Infortrend EonStor GSe 3000 Series Hardware Manual

Version 1.4

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Safety Precautions

Read these instructions carefully before you install, operate, or transport the Unified Storage System and JBODs.

Energy Hazards Precaution

This equipment is intended to be used in Restrict Access Location, like computer room. The access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the metal chassis of the equipment is have energy hazards that service persons have to pay special attention or take special protection before touching it. Further, the access is through the use of key or security identity system. Only authorized by well trained professional person can access the restrict 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:
    a. **35°C** ~ if your system has a BBU
    b. **40°C** ~ if your system does not have a BBU
- 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 20cm 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 retaining screws.
- Place power cords and other cables away from foot traffic. Do not place items on top of power cords and make sure they do not rest against data cables.
- Install all modules to the enclosure before powering-on systems.

- Ensure that the correct power range is being used before powering-on.
- DO NOT remove covers or replaceable modules if they are not faulty.
- If the system is not going to be used for a long period of time, disconnect it from the power mains 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 soft and clean surface to prevent exterior damage. Do not place tools or other items on top.
- When transporting the enclosure, repackage all disk drives separately in the original package foam blocks. Replaceable modules can stay in the enclosure if you are using the original package; if not, repackage them separately as well.
- Disconnect the power cords before servicing or cleaning the enclosure.
- Use a slightly moistened paper sheet or cloth for cleaning. Avoid using liquid or sprayed detergent.
- When replacing components, insert them as gently as possible while assuring full engagement. Vibration and shock can easily damage hard drives.
- Only qualified service personnel should open the enclosure.
- Contact service personnel if any of the following situations occurs:
  - The power cord or plug is damaged.
  - The enclosure has been exposed to moisture.
  - The system has not been working properly.
  - The enclosure was dropped against a hard surface.
  - The enclosure shows obvious signs of breakage.
- To move the enclosure, more than one person might be necessary due to its weight. Drives should be removed from the enclosure beforehand.

Important Notice

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

ESD Precautions

- Handle the modules by their retention screws, ejector levers, or the module's metal frame/faceplate only. Avoid touching the PCB boards or connector pins.
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or operating the enclosure.
- Avoid dust, debris, carpets, plastic, vinyl, and Styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation takes place.
- Drives must not be stacked on top of each other without their protective drive trays. Even when drives are fixed in the drive trays, contacting the exposed PCB or rear-side interface may damage the drives.

About This Manual

The manual introduces hardware components of this Unified Storage Systems and corresponding JBOD systems. It also describes how to install, monitor, and maintain them.

For non-serviceable components, please contact our support sites.

Firmware operation: Consult the Firmware User Manual on the CD-ROM.

Management Software Suite: Consult the respective User Manual on the CD-ROM.

Revision History

Version	Date	Description
1.0	April 2016	Initial release
1.1	June 2016	Railkit and CBM installation updated
1.2	July 2016	Interface Status LEDs updated
1.3	October 2016	Converged host board added
1.4	November 2016	Updated system connections and monitoring status

Table of Contents

Legal Information 2

Contact Information 3

Copyright Notice 4

Safety Precautions 5

- Energy Hazards Precaution 5
- Installation and Operation 5
- Service and Maintenance 6
- Important Notice 7
- ESD Precautions 7

About This Manual 8

- Revision History 8

Table of Contents 9

Introduction 15

- Product Overview 15
  - Model Naming Conventions 15
  - Model Variations 16
- Major Components 17
  - Controller and Interface 17

JBOD Controller and Interface 17
Power supply unit with built-in cooling module 18
The Rear Panel 19
Connection between Unified Storage System and JBOD 19
Chassis 20
Front Panel 20
Rear Panel 22
Internal Backplane 23
Front Panel Components 24
LED Panel 24
Drive Tray Bezel 25
Rear Panel Components 26
Controller Module of Unified Storage Systems 26
Controller Module of JBOD enclosures 27
Cache Backup Module (CBM), Battery Backup Unit & Flash Backup Module 28
Cache Backup Module (CBM), Super Capacitor & Flash Backup Module 29
PSU & Cooling Module 30
System Monitoring Features 31
Expansion Enclosure Support 31
JBOD Enclosure Status Monitoring: 32
I^2C bus 32
Firmware (FW) and Management Software Suite 32
Audible Alarms 32
Hot-swapping 33

Hardware Installation 34

Installation Prerequisites 34
Installation Procedures Overview 35
Unpacking the System 36
Box contents 36

Preinstalled Components 36
Components to be installed 36
Installing Hard Drives 37
Hard Drive Installation Prerequisites 37
SAS Interface 39
Hard Drive Designation 40
Installing the Hard Drive into Drive Tray 41
Installing the Hard Drive Tray into the Enclosure 42
Installing CBM for Unified Storage Systems 43
Removing the Controller 43
Battery Backup Unit Installation Notes 44
Step by step Battery Backup Unit Installation 44
Supercapacitor Installation Notes 47
Step by step Supercapacitor Installation 47
Installing the Controller 49
Installing Host Boards 50

System Connection 52

General Considerations on Making Connections 52
Host-Side Topologies 53
Host-Side Parameters 53
Maximum Concurrent Host LUN Connection (“Nexus” in SCSI) 54
Maximum Queued I/O Count 54
Fibre-Host Connections 55
Fibre-Host Topologies 57
Fibre Cabling 58
DAS (Direct-Attached) Connection 59
Switched Fabric Connection 61
SAS-Host Connections 63
DAS (Direct-Attached Storage) Connection with Redundant Host Path 64
DAS (Direct-Attached Storage) Connection to Two Servers 65

Ethernet-Host Connections 66
Network & Host Connection Topologies 67
Single-Controller with Fault-Tolerant Path 68
JBOD Connections 69
JBOD SAS Expansion Configuration 69
Configuration Rules 70
Single-Controller Expansion Connection 71
Management Console Connections 72
Connecting Unified Storage System to external consoles 72
Power Connections 73
Checklist 73
Power Cords Connections 73
Power on Procedure 74
Power on Status Check 75
Power off Procedure 76

System Monitoring 77

Monitoring Features 77
LED Panel 78
Drive Tray LED 80
Unified Storage System Controller LEDs 81
1G Ethernet Management Port LEDs 83
12G SAS Expansion Port LEDs 83
10G Ethernet Port LEDs 84
16G Fibre Channel Port LEDs 85
8G Fibre Channel Port LEDs 86
Converged Host Board 87
Controller LED for 12 G SAS JBOD Models 88
PSU & Built-in Cooling Module LEDs 89
Alarms and I2C Bus 90
Audible Alarms 90

I²C 90

System Maintenance 91

Restoring Default System Settings 92
Restoring Default Settings 92
Replacing the Controller Module 93
Replacing the Host Board 95
Replacing Memory Module(s) 96
Replacing the Cache Backup Module (CBM) 97
BBU Fault Conditions and Precautions 97
Replacing the Battery Backup Unit (BBU) 98
Replacing the Flash Backup Module (FBM) 99
Super Capacitor Fault Conditions and Precautions 100
Replacing the Supercapacitor 101
Replacing Flash Backup Module (coupled with Supercapacitor) 102
Replacing the Power Supply / Cooling Module 103
Detecting a Failed PSU 103
Replacing Power Supply Unit 104
Replacing a Hard Drive 106

Appendix 108

Technical Specifications 108
Host Board Interface 108
RAID Configurations for Unified Storage Systems 109
Fault Tolerance for Unified Storage Systems 110
Power Supply 111
Dimensions 112
Environment 113
Certifications 114
Summary 114

Slide Rail Kit Installation Guide 115

Slide Rail Kits 115
Enclosure Installation Prerequisites 115
Unpacking the System 116
Component Installation Procedure 116
Tools Required 116
Rack Ear Mount Kit 117
Kit Contents 117
Installation Procedure 118
Slide Rail Kit 120
Kit Contents 120
Installation Procedure 121
Once Mounted 124
Safety Reminders 124

Introduction

Product Overview

This manual introduces Infortrends Unified Storage System that support 3Gbps, 6Gbps and 12Gbps SAS and Near Line SAS, SATA hard drives and SSDs. The enclosure is designed to utilize 2.5" or 3.5" hard drives. Drive capacity can be expanded by attaching expansion hard drive enclosures (JBODs).

Model Naming Conventions

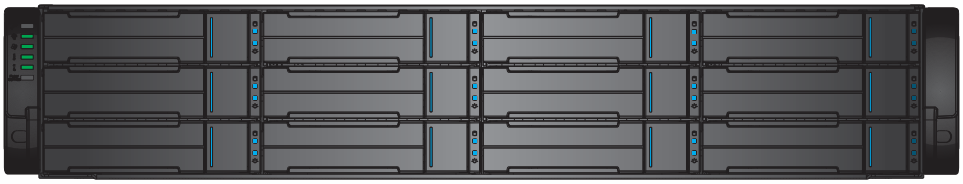
The naming rules for Unified Storage and JBOD models are explained in the example below:

Unified Storage System: GSe 3016 → GSe (A) + 30 (B) + 16 (C)

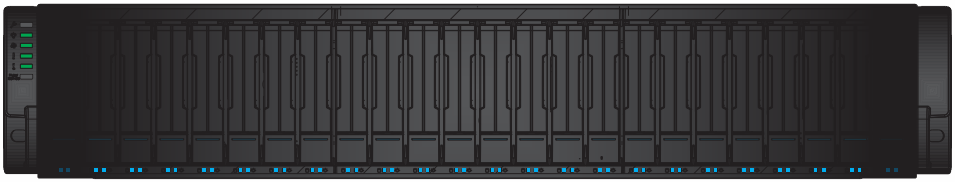
Designation	Description
(A)	GSe = EonStor GSe systems JB = JBOD systems
(B)	30 where 0 indicates first generation, 1 indicates second generation and so on
(C)	12 = 2U system, 12 hard drives capable 16 = 3U system, 16 hard drives capable 24 = 2U system, 24 hard drives capable
(D)	**B** = 2.5" hard drive form factor system 3.5" hard drive form factor system if not mentioned

Model Variations

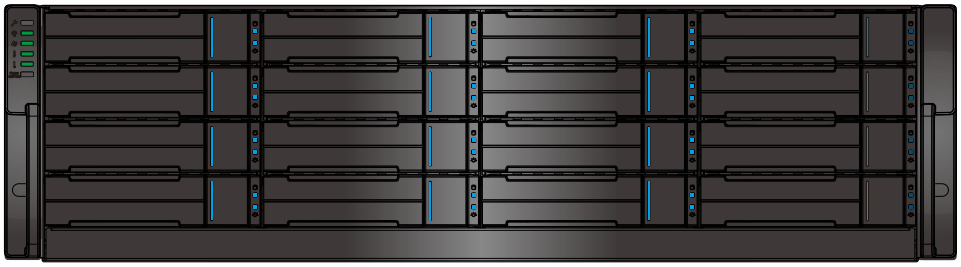
Comprised of Unified Storage Systems and JBOD models, Unified Storage Systems store hard drives and control the entire storage array while JBOD systems connect to a master Unified Storage System and allow storage capacity expansion by adding more hard drives. Hard drive limitation(s) may vary model to model.



EonStor GS 3012



EonStor GS 3024B



EonStor GS 3016

Major Components

NOTE

Upon receiving your system, check the package contents against the included **Unpacking List**. If module(s) are missing, please contact your system vendor immediately.

Controller and Interface

Each controller comes with pre-installed DIMM module(s).

The traditional battery backup is replaced by an innovative Cache Backup Module methodology (CBM) which consists of a super capacitor / Batter Backup Unit (BBU) and a flash backup module (FBM). Cached data is quickly distributed to a flash backup module for permanent storage with the support of the super capacitor in the event of a power outage. The advantage of a super capacitor is its very fast charging time. The super capacitor is charged within a few minutes and available to distribute power to the controller. So cached data can be saved immediately and permanently in flash backup module (FBM).

The embedded firmware features intelligent algorithms, such as power-saving modes, variable fan speeds, and exiled drive handling, making this model a greener choice.

JBOD Controller and Interface

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

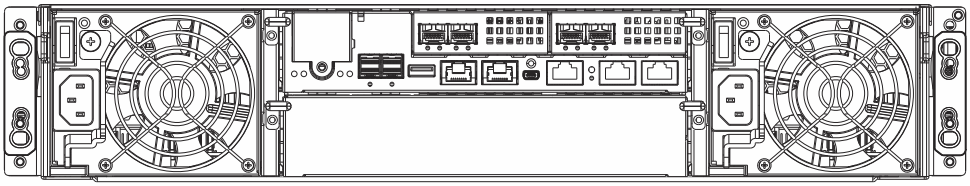
In terms of supported protocols, the firmware supports communications with enclosure devices, SAS/SATA disk drives and as Unified Storage System featuring SAS expansion ports.

In terms of physical connection, the SAS interface provides ease of cabling through Mini-SAS connectors. With a backplane adapting SAS or SATA drives, the system supports enterprise-class SAS, Near-line SAS, cost-effective SATA-II or SATA-III hard drives or SSDs, and is ideal for adding large capacity to a storage pool.

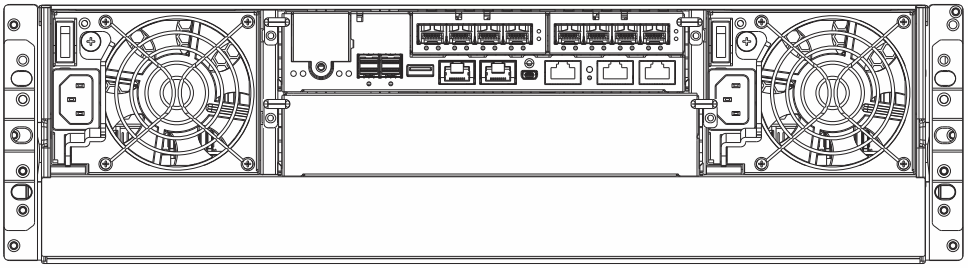
Power supply unit with built-in cooling module

Cooling module is built into the power supply unit (PSU) to protect the system from overheating. The two hot-swappable PSUs provide constant power to the system. The modular nature of the system and the easy accessibility to all major components ensure ease of maintenance.

The Rear Panel



2U models



3U models

Connection between Unified Storage System and JBOD

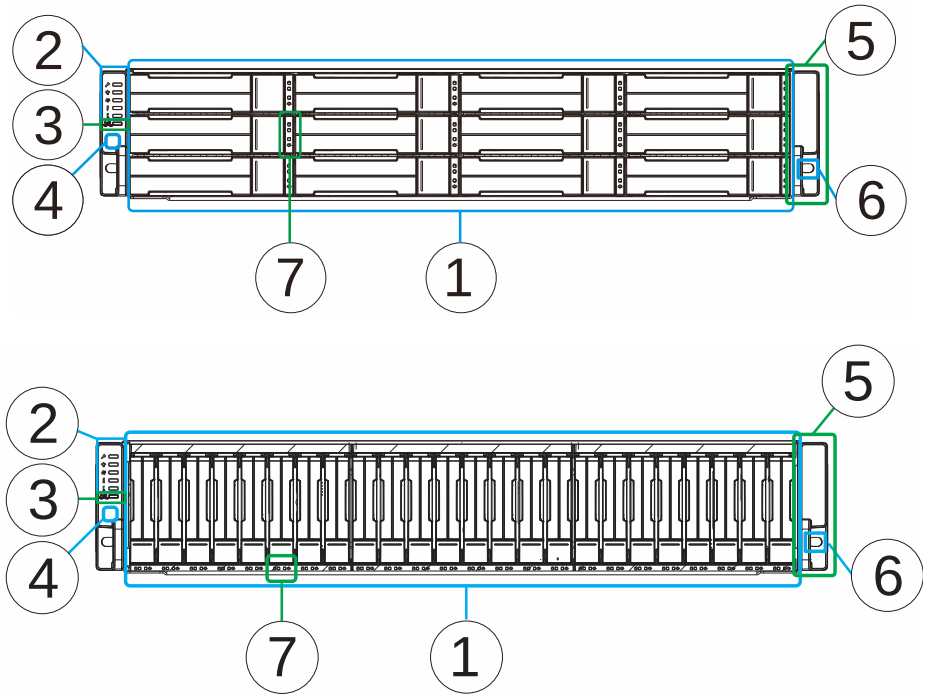
The following rule applies when connecting Unified Storage System and JBOD(s):

- Single-Controller Unified Storage System connects to Single-Controller JBOD.

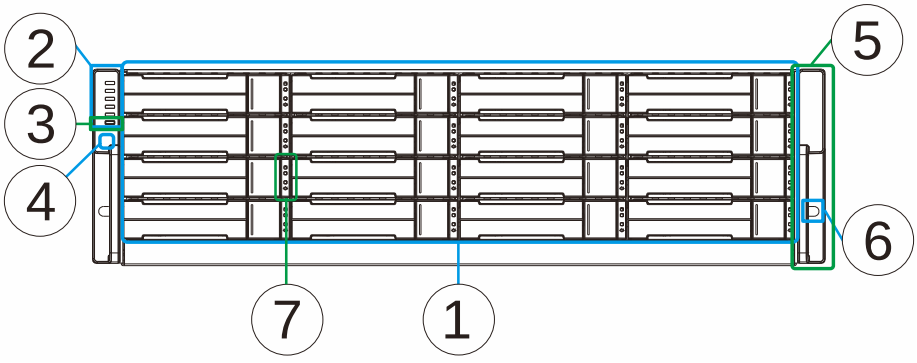
Chassis

The chassis is rugged constructed and divided into front and rear sections. The chassis is designed to be installed into a rack or cabinet.

Front Panel



2U models

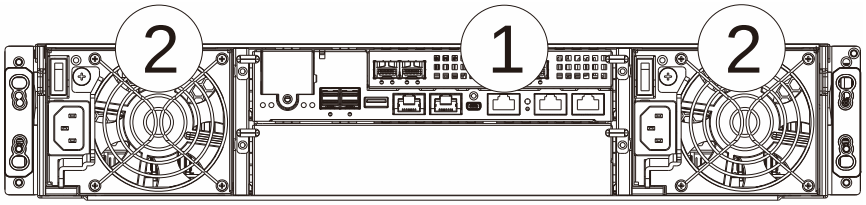


3U models

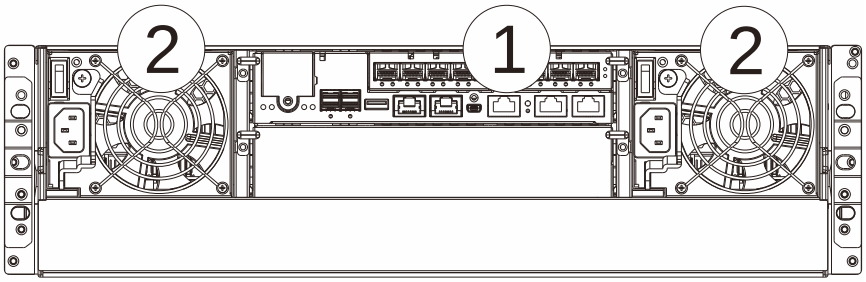
- **Hard drive trays (1):** Each drive tray is hot-swappable and holds a 2.5 / 3.5-inch hard drive. 4U systems, capable of carrying 60 hard drives have either 3 drawer (each capable 20 hard drives) or no drawer (top-loader).
- **LED Panel (2):** It contains Service / Power / Cooling Fan / Thermal / System LED
- **Mute button / service LED (3):** The mute button is to mute an alarm when sound or to indicate that the system requires service.
- **Rotary ID switch in JBOD systems (4):** The rotary ID switch is for users to set a unique ID to each JBOD when connected in a multi-array environment.
- **Handles (5):** There are handles on both sides of the enclosure for users to pull / push the enclosure out and into the cabinet when the enclosure is installed on a slide rail rackmount system.
- **Rackmount holes (6):** There are two rackmount holes (one on each side of the enclosure) for users to secure the enclosure onto the cabinet.
- **Hard drive status LED (7):** There is a set of hard drive status LEDs on each hard drive tray or right hand side or below of it to indicate operation status.
- **Drawer release notch (8):** The drawer release notch is used to open each drawer.

Rear Panel

#	Description	#	Description
1	Controller	**2**	Power supply + cooling module
3	Cooling module unit		



2U models



3U models

- **Controllers (1):** The controller module contains a main circuit board and a pre-installed DIMM module. For details, see Rear Panel Components.
- **PSU (2):** The hot-swappable PSUs provide power to the system. There is a cooling module within each PSU. Please refer to your specific system for details shown in the later sections of this chapter.

WARNING

Do NOT remove the dummy cage for this model. Doing so will disrupt the internal airflow.

Internal Backplane

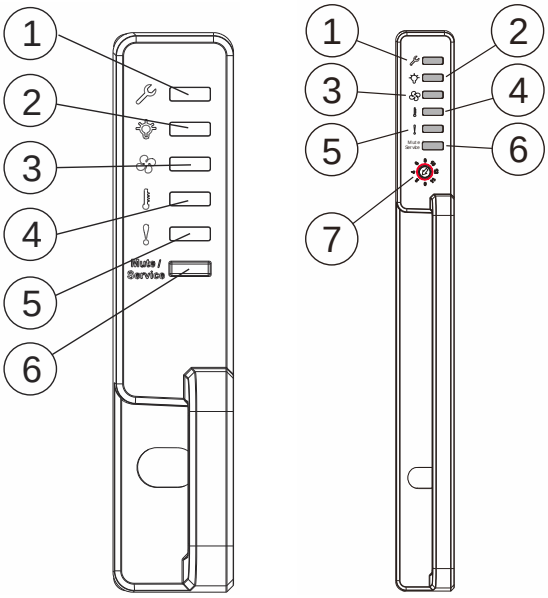
An integrated backplane separates the front and rear sections of the chassis. This circuit board provides logic level signals and low voltage power paths. Thermal sensors and I^2C devices are embedded to detect system temperatures and PSU/cooling module operating status. This board contains no user-serviceable components.

WARNING

Accessing the backplane board may lead to fatal damage of the system. Also, physical contact with the backplane board may cause electrical hazards.

Front Panel Components

LED Panel



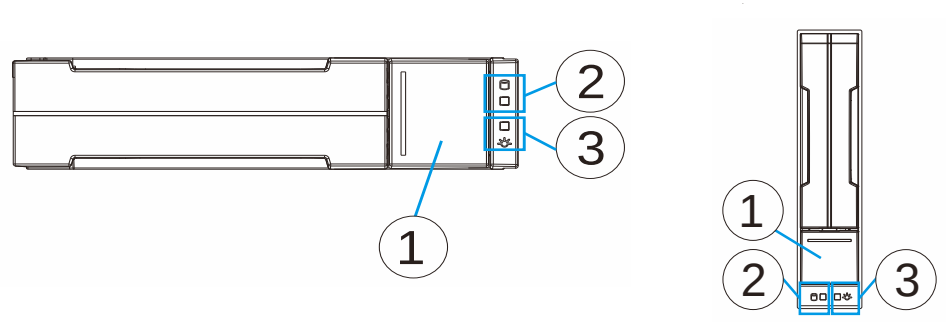
Unified Storage System LED panel JBOD LED panel

The LED panel can be located on the chassis ear. The LED panel contains Service LED **(1)**, a power supply status LED **(2)**, cooling module status LED **(3)**, temperature sensor status LED **(4)**, System fault LED **(5),** Mute Service button **(6),** rotary ID switch (only JBOD) **(7)**. For details, please refer to LED Panel.

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 and arrange for a replacement module.

Drive Tray Bezel



3.5 inch 2.5 inch

The drive tray is designed to accommodate separately purchased SAS or SATA interface hard disk drives. There is a release button **(1)** that has to be used to retrieve disk drives from the chassis. To the right of the bezel plate, there is a drive busy LED **(2)** and a power status LED **(3)**.

NOTE

Please note: The status LEDs of a 2.5 inch HDD tray are on the front panel of an SFF (Small Form Factor) enclosure itself, below each tray or top right (3U / 36-bay).

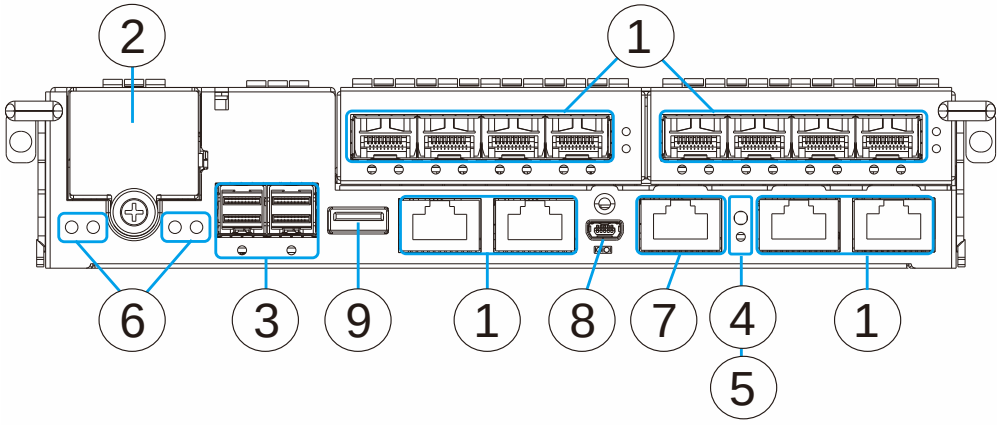
WARNING

Be careful not to warp, twist, or contort the drive tray in any way (e.g., by dropping it or resting heavy objects on it). If the drive bay structure is deformed or altered, the drive trays may not fit into the drive bay.

Rear Panel Components

Controller Module of Unified Storage Systems

Designation	Description	Designation	Description
1	Host ports	**6**	Controller status LED
2	Super capacitor / Battery Backup Unit (optional)	**7**	Management port
3	SAS expansion port	**8**	Mini USB port (**console port**)
4	Restore default button	**9**	USB Service port
5	Restore default LED		



The controller also features a **Cache Backup Module** (CBM), consisting of a **super capacitor** or a **battery backup unit** (BBU) and a **Flash Backup Module** (FBM). The type of CBM module may vary and is optional on all models.

NOTE

The management port supports 100Mbs and 1000Mbs (1Gbs) speeds.

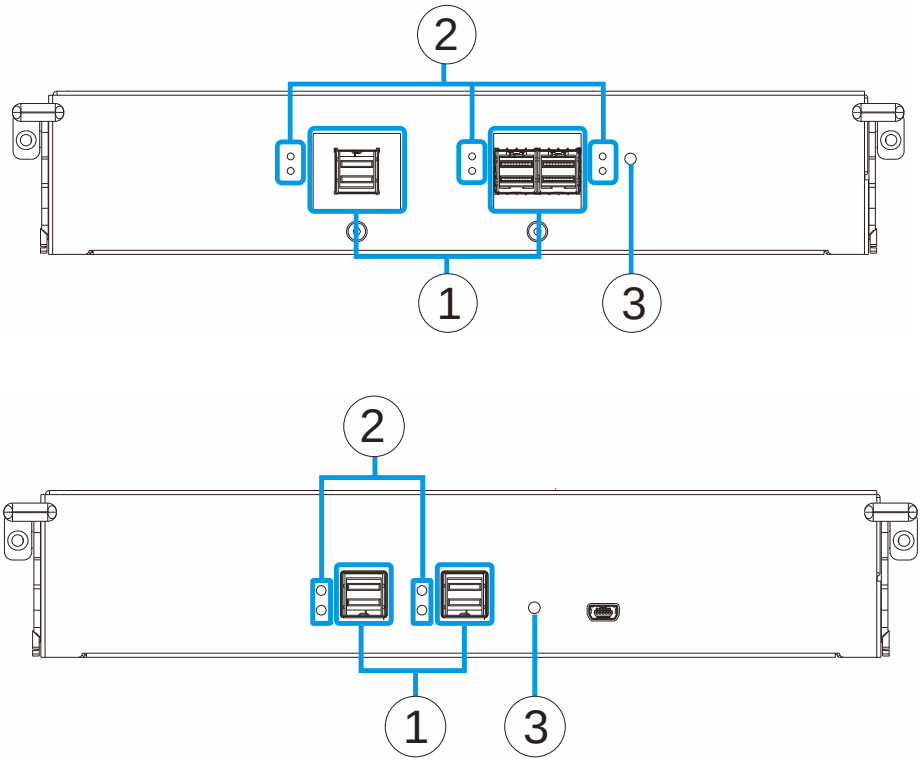
Host boards are optional add-on components! There are two host board slots, if you are installing a host board for the first time, please install it to the slot on the left (next to SAS exp. Ports).

WARNING

The only time you should remove the controller is to install/ replace the CBM or a failed controller. The controller is built of sensitive components and unnecessary tampering may damage the controller.

Controller Module of JBOD enclosures

The expansion controller contains a circuit board within a metal canister, interfaced through hot-swap docking connectors at the back-end. Three SAS wide ports on the interface faceplate connect to a managing Unified Storage System or other JBODs.



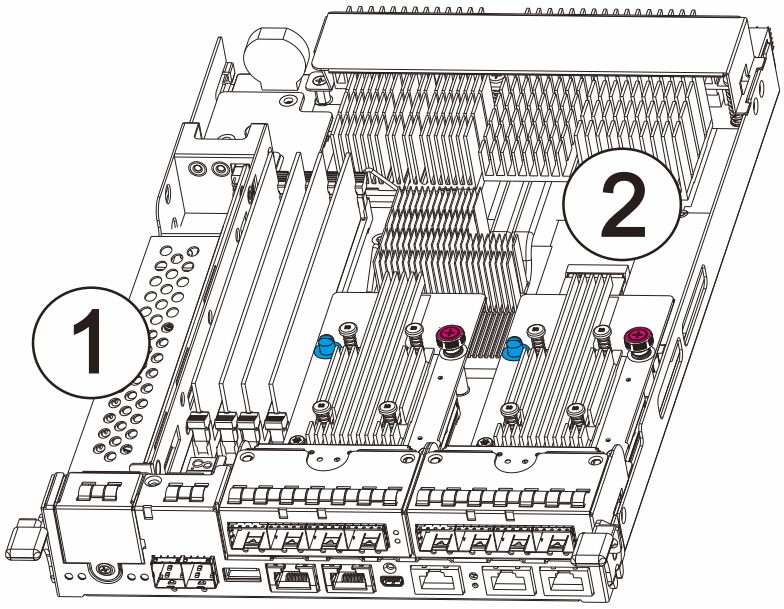
Designation	Description
1	SAS expansion ports
2	SAS expansion port Status LED
3	Controller Status LED

WARNING

The only time you should remove the controller is to replace a failed controller. The controller is built of sensitive components and unnecessary tampering can damage the controller.

Cache Backup Module (CBM), Battery Backup Unit & Flash Backup Module

The Cache Backup Module (CBM), located inside the controller, consists of a battery backup unit (BBU) **(1)** and a flash backup module (FBM) **(2)**. The Battery Backup Unit (BBU) can be serviced by the user, the Flash Backup Module (FBM) is not serviceable by the user. The CBM can sustain cache memory after a power failure. The use of a CBM is highly recommended in order to safeguard data integrity. If you ordered a model without CBM and would like to install it, refer to CBM Installation.

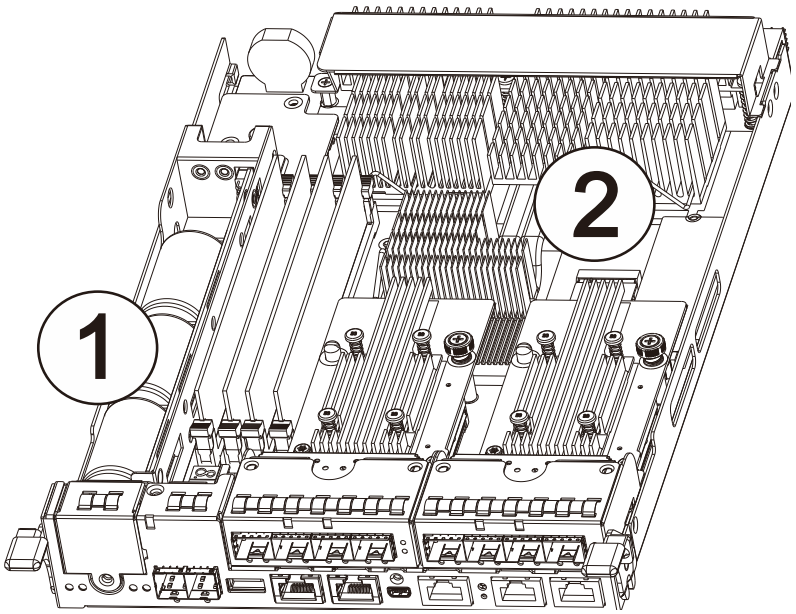


NOTE

The BBU is only charged partially when shipped. Therefore, after powering on the system the BBU will start charging to its full capacity. It normally requires approximately twelve hours for the battery to be fully charged. If the battery is not fully charged after twelve hours, there may be a problem with the BBU and you should contact your system vendor immediately. You can also check the status of the battery module via the management software or the firmware (please refer to respective manuals).

Cache Backup Module (CBM), Super Capacitor & Flash Backup Module

The super capacitor **(1)** and flash backup module **(2)** can be located inside the controller and serve as a Cache Backup Module (CBM) described in the previous section. With the super capacitor, the cached data can be stored permanently in the flash backup module, in case of a power outage.

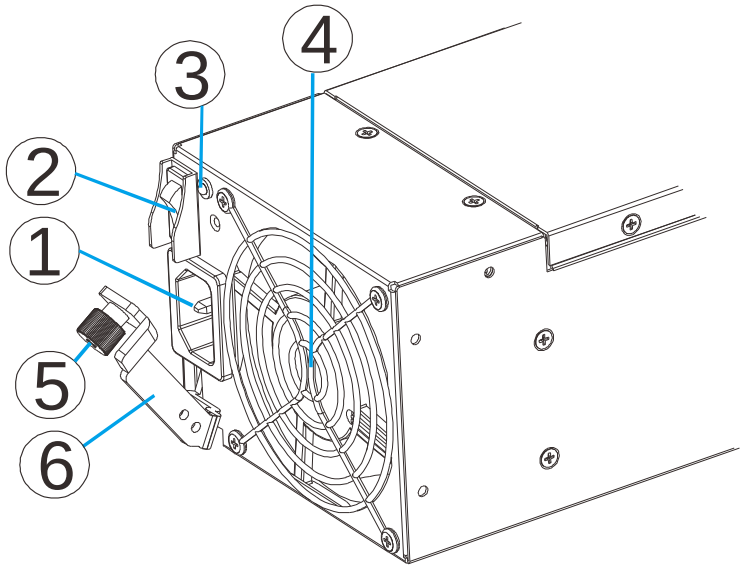


NOTE

The super capacitor is only charged partially when shipped. Therefore, after powering on the system, the super capacitor will start charging to its full capacity. The super capacitor will be charged within a few minutes. If the super capacitor is not charged, there may be a problem with the super capacitor and you should contact your system vendor immediately. You can also check the status of the super capacitor module via management software or the firmware (please refer to respective manuals).

PSU & Cooling Module

The two redundant, hot-swappable PSUs have a power socket **(1)**, power switch **(2)**, PSU status LED **(3)**, cooling module **(4)**, retention screw **(5)** and an extraction handle **(6)**.



The cooling modules can operate at three rotation speed settings. Under normal operating conditions, the cooling fans run at the low speed. Under the following conditions, cooling fans raise their rotation speed to increase the airflow:

- Component failure: if a cooling module, PSU, or a temperature sensor fails.
- Elevated temperature: if the temperature breaches the upper threshold set for any of the interior temperature sensors.
- During the system initialization stage, the cooling fans operate at high speed and return to low speed once the initialization process has completed and no erroneous condition detected.

NOTE

There are two upper temperature thresholds: one for event notification and the other for triggering higher fan rotation speed. The preset-value for event notification can be changed using the firmware-embedded configuration utility, while the fan speed trigger cannot be changed. Refer to the Firmware Operation Manual for details.

System Monitoring Features

There are a number of monitoring approaches that provide the operating status of individual components.

Expansion Enclosure Support

Monitoring:

A managing Unified Storage System is aware of the status of JBOD components including those of:

- Expander controller (presence, voltage and thermal readings)
- PSU
- Cooling module
- Enclosure thermal sensor
- Service (the Service signal to specify a specific enclosure)
- Disk drives

JBOD Identifier:

The managing Unified Storage System will sound the alarm and deliver warning messages if there is a conflict between JBOD IDs.

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

NOTE

The IDs for JBODs are #1 to #15. For details, please refer to JBOD connections.

Cooling Module Speed Adjustment:

If any of the detected temperature readings breaches the temperature threshold, the firmware running on the managing Unified Storage System automatically raises the rotation speed of all cooling fans.

JBOD Enclosure Status Monitoring:

A Unified Storage System, when connected with expansion JBODs, acquires the component status within other enclosures via a proprietary enclosure monitoring service using the in-band connectivity. No additional management connection is required.

I^2C bus

The detection circuitry and temperature sensors are interfaced through a non-user-serviceable I^2C bus. When JBODs are attached to controllers, JBOD component status is reported through in-band protocols over expansion links that is managed by a proprietary enclosure service.

Firmware (FW) and Management Software Suite

The firmware (FW) is preloaded and is used to configure the system. The FW can be accessed through the management software, a browser-based graphical user interface (GUI) software that can be installed on a local/remote computer and accessed via the network. The manager communicates with the array via the connection of the existing host links or the Ethernet link to the array's Ethernet port.

Audible Alarms

The system comes with audible alarms that are triggered when certain active components fail or when certain controller or system thresholds are exceeded. Whenever you hear an audible alarm, it is imperative that you determine the cause and rectify 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. The alarm can be turned off using the mute button on the front panel.

WARNING

Failing to respond when an audible alarm is heard can lead to permanent damage(s) to the system. When an audible alarm is heard, rectify the problem as soon as possible.

Hot-swapping

The system comes with a number of hot-swappable components that can be exchanged while the system is still online without affecting the operational integrity. These components should only be removed from the system when they have to be replaced.

The following components can be user-maintained and hot-swappable:

- Controller module (Dual-Controller models)
- PSU (including cooling modules)
- Hard drive

NOTE

Normalized airflow ensures sufficient cooling of the system and is only attained when all components are properly installed. Therefore, a failed component should only be removed when a replacement is available. For instructions on how to replace these hot-swappable components, please refer to System Maintenance.

Hardware Installation

This chapter describes how to install modular components, such as hard drives into the enclosure and CMB into Unified Storage controller enclosure.

> **NOTE**
>
> Installation into a rack or cabinet should occur **BEFORE** hard drives are installed into the system.

Installation Prerequisites

Static-free installation environment: The system must be installed in a static-free environment to minimize the possibility of electrostatic discharge (ESD) damage.

Component check: Before installing the system, check to see that you have received all the required components using the **Unpacking List** included in the package. If there are item(s) missing or appear damaged, contact your vendor for a replacement.

Hard drives: SAS/SATA hard drives must be purchased separately and be available prior to installing the system.

Cabling: All the cables that connect the system to the hosts must be purchased separately. Please refer to System Connection for sample topologies and configuration options. Contact your vendor for the list of compatible cables.

Memory modules: If you wish to change the pre-installed DIMM module, you can find DIMM replacement procedures in Replacing Memory Module(s).

Rack installation: The rack slide rails are optional accessories and should you need to install it, please refer to the Slide Rail Installation Guide section.

Make sure you are aware of the related positions of each plug-in module and interface connector.

Cables must be handled with care and must not be bent. To prevent emission interference within a rack system and accidental cable disconnection, the routing paths must be carefully planned.

Installation Procedures Overview

Following all the instructions provided below can minimize system installation time. Detailed, illustrated instructions for each component are given in the following sections.

1. **Unpack:** Unpack the system and confirm all components have been received against the Unpacking List.
2. **Rack/Cabinet installation:** If the system is going to be installed in a rack or cabinet, it should be installed prior to installing the hard drives. Installing the system into a rack or cabinet requires at least two people due to its weight. If you need to install the slide rails that came with the system, please go here.
3. **Install CBM (if necessary)**: Install the CBM (Super Capacitor or Battery Backup Unit (BBU) + Flash Backup Module) onto the controller if you purchased it as an additional item.
4. **Install hard drives:** Separately purchased SAS/SATA hard drives must be individually installed into the drive trays.
5. **Install drive trays:** After the hard drives have been installed into the drive trays, you can install the drive trays into the enclosure (install trays **AFTER** the enclosure has been mounted onto the rack).
6. **Cable connection:** Use the supplied power cords to connect the system to main power. It is recommended to connect power cords to separate and independent power sources (different circuit breakers for redundancy).
7. **Power up:** Once the components have been properly installed and all cables are properly connected, you can power up the system and configure the Unified Storage System.

Unpacking the System

Compare the **Unpacking List** included in the shipping package against the actual package contents to confirm that all required materials have arrived.

Box contents

For detail content(s), please refer to the unpacking list that came with the system.

The accessory items include a serial port cable, screws, **Quick Installation Guide**, a CD containing the Management Software and its manual and **Firmware Operation Manual**, and a product utility CD containing the **Installation and Hardware Reference Manual** (this document).

Preinstalled Components

Shown below are the components pre-installed in the system:

- Controllers
- LED front panels
- DIMM module for Unified Storage Systems
- PSUs including cooling modules
- Host board

Components to be installed

You must install the following components:

- The enclosure itself (please refer to the Slide Rail Kit Installation Guide)
- Hard drives
- CBM (optional)
- Cabling

Installing Hard Drives

Installation of hard drives should only occur after the enclosure has been rack-mounted!

Hard Drive Installation Prerequisites

Hard drives are separately purchased and when purchasing hard drives, the following factors should be considered:

Capacity (MB/GB): Use drives with the same capacity. RAID arrays use a "least-common-denominator" approach, meaning the maximum capacity used in each drive for composing a RAID array is the maximum capacity of the smallest drive. Therefore it is recommended to use large storage capacity hard drives.

WARNING

Even hard drives by the same manufacturer, of the same model, and claiming the same rated capacity may actually carry different block numbers meaning that their capacity may not be exactly the same.

When configuring hard drives into a RAID array, you may use a slightly smaller capacity as the "**Maximum Disk Capacity**" in each individual hard drive. The configuration option can be found in the interface-specific firmware manual that came with your enclosure.

Profile: The drive trays and bays of the system are designed for 2.5" or 3.5" hard drives, depending on the Unified Storage System model.

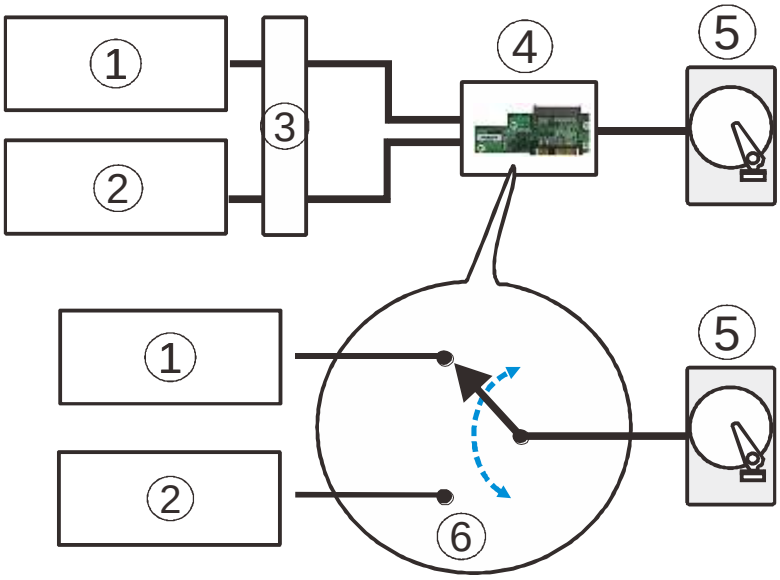
Drive type: The system uses SAS (3Gbps, 6Gbps or 12Gbps), SATA and Near-line 2.5" or 3.5" hard drives. Please ensure that you purchase the correct hard drives.

NOTE

If you prefer using SATA hard drives in a Dual-Controller Unified Storage System or in attached JBODs, make sure you also purchase MUX kits.

MUX Board:

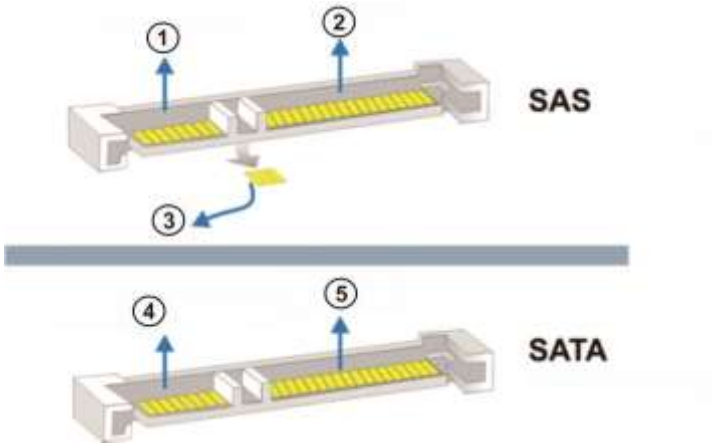
Shown below, controller A **(1)** and controller B **(2)** is connected to the backplane **(3)**. With a MUX board **(4)** paired to the hard drive **(5)**, data signals is able to switch between controllers A and B signal ports (indicated by the blue arrow / dotted line). Under normal circumstances, controller B signal port is in standby mode **(6)**.



MUX Kit Port Selector Mechanism

SAS Interface

The SAS interface features a dual-ported connectivity with pins on both sides of its connector that include SAS primary links **(1)**, power link **(2)** and underneath it, the SAS secondary links **(3)**. The SATA drives have only one port that includes the SATA physical links **(4)** and the power link **(5)**. The MUX-enabled drive trays must be separately purchased and applied.



Dual-ported SAS and Single-port SATA Connectors

WARNING

The hard drives and drive trays should only be installed into the system after rack mounting. If the hard drives are installed first, the system will be too heavy to handle and the possible impact during installation may damage your hard drives.

Handle hard drives with extreme care and observe all ESD prevention methods when installing drives.

Only use screws supplied with the system package. Longer screws may damage the drive.

Hard Drive Designation

Illustrations shown below are system hard drive slot number designations. Please familiarize yourself with the designations to avoid withdrawing the hard drive(s) out of the enclosure.

1	**2**	**3**	**4**
5	**6**	**7**	**8**
9	**10**	**11**	**12**

2U systems

1	**2**	**3**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**

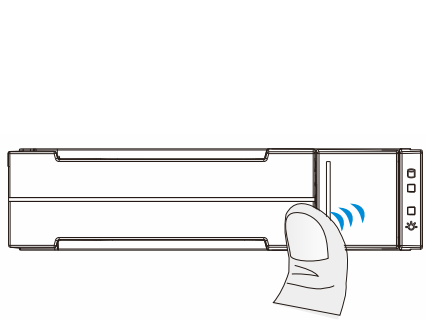
2U SFF systems

1	**2**	**3**	**4**
5	**6**	**7**	**8**
9	**10**	**11**	**12**
13	**14**	**15**	**16**

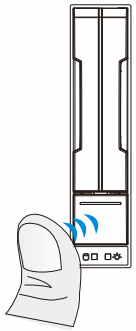
3U systems

Installing the Hard Drive into Drive Tray

Open the bezel by pressing the release button and gently pull out the tray.



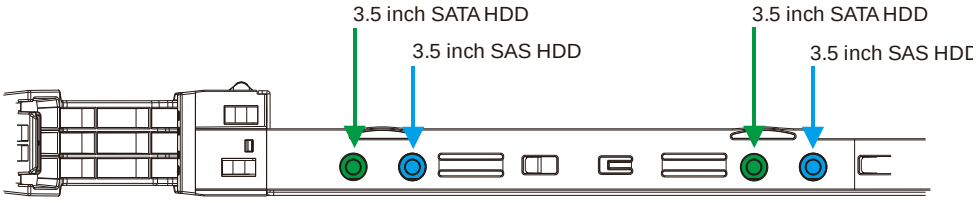
3.5 inch



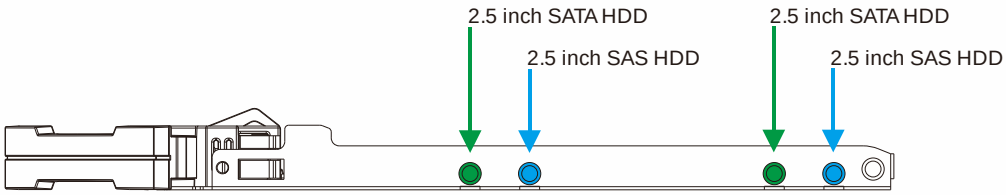
2.5 inch

Place the hard drive into the drive tray, making sure that the interface connector is facing the open side of the drive tray and its label side facing up.

If you want to install a SAS drive, an installed MUX board must be removed first.



Installing a 3.5” SAS / NL-SAS / SATA drive



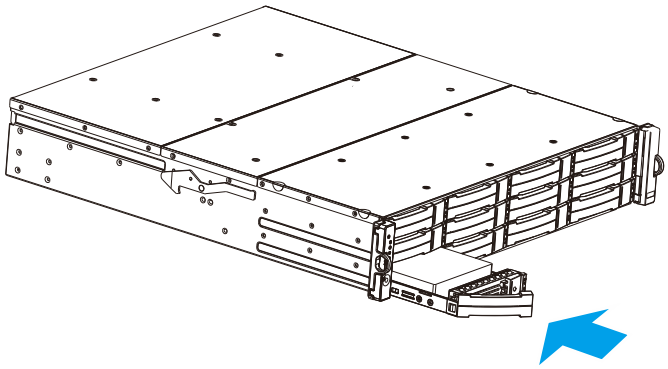
Installing a 2.5” SAS / SATA drive

Adjust the drive location until the mounting holes in the drive tray are aligned with those on the hard drive. Secure the drive with four of the supplied flat-head screws.

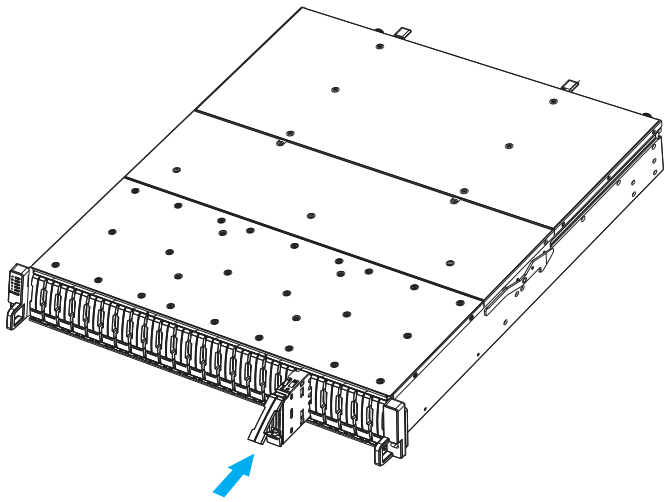
Installing the Hard Drive Tray into the Enclosure

Once the hard drives have been installed in the drive trays, install the drive trays into the system.

> **WARNING**
>
> Each drive bay must be populated with a tray even if it does not contain a hard drive. An empty bay will disrupt ventilation and the system might overheat.



3.5 inch



2.5 inch

With the hard drive tray bezel opened, align and insert the tray into the enclosure. Once fully inserted, close the tray till it's snapped.

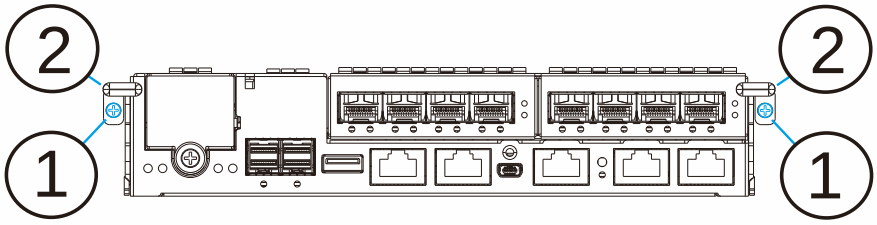
Installing CBM for Unified Storage Systems

The CBM consists of a supercapacitor or battery backup unit (BBU) and flash backup module (FBM). The CBM 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 highly recommended in order to safeguard data integrity. The CBM is an optional item for this Unified Storage System model and can be purchased from your system vendor. The CBM has to be installed on the controller before rack-mounting the system.

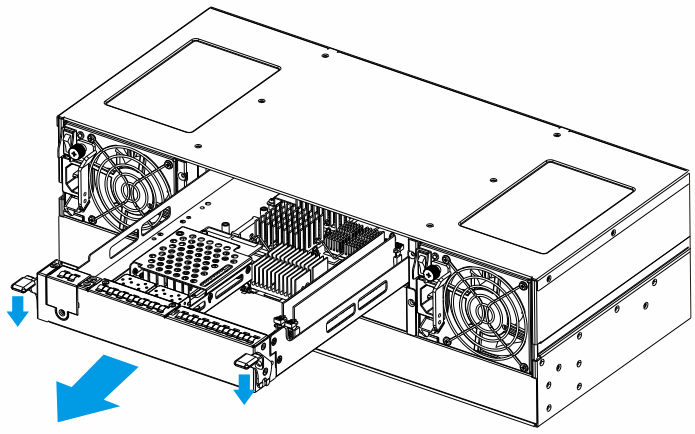
> NOTE
>
> The CBM (BBU + FBM) will be pre-installed for you if you ordered it as a part of the system. If you purchase the CBM afterwards as an upgrade component, please read and follow the instructions in this section carefully.

Removing the Controller

Loosen the screws **(1)** under the ejection levers **(2)**.



Push ejection levers downwards and the controller will ease out from chassis.

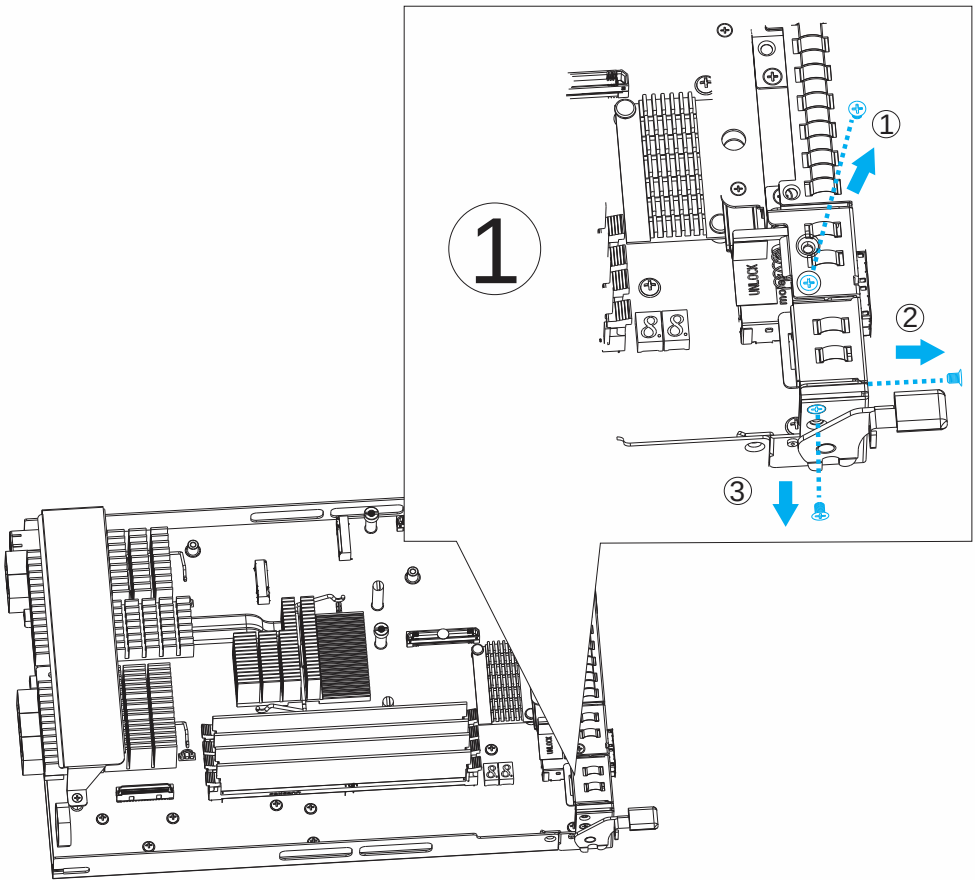


Battery Backup Unit Installation Notes

Please read the following sections on how to install the supercapacitor / battery backup module into the controller module. Always place the controller on a clean, static-free surface and hold the controller only by its metal canister and never touch the circuit board or connector pins.

Step by step Battery Backup Unit Installation

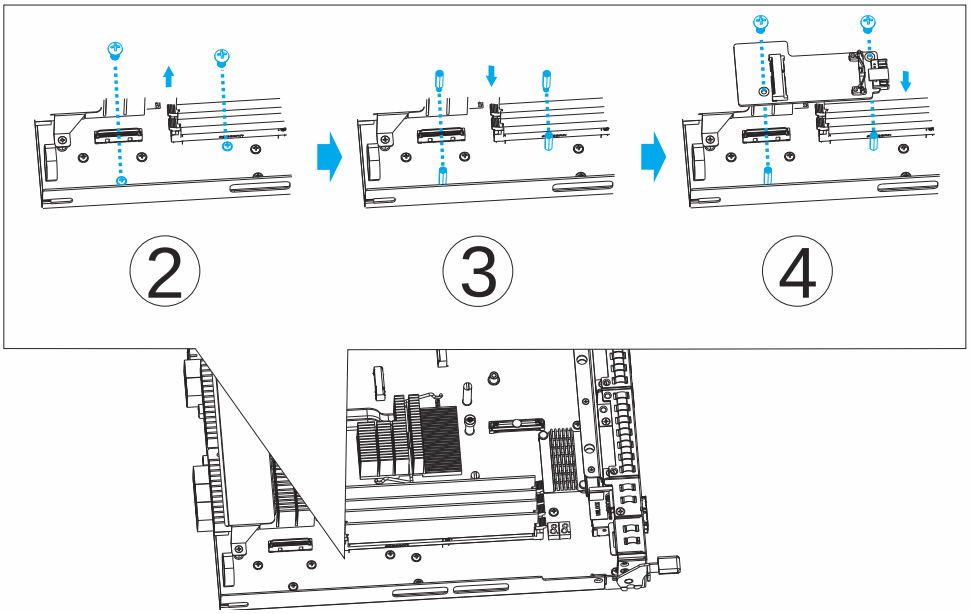
1. With the controller removed, remove the dummy cover by loosen the three screws as shown in the picture.



2. Install the charge board, loosen the two screws as shown in the picture. Keep the two screws at a safe place.

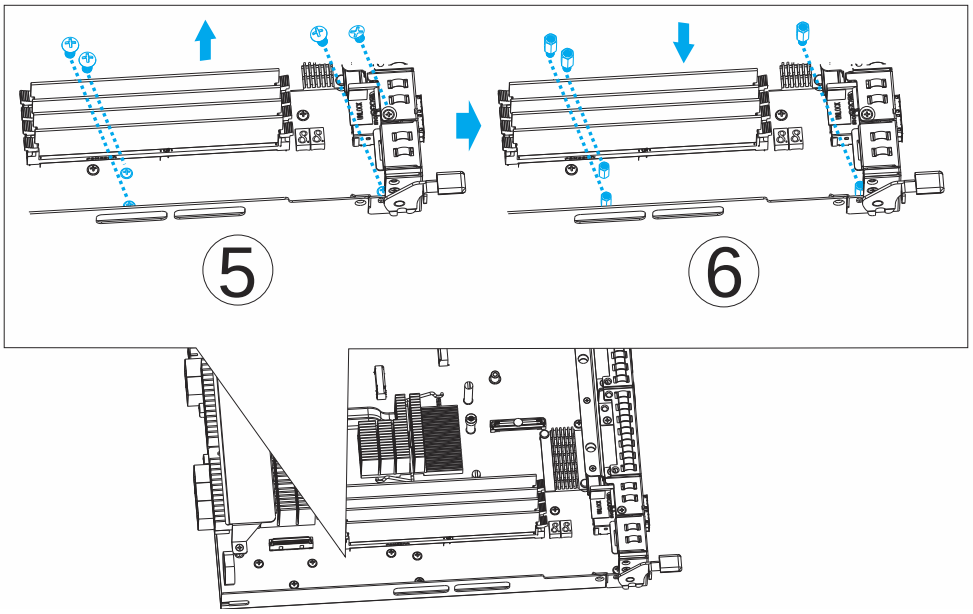
3. Screw the two spacer bolts into the designated thread holes.

4. Place the charge board on top of the two spacer bolts, so the connector of charge board and controller match. Push the charge board gently down to join the connectors. Secure the charger board with two former removed screws.

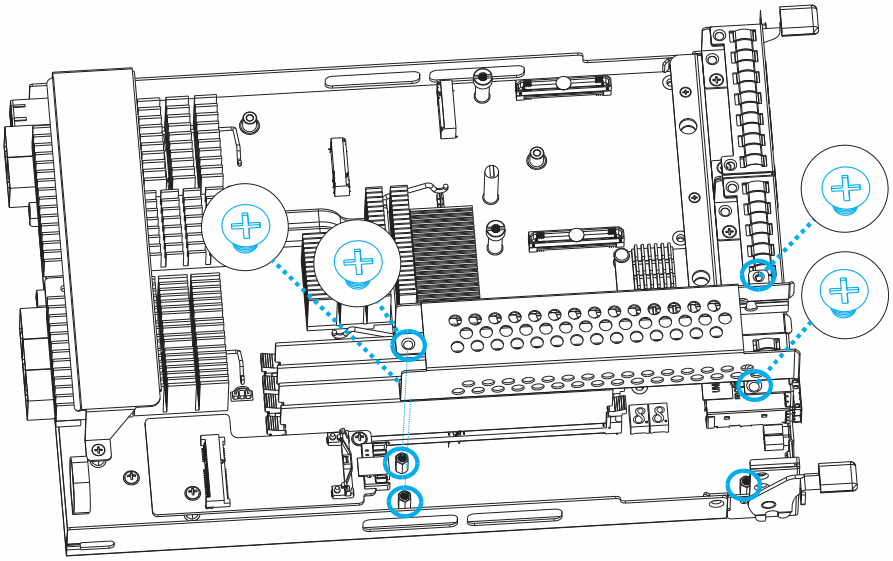


5. Install the battery cage, loosen the four screws as shown in the picture. Keep the four screws at a safe place.

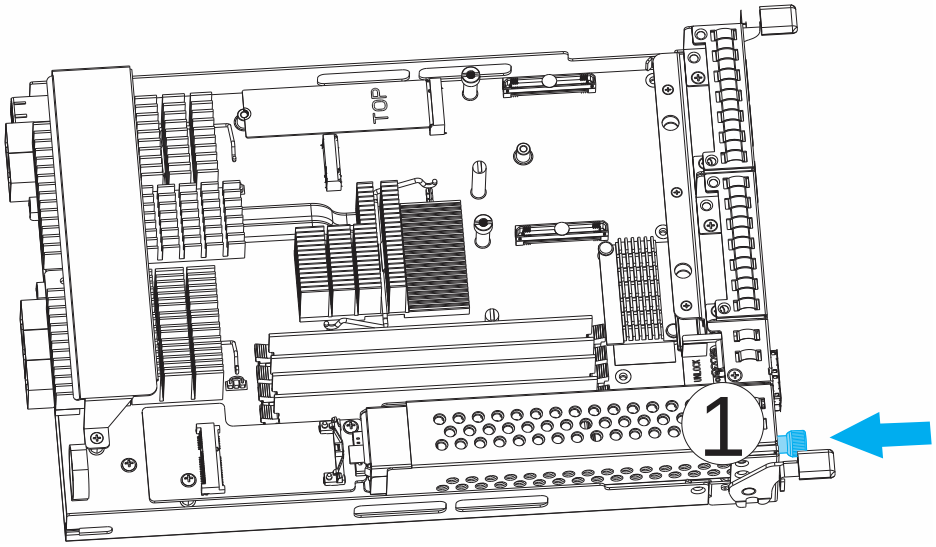
6. Screw the three spacer bolts into the designated thread holes.



7. Hold the battery cage on top of the space bolts, make sure the cage fits and meets the space bolt screw holes. Pull it down and secure it using the supplied three flat tap screws. Join the battery cage with the front frame using the fourth flat tap screw.



8. Gently insert the battery backup unit into the cage and secure it using the thumb screw (**2**).



9. Reinstall the controller.

Supercapacitor Installation Notes

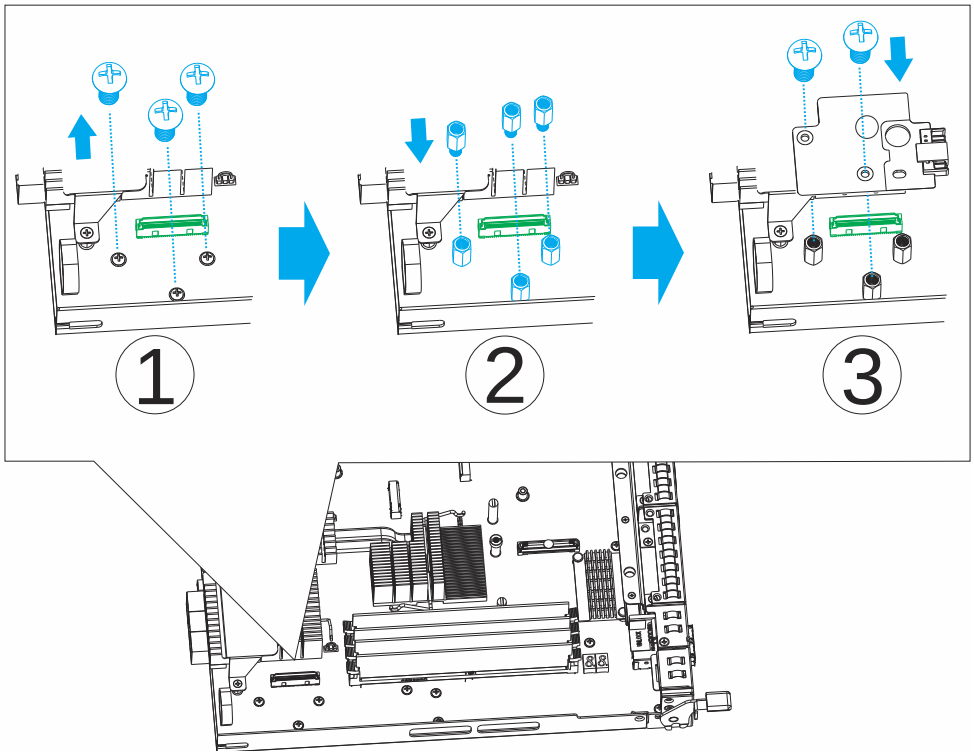
Please read the following sections on how to install the supercapacitor & flash backup module into the controller. Always place the controller on a clean, static-free surface and hold the controller only by its metal canister and never touch the circuit board or connector pins.

Step by step Supercapacitor Installation

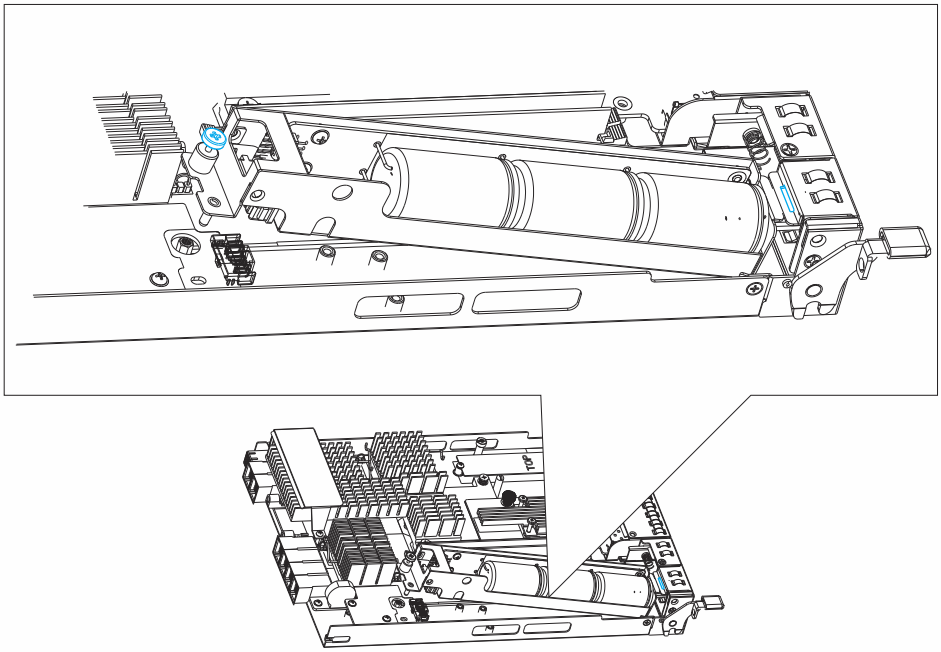
1. With the controller removed, loosen the three screws as shown in the picture. Keep the three screws at a safe place.

2. Screw the three spacer bolts into the designated thread holes.

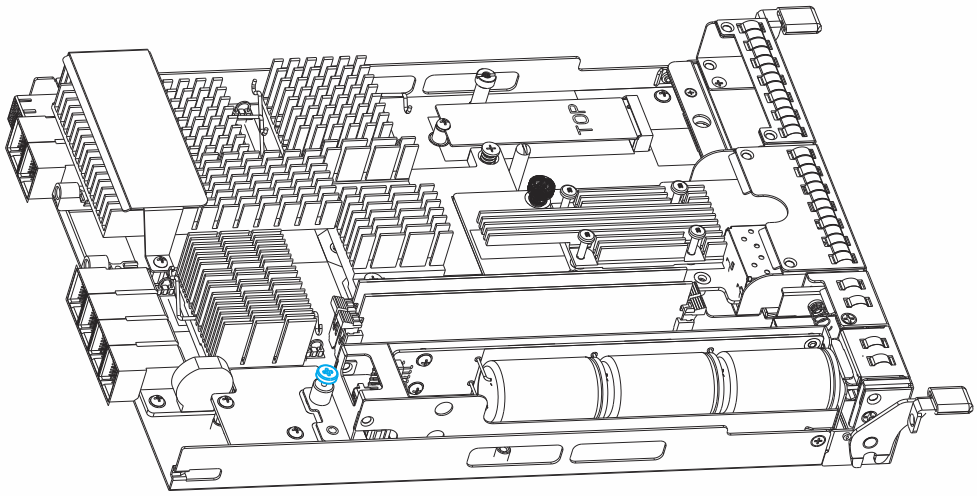
3. Place the charge board on top of the three spacer bolts, so the connector of charge board and controller match. Push the charge board gently down to join the connectors. Secure the charger board with **two** of the former removed three screws.



4. Insert the supercapacitor at a 45 degree angle. Make sure the protrusion is inserted into the slot.



5. Secure the supercapacitor with a supplied screw at the end (indicated by the **blue color screw**).

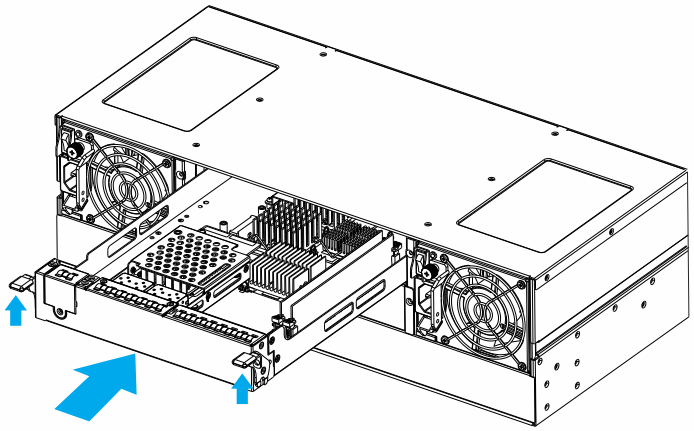


6. Reinstall the controller.

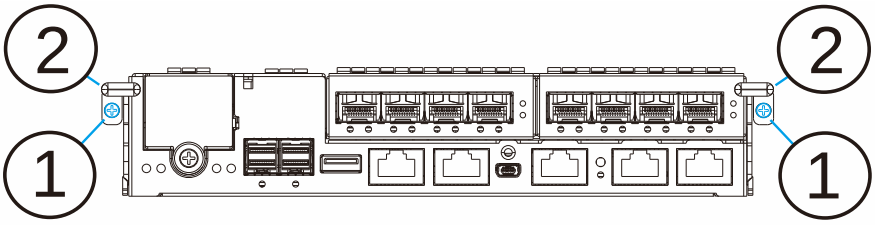
Installing the Controller

After completing the battery backup unit and flash backup module installation, the controller can be re-inserted into the enclosure:

1. Insert the controller slowly into the module slot. When you feel the contact resistance, use slightly more force and then push both of the ejection levers upwards (indicated by the **blue arrows**) to secure the controller into chassis.



2. Secure the controller by fastening the two retention screws **(1)** under the ejection levers **(2)**.



NOTE

A new or replaced BBU takes at least 12 hours to charge to its full capacity.

A Supercapacitor is charged within a few minutes.

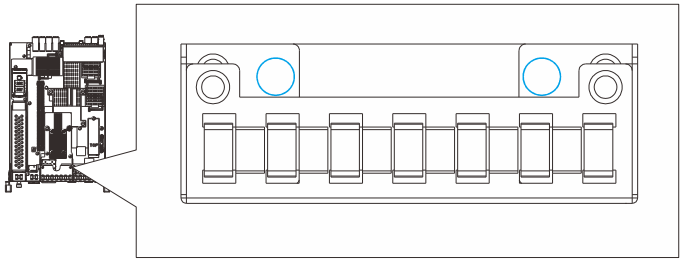
Installing Host Boards

NOTE

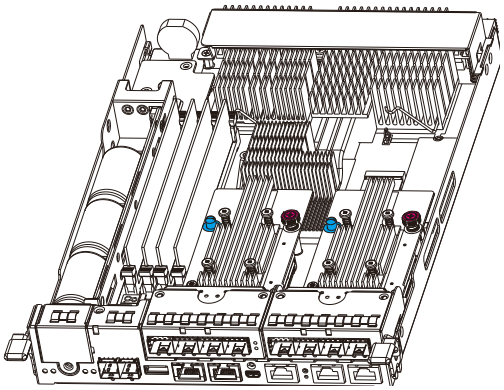
Be aware that upgrading the controller / host board down time may occur.

The system will be reset to the factory settings after installation.

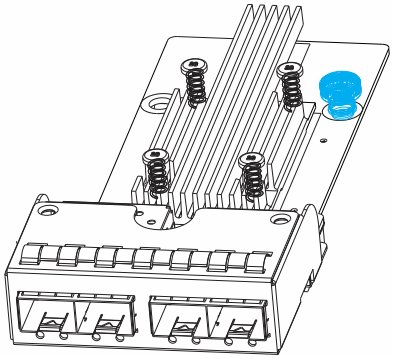
1. Shutdown and remove the controller from the enclosure.
2. For users installing a new host board, you will need to remove the screws holding the dummy covers in place.



3. If you are replacing an existing host board, please loosen the thumb screw that is securing the host board onto the controller and gently lift the host board.



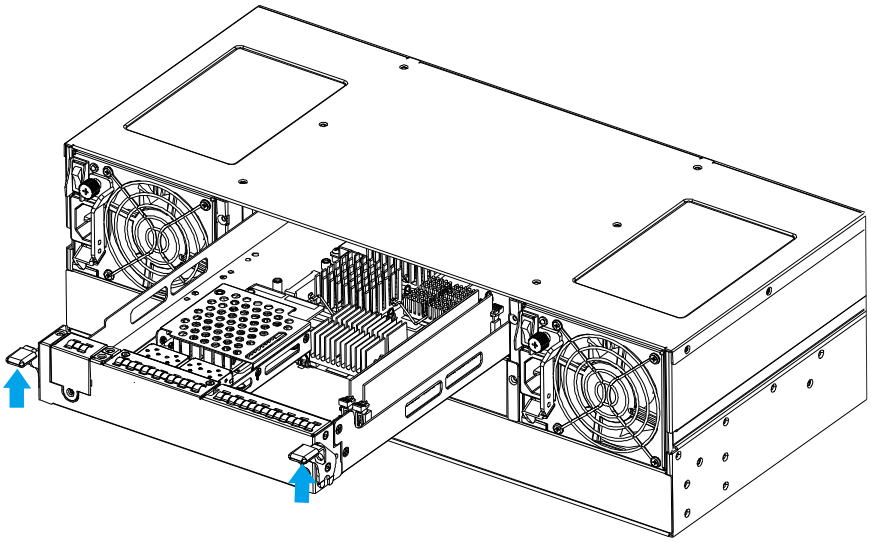
Guide pin (blue)



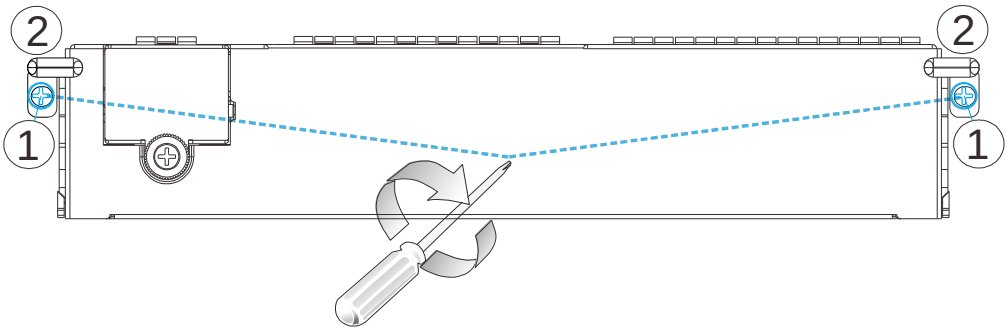
Thumb screw on host board

4. By holding onto the edges of the PCB and using the “guide pin” for positioning, power the replacement host board into the controller. Tighten the thumb screw to complete the installation. Reinsert the controller back into the system.

5. Insert the controller slowly into the module slot. When you feel the contact resistance, use slightly more force and then push both of the ejection levers upwards (indicated by the blue arrows) to secure the controller into chassis.



3. Secure the controller by fastening the two retention screws **(1)** under the ejection levers **(2)**.



System Connection

This chapter outlines the general configuration rules you should follow when cabling a storage system and introduces basic information about topologies. You can use these topologies or refer to them as a guide for developing your own unique topologies. A complete description of the power-on and power-off procedures is also given in this chapter.

General Considerations on Making Connections

When selecting the number of hard drives to be included in a logical drive, the host channel bandwidth and the mechanical performance of individual disk drives should be considered.

It is a good practice to calculate performance against the host port bandwidth when designing an application topology. As an example, if eight members are included in a logical drive and this logical drive is associated with a host ID (LUN mapping), the combined performance of this logical drive should approximate the channel bandwidth. If, for example, two 6-drive logical arrays are associated with two IDs residing on a single host channel, there may be a trade-off with performance.

If your system comes with a total of 8+ host ports, it is recommended that you obtain more disk drives by attaching a JBOD so that you can create host-port corresponding 6-member logical drives (RAID-5) or 8-member logical drives (RAID-6). These logical drives leverage the bandwidth of each host port.

There are other considerations:

- For example, a spare drive carries no data stripes and will not contribute to disk-level performance. Refer to the documentation for your hard drives for performance data.
- The disk drives in the same logical array should have the same capacity, but it is preferred that all the drives within a chassis have the same capacity.
- Disk drives in the same logical drive should have the same capacity, but it is preferred that all the disk drives within a chassis have the same capacity. Tiered storage configuration is supported, e.g., 150GB SAS drives in your RAID enclosure and 750GB SATA drives in JBODs. However, you should not include both SAS and SATA drives in a logical drive.

- A spare drive should have a minimum capacity that is equivalent to the largest drive that it is expected to replace. If the capacity of the spare is less than the capacity of the drive it is expected to replace, the controller will not proceed with the failed drive rebuild.
- When cabling, follow all the specifications. Pay attention to signal quality and avoid electronic noise from adjacent interfaces, e.g., do not lay power cords on optical cables.
- When rack-mounted, leave enough slack in the cables so that they do not bend to a diameter of less than 76mm (3 inches).
- Route the cables away from places where it can be damaged by other devices, e.g., foot traffic or fan exhaust.
- Do not over-tighten or bend the cables.

Host-Side Topologies

The primary concern for configuring host-side topologies is to avoid points of failure. It is therefore recommended that the host ports are connected to at least two HBAs.

NOTE

In order to manage the fault-tolerant data paths and to optimize data throughput on multiple data paths, it is necessary to apply a multipath software or utilities such as Linux Device Mapper.

Host port channel designation may vary from system to system, please refer to the following topologies as a guide to create your own connections to suit your needs.

Host-Side Parameters

It is STRONGLY recommended that users use the default settings with their system. Should you feel the need to adjust your host-side parameters, please consult on-site technical personnel or seek technical support from your vendor.

Maximum Concurrent Host LUN Connection (“Nexus” in SCSI)

The "Max Number of Concurrent Host-LUN Connection" menu option is used to set the maximum number of concurrent host-LUN connections.

Maximum concurrent host LUN connection (nexus in SCSI) is the arrangement of the controller internal resources for use with a number of the current host nexus.

For example, you can 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 all queued in the cache and are called four nexus.

If there is I/O in the cache with four different nexus, and another host I/O comes with a nexus different than the four in the cache (for example, host A accesses ID 3), the controller returns busy. This occurs with the concurrent active nexus; if the cache is cleared, it accepts four different nexus again. Many I/O operations can be accessed via the same nexus.

Maximum Queued I/O Count

The "Maximum Queued I/O Count" menu option enables you to configure the maximum number of I/O operations per host channel that can be accepted from servers. The predefined range is from 1 to 1024 I/O operations per host channel, or you can choose the "Auto" (automatically configured) setting. The default value is 256 I/O operations.

The appropriate "Maximum Queued I/O Count" setting depends on how many I/O operations the attached servers are performing. This can vary according to the amount of host memory present as well as the number of drives and their size. But usually, optimum performance results from using the "Auto" or "256" settings.

For more information, please refer to the Firmware Manual that came with your system.

Fibre-Host Connections

WARNING

All Fibre cables are sensitive and must be handled with care. To avoid interference, the cable routing path must be carefully planned and the cables must not be bent.

The Fibre Channel standard allows optical connections. Optical cables can be used over longer distances and have been shown to be more reliable. Due to the demands of high transfer rates, optical cables are preferred for 16/ 8/ 4Gbps fiber connectivity. Optical cables are not susceptible to EMI.

The Fibre host ports connect to Fibre Channel host adapters (HBA) that feature SFP interface that supports full-duplex transfer and come with a preferred 64-bit/133MHz PCI-X or PCI-E interface. Please contact your vendor for the latest certified items.

WARNING

Lasers can be hazardous and may cause permanent eye damage or blindness, and therefore must be treated with respect and used with caution. Never look directly at lasers while it is turned on.

Auto speed detection

Speed auto-detection is specified by the Fibre Channel standard. If a 16Gbps port is connected to an 8Gbps port, it will negotiate down and run at 8Gbps. If there are 16Gbps ports on both ends of the link, the link will run at 16Gbps.

SFP / SFP+ transceivers

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

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

WARNING

The SFP transceiver contains a laser diode featuring class 1 laser. To ensure continued safety, do not remove any covers or attempt to gain access to the inside of the product. Refer all servicing to qualified personnel.

FC port dust plugs

Each FC port comes with a dust plug. Remove these dust plugs only when you are ready to insert an SFP transceiver.

Please contact your vendor for a list of compatible components!

Fibre-Host Topologies

The Fibre Channel standard supports three (3) separate topologies. They are point-to-point, Fibre Channel Arbitrated Loop (FC-AL), and fabric switch topologies.

- Point-to-Point: Point-to-point topology is the simplest topology. It is a direct connection between two (2) Fibre Channel devices.
- FC-AL: This is the most common topology currently in use. Fibre Channel devices are all connected to a loop. Each device is assigned an arbitrated loop physical address (AL_PA). The FC-AL supports 124 devices in a single loop.
- Fabric: The fabric topology supports up to 224 Fibre Channel devices. This topology allows multiple devices to communicate simultaneously. A Fibre switch is required to implement this topology.

NOTE

If a logical drive has to be accessed by different servers, file locking, FC switch zoning, port binding, and multipath access control will be necessary.

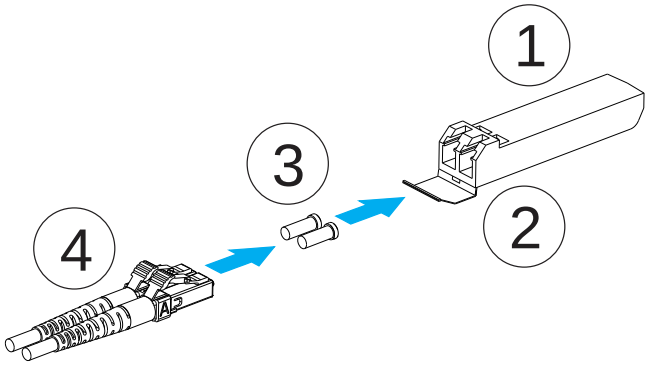
Fibre Cabling

Following are steps that should be completed with cabling:

1. Maintain a configuration plan. In addition to cabling topologies and list of networking components, the plan can also include firmware and software maintenance details.
2. Confirm that you have a Fibre Channel cable that loops 6-inch or longer.
3. Ensure proper airflow and keep cables away from ventilation airflow outlets.

Cabling steps:

1. Remove the SFP module **(1)** from its static-protective package.
2. Remove the dust plug (2) from the SFP transceiver module.

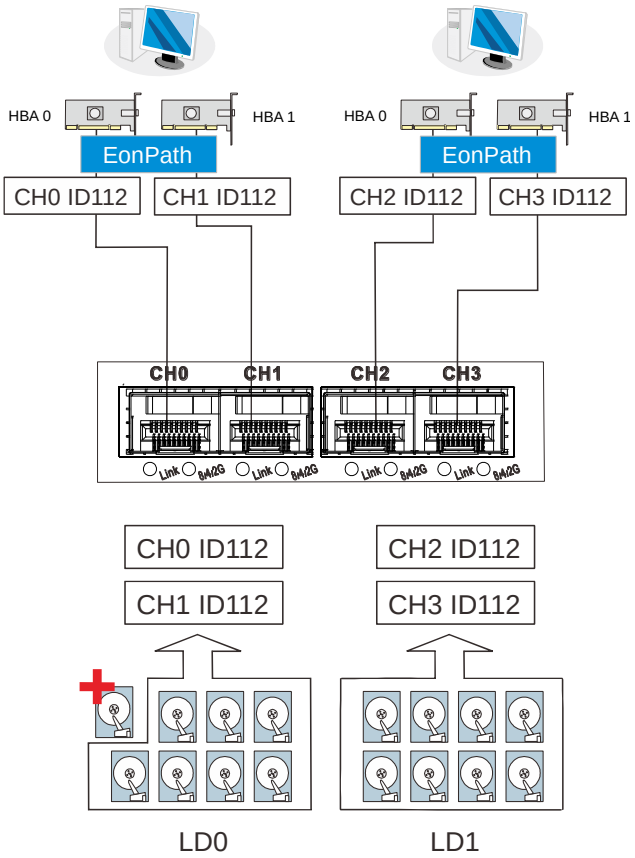


3. Insert the SFP module into one of the system host ports. The module will snap into place.
4. Remove the two protective caps **(3)** from the LC-to-LC type cable. Save the protective caps for future use
5. Connect a LC-to-LC type cable **(4)**.
6. Carefully insert the cable into an SFP module that is already on the system. The cable connector is keyed and will click into place.
7. Remove the protective caps on the other end and connect this end to an SFP transceiver module on a Fibre Channel switch port or a Fibre Channel host bus adapter (HBA) port.

DAS (Direct-Attached) Connection

NOTE

If a logical drive has to be accessed by different servers, file locking, FC switch zoning, port binding, and multipath access control will be necessary in order to avoid access contention.



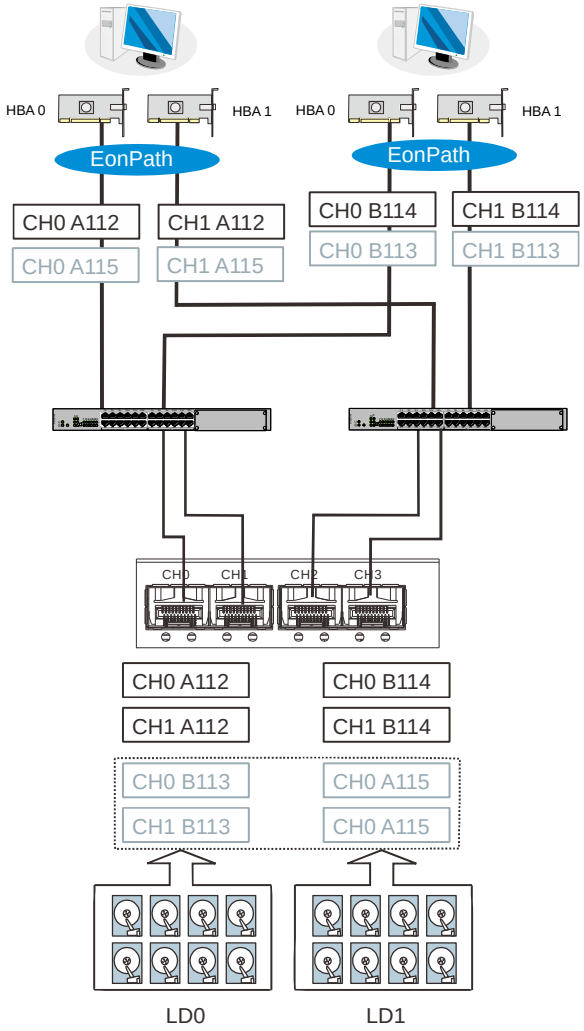
Channels	Controller A
Host	CH0, CH1, CH2, CH3
Configuration Information	
Controller	1
Host server	2
Data path connection	Simple end-to-end connections with fault-tolerant pairs
Host channel bandwidth	3200 MB/s

With more disk drives over SAS expansion links, you can create more logical groups of drives. These logical drives using more host channel IDs or LUN numbers.

If a server has multiple data paths to a Unified Storage System, a multi-path software might be necessary.

The two logical drives in the above drawing cannot leverage the full computer power of the system. You may attach 1 or 2 more JBODs to acquire more end-to-end performance.

Switched Fabric Connection



Channels	Controller A
Host	CH0, CH1, CH2, CH3
Configuration Information	
Controller	1
Host server	4
Data path connection	Data paths are attached to one or more FC switches. SAN management measures, such as switch zoning and port binding, should be taken to avoid multiple servers from accessing the same LUN.

Above is the sample drawing showing connections with each SFP port connected to FC switches and then to host adapters. See logical associations in the drawing for LUN mapping details.

Use Enclosure-specific spares to prevent a spare drive from participating in the rebuild of a logical drive on another enclosure.

You can refer to the ID tags on the host links to see the related LUN mapping and cable links routing paths.

Each logical partition is mapped to a single host channel ID. If you prefer path redundancy, you can map a logical partition to IDs residing on two different channels. You will then need a multipath driver to manage access through two different HBA ports. The driver communicates with system firmware and performs load balance and automated distribution of I/O.

If multiple servers can “see” a mapped volume, you will need to avoid access contention using file locking software, port binding, or zoning feature by FC switches, which limits the access from host to a specific LUN. If you have two servers in a clustered configuration, access control will be performed by the clustering software.

SAS-Host Connections

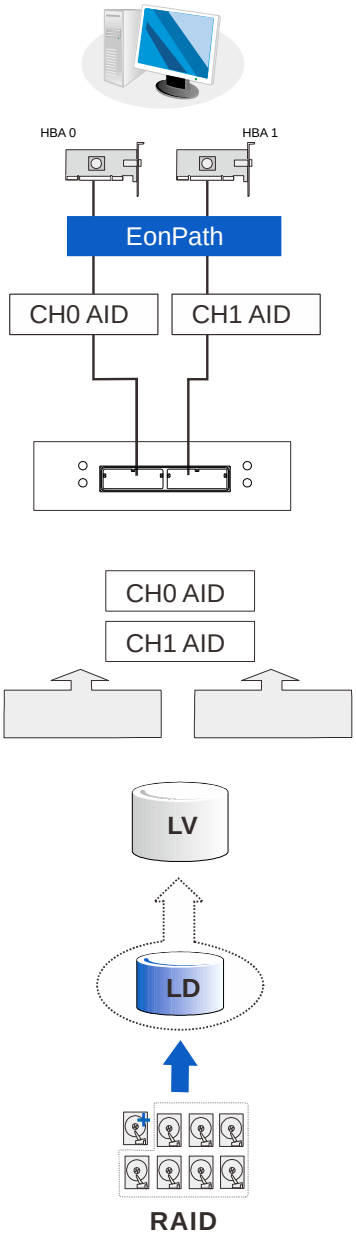
Please contact your vendor to purchase compatible host-link cables.

SAS cables (28AWG x 8 pairs) are characterized by 100ohm, black colors, UL-approved, lead-free, 50, 120 or 170cm cable lengths; connectors can be secured to chassis receptacle using latching mechanism.

WARNING

All SAS cables are sensitive and must be handled with care. To prevent interference within a rack system, the cable routing path must be carefully planned and the cables must not be bent.

DAS (Direct-Attached Storage) Connection with Redundant Host Path

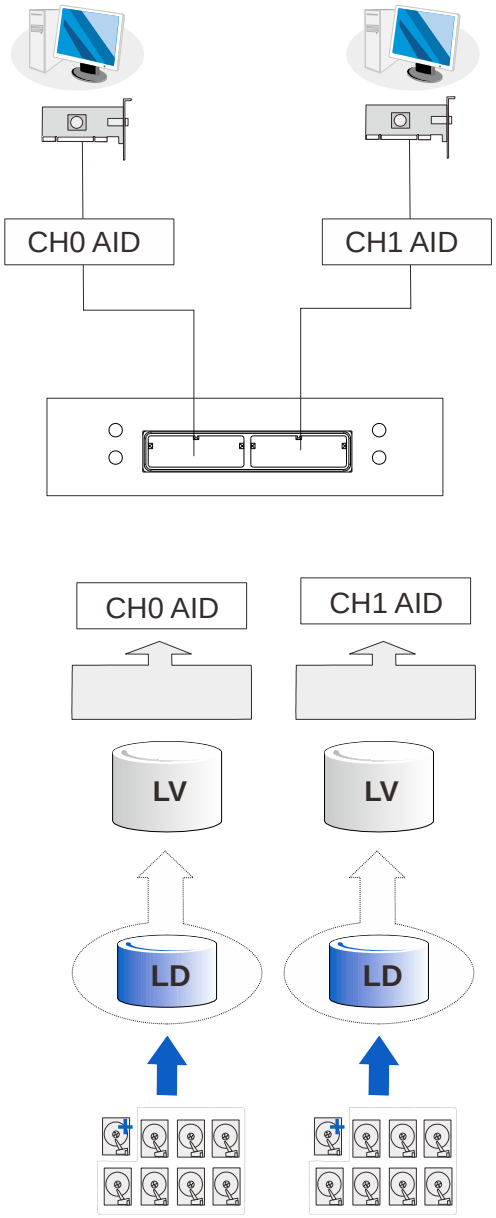


With more hard drives over SAS expansion links, you can create more logical groups of drives. Avail these logical partitions using more LUN numbers.

NOTE

A multipath software or Linux Device Mapper might be necessary for controlling and optimizing the access to logical drives via multiple data paths.

DAS (Direct-Attached Storage) Connection to Two Servers



RAID

NOTE

If you would like a LUN (a logical partition) to be accessed by multiple hosts, file locking or multipath access control will be necessary.

Ethernet-Host Connections

Ethernet cable requirements:

- Ethernet cables are user-supplied. Cat5e shielded STP type network cables or better performance types (important for meeting the requirements imposed by emission standards).
- Straight-through Ethernet cables with RJ-45 plugs.
- Use of cross-over cables can also be automatically detected and re-routed for a valid connection.

Connection types:

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

NOTE

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

Network & Host Connection Topologies

The iSCSI host ports connect to Ethernet network devices and iSCSI initiators that comply with the IETF iSCSI standard (RFC 3720). Network connection of the iSCSI ports is flexible. The use of network connecting devices, subnet, Name Servers, or iSCSI management software can vary from case to case. In the following sections, configuration diagrams will be provided to illustrate the possible uses of this Unified Storage System in an iSCSI network.

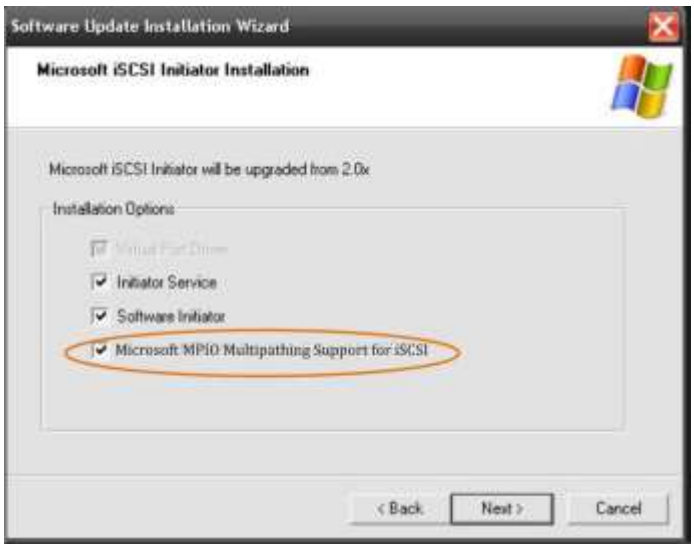
Note that host NIC ports and the storage system's iSCSI host ports must be configured into the same subnet.

Please note the following:

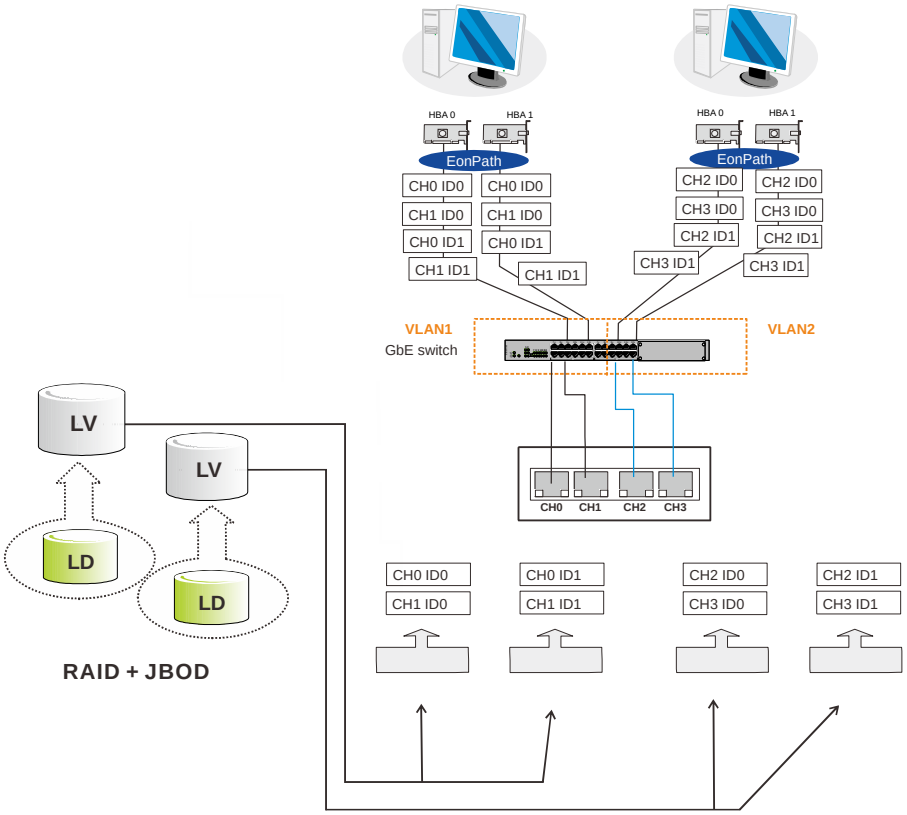
- Use the Ethernet management port for management purposes only, i.e., Management Software or telnet console. This Ethernet management port is not used for I/O transactions.
- Configurations such as subnet or Virtual LAN can separate iSCSI host links, decrease overhead, and eliminate the impact of link failure.
- Multiple arrays or logical partitions can be created and made available separately through different IDs or LUN numbers on the host ports. Usually, a RAID5 logical drive of eight (8) members often brings optimal array performance.

NOTE

If you are using Microsoft's software initiator, please de-select the embedded MPIO function when installing the software, as the MPIO selection creates conflicts with EonPath driver.



Single-Controller with Fault-Tolerant Path



Component	Description
Unified Storage System	Single-Controller, with a total of 4 host ports
HBA or NIC	iSCSI initiators, preferably PCI-E TCP/IP offload engine (TOE) capable cards
GbE cables	GbE network cables
Software	EonPath to manage the fault-tolerant paths with failover/ failback and load balance
RAID configuration	4 logical partitions (created from 2 logical volumes) 2 Logical Volumes (each contains a logical drive) 2 Logical Drives * Each logical partition appears on two different host links for the purpose of fault tolerance. Use EonPath multipath software so that your operating system can identify alternate paths to the same logical drive.

JBOD Connections

A SAS host link cable is included per JBOD. If you need to purchase other cables or if you need other cable(s) of different length, please contact your vendor.

WARNING

All SAS cables are sensitive and must be handled with care. To prevent interference within a rack system, the cable routing path must be carefully planned and the cables must not be bent.

Please contact your vendor for a list of compatible components!

JBOD SAS Expansion Configuration

The SAS expansion port connects to expansion JBOD enclosures.

There is a rotary ID switch on every expansion enclosure that is manually configured using a flat blade screwdriver.

Configuring enclosure IDs:

- The configurable IDs for JBODs are from 1 to 15. Usually the numbering starts from the one closest to the managing Unified Storage System.
- Make sure a unique ID is configured on each JBOD so that the SAS WWN addresses of disk drives can be properly assigned. Unified Storage System firmware automatically manages these addresses.

Configuration Rules

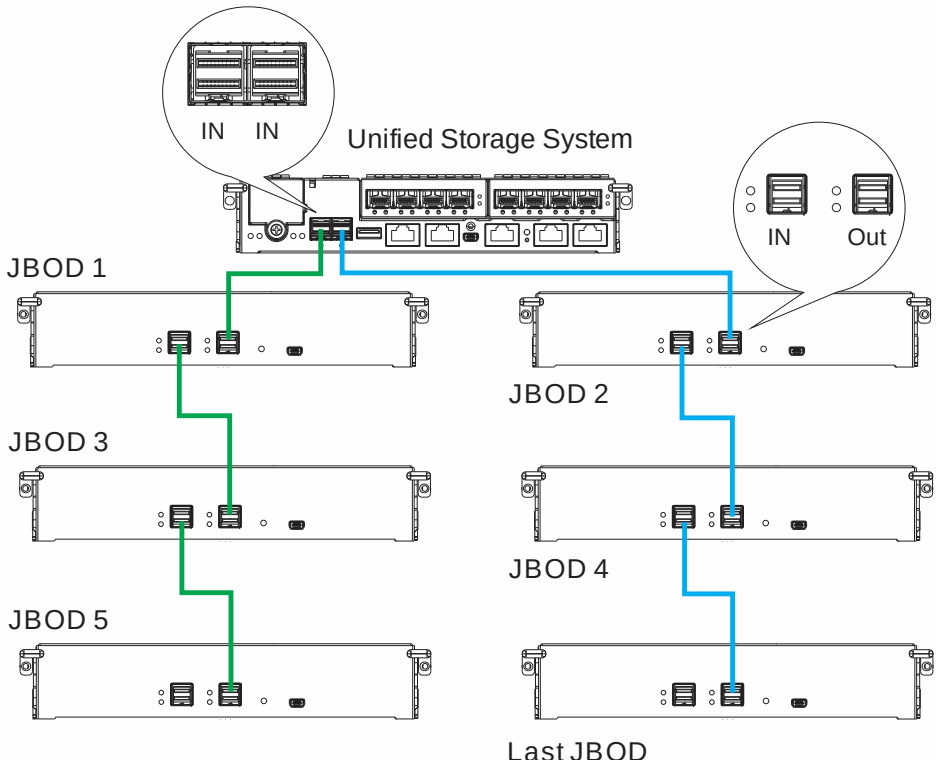
How to connect SAS interfaces across Unified Storage System and JBOD enclosures:

- SAS expansion cables will be available with the JBODs. Note that if many JBODs are connected, a longer SAS external cable (e.g., a 120cm cable) may be necessary for connecting a JBOD from the opposite direction offering high redundancy.
- Both expansion links connects JBODs from Unified Storage System to the nearest JBOD, and then to the farthest JBOD.
- Each expander controller on the SAS JBOD controls a "**SAS Domain**" that connects one of the alternative interfaces on all of the disk drives in the enclosure. For example, one expander unit controls Domain A.
- The SAS Domains can be identified by the expanders' locations, i.e., upper controller slot (Controller A / Slot A). On the Unified Storage System, each controller can be 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.

Single-Controller Expansion Connection

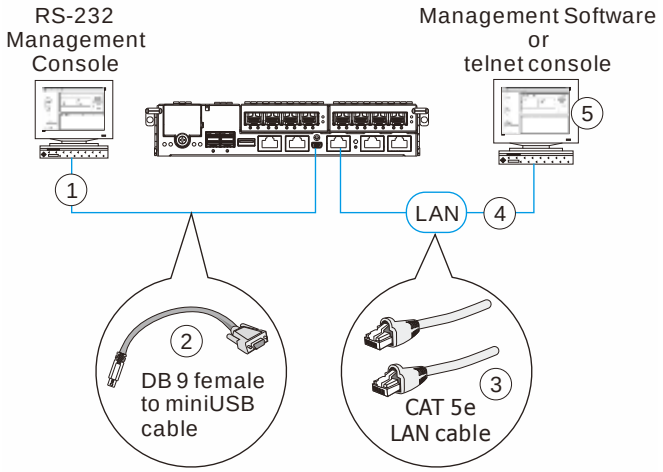
- Unified Storage Controller left SAS exp. IN -> 1st JBOD SAS exp. OUT
- 1st JBOD SAS exp. IN –> 3rd JBOD SAS exp. OUT
- 3rd JBOD SAS exp. IN –> 5th JBOD SAS exp. OUT

- Unified Storage Controller right SAS exp. IN -> 2nd JBOD SAS exp. OUT
- 2nd JBOD SAS exp. IN –> 4th JBOD top SAS exp. OUT
- 4th JBOD SAS exp. IN –> Last JBOD SAS exp. OUT



Management Console Connections

Designation	Description	Designation	Description
1	Serial port (for Telnet access)	**4**	Local area network
2	DB9 to mini USB	**5**	Management Software / telnet
3	CAT5e LAN cable		



Management connection

Connecting Unified Storage System to external consoles

Serial port (mini USB): Use the cable supplied with the system to connect to mini USB port. **Ethernet port**: An Ethernet cable should be supplied by the user.

NOTE

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

The serial port's defaults are:

Baud Rate	38400
Data Bit	8
Parity	None
Stop Bit	1
Flow Control	Hardware

For TCP/IP connection and firewall configuration please refer to Management Software online help or User's Manual. If your network environment is not running DHCP server protocols, a default IP, <10.10.1.1> can be used if you are accessing for the first time.

Power Connections

Once all hard drives have been properly installed and the I/O ports or management interfaces have been connected, the system can be powered on.

Checklist

BEFORE powering on the system, please check the following:

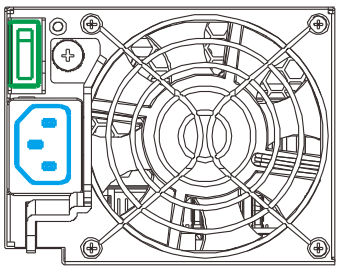
- **Hard drives:** Hard drives are correctly installed in the drive trays.
- **Drive trays:** All the drive trays, whether or not they contain a hard drive, have been installed into the system.
- **Cable connections:** The system has been correctly connected to host computer(s), management computers, or external networking devices.
- **Ambient temperature:** Make sure the surrounding environment temperature is not higher 35 degrees Celsius (with CBM).

NOTE

Make sure you use the power cables provided that are 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.

Power Cords Connections

Use the included cables. Connect them to the power sockets (in blue) for all PSUs.

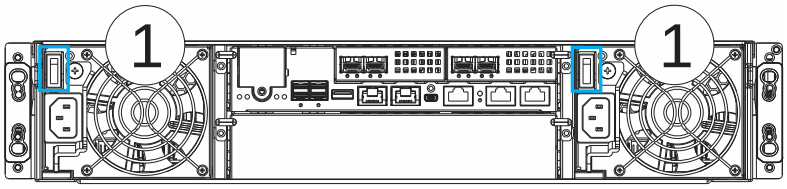


Power on Procedure

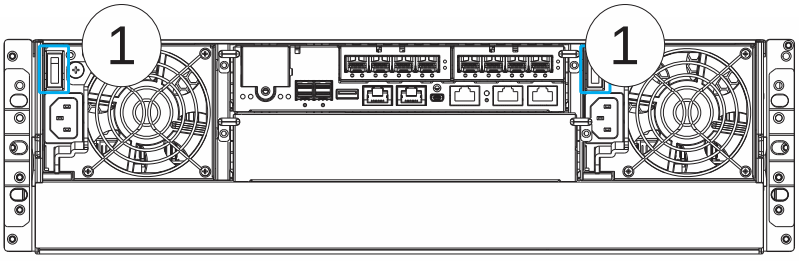
Before you power on the Unified Storage System, please power on the expansion enclosure (JBOD) first if your network configuration has multiple arrays.

To power on the system please follow the procedures below.

1. Turn on the power switches to the “on” position for every PSU (shown in blue).
2. Power on the networking devices, e.g. switches.
3. Power on the host computers. They should be the last devices to be turned on.



2U Unified Storage System



3U Unified Storage System

NOTE

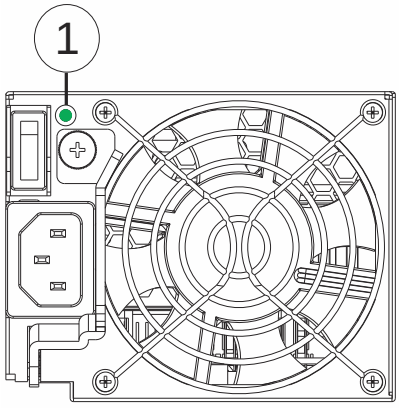
Make sure all power supply modules’ switches are turned on!

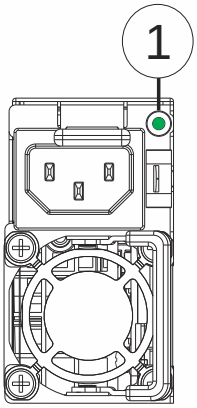
Power on Status Check

As a general rule, once the system has been powered on, there should be **NO** LED(s) that light up **red** / **amber** nor should you hear an audible alarm from the system. You may verify system status via the following monitoring interfaces: LEDs on rear chassis, including controller module, PSUs, and cooling modules (refer to System Monitoring).

PSU & Cooling Module LEDs:

PSU LED (**1**):	On	Green
	Failure	Amber





Power off Procedure

If you wish to power down the system, please follow these steps:

> **NOTE**
>
> If you wish to power down the system, please ensure that no time-consuming processes, like “Regenerate Logical Drive Parity” or a “Media Scan,” are taking place.

1. **Stop I/O access to the system**

   Close your applications running on the host computers to stop all I/O access to the system.

2. **Flush the cache**

   Locate the C_Dirty LED (refer to Unified Storage System Controller LEDs) on the controller module to check if there is still cached data in the DRAM (if the LED is lid up in **amber**).

3. **Use the Shutdown Controller function to flush all cached data** (please refer to the Management Software manual)

4. **Once the cache has been flushed,** you may proceed to power down the system.

System Monitoring

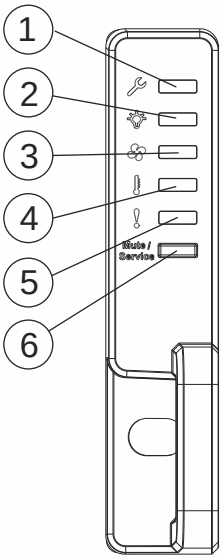
This Unified Storage System is equipped with a variety of self-monitoring features that help keep system managers aware of system operation statuses.

Monitoring Features

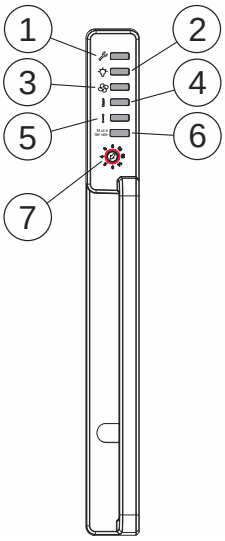
You may monitor the system through the following features:

- **Firmware**: The controller in the system is managed by a pre-installed firmware, which is accessible in a terminal program via the serial port. For more details, see the Firmware manual in the CD-ROM.
- **EonOne:** EonOne is a browser-based Graphical User Interface (GUI) that can to monitor and manage the system locally or remotely over TCP/IP network, via the Ethernet Management port. The management session is conducted using the Ethernet management port. For more details, see the EonOne manual in the CD-ROM.
- **LEDs**: LED indicators notify users of system status, events, and failures. LEDs are located on both the front and rear panel of the chassis. For details, see and subsequent sections.
- **Audible alarm:** Audible alarm will be triggered in case of system failures.

LED Panel



Unified Storage System



JBOD System

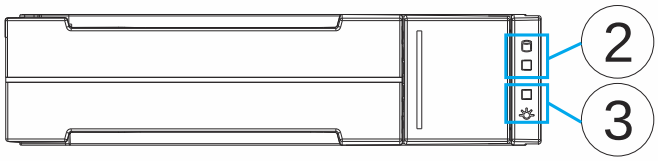
Name	Color	Status
1. Service	White	White indicates that the system is being serviced or is requiring services. **OFF** indicates that the system is not being serviced nor is requiring services.
2. Power	Green/ Amber	Green indicates that the system is powered properly. Amber indicates that there is a power failure in the system.
3. Cooling fan	Green/ Amber	Green indicates that the cooling fan is operating properly. Amber indicates that the there is a cooling fan failure in the system.
4. Thermal	Green/ Amber	Green indicates that the internal temperature is within the safety threshold.

		Amber indicates that the internal temperature has gone over the safety threshold.
5. System fault	**Green/ Amber**	**Green** indicates that the system is operating normally. **Amber** indicates that the system has encountered abnormal conditions:
6. Mute/ service button	**N/A**	**Pressing less than one second** mutes the audible alarm. **Pressing more than two seconds** sends a service notification to the host computer.
7. Rotary Switch	**N/A**	**Setting up the JBOD ID.** When connecting expansion enclosures (JBODs) to the Unified Storage System you have to set an individual ID for each expansion enclosure (JBOD).

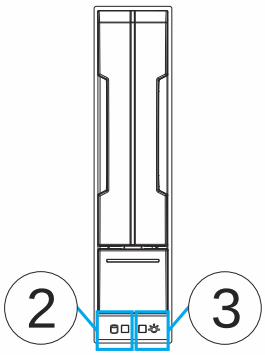
When lid amber to indicate failure, please check the corresponding module(s). For example, if the Thermal LED lights up amber, please check if there are faults on the system cooling modules (built within the PSU) or the drawer fans.

Drive Tray LED

Two LED indicators are located on the right side of each drive tray or at the bottom of the front panel of a SFF (Small Form Factor) enclosure (2.5 inch hard drive trays). When notified by a drive failure message, you should check the drive tray indicators to find the correct location of the failed drive.



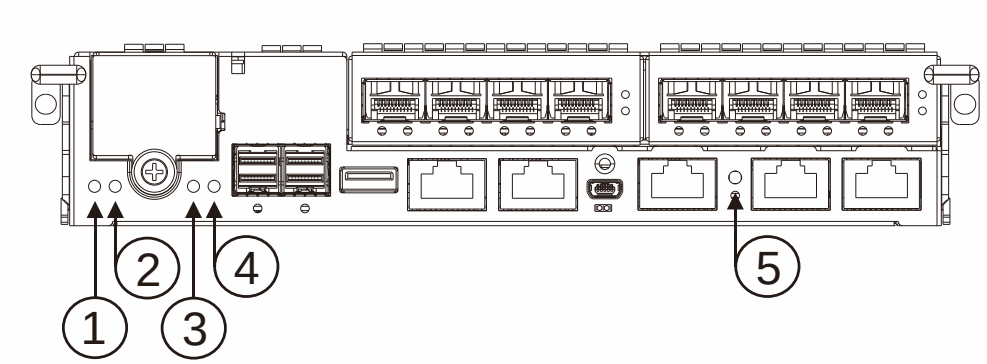
3.5 inch



2.5 inch

Name	Color	Status
2. Drive Busy	**Blue**	**Flashing Blue** indicates data is being written to or read from the drive. The drive is busy. **Steady Blue** indicates that a hard drive is plugged-in but there is no activity on the disk drive.
3. Power Status	**Green** / **Red**	**Green** indicates that the drive bay is populated and is working normally. **RED** indicates that the disk drive has failed, or a connection problem occurred.

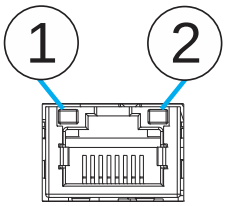
Unified Storage System Controller LEDs



Name	Color	Status
1. Ctrl Status	**Green**/ **Amber**	**Green** indicates that a controller is operating healthily. **Amber** indicates that a component failure has occurred, or inappropriate RAID configurations have caused system faults. It is also lit during the initialization process.
2. CBM Status	**Green**/ **Amber**	**Green** steady on indicates the CBM module is ready. Both a BBU and flash modules are present. **Amber** steady on indicates CBM failure, meaning either super capacitor or flash has failed. When lit, it also indicates either super capacitor or a flash is missing. Blinking means the super capacitor is being charged.

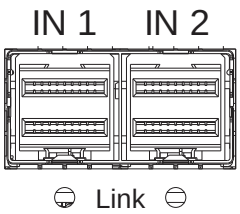
Name	Color	Status
3. C_Dirty	**Amber**	**Amber** indicates the following: - Cache Memory is dirty. - Data in flash backup module is being flushed to cache. - Errors occurred with cache memory (ECC errors). - Data is being flushed from flash backup module to drive (when power is restored). - Super capacitor temperature reading is abnormal (out of the 0 to 35°C range). - Super capacitor is not present. **OFF** indicates that the cache is clean, and that the Super capacitor is capable of sustaining memory in case of power loss. **Blinking Amber** indicates cached data is being transferred to the flash module after the occurrence of a power outage. Once the transfer is done, all LEDs will turn off. This signal is local to each controller.
4. Host Busy	**Green**	**Blinking Green** to indicate traffic on the host bus.
5. Restore default	**Green**	**Lights up Green** after pressing and holding Restore default button to indicate a successful reset.

1G Ethernet Management Port LEDs



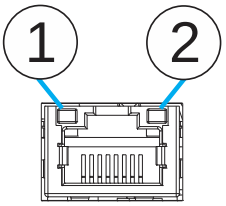
Name	Status	Description
1. Speed	**ON**	Indicates 1Gb connection is established.
	Off	Indicates 10/100Mb connection is established or no connection established.
2. Link / Active	**ON**	Indicates a connection has been established.
	FLASHING	Indicates data I/O.
	OFF	Indicates connection is not established.

12G SAS Expansion Port LEDs



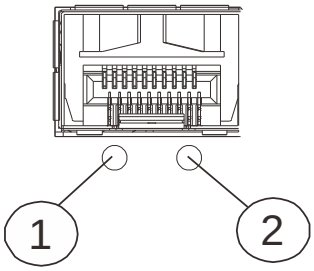
Name	Status	Description
Link / Active	**ON**	Indicates that all 4 PHYs are validly linked.
	FLASHING	Indicates less than 4 PHY links are connected (at least one 1 of the 4 PHYs links has failed).
	OFF	Indicates all 4 PHYs links are offline.

10G Ethernet Port LEDs



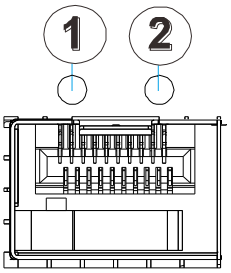
Name	Status	Status
1. Speed	Green	Indicates 10Gb connection is established.
	Amber	Indicates 1Gb connection is established.
	OFF	Indicates 10/100 connection is established.
2. Link / Active	ON	Indicates a connection is established.
	Flashing	Indicates data activity.
	OFF	Indicates connection is not established.

16G Fibre Channel Port LEDs



Name	Status	Description
1. Link / Active	ON	Indicates an established connection.
	FLASHING	Indicates data activity.
	OFF	Indicates that a connection is not established.
2. Speed	Green	Indicates a 16 GB connection is established.
	Yellow	Indicates an 8Gb connection is established.
	OFF	Indicates a 4Gb or slower connection is established.

8G Fibre Channel Port LEDs

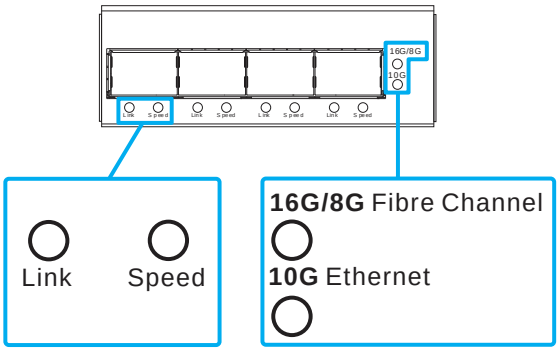


Each controller module houses Fibre channel host ports. Each of these ports has two LEDs for displaying the operating status.

Name	Status	Description
1. Link / Active	**ON**	Indicates an established link.
	OFF	A link is broken.
2. Speed	**Green**	Indicates an 8Gbps connection.
	Amber	Indicates a 4Gbps connection.
	OFF	Indicates a 2 Gbps or no connection.

For systems that come with 8 Gb Fibre channel host ports. They deliver fast I/O performance for Storage Area Network (SAN) applications. Optical cables can be used over distances and have been shown to be more reliable. Due to the demands of high transfer rates, optical cables are preferred for 8/4Gbps fiber connectivity. Optical cables are not susceptible to EMI.

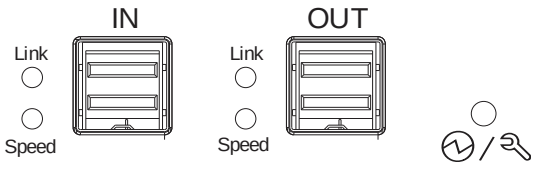
Converged Host Board



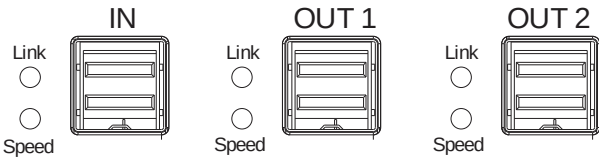
Name	Status	Description
16G / 8G Fibre Channel	On (**Green**)	Indicates 16 G Fibre Channel mode
16G / 8G Fibre Channel	On (**Amber**)	Indicates 8 G Fibre Channel mode
10 G Ethernet	On (**Green**)	Indicates 10 G Ethernet mode

Name	Status	Description		
Link	On (**Green**)	Indicates an established link.		
	Off	Indicates a broken link.		
Name	**Status**	**16 G Fibre Channel**	**8 G Fibre Channel**	**10 G Ethernet**
Speed	On (**Green**)	16G FC	8G FC	10G Ethernet
	On (**Amber**)	8G FC	4G FC	----------
	Off	4G FC or no link	2G FC or no link	No link

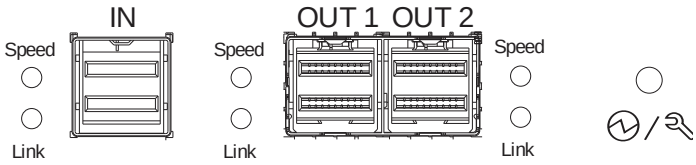
Controller LED for 12 G SAS JBOD Models



JBOD 3000 series



JB 3060L series

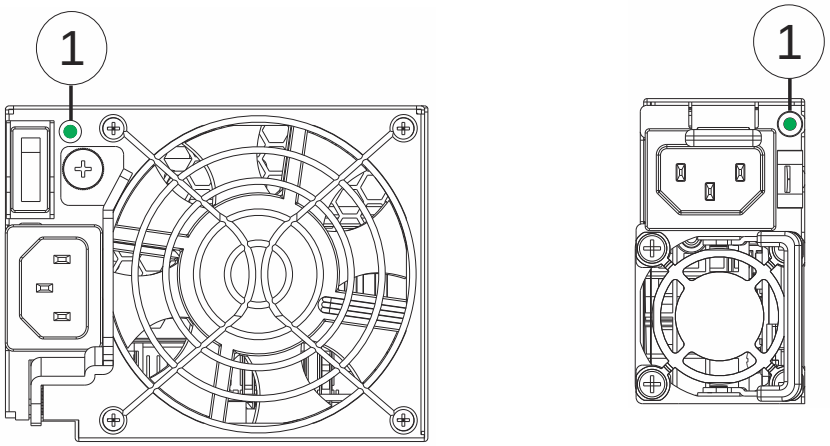


JB 3060 series (3 drawer)

Name	Status	Description
Link / Active	**ON**	Indicates all 4 PHYs are validly linked.
	FLASHING	Indicates one of the 4 PHYs links has failed.
	OFF	Indicates all 4 PHYs are offline.
Speed	**Green**	Indicates 12Gbps link speed.
	Amber	Indicates 6 / 3Gbps link speed.
	OFF	Indicates no connection.
	Green	Indicates the controller is operating normally.
	Amber	Indicates a component failure has occurred. It is also lit during the initialization process.

PSU & Built-in Cooling Module LEDs

The PSU (Power Supply Unit) contains the LEDs for the PSU and the cooling module statuses. When either of the unit fails, you need to replace the PSU as soon as possible. For details, please refer to Replacing the Power Supply Module.



PSU & Cooling Module Status LED (1)

Status	Description
Flashing (Green)	The system is connected to power supply but the power switch has not turned on.
On (Green)	The PSU / cooling module is operating normally.
On (Amber)	The PSU / cooling module is faulty.

WARNING

HAZARDOUS MOVING PARTS!
KEEP FINGERS AND OTHER BODY PARTS AWAY!

Alarms and I2C Bus

Other monitoring schemes include audible alarms and I²C bus.

Audible Alarms

If any of the following components fails, the audible alarm will be triggered:

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

If an alarm rings out, the administrator must read the error message on the terminal or Management Software screen to determine what has triggered the alarm, and then take appropriate actions to rectify the problem. The alarm can be turned off using the mute button on the front panel and the Alarm beep pattern is described in the Troubleshooting Guide included in the CD-ROM.

NOTE

When temperature exceeds a preset threshold, the controller's charger circuits will stop charging. You will then receive a message that reads "Thermal Shutdown/Enter Sleep Mode." When the temperature falls back within normal range, the super capacitor will resume charging.

I²C

The operating status of PSU and cooling fan modules are collected through an I²C serial bus. If either of those modules fails, the failure will be detected and you will be notified through the same methods as in the audible alarms.

System Maintenance

WARNING

Do not remove a failed component from the system until you have a replacement on hand. If you remove a failed component without immediate replacement, it will disrupt the internal airflow.

Qualified engineers who are familiar with the system should be the only ones who make component replacements.

When inserting a removable module, do not use excessive force. Forcing or slamming a module can damage the connector pins either on the module itself or on the backplane.

The following components can be replaced:

- Controller module (please refer to Replacing the Controller Module)
- Memory module (please refer to Replacing Memory Module(s))
- CBM module (please refer to Replacing the Cache Backup Module (CBM))
- Host board (please refer to Replacing the Controller Host Board)
- PSU module (please refer to Replacing the Power Supply)
- Hard drive (please refer to Replacing the Hard Disk Drive)

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 Unified Storage System.

Restoring Default Settings

To restore default settings for Dual-Controller models, follow these steps.

1. Stop all host I/Os.
2. Save the current configuration using the "**Export NVRAM**" function.
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 (e.g., which logical drive is associated with which host ID/LUN)
4. Power off the Unified Storage System.
5. Press and hold the Restore Default button on Controller A. You may use a straightened paper clip to press the button. While pressing the Restore Default button down, power on the Unified Storage System.
6. Keep pressing the Restore Default button till the Restore Default LED lights up than release the Restore Default button.
7. System default has been restored when the Controller Status LED changes the color from **amber** to **green**.
8. Restore previous settings using the "**Import NVRAM from reserve space**" or "**Restore NVRAM from Files**" in the firmware. ID/LUN mapping will be restored.

*The system's restore default procedure is complete now.

Replacing the Controller Module

WARNING

Controller firmware **MUST** be identical for proper functionality.

DO NOT mix controller modules from different models. Each controller has a unique ID which is applied to host port names. As the result, you may encounter SAN problems with identical port names on multiple systems.

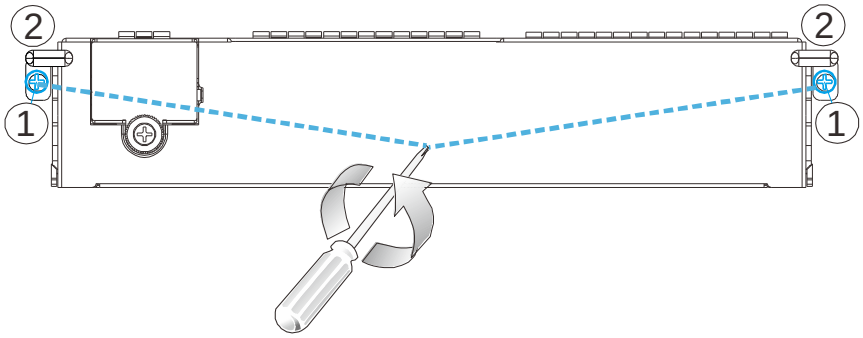
When removing a controller from this system, ensure that your applications have been shut down beforehand.

1. Prepare a clean, static-free work pad or container to place the controller.
2. **Replacing the controller model**:

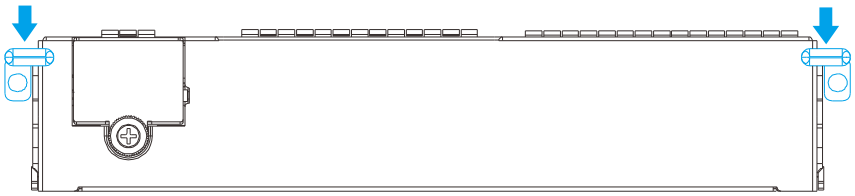
   First, shut down the system.

   Stop all I/O access to the system and make sure all cached writes have been distributed to disk drives using firmware's Main Menu -> System Functions > Shutdown controller function.

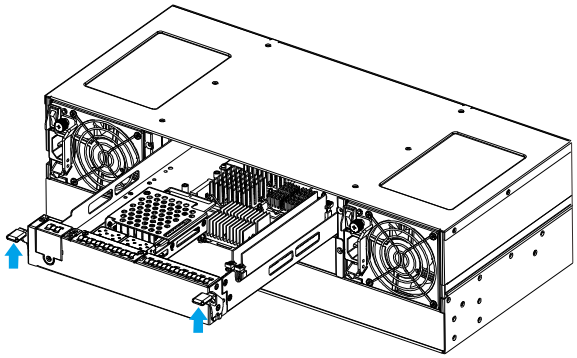
   Power off the system and turn off the power switches and unplug the power cords from PSUs.
3. **Disconnect all cables** that are connected to the controller module.
4. **Loosen the screws** that secure the control module's ejection levers.



5. **Push the ejection levers downwards (indicated by the blue arrows).** The controller module will automatically ease out of the controller module bay.



6. **Insert the new controller module**. Carefully push the controller until you feel the contact resistance when the board edge connectors are engaging the backplane. Push the ejection levers upward (indicated by the **blue arrows**) and fasten the retention screw on the ejection levers.



7. Reattach all the cables.

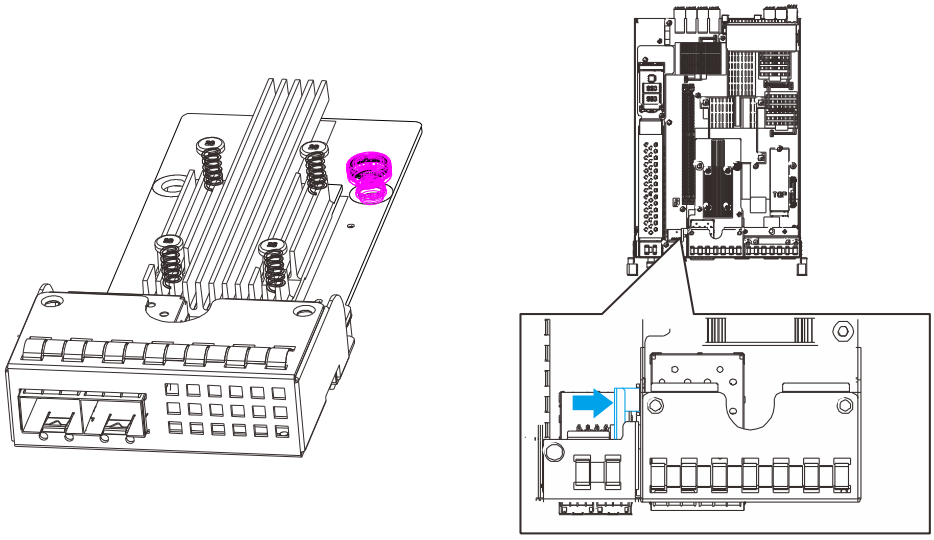
8. **Power up the system**. Check system message on the LCD screen, the management software, or firmware menu-driven utility. When the replacement controller is successfully brought online, the Power On Status LEDs should turn on properly.

9. **Restoring NVRAM data.** To restore previous ID/LUN mapping settings, users may use the following options:

   - Use the "**Restore NVRAM from Disks** "or "**Restore NVRAM from Files**" functions in the firmware. ID/LUN mapping will be restored.

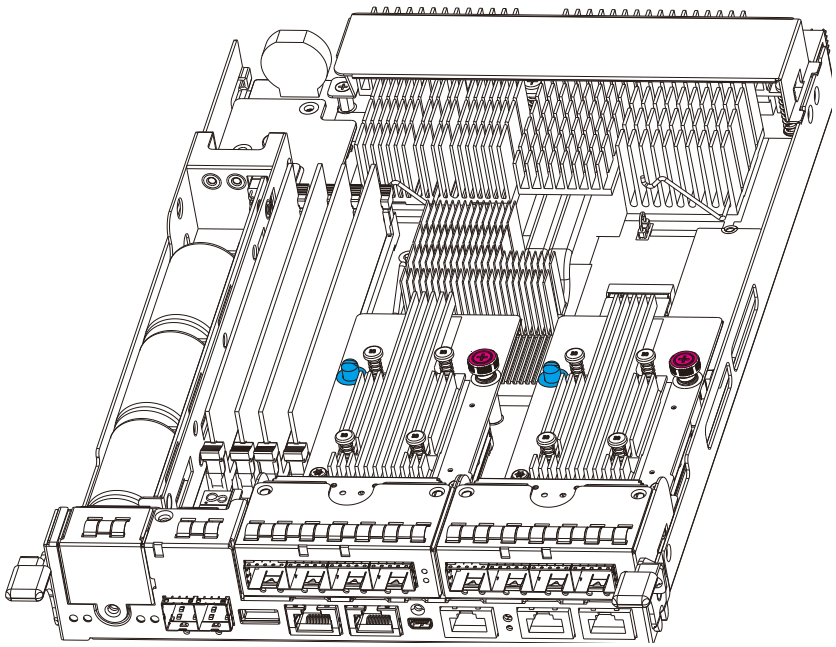
Replacing the Host Board

To replace the existing host board, loosen the thumb screw and push the release lever to detach the host board from the controller.



Thumb screw Release lever

By holding onto the edges of the PCB and using the guide pin (shown below in **blue**) for positioning, lower the replacement host board into the controller. Tighten the thumb screw to complete the installation. Reinsert the controller back into the system.



Replacing Memory Module(s)

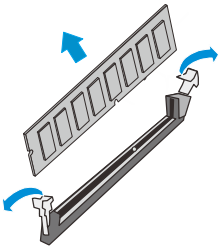
The controller comes with pre-installed DRAM module(s). You may upgrade it or replace it when the original module malfunctions (shown as the “NVRAM failure” event in EonOne). If you have two modules installed, please identify correctly which one has failed before proceeding with the replacement procedure!

WARNING

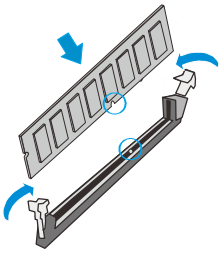
If you are installing only one or replacing just one DRAM module, with the I/O ports pointing at you, always install to the DRAM slot on the right (blue slot). Follow the ESD Precautions (refer to ESD Precautions). Contact your system vendor for selecting a compatible DRAM module. Reusing the DRAM module removed from a failed controller is not recommended unless you have a similar Unified Storage System to test its integrity.

Installing the DIMM Module

1. Remove the controller module (refer to Replacing the Controller Module).
2. **Wait for one minute** for the remaining electricity on the main board to disperse.
3. Push down the clips on the sides of the DIMM socket. The DIMM will eject automatically from the socket.



4. **Insert the replacement module**. Make sure the side clips are in the open positions. Align the DIMM module with the socket and firmly push the DIMM module into the socket. The side clips will close automatically and secure the DIMM module into the socket.



5. **(If applicable)** Reinstall the BBU module (refer to Replacing the BBU).
6. Reinstall the controller module into the chassis (refer to Replacing the Controller Module).

Replacing the Cache Backup Module (CBM)

WARNING

Make sure you have the correct replacement module(s): Supercapacitor, Battery Backup Unit (BBU), Flash Backup Module (FBM) on-hand before you attempt to replace the CBM.

BBU Fault Conditions and Precautions

If a BBU leaks, gives off a bad odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it from the system and stop using it. Here are some of the conditions that might trigger BBU fault.

- The temperature sensor on the system's charger circuit reports a temperature reading exceeding the pre-set threshold. The charger circuits will enter a low-power and self-protection state.
- A BBU module has been charged for over twelve hours. A timer is embedded with the charger. When this occurs, the charger will enter a timer fault state. Charging will resume automatically after you remove/re-install the BBU module or reset the system.

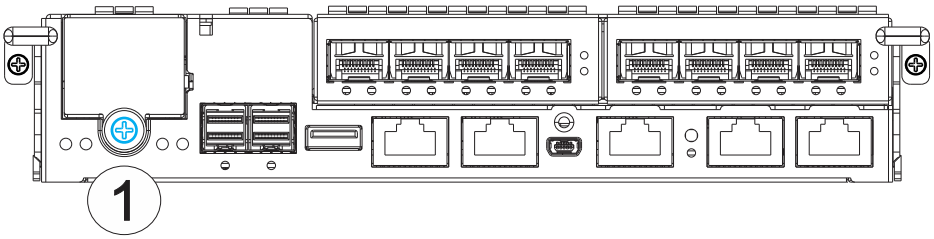
Follow these precautions when you install the BBU.

- Use the replacement BBU supplied by your distributor. Use of battery cells provided otherwise will void your warranty.
- Dispose of used BBUs at authorized battery disposal sites only.
- Do not place a BBU near a heat source.
- Do not immerse the BBU in water or expose it to liquids.
- Do not disassemble or modify the BBU.
- Do not pierce the BBU with a sharp object, strike it with a hammer, exert pressure on it, or throw it.

Replacing the Battery Backup Unit (BBU)

To replace the BBU, follow these steps:

1. Simply loosen the thumb screw **(1).**



2. Using the thumb screw as an anchor, gently pull out the BBU **(1)**.

3. Install the replacement BBU module and fasten the thumb screw.

NOTE

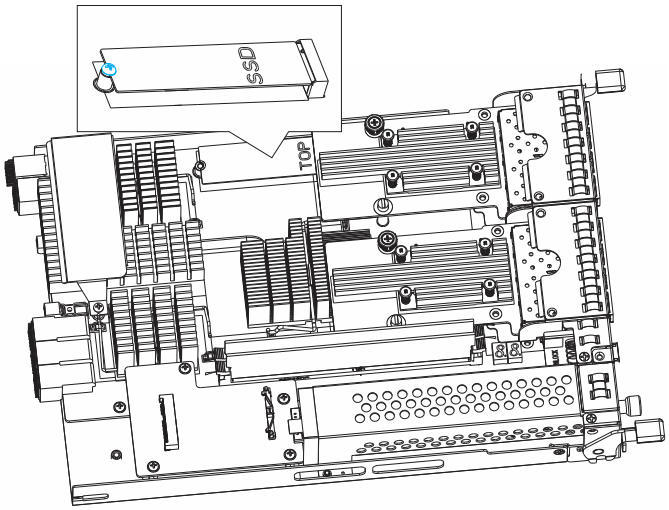
- A replacement BBU takes approximately twelve hours to charge to its full capacity.
- The life expectancy of a BBU is three years.
- If the cause of a failure cannot be determined even after a BBU module is replaced, contact your system vendor.

Replacing the Flash Backup Module (FBM)

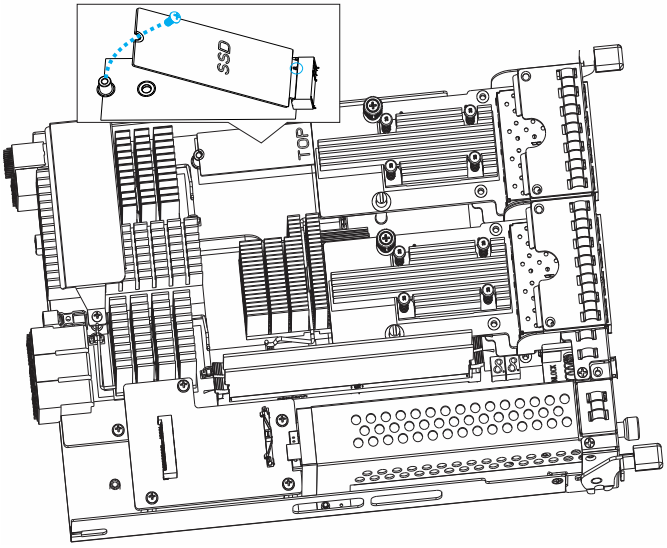
To replace the flash backup module (FBM) of a CBM with BBU (Batter Backup Unit), please follow these steps:

1. Remove the controller module (refer to Replacing the Controller Module).

2. Locate the flash backup module.



3. Loosen the screw holding down the FBM to release it. Remove it while holding it on a 45 degree angle.



4. Insert the new FBM on a 45 degree angle, make sure the notch matches and gently push it downwards. Fasten the screw to fix the FBM again.

5. Reinstall the controller.

Super Capacitor Fault Conditions and Precautions

If a super capacitor leaks, gives off a bad odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it from the system and stop using it. Here are some of the conditions that might trigger super capacitor fault.

- The temperature sensor on the system's charger circuit reports a temperature reading exceeding the pre-set threshold. The charger circuits will enter a low-power and self-protection state.
- A super capacitor module has been charged for more than 10 minutes. A timer is embedded with the charger. When this occurs, the charger will enter a timer fault state. Charging will resume automatically after you remove/re-install the super capacitor module or reset the system.

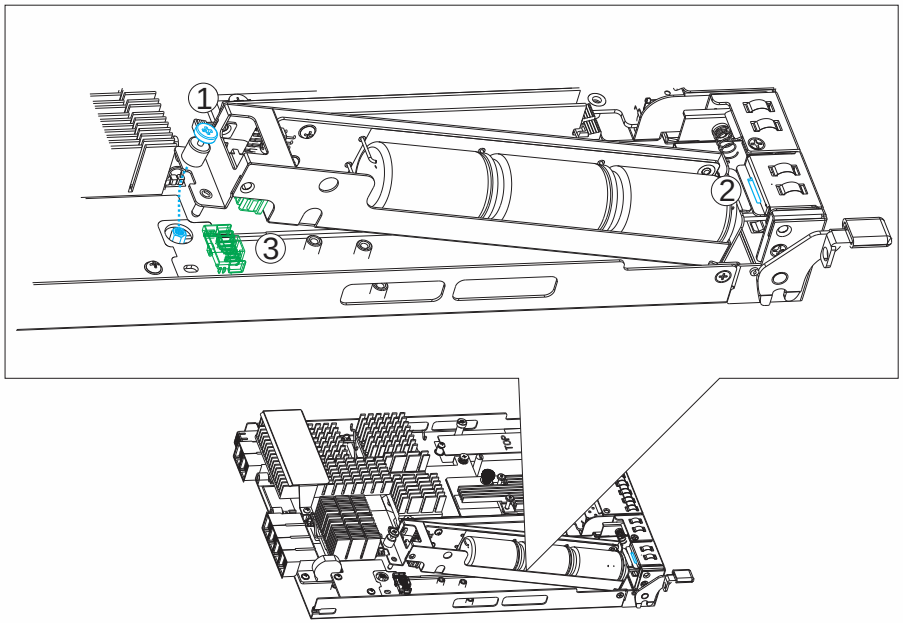
Follow these precautions when you install the super capacitor.

- Use the replacement super capacitor supplied by your distributor. Use of capacitors provided otherwise will void your warranty.
- Dispose of used super capacitor at authorized battery disposal sites only.
- Do not place a super capacitor near a heat source.
- Do not immerse the super capacitor in water or expose it to other forms of liquids.
- Do not disassemble or modify the super capacitor.
- Do not pierce the super capacitor with a sharp object, strike it with a hammer, exert pressure on it, or throw it.

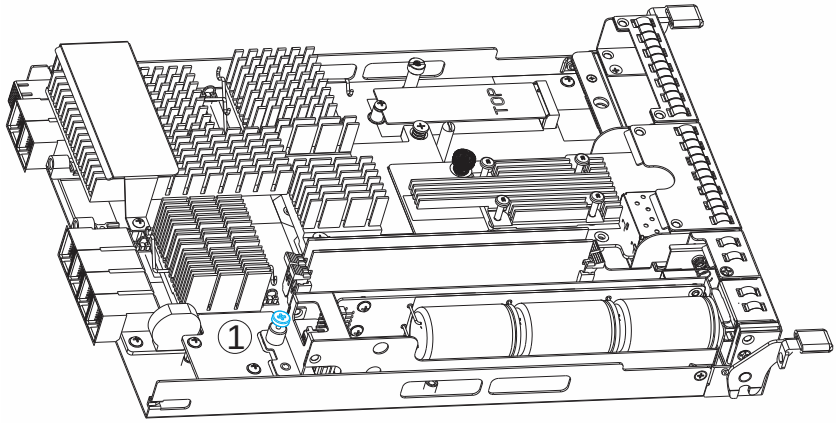
Replacing the Supercapacitor

To replace the Supercapacitor, follow these steps:

1. Remove the controller module (refer to Replacing the Controller Module).
2. Loosen the **thumb screw (1)** at the end of the Supercapacitor.
3. Lift the Supercapacitor from the screw end at 45 degree angle.



4. Insert the replacement Supercapacitor at a 45 degree angle, make sure the **protrusion (2)** meets at the front and the **connector (3)** of Supercapacitor and charge board match. Secure the Supercapacitor with the thumb screw (1) once it is in place.



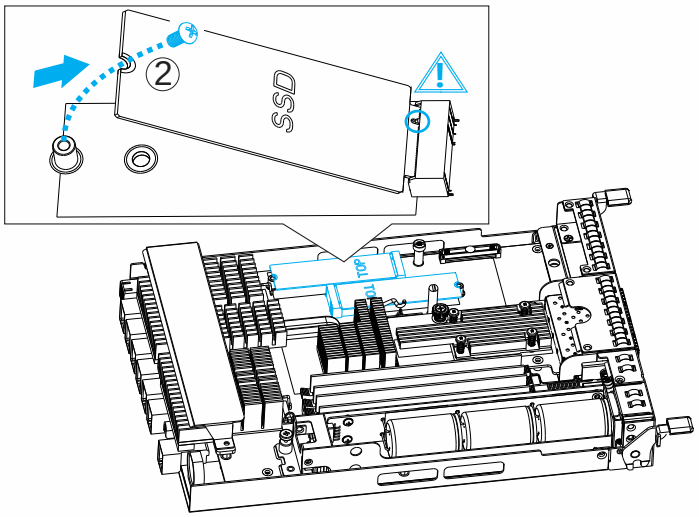
5. Reinstall the controller.

Replacing Flash Backup Module (coupled with Supercapacitor)

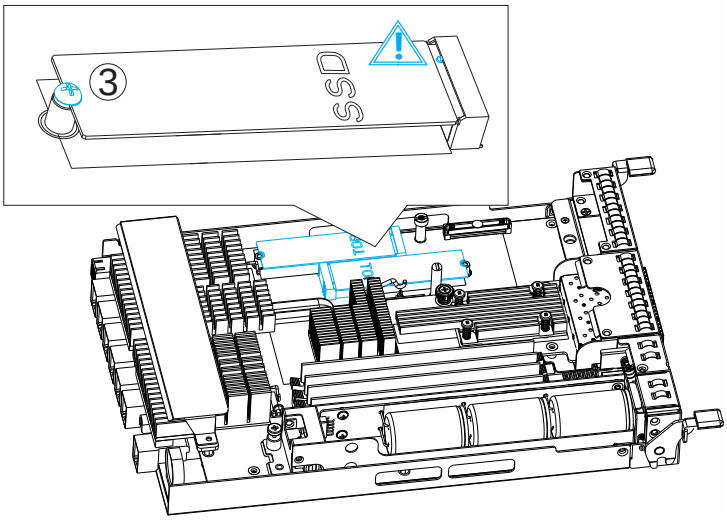
Up to two flash backup modules can be installed. If there are two host boards installed, to gain access to the FBMs will require the user to remove the second host board. Once the second host board has been removed, please read the following instructions to replace the flash backup module:

1. Remove the controller module (refer to Replacing the Controller Module).

2. Loosen the screw at the end of flash backup module. Lift it up at a 45 degree angle and remove it than from the base board.



3. Insert the replacement flash backup module on a 45 degree angle, gently lower the other end of the SSD and secure it with the original screw.



4. Reinstall the controller.

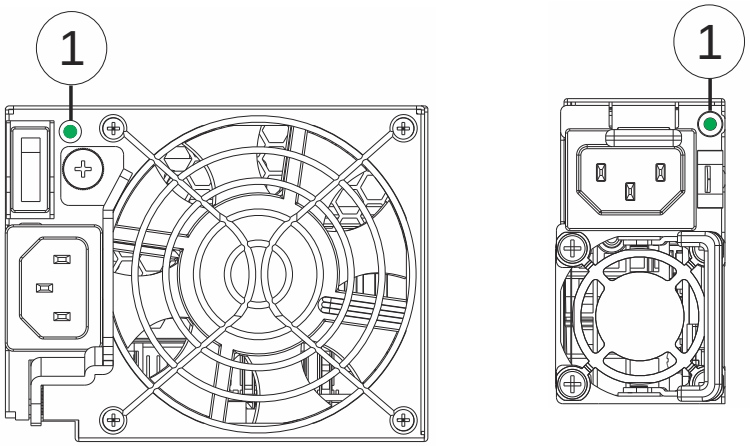
Replacing the Power Supply / Cooling Module

The power supply units (PSU) are configured in a redundant configuration with each PSU housed in a robust steel canister.

Detecting a Failed PSU

If a PSU module fails, the system notifies you through the following indicators:

- PSU status LED locations (1):



- Audible alarm (refer to Audible Alarms)
- Firmware utility (refer to Firmware User Manual in the CD-ROM for details)
- Management Software Suite (refer to the respective User Manual in the CD-ROM for details)

Replacing Power Supply Unit

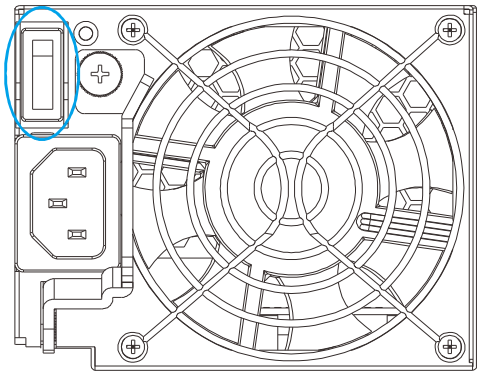
A failed PSU should be replaced as soon as possible, but only when you have a replacement module in your hand. Contact your vendor for more details (refer to Contact Information).

WARNING

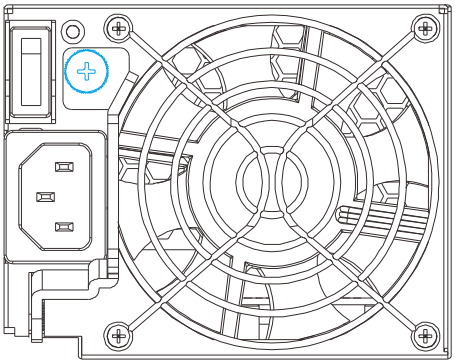
Although the system can operate with a failed PSU in a system, it is not recommended to run the system with a failed PSU for an extended period of time. The failed spare redundant PSU should be replaced as soon as possible!

To replace a PSU, follow these steps:

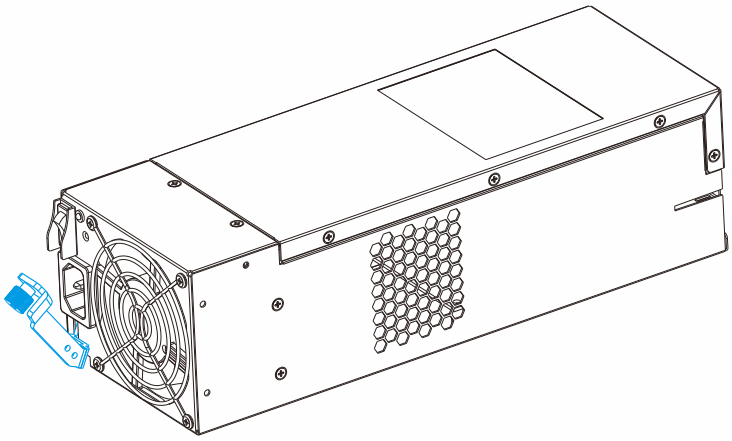
1. Turn the switch to the off position and unplug the power cord.



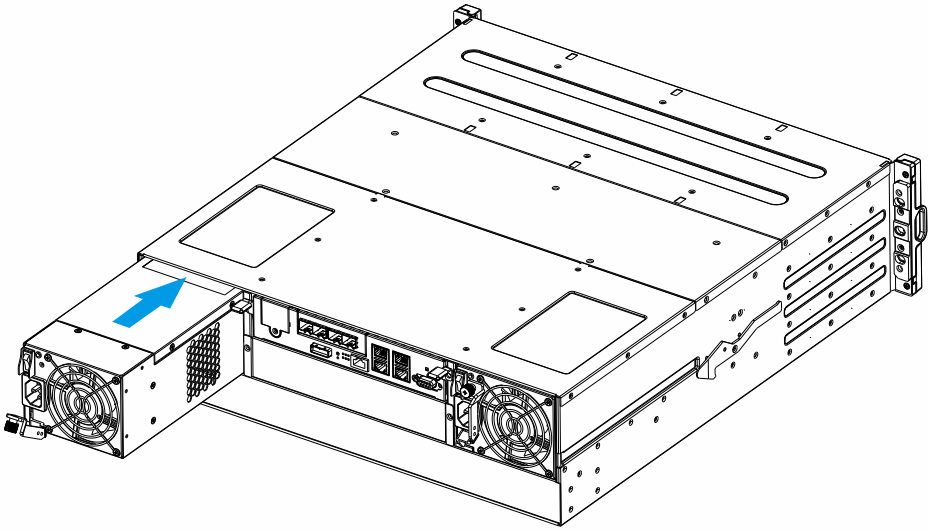
2. Loosen the retention screw that secures the extraction handle to the chassis.



3. To remove the PSU module, pull the extraction handle downwards to disconnect the PSU from the backplane connectors. Once dislodged, gently pull the PSU out of the system. If the system is mounted in a rackmount rack, use another hand to support its weight while removing the module.



4. Insert the replacement module. Make sure the extraction handle is pointing outwards. Push the replacement PSU into the chassis, and when you feel the contact resistance, push the extraction handle towards the PSU module and it should engage the back-end connectors.



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

NOTE:

Should a cooling fan fail within a PSU, the whole PSU module will need to be replaced!

Replacing a Hard Drive

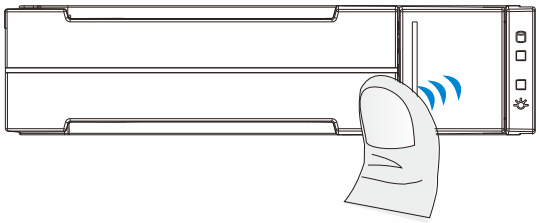
WARNING

Keep a replacement on hand before replacing the hard drive. Do not leave the drive tray open for an extended period of time or the internal airflow will be disrupted.

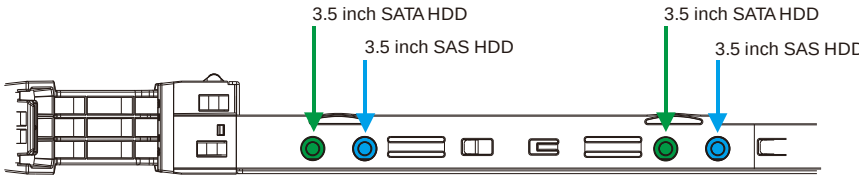
Handle the hard drives with extreme care. Carry them only by the edges and avoid touching their circuits part and interface connectors.

To replace a hard drive, follow these steps.

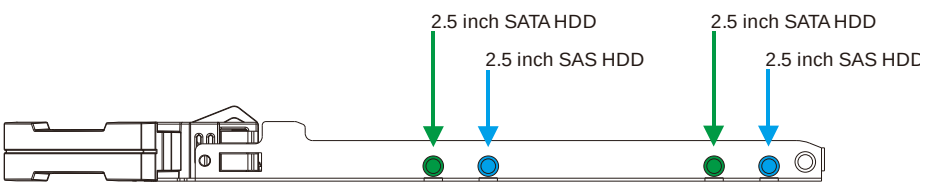
1. **Identify the drive tray**. Use the firmware utility, the management software, or the LED on the drive tray to identify faulty hard drive(s). The drive bays are numbered from left to right and from top to bottom.
2. **Open the drive tray**. Press the button. The spring handle will pop out.



3. **Remove the drive tray**. Pull the tray one inch away from the enclosure. Wait for at least 30 seconds for the disk drive to spin down, and then gently withdraw the drive tray from the chassis.
4. **Remove four retention screws** (two on each side). The screws secure the hard drive to the drive tray.

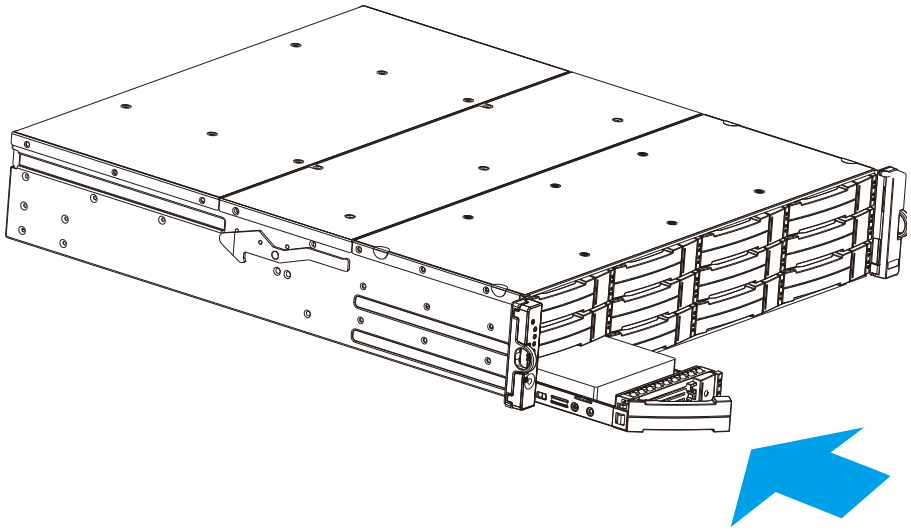


3.5 inch HDD tray

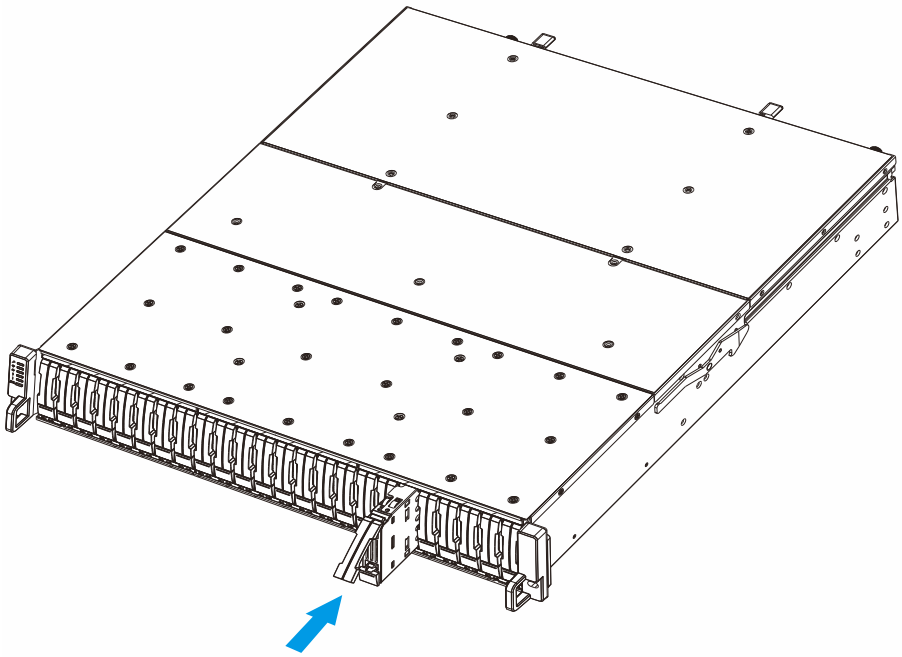


2.5 inch HDD tray

5. **Replace the drive.** After swapping the drive, fasten the retention screws back. Refer to screw locations in the previous step.
6. **Insert the drive tray back into the enclosure.** Install the drive tray with the front bezel open. When fully inserted, close the front bezel.



3.5 inch



2.5 inch

7. **Check for drive error.** Make sure that there is no more error reported.

Appendix

Technical Specifications

Host Board Interface

Fibre/iSCSI hybrid-host Unified Storage Systems	
Host Interface	8Gbps / 16Gbps Fibre
Drive Interface / channel	Supports 12 / 16 / 24 channels of 3 / 6 / 12 Gbps SAS, SATA-II/SATA-III, Near-line SAS series
Host Interface	8Gbps / 16Gbps Fibre + 2iSCSI (onboard)
SAS/iSCSI hybrid-host Unified Storage Systems	
Host O/S Compatibility	Host O/S independent
Host Interface	3Gbps / 6Gbps / 12Gbps Multi-lane SAS
Host Channels	Multiple SAS PHYs logically combined into 2 host channels per controller
Drive Interface / channel	Supports 12 / 16 / 24 channels of 3 / 6 / 12 Gbps SAS, SATA-II/SATA-III, Near-line SAS series
iSCSI-host Unified Storage Systems	
Host O/S Compatibility	Host O/S independent / iSCSI offload utilities and hardware
Host Interface	RJ-45 Gigabit Ethernet / RJ-45 10Gb Ethernet / 10Gb FCOE
Drive Interface / channel	Supports 12 / 16 / 24 channels of 3 / 6 / 12 Gbps SAS, SATA-II/SATA-III, Near-line SAS series
JBOD models	
SAS Interface	Eight SMP PHYs interfaced through two / three 12Gb SAS ports
Drive Interface / channel	Supports up to 12 / 16 / 24 / 60 channels of 3 / 6 / 12 Gbps SAS, SATA-II/SATA-III, Near-line series

*Host board interface and specifications are subject to change without prior notice. For the latest specifications and information, please refer to the official EonStor GSe website.

RAID Configurations for Unified Storage Systems

RAID Levels	0, 1(0 + 1), 3, 5, 6, 10, 30, 50, 60, and non-RAID disk spanning
Cache Mode	All drive channels are pre-configured and cannot be changed
Cache Memory	Write-through, write-back, and adaptive write policy
Number of LUNs	Pre-installed DRAM module with ECC, registered; in two DIMM sockets
Multiple Target IDs/Host Channel	Up to 32 per host ID, for a total of 1024 on all host channels
Aliases for Target IDs	Yes
Firmware on Flash Memory	Yes
DIMM Slot	Two DRAM module slot(s)
Hardware XOR	Yes
Real-time Clock	For event messages with time record and task scheduling
Configuration	Text-based firmware-embedded utility over RS-232C through the serial cable Telnet via an established network connection The Management Software Suite using in-band or Ethernet connection
Performance Monitoring	Yes
Remote Control and Monitoring	Yes
Event Broadcast/Alert	Yes, via Java-based Management Software Suite
Event Notification	Yes, via the Management Software Suite
Hardware Connection	In-band over Fibre, SAS, or other host link types, out-of-band via Ethernet or RS-232C
Configuration on Disk	Configuration data stored on disks so that logical drive assemblies exist after controller replacement.
Failure Indicator	Faults are indicated via alarm, module LED indicators, LCD panel, Management Software Suite, or terminal emulation.

Fault Tolerance for Unified Storage Systems

Drive S.M.A.R.T Support	Yes, with user-configurable detect-only, clone and replace, and perpetual clone functions.
CBM (Cache Backup Module)	Yes (R models only, optional accessory for Single-Controller models)
ISEMS (Infortrend Simple Enclosure Management Service) via I^2C interface	Yes
Automatic Drive Failure Detection	Yes
Automatic Rebuild on Spare Drives	Yes
Regenerate Logical Drive Parity	Yes
Bad Block Reassignment	Yes
Manual and Automatic Rebuild upon Failed Drive Replacement	Yes
Manual Clone of Suspected Failed Drive	Yes
Concurrent Rebuild on Multiple Drives in a RAID (0 + 1) Logical Drive	Yes
Salvage the 2nd Temporary Failed Drive in a RAID 1, 3, 5 or 6 Logical Drive	Yes
Salvage the 1st Temporary Failed Drive in a RAID 0 Logical Drive	Yes

Power Supply

Input Voltage	Dual-Controller model: 100VAC @ 10A 240VAC @ 5A with PFC (auto-switching)
	Single-Controller model: 100VAC @ 10A 240VAC @ 5A with PFC (auto-switching)
Frequency	50 to 60Hz
Power rating	460W
DC Output	12.0V: 38A (Max.) 5.0VSB: 2A (Max.)
Input Frequency	50 to 60Hz
AC Input	100VAC @ 10A or 240VAC @ 5A with PFC
Power Factor Correction	Yes
Hold-up Time	At least 12ms at 115/230VAC full load after a loss of AC input
Over-temperature Protection	Auto shutdown when lost cooling or exceeded ambient temperature; over-voltage protection is also available.

*PSU specifications described above are general measurements and do not represent all models. For details, please refer to specific model specifications.

Dimensions

2U series

Dimensions	Without chassis ears & protrusions
Height	88mm
Width	446mm
Length	514mm

3U series

Dimensions	Without chassis ears & protrusions
Height	130mm
Width	445mm
Length	514.04mm

4U series (3 drawer)

Dimensions	Without chassis ears & protrusions
Height	175.9mm
Width	445mm
Length	873.5mm

4U series

Dimensions	Without chassis ears & protrusions
Height	176mm
Width	445mm
Length	840mm

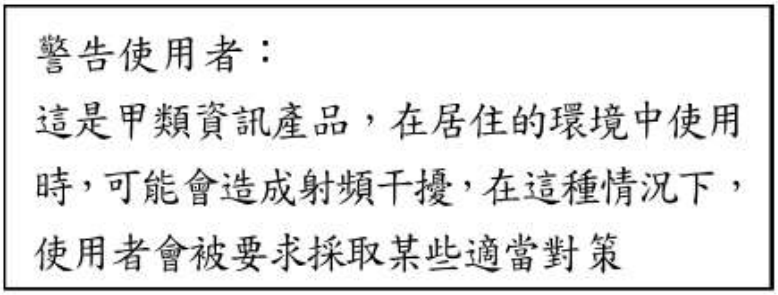
Environment

Humidity	5 to 95% (non condensing – operating and non-operating)
Temperature	Operating: a. With Cache Backup Module 0º to 35ºC b. Without Cache Backup Module 0º to 40ºC Non-operating: -40º to 60ºC
Altitude	Operating: Sea level to 12,000ft Packaged: Sea level to 40,000ft
Shock (Half-sine)	Operating: 5G, half-sine, 11ms pulse width Non-operating: 15G, half-sine, 11ms pulse width
Vibration	(Random) Operating: 5 to 500Hz, 0.25Grms, X/Y/Z, 30min Non-operating: 5 to 500Hz, 1.0Grms, X/Y/Z, 30min (Sine) Operating: 5 to 500Hz, 0.2Grms, X/Y/Z Sine, 1hr/sweep Non-operating: 5 to 500Hz, 1.0Grms, X/Y/Z Sine, 1hr/sweep
Acoustic Noise	65dBA boundary, 60dBA normal

Certifications

Summary

Safety	UL (60950-1 2'nd) BSMI CNS 14336: 2005 CB IEC 60950-1, 2'nd Edition GOST-R GOST R 60950-1-2005
EMC	CE EN 55022: 2006/A1:2007 / EN 61000-3-2: 2006 / EN 61000-3-3: 1995/A1: 2001 /A2: 2005 / EN 55024: 1998/A1: 2001/A2: 2003 IEC 61000-4-2:1995/A2:2000 IEC 61000-4-3:1995/A2:2006 IEC 61000-4-4:2004 IEC 61000-4-5:2005 IEC 61000-4-6:2003/A1:2004/A2:2006 IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11: 2004 IEC 61000-3-2, IEC61000-3-3 BSMI (CNS 13438) FCC (FCC Part 15,subpart B)
Environment	IEC 60068-2 MIL-STD-810E/883E ISTA ASTM-D3332 IPC-TM-650
Others	ISO7779/3744 RoHS Microsoft WHQL-Windows Server 2003



Slide Rail Kit Installation Guide

The table is categorized into model numbers in alphabetical / numeric order so users can fast locate the corresponding slide rail kit for their respective enclosure.

Slide Rail Kits

If you are unable to locate clear instructions on installing your enclosure, please contact Technical Support!

Enclosure Installation Prerequisites

To ensure proper installation and functionality of the Unified Storage System, please observe the following warnings:

- Cross check all components have been received against the “Unpacking List”. Contact your vendor immediately if anything is missing
- Install the enclosure as-is out of the packaging; install hard drives and optional modules (FBM / Supercapacitor) after the enclosure has been mounted
- Wear an anti-static wristband before and during the installation procedure
- It is recommended to plug the system into two different power sources (e.g. into a power outlet and another into a UPS)
- Ensure the rack which the enclosure will be mounted onto has proper grounding and over-current protection
- Do not obstruct ventilation openings; provide 20cm of free space at the front and back of the enclosure for air circulation; keep the ambient temperature below 35 degrees Celsius

Unpacking the System

Use the “Unpacking List” to cross check all components have been received. The basic contents include one GUI CD pack, Quick Installation Guide and Unified Storage System Installation Guide. For details on each slide rail kit contents, please refer to specific kit installation details in this manual.

Component Installation Procedure

Please install components in the following order:

1. Rackmount rails onto the enclosure / rack / cabinet
2. Enclosure onto the slide rail and into the cabinet
3. Hard drives into drive trays and then into the enclosure.
4. Drive trays (with or without hard drives) into the enclosure
5. If Supercapacitor / FBM were purchased as an optional component, the controller must be removed from the enclosure for installation.

NOTE

For detail procedures from step 3 and onwards, please refer to the earlier sections in this hardware manual.

Tools Required

For each of the slide rail installation procedures, you will need the following tools:

- One medium sized Phillips screwdriver
- One small sized Phillips screwdriver
- One medium size flat blade screwdriver

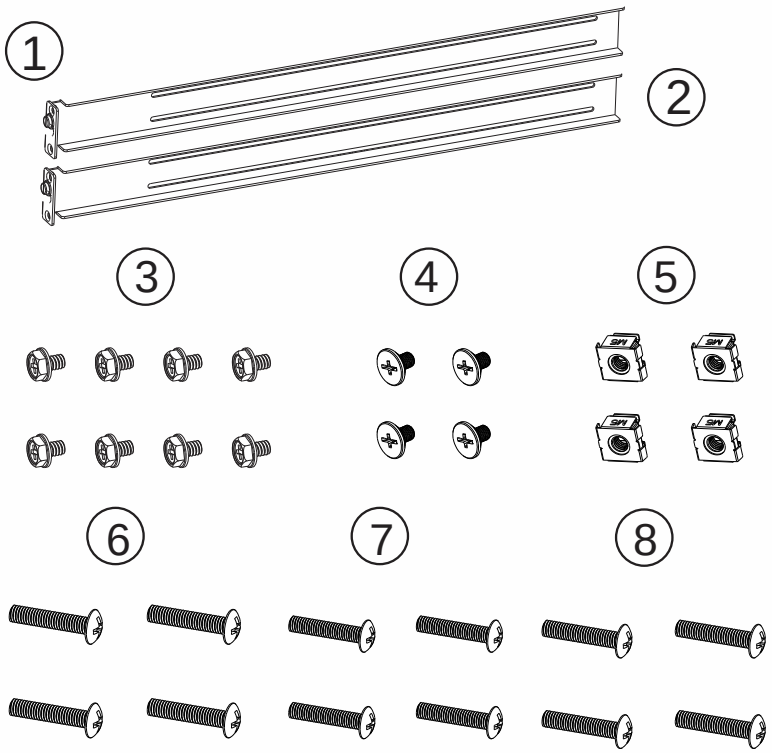
Rackmount Slide Rail Kits

Rack Ear Mount Kit

The following table shows all accessories that came with the rack ear mount kit.

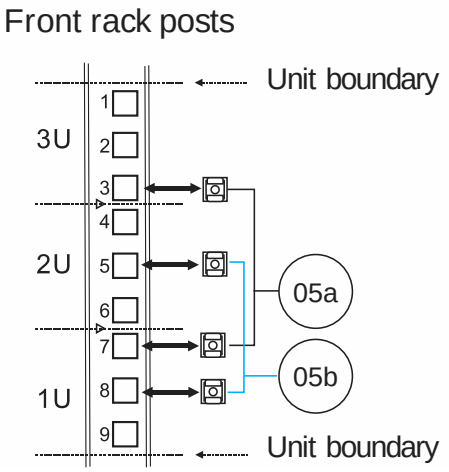
Kit Contents

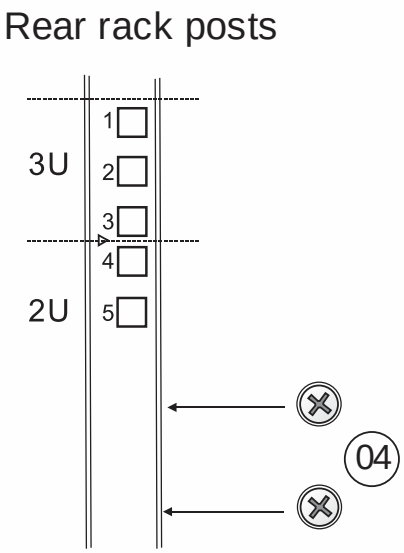
Item	Description	Quantity
01	Mounting bracket assembly, left-side	1
02	Mounting bracket assembly, right-side	1
03	Hexagon washer screws #6-32mm	8
04	Truss head screws M5 x 9.0mm	4
05	M5 cage nuts	4
06	M5 x 25mm	4
07	M6 x 25mm	4
08	#10-32 x 25.4mm	4



Installation Procedure

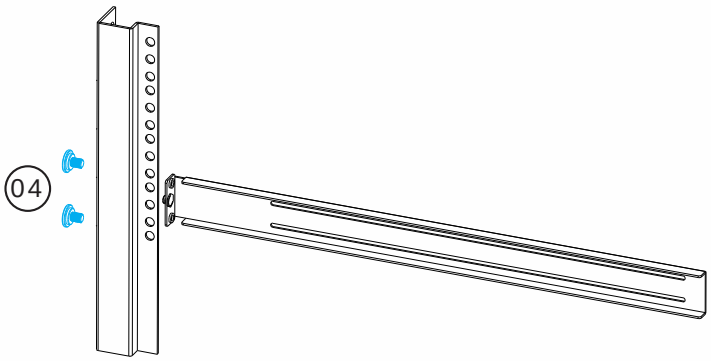
1. The installation begins with determining the installation position and M5 cage nut **(5)** insertion location.





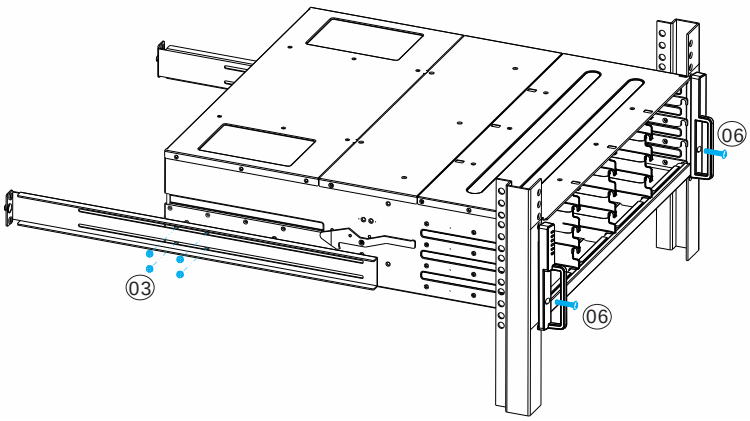
Item	Description
04	Screws M5 x 9.0 mm
05a	Cage nuts M5, 3U position
05b	Cage nuts M5, 2U position

2. Install the fixed rack ear mount to the rear posts and secure them using truss head screws **(4)**



Item	Description
04	Screws M5 x 9.0 mm

3. With the assistance of another person holding the enclosure at the installation height, the other person can place two M5 x 25mm **(7)** at the front of the enclosure and eight #6-32 screws **(3)**, four on each side, to secure the enclosure into the rack.



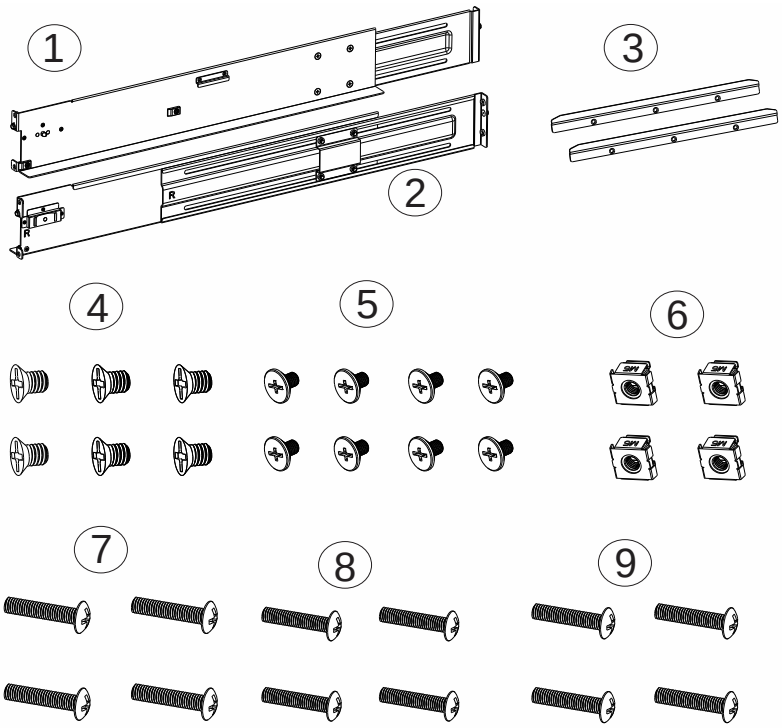
Item	Description
03	Screws #6-32L4
06	Screws M5 x 25 mm or
07	Screws M6 x 25 mm or
08	Screws #10-32 x 25.4mm

Slide Rail Kit

The following table shows all accessories that came with the slide rail kit.

Kit Contents

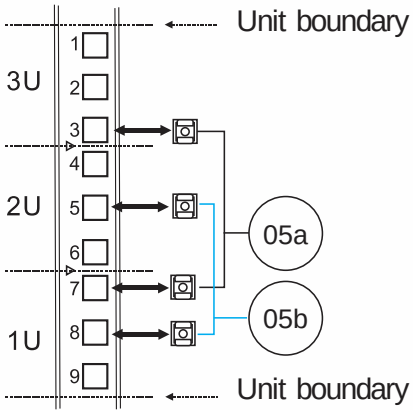
Item	Description	Quantity
01	Mounting bracket assembly, left-side	1
02	Mounting bracket assembly, right-side	1
03	Inner glides	2
04	Flathead screws #6-32 L4	6
05	Truss head screws M5 x9.0mm	8
06	M5 cage nuts	4
07	M5 x 25mm	4
08	M6 x 25mm	4
09	#10-32 x 25.4mm	4



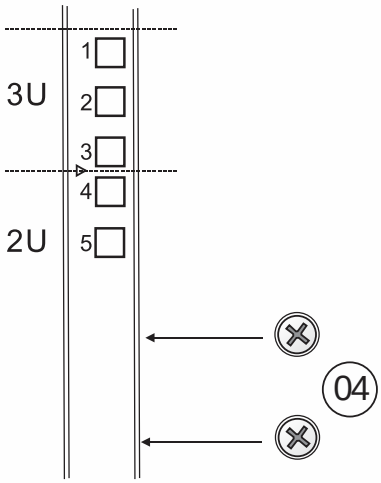
Installation Procedure

1. The installation begins with determining the installation position (front and rear rack positions) and M5 cage nut **(5)** insertion location.

Front rack posts

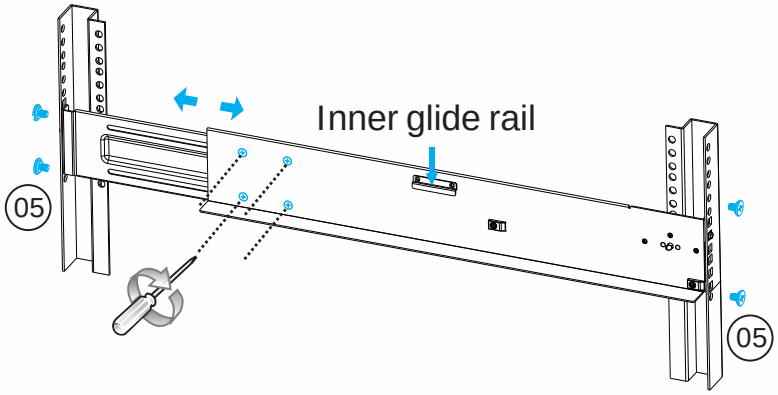


Rear rack posts



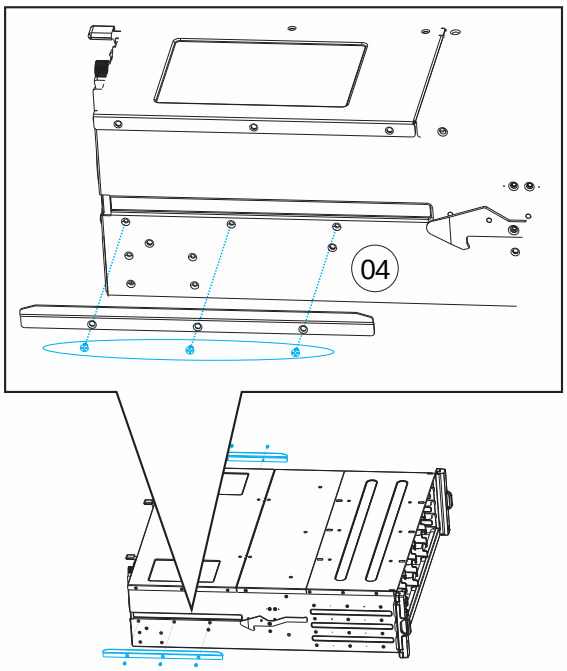
Item	Description
04	Screws M5 x 9.0 mm
05a	Cage nuts M5, 3U position
05b	Cage nuts M5, 2U position

2. Adjust the length by loosening the four screws on the slide rail. Secure the slide rails to front and rear posts using truss head screws. Tighten the four screws on the slide to fix the length.



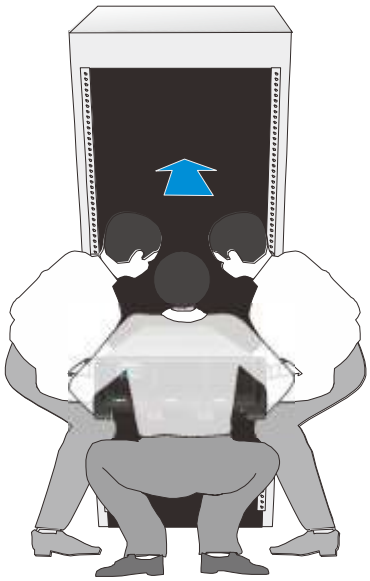
Item	Description
05	Truss head screws M5 x 9.0mm

3. Attach the inner glides to BOTH sides of the enclosure using flathead screws #6-32 **(8)**



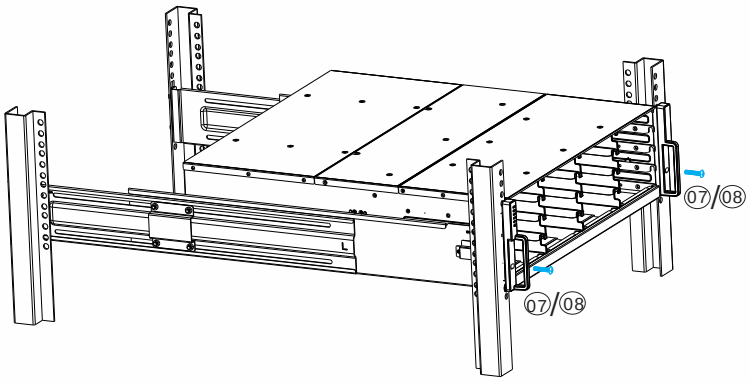
Item	Description
04	Flathead screws #6-32 L4

4. With the assistance of another person, lift and insert the enclosure onto the slide rail. Make sure the inner glides on both sides of the enclosure meets the inner glide rail. Secure the enclosure with M5 or M6 screws from the front.



5. To insert the enclosure into the rack, with at least three people lifting the enclosure, align the end of the enclosure slide rail to the opening of the rack slide rail and gently insert it into the rack. You should hear a “click” sound when the enclosure slide rail engages the rack slide rail at the release lever.

6. Secure the system using two 20mm screws and cage nuts from the accessory box.



Item	Description
07	Screws M5 x 25 mm or
08	Screws M6 x 25 mm or
09	Screws #10-32 x 25.4mm

Once Mounted

Once the enclosure has been mounted, you may refer to the User's Manual that came with your system for further instructions on completing the hardware installation process. The User's Manual will go on to explain details on installation / maintenance of hard drives, controllers, optional modules (super capacitor, CBM, etc.), cooling modules, power supplies, cable connections, topology configurations, etc.

Safety Reminders

If you must relocate the enclosure after installation

- Cease all input / output transactions, shutdown the system, disconnect all the cables (please refer to the User Manual for details)
- Empty all drive bays (hard drives + hard drive trays) and transport them separately in safe packaging
- Modules came installed within the enclosure need not be removed

When the system is in operation

- Module and drive bays must not be empty! They must have a dummy cover / plate in place to stabilized internal airflow!
- Should a module fail, leave it in its place until you have the replacement item on-hand to take its place
- Allow at least 18~20cm of clearance space at the rear of the enclosure for ventilation
- Avoid touching the PCB and gold-finger connections.