated safety precautions and caution messages connection
1.2	April 2022	-Added new model information: PS 4024U -Added new host board information: 2 x 100GbE ports (QSFP28) -Updated instructions on replacing a host board -Updated screw hole locations on the drive tray of 2U 24-bay systems -Removed information on single-controller systems -Minor corrections and content updates
1.3	August 2022	-Added new model information: PS 3024UT -Added new host board information: 1 x 100GbE port (QSFP28) -Added expansion/host board information: 2 x 12Gb/s SAS ports -Added instructions on connecting the storage system to EonOne -Updated memory specifications -Updated rear panel images of PS 4024U -Corrected the baud rate for the serial console port of 2U 25-bay systems -Removed the section on replacing the FBM (non-FRU component) -Marked 10GbE port (RJ-45) host board as discontinued (EOL) -Minor corrections and content updates
1.4	October 2022	-Renamed manual title to include PSe U.2 series -Added new model information: PSe 2024U/3024U/3024UT/4024U -Added instructions on installing the optional CBM on the PSe U.2 series -Added DIMM numbering information for 2U 24-bay models in **4.4 Replacing a Memory Module** -Added channel type rules for 25GbE x 2, 40GbE x 2, and 100 GbE x 2 host boards where both ports on the same board must be set to the same channel type in **2.4 Installing Host Boards / Expansion Boards** -Added the image of connecting GS 2024U/3024U to expansion enclosures using SAS expansion boards in **2.6.2 Expansion Connections** -Enhanced front panel LED descriptions and corresponding actions in **3.2.1 Front Panel LEDs** -Updated rear panel images of PS 2024U/3024U (remove onboard SAS expansion ports) -Updated the wording and the image of scale-out connection in **2.6.5 Scale-out Cluster Connection** -Re-structured the LED sub-sections in **3.2 LEDs** -Listed LED sub-section headings in the table of contents to enhance search experience -Minor corrections and content updates
1.5	January 2023	-Added new model information: EU version of PS/PSe 2024U/3024U/3024UT/4024U with new PSUs and fan modules -Marked 40GbE port (QSFP+) host board as discontinued (EOL) -Re-structured **Chapter 4 System Maintenance** -Minor corrections and content updates

Version	Date	Description
1.6	April 2023	-Added compatible SSD part numbers for dual-controller models -Added compatible controller part numbers for dual-controller models - Added a picture to illustrate the 7-segment LED in the instructions on replacing a memory module / host board -Minor corrections and content updates
1.7	June 2023	-Added new model information: PS 3048UT/4048U -Added new JBOD information: JB 3090 -Minor corrections and content updates
1.8	August 2023	-Specify that dual-controller models have two management ports in **1.4.1 Controller Module Interfaces** -Updated user warning in the appendices
1.9	April 2024	-Added new model information: PS 5024U -Added new 25GbE x 2 and 25GbE x 4 host board information -Added FC 32Gb/s x 4 host board LED descriptions -Added OCP card host board LED descriptions -Re-structured Chapter 2 -Removed CD information -Updated the image of installing a host board to PS/PSe 3024UT/4024U -Minor corrections and content updates

Hardware Specifications

Note: Product specifications are subject to change without notice. Please refer to our official website for the latest information.

Form Factor	**PS U.2 Series** 2U 24-bay: PS 2024U/3024U/3024UT/4024U/5024UE 2U 25-bay: PS 3025U/4025U 4U 48-bay: PS 3048UT/4048U **PSe U.2 Series** 2U 24-bay: PSe 2024U/3024U/3024UT/4024U
CPU	PS/PSe 2024U: Intel® Xeon® D-1602 2-Core PS/PSe 3024U: Intel® Xeon® D-1627 4-Core PS/PSe 3024UT: Intel® Xeon® D-1715TER 4-Core PS/PSe 4024U: Intel® Xeon® D-1726 6-Core PS 5024UE: Intel: Xeon® Scalable 12-Core PS 3025U: Intel® Xeon® D-2123 4-Core PS 4025U: Intel® Xeon D-2143IT 8-Core PS 3048UT: Intel® Xeon D-1715TER 4-Core PS 4048U: Intel® Xeon D-1726 6-Core
Controller	PS U.2 series: Dual-redundant controllers PSe U.2 series: Single controller
Management Port (per Controller)	1 x 1GbE port (RJ-45)
Onboard iSCSI Ports (per Controller)	PS/PSe 3024U: 2 x 10GbE ports (SFP+ PS/PSe 3024UT: 2 x 25GbE ports (SFP28) PS 3025U/4025U: 4 x 10GbE ports (SFP+) PS 3025U/4025U: 2 x 12Gb/s SAS
Onboard SAS Expansion Ports (per Controller)	Super capacitor + flash backup module (FBM) PS series: default
Cache Backup Technology	PSe series: optional **PS/PSe 2024U/3024U** Default DDR4 8GB (2 x 4GB), up to 64GB (2 x 32GB)
Cache Memory (per Controller)	**PS 3024UT/4024U/3048UT/4048U** Default DDR4 24GB (3 x 8GB), up to 192GB (3 x 64GB) **PSe 3024UT/4024U** Default DDR4 12GB (3 x 4GB), up to 192GB (3 x 64GB) **PS 3025U/4025U** Default DDR4 8GB (2 x 4GB), up to 256GB (4 x 64GB) **PS 5024UE** Default DDR5 64GB (4 x16GB), up to 512GB (8 x 64GB) **Note:** For more information, refer to the Host Board and Memory guide on PAC Storage's official website.

(See next page)

Host Board Options	**PS/PSe 2024U/3024U** 16Gb/s FC x 4 32Gb/s FC x 2 32Gb/s FC x 4 10GbE (SFP+) x 2 25GbE (SFP28) x 2 25GbE (SFP28) x 4 12Gb/s SAS x 2 **PS/PSe 3024UT/4024U & PS 3048UT/4048U** 16Gb/s FC x 4 32Gb/s FC x 2 32Gb/s FC x 4 10GbE (SFP+) x 2 25GbE (SFP28) x 2 25GbE (SFP28) x 4 100GbE (QSFP28) x 1, RDMA 100GbE (QSFP28) x 2, RDMA 12Gb/s SAS x 2 **PS 5024UE** 32Gb/s FC x 4 25GbE (SFP28) x 2 25GbE (SFP28) x 4 100GbE (QSFP28) x 1, RDMA 100GbE (QSFP28) x 2, RDMA 12Gb/s SAS x 2 **Note:** 1. One 100GbE x 2 host board delivers a maximum throughput of 100Gb/s. 2. For complete information, refer to the Host Board and Memory guide on PAC Storage's official website.
Drive Interface	U.2 NVMe
Supported Drives	2.5" U.2 SSD **Note:** For the latest information, refer to the Compatibility Guide (QVL) on PAC Storage's website.
Maximum Number of Drives	**Via expansion enclosures:** 896
Compatible Expansion Enclosures (JBODs)	JB 3012A, JB 3016A, JB 3024BA, JB 3025BA, JB 3060L, JB 3090 **Note:** 1. For more information regarding expansion enclosure models, refer to the datasheet on our official website. 2. For more information regarding storage expansion via expansion enclosures, refer to the Expansion Guide on PAC Storage's official website.
Green Design	- 80 PLUS-certified power supplies delivering more than 80% energy efficiency - Intelligent multi-level drive spin-down

(See next page)

Power (Redundant and Hot-swappable Power Supplies)	**PS/GSe 3000/4000 series** **2U 24-bay: 2 x 530W (80 PLUS Bronze)** 100-127VAC / 50-60Hz/ 10A 200-240VAC / 50-60Hz/ 5A **2U 24-bay (EU version): 2 x 800W (80 PLUS Titanium)** 100-127VAC / 50-60Hz/ 10A 200-240VAC / 50-60Hz/ 5A 1600W x 2 (80 PLUS Titanium) **2U 25-bay: 2 x 800W (80 PLUS Platinum)** 100-127VAC / 50-60 Hz/ 10A 200-240VAC / 50-60 Hz/ 5A **4U 48-bay: 2 x 1300 W (80 PLUS Titanium)** 100-127VAC / 50-60Hz/ 12A 200-240VAC / 50-60Hz/ 8.5A
	PS S000U series **2U 24-bay: 2 x 1600W (80 PLUS Titanium)** 100-127VAC / 50-60Hz/ 12A 200-240VAC / 50-60Hz/ 10A
Environment	**Temperature** - Operating: 0°C to 40°C without CBM, 0°C to 35°C with CBM, for 2U 24-bay and 4U 48-bay; 0°C to 35°C for 2U 25-bay - Non-operating: -40°C to 60°C **Altitude** - Operating: sea level to 3,048 m (10,000 ft.) - Non-operating: sea level to 12,192 m (40,000 ft.) **Relative humidity** 5% to 95% non-condensing, operating and non-operating
Regulatory	Safety: UL, BSMI, CB Electromagnetic compatibility: CE, BSMI, FCC
Dimensions (W x H x D)	PS/PSe 2024U/3024U: 449 x 88 x 500 mm PS/PSe 3024UT/4024U: 449 x 88 x 530 mm PS 3025U/4025U: 449 x 88 x 589.6 mm PS 3048UT/4048U: 449 x 176 x 530 mm PS 5024UE: 449 x 88 x 830 mm **NOTE:** The dimensions do not include chassis ears/protrusions.
Package Dimensions (W x D x D)	PS/PSe 2024U/3024U: 780 x 338 x 588 mm PS/PSe 3024UT/4024U: 780 x 338 x 588 mm PS 3025U/4025U: 794 x 369 x 596 mm PS 3048UT/4048U: 780 mm x 423 x 588 mm PS 5024UT: 594 x 235 x 1106 mm

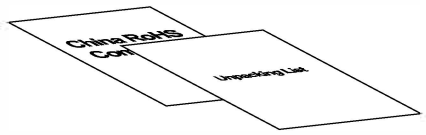
Package Contents

Check the **Unpacking List** for the complete list of contents and the exact quantity of the components of your system.

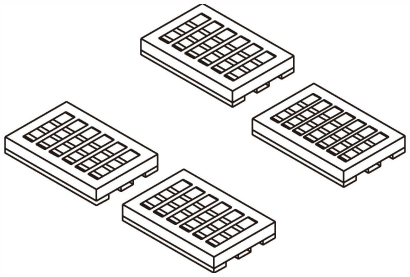
NOTE:

- All images in this manual are for illustration purposes only and may not be an accurate depiction.
- The contents and quantity may vary depending on the system model and order requests.

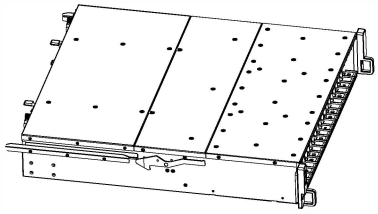
System Package



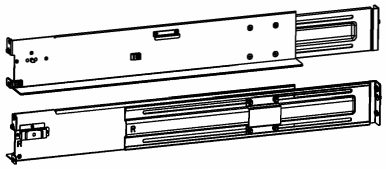
Unpacking list and China RoHS compliance documentation



Tray EPE

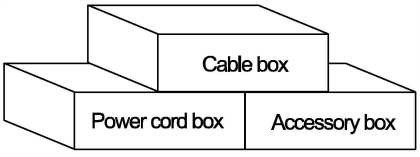


Enclosure chassis



Rackmount kit

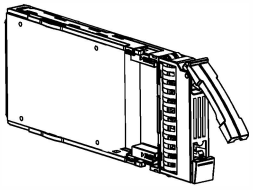
Host board box (optional)



Power cord, cable, and accessory boxes

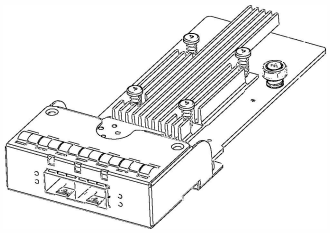
Tray EPE Content

2.5" drive tray
for 2U 24-bay and 4U 48-bay models

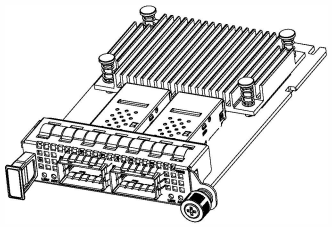


2.5" screwless drive tray
for 2U 25-bay models

Host Board Box (Optional)

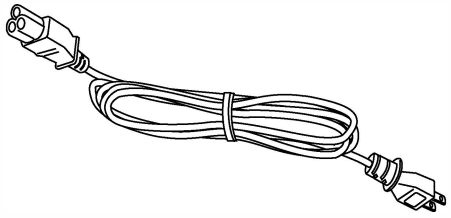


Host board
for 2000U/3000U/4000U series

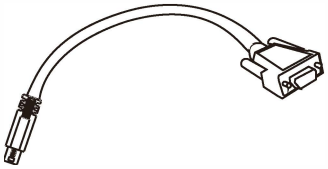


Host board (OCP)
for 5000U series

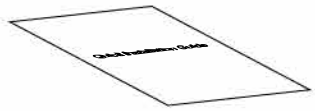
Power Cord, Cable, and Accessory Boxes



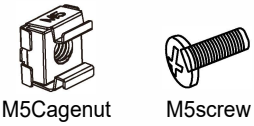
Power cord



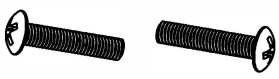
RS-232C serial cable(mini USB to D89)



Quick Installation Guide

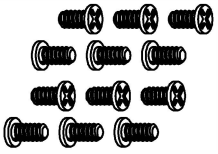


M5Cagenut M5screw



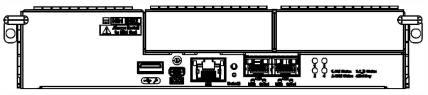
No. 10-32smm M6screw

Screws and nuts for mounting enclosure

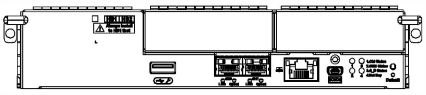


2.5" drive tray screws
for 2U 24-bay and 4U 48-bay models

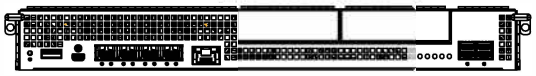
Pre-installed Components in the Enclosure Chassis



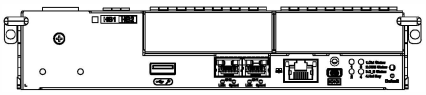
Controller module (including DIMM) for PS/PSe 2024U/3024U



Controller module (including DIMM) for PS/PSe 3024UT/4024U



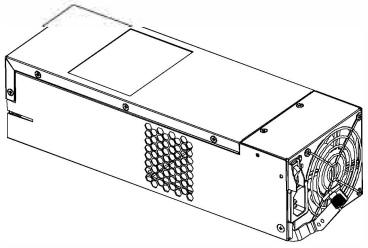
Controller module (including DIMM) for PS 3025U/4025U



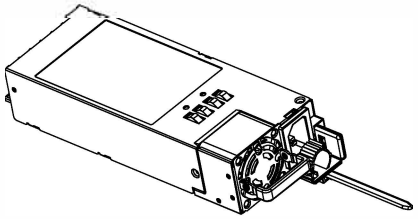
Controller module (including DIMM) for PS 3048UT/4048U

Controller module (including DIMM) for PS 5024UE

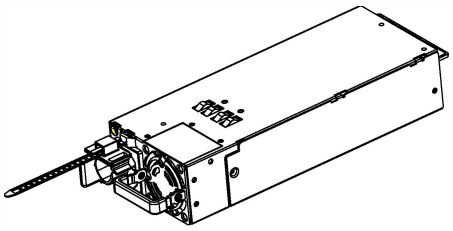
NOTE: Onboard host ports are present on selected models.



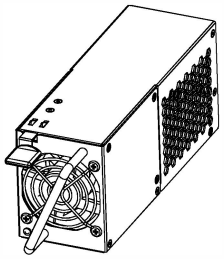
PSU/cooling module for 2U 24-bay models (excl. PS 5024UE)



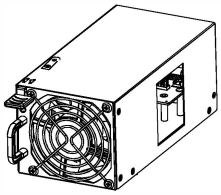
PSU/cooling module for 2U 24-bay models (EU version), PS 5024UE, and 4U 48-bay models



PSU/cooling module for 2U 25-bay models

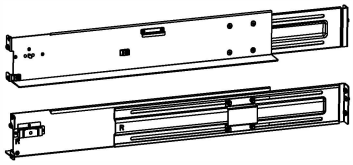


Fan module for 2U 24-bay models (EU version, excl. PS 5024UE)



Fan module for 4U 48-bay models

Rackmount Kit



Slide rail kit

NOTE: See section **2.2. Installing the Rackmount Kit** for the exact package contents.

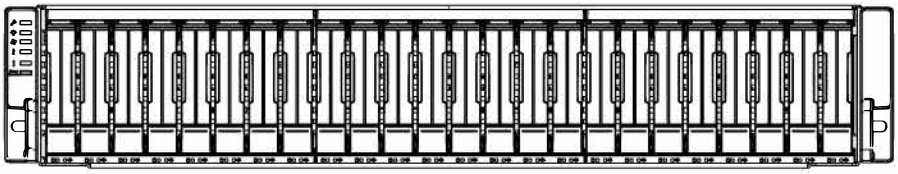
1 Product Introduction

This chapter introduces the hardware design of the PS/PSe U.2 series systems, including their features and supported components.

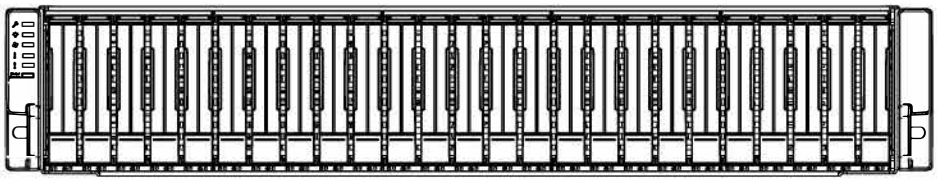
1.1 Overview

The PS/PSe U.2 series is designed to utilize 2.5-inch U.2 NVMe solid-state drives (SSDs). Storage capacity can be expanded by connecting expansion enclosures (also called JBODs) to the storage system or via scale-out expansion

2U Systems

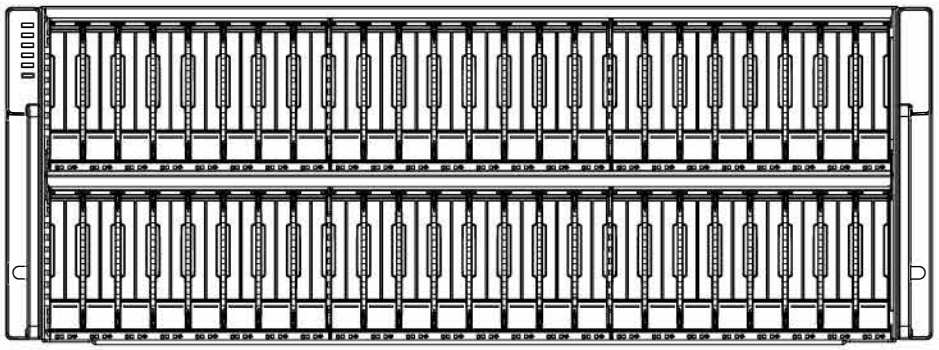


PS/PSe 2024U/3024U/3024UT/4024U
PS 5024UE



PS 3025U/4025U

4U Systems



PS 3048UT/4048U

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

Each system has one or two controllers, and each controller comes with pre-installed DIMM modules. The PS U.2 series also has a **CBM** (cache backup module), a module that has a **super capacitor** 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 super capacitor if power outage occurs. With the super capacitor's fast-charging feature, it can distribute a fair supply of power to the controller, so the controller can save cached data to the FBM immediately and permanently.

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.

NOTE: The CBM is an optional component on PSe U.2 series.

Power Supply Unit and Cooling Fan Module

There are two PSUs in the system. Each PSU is hot-swappable and is built with a fan to protect the system from overheating while providing constant power. Additional fan modules are also pre-installed on the new EU version of PS/PSe 2024U/3024U/3024UT/4024U as well as on PS 3048UT/4048U.

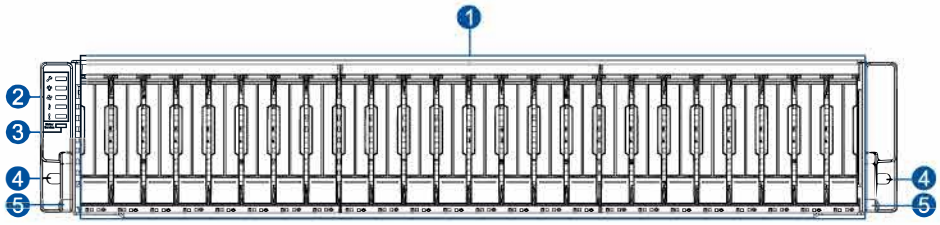
For PS 3025U/4025U/5024UE, there are also internal fans located at the center of the endosure, which ventilate the system and keep the operating temperatures under optimal condition.

The modular architecture of the system and easy accessibility to all major components provide you an easy maintenance.

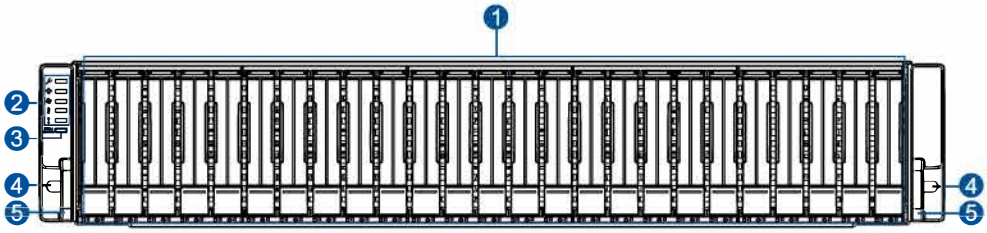
1.2 Chassis

This section describes the front and rear panels of the storage chassis. The chassis is designed to allow installation to the rack or a cabinet.

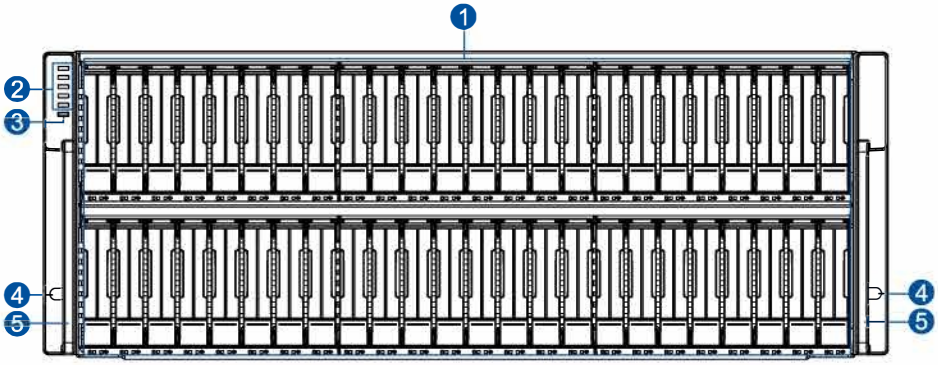
1.2.1 Front Panel



PS/PSe 2024U/3024U/3024UT/4024U
PS 5024UE



PS 3025U/4025U

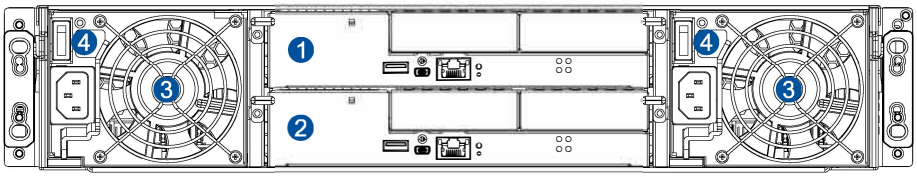


PS 3048UT/4048U

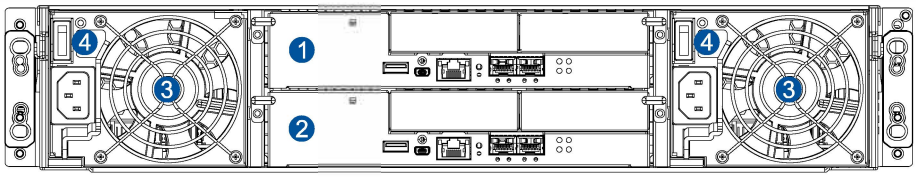
Number	Part	
1	Drive Trays	Each drive tray is hot-swappable and holds a 2.5-inch SSD.
2	LED Panel	LED panel has service, power, cooling module, temperature, and system fault LEDs.
3	Mute Button/ Service LED	This button mutes the alarm while the embedded Service LED notifies you that the system requires service.
4	Rackmount Holes	These holes secure the enclosure to the rackmount kit with the mounting screws.
5	Handles	These handles allow you to push/pull the enclosure to/from the cabinet installed in the rackmount system.

1.2.2 Rear Panel

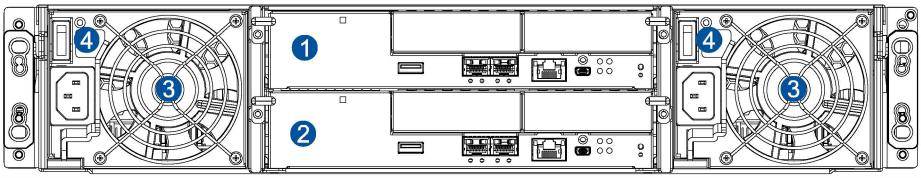
Dual-controller Systems



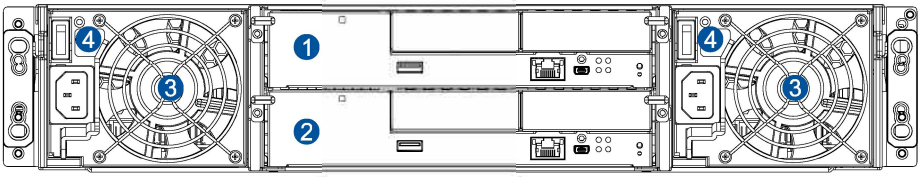
PS 2024UR



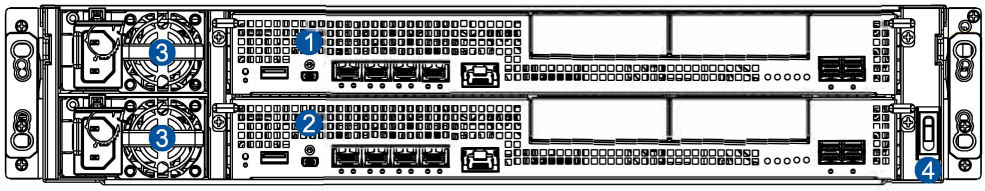
PS 3024UR



PS 3024URT



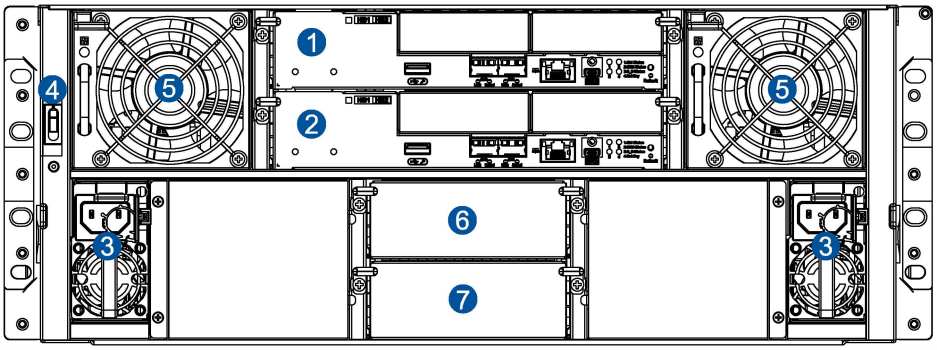
PS 4024UR



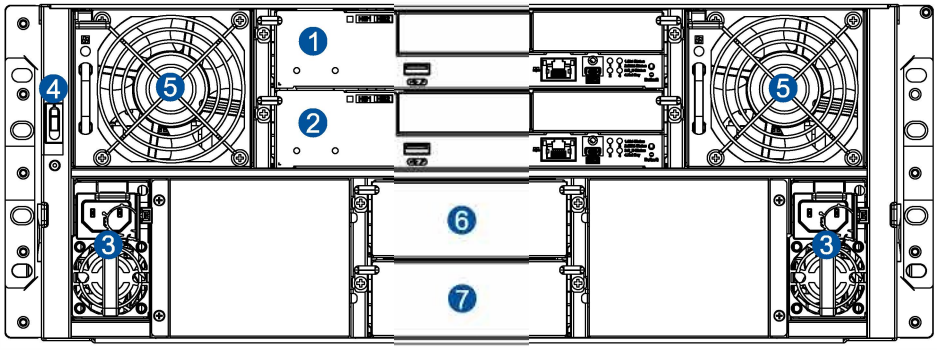
PS 3025UR/4025URT

NOTE:

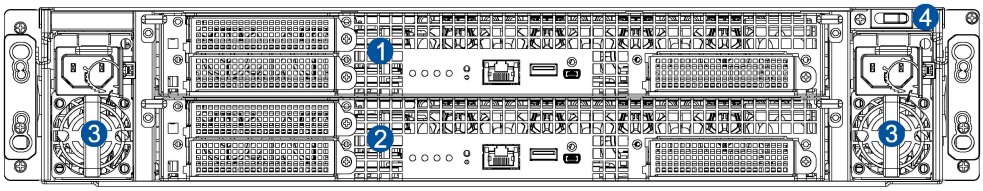
- Refer to the **Rear Component Description Table** for details.
- The new EU version of PS 2024U/3024U/3024UT/4024U comes with two PSU/cooling modules and two fan modules. Refer to **1.4.3 PSUs and Cooling Modules** and **2.6.3 Power Connection.** for details.



PS 3048URT



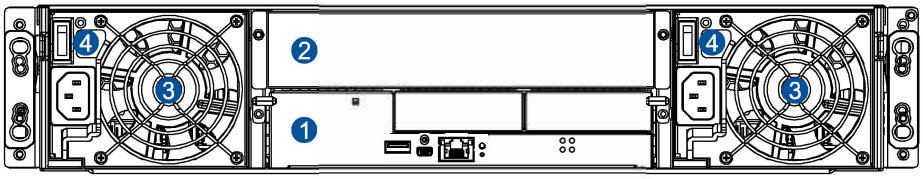
PS 4048UR



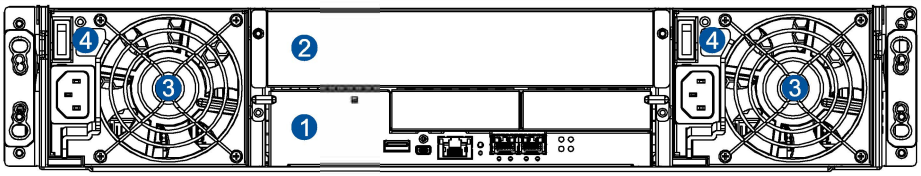
PS 5024URE

NOTE: Refer to the **Rear Component Description Table** for details.

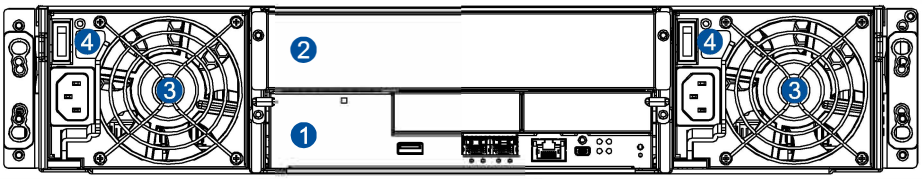
Single-controller Systems



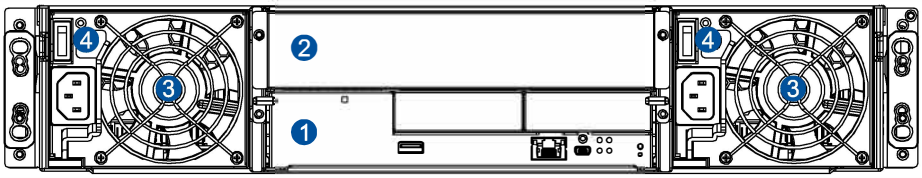
PSe 2024U



PSe 3024U



PSe 3024UT



PSe 4024U

NOTE: The new EU version of PSe 3024UT/4024U comes with two PSU/cooling modules and two fan modules. Refer to **1.4.3 PSUs and Cooling Modules** and **2.6.3 Power Connection.** for details.

Rear Component Description Table

Number	Part
1	Controller A See section **1.4.1 Controller Module Interfaces** for details.
2	Controller B or Dummy Cage
3	PSU/Cooling Module See section **1.4.3 PSUs and Cooling Modules** for details.
4	Power Button
5	Fan Module
6	Controller A 1/0 Module
7	Controller B 1/0 Module

WARNING!

- DO NOT remove the redundant components.
- DO NOT replace 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 board provides logic level signals and low voltage power paths. The thermal sensors and 1^2C devices are embedded to detect system temperatures and PSU operating status. This board is comprised of non user-serviceable components.

WARNING!

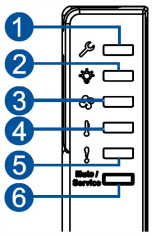
- Accessing the backplane board may lead to serious damage to the system.
- Physical contact with the backplane board may cause injuries and a fatal shock.

1.3 Front Panel Components

This section describes the front panel components of the system.

1.3.1 LEDs and Button Panel

The LEDs on the panels allow you to monitor your system's current status when turned on.



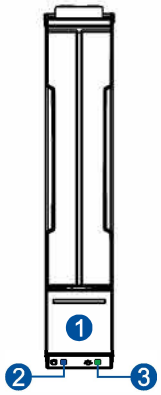
Number	Part	Description
1	Service LED	This LED indicates whether the system requires service or is currently being serviced (i.e. repaired).
2	Power LED	This LED provides the system's power status.
3	Cooling Module LED	This LED provides the cooling module's status.
4	Temperature LED	This LED provides 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 **3.2.1 Front Panel 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 Drive Tray and Drive LEDs

The components of the drive tray are designed to facilitate drive installation and drive status monitoring.



Number	Part	Description
1	Release Button	This button unlocks the drive tray from the drive tray slot.
2	Drive Busy LED	This LED provides the status of the drive.
3	Power Status LED	This LED provides the power status of the drive.

NOTE:

- Drive LEDs are located on the enclosure, not on the drive tray
- For more details regarding the LEDs and their respective status, see **3.2.2 Drive Tray LEDs.**

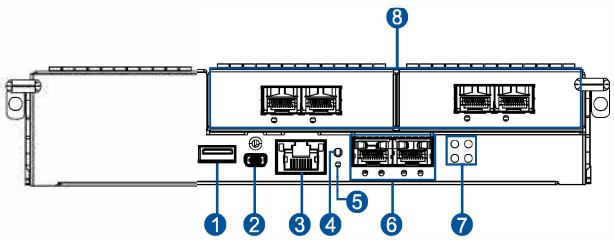
WARNING! Be careful not to drop or put heavy objects on the drive tray, as these may cause to bend or deform the drive tray's structure. If the drive tray is deformed, it may not fit into the system's drive bay.

1.4 Rear Panel Components

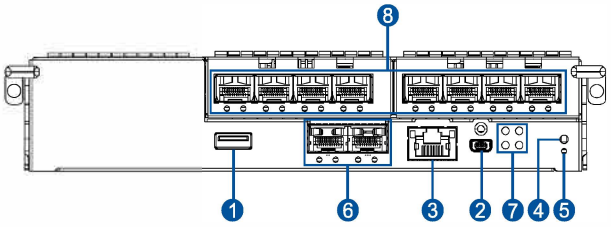
This section describes the rear panel components of the system.

1.4.1 Controller Module Interfaces

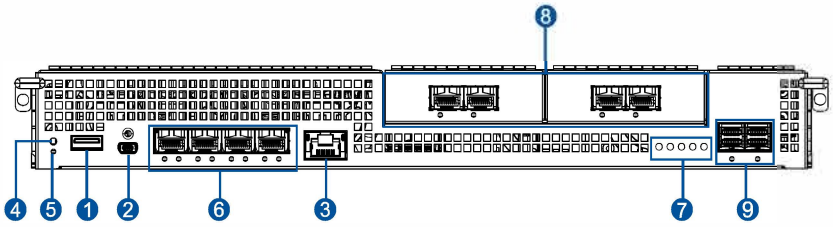
The 1/0 interfaces of the controller module allow you to connect to other devices and the LEDs allow you to monitor the status of your controller.



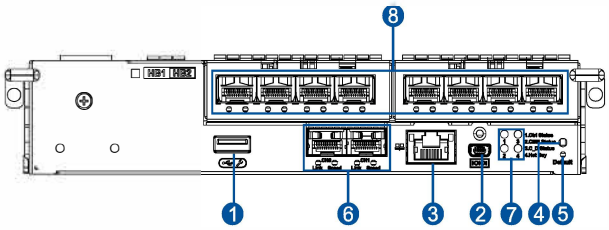
PS/PSe 2024U/3024U



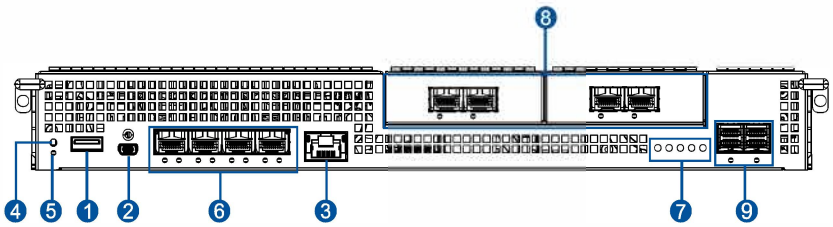
PS/PSe 3024UT/4024U



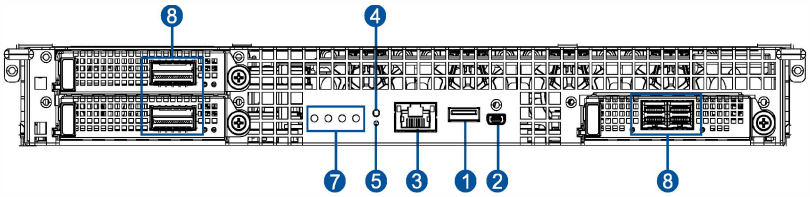
PS 3025U/4025U



PS 3048UT/4048U



PS 3025U/4025U



PS 5024UE

Number	Part	Number	Part
1	USB 3.0 Port (for Service Only)	6	Onboard Host Ports (Not on PS/PSe 2024U/4024U and PS 4048U)
2	Serial Port (Mini USB Connector)	7	Controller Status LEDs
3	Ethernet Management Port	8	Host Board Ports (Optional)
4	Restore Default Button	9	SAS Expansion Ports
5	Restore Default LED		

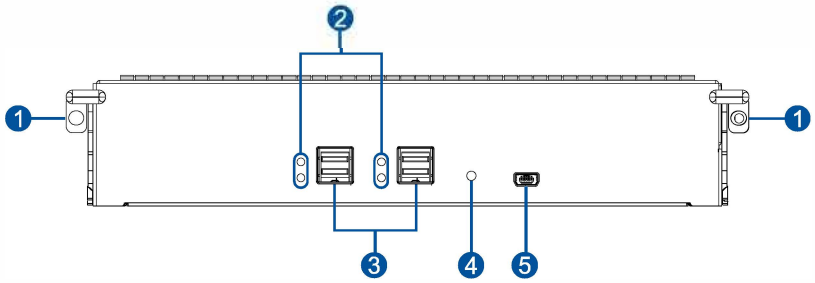
WARNING! The controller module is built of sensitive and non-replaceable components. You can only replace the controller module when you already have the replacement. Unnecessary tampering may damage the controller.

NOTE:

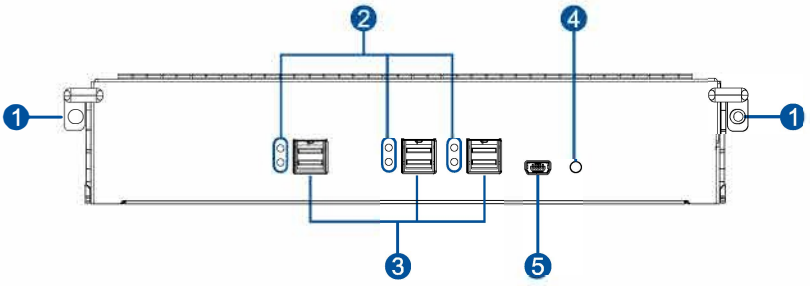
- An "R" model has two Ethernet management ports, one per controller.
- Host boards are add-on components.
- Whenever an onboard host port cable is not plugged in, insert a dust cap (bundled in the package) into the port.

1.4.2 Controller Module Interfaces of the JBOD Models

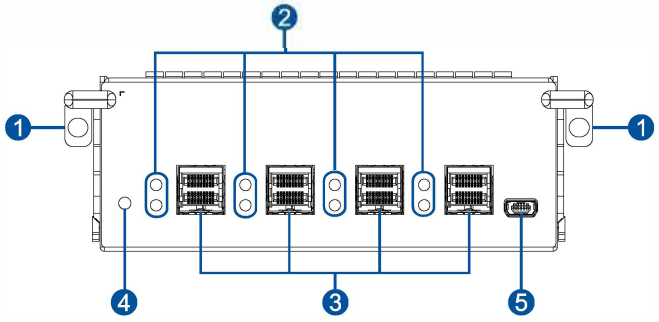
The expansion controller contains a circuit board within a metal canister, integrated with the hot-swap docking connectors at the backend. The SAS wide ports on the interface faceplate connect to a managing PS system or other expansion systems.



JB 3012A/3016A



JB 3060L



JB 3090

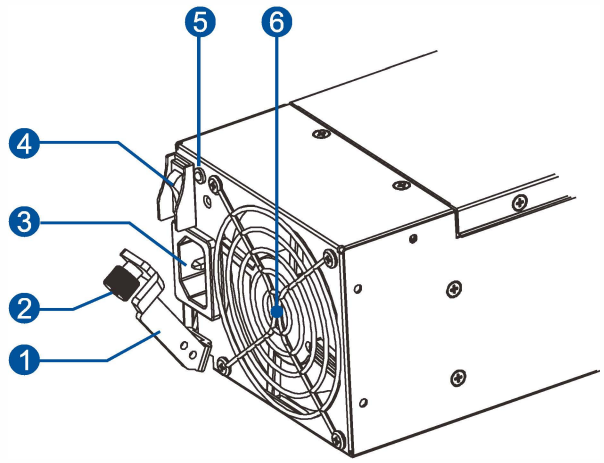
Number	Part
1	Extraction Levers/Screw Holes
2	SAS Expansion Port Status LEDs
3	SAS Expansion Ports
4	Controller Status LED
5	Mini USB Service Port

WARNING! You can only remove the controller when you already have the replacement. The JBOD (expansion) controller is built of sensitive components. Unnecessary tampering may damage the controller.

1.4.3 PSUs and Cooling Modules

The system has two redundant, hot-swappable PSUs, each built with a cooling fan that helps with the airflow to provide efficient ventilation.

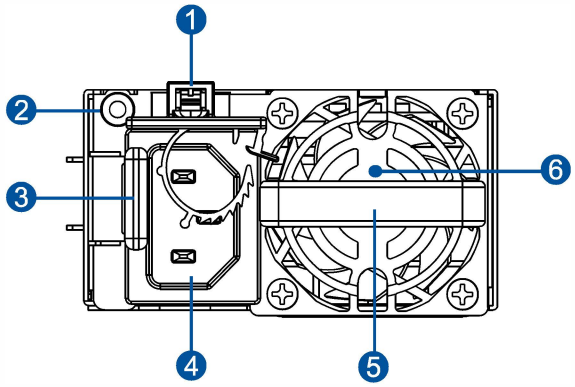
PSU/Cooling Module for PS/PSe 2024U/3024U/3024UT/4024U



Number	Part
1	Extraction Lever
2	Retention Screw
3	Power Socket
4	Power Switch
5	PSU Status LED
6	Fan

PSU/Cooling Module for PS/PSe 2024U/3024U/3024UT/4024U (EU Version)

PSU/Cooling Module for PS 3025U/4025U/3048UT/4048U/5024UE



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 a temperature sensor 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.

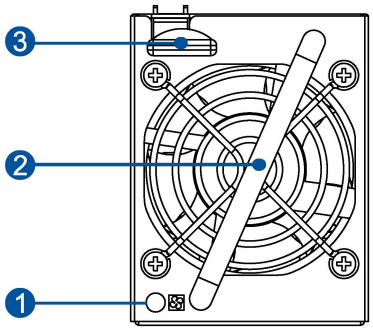
NOTE: There are two upper temperature thresholds: one for event notification and the other for triggering high fan rotation speed. You can change the preset values for event notification using the firmware-embedded configuration utility.

WARNING!

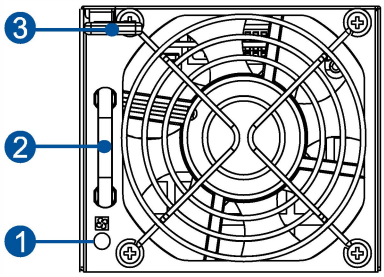
- If any of the LEDs lights up in amber, contact your local vendor to request for a replacement immediately.
- When removing the system PSU/cooling module, pull the module for about 3 inches and wait for at least 10 seconds before removing the whole module from the enclosure.
- DO NOT run the system with faulty PSU/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.

Fan Module



PS/PSe 2024U/3024U/3024UT/4024U
(EU version)

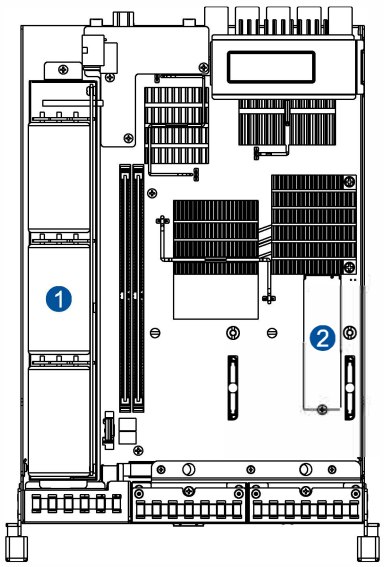


PS 3048UT/4048U

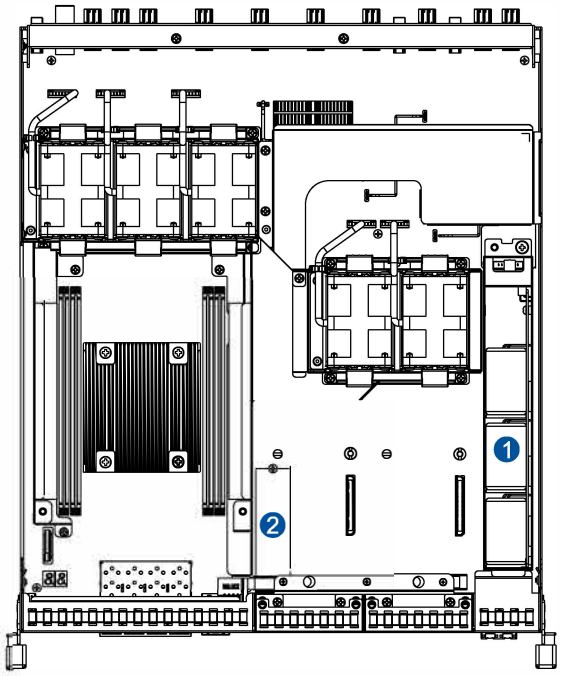
Number	Part
1	Fan module LED
2	Extraction Handle
3	Retention Lever

1.4.4 Super Capacitor and Flash Backup Module

The CBM (Cache Backup Module) is composed of a super capacitor and a flash backup module, installed in the controller. The super capacitor provides power, allowing the system to store cached data to the flash backup module permanently in case of power interruption or outage.

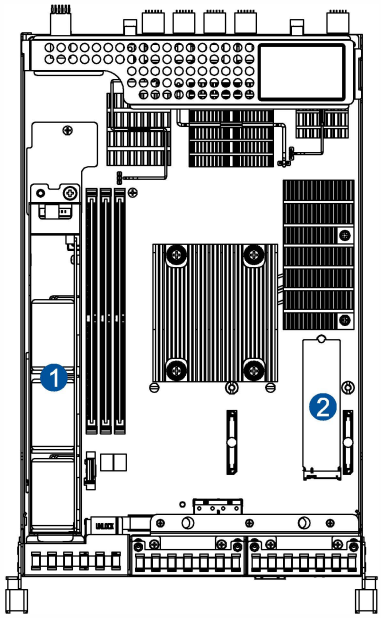


PS 2024U/3024U

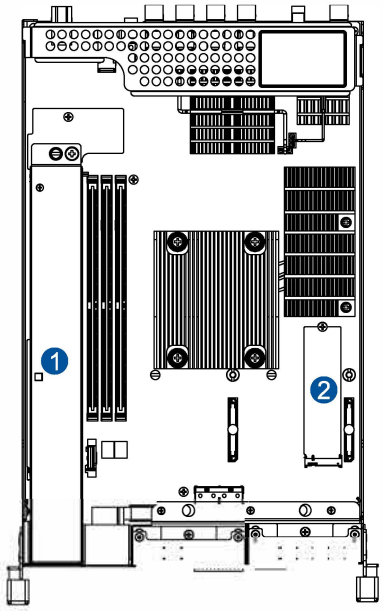


PS 3025U/4025U

PSe 2024U/3024U*

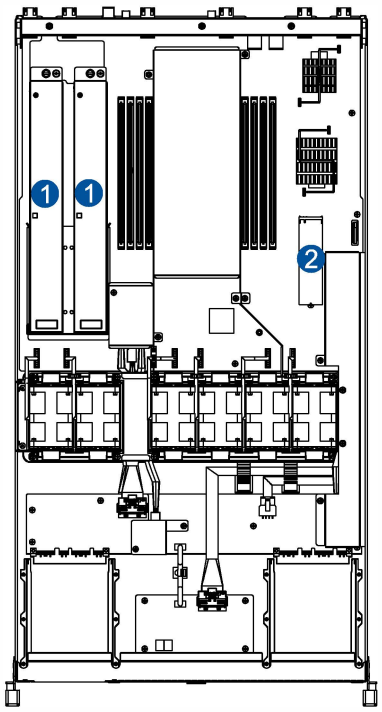


PS 3024UT/4024U



PS 3048UT/4048U

PSe 2024U/3024U*



PS 5024UE

Number	Part
1	Super Capacitor
2	Flash Backup Module

NOTE:

- The CBM is an optional component on PSe U.2 series. If you purchase the CBM as an upgrade component, refer to section **2.5 Installing the CBM for PSe U.2 Series** to install the CBM.
- If your system is installed with host boards, the flash backup module is located under one of the host boards.

The super capacitor is partially charged when shipped. When you turn ON the system, the super capacitor will charge to its full capacity, which will take a few minutes. You can check the status of the super capacitor in EonOne. To do so, follow the steps below:

1. Log in to EonOne. Go to **Main menu > Settings > Device > System.**
2. Select RAID from the scroll down list, and click **Enclosure view.**
3. Click on the controller module in the enclosure image that appears.
4. View the **CBM status** in the right-hand pane. The status should display **Normal** with a green check after the super capacitor has been fully charged.

NOTE: If the super capacitor is not charging, there may be a problem. Contact your system vendor immediately.

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 storage 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)
- 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 storage 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 **2.6.2 Expansion Connections.**

Cooling Module Speed Adjustment

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

Expansion Enclosure Status Monitoring

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

1^2C Bus

The detection circuitry and temperature sensors are interfaced via a non-user-serviceable 1^2C bus. When the expansion systems are connected to the storage system controllers, the component status is reported through in-band protocols over expansion links, which is managed by a proprietary enclosure service.

EonOne and Firmware

- **EonOne:** EonOne is a browser-based GUI (graphical user interface) software tool that you can install on a local or remote computer and access via the network. EonOne communicates with the storage system via connection of the existing host links or the Ethernet cable to the storage system's Ethernet management port.
- **Firmware (FW):** The preloaded firmware configures the system settings. You can view system settings from the FW menu via a terminal emulation program running on a management computer connected to the storage system's serial port.

> **NOTE:** For more details, refer to **2.6.4 Management Tool Connections.**

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 are exceeded. 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.

> **NOTE:** For the location of the mute button, refer to **1.3.1 LEDs and Button Panel.**

> **WARNING!** Failure to respond when an audible alarm goes 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:

- Controller module
- PSU/cooling module
- Fan module (PS/PSe 2024U/3024U/3024UT/4024U EU version and PS 3048UT/4048U)
- Drive

> **IMPORTANT!** Remove these hot-swappable components only 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 a failed component if there is a replacement on hand. For more information on replacing hot-swappable components, see **Chapter 4 System Maintenance.**

2 Hardware Installation

This chapter describes installing the modular components such as drives, 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.
- **Drives**
  NVMe SSDs should be purchased together with the storage appliance and must be available before the system installation.
- **Cables**
  All cables that connect the system to the hosts are purchased separately. Contact your vendor for the list of compatible cables.
- **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.
- **Rackmount equipment**
  The rack slide rails are optional accessories. If you need to install it, see section **2.2. Installing the Rackmount Kit**

IMPORTANT! Install the system first to the rack or cabinet before installing 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 path carefully planned. DO NOT bend or twist the cables as this may cause emission interference and accidental cable disconnection.

Installation Procedures

The installation procedures in this chapter 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.

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 included in your package.

Pre-installed Components

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

- Controllers
- LED front panels
- DIMM modules
- CBM, including a super capacitor and an FBM (default for PS U.2 series, optional for PSe U.2 series)
- PSUs with cooling modules
- Fan modules (PS/PSe 2024U/3024U/3024UT/4024UR EU version and PS 3048UT/4048U)
- Internal fans (PS 3025U/4025U/5024UE)

Components that Need User Installation

You must do the following installation:

- Assemble the system to a rack or a cabinet
- Install drives into drive trays and tray bays
- Install host boards or expansion boards
- Connect cables to hosts, expansion enclosures, power outlets, and management tools

User-provided Tools

Before assembling the rackmount kit, you must prepare the following tools:

- Phillips screwdriver (medium size)
- Flat blade screwdriver (small size)
- Anti-static wrist wrap
- RJ-45 LAN cables
- Host link cables

2.2. Installing the Rackmount Kit

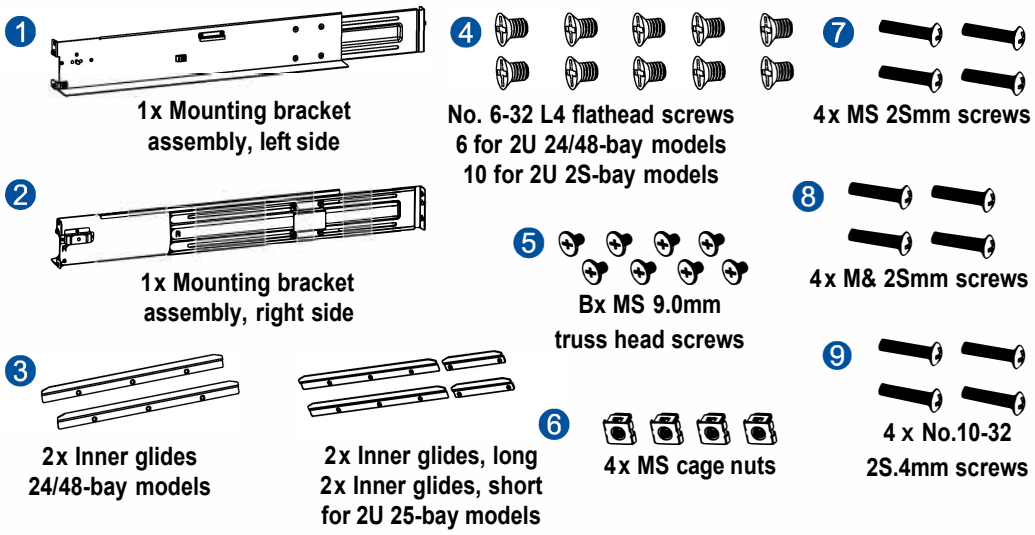
This section details the overview of the rackmount kit, its assembly, and installation with the storage system.

IMPORTANT!

- Refer to sections **ESD Precautions** and **Rackmount Safety Instructions** for safety information.
- Please contact our technical support team if you need further help in installing your system/endosure to the rack.

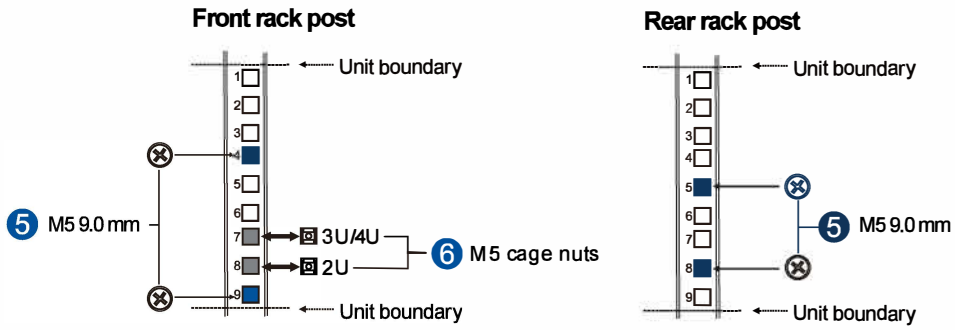
Checking the Slide Rail Kit Contents

Check your slide rail kit for the following contents.

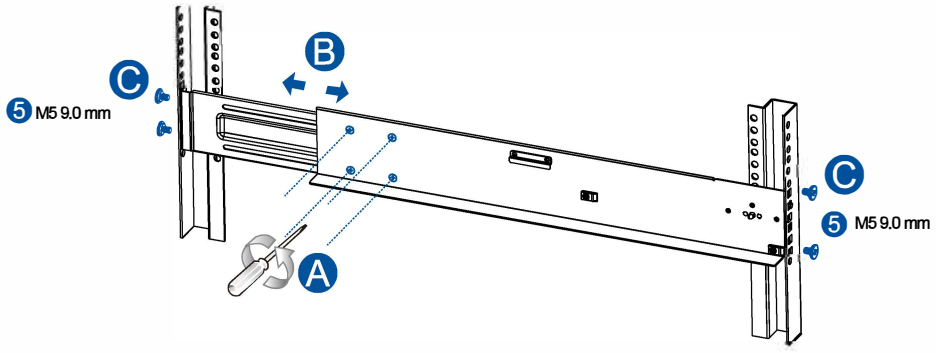


Assembling the Slide Rail Kit

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

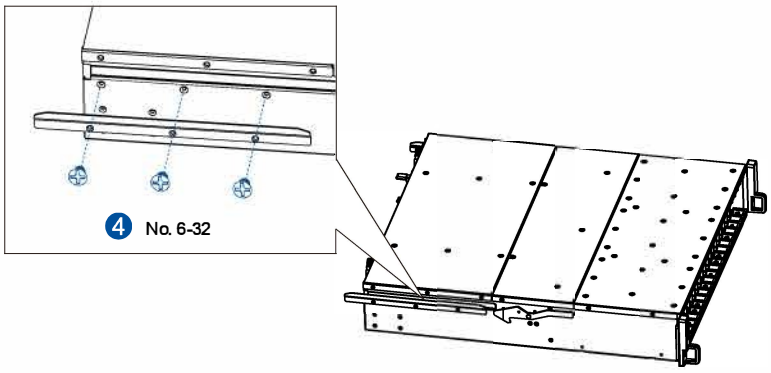


2. Loosen the four screws on the slide rail (A), adjust the length (8), and then secure the slide rails to the front and rear rack posts using the M5 9.0mm screws (C). Tighten the four screws on the slide rail to fix the length.

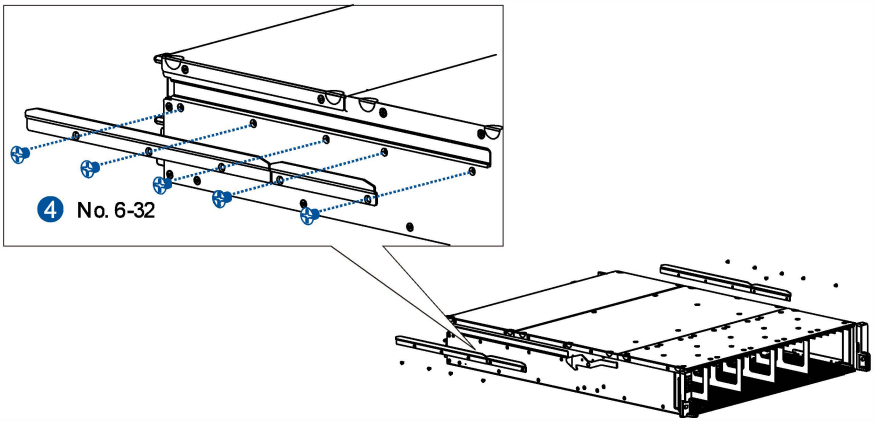


3. Attach the inner glides to both sides of the enclosure using the no. 6-32 flathead screws.

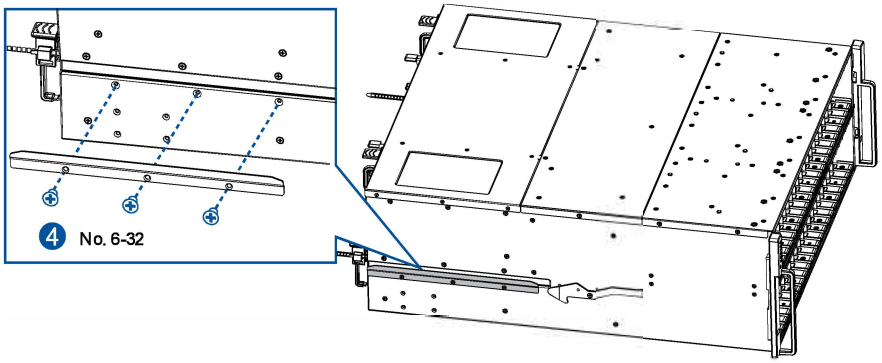
- **2U 24-bay System**



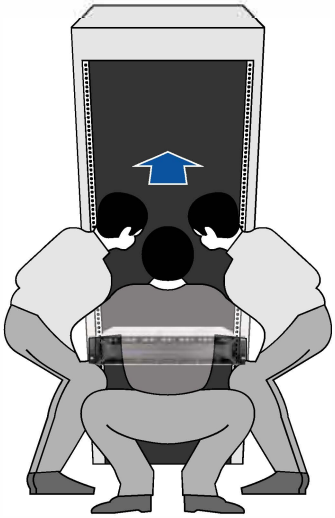
- **2U 25-bay System**



- **4U 48-bay System**



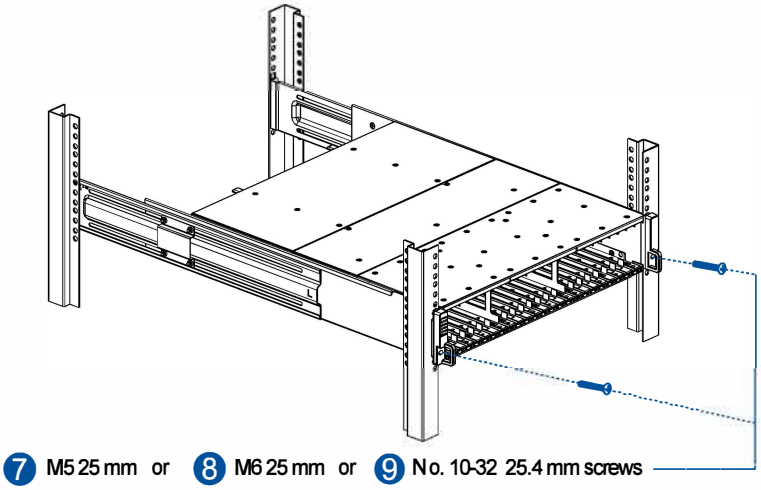
4. With the assistance of two other people, lift and insert the enclosure onto the slide rails. Ensure that the inner glides on both sides of the enclosure meet the inner glide rails.



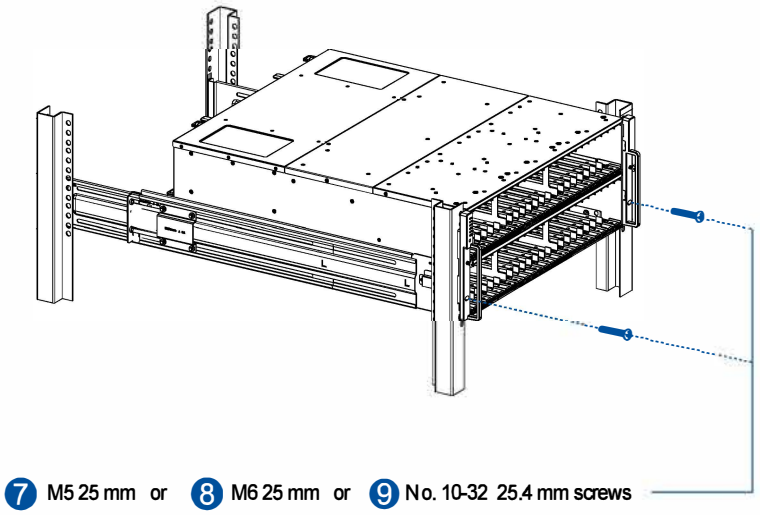
NOTE: The image is for illustration purposes only. DO NOT install drives yet.

5. Secure the enclosure using the MS, M6, or no. 10-32 screws from the front.

- **2U System**



- **4U System**



Once the enclosure is assembled to the cabinet, you can proceed to install other components.

2.3 Installing Drives

2.3.1 Installing Drives for 2U 24-bay and 4U 48-bay Models

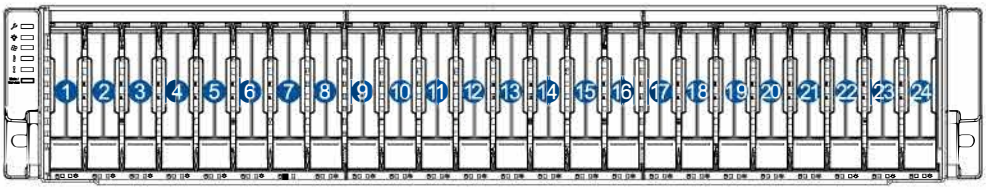
MPORTANT! NVMe SSDs must be purchased from PAC Storage.

Checking the SSD Part Number

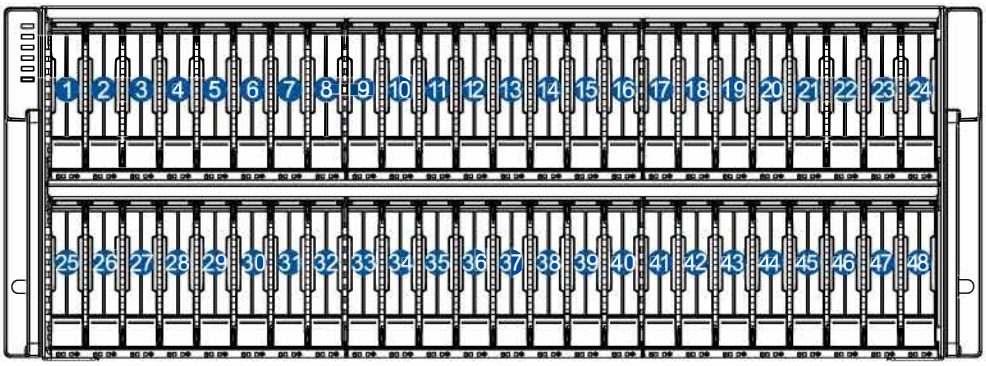
When purchasing NVMe SSDs for PS 2024UR/3024UR/3024URT/4024UR, check the part number to make sure that the SSDs are compatible with your storage system. Refer to Checking the SSD Part Number in section 4.7 Replacing a Drive for details.

Drive Numbering

Get to know the exact order of the drives to avoid removing the wrong drives out of the enclosure.



PS/PSe 2024U/3024U/3024UT/4024U
PS 5024UE

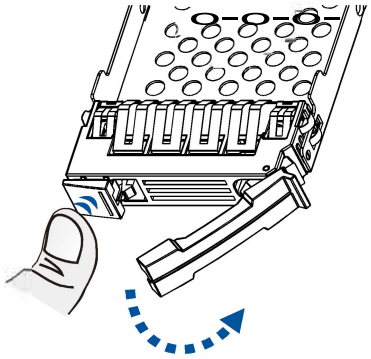


PS 3048UT/4048U

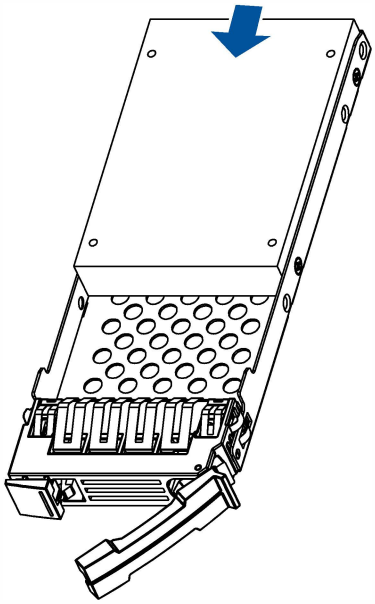
Installing a Drive into a Drive Bay

IMPORTANT! Ensure to install the endosure to the rack first before installing drives to the endosure's drive bays.

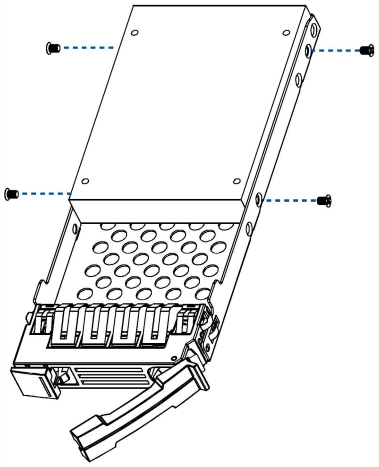
1. Press the release button to open the spring handle.



2. Place an SSD into the drive tray, with the interface connectors facing the open side of the tray and the label facing up.

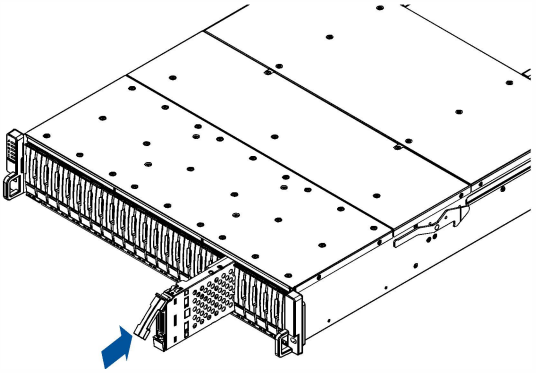


3. Secure the drive to the correct holes of the tray using four of the bundled screws.

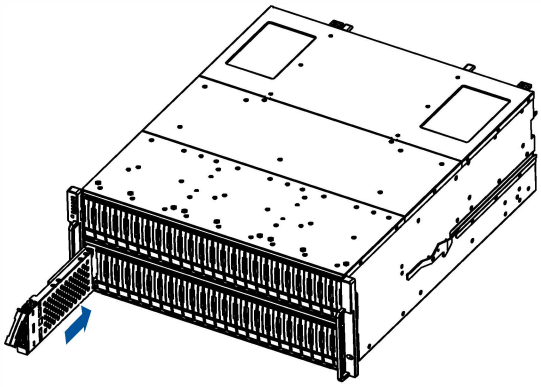


4. With the spring handle open, insert the assembled drive and drive tray into the enclosure.

- **PS/PSe 2024U/3024U/3024UT/4024U and PS 5024UE**



- **PS 3048UT/4048U**



WARNING! Ensure that your system has all the drive bays occupied with the drive trays even if there are no drives installed. Without the drive trays, the ventilation is compromised and may cause overheating.

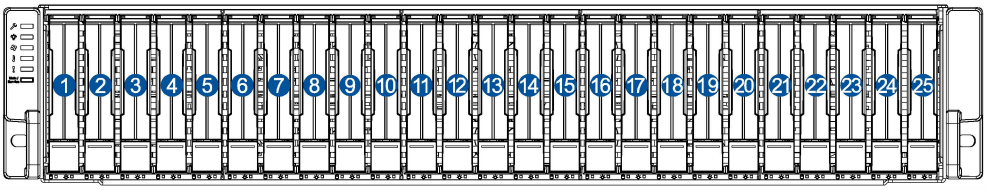
5. When the tray is fully inserted into the bay, close the spring handle.

2.3.2 Installing Drives for 2U 25-bay Models

MPORTANT! NVMe SSDs must be purchased from PAC Storage.

Drive Numbering

Get to know the exact order of the drives to avoid removing the wrong drives out of the enclosure.

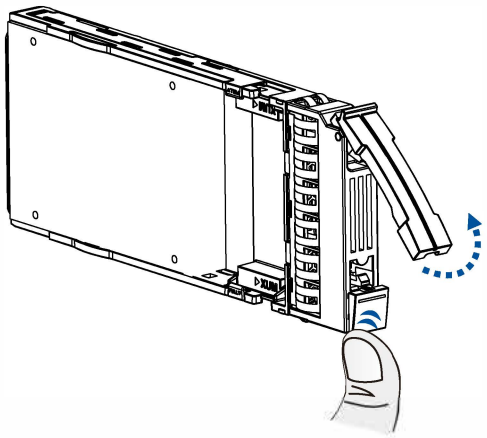


PS 3025U/4025U

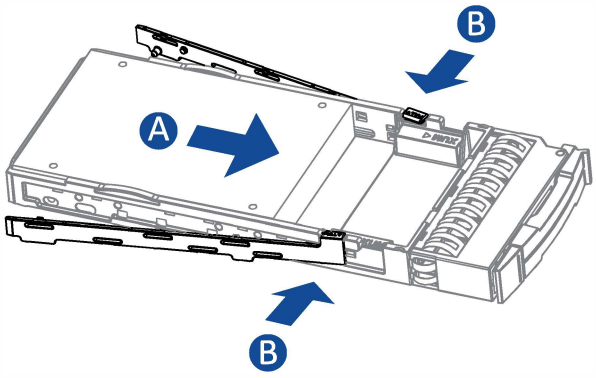
Installing a Drive into a Drive Bay

IMPORTANT! Ensure to install the enclosure to the rack first before installing drives to the enclosure's drive bays.

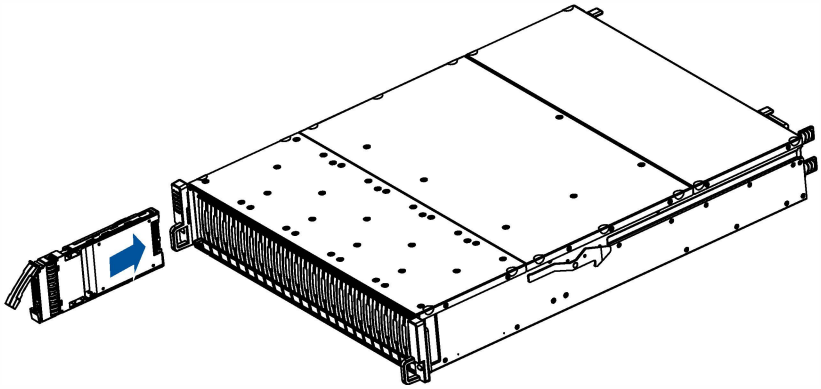
1. Press the release button to open the spring handle.



2. Place an SSD into the drive tray (A) and secure the clips to both sides of the tray (B).



3. With the spring handle open, insert the assembled drive and drive tray into the enclosure.



WARNING! Ensure that your system has all the drive bays occupied with the drive trays even if there are no drives installed. Without the drive trays, the ventilation is compromised and may cause overheating.

4. When the tray is fully inserted into the bay, close the spring handle.

2.4 Installing Host Boards / Expansion Boards

IMPORTANT!

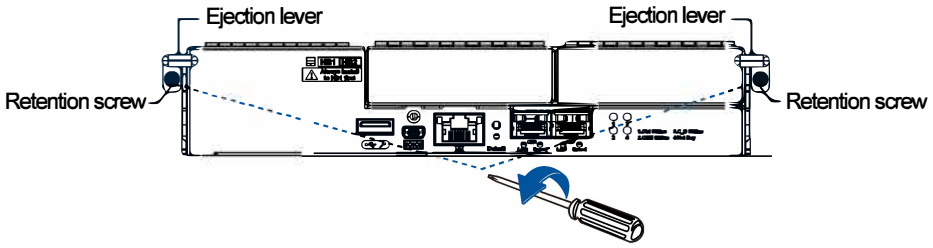
- A downtime may occur when upgrading the controller/host board.
- When you add or replace a host board, the firmware automatically restores the default factory settings of your system.
- For redundant controller models, identical host board combinations must be used, in the same order, on both controllers.
- For 25GbE x 2, 40GbE x 2, and 100 GbE x 2 host boards, both ports on the same host board must be set to the same channel type (block-level or file-level).
- Refer to the **Host Board and Memory Guide** on PAC Storage's official website for more information, including supported host board types, supported combinations, and important notes.

2.4.1 Installing Host Boards for PS/PSe 2024U/3024U

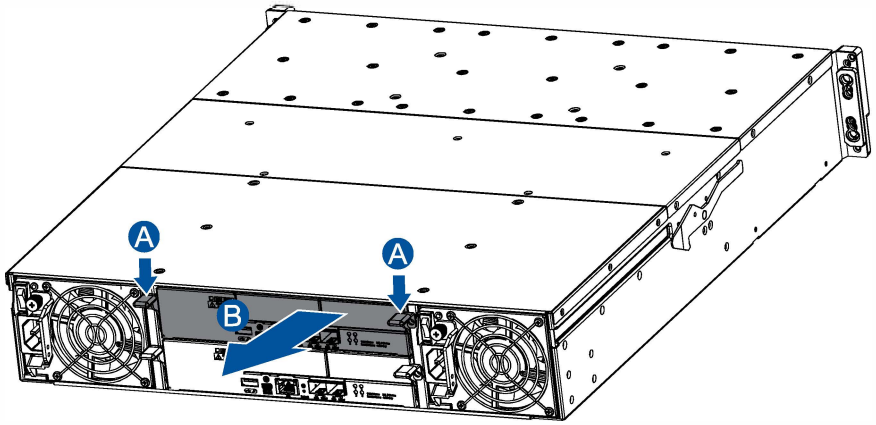
1. Disconnect all cables from the controller module.

CAUTION! Disconnect all power sources to avoid shock hazards.

2. Remove the retention screws that secure the controller module's ejection levers to the chassis.



3. Push the ejection levers downwards to dislodge the controller from the system (A), and then pull to remove the controller from the enclosure (B).

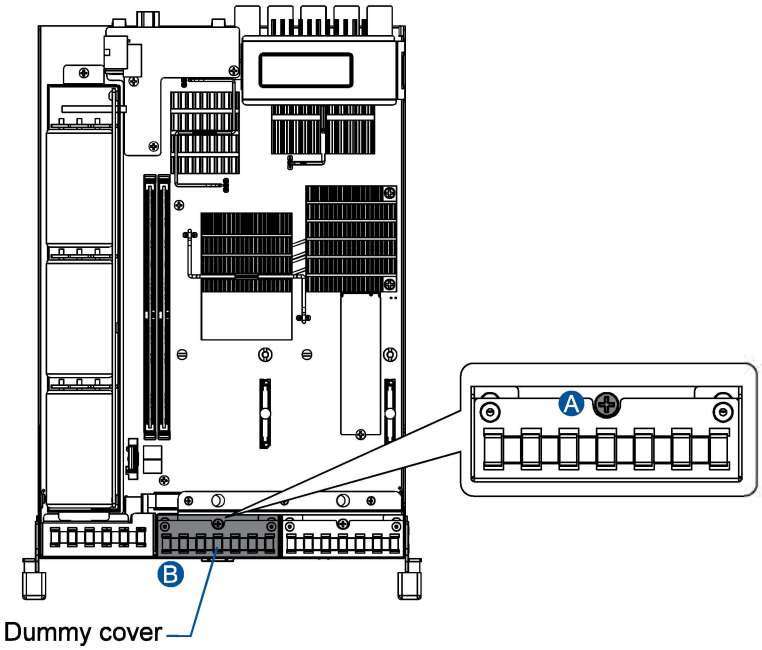


If the controller has a super capacitor, remove it from the controller. See **4.6 Replacing a Super Capacitor** for details.

IMPORTANT!

- Ensure to follow this step; otherwise, the super capacitor may emit electricity, which can damage the DIMMs and host boards.
- Alternatively, wait for at least 30 seconds after the 7-segment LED in the controller turns OFF.

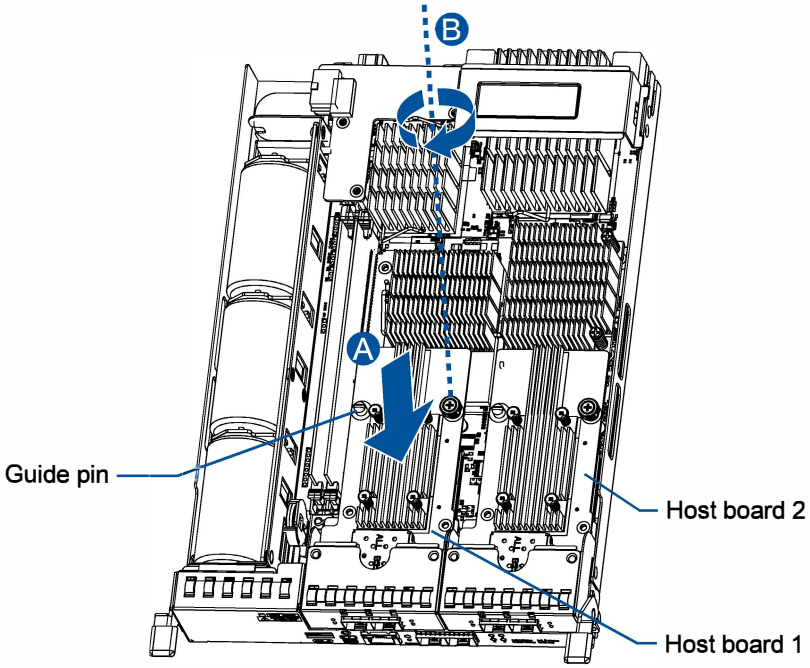
5. Remove the screw that secures the dummy cover to the controller (A), and then remove the dummy cover (B).



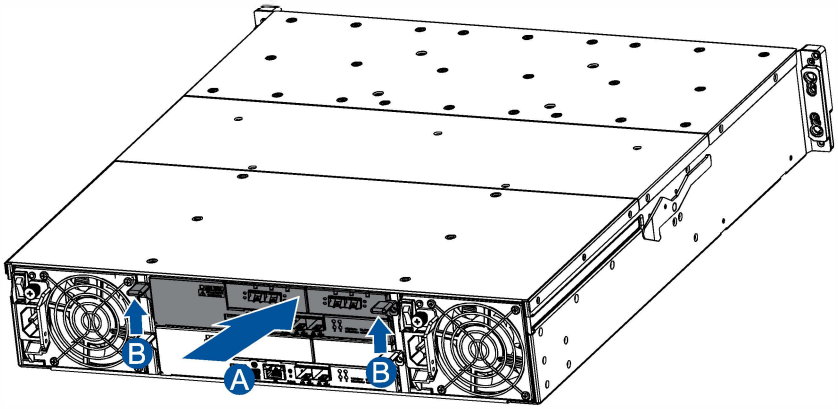
6. Use the guide pin to position the host board onto the slot. Place it carefully (A), and then tighten the thumb screw to secure the host board in place (B).

IMPORTANT!

- When installing a **host board** on PS/PSe 2024U/3024U, always install it into the **HB1** slot first.
- When installing **a SAS 12G expansion board** on PS/PSe 2024U/3024U, always install it into the **HB2slot.**



7. Reinstall the super capacitor back to the controller if you have removed it in step 4. Refer to **4.6 Replacing a Super Capacitor** for details.
8. Insert the controller back into the module slot carefully (A). When you feel a contact resistance, use a small but careful force and push the ejection levers upwards to secure the controller into the chassis (8).



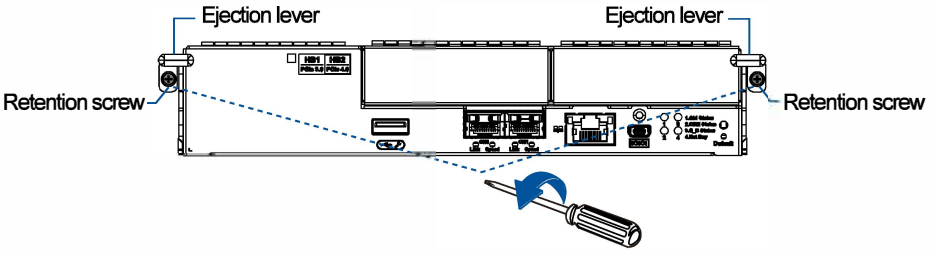
9. Secure the controller to the enclosure with the retention screws. Reconnect the cables to the controller module.

2.4.2 Installing Host Boards for PS/PSe 3024UT/4024U

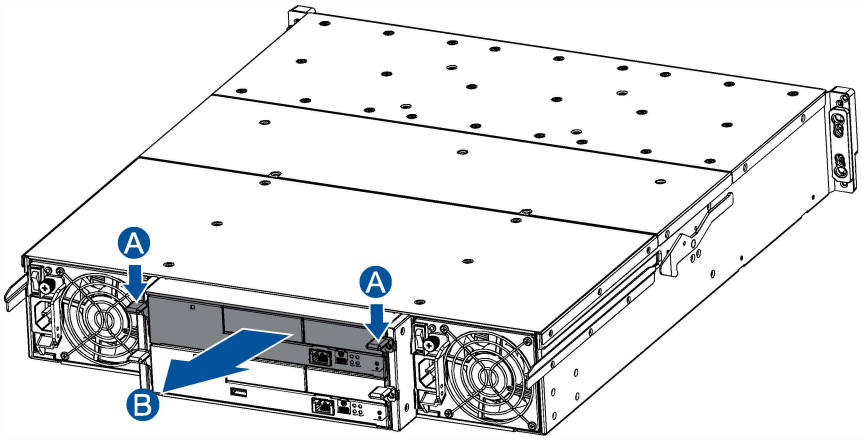
1. Disconnect all cables from the controller module.

CAUTION! Disconnect all power sources to avoid shock hazards.

2. Remove the retention screws that secure the controller module's ejection levers to the chassis.



3. Push the ejection levers downwards to dislodge the controller from the system (A), and then pull to remove the controller from the enclosure (B).



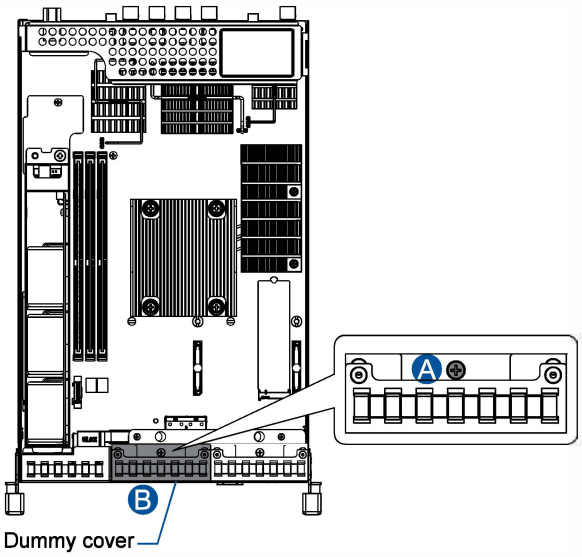
4. If the controller has a super capacitor, remove it from the controller. See **4.6 Replacing a Super Capacitor** for details.

IMPORTANT!

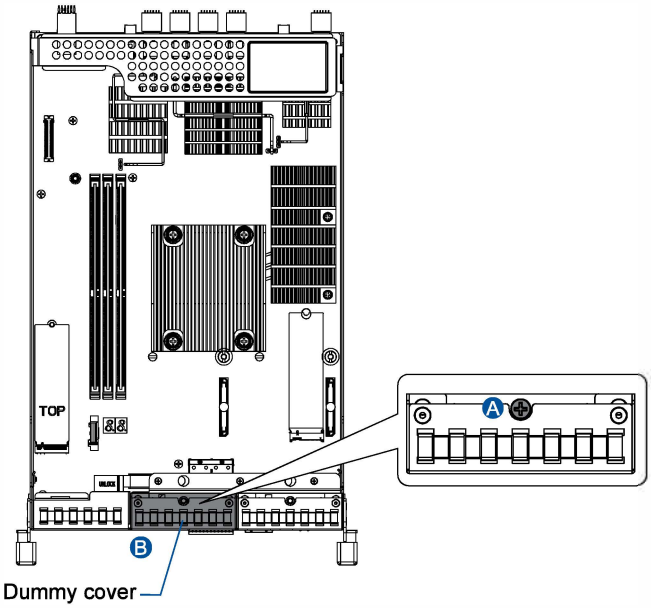
- Ensure to follow this step; otherwise, the super capacitor may emit electricity, which can damage the DIMMs and host boards.
- Alternatively, wait for at least 30 seconds after the 7-segment LED in the controller turns OFF.

5. Remove the screw that secures the dummy cover to the controller (A), and then remove the dummy cover (B).

- **PS 3024UT/4024U**



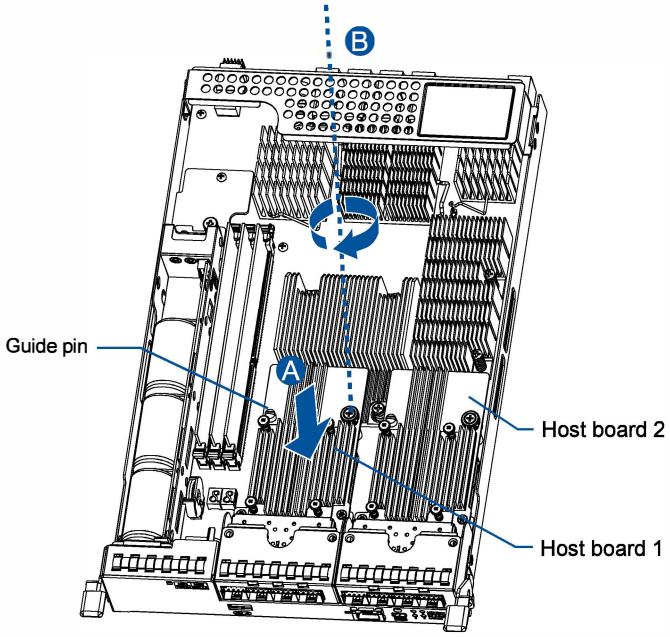
- **PSe 3024UT/4024U**



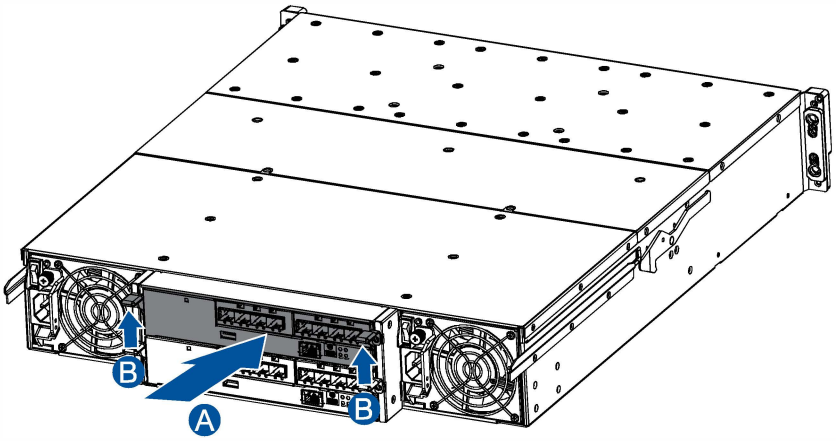
6. Use the guide pin to position the host board onto the slot. Place it carefully (A), and then tighten the thumb screw to secure the host board in place (B).

IMPORTANT!

- When installing a **100GbE host board** on PS/PSe 3024UT/4024U, always install it into the **HB2** slot (PCIe 4.0) to obtain the highest performance.
- When installing a **SAS 12G expansion board** on PS/PSe 3024UT/4024U, always install it into the **HB1** slot (PCIe 3.0).



7. Reinstall the super capacitor back to the controller if you have removed it in step 4. Refer to **4.6 Replacing a Super Capacitor** for details.
8. Insert the controller back into the module slot carefully (A). When you feel a contact resistance, use a small but careful force and push the ejection levers upwards to secure the controller into the chassis (8).



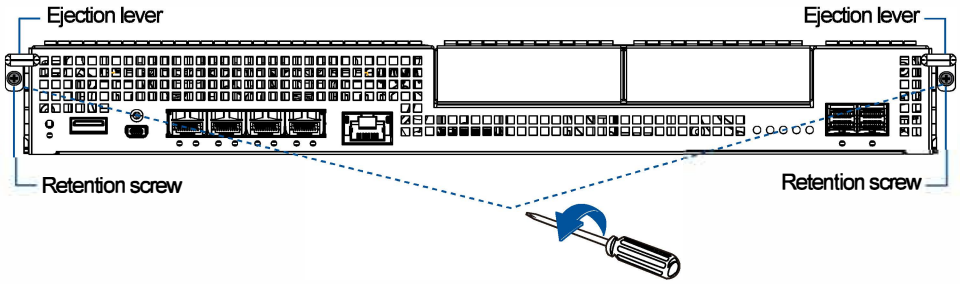
9. Secure the controller to the enclosure with the retention screws. Reconnect the cables to the controller module.

2.4.3 Installing Host Boards for PS 3025U/4025U

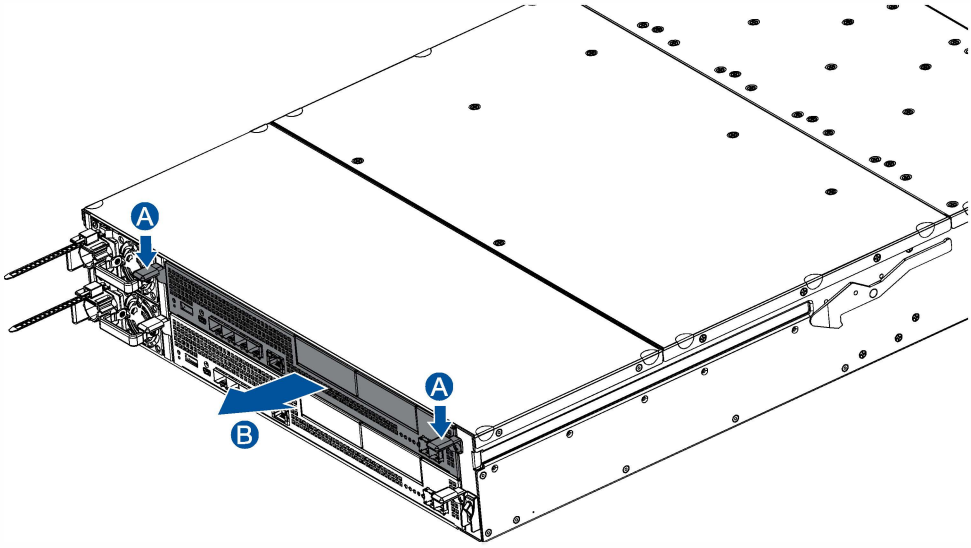
1. Disconnect all cables from the controller module.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Remove the retention screws that secure the controller module's ejection levers to the chassis.



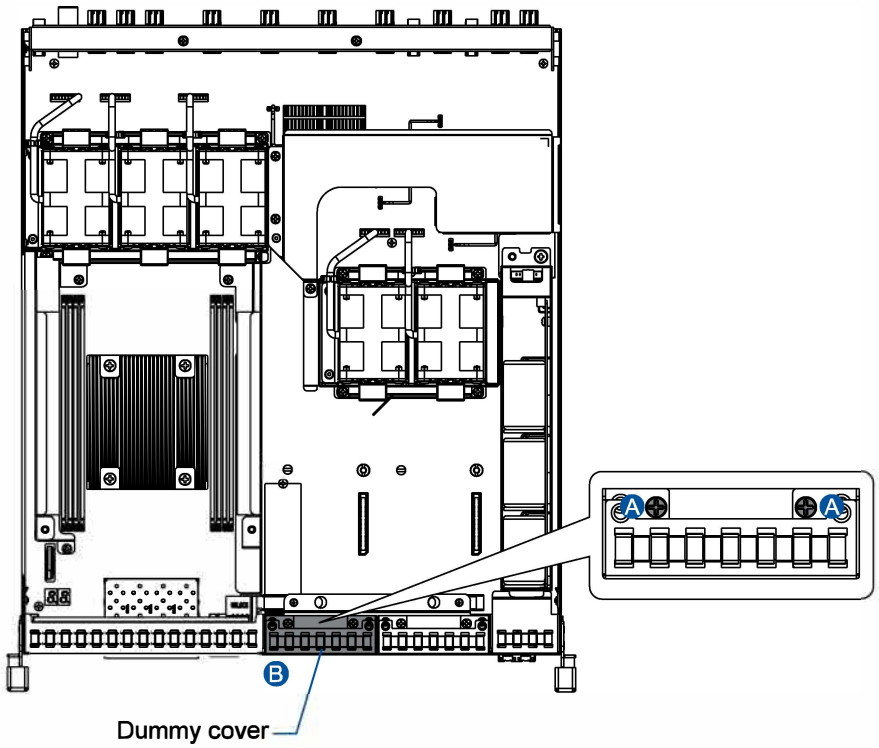
3. Push the ejection levers downwards to dislodge the controller from the system (A), and then pull to remove the controller from the enclosure (B).



4. Remove the super capacitor from the controller. See section **4.6 Replacing a Super Capacitor** for details.

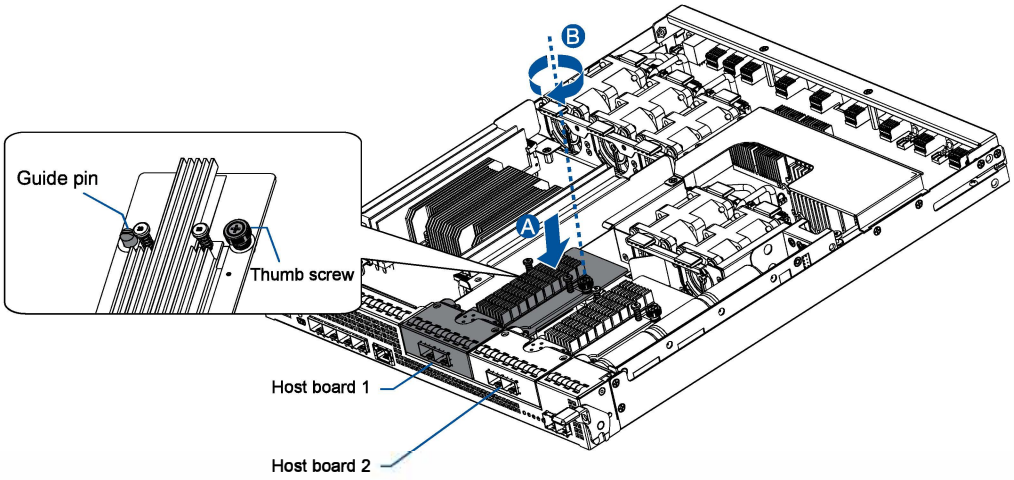
> **IMPORTANT!**
>
> - Ensure to follow this step; otherwise, the super capacitor may emit electricity, which can damage the DIMMs and host boards.
> - Alternatively, wait for at least 30 seconds after the 7-segment LED in the controller turns OFF.

5. Remove the screws that secure the dummy cover to the controller (A), and then remove the dummy cover (B).



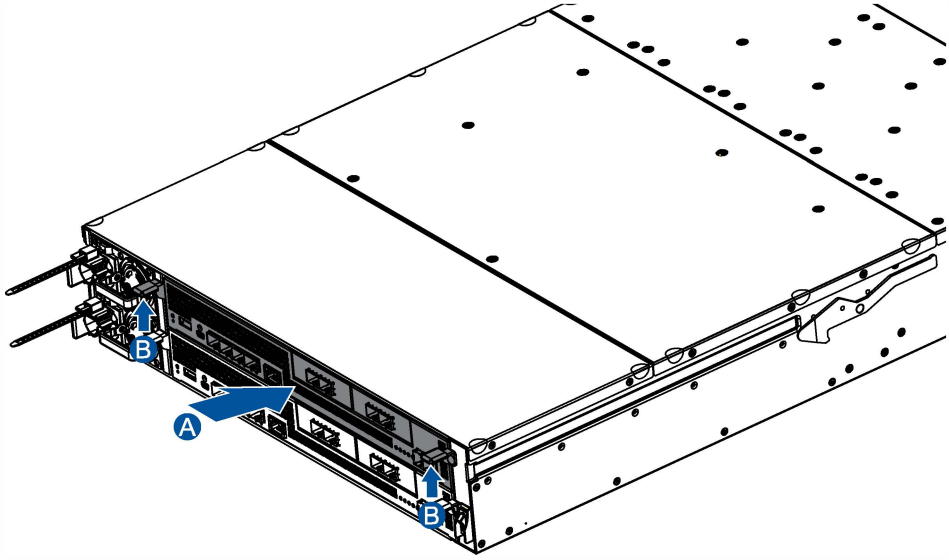
6. Use the guide pin to position the new host board to the host board slot and place it carefully (A). then tighten the thumb screw to secure the host board in place (B).

IMPORTANT! Identical host boards must be installed in the same order on both controllers.



7. Reinstall the super capacitor back to the controller if you have removed it in step 2. Refer to **4.6 Replacing a Super Capacitor** for details.

8. Insert the controller back into the module slot carefully (A). When you feel a contact resistance, use a small but careful force and push the ejection levers upwards to secure the controller into the chassis (B).



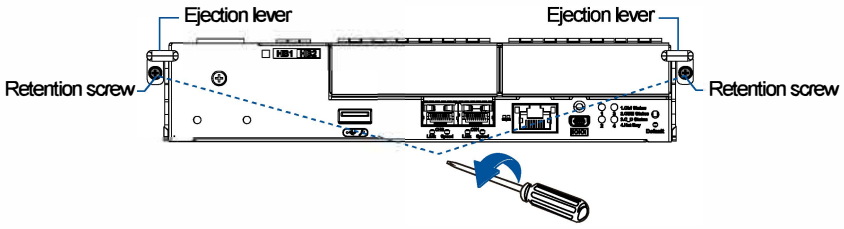
9. Secure the controller to the enclosure with the retention screws. Reconnect the cables to the controller module.

2.4.4 Installing Host Boards for PS 3048UT/4048U

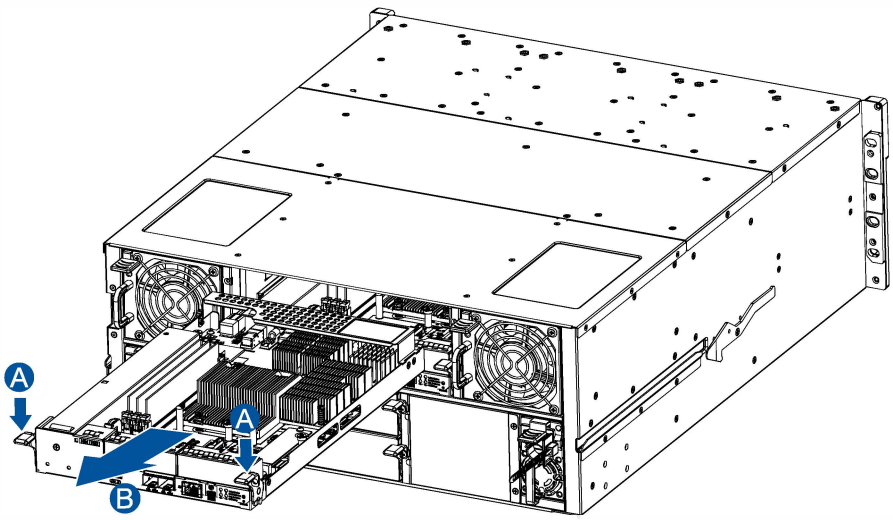
1. Disconnect all cables from the controller module.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Remove the retention screws that secure the controller module's ejection levers to the chassis.



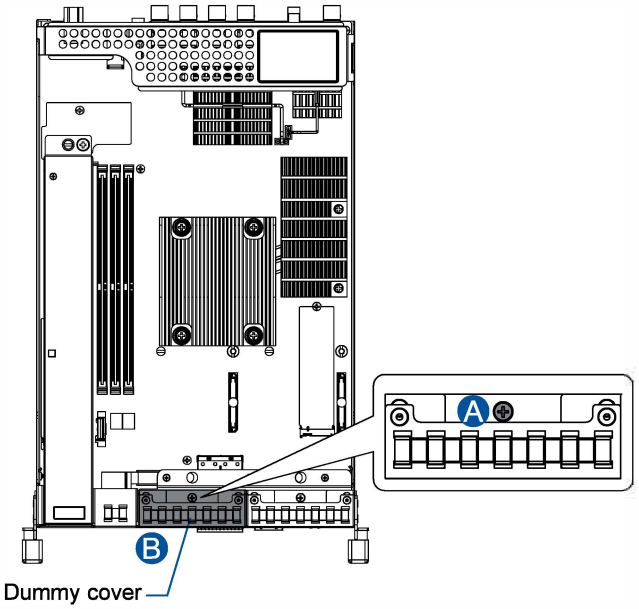
3. Push the ejection levers downwards to dislodge the controller from the system (A), and then pull to remove the controller from the enclosure (B).



4. If the controller has a super capacitor, remove it from the controller. See **4.6 Replacing a Super Capacitor** for details.

> **IMPORTANT!**
>
> - Ensure to follow this step; otherwise, the super capacitor may emit electricity, which can damage the DIMMs and host boards.
> - Alternatively, wait for at least 30 seconds after the 7-segment LED in the controller turns OFF.

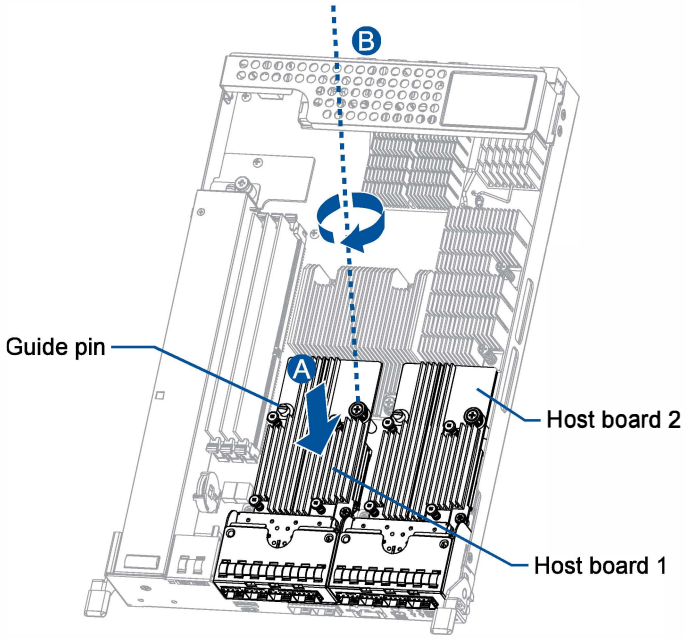
5. Remove the screws that secure the dummy cover to the controller (A), and then remove the dummy cover (B).



6. Use the guide pin to position the host board onto the slot. Place it carefully (A), and then tighten the thumb screw to secure the host board in place (B).

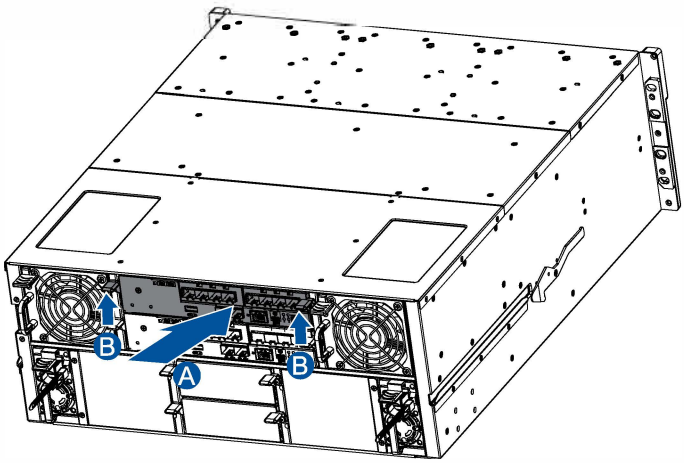
IMPORTANT!

- When installing a **100GbE host board** on PS 3048UT/4048U, always install it into the **HB2** slot.
- When installing a **SAS 12G expansion board** on PS 3048UT/4048U, always install it into the **HB1** slot.



7. Reinstall the super capacitor back to the controller if you have removed it in step 4. Refer to **4.6 Replacing a Super Capacitor** for details.

8. Insert the controller back into the module slot carefully (A). When you feel a contact resistance, use a small but careful force and push the ejection levers upwards to secure the controller into the chassis (B).



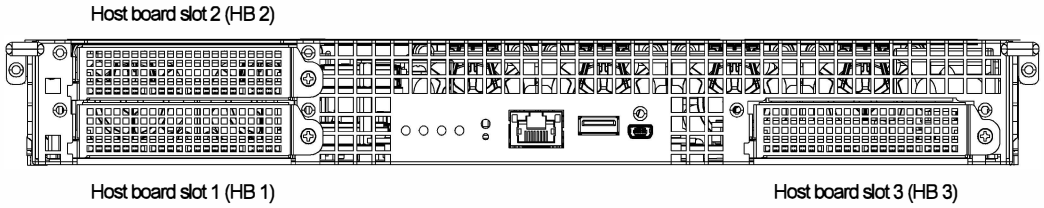
9. Secure the controller to the enclosure with the retention screws. Reconnect the cables to the controller module.

2.4.5 Installing Host Boards for PS 5024UE

IMPORTANT! For supported host/expansion board combinations, refer to the **Host Board and Memory Guide** on Infortrend's website.

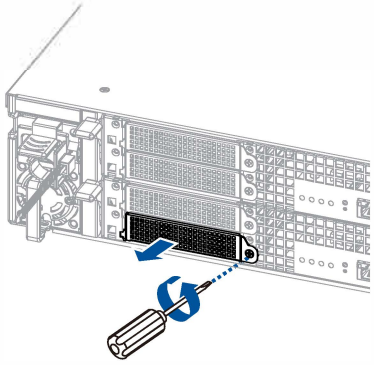
PS 5024UE comes with three host board slots.

- Host board slot 1 (PCIe Gen5 x 16)
- Host board slot 2 (PCIe Gen5 x 8)
- Host board slot 3 (PCIe Gen3 x 8)



To install a host board:

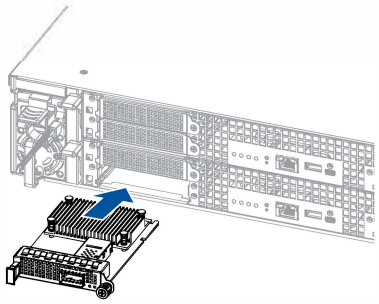
1. Loosen the screw that secures the dummy bracket, and then remove the bracket from the chassis.



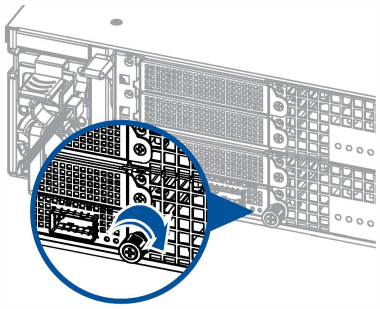
NOTE:

- The HB 1 slot is used as an illustrating example. The same steps apply to the other slots.
- When instalingl a SAS 12G expansion board, use the HB 3 slot.

2. Insert an OCP card into the module slot.



3. Tighten the thumb screw to secure the card.



2.5 Installing the CBM for PSe U.2 Series

The CBM is an optional item for PSe U.2 series models and can be purchased from your system vendor. The CBM comes in a combination of a super capacitor and an FBM (flash backup module), which can sustain cache memory in the event of a power failure or in the extremely unlikely event of both PSUs failing at the same time. The use of a CBM is thus highly recommended in order to safeguard data integrity.

IMPORTANT! The CBM has to be installed on the controller before rack-mounting the system.

NOTE:

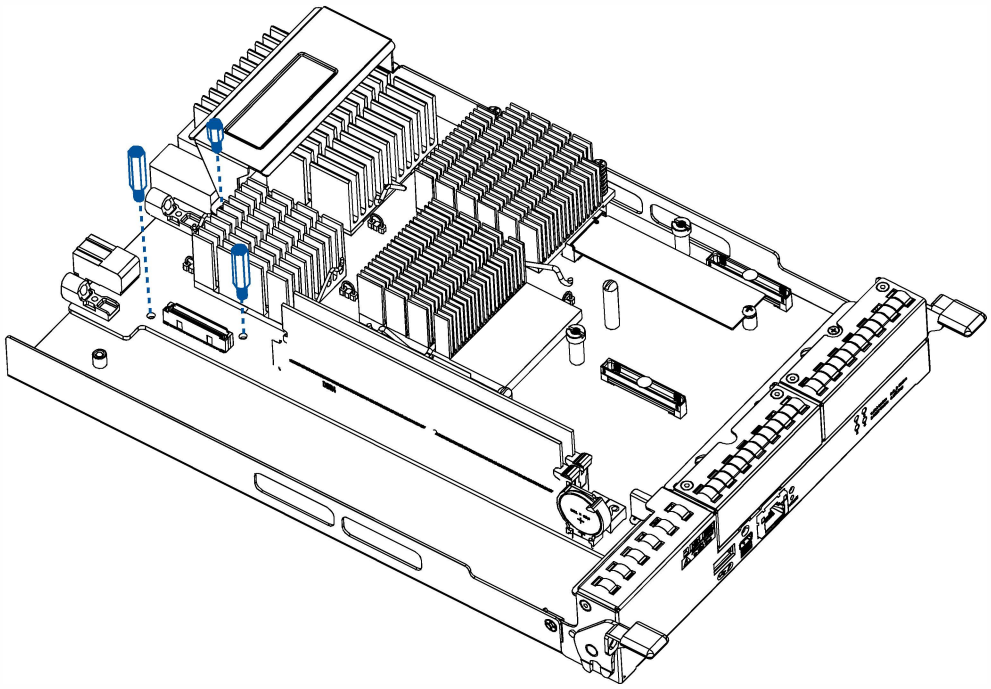
- For PSe U.2 series models, the CBM will be pre-installed if you order it as a part of the system. If you purchase the CBM afterwards as an upgrade component, please read and follow the instructions in this section carefully.
- The CBM is a default component on the PS U.2 series models. Refer to **1.4.4 Super Capacitor and Flash Backup Module** for details.

2.5.1 Installing the CBM for PSe 2024U/3024U

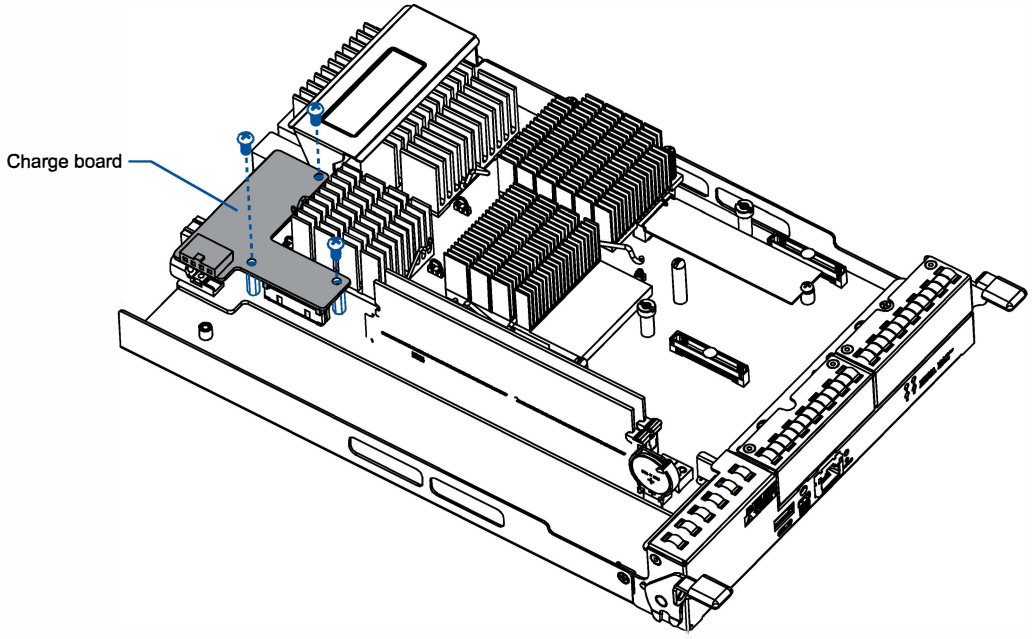
1. Disconnect all cables from the controller module.

CAUTION! Disconnect all power sources to avoid shock hazards.

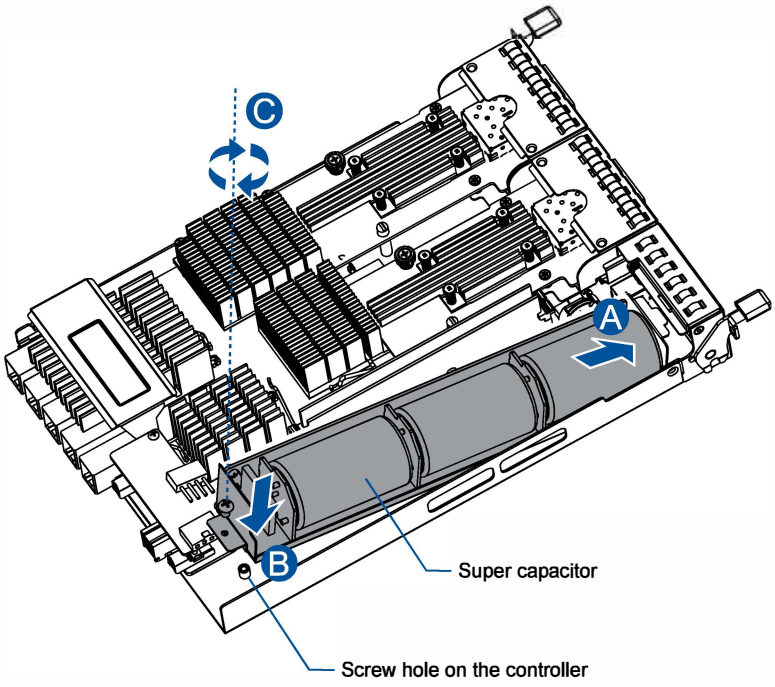
2. Remove the controller from the enclosure. Refer to **2.4.1 Installing Host Boards for PS/ PSe 2024U/3024U** for details.
3. Insert the three copper stands into the holes as illustrated below.



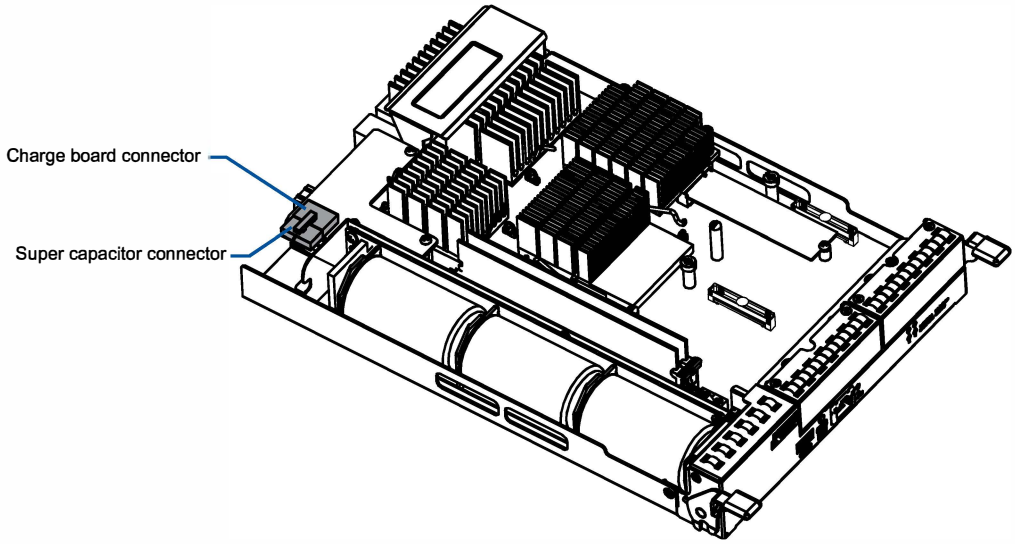
4. Place the charge board onto the controller while aligning the screw holes with the copper stands. Then secure the board using the three supplied screws.



5. Insert the super capacitor at a 45° angle (A). Place it onto the controller carefully and make sure it meets the screw hole on the controller (B). Then tighten the supplied screw to secure the super capacitor in place (C).



6. Connect the 4-pin Molex connector of the super capacitor to the charge board connector.



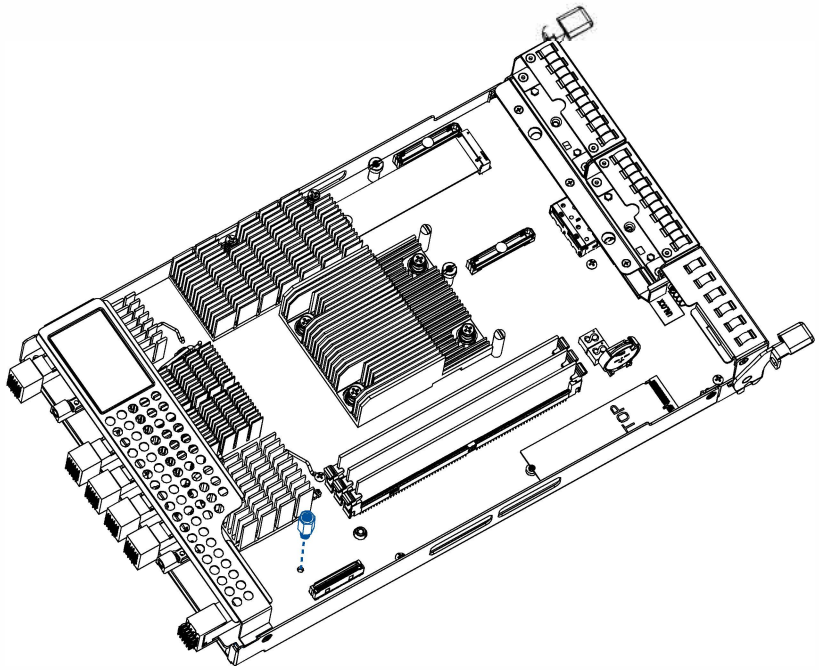
7. Install the controller back into the enclosure. Refer to **2.4.1 Installing Host Boards for PS/PSe 2024U/3024U** for details.

2.5.2 Installing the CBM for PSe 3024UT/4024U

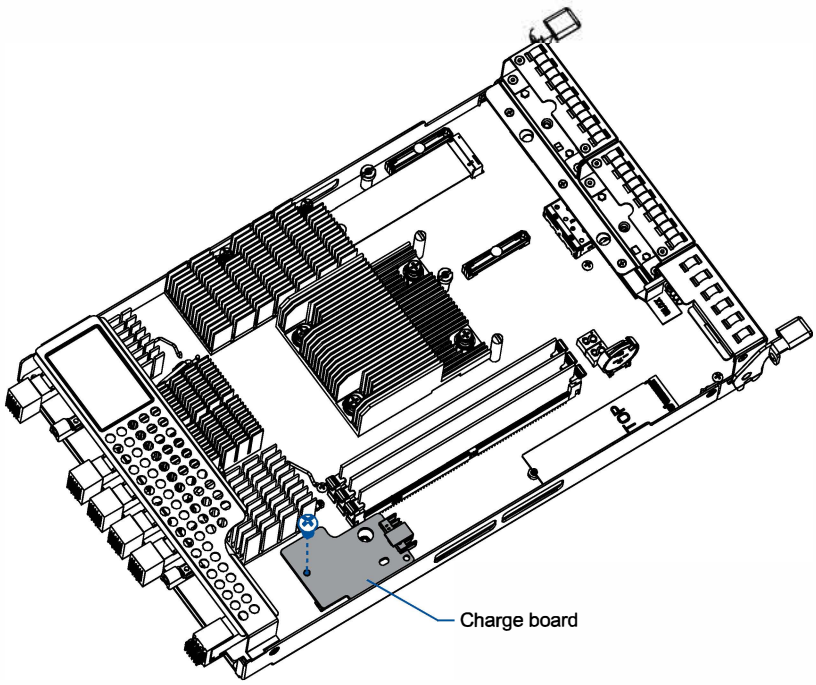
1. Disconnect all cables from the controller module.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

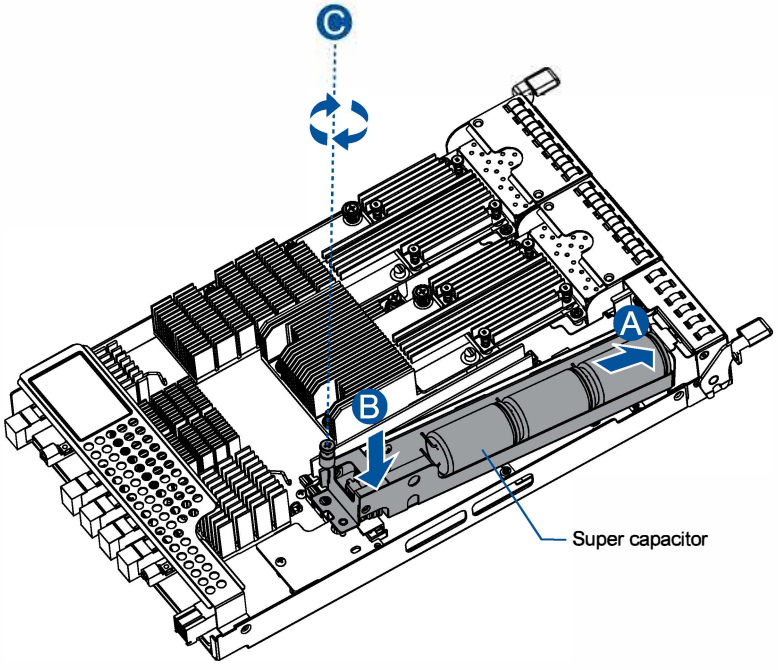
2. Remove the controller from the enclosure. Refer to **2.4.2 Installing Host Boards for PS/PSe 3024UT/4024U** for details.
3. Insert the the copper stand into the hole as illustrated below.



4. Place the charge board onto the controller while aligning the screw hole with the copper stand. Then secure the board using the supplied screw.



5. Insert the super capacitor at a 45° angle (A). Place it onto the controller carefully (B). Then tighten the supplied screw to secure the super capacitor in place (C).



6. Install the controller back into the enclosure. Refer to **2.4.2 Installing Host Boards for PS/PSe 3024UT/4024U** for details.

2.6 Connections

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

2.6.1 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 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 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.
- When rackmounting, leave enough space for the cables. DO NOT bend them to a diameter of less than 76 mm (3 inches).
- Route the cables away from places where it can be damaged by other devices such as foot traffic or fan exhaust.
- 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 (Host Bus Adapters).

NOTE:

- To manage the fault-tolerant data paths and optimize data throughput on multiple data paths, you must apply 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 1/0 in the cache with these four nexus and another host 1/0 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 1/0 operations can be accessed via the same nexus.

Knowing the Maximum Queued 1/0 Count

The menu option *Maximum Queued /JO Count* allows you to configure the maximum number of 1/0 operations per host channel that can be accepted from the servers. The predefined range is from 1 to 1024 1/0 operations per host channel. You can also choose **Auto,** which sets the automatic configuration. The default value is 256 1/0 operations. The appropriate setting for this option depends on how many 1/0 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.

2.6.2 Expansion Connections

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 path 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 storage 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 storage and expansion system connections:

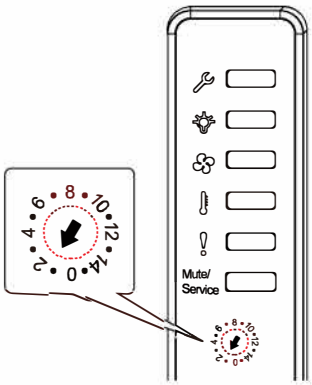
- Dual-controller storage connects to a dual-controller expansion system
- A longer cable is available in making expansion links with a dual-controller configuration. If you need to connect expansion systems from two opposite directions, you may need a longer cable. Routing between two different connections 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. Toset the expansion IDs, use a small flat blade screwdriver.

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

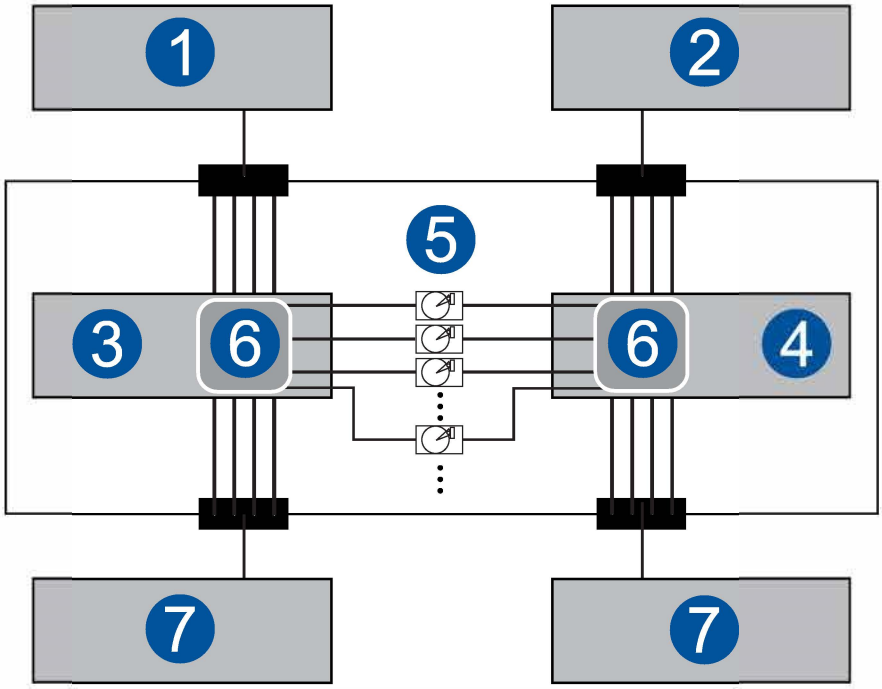
- When setting an ID on an expansion system, you must start from 1. The order starts from the expansion enclosure that is closest to the managing storage enclosure.
- Refer to **Hardware Specifications** for compatible expansion models.
- For more information, refer to the **Expansion Guide** on PAC Storage's official website.



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, and 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.



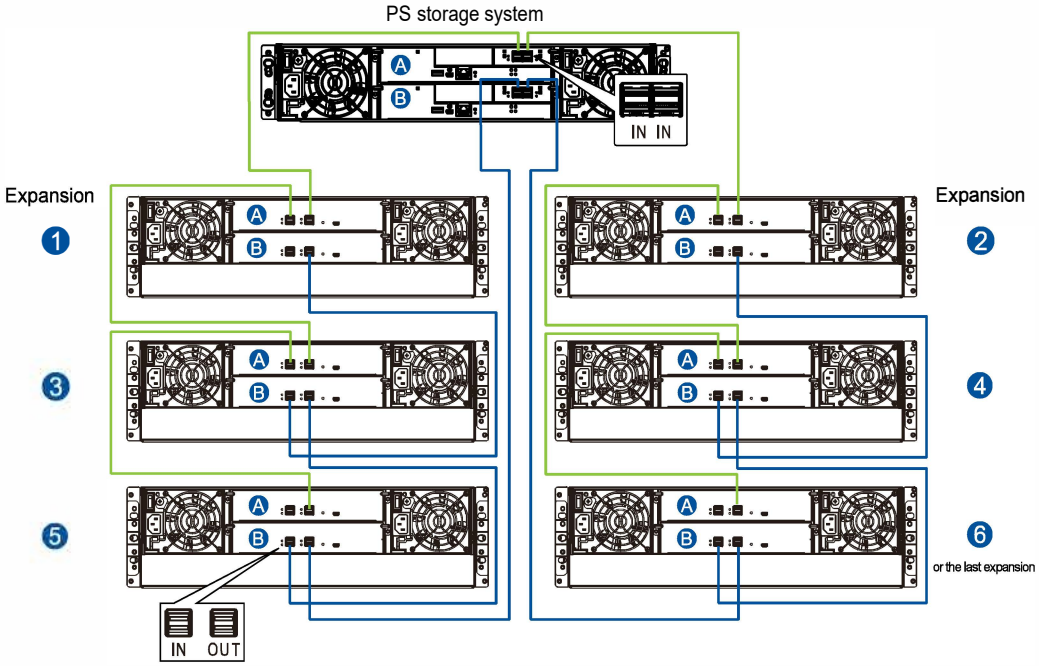
Number	Description
1	RAID controller A
2	RAID controller B
3	Expansion system controller A
4	Expansion system controller B
5	Dual-port SAS drives
6	Expander
7	To another expansion system

- **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, and 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 to Expansion Systems

- **PS 2024UR/3024UR**

The following example illustrates **IN to OUT** connections between a PS storage system and six dual-controller JBOD expansions, using two **SAS 12G expansion boards.**



- Storage controller **A**: left SAS port **IN** ➡ Expansion **1**, controller **A**: SAS port **OUT**
- Expansion **1**, controller **A**: SAS port **IN** ➡ Expansion **3**, controller **A**: SAS port **OUT**
- Expansion **3**, controller **A**: SAS port **IN** ➡ Expansion **5**, controller **A**: SAS port **OUT**
- Storage controller **A**: right SAS port **IN** ➡ Expansion **2**, controller **A**: SAS port **OUT**
- Expansion **2**, controller **A**: SAS port **IN** ➡ Expansion **4**, controller **A**: SAS port **OUT**
- Expansion **4**, controller **A**: SAS port **IN** ➡ Expansion **6** or last, controller **A**: SAS port **OUT**

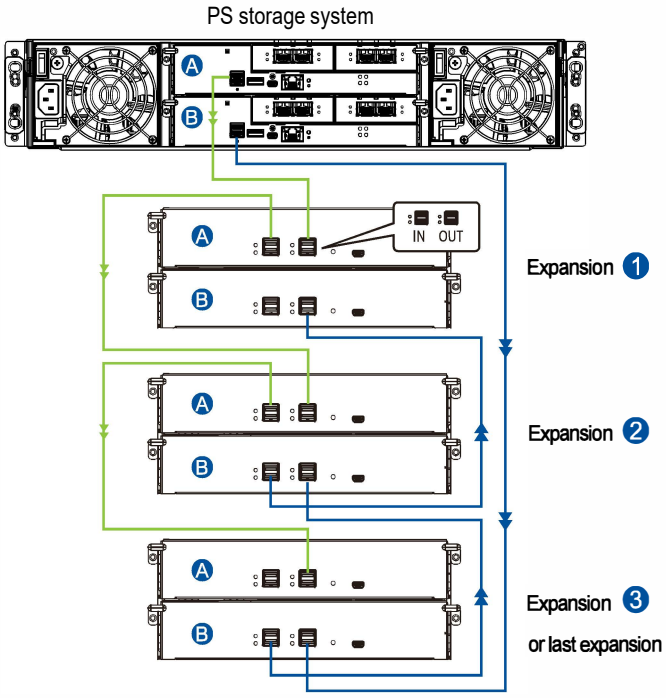
- Storage controller **B**: left SAS port **IN** ➡ Expansion **5**, controller **B**: SAS port **OUT**
- Expansion **5**, controller **B**: SAS port **IN** ➡ Expansion **3**, controller **B**: SAS port **OUT**
- Expansion **3**, controller **B**: SAS port **IN** ➡ Expansion **1**, controller **B**: SAS port **OUT**
- Storage controller **B**: right SAS port **IN** ➡ Expansion **6** or last, controller **B**: SAS port **OUT**
- Expansion **6** or last, controller **B**: SAS port **IN** ➡ Expansion **4**, controller **B**: SAS port **OUT**
- Expansion **4**, controller **B**: SAS port **IN** ➡ Expansion **2**, controller **B**: SAS port **OUT**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's offical website.

- **PS 2024UR/3024UR**

The following example illustrates **IN to OUT** connections between a PS storage system and three dual-controller JBOD expansions, using the **onboard SAS expansion ports.**

IMPORTANT! Systems with onboard SAS expansion ports have been discontinued (EOL). For systems purchased later without onboard SAS expansion ports, please use SAS expansion boards (see the previous page for details).



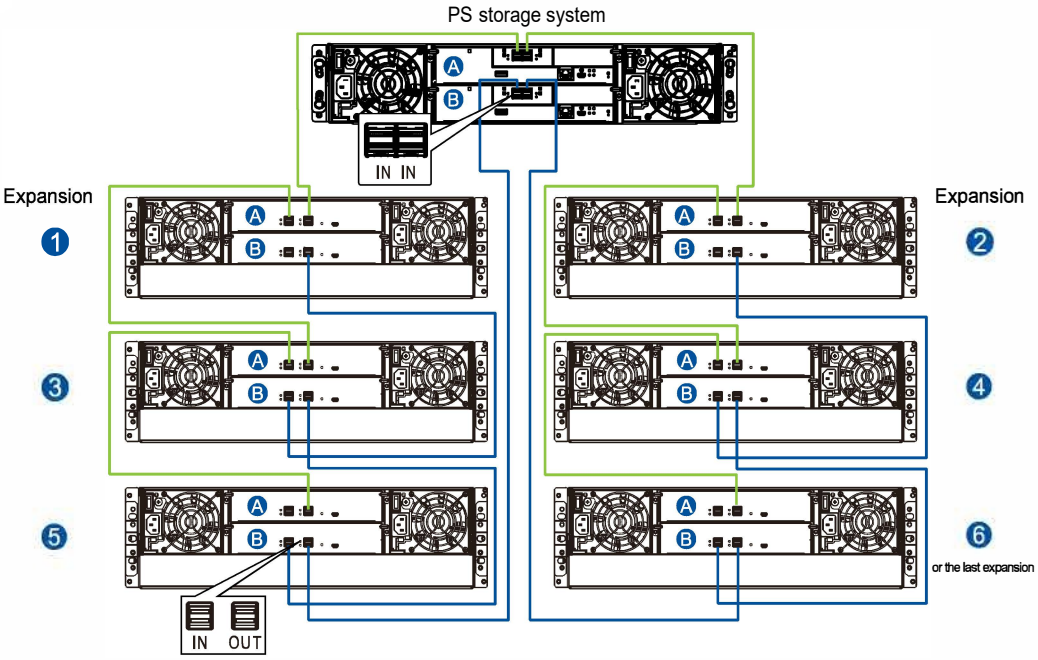
- Storage controller A: SAS port **IN** ➡ Expansion 1, controller A: SAS port **OUT**
- Expansion 1, controller A: SAS port **IN** ➡ Expansion 2, controller A: SAS port **OUT**
- Expansion 2, controller A: SAS port **IN** ➡ Expansion 3 or last, controller A: SAS port **OUT**

- Storage controller B: SAS port **IN** ➡ Expansion 3 or last, controller B: SAS port **OUT**
- Expansion 3 or last, controller B: SAS port **IN** ➡ Expansion 2, controller B: SAS port **OUT**
- Expansion 2, controller B: SAS port **IN** ➡ Expansion 1, controller B: SAS port **OUT**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's official website.

- **PS 3024URT/4024UR**

The following example illustrates **IN to OUT** connections between a PS storage system and six dual-controller JBOD expansions, using two **SAS 12G expansion boards.**



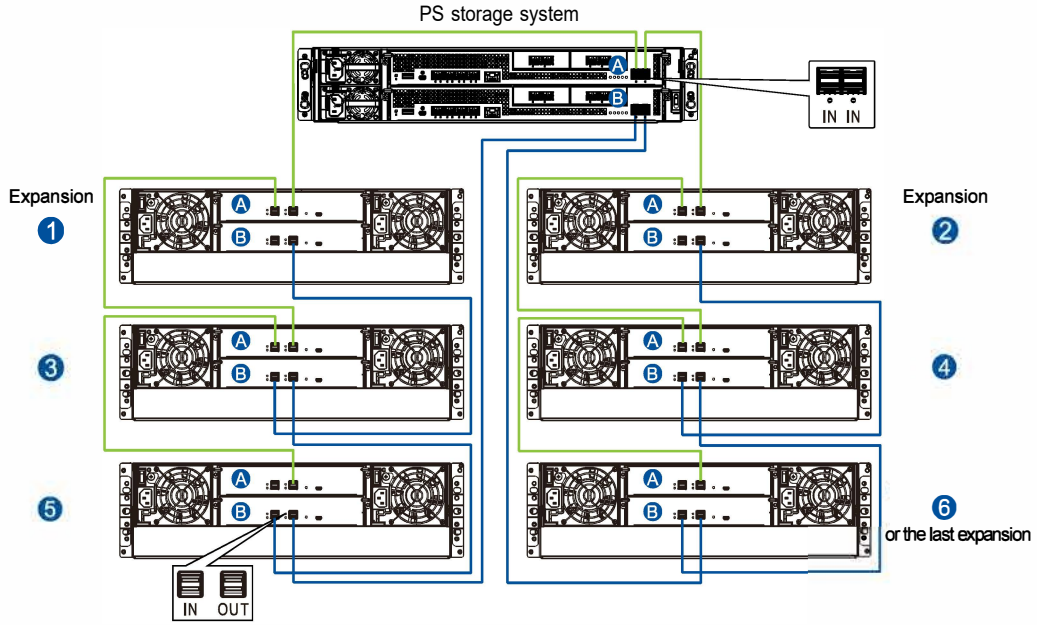
- Storage controller A: left SAS port **IN** ➡ Expansion 1, controller A: SAS port **OUT**
- Expansion 1, controller A: SAS port **IN** ➡ Expansion 3, controller A: SAS port **OUT**
- Expansion 3, controller A: SAS port **IN** ➡ Expansion 5, controller A: SAS port **OUT**
- Storage controller A: right SAS port **IN** ➡ Expansion 2, controller A: SAS port **OUT**
- Expansion 2, controller A: SAS port **IN** ➡ Expansion 4, controller A: SAS port **OUT**
- Expansion 4, controller A: SAS port **IN** ➡ Expansion 6 or last, controller A: SAS port **OUT**

- Storage controller B: left SAS port **IN** ➡ Expansion 5, controller B: SAS port **OUT**
- Expansion 5, controller B: SAS port **IN** ➡ Expansion 3, controller B: SAS port **OUT**
- Expansion 3, controller B: SAS port **IN** ➡ Expansion 1, controller B: SAS port **OUT**
- Storage controller B: right SAS port **IN** ➡ Expansion 6 or last, controller B: SAS port **OUT**
- Expansion 6 or last, controller B: SAS port **IN** ➡ Expansion 4, controller B: SAS port **OUT**
- Expansion 4, controller B: SAS port **IN** ➡ Expansion 2, controller B: SAS port **OUT**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's official website.

- **PS 3025UR/4025UR**

The following example illustrates **IN to OUT** connections between a PS storage system and six dual-controller JBOD expansions, using the **onboard SAS expansion ports.**



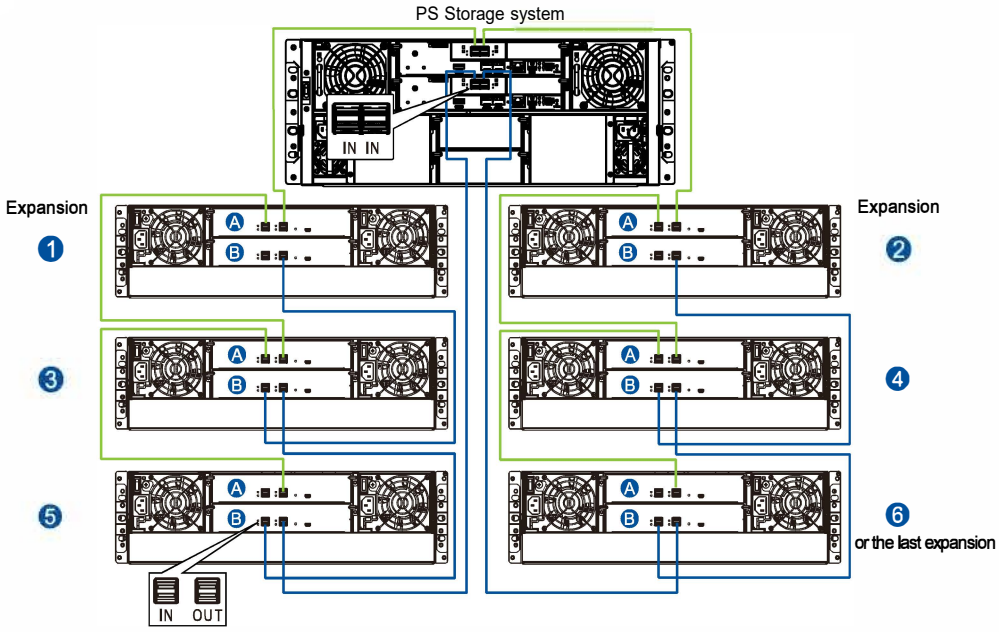
- Storage controller A: left SAS port **IN** ➡ Expansion 1, controller A: SAS port **OUT**
- Expansion 1, controller A: SAS port **IN** ➡ Expansion 3, controller A: SAS port **OUT**
- Expansion 3, controller A: SAS port **IN** ➡ Expansion 5, controller A: SAS port **OUT**
- Storage controller A: right SAS port **IN** ➡ Expansion 2, controller A: SAS port **OUT**
- Expansion 2, controller A: SAS port **IN** ➡ Expansion 4, controller A: SAS port **OUT**
- Expansion 4, controller A: SAS port **IN** ➡ Expansion 6 or last, controller A: SAS port **OUT**

- Storage controller B: left SAS port **IN** ➡ Expansion 5, controller B: SAS port **OUT**
- Expansion 5, controller B: SAS port **IN** ➡ Expansion 3, controller B: SAS port **OUT**
- Expansion 3, controller B: SAS port **IN** ➡ Expansion 1, controller B: SAS port **OUT**
- Storage controller B: right SAS port **IN** ➡ Expansion 6 or last, controller B: SAS port **OUT**
- Expansion 6 or last, controller B: SAS port **IN** ➡ Expansion 4, controller B: SAS port **OUT**
- Expansion 4, controller B: SAS port **IN** ➡ Expansion 2, controller B: SAS port **OUT**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's official website.

- **PS 3048URT/4048UR**

The following example illustrates **IN to OUT** connections between a PS storage system and six dual-controller JBOD expansions, using two **SAS 12G expansion boards.**



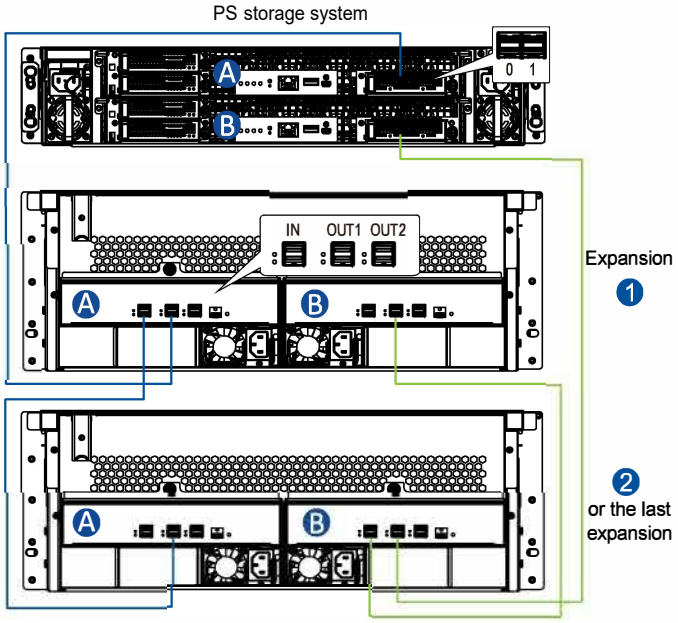
- Storage controller A: left SAS port **IN** ➡ Expansion 1, controller A: SAS port **OUT**
- Expansion 1, controller A: SAS port **IN** ➡ Expansion 3, controller A: SAS port **OUT**
- Expansion 3, controller A: SAS port **IN** ➡ Expansion 5, controller A: SAS port **OUT**
- Storage controller A: right SAS port **IN** ➡ Expansion 2, controller A: SAS port **OUT**
- Expansion 2, controller A: SAS port **IN** ➡ Expansion 4, controller A: SAS port **OUT**
- Expansion 4, controller A: SAS port **IN** ➡ Expansion 6 or last, controller A: SAS port **OUT**

- Storage controller B: left SAS port **IN** ➡ Expansion 5, controller B: SAS port **OUT**
- Expansion 5, controller B: SAS port **IN** ➡ Expansion 3, controller B: SAS port **OUT**
- Expansion 3, controller B: SAS port **IN** ➡ Expansion 1, controller B: SAS port **OUT**
- Storage controller B: right SAS port **IN** ➡ Expansion 6 or last, controller B: SAS port **OUT**
- Expansion 6 or last, controller B: SAS port **IN** ➡ Expansion 4, controller B: SAS port **OUT**
- Expansion 4, controller B: SAS port **IN** ➡ Expansion 2, controller B: SAS port **OUT**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's official website.

- **PS 5024URE**

The following example illustrates **IN to OUT** connections between a PS storage system and two dual-controller JBOD expansions, using two **SAS 12G expansion boards.**



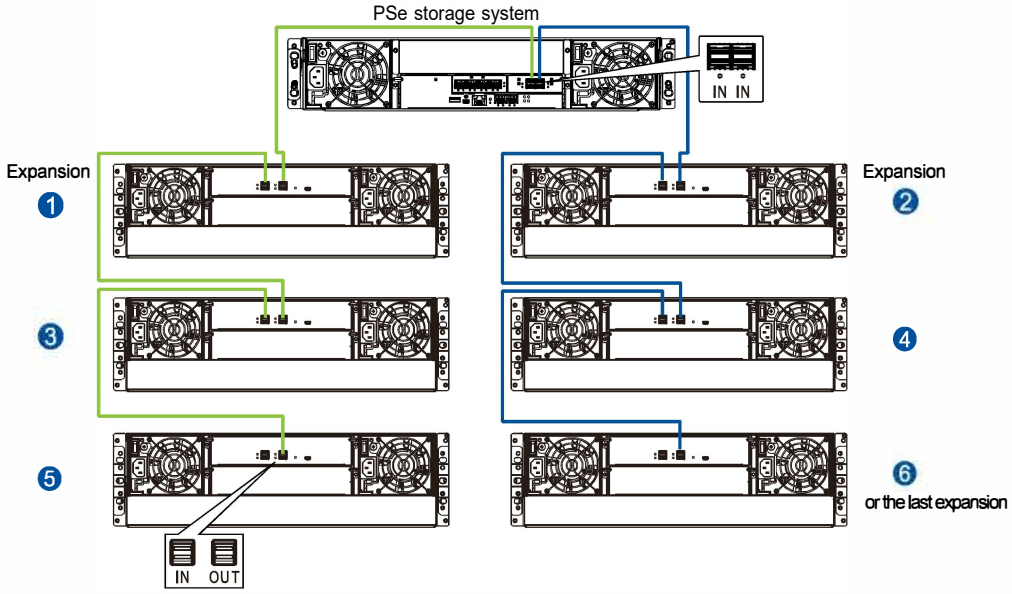
- Storage controller Ⓐ: left SAS port **IN** ➡ Expansion ❶, controller Ⓐ: SAS port **OUT1**
- Expansion ❶, controller Ⓐ: SAS port **IN** ➡ Expansion ❷, controller Ⓐ: SAS port **OUT1**

- Storage controller Ⓑ: left SAS port **IN** ➡ Expansion ❶, controller Ⓑ: SAS port **OUT1**
- Expansion ❶, controller Ⓑ: SAS port **IN** ➡ Expansion ❷, controller Ⓑ: SAS port **OUT1**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's official website.

- **PSe 2024U/3024U**

The following example illustrates **IN to OUT** connections between a PSe storage system and six single-controller JBOD expansions, using a **SAS 12G expansion board.**

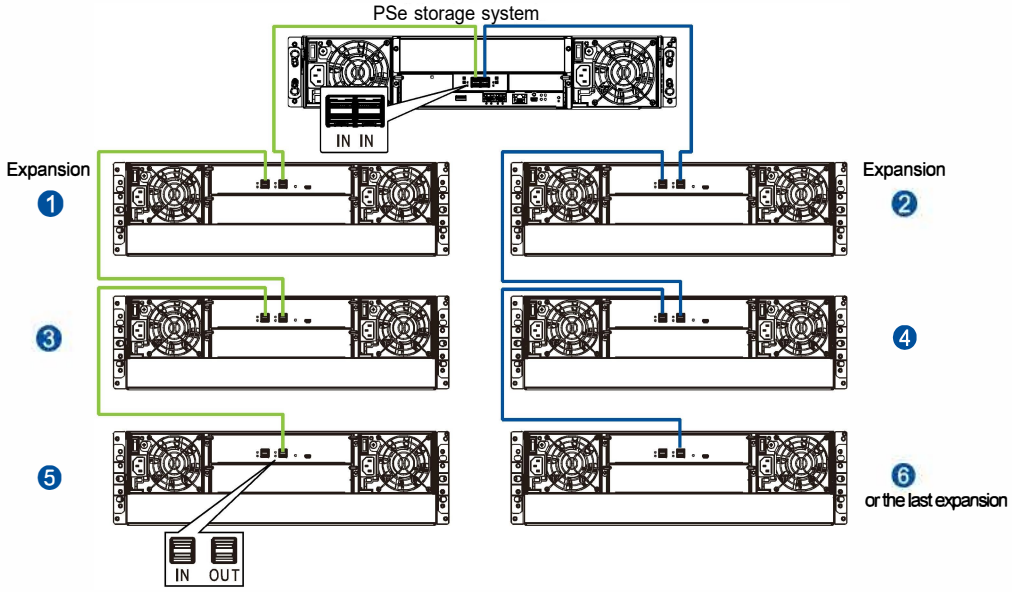


- Storage controller: left SAS port **IN** ➡ Expansion 1: SAS port **OUT**
- Expansion 1: SAS port **IN** ➡ Expansion 3: SAS port **OUT**
- Expansion 3: SAS port **IN** ➡ Expansion 5: SAS port **OUT**
- Storage controller: right SAS port **IN** ➡ Expansion 2: SAS port **OUT**
- Expansion 2: SAS port **IN** ➡ Expansion 4: SAS port **OUT**
- Expansion 4: SAS port **IN** ➡ Expansion 6 or last: SAS port **OUT**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's official website.

- **PSe 3024UT/4024U**

The following example illustrates **IN to OUT** connections between a PSe storage system and six single-controller JBOD expansions, using a **SAS 12G expansion board.**



- Storage controller: left SAS port **IN** ➡ Expansion 1: SAS port **OUT**
- Expansion 1: SAS port **IN** ➡ Expansion 3: SAS port **OUT**
- Expansion 3: SAS port **IN** ➡ Expansion 5: SAS port **OUT**
- Storage controller: right SAS port **IN** ➡ Expansion 2: SAS port **OUT**
- Expansion 2: SAS port **IN** ➡ Expansion 4: SAS port **OUT**
- Expansion 4: SAS port **IN** ➡ Expansion 6 or last: SAS port **OUT**

NOTE: For more information, refer to the **Expansion Guide** on PAC Storage's offical website.

2.6.3 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:

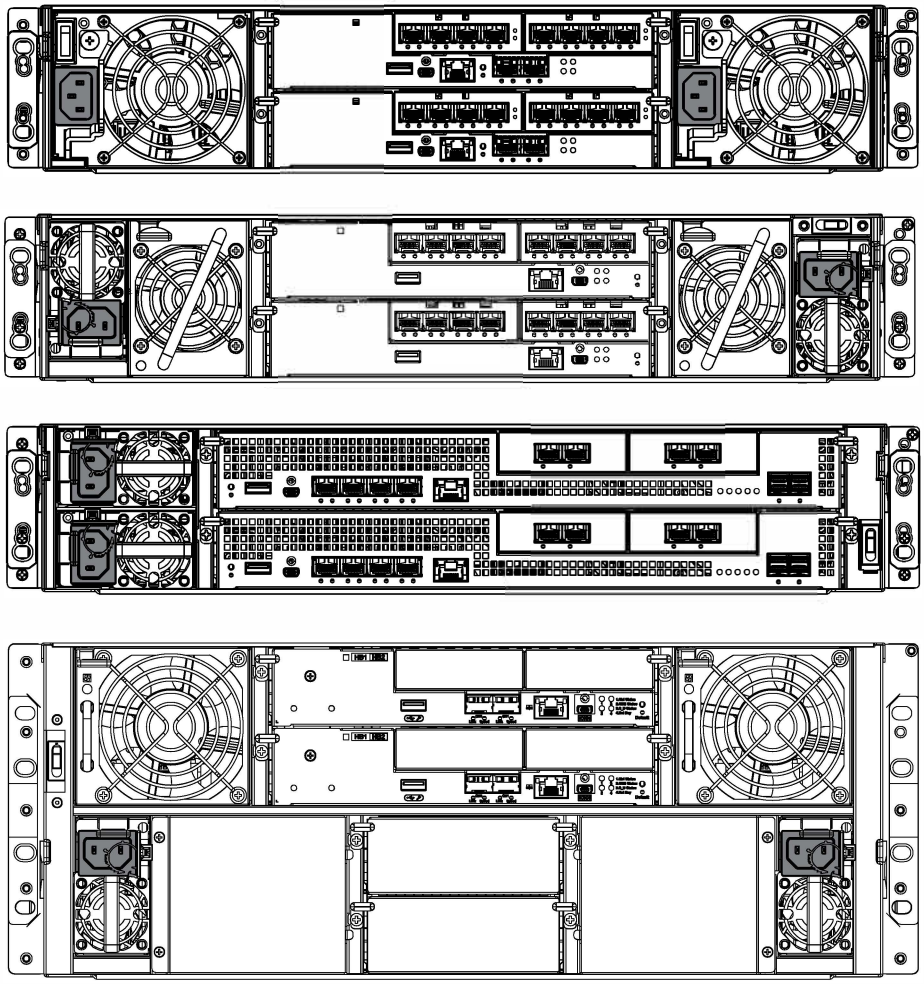
- All drives are correctly installed into the drive trays.
- All drive trays are installed into the system, whether or not they contain a drive.
- The system is connected to host computers, management computers, or external networking devices with the correct cables.

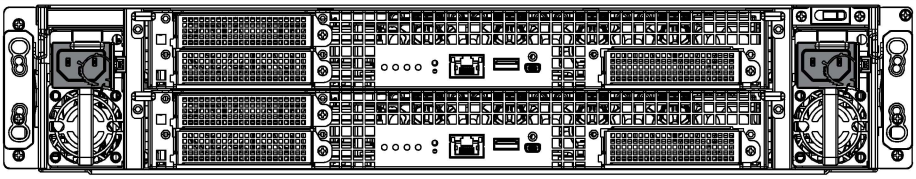
> **IMPORTANT!** Ensure to use the power cables with at least 1.2 meters in length. DO NOT use extension cables as the power cables are designed to connect **ONLY and DIRECTLY** to relocatable power taps (RPTs) on server cabinets.

- Ensure that the ambient temperature is no more than 35°C (with CBM).

Connecting to Power Source

Connect the bundled power cables the power sockets for both PSUs.

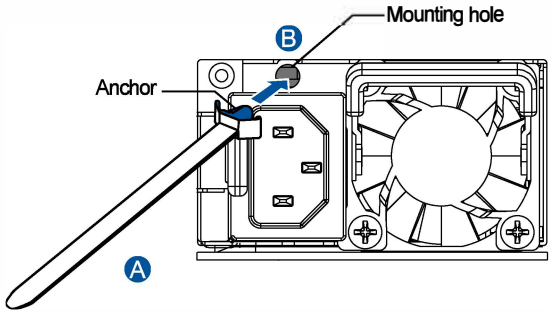




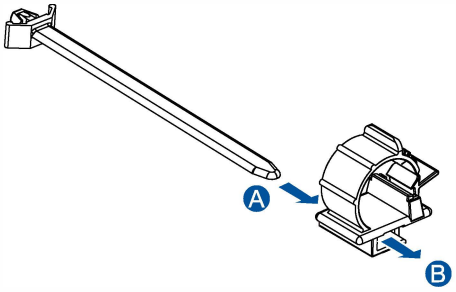
You can secure the power cord to the system with a bundled cable tie before you connect the power cord to the system's power socket.

To assemble the cable tie:

1. Insert the cable tie's anchor (A) into the mounting hole on the PSU (B).



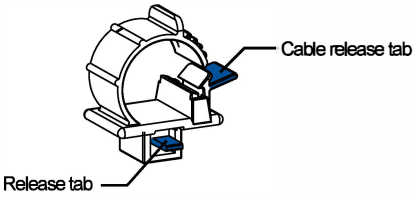
2. Insert the cable tie (A) into the lower slot of the cable clamp (B).



3. Connect the power cords to the PSUs' power sockets.

> **IMPORTANT!** DO NOT plug the power cords to a power outlet yet.

4. Use the cable release tab to open the cable clamp, insert the power cord, and then press the cable clamp to close it until you hear a snap.

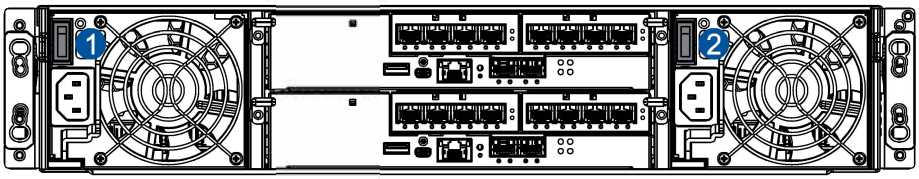


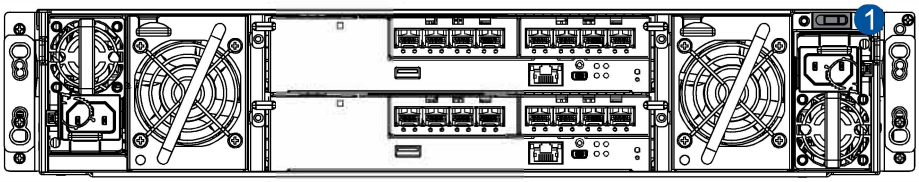
> **NOTE:** To adjust the cable's position and tightness, use the cable damp's release tab.

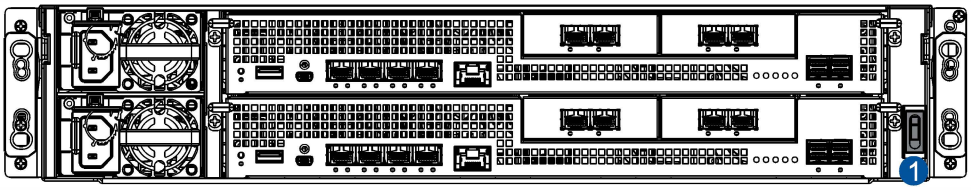
5. Connect the power cords to a power outlet.

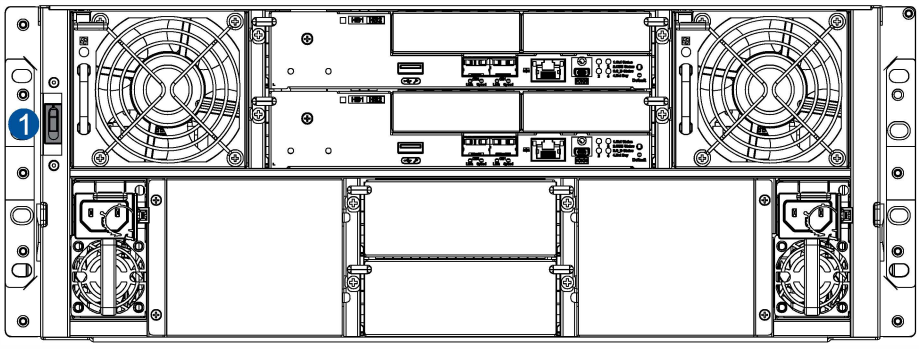
Turning On the System

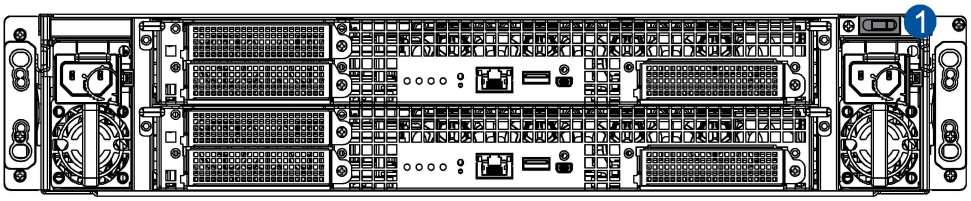
1. Turn on the networking devices.
2. Turn on the JBOD/expansion systems (if applicable).
3. Press the power switches to turn on the storage system. For models with two power switches, press the switches from left to right.
4. Turn on the application servers.











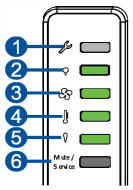
Checking the Power Status

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, Drive Tray, PSU, and Fan Module LEDs**

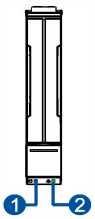
Front panel LEDs

Item	Name	Status
1	Service	Off
2	Power	Green
3	Cooling fan	Green
4	Temperature	Green
5	System fault	Green
6	Mute/Service button	



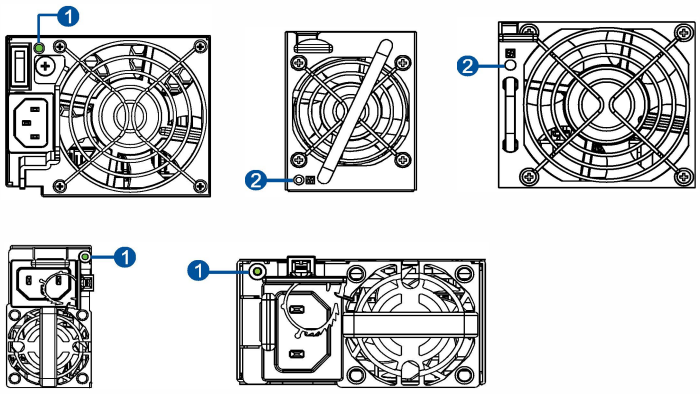
Drive tray LEDs

Item	Name	Status	Description
1	Drive busy	Blinking blue	R/W activity
		Blue	Extremely busy
		Off	No activity
2	Power status	Green	On
		Red	Failed



PSU & fan module LEDs

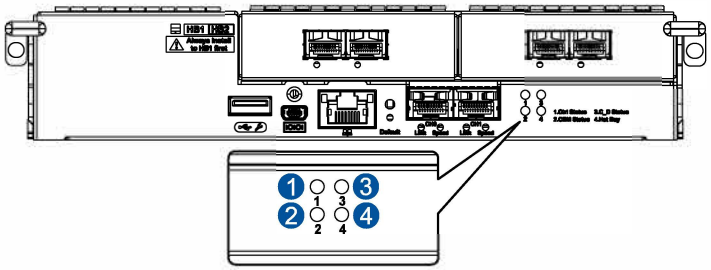
Item	Name	Status
1	PSU	Green
2	Fan module	Off



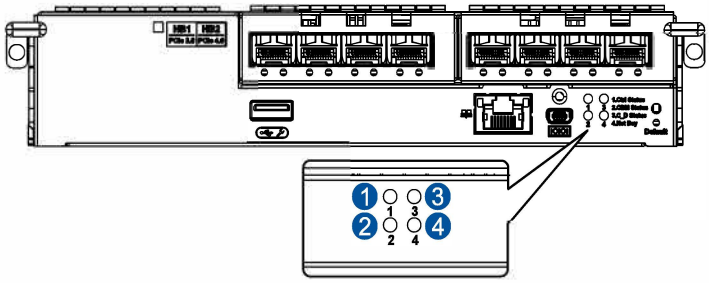
NOTE:

- Cache dirty LED may occasionally blink in amber, which indicates the NAS OS is in operation.
- Check the power status LED on the front panel to know the main power status of the system.
- The fan module is present on certain types of models (EU version) only.
- Refer to **Chapter 3 System Monitoring** for more information regarding the LED descriptions.

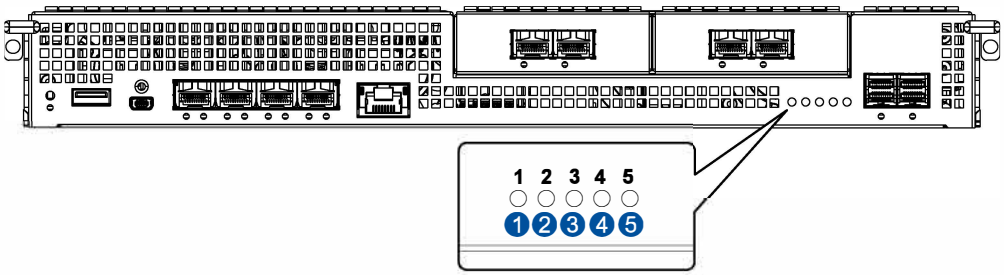
- **Controller Module LEDs**



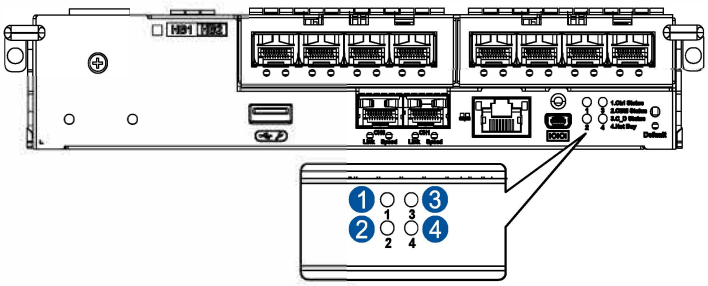
PS/PSe 2024U/3024U



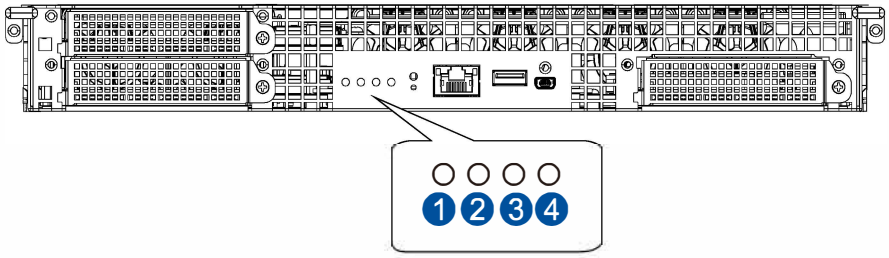
PS/PSe 3024UT/4024U



PS 3025U/4025U



PS 3048UT/4048U



PS 5024UE

Number	LED Name	Status
1	Control Status	Green
2	CBM Status	GS: Green GSe: OFF without CBM (default); Green with CBM (optional)
3	Cache Dirty	OFF
4	Host Busy	OFF / Blinking green
5	Fan Status	OFF

NOTE: Refer to **Chapter 3 System Monitoring** for more information regarding the LED descriptions.

2.6.4 Management Tool Connections

To connect your storage to management interfaces, you need the following:

- RJ-45 LAN cable (user supplied)
- D89 female to mini USB cable (bundled with the package)

> **IMPORTANT!** Always connect to the primary controller.

> **NOTE:** A null modem may be required if you are using a 3rd party cable.

You can access the storage system via the following interfaces:

- **Ethernet management port (out-of-band connection)**

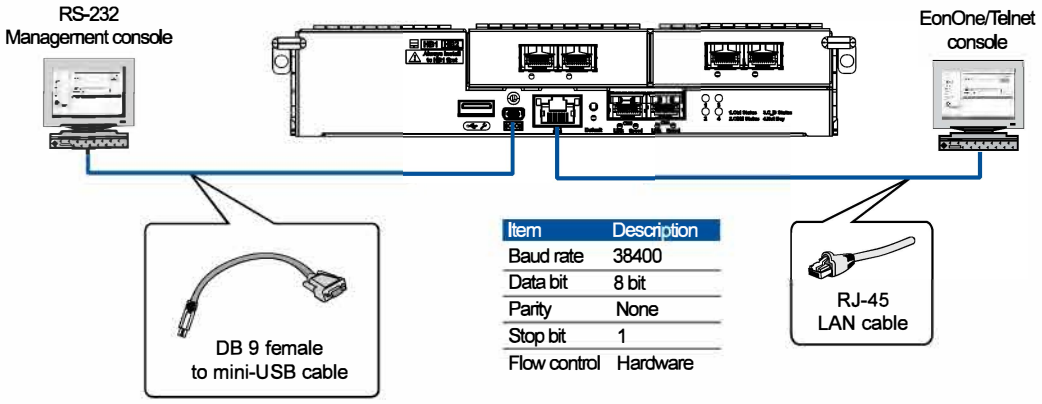
  Access the storage system from a remotely connected computer using RJ-45 Ethernet cables.

- **Onboard host ports or host board ports (in-band connection)**

  Access the storage system from the host servers through the host links.

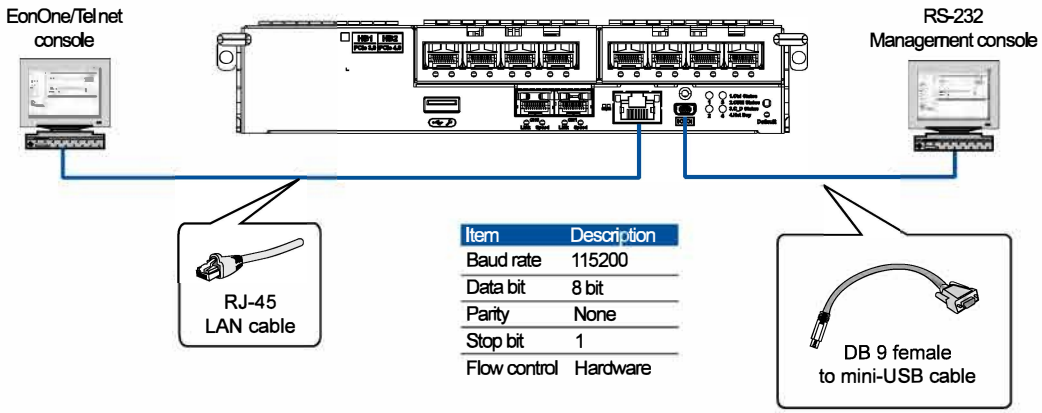
- **Serial port**

  Access the storage system directly from the computer via the RS-232C serial port.



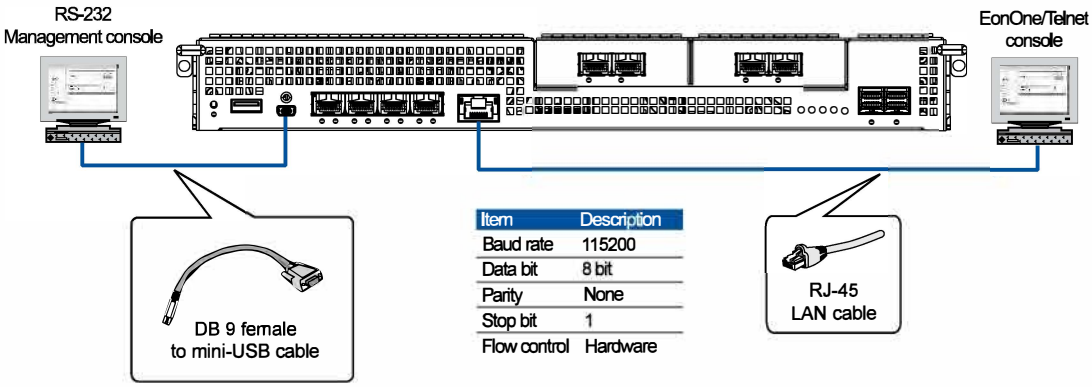
Item	Description
Baud rate	38400
Data bit	8 bit
Parity	None
Stop bit	1
Flow control	Hardware

PS/PSe 2024U/3024U



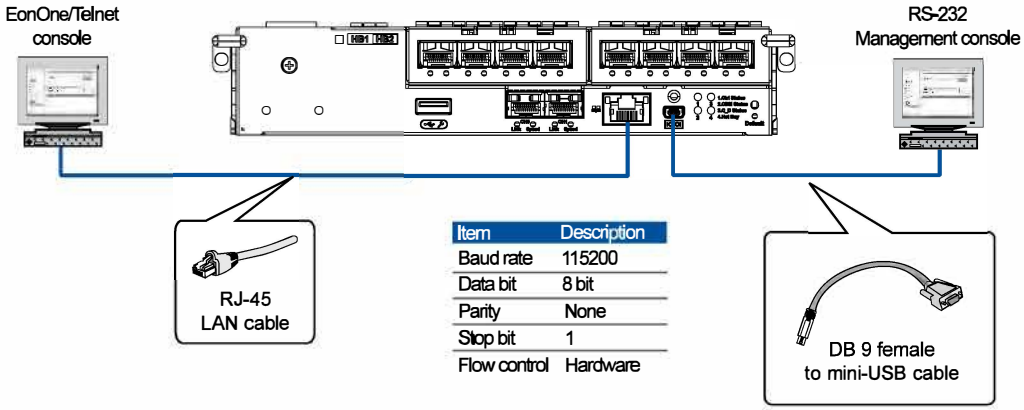
Item	Description
Baud rate	115200
Data bit	8 bit
Parity	None
Stop bit	1
Flow control	Hardware

PS/PSe 3024UT/4024U



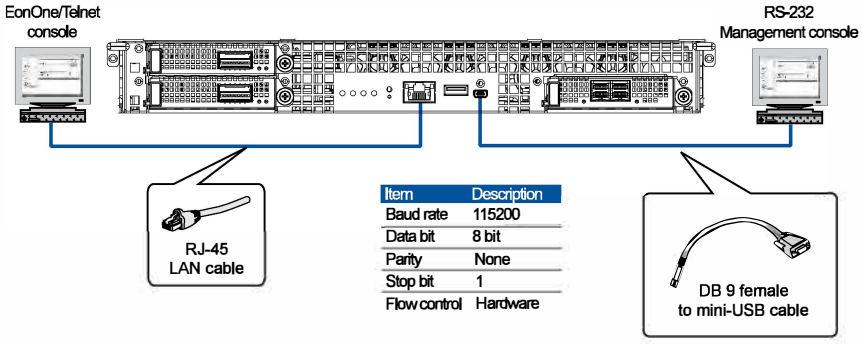
Item	Description
Baud rate	115200
Data bit	8 bit
Parity	None
Stop bit	1
Flow control	Hardware

PS 3025U/4025U



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

PS 3048UT/4048U



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

PS 5024UE

Using EonOne

Manage the storage system using the EonOne GUI software.

1. Connect the storage system to a remote computer via the Ethernet management port.
2. Launch a web browser and enter the IP address of the Ethernet management port. You must obtain the IP address, either a static IP address or DHCP, from your network administrator. If neither is available, use the default address <10.10.1.1>.
3. Enter **admin** into the Username and Password fields to log in to EonOne.

Using Central EonOne

Manage multiple storage systems using Central

EonOne.

1. Connect the storage system to a remote computer via the management Ethernet port or to a host PC using an RJ-45 LAN cable.
2. Install the Central EonOne software suite. To download it, go to Infortrend's website > **Support> Technical Support,** find your model, and then go to **Downloads.**
3. Launch Central EonOne and enter **admin** into the Username and Password fields.
4. Add the storage system to the **Device List.**
5. Click the **Settings** icon in the top-right corner to configure the storage system.
6. Activate the license.

   a. Click **System** > **License Management> Generate the license application file.** Download will start immediately and the file will be saved on your computer.

   b. Visit the PAC Storage website and register using the generated License Application File. The license number is attached to the software license envelope.

   c. Enter the license number, download the **License Key File,** and then upload it to EonOne to activate the license.

Using the Firmware Menu

View storage settings using the firmware menu.

1. Connect your computer to the storage system via the RS-232C serial port.
2. Launch VT-100 terminal emulation software on your PC.
3. Configure the serial port as shown above to connect the system. The main firmware menu appears.
4. Use the arrow keys to select from the menu.

NOTE: Refer to the **EonOne Software User Manual** for details.

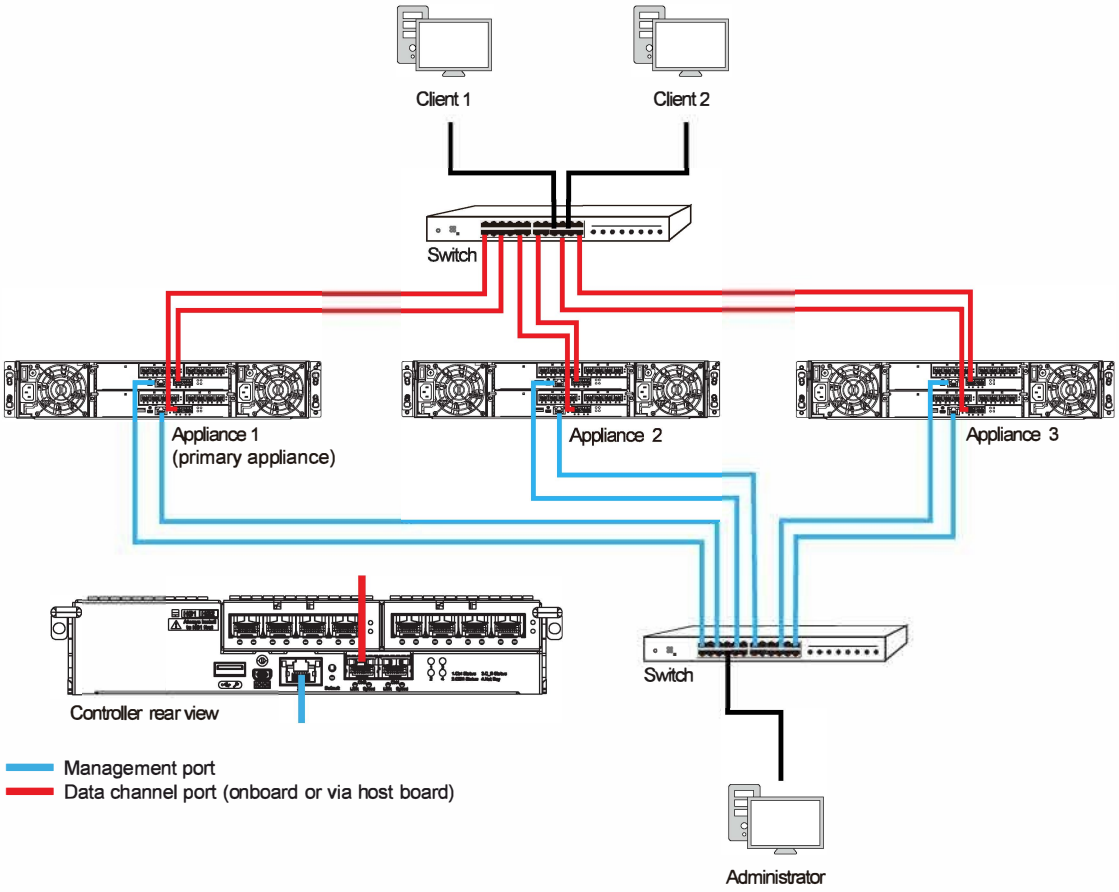
2.6.5 Scale-out Cluster Connection

Via scale-out, you can connect multiple storage appliances to increase storage performance and capacity. Initial deployment can start with only one appliance. As your data grows over time, you add more appliances one by one, forming a scale-out duster of up to four appliances, with the first one acting as the primary appliance. Each appliance can then be connected to expansion enclosures to further increase storage capacity.

Cable Connection

The drawing below illustrates cable connection of a cluster with three storage appliances.

- Connect the **management port** on each storage appliance to the same network that the administrator's computer is connected to (marked in blue below).
- Connect the **data channel port** on each storage appliance to another network that clients are connected to (marked in red below).



Scale-out Settings

After connecting networking cables, log in to EonOne using the management IP of the first appliance. Then enable scale-out and complete required settings. For a step-by-step tutorial on scale-out settings, refer to the PS Installation Guide on our website (at **Support> Technical Support> Unified Storage> Installation).**

NOTE:

- Scale-out features are also supported on one single appliance.
- Additional licenses are required for a file-level cluster with two or more appliances.

2.6.6 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 1/0 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 the **EonOne Software User 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 PS/PSe U.2 series systems.

3.1 Monitoring Features

The system is equipped with self-monitoring features that 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.

- **EonOne**

  EonOne is a browser-based GUI (graphical user interface) software tool that you can install into a local or remote computer and access via the network. For more information, refer to the **EonOne Software User Manual** on PAC Storage's official website; find your model and then go downloads fo find the most up to date document.

- **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.

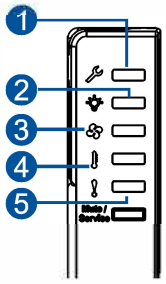
- **Audible Alarms**

  The audible alarms are triggered in case of system failures.

3.2 LEDs

3.2.1 Front Panel LEDs

This section details the system LEDs and their descriptions (see next page).



Number	LED Name	Number	LED Name
1	Service	4	Temperature
2	Power	5	System Fault
3	Cooling Module		

Color/Status	Description	Action
	The system is operating normally.	No action required.
	• A controller cannot be detected. • Memory is not installed. Wrong • BIOS self-test	1. Power off the system and remove the controller. 2. Make sure that all the DIMMS are properly installed. Then install the controller back. 3. For a dual-controller model, repeat the above for the other controller. 4. Power up the system. 5. If unresolved, contact technical support.
	The system memory is not enough.	1. Power off the system and remove the controller. 2. Make sure that the memory size is equal to or larger than the default memory size per controller. Also make sure that all the DIMMs are properly installed. Then install the controller back. 3. For a dual-controller model, repeat the above for the other controller. 4. Power up the system. 5. If unresolved, contact technical support.
	System boot failed (Service LED flashing in white).	1. Identify the faulty controller(s). 2. Replace the faulty controller(s). 3. If unresolved, contact technical support.

NOTE:

- Refer to **Hardware Specifications** > **Cache Memory (per Controller)** for the default memory size per controller.
- Refer to **Chapter 4 System Maintenance** to remove, check, reinstall, or replace a component.

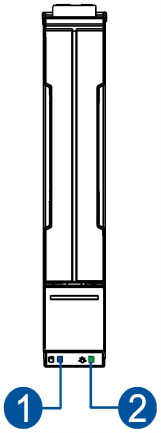
Color/Status	Description	Action
	One of the PSUs is faulty.	1. Check the PSU LEDs on the rear panel to find the faulty PSU. 2. Remove and reinstall the PSU properly. 3. If unresolved, replace the PSU. 4. If still unresolved, contact technical support.
	The system temperature is too high.	1. Make sure that the rear openings are NOT covered. 2. Make sure that the environmental temperature is within the normal range. 3. If unresolved, contact technical support.
	• A cooling fan built with the PSU is faulty. • A cooling fan inside the enclosure is faulty (2U 25-bay models).	1. Check the cooling fans on the rear panel. Replace the PSU that has the faulty cooling fan. 2. For 2U 25-bay models, remove a controller, check the cooling fans inside, and replace the faulty fan. Repeat for the other controller. 3. If unresolved, contact technical support.
	A cooling fan is faulty and the system temperature is too high.	1. Make sure that the rear openings are NOT covered. 2. Make sure that the environmental temperature is within the normal range. 3. Check the cooling fans on the rear panel. Replace the PSU that has the faulty cooling fan. 4. For 2U 25-bay models, remove a controller, check the cooling fans inside, and replace the faulty fan. Repeat for the other controller. 5. If unresolved, contact technical support.

NOTE:

- Refer to **Hardware Specifications** > **Green Design** for the normal temperature range.
- Refer to **Chapter 4 System Maintenance** to remove, check, reinstall, or replace a component.

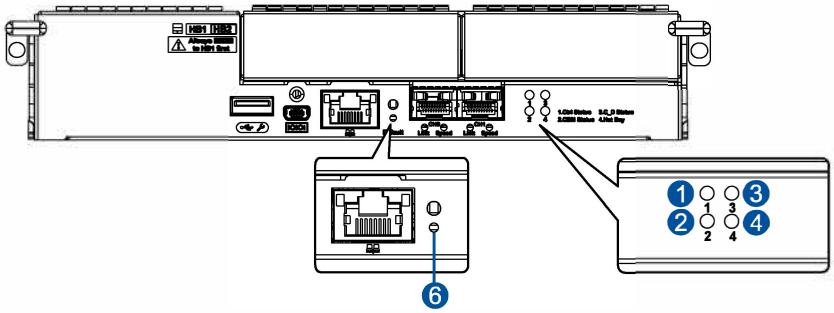
3.2.2 Drive Tray LEDs

There are two LEDs that indicate the drive status. When you get notified by a drive failure message, you must check the drive tray LEDs to find the failed drive.

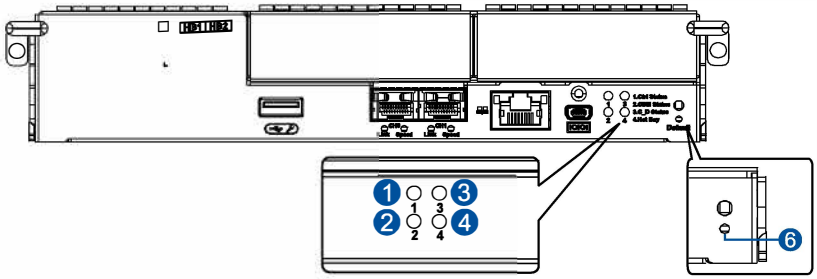


Number	LED Name	Color/ Status	Description
1	Drive Busy	⚡	Data is being written to or read from the drive. The drive is busy.
		●	Data is being written to or read from the drive. The drive is extremely busy.
		OFF	The drive is plugged in but there is no activity going on.
2	Power Status	●	The drive bay is occupied and working normally.
		●	The drive failed or a connection problem occurred.

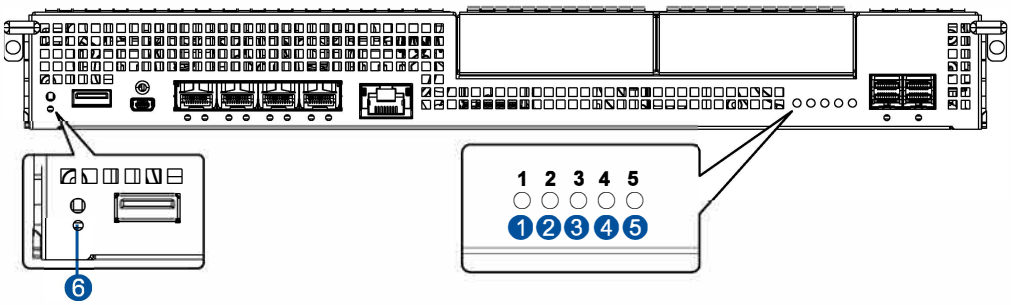
3.2.3 Controller Status LEDs



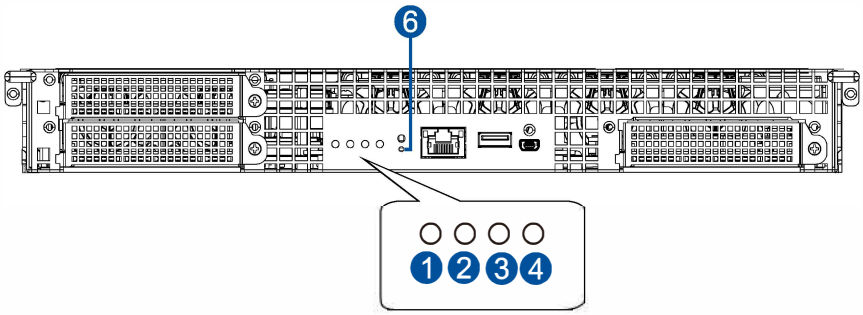
PS/PSe 2024U/3024U



PS/PSe 3024UT/4024U; PS 3048UT/4048U



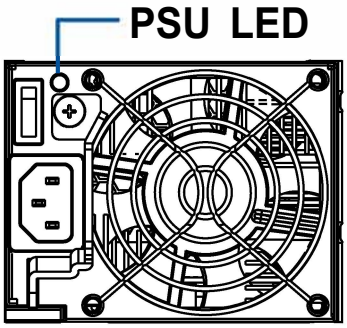
PS 3025U/4025U



PS 5024UE

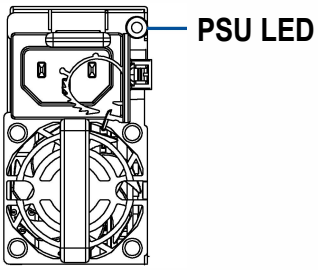
Number	LED Name	Color/ Status	Description
1	Control Status	Green	A controller is operating normally.
		Amber	• A component has failed or inappropriate RAID configurations caused system faults. • The controller is initializing.
2	CBM Status	Green	• The super capacitor and the FBM (flash backup module) are installed in the system. • The CBM (cache backup module) is ready for operation.
		Amber	• The CBM failed in operating, either the super capacitor or the FBM. • Either the super capacitor or the FBM is missing.
		Green blinking	The super capacitor is charging.
		OFF	The super capacitor is not installed in the system.
3	Cache Dirty	Amber	• Cache memory is dirty. • Data in the FBM is flushed to the cache. • Errors occurred with cache memory (ECC errors). • Data is flushed from FBM to drive when the power is restored. • The super capacitor temperature reading is abnormal (out of 0 to 35°C range). • The super capacitor is not present.
		Amber blinking	The cached data is being transferred to the FBM after a power outage. Once the transfer is done, all LEDs will turn off. This signal is local to each controller.
		OFF	The cache is clean and the super capacitor can sustain the memory in case of power loss.
4	Host Busy	Green blinking	Traffic is going on the host bus.
		OFF	No traffic is going on the host bus.
5	Fan Status	OFF	The cooling fan module is operating normally.
		Red	The cooling fan module is faulty.
6	Restore Default	Green	Successfully reset the controller after pressing and holding the restore default button.

3.2.4 PSU and Fan Module LEDs



PS/PSe 2024U/3024U

PS/PSe 3024UT/4024U

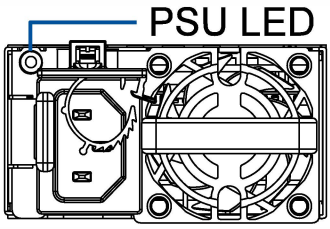


PS/PSe 2024U/3024U (EU version)

PS/PSe 3024UT/4024U (EU version)

PS 3048UT/4048U

PS 5024UE



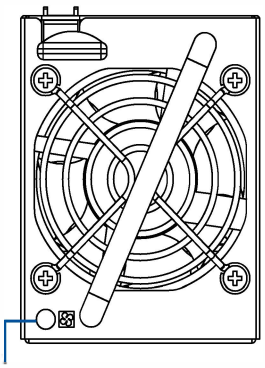
PS 3025U/4025U

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 operating under high temperature or with slow fan speed.
	• The PSU is faulty. • Over Voltage Protection (OVP)/Over Power Protection (OPP)/Over Current Protection (OCP) is activated. • The fan built with the PSU is faulty.
OFF	The system is not connected to the power.

The PSU LED alerts you of the current status of your PSU. When this component fails, you must replace the PSU immediately.

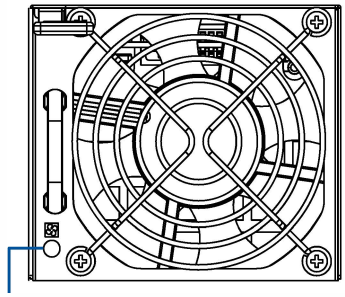
WARNING! Keep your fingers away from moving parts of the system to prevent technical mishaps and physical injuries.

NOTE: For more details, refer to section **4.2 Replacing a PSU Module.**



Fan module LED

PS/PSe 2024U/3024U (EU version)
PS/PSe 3024UT/4024U (EU version)



Fan module LED

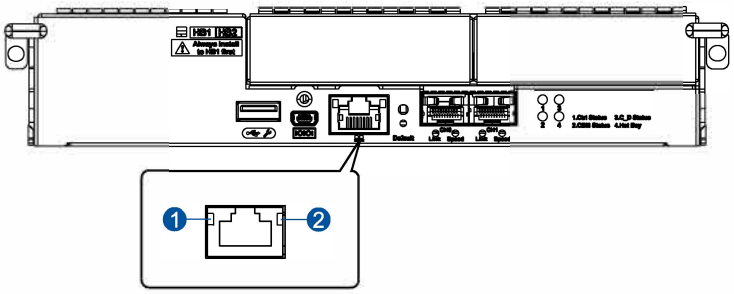
PS 3048UT/4048U

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

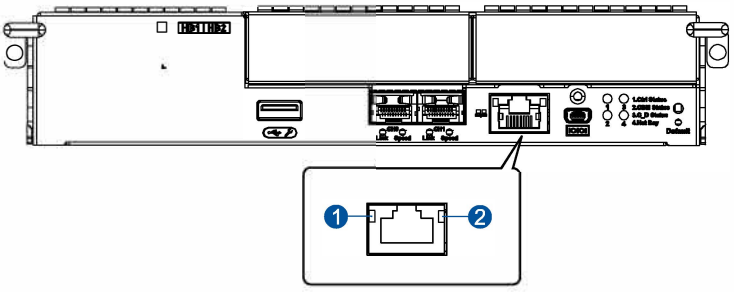
WARNING! Keep your fingers away from moving parts of the system to prevent technical mishaps and physical injuries.

NOTE: For more details, refer to **4.8 Replacing a Fan Module.**

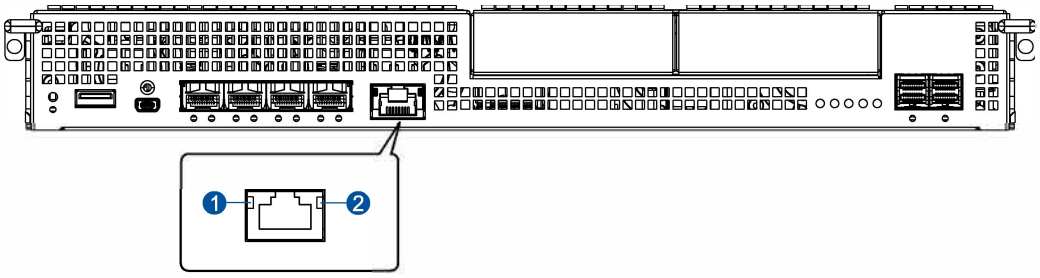
3.2.5 1 GbE Management Port (RJ-45) LEDs



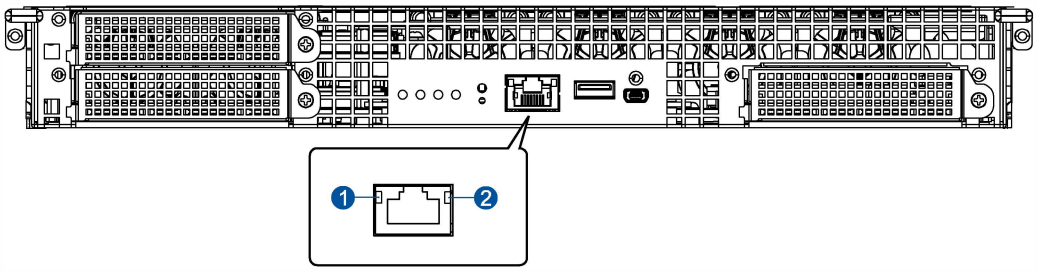
PS/PSe 2024U/3024U



PS/PSe 3024UT/4024U; PS 3048UT/4048U



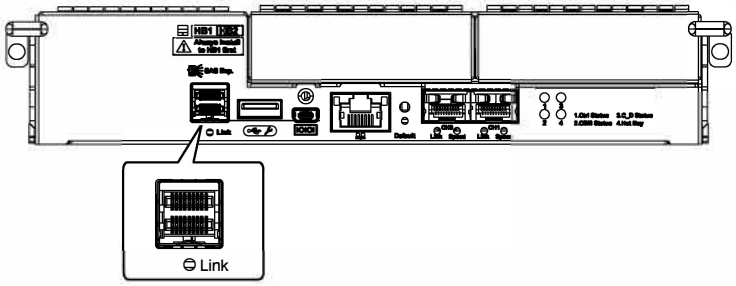
PS 3025U/4025U



PS 5024UE

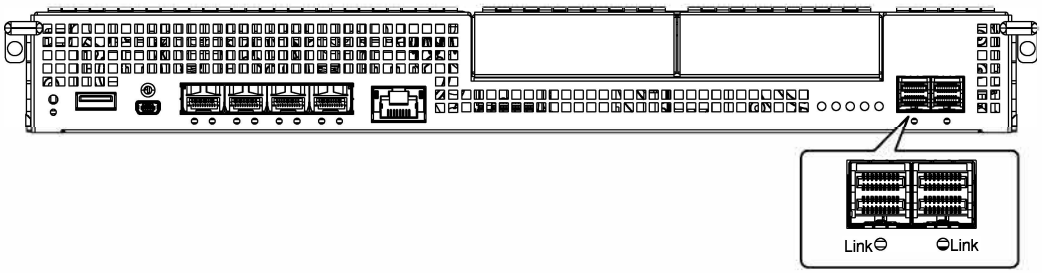
Number	LED Name	Color/Status	Description
1	Speed	●	1Gb connection is established.
		OFF	10/100Mb connection is established.
2	Link/Active	●	A connection is established.
		● ϟ	Data 1/0 is ongoing.
		OFF	No connection is established.

3.2.6 Onboard 12Gb/s SAS Expansion Port LEDs



PS 2024U/3024U

NOTE: Only systems purchased before a certain date have onboard SAS expansion ports.

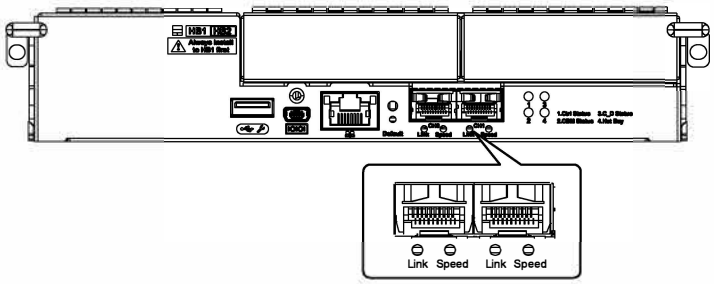


PS 3025U/4025U

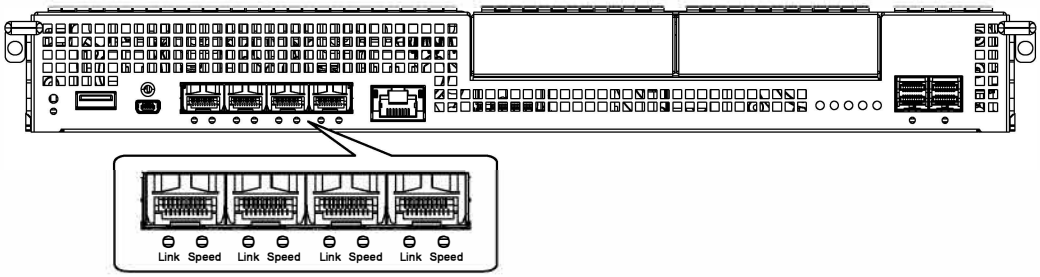
LED Name	Color/Status	Description
Link/Active	●	All 4 PHY links are validly linked.
	⚡	Less than 4 PHY links are connected (at least one of the PHYs has failed).
	OFF	All 4 PHY links are offline.

3.2.7 Onboard Host Port LEDs

- Onboard 10GbE Port (SFP+) LEDs



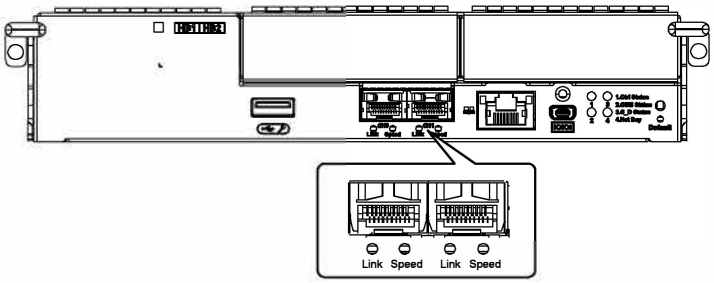
PS/GSe 3024U



PS 3025U/4025U

LED Name	Color/Status	Description
Link/Active	●	A connection is established.
	⚡	Data 1/0 is ongoing.
	OFF	No connection is established.
Speed	●	10Gb connection is established.
	OFF	1Gb connection is established.

- **Onboard 25GbE Port (SFP28) LEDs**

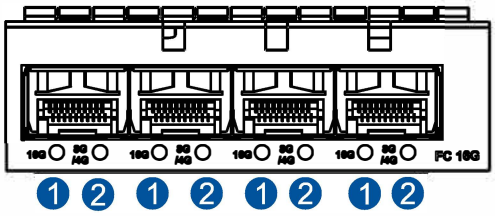


PS/PSe 3024UT; PS 3048UT

LED Name	Color/Status	Description
Link/Active	●	A connection is established.
	ϟ	Data 1/0 is ongoing.
	OFF	No connection is established.
Speed	●	25Gb connection is established.
	OFF	1Gb connection is established.

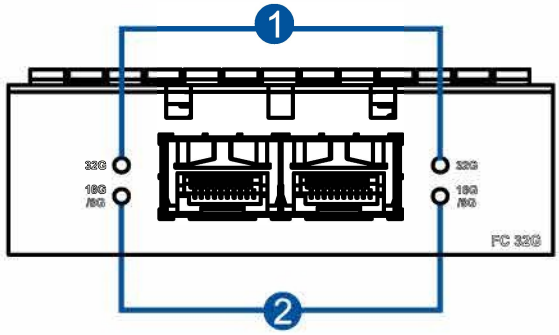
3.2.8 Host Board LEDs

- **16Gb/s Fiber Channel Host Board LEDs**



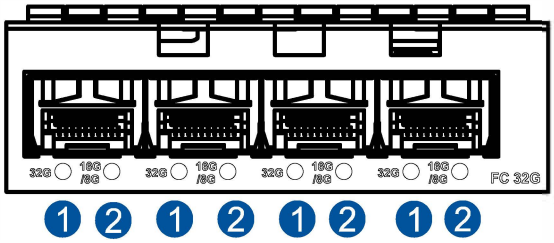
Number	LED Name	Color/Status	Description
1	16Gb/s Speed	●	A connection is established.
		● (fast)	Data I/O is ongoing.
		● (slow)	No link/connection is established.
2	8Gb/s Speed	●	A connection is established.
		● (fast)	Data I/O is ongoing.
		● (slow)	No link/connection is established.
	4Gb/s Speed	●	A connection is established.
		● (fast)	Data I/O is ongoing.
		● (slow)	No link/connection is established.

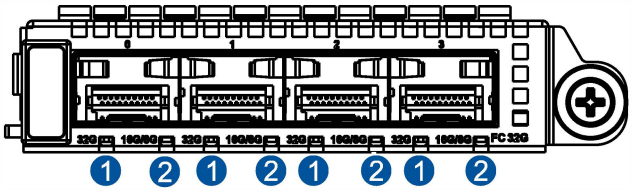
- **32Gb/s X 2 Fiber Channel Host Board LEDs**



Number	LED Name	Color/ Status	Description
1	32Gb/s Speed	●	A connection is established. Data
		● (fast)	1/0 is ongoing.
		● (slow)	No link/connection is established.
2	16Gb/s Speed	●	A connection is established.
		●	Data 1/0 is ongoing.
		OFF	No link/connection is established.
	8Gb/s Speed	●	A connection is established.
		●	Data 1/0 is ongoing.
		OFF	No link/connection is established.

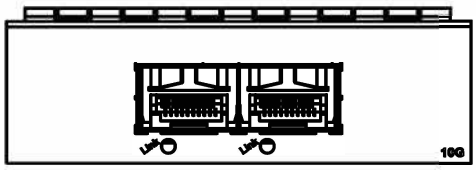
- **32Gb/s x 4 Fiber Channel Host Board LEDs**





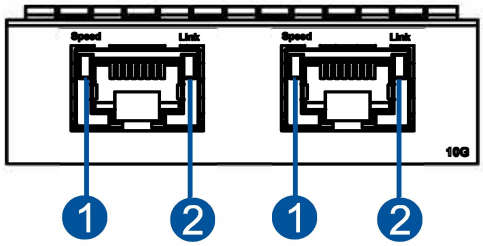
Number	LED Name	Color/ Status	Description
1	32Gb/s Speed	●	A connection is established.
		● (fast)	Data 1/0 is ongoing.
		● (slow)	No link/connection is established.
2	16Gb/s Speed	●	A connection is established.
		● (fast)	Data 1/0 is ongoing.
		● (slow)	No link/connection is established.
	8Gb/s Speed	●	A connection is established.
		● (fast)	Data 1/0 is ongoing.
		● (slow)	No link/connection is established.

- **10GbE (SFP+) Host Board LEDs**



LED Name	Color/Status	Description
Link/Active	●	A connection is established.
	ϟ	Data 1/0 is ongoing.
	OFF	No connection is established.

- **10GbE (RJ-45) Host Board LEDs***

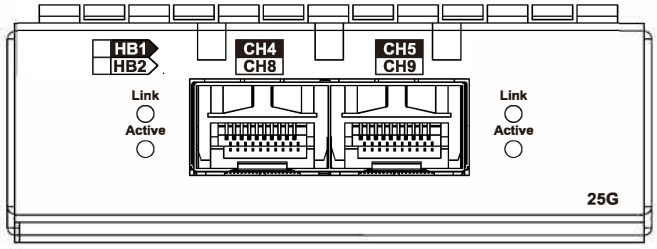


Number	LED Name	Color/Status	Description
1	Speed	●	10Gb connection is established.
		●	1Gb connection is established.
		OFF	10/100Mb connection is established.
2	Link/Active	●	A connection is established.
		ϟ	Data 1/0 is ongoing.
		OFF	No connection is established.

NOTE: 10GbE (RJ-45) host board has been discontinued (EOL).

- **25GbE x 2 Host Board (SFP28) LEDs***

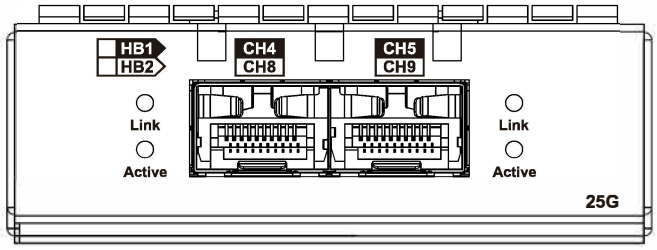
Part number: RES25G1HIO2-0010



LED name	Color/Status	Description
Link	●	25Gb/s connection is established.
	OFF	• 10Gb/s or 1Gb/s connection is established {when Active = blinking amber). • No connection is established {when Active = OFF).
Active	●	Data 1/0 is ongoing.
	OFF	No data 1/0.

- **25GbE x2 Host Board (SFP28) LEDs**

Part number: RES25G3HIO2-0010

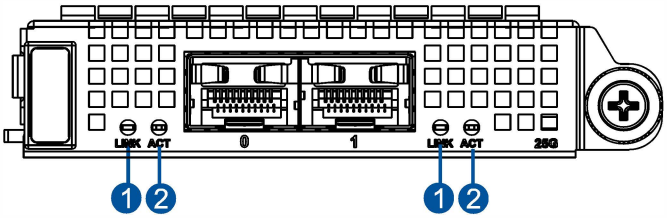


LED name	Color/Status	Description
Link	●	25Gb/s connection is established.
	●	10Gb/s or 1Gb/s connection is established.
	OFF	No connection is established.
Active	⚡	Data 1/0 is ongoing.
	OFF	No data 1/0.

NOTE:

- For a 25GbE x2 host board, both ports on the same host board must be set to the same channel type (block-level or file-level).
- There are two types of 25GbE x2 host boards. Refer to the pictures and part numbers above to identify your host board.
- 25GbE x2 host board with P/N RES25G1HIO2-0010 has been discontinued (EOL).

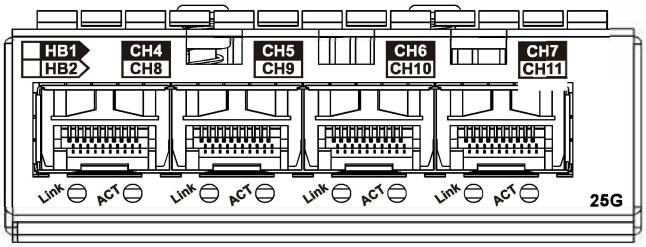
- **25GbE x2 Host Board (SFP28) LEDs**



LED name	Color/Status	Description
Link	●	25Gb/s connection is established.
	●	10Gb/s or 1 Gb/s connection is established.
	OFF	No connection is established (when Active = OFF).
Active	●	Data 1/0 is ongoing.
	OFF	No data 1/0.

NOTE: For a 25GbE x2 host board, both ports on the same host board must be set to the same channel type (block-level or file-level).

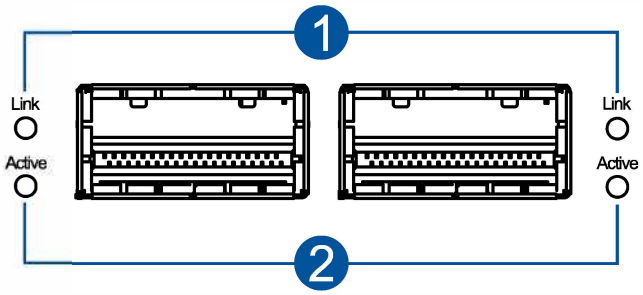
- **25GbE x4 Host Board Port LEDs**



LED name	Color/Status	Description
Link		25Gb/s connection is established.
		1 0Gb/s or 1 0Gb/s connection is established. No
	OFF	connection is established.
Active		Data 1/0 is ongoing.
	OFF	No data 1/0.

IMPORTANT! For a 25GbE x4 host board, all ports on the same host board must be set to the same channel type (block-level or file-level).

- **40GbE (QSFP+) Host Board LEDs***

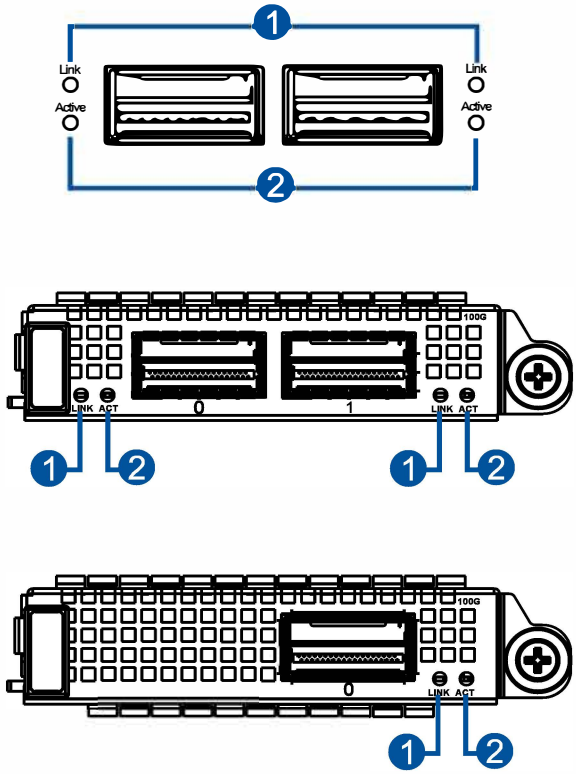


Number	LED Name	Color/Status	Description
1	Link		A connection is established. No
		OFF	connection is established. Data
2	Active		1/0 is ongoing.
		OFF	No data 1/0.

NOTE:

- For 40GbE x 2, both ports on the same host board must be set to the same channel type (block-level or file-level).
- 40GbE (QSFP+) host board has been discontinued (EOL).

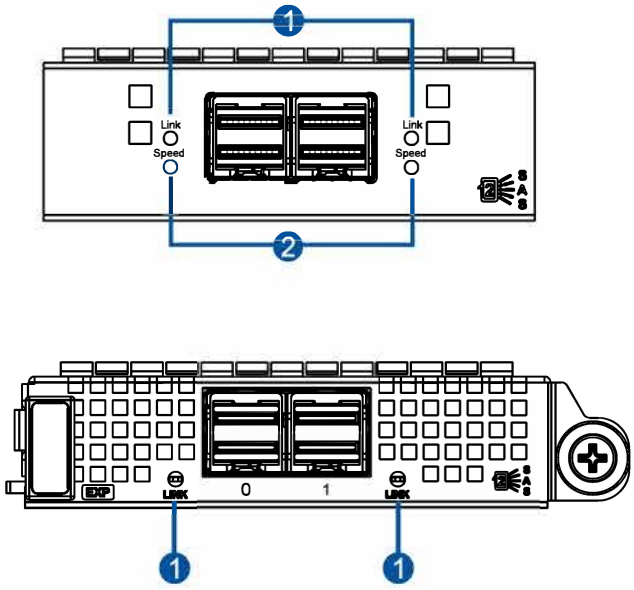
- **100GbE (QSFP28) Host Board LEDs**



Number	LED Name	Color/Status	Description
1	Link	Green	100Gb connection is established.
		Orange	50/25/10/1Gb connection is established.
		OFF	No connection is established.
2	Active	Green (blinking)	Data 1/0 is ongoing.
		OFF	No data 1/0.

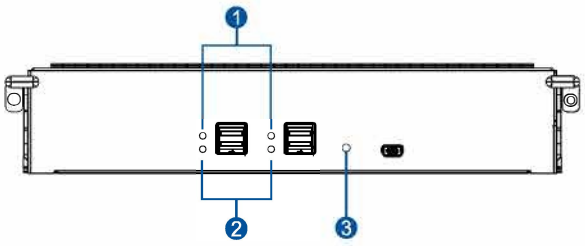
NOTE: For 100GbE x 2, both ports on the same host board must be set to the same channel type (block-level or file-level).

- **12Gb/s SAS Host/Expansion Board LEDs**

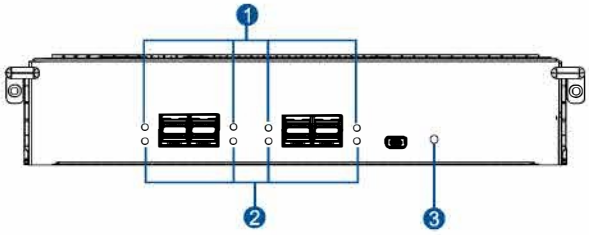


Number	LED Name	Color/Status	Description
1	Link	●	A connection is established.
		OFF	No connection is established.
2	Speed	●	12Gb connection is established.
		●	6Gb connection is established.
		OFF	No connection is established.

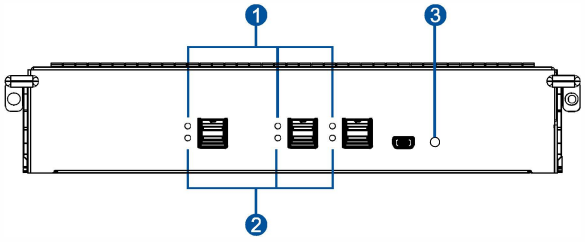
3.2.9 JBOD 12Gb/s SAS Expansion Controller LEDs



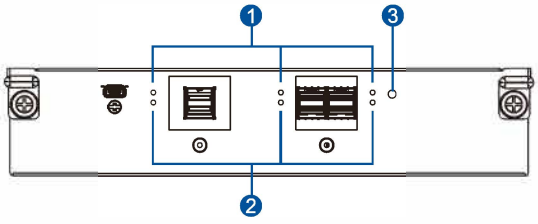
JB 3012A/3016A



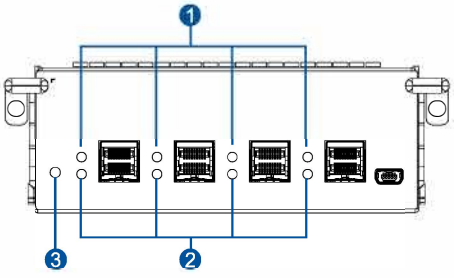
JB 30258A



JB 3060L



JB 3060



JB 3090

Number	LED Name	Color/Status	Description
1	Link	●	All PHYs are validly linked.
		⚡	One of the PHYs has failed.
		OFF	All PHYs are offline.
2	Speed	●	12Gb/s link speed
		●	6Gb/s or 3Gb/s link
		OFF	speed No connection
3	Controller Status	●	The controller is operating normally.
		●	• A component failure • occurred. Initialization is ongoing.

3.3 Alarms and PC Bus

This section details the system alarms and I^2C bus.

Audible Alarms

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

- Cooling modules
- PSU modules
- Drives
- Sensors or presence detection circuitries

If you hear an audible alarm, ensure to read the error message on the terminal or in EonOne 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.

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

I^2C bus

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

4 System Maintenance

This chapter provides maintenance and replacement procedures of replaceable components of the system.

4.1 Replaceable Components

The system is comprised of replaceable components:

- PSU/cooling module
- Fan module
- Controller module
- Memory module
- Host board / expansion board
- Super capacitor
- Drive

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 qualified engineers who are familiar with the system to recommend 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.

4.2 Replacing a PSU Module

Replace a defective PSU/cooling module immediately, but only when you have the replacement.

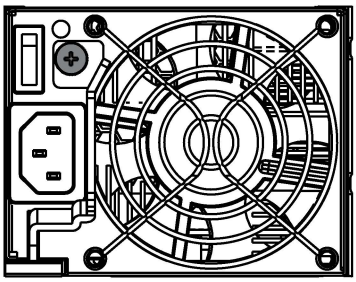
WARNING! Although the system can still operate with a defective PSU, it is not recommended that you use it for an extended period of time.

4.2.1 Replacing a PSU for PS/PSe 2024U/3024U/3024UT/4024U

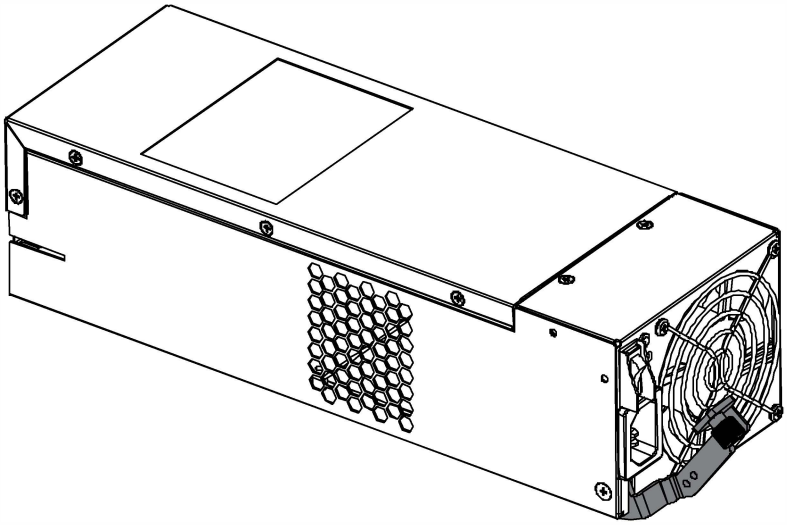
1. Shut down the system, turn off the PSU, and then unplug the power cord.

CAUTION! Disconnect all power sources to avoid shock hazards.

2. Loosen the retention screw that secures the extraction lever to the chassis.

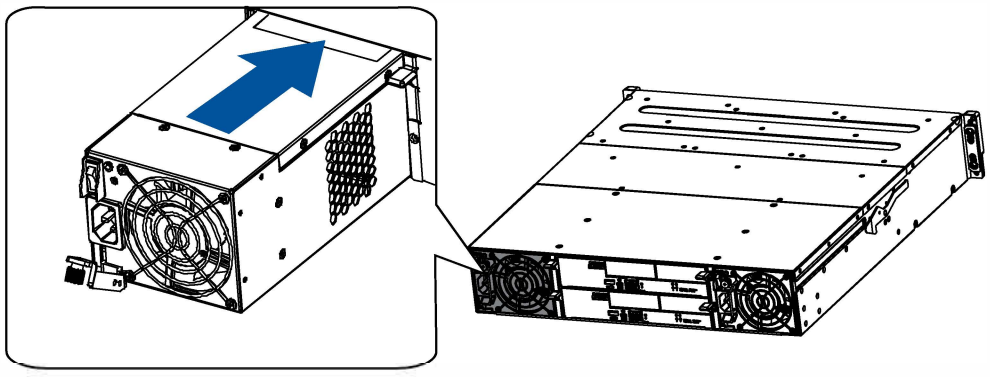


3. Pull down the extraction lever to dislodge the PSU/cooling module from the backplane connectors, and then gently pull the PSU/cooling module from the system. If the system is mounted to the rackmount, carefully support its weight with the rack while removing the module.

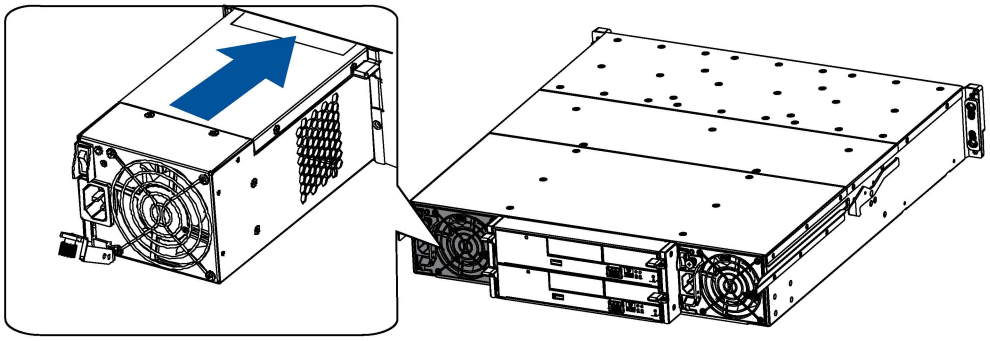


4. Insert the replacement PSU/cooling module with the extraction lever pointing outwards, and then push it into the chassis. When you feel a resistance, push the extraction lever to lodge the PSU/ cooling module to the backend connectors.

- **PS/PSe 2024U/3024U**



- **PS/PSe 3024UT/4024U**



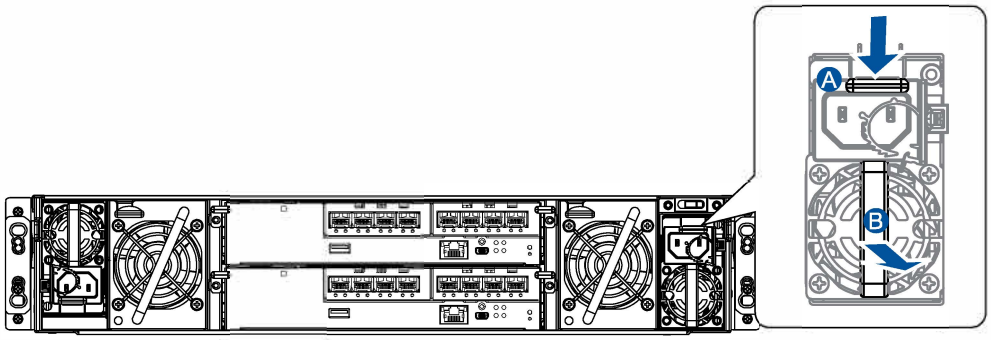
5. Fasten the retention screw.
6. Reconnect the power cord.
7. Power on the PSU module.

4.2.2 Replacing a PSU for PS/PSe 2024U/3024U/3024UT/4024U (EU Version)

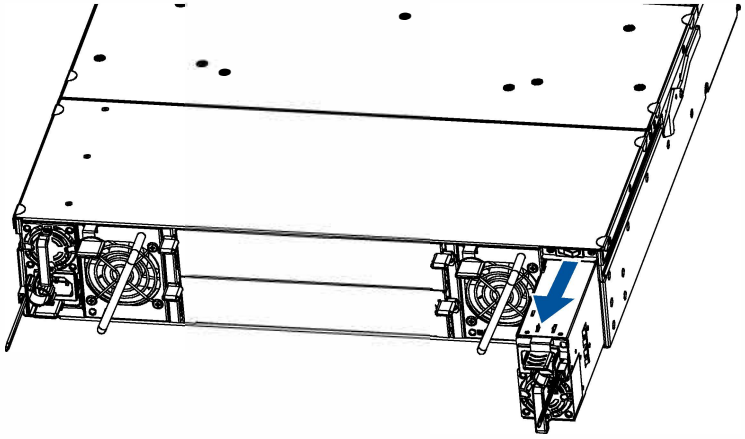
1. Shut down the system, turn off the PSU, and unplug the power cord.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Press the PSU's retention lever towards the power socket (A), and then pull out the extraction handle (B).



3. Hold the extraction handle, and then pull gently to remove the PSU from the system.



> **NOTE:** The illustration is for reference only.

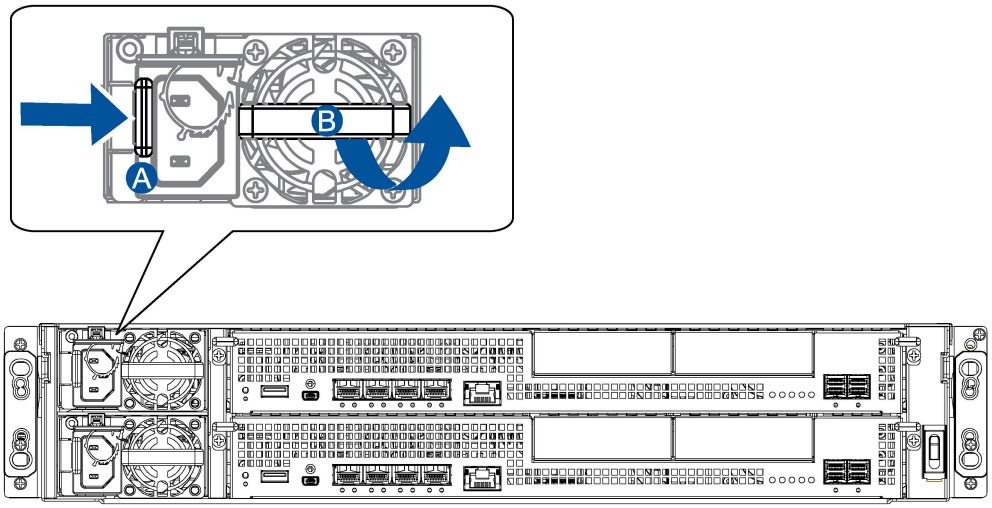
4. Insert the replacement PSU into the enclosure and push it gently. When you feel a resistance, push the module to lodge it to the backend connectors.
5. Connect the power cord.
6. Turn on the system.

4.2.3 Replacing a PSU for PS 3025U/4025U

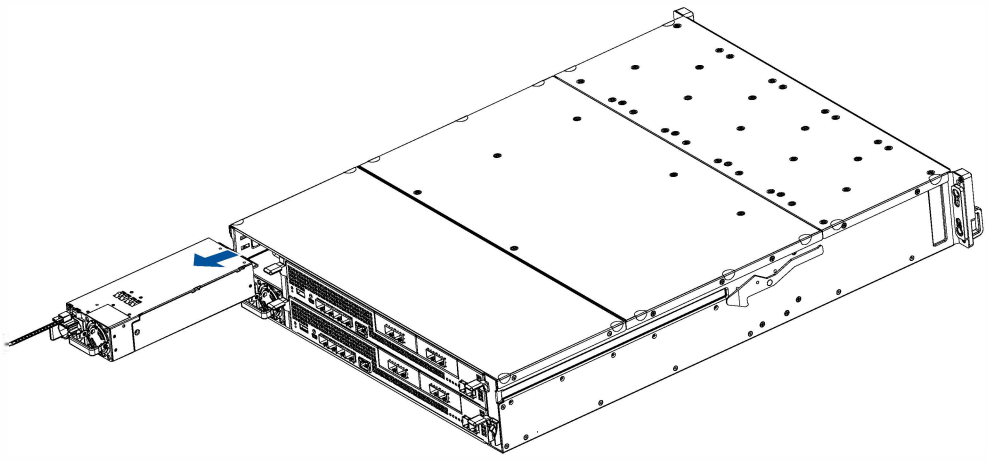
1. Shut down the system, turn off the PSU, and unplug the power cord.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Press the retention lever to the right (A), and then pull out the extraction handle (B).



3. Hold the extraction handle then pull gently to remove the PSU from the system.



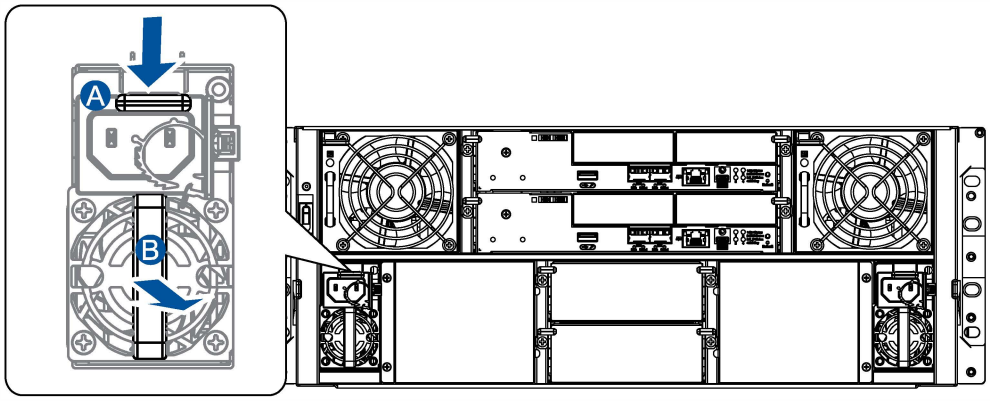
4. Insert the replacement PSU into the enclosure and push it gently. When you feel a resistance, push the module to lodge it to the backend connectors. Once lodged, the retention lever clicks back into place.
5. Connect the power cord.
6. Turn on the system.

4.2.4 Replacing a PSU for PS 3048UT/4048U

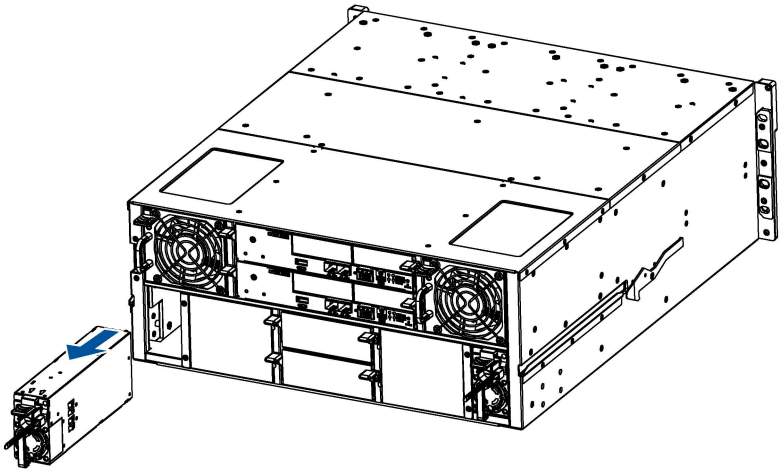
1. Shut down the system, turn off the PSU, and unplug the power cord.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Press the PSU's retention lever towards the power socket (A), and then pull out the extraction handle (B).



3. Hold the extraction handle, and then pull gently to remove the PSU from the system.



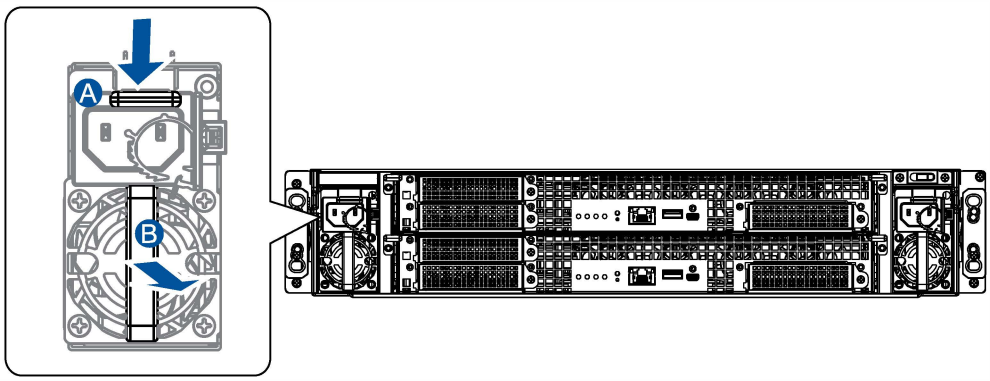
4. Insert the replacement PSU into the enclosure and push it gently. When you feel a resistance, push the module to lodge it to the backend connectors.
5. Connect the power cord.
6. Turn on the system.

4.2.5 Replacing a PSU for PS 5024UE

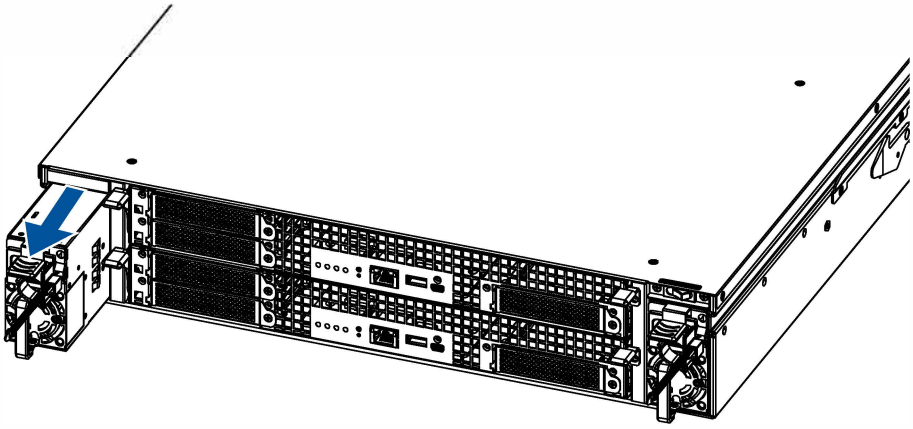
1. Shut down the system, turn off the PSU, and unplug the power cord.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Press the PSU's retention lever towards the power socket (A), and then pull out the extraction handle (B).



3. Hold the extraction handle, and then pull gently to remove the PSU from the system.



4. Insert the replacement PSU into the enclosure and push it gently. When you feel a resistance, push the module to lodge it to the backend connectors.
5. Connect the power cord.
6. Turn on the system.

4.3 Replacing a Controller Module

Replace a controller module only when you have the replacement on hand.

> **WARNING!** DO NOT use controller modules from different models. Each controller module has a unique ID which is applied to the host port names.

Checking the Controller Part Number

When purchasing a new controller for **PS 2024UR/3024UR/3024URT/4024UR,** check the part number to make sure that the controller is compatible with your storage system. The part number of the new controller must be the same as the part number of the present controller.

System Sub Part Number	Compatible Controller Part Number
PS2024UR01XXX-0032	8UGS21R24CXX-0010
PS3024UR01XXX-0032	8UGS31R24CXX-0010
PS3024URT1XXX-0032	8UGS32R24TCXX-0010
PS4024UR01XXX-0032	8UGS42R24CXX-0010
PS2024UR02XXX-0032	8UGS22R24MXX-0010
PS3024UR02XXX-0032	8UGS32R24MXX-0010
PS3024URT2XXX-0032	8UGS32R24TMXX-0010
PS4024UR02XXX-0032	8UGS42R24MXX-0010

Checking the Firmware Version

Before replacing a controller, ensure that the replacement controller and the present controller have the same version of firmware.

- Replacement controller: Check the firmware version on the label of the packaging.
- Present controller: Log in to EonOne, go to **Settings** > **Update** & **security> Firmware update,** and check the current firmware version.

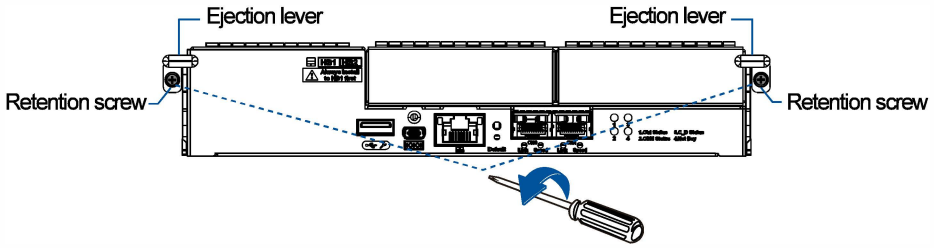
> **IMPORTANT!** When removing/installing both controllers simultaneously in a dual-controller system, ensure that you shut down the applications and the system.

4.3.1 Replacing a Controller for PS/GSe 2024U/3024U/3024UT/4024U and PS 3048UT/4048U

1. Prepare a clean, static-free work pad or container to place the controller.
2. From your system's EonOne software, go to **Main Menu** > **System Functions** > **Shutdown controller** function to stop all 1/O access to the system and the cached data are distributed to the drives
3. Power off the system, switch off the power buttons, and unplug the power cords from the PSUs.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

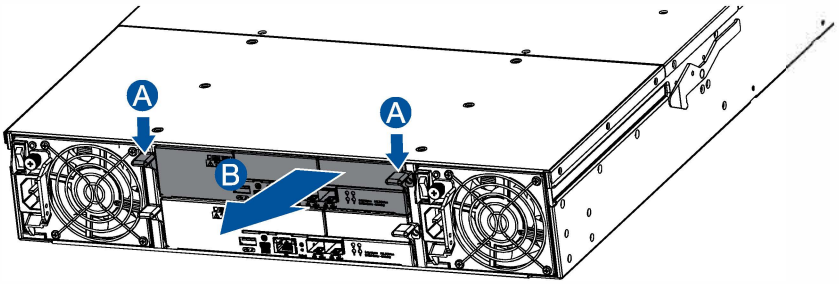
4. Disconnect all cables from the controller that you want to replace.
5. Remove the retention screws that secure the controller module's ejection levers to the chassis.



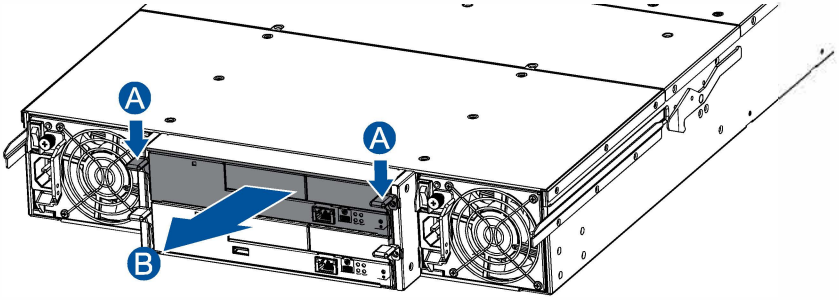
NOTE: The controller image above is for reference only.

6. Push the ejection levers downwards to dislodge the controller from the system (A), and then pull to remove the controller from the enclosure (B).

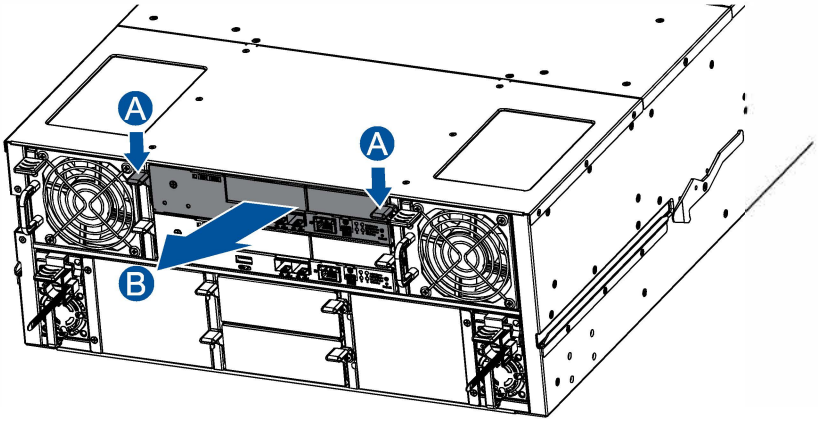
- **PS/GSe 2024U/3024U**



- **PS/GSe 3024UT/4024U**

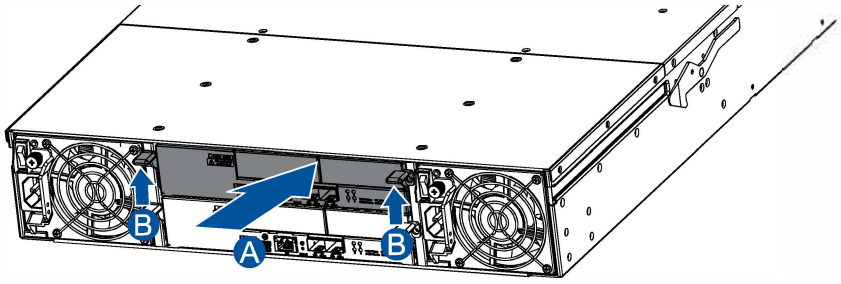


- **PS 3048UT/4048U**

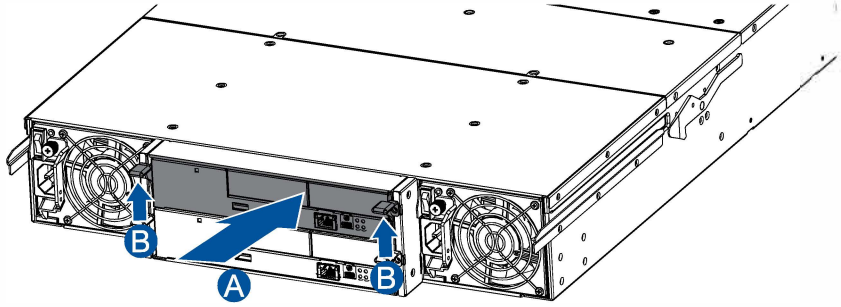


7. Insert the replacement controller carefully into the controller module slot (A). When you feel a contact resistance, use a small but careful force and push the ejection levers upwards to secure the controller to the enclosure (B).

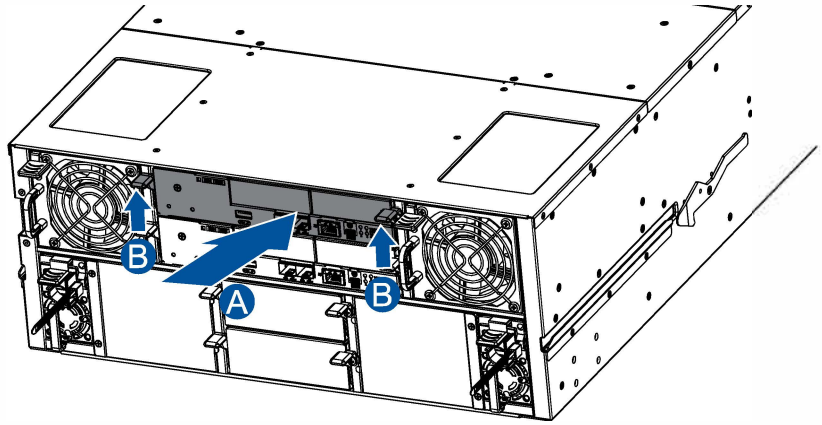
- **PS/PSe 2024U/3024U**



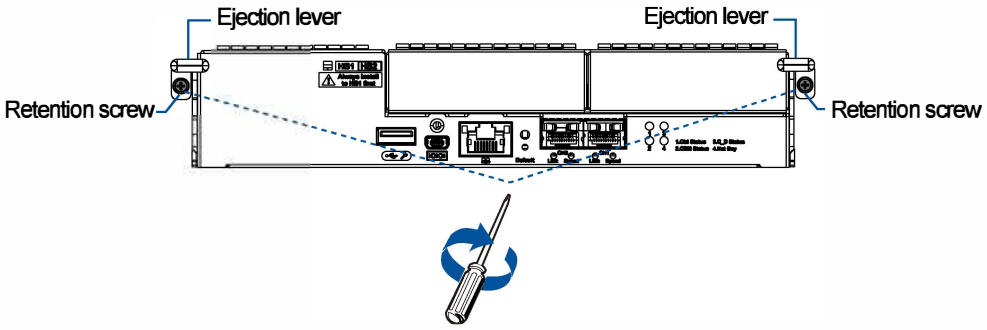
- **PS/PSe 3024UT/4024U**



- **PS 3048UT/4048U**



9. Fasten the two retention screws to the controller's mounting holes under the ejection levers.



NOTE: The controller image above is for reference only.

9. Reconnect the cables to the controller's ports.
10. For replacing both controllers simultaneously in a dual-controller system, power up the system. Check the messages on EonOne or the firmware utility. The power LEDs turn on when the system is successfully initiated online.
11. For replacing both controllers simultaneously in a dual-controller system, restore NVRAM data. From your firmware, look for **Restore NVRAM from Disks or Restore NVRAM from Files** to restore your previous IO/LUN mapping configuration.

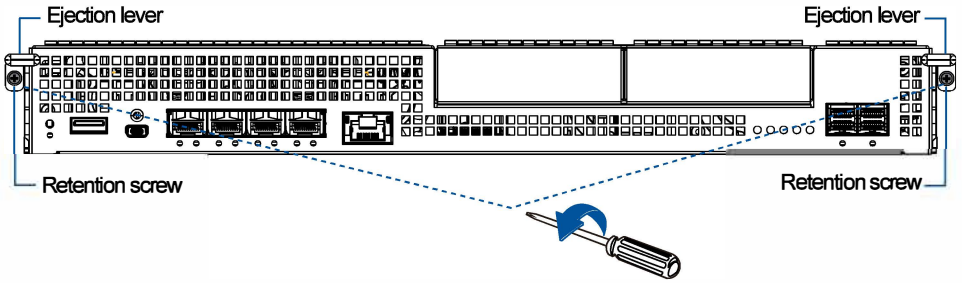
4.3.2 Replacing a Controller for PS 3025U/4025U/5024UE

1. Prepare a clean, static-free work pad or container to place the controller.
2. From your system's software, go to **Main Menu** > **System Functions** > **Shutdown controller** function to stop all I/0 access to the system and the cached data are distributed to the drives.
3. Shut down the system, switch off the power buttons, and unplug the power cords from the PSUs.

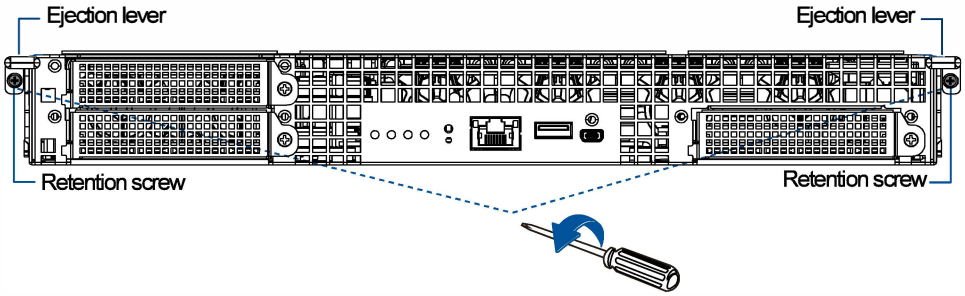
> **CAUTION!** Disconnect all power sources to avoid shock hazards.

4. Disconnect all cables from the controller module that you want to replace.
5. Loosen the screws that secure the controller module's ejection levers to the chassis.

- **PS 3025U/4025U**

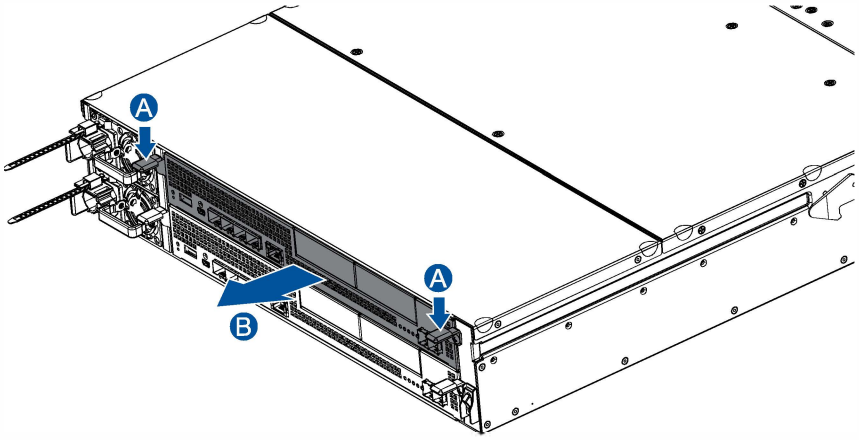


- **PS 5024UE**

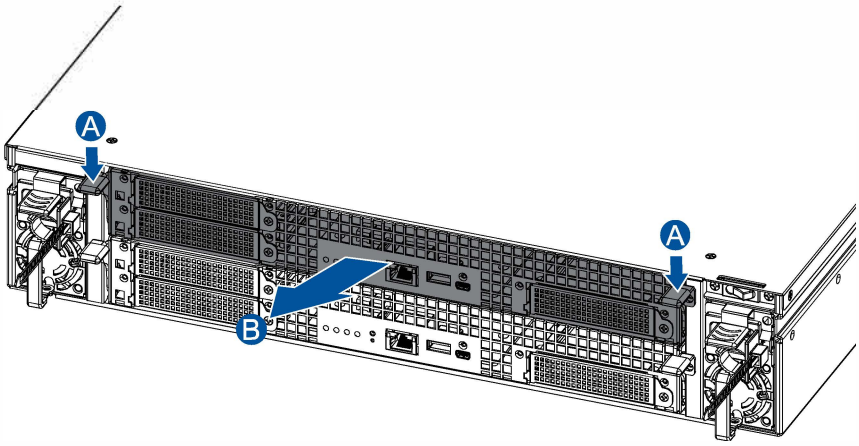


6. Push the ejection levers downwards to dislodge the controller from the system (A), and then pull to remove the controller from the enclosure (B).

- **PS 3025U/4025U**



- **PS 5024UE**



7. Insert the replacement controller carefully into the module slot. When you feel a contact resistance, push the controller with a small but careful force, and secure the controller to the enclosure with the retention screws.
8. Reconnect the cables to the controller module.
9. Turn on the system, and then check the system message on EonOne or the firmware utility.

> **NOTE:** Once the replacement controller becomes active online, the Control status LED lights up in green. See **3.2.3 Controller Status LEDs** in Chapter 3 for details.

10. Restore the previous ID/LUN mapping settings that you set using the following options:
    a. Restore NVRAM from Disks
    b. Restore NVRAM from Files

4.4 Replacing a Memory Module

The controller comes with pre-installed DRAM modules. You can upgrade or replace them when the modules malfunction.

IMPORTANT!

- We strongly recommend NOT using a removed DRAM module from a failed controller of a different storage system.
- Contact your system vendor to help you purchase the compatible DRAM modules.
- Before removing memory modules from both controllers or installing memory modules in both controllers, ensure that you have shut down the applications and the system.

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

To replace a memory module:

1. Identity the memory module you want to replace, and remove the controller from the enclosure. Refer to section **4.3 Replacing a Controller Module** for details.

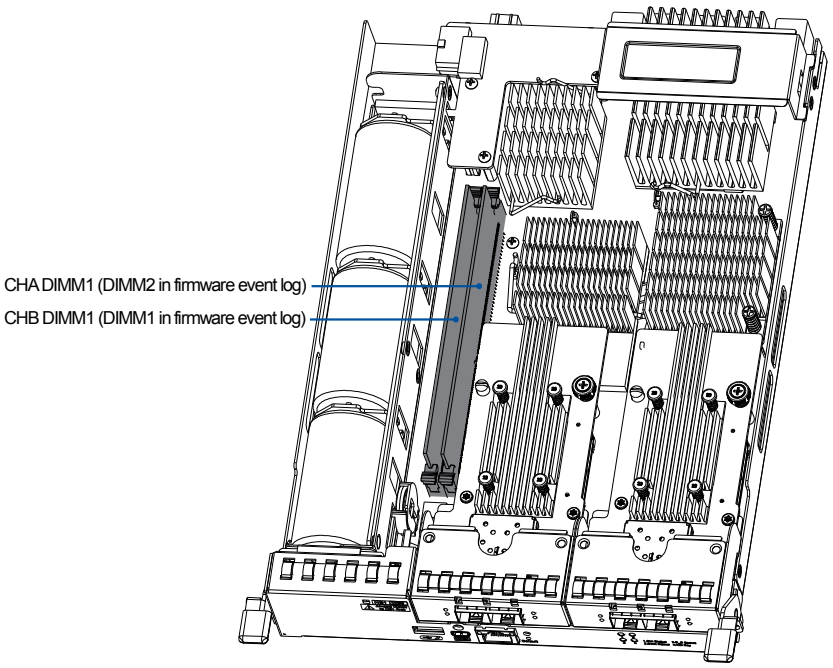
CAUTION! Disconnect all power sources to avoid shock hazards.

2. Remove the super capacitor from the controller. See **4.6 Replacing a Super Capacitor** for details. Alternatively, wait for at least 30 seconds after the 7-segment LED in the controller turns OFF

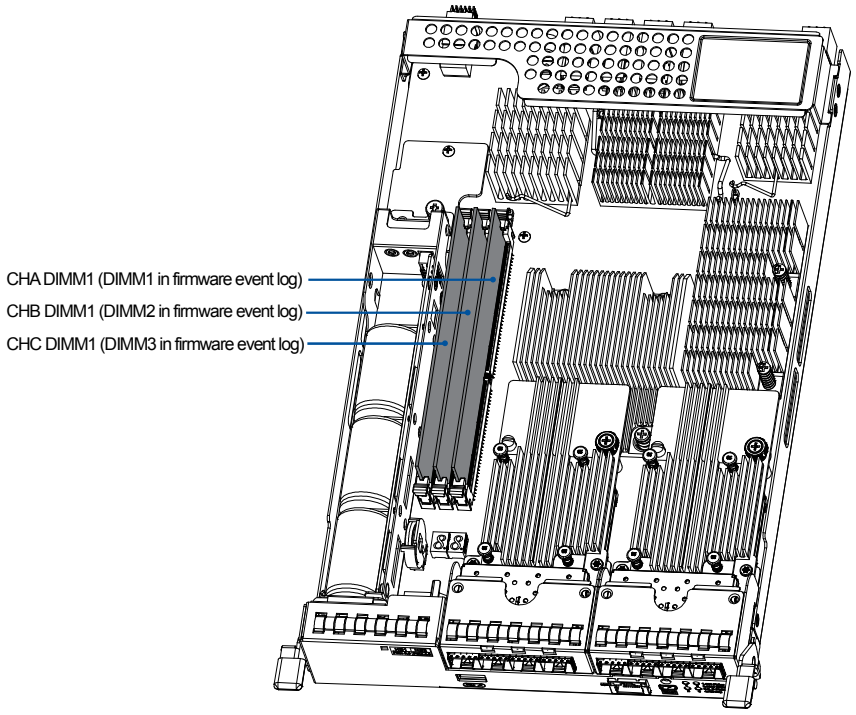
IMPORTANT! Ensure to follow this step; otherwise, the super capacitor may emit electricity, which can damage the DIMMs and host boards.

3. Locate the DIMM slot in the controller.

- **PS/PSe 2024U/3024U**

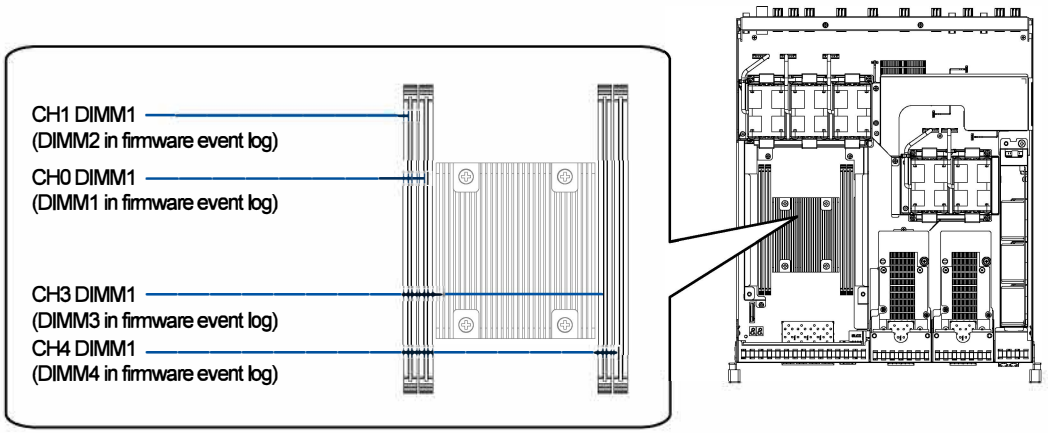


- **PS/PSe 3024UT/4024U; PS 3048UT/4048U**



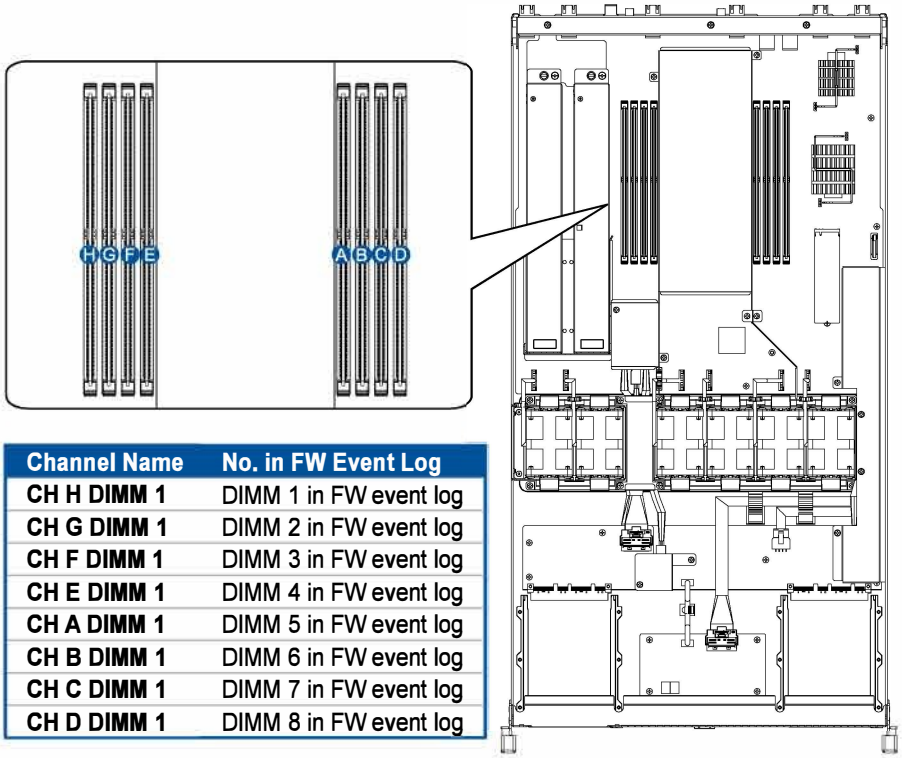
NOTE: The controller image above is for reference only.

- **PS 3025U/4025U**



IMPORTANT! When installing memory modules, please fill CHO DIMM1 and CH3 DIMM1 slots first.

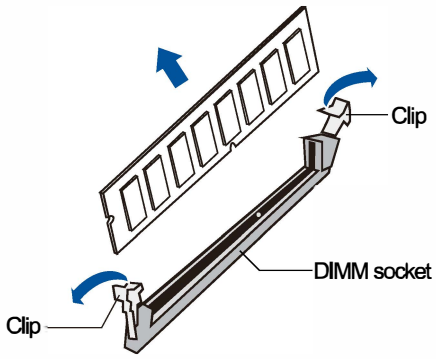
- **PS 5024UE**



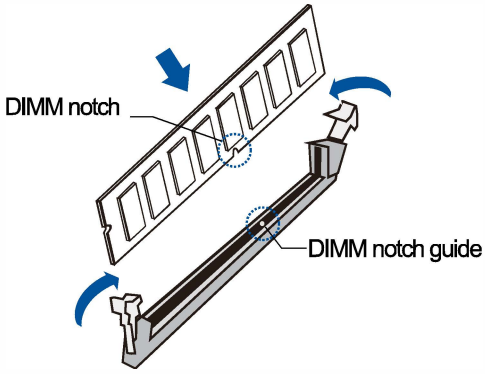
Channel Name	No. in FW Event Log
CH H DIMM 1	DIMM 1 in FW event log
CH G DIMM 1	DIMM 2 in FW event log
CH F DIMM 1	DIMM 3 in FW event log
CH E DIMM 1	DIMM 4 in FW event log
CH A DIMM 1	DIMM 5 in FW event log
CH B DIMM 1	DIMM 6 in FW event log
CH C DIMM 1	DIMM 7 in FW event log
CH D DIMM 1	DIMM 8 in FW event log

IMPORTANT! When installing memory modules, please fill CH G, CH E, CH A, and CH C slots first.

4. Push down the clips to release the DRAM module from the DIMM socket.



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



6. Reinstall the super capacitor back to the controller if you have removed it in step 2. See **4.6 Replacing a Super Capacitor** for details.
7. Reinstall the controller back to the enclosure.

4.5 Replacing a Host Board

Before replacing a host board from the controller, you must take note of the following:

- The new host board and the present one must be of the same type.
- A controller/host board downtime may occur if you replace a host board for an upgrade.
- The firmware automatically restores the system to its factory settings when adding or replacing a host board.

4.5.1 Replacing a Host Board for Models Other Than PS 5024UE

1. Identify the host board you want to replace, and remove the controller from the enclosure. Refer to section **4.3 Replacing a Controller Module** for details.

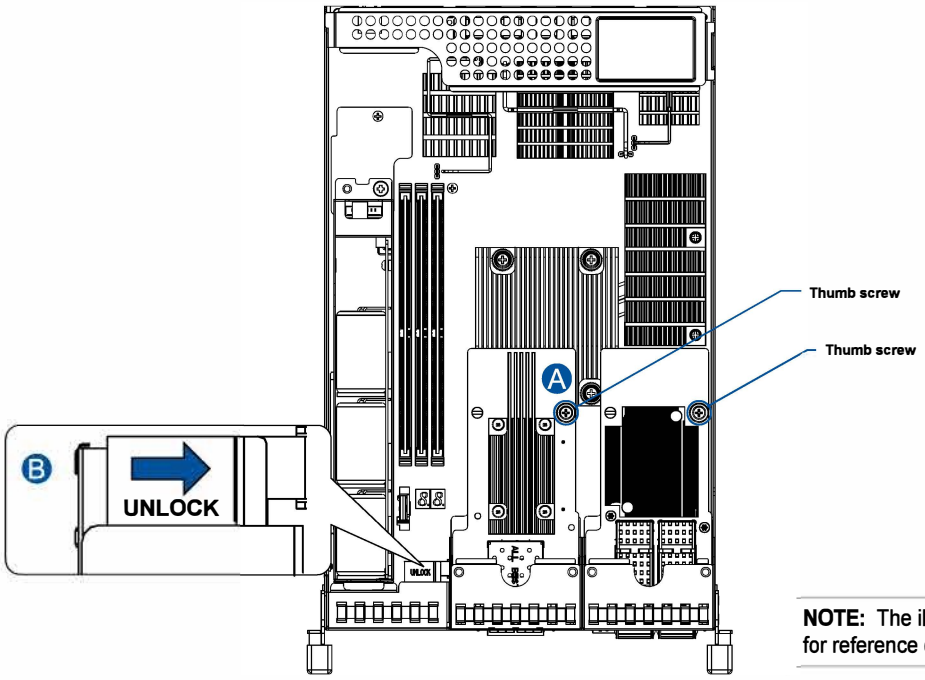
> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Remove the super capacitor from the controller. See **4.6 Replacing a Super Capacitor** for details. Alternatively, wait for at least 30 seconds after the 7-segment LED in the controller turns OFF

> **IMPORTANT!** Ensure to follow this step; otherwise, the super capacitor may emit electricity, which can damage the DIMMs and host boards.

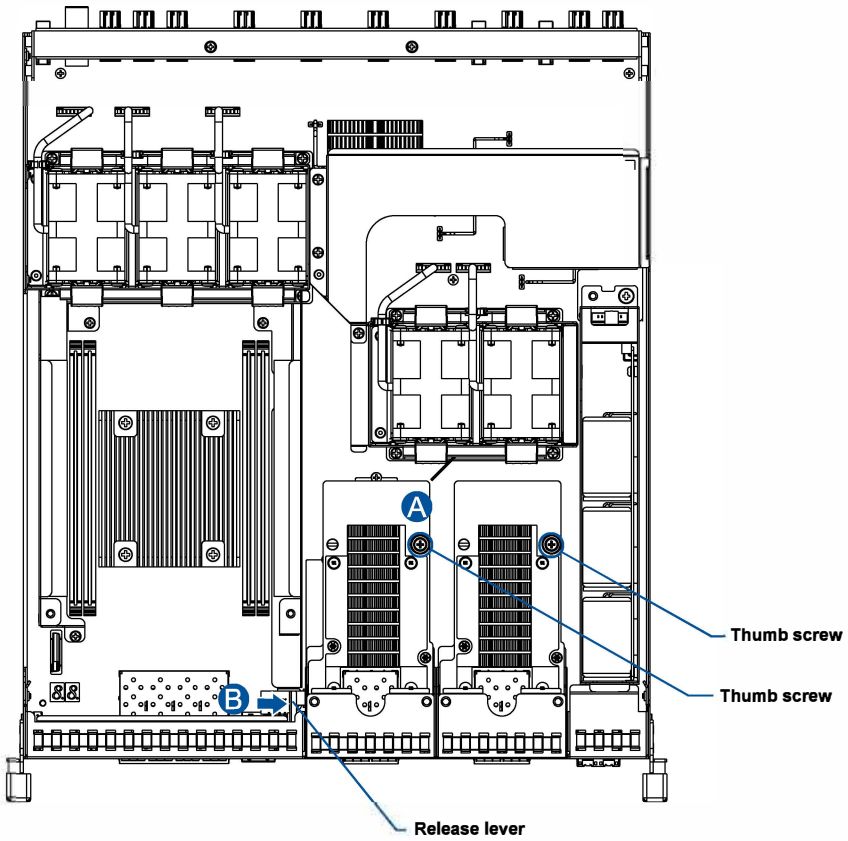
3. Loosen the thumb screw that secures the host board to the controller (A), push the release lever to the right to unlock the host board bracket (B), and then lift to remove the host board.

- **PS/PSe 2024U/3024U/3024UT/4024U; PS 3048UT/4048U**



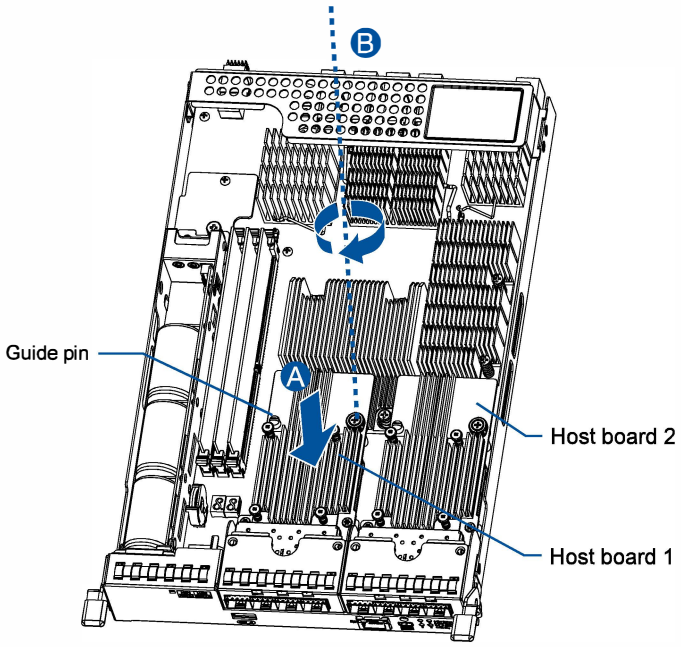
NOTE: The illustration is for reference only.

- **PS 3025U/4025U**



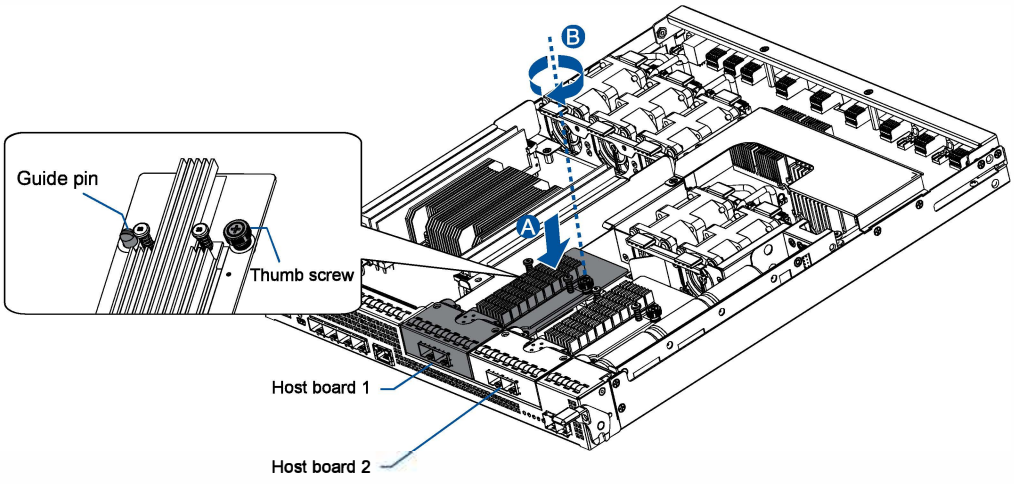
4. Use the guide pin to position the new host board to the host board slot, place it carefully (A), and then tighten the thumb screw to secure the host board in place (B).

- **PS/PSe 2024U/3024U/3024UT/4024U; PS 3048UT/4048U**



NOTE: The illustration is for reference only.

- **PS 3025U/4025U**



5. Reinstall the super capacitor back to the controller if you have removed it in step 2. See 4.6 Replacing a Super Capacitor for details.
6. Reinstall the controller back to the enclosure.

4.5.2 Replacing a Host Board for PS 5024UE

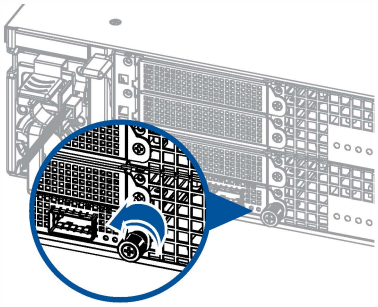
1. Identify the host board you want to replace, and remove the controller from the enclosure. Refer to section **4.3 Replacing a Controller Module** for details.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

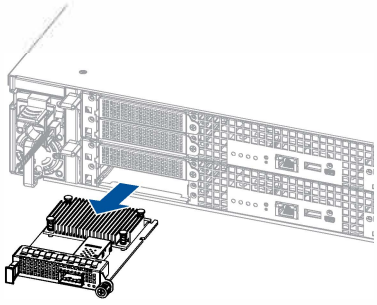
2. Remove the super capacitor from the controller. See **4.6 Replacing a Super Capacitor** for details. Alternatively, wait for at least 30 seconds after the 7-segment LED in the controller turns OFF.

> **IMPORTANT!** Ensure to follow this step; otherwise, the super capacitor may emit electricity, which can damage the DIMMs and host boards.

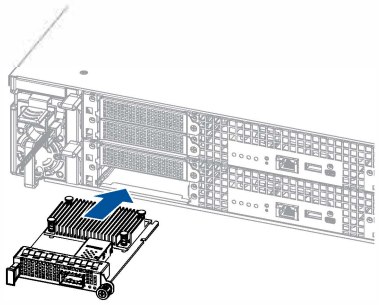
3. Loosen the thumb screw that secures the host board to the controller.



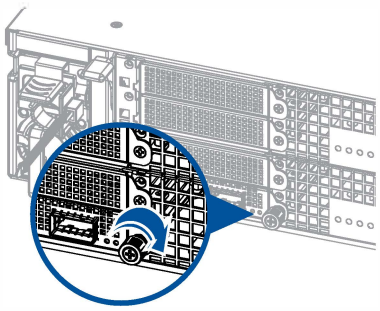
4. Pull the host board out of the slot.



5. Insert the replacement host board into the module slot.



6. Tighten the thumb screw to secure the host board.



4.6 Replacing a Super Capacitor

A super capacitor allows your controller to provide power during a power outage, supporting the controller to save the data to the flash backup module.

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

NOTE: The super capacitor is an optional component on PSe U.2 series.

Checking the CBM Status in EonOne

Refer to **1.4.4 Super Capacitor and Flash Backup Module** for details.

Super Capacitor Fault Conditions and Precautions

If a super capacitor leaks, gives off bad odor, generates abnormal amount of 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 a temperature that exceeds the preset threshold. The charger circuit enters to a low power and self-protection state.
- A super capacitor 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 super capacitor, or after you reset the system.

When reinstalling/replacing the super capacitor, remember these precautions:

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

4.6.1 Replacing a Super Capacitor for 2U 24-bay and 2U 25-bay Models

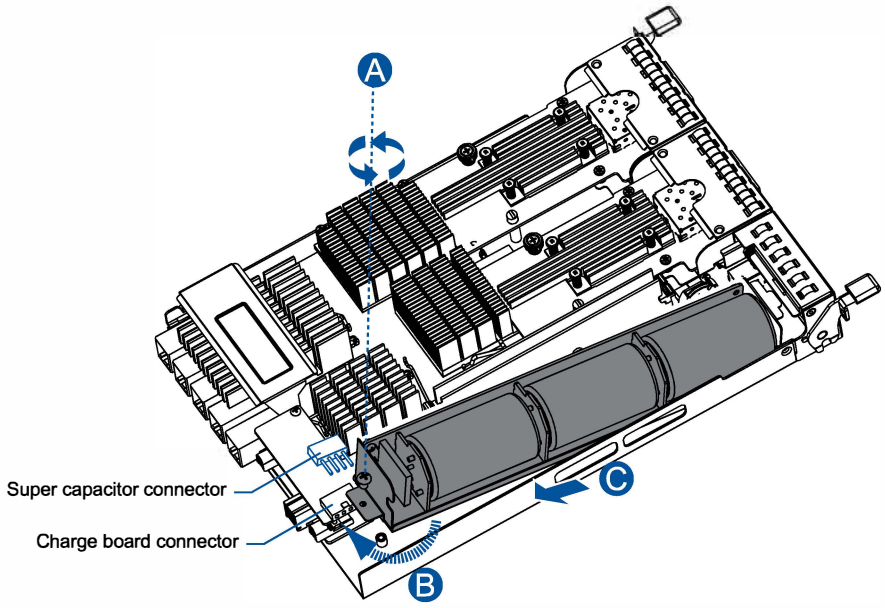
NOTE: The super capacitor is an optional component for PSe U.2 series.

1. Identify the super capacitor you want to replace, and remove the controller from the enclosure. Refer to section **4.3 Replacing a Controller Module** for details.

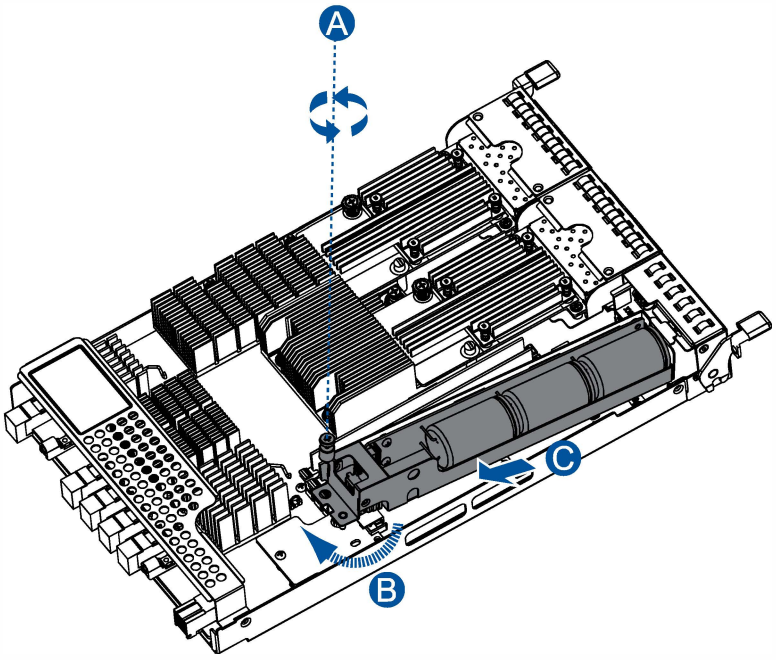
CAUTION! Disconnect all power sources to avoid shock hazards.

2. Loosen the screw that secures the super capacitor to the controller (A), lift its side to a 45° angle (8), and then pull to remove from the controller (C). For PS/PSe 2024U/3024U, disconnect the super capacitor connector from the charge board connector before removing the super capacitor.

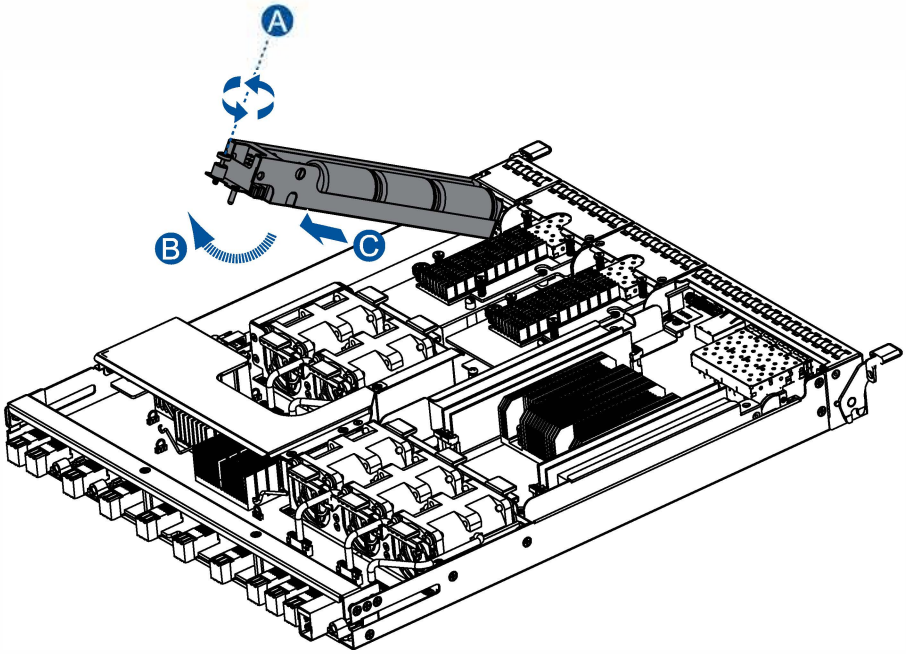
- **PS/PSe 2024U/3024U**



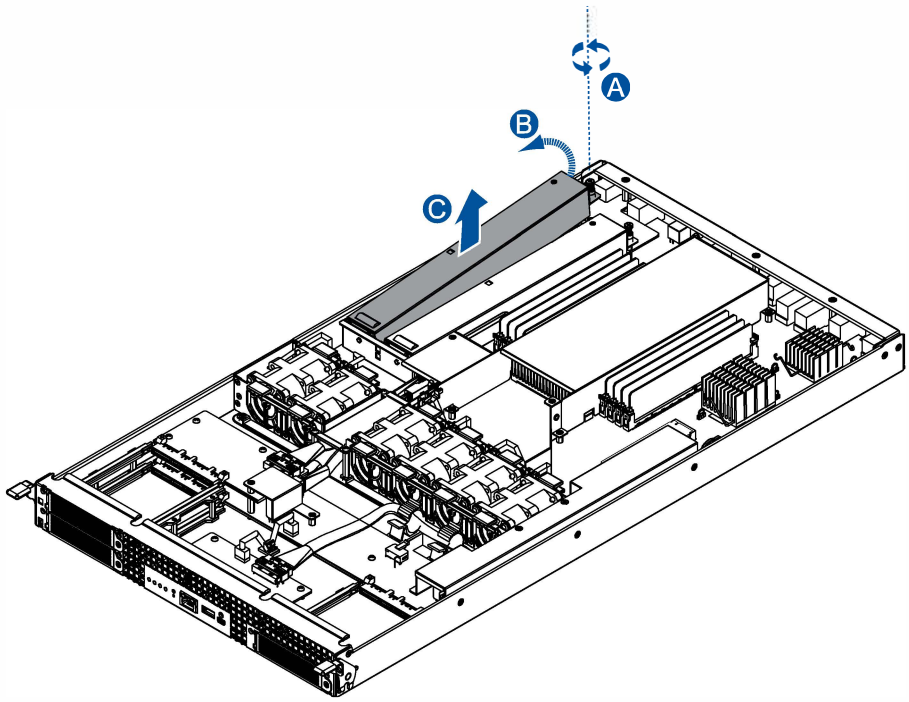
- **PS/PSe 3024UT/4024U**



- **PS 3025U/4025U**



- **PS 5024UE**



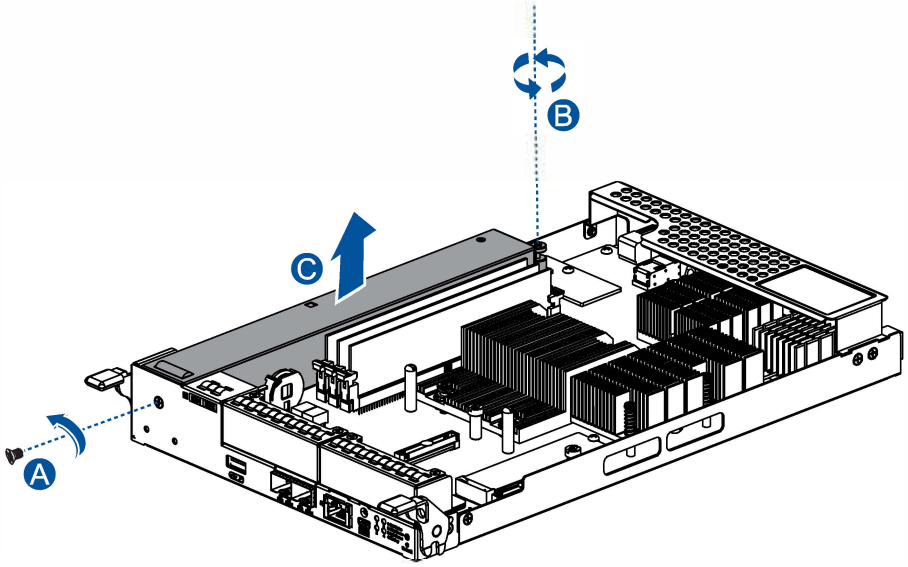
3. Install the replacement super capacitor to the controller, and then tighten the screw to secure it in place.
4. Reinstall the controller back to the enclosure.

4.6.2 Replacing a Super Capacitor for 4U 48-bay Models

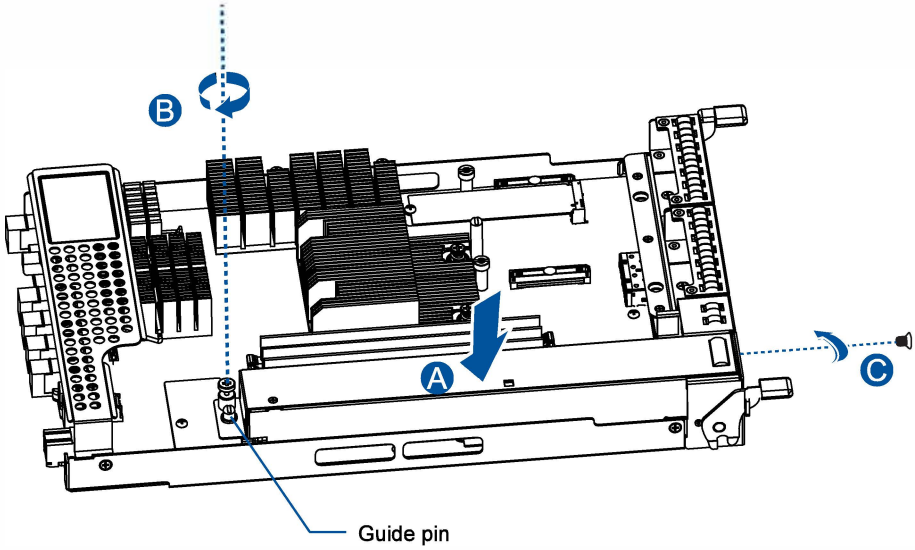
1. Identify the super capacitor you want to replace, and remove the controller from the enciosure. Refer to section **4.3 Replacing a Controller Module** for details.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Remove the screw that secures the super capcitor to the controller (A). Loosen the screw that secures the super capacitor to the main board (B), and then grab the super capacitor by the middle to pull it out of the controller carefully (C).



3. Use the guide pin to position the new super capacitor to controller. Place it carefully (A), tighten the screw to secure it to the main board (B), and then tighten the screw you removed in step 2 to secure it to the controller (C).



4. Reinstall the controller back to the enclosure.

4.7 Replacing a Drive

WARNING!

- Ensure to have the replacement ready before replacing a drive. DO NOT leave the drive tray open for long periods to prevent disruption of internal airflow.
- Handle the drives with extreme care. Hold them by the edges and avoid touching the circuits and interface connectors.

Checking the SSD Part Number

When purchasing NVMe SSDs for **PS 2024UR/3024UR/3024URT/4024UR,** check the part number to make sure that the SSDs are compatible with your storage system.

NOTE: For the latest information on compatible NVMe SSDs, please visit our website.

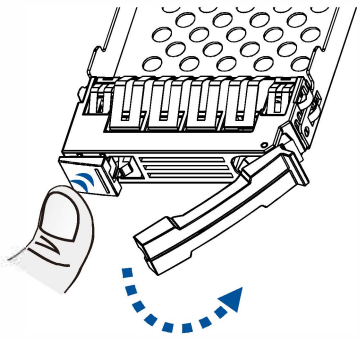
System Sub Part Number	Compatible SSD Part Number (as of April 2023)
PS2024UR01XXX-0032	HNBKFLP4192
PS3024UR01XXX-0032	HNBKFLP4384
PS3024URT1XXX-0032	HNBKFLP4768
PS4024UR01XXX-0032	HNBKFLP4T15
PS2024UR02XXX-0032	HNBKSRP41921
PS3024UR02XXX-0032	HNBKSRP43841
PS3024URT2XXX-0032	HNBKSRP47681
PS4024UR02XXX-0032	HNBKSRP4T151

4.7.1 Replacing a Drive for 2U 24-bay and 4U 48-bay Models

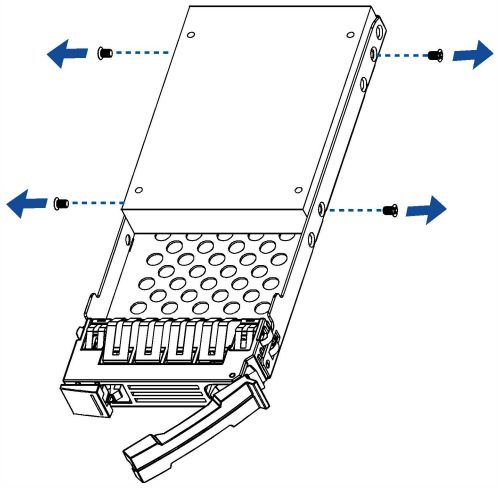
1. Identify the faulty drive using the drive LEDs or the EonOne software.

NOTE: See section **Drive Numbering** in Chapter 2 for the order of the drive bays.

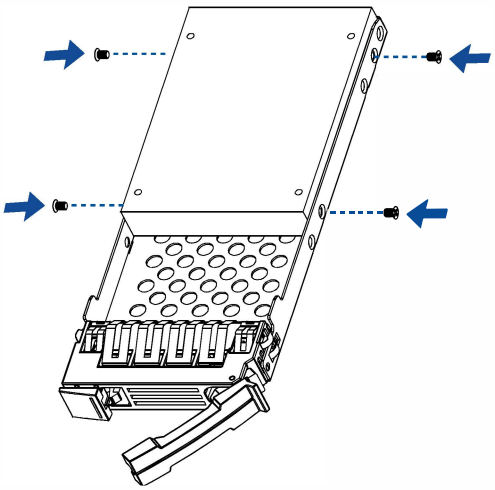
2. When the faulty drive is located, push the release button to eject the drive tray, and then pull out the tray by holding the spring handle.



3. Remove the retention screws from the drive tray to dislodge the drive.

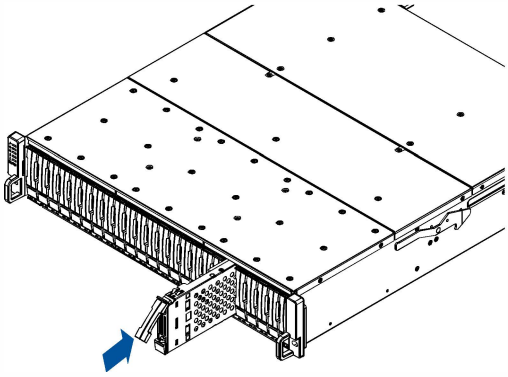


4. Install the replacement drive to the drive tray.

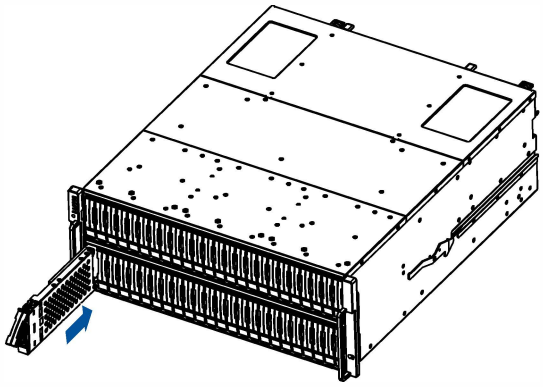


5. Insert the assembled drive and drive tray into the drive bay with the spring handle open.

- **PS/PSe 2024U/3024U/3024UT/4024U and PS 5024UE**



- **PS 3048UT/4048U**



6. When the tray is fully inserted into the bay, close the spring handle.

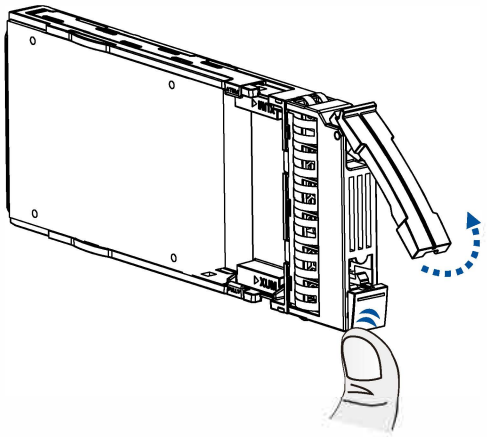
IMPORTANT! Ensure that there is no more drive error reported in EonOne or the terminal.

4.7.2 Replacing a Drive for 2U 25-bay Models

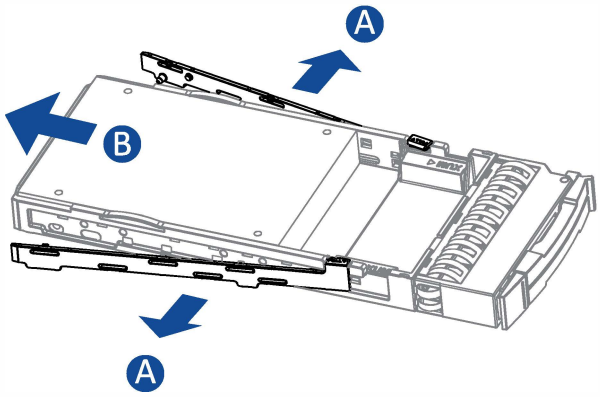
1. Identify the faulty drive using the drive LEDs or the EonOne software.

> **NOTE:** See section **Drive Numbering** in Chapter 2 for the order of the drive bays.

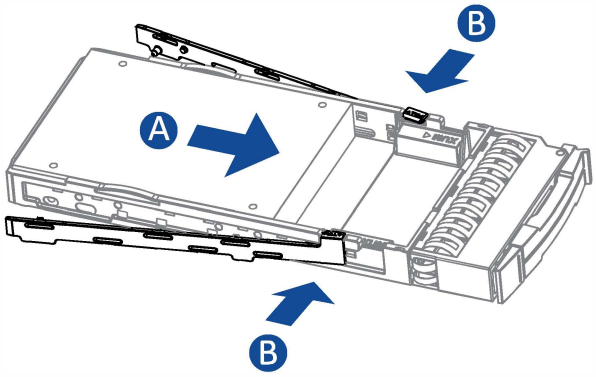
2. When the faulty drive is located, push the release button to eject the drive tray, and then pull out the tray by holding the spring handle.



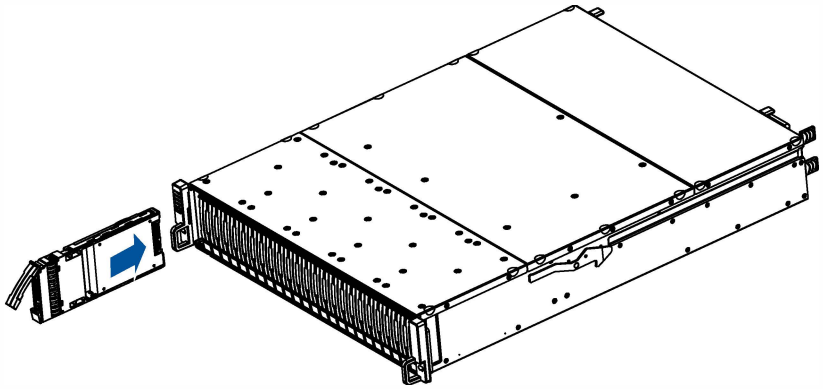
3. Remove the side clips from the tray (A), and then remove the drive from the tray (B).



4. Place the replacement drive on the tray (A), and then secure the dips to both sides of the tray (B).



5. Insert the assembled drive and tray into the drive bay with the spring handle open.



6. When the tray is fully inserted into the bay, close the spring handle.

IMPORTANT! Ensure that there is no more drive error reported in EonOne or the terminal.

4.8 Replacing a Fan Module

WARNING!

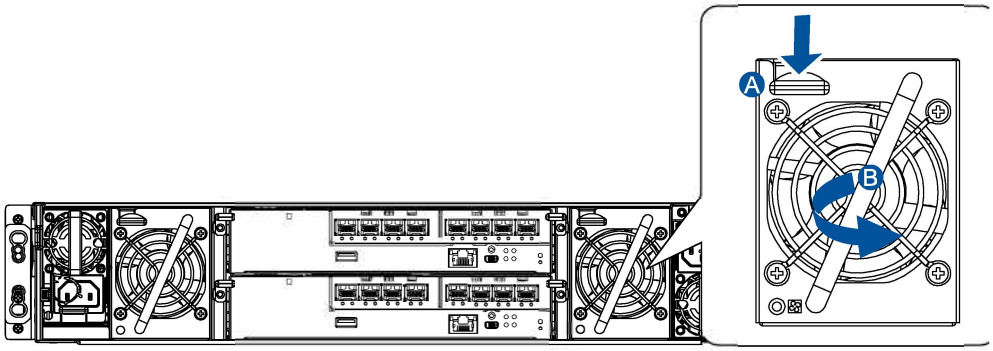
- Only qualified personnel are allowed to replace fan modules to avoid damage and injuries.
- Replace a faulty fan only when you have the replacement fan on hand.

4.8.1 Replacing a Fan for PS/PSe 2024U/3024U/3024UT/4024U (EU Version)

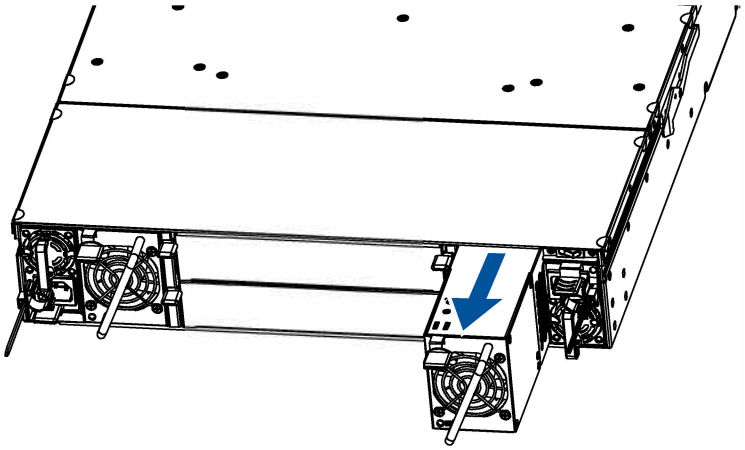
1. Shut down the system, turn off the PSU, and unplug the power cord.

CAUTION! Disconnect all power sources to avoid shock hazards.

2. Press the fan module's retention lever downwards (A), and then pull out the extraction handle (B).



3. Hold the extraction handle, and then pull gently to remove the fan module from the system.



NOTE: The illustration is for reference only.

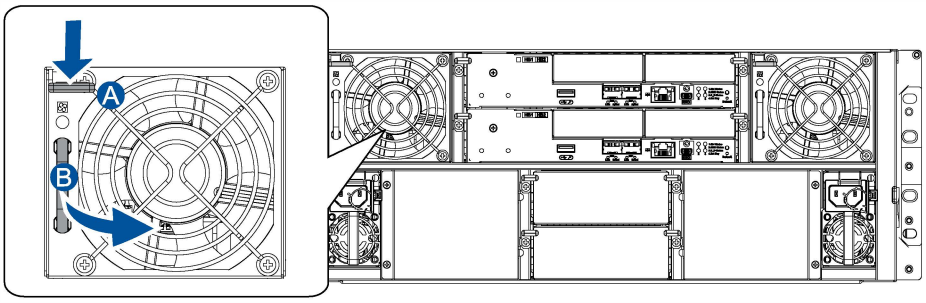
4. Insert the replacement fan module into the enclosure and push it gently. When you feel a resistance, push the module to lodge it to the backend connectors.
5. Connect the power cord.
6. Turn on the system.

4.8.2 Replacing a Fan for GS 3048UT/4048U

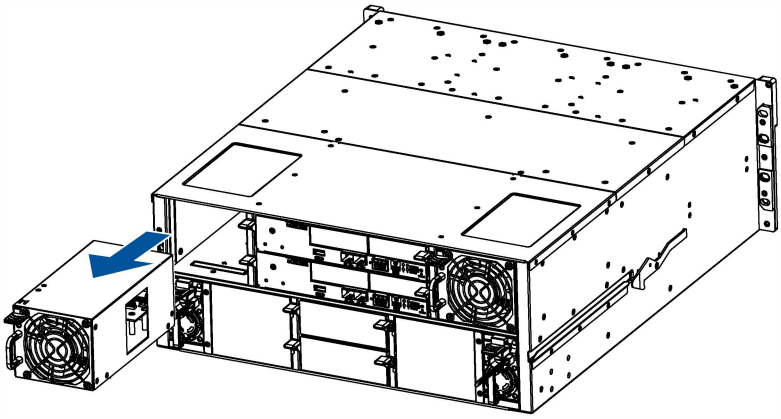
1. Shut down the system, tum off the PSU, and unplug the power cord.

> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Press the fan module's retention lever downwards (A), and then pull out the extraction handle (B).



3. Hold the extraction handle, and then pull gently to remove the fan module from the system.



4. Insert the replacement fan module into the enclosure and push it gently. When you feel a resistance, push the module to lodge it to the backend connectors.
5. Connect the power cord.
6. Turn on the system.

4.8.3 Replacing an Internal Fan for PS 3025U/4025U/5024UE

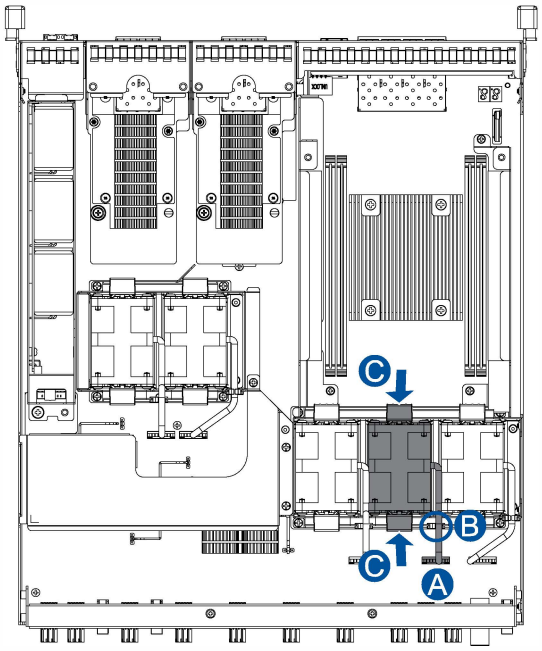
1. Remove the controller from the enclosure.

> **NOTE:** See **4.3.2 Replacing a Controller for PS 3025U/4025U/5024UE** for details.

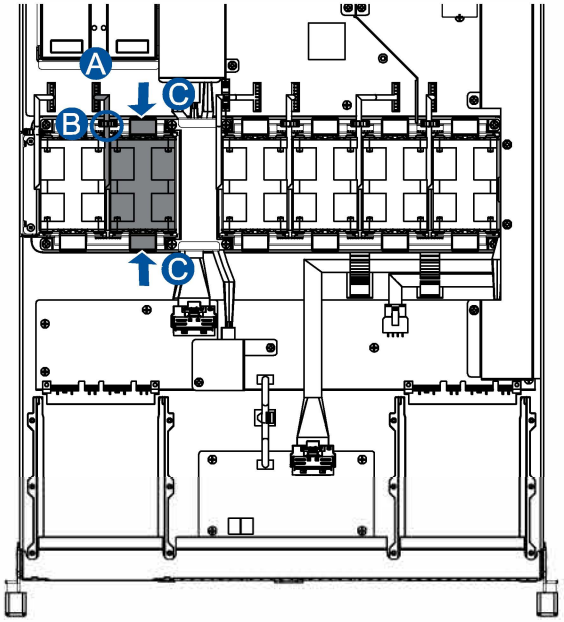
> **CAUTION!** Disconnect all power sources to avoid shock hazards.

2. Locate the faulty fan on the controller. Unplug the fan's power cord (A), release the wire from the wire dips (8), and press the fan's retention levers inwards to dislodge the fan from the fan slot.

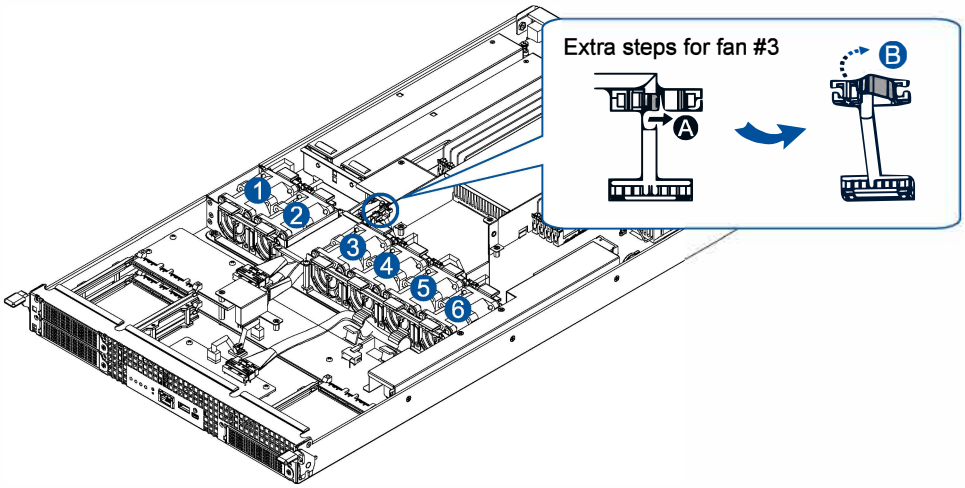
- **PS 3025U/4025U**



- **PS 5024UE**

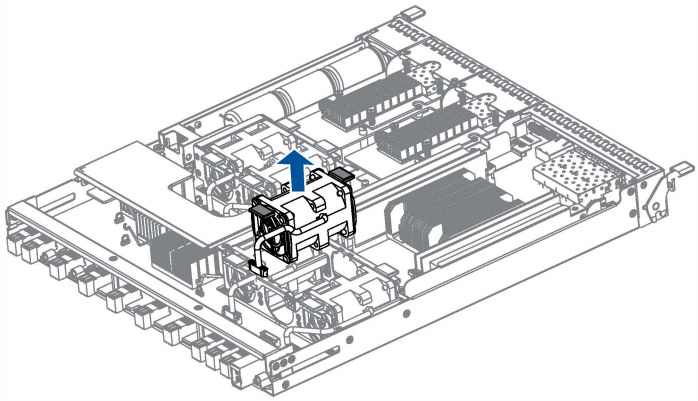


To replace fan #3 on PS 5024UE, open the additional wire clip. Press the clip (A) and then lift it up (B).

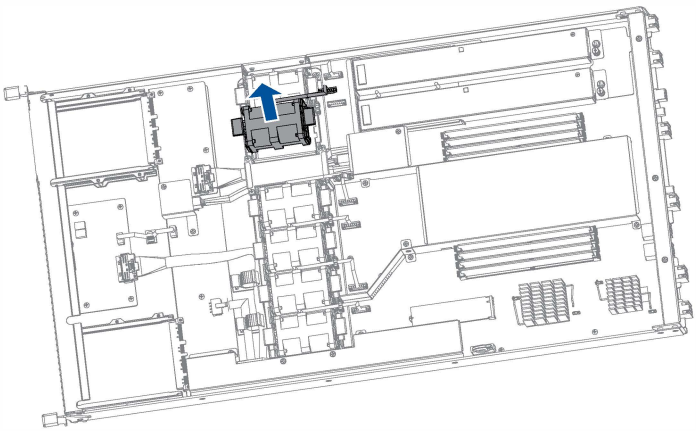


3. Lift to remove the fan from the controller by holding the retention levers.

- **PS 3025U/4025U**



- **PS 5024UE**



4. Insert the replacement fan into the fan slot by holding the retention levers. After the fan snaps in place, secure the wire with the wire clips and plug the power cord. For fan #3 on PS 5024UE, closse the additional wire clip to secure the wire.
5. Insert the controller back to the enclosure.

4.9 Restoring Default System Settings

NOTE: Restoring default settings is a last-resort function. All configurations such as parameters and host LUN mappings will be erased.

You may need to restore default settings in the following cases:

- When the firmware update procedure requires it.
- When you need to reset the password to access the storage system.

To restore the default settings, follow these steps:

1. Stop all host I/O's.
2. Save the current configuration using **Export NVRAM.**
3. You may also want to make a list of the existing ID/LUN mapping information because the default restoration will erase the ID/LUN mapping associations (i.e., which logical drive is associated with which host ID/LUN).
4. If your system is a dual-controller model, remove Controller B from the chassis. Please refer to section **4.3 Replacing a Controller Module.**
5. Power off the storage system.
6. Insert a straightened paper clip to the Restore Default button on Controller A, and then press and hold until the Restore Default LED lights up.

NOTE: During restoration, the Restore Default LED lights up in . It lights up in after the restoration process is complete.

7. In the firmware, use **Import NVRAM from reserved space or Restore NVRAM from files** to restore your previous settings. ID/LUN mapping configuration is restored after applying your previous settings.
8. Power off the system.
9. Replace Controller A with Controller B (Insert Controller B into Controller A's slot). While leaving Controller B's slot empty with Controller B in slot A, perform the above steps 1 to 7 to restore Controller B to default settings.
10. Put both Controller A and Controller B into their original positions and power up the system.

Appendices

A

Certifications

Summary

Safety	UL62368 BSMI CNS 15598-1 CB IEC 62368
EMC	CE EN 55032 / EN61000-3-2 / EN 61000-3-3 / EN 55035 BSMI (CNS 15936) FCC (FCC Part 15, subpart B)
Others	ISO 9001/14001 RoHS

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.

UL Caution, Safety, and Warning Markings

SAFETY STOP - DO NOT ALTER	**DISPOSITIF DE SÛRETÉ – NE PAS MODIFIER**
CAUTION: This product is combustible. A protective barrier or thermal barrier is required as specified in the appropriate building code	**ATTETNION:** Ce produit est combustible. Une barrière de protection ou une barrière thermique est exigée par le code du bâtiment en vigueur.
WARNING – Interconnection of more than one power supply source to a section of grid rail bus may present a fire hazard.	**AVERTISSEMENT –** Interconnexion de plus d'une source d'alimentation à une section de bus sur rail grille peut présenter un risqué d'incendie.
DANGER – RADIATION	**DANGER – RAYONNEMENT**