Alnico 8 Series RAID Subsystem Hardware Installation Guide Version 1.3

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Regulatory information

For Europe

This drive is in conformity with the EMC directive.

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

Those limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antennas.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circlet different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Warning:

A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

About This Hardware Installation Guide

Welcome to Hardware Installation Guide. This guide is designed to be used as step-by-step instructions for installation of your subsystem, and covers everything you need to know in learning how to operation, troubleshooting and future upgrades. For the detail about how to configure your subsystem, please refer to the Software Operation manual.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

Caution

This icons indicates that failure to follow directions could result in personal injury, damage to your equipment or loss of information.

Note

This icon presents commentary, sidelights, or interesting points of information .

Important terms, commands and programs are put in **Boldface** font.

Screen text is given in **`screen`** font.

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SPECIFICATIONS 29

Chapter 1. INTRODUCTION

This chapter introduces the features and capabilities of Alnico series RAID subsystems.

You will find:

- ⇨ **A full introduction to your Alnico RAID subsystem.**
- ⇨ **Details of key features and supplied accessories.**

Model Variations

There are ten available models in Alnico 8 RAID storage subsystem series; which utilize dual 4Gb Fibre / dual miniSAS/ dual 1Gb Ethernet as Host interface per controller, each with 12, 16, or 24 device bays. .

Model Name	*Host Interface*	*Device bays*	*Controller Numbers*
AL-8241F-S	2 x 4Gbps FC	24 bays	1
AL-8241F-D	4 x 4Gbps FC	24 bays	2
AL-8241S-S	2 x miniSAS	24 bays	1
AL-8241S-D	4 x miniSAS	24 bays	2
AL-8161F-S	2 x 4Gbps FC	16 bays	1
AL-8161F-D	4 x 4Gbps FC	16 bays	2
AL-8161S-S	2 x miniSAS	16 bays	1
AL-8161S-D	4 x miniSAS	16 bays	2
AL-8121F	2 x 4Gbps FC	12 bays	1
AL-8121S	2 x miniSAS	12 bays	1

Before the Alnico SAS\SATA MUX board is available, only SAS hard drives can be installed in the Alnico redundant controller subsystem.

Features

The Alnico Series RAID Subsystem is designed to meet today's high volume, performance storage requirements from rapidly changing business environment. It provides a maximum data protection and exceptional performance in a storage subsystem. Target usage ranges are set from small business to departmental and corporate server needs. The RAID SYSTEM is designed for easy integration, smooth data expansion and server migration.

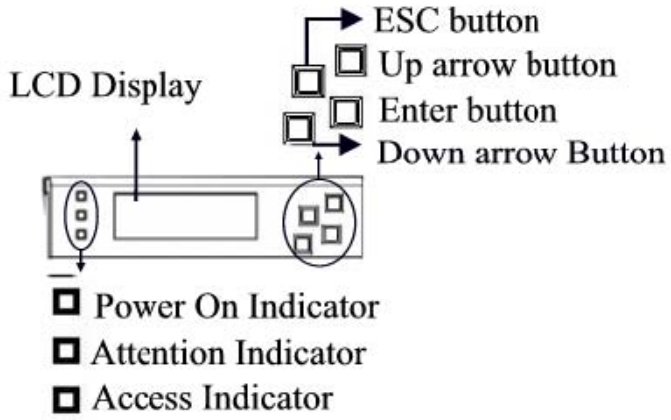
The Alnico 8 series supports the following features:

- RAID Levels : 0, 1,1E, 3, 5, 6, 50, 60 & JBOD.
- Multiple RAID selection.
- Online RAID level/stripe size migration.
- Online Array roaming.
- Hot Spare Disk / Pass through Disk support.
- Disk Scurbbing/Array verify scheduling.
- Max 122 SAS devices.
- Max 128 LUNs (volumeset) per controller.
- Online capacity expansion and RAID level migration simultaneously.
- Online Volume Set growth
- Support spin down drivers when not in use to extend service life(MAID).
- Instant availability and background initialization.
- Automatic drive insertion / removal detection and rebuilding.

Understanding the Alnico RAID subsystem

Front Panel Overview

LCD Module



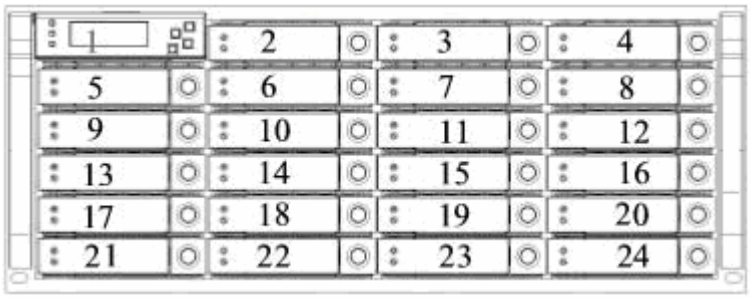
Function keys. (ENT, ESC, Scroll up, Scroll Down)

Keys	Descriptions
Up Arrow	To scroll upward through the menu items
Down Arrow	To scroll downward through the menu items
(ENT) Enter	To confirm a selected item
(ESC) ESC	To exit a sub-menu and return to previous menu.

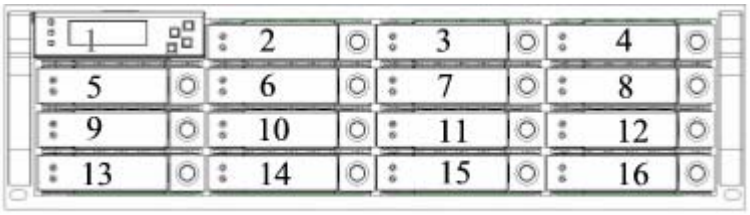
Driver Bay numbering convention

The enclosure bay numbering convention is shown in following figure. A bay is designed to house a single 1.0-inch high, 3,5-inch hard disk drive in his carrier module.

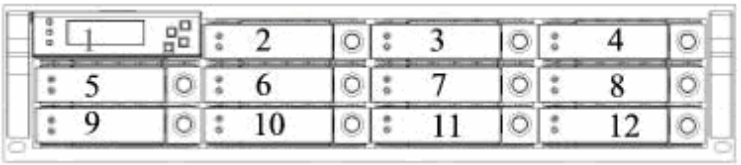
AL-8241F / AL-8241S



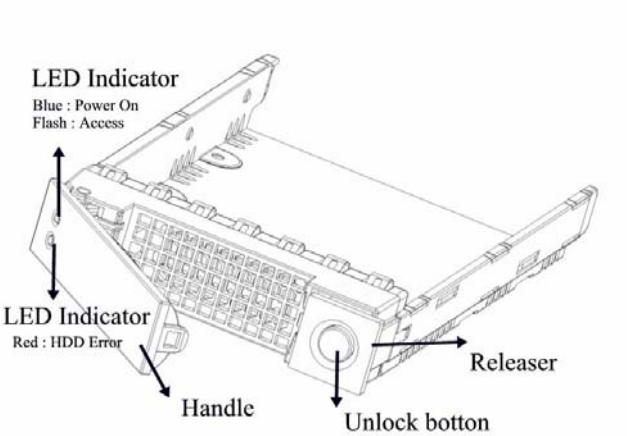
AL-8161F / AL-8161S



AL-8121F / AL-8121S

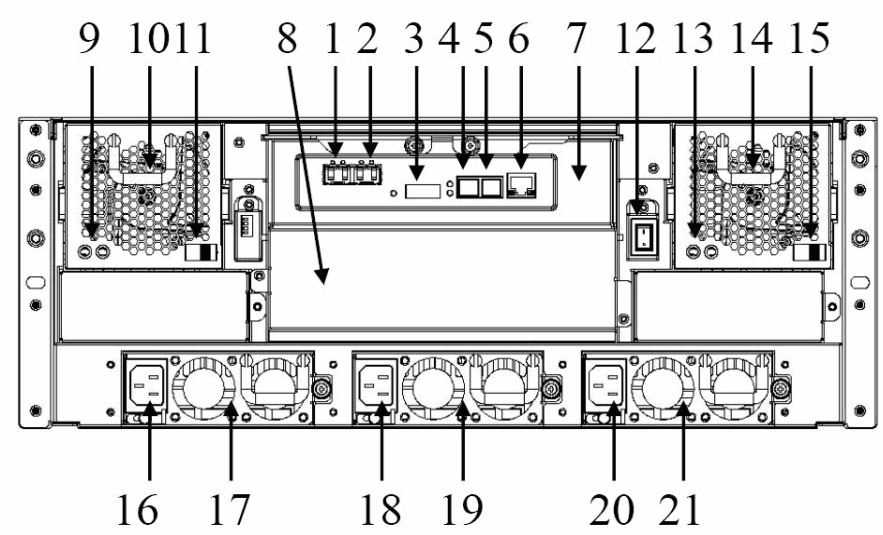


Drive Bay

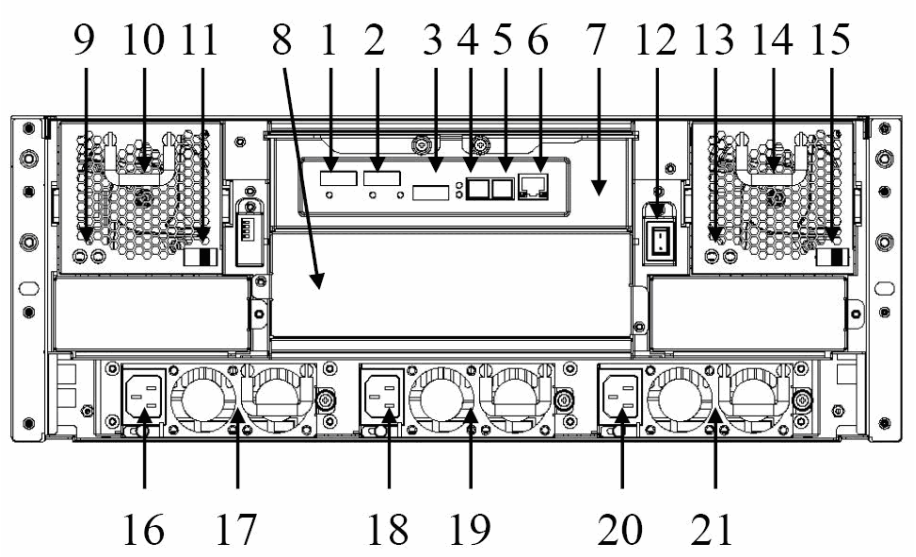


Rear Panel Overview

AL-8241F Fibre-SAS/SATA RAID SUBSYSTEM



AL-8241S SAS-SAS/SATA RAID SUBSYSTEM



Fibre-SAS/SATA RAID SUBSYSTEM: 1. FC CH 1

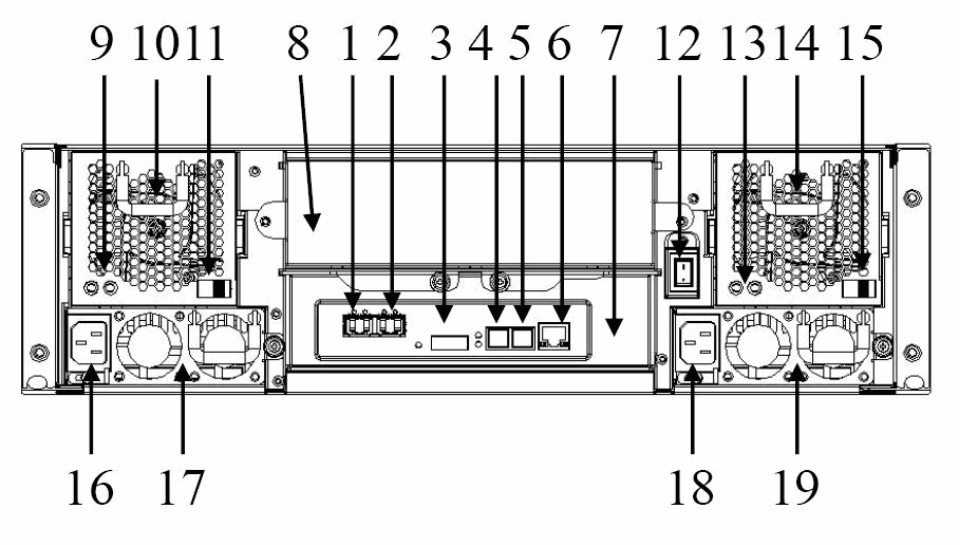
2. FC CH 0

SAS-SAS/SATA RAID SUBSYSTEM: 1. SAS CH 1

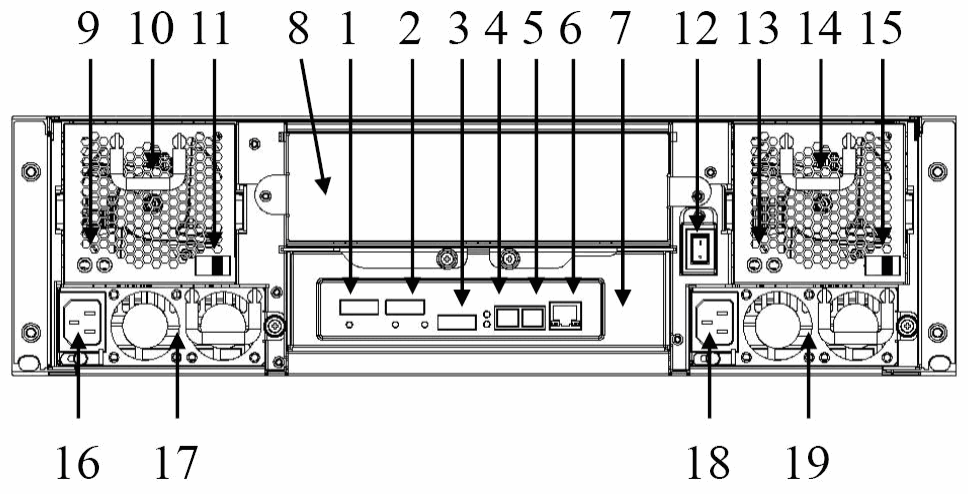
2. SAS CH 0

3. SAS Expand Port
4. Console
5. Terminal
6. LAN port
7. Controller Box 1 (The default first controller location)
8. Controller Box 2
9. FAN failure indicator (Rear / Front)
10. FAN Module /FAN Module 1
11. FAN Module /FAN Module 1 latch
12. Power Switch
13. FAN failure indicator (Rear / Front)
14. FAN Module 2
15. FAN Module 2 latch
16. AC inlet 1 & Ltch
17. Power Module 1
18. AC inlet 2 & Latch
19. Power Module 2
20. AC inlet 3 & Latch
21. Power Module 3

AL-8161F Fibre-SAS/SATA RAID SUBSYSTEM



AL-8161S SAS-SAS/SATA RAID SUBSYSTEM



Fibre-SAS/SATA RAID SUBSYSTEM: 1. FC CH 1
2. FC CH 0

SAS-SAS/SATA RAID SUBSYSTEM: 1. SAS CH 1
2. SAS CH 0

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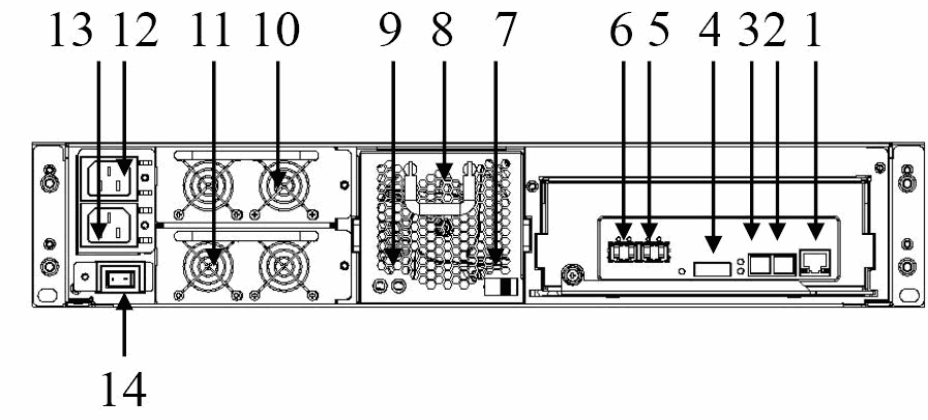
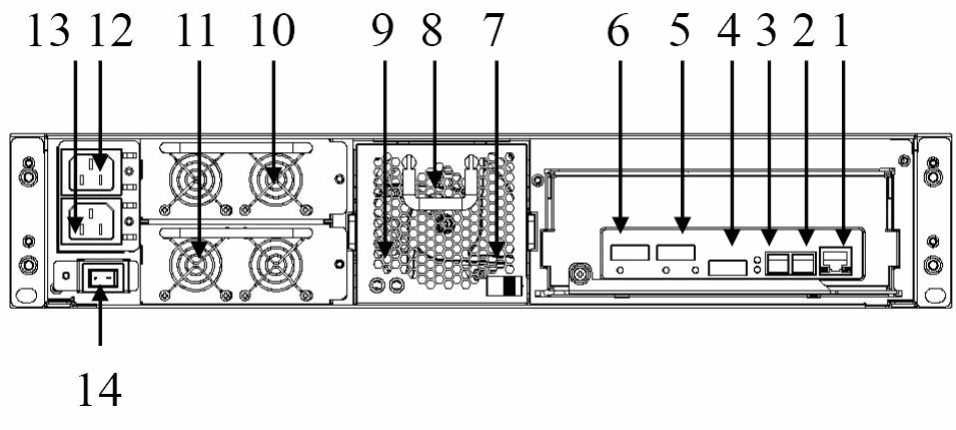
14. FAN Module 2
15. FAN Module 2 latch
16. AC inlet 1 & Ltch
17. Power Module 1
18. AC inlet 2 & Latch
19. Power Module 2

AL-8121F Fibre-SAS/SATA RAID SUBSYSTEM



AL-8121S SAS-SAS/SATA RAID SUBSYSTEM



1. LAN port
2. Terminal
3. Console
4. SAS Expand Port

Fibre-SAS/SATA RAID SUBSYSTEM:
5. FC CH 1
6. FC CH 0

SAS-SAS/SATA RAID SUBSYSTEM:
5. SAS CH 1
6. SAS CH 0

7. FAN Module /FAN Module 1 latch
8. FAN Module /FAN Module 1
9. FAN failure indicator (Rear / Front)
10. Power Module 1
11. Power Module 2
12. AC inlet 1 & Latch
13. AC inlet 2 & Latch
14. Power Switch

Chapter 2. INSTALLATION

This chapter presents:

- ⇨ **Instructions on unpacking & checking the equipment**
- ⇨ **Instructions on how to install Hard disk drive**
- ⇨ **Instructions on how to install Alnico RAID in a Rack.**
- ⇨ **Instructions on how to connect Alnico RAID.**

Unpacking & checking the Equipment

Before unpacking the Alnico RAID subsystem, prepare a clean, stable surface to put on the contents of Alnico 8 RAID shipping container. Altogether, you should find following items in the package:

Alnico 8 Fibre to SAS/SATA RAID Subsystem :

- . Alnico RAID subsystem x1
- . CD-ROM x 1 (Includes Hardware Installation Guide, Software operation Manual & HTTP Proxy Server utility for Web browser-based Configuration).
- . Serial cable x1
- . Power Cord x 2 (AL-8161 and AL-8121), Power Cord x 3 (AL-8241)
- SAS cable (SFF-8088) x 1 (for SAS model only) per controller
- . Spare Fan x 1
- . Spare Drive Bay x 1
- . Rails for Rack
- . Mounting screws (bag) ×1

Alnico 8 SAS to SAS/SATA RAID Subsystem :

- . Alnico RAID subsystem x1
- . CD-ROM x 1 (Includes Hardware Installation
- Guide, Software operation Manual & HTTP Proxy Server utility for Web browser-based Configuration).
- . Serial cable x1
- . Power Cord x 2 (AL-8161 and AL-8121), Power Cord x 3 (AL-8241)
- . Spare Fan x 1
- SAS cable (SFF-8088) x 1 per controller (For SAS model only)
- . Spare Drive Bay x 1
- . Rails for Rack
- . Mounting screws (bag) ×1

To avoid the unmatched connector type between the Fibre HBA in the Host computer and Alnico RAID, Alnico RAID doesn't include the Fibre cable with the standard shipping.

What else you need

- Hard disk drives (different RAID levels requires different numbers of HDDs. Refer to Software Operation manual for more detail information.
- Host computer with SCSI or Fibre interface.
- Dedicated terminal or PC with third party communication software that supports ANSI terminal emulation (required for viewing Monitor Utility)

ESD Precaution

Use a suitable anti-static wrist or ankle strap and observe all conventional ESD precaution when handle Alnico RAID's modules and components. Avoid contact with backplane components and module connectors.

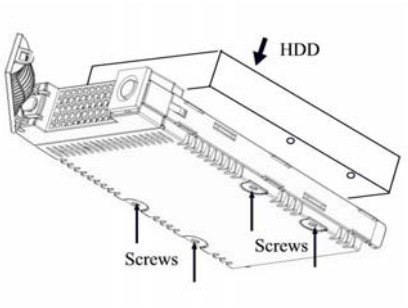
Installing hard disks

The Alnico RAID series includes 16 hot swappable drive bays. The following sections describe how to install disks into Alnico RAID subsystems.

Loading Hard Disk to the drive bay.

1. Put HDD into the bay.

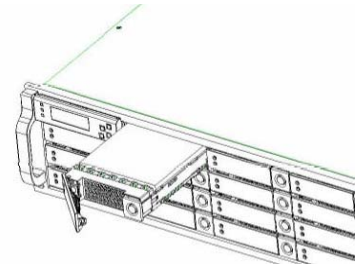
2. Fasten all 4 screws to mount HDD in the bay and make sure the HDD is properly tightened.



Place drive bays back into the system

1. Slide in drive bay, make sure the handle is open fully.

2. Close the handle to engage the drive bay into the slot.



NOTE

The hard drives in a RAID array should match in size and speed. All drives in any array should be identical models with the same firmware versions. RAID arrays can use any size drive, however the smallest drive will determine the size of the array.

Caution

1. *Only use the screws offered with Alnico RAID subsystem. Longer screws might cause the drive damage.*

2. *All the drive bays (with or without hard drive) must be placed in the Alnico subsystem. Alnico's cooling system is designed with full of drive bays. Missing drive bays might cause the subsystem damage.*

Install The Alnico RAID subsystem in a Rack

You are shipped one rackmounting kit for each Alnico subsystem that you intend to rackmount. Alnico subsystem is designed for installation into a industry-standard 19-inch rackmount cabinet. Following the use of this section for installing the Alnico subsystem into a Rack

Install the Slide Rails

1. Combine Left slide rail and rear slide rail.
2. Measure the depth of the rack enclosure, then fasten 4 of P4*8M screws into M4 Locking nuts to fix the length.
3. Use T5*8M screws and PW14 washer to install the left slide on Front and rear Posts of Rack as Figure 1.
4. repeat procedure 1 ~ 3 to install the right Slide into the Rack.

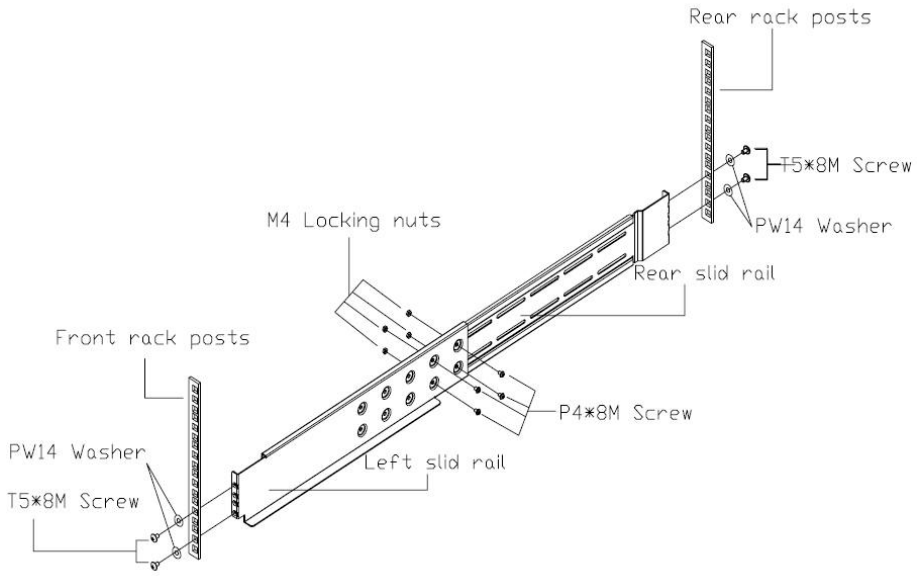


Figure 1.

Place the Alnico Subsystem into the rack

1. Lift the subsystem enclosure and slide it slowly and gently along the slide rail into the rack as Figure 2.

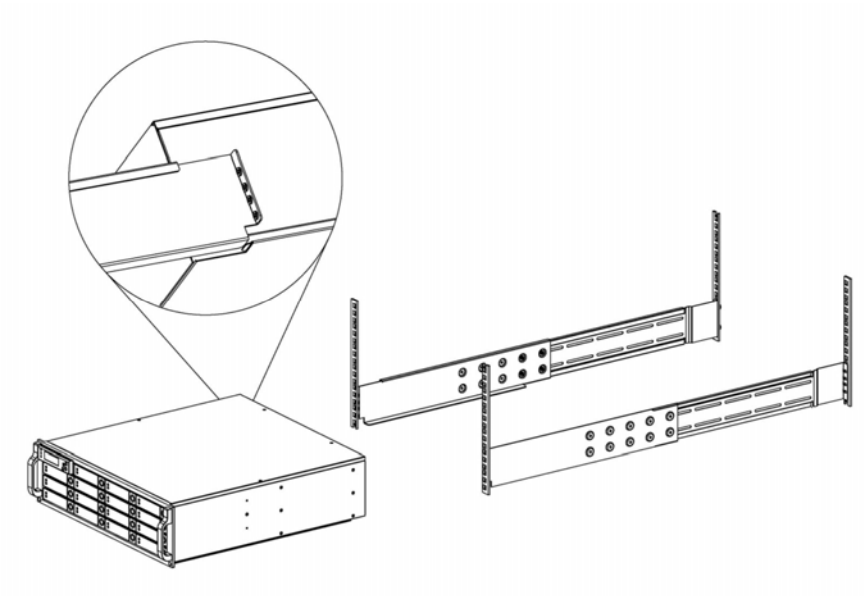


Figure 2.

2. Fasten two M5 screws through the chassis ears in the front side of the chassis to secure the Alnico subsystem in the rack as Figure 3.

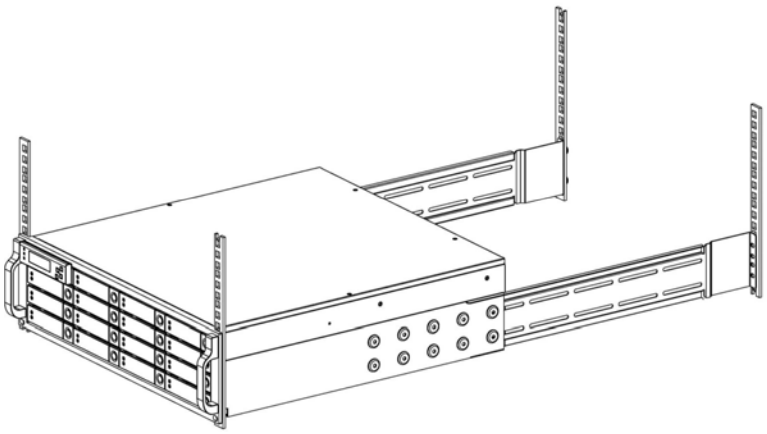


Figure 3.

NOTE

The Alnico subsystem is heavy, two person are required to move the system in the procedure.

System Connection

Connect all cables and power cord as shown below :

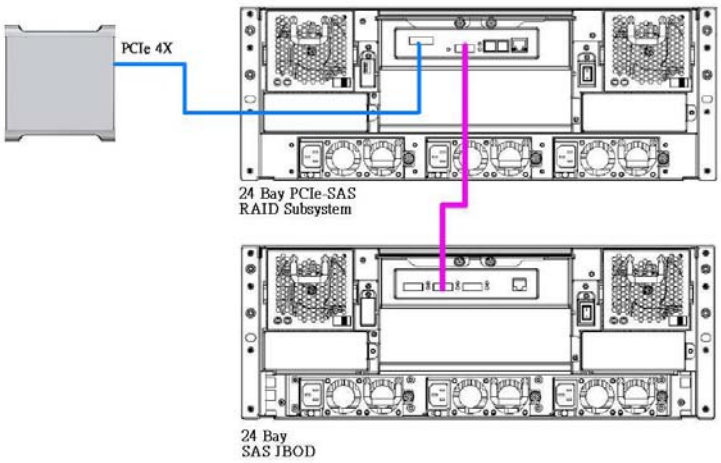
Cable	Alnico RAID	Device	Purpose
Serial Cable	Terminal Port	ANSI Terminal ora PC with Terminal emulator.	Configuration Utility
Serial Cable	Console Port	ANSI Terminal or a PC with Terminal emulator.	Debug port, to check and monitoring all of status of RAID subsystem.
Fibre cable / Mini SAS Cable	Primary FC-AL/SAS Secondly FC-AL / SAS	FC-AL / SAS HBA of Host computer	Host interface between RAID and Host computer
Power Cord	Power inlet	A/C power outlet	A/C power input
RJ 45 Cable	Ethernet Port	Switch or HUB	Connect to Internet.
Mini SAS Cable	SAS Expander Port	Raid System	Connect to SAS Expander

Alnico RAID subsystem with redundancy controllers supporting require the installation of MPIO (Multi pathing I/O) drivers for use with different operating systems. For more detail information, please check Chapter 6 of "Software Operation Manual".

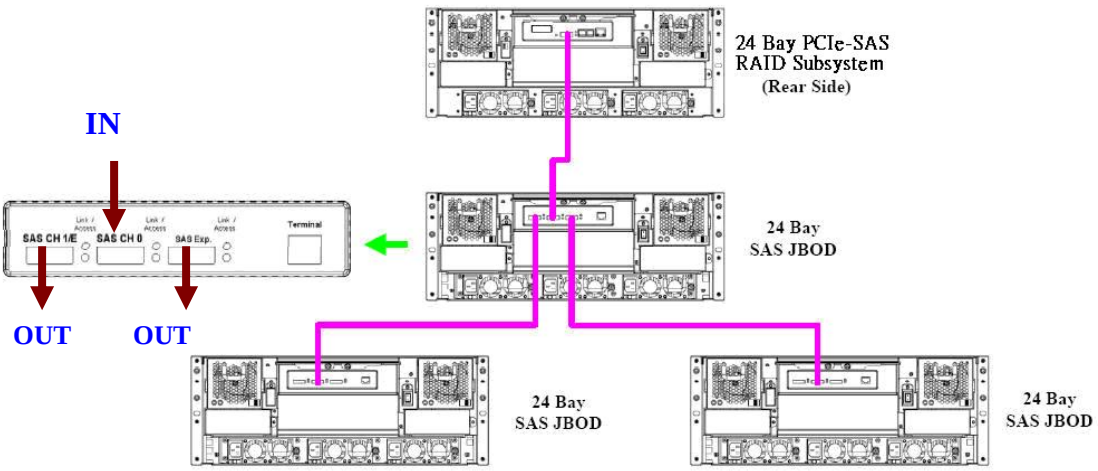
Connection to Alnico 8 RAID subsystem with SAS JBODs

There are many topologies of SAS JBOD with Alnico 8 RAID subsystems. Ways to implement are as below:

One SAS Raid subsystem with one SAS JBOD



One SAS Raid subsystem with more SAS JBODs



It supports up to four tiers and 122 drives.

- One RAID Set supports up to 32 HDDs
- One SAS Raid subsystem supports up to 122 Volumes
- One SAS Raid subsystem supports up to 122 SAS devices

There are four tiers within JBOD topology as above:

- First tier is a RAID System.
- Second tier is a SAS JBOD with a SAS CH0 on it. Connecting SAS CH0 to SAS exp. Port on RAID System via a Mini SAS to Mini SAS Cable.
- Third tier could be two SAS JBODs with a SAS CH0 port individually. One is connected to the SAS EXP. Port on the second tier SAS JBOD via a Mini SAS to Mini SAS Cable. Another is connected to the SAS CH1/E Port on the second tier SAS JBOD
- Fourth tier is a SAS JBOD with a SAS CH0 on it. Connecting SAS CH0 to SAS exp. Port on third tier SAS JBOD via a Mini SAS to Mini SAS Cable.

1. *Alnico RAID subsystem do not require the installation of different drivers for use with different operating systems. Alnico RAID is independent and transparent to the host operating system.*
2. *It is often recommended to install the hard drive with same brand, model no., interface and capacity in this RAID subsystem.*
3. *Please do not install SAS and SATA hard drives at the same time, as these hard drives spin at different speed and may lead to compatible issues or performance decline.*
4. *RAID members need to be included at the same enclosure that means you need to create array in the same enclosure. RAID members across two or more enclosures would get some risks (for example: if mini-SAS cable get problem, more RAID members will be lost, volume sets belong to this Array may be failed. Shutdown RAID and JBOD to fix problem, after that, turn on JBOD and RAID system again and controller will get array back, but in some special case maybe it can't get array back)*

Turning on for the first time

When cabling is completed, RAID SYSTEM can be turned on. This should be done in the following order:

1. First turn on the power switch of JBODs.
2. Then turn on the power switch of RAID SYSTEM.
3. Power on and boot the host computer(s)

When RAID SYSTEM is running, you are ready to configure one or more RAID arrays. You have the following options:

1. Turn to Chapter 3 of “Software Operation Manual” to perform a quick setup of a single RAID array using the control panel.
2. Turn to Chapter 6 of “Software Operation Manual” to access the Monitor Utility. Once the Monitor Utility is accessed, you can perform a Quick Setup or complete configuration with Monitor Utility.
3. Turn to Chapter 5 of “Software Operation Manual” to perform a full configuration using the web browser.

Turning off

When turning off RAID SYSTEM, users are advised to first shut down the server, then power off RAID SYSTEM.

Chapter 3. TROUBLE SHOOTING

This chapter contains trouble shooting procedures and suggestions to minimize their impact on the Alnico RAID operation :

- ⇨ **Instructions on how to replace the components of Alnico RAID subsystem.**

If the fault LED on the front panel and LCD of Alnico RAID lights red and LCD displays a error message , or if Alnico RAID's Internet manager indicates a fault, determine the reason for this alert immediately. Examine the component LEDs to see if any indicates a fault, then replace it as soon as possible.

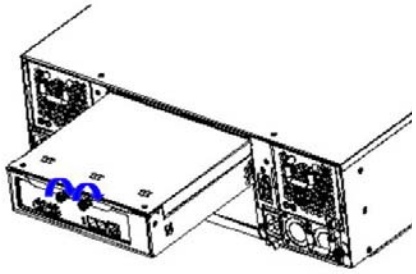
Replace the Controller

Read the replacing notices earlier in this chapter before proceeding with replacement.

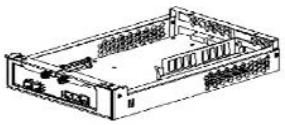
This section provides instructions for the removal and installation of the RAID controller components indicated in the figure below. This section is for the reference of engineers. End users should not need to replace or remove components.

Removing the controller from Alnico RAID :

In order to access controller box, turn anti-clock wise to release three thumb screws, then use the eject bar to remove controller box.



Disconnect all cables, then unscrew four fasteners on controller and upward to remove it.



Installing the controller into Alnico

RAID:

Reverse the procedure of **"removing the controller"** to install the controller into Alnico RAID.

Then according to "Appendix C. Configuration table" on "Soft Operation Manual" to reconfigure your RAID

Replacing / Upgrading DIMM

Alnico RAID are normally supplied with 512MB cache memory installed.

There's no set formula to determine how much cache memory to use, but as a general rule, a workstation, with mostly very large files, such as for audio or video editing and playback, graphics or CAD files, can benefit from a large cache. File servers, with multiple random access of varying file size, generally have little or no performance improvement with additional cache.

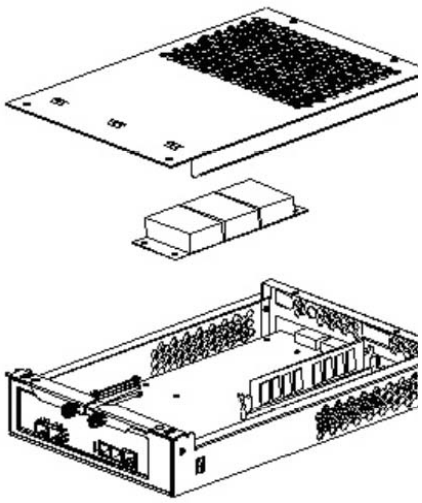
Specifications:

Type	◆ 240-pin DDR-II DIMM module (DDR II-533Mhz) ◆ ECC, without Register and Unbuffered.
Parity (ECC)	◆ With parity for data security.
Size	◆ From 256MB, 512MB, 1GB, 2GB & 4GB

Installing DIMM

To install a DIMM, ensure the system power is off and disconnected. Then:

1. Turn anti- lock wise to release two thumb screws, then use the eject bar to remove controller box, then open the cover.
2. Remove the BBM module.
3. Insert a memory card at a 45-degree angle into the memory card socket so that the gold teeth of the card are no longer visible.
4. Press the card down firmly until the latches lock it into place.



Caution

1. *Before starting any kind of hardware installation, please ensure that all power switches have been turned off and all power cords disconnected to prevent personal injury and damage to the hardware.*
2. *Use screws provided with Alnico system only. Longer or shorter screws may cause electric shorting or un-proper installed.*
3. *Static electricity can damage electronic components. To guard against such damage:*

   Work in a static-free environment

   Wear a grounded anti-static wrist strap

   Store uninstalled components in anti-static bags

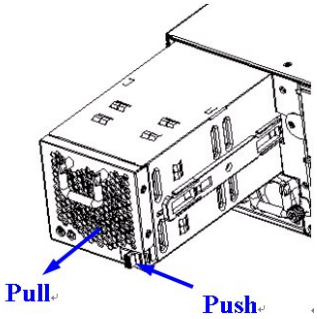
   Handle PCBs by their edges and avoid touching chips and connectors.

Hot Swapping to replace the Fan Module

This section provides instructions for the removal and installation of the Fan Module indicated in the figure below.

Removing the Fan Module from Alnico :

Remove the Fan modules by slide the release button left and pull the module out of system.

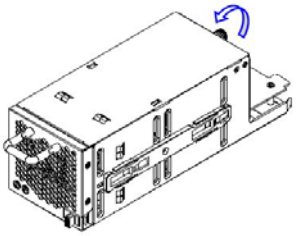


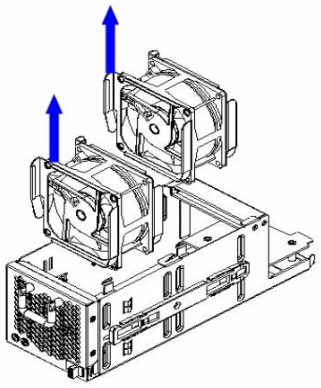
Installing the Fan module into Alnico :

Insert a Fan module.

Replace the Fan in Fan module

1. There are two failure LEDs on the rear of Fan module. Check which LED lights to yellow.
2. Remove the Fan modules by anti-clock wise to release the thumb screw then slide it back and lifting off.
3. Release the screw to remove the defect fan.
4. Insert the spare Fan and fasten the screw.





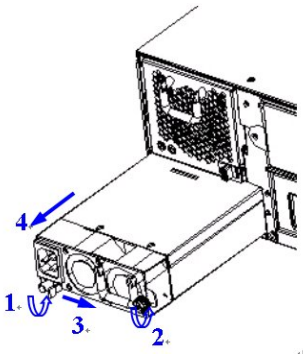
Hot Swapping to replace the Power Module

This section provides instructions for the removal and installation of the Power Module indicated in the figure below.

Removing the Power Module

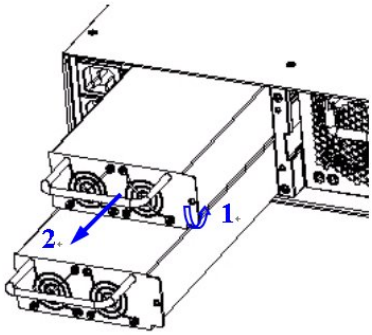
AL-8161 & AL-8241

Unscrew the thumb fastener, then push right the release button, slide it back and lifting off.



AL-8121

Unscrew the fastener, then slide it back and lifting off.



Installing the Power module into Alnico:

Insert a Power module then fasten the screw.

NOTE

The Power indicator will turn bright “Green” to indicate it has powered on

Appendix A

Connectors

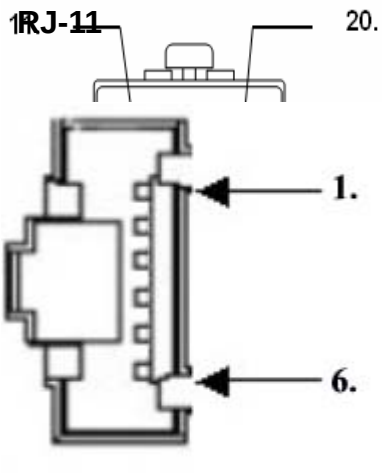
Ethernet RJ-45 Connector

1.

8.

Pin#	Signal Name
1	TX+
2	TX-
3	RX+
4	NC
5	NC
6	RX-
7	NC
8	NC

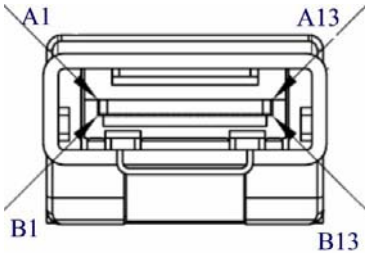
Fibre SFP



Pin#	Signal Name
1	VEFT
2	TFAULT
3	TDIS
4	MOD_DEF(2)
5	MOD_DEF(1)
6	MOD_DEF(0)
7	Rate Select
8	LOS
9	VEER
10	VEER
11	VEER
12	RD-
13	RD+
14	VEER
15	VCCR
16	VCCT
17	VEET
18	TD+
19	TD-
20	VEET

miniSAS (SFF-8088)

Pin#	Signal	Pin#	Signal
1	NC	6	NC
2	GND		
3	RX		
4	TX		
5	CTS		



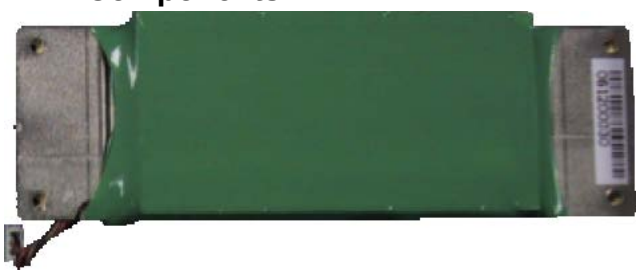
Pin#	Signal	Pin#	Signal
A1	GND	B1	GND
A2	RX0+	B2	TX0-
A3	RX0-	B3	TX0+
A4	GND	B4	GND
A5	RX1+	B5	TX1-
A6	RX1-	B6	TX1+
A7	GND	B7	GND
A8	RX2+	B8	TX2-
A9	RX2-	B9	TX2+
A10	GND	B10	GND
A11	RX3+	B11	TX3-
A12	RX3-	B12	TX3+
A13	GND	B13	GND

Appendix B

Battery Backup Module (BBM)

The external RAID controller operates using cache memory .The battery Backup Module is an add-on module that provides power to the external RAID controller cache memory in the event of a power failure. The Battery Backup Module monitors the write back cache on the external RAID controller, and provides power to the cache memory if it contains data not yet written to the hard drives when power failure occurs.

BBM Components



Battery Connector

BBM Specifications

Mechanical

Module Dimension (W x H x D) : 50 x 5 x 147 mm

BBM Connector

3 x Pins Connector

Input Voltage

+3.6 VDC

On Board Battery Capacity

3000MAH (3*1000MAH)

Installation

- . Make sure all power to the system is disconnected.

- . Remove the controller box.
- . Remove the memory.
- . Exchange 4 screws to 4 holding pole, as bellow :

- Install the BBM and fasten 4 screws.
- Plug in the BBM's connector into J6 of Controller.

Battery Backup Capacity

Battery backup capacity is defined as the maximum duration of a power failure for which data in the cache memory can be maintained by the battery. The BBM's backup capacity varied with the memory chips that installed on the external RAID controlle

Capacity	Memory Type	Battery Backup duration (Hours)
512MB Memory	Normal	160
1GB Memory	Normal	105

Operation

- Battery conditioning is automatic. There are no manual procedures for battery conditioning or preconditioning to be performed by the user.
- Battery bad a tendency to “remember” its capacity. In order to make sure of all the capacity of your battery cells, allow the battery cell to be fully charged when installed for the first time. The first time charge of battery cells takes about 24 hours to complete.

Removing the Battery Backup Module

The battery module will need to be removed for one of the following reason:

- Disconnect battery module if there is a long storage period before deployment
- The LI-ION battery will no longer accept a charge properly.

Appendix C. Specifications

Specifications

Model	AL-8241F	AL-8161F	AL-8121F
RAID Engine	Intel Xscale i81341 @800Mhz		
RAID Levels	0, 1,1+0, 3, 5 , 6, 30, 50 ,60 & JBOD		
Cache Support (Write back)	Up to 2GBytes with ECC240pins DDR2 SDRAM Memory		
System Type	Rack mountable		
Host Interface	Dual loops 4Gb Fibre Channels, Standard SFP connectors		
Host Transfer Rate	4Gb/ Sec per loop		
Disk Interface	SAS 3.0 Gbps		
Disk Channel	24 x SAS 3.0Gb/SATA-II	16x SAS 3.0Gb/SATA-II	12 x SAS 3.0Gb/SATA-II
LCD Display	2 Lines by 16 Characters		
Hot Swap and redundant	Yes (Power Supply, Drive and Fan).		
Hot Spare	Yes (Drive).		
Battery Back-Up Module	**Optional**, Support up to 72hrs battery back-up time (N.A.)		
Array Management Support	Yes.		
Automatic Bad-Sector & Error Recovery	Yes.		
Automatic Drive Rebuilds	Yes. Automatic Data rebuilds.		
Remote Terminal Configuration	Yes. Through Network port .or Terminal port		
Operating Systems	O/S Independent and Transparent		
Power Supply	460+460+460 watts Redundancy high quality power system, Three 460 watts module with PFC function. Load sharing type and cable-less design with **Redundancy Three Power inlet**	460+460 watts Redundancy high quality power system, two 460 watts module with PFC function. Load sharing type and cable-less design with **Redundancy Dual Power inlet**	375+375 watts Redundancy high quality power system, three 375 watts module with PFC function. Load sharing type and cableless design with **Redundancy Dual Power inlet**
Electrical	AC Voltage 100-240 VAC Ac Frequency 47-63Hz		
Temperature	Operating Temperature : 5 to 35 degree C. Non Operating Temperature : -40 to 60 degree C.		
Relative Humidity	20% to 80% non-condensing		
Dimensions	447mm(W)*550mm(D)*4U(H)	447mm(W)*496mm(D)*3U(H)	447mm(W)*496mm(D)*2U(H)

Model	AL-8241S-S	AL-8161S-S	AL-8121S
RAID Engine	Intel Xscal i81341 @800Mhz		
RAID Levels	0, 1,1+0, 3, 5 , 6, 30, 50 ,60 & JBOD		
Cache Support (Write back)	Up to 2GBytes with ECC240pins DDR2 SDRAM Memory		
System Type	Rack mountable		
Host Interface	Dual 4 x 3 SAS Ports, Standard Mini SAS connectors		
Host Transfer Rate	3Gb/ Sec per port		
Disk Interface	SAS 3.0 Gbps		
Disk Channel	24 x SAS 3.0Gb/SATA-II	16x SAS 3.0Gb/SATA-II	12 x SAS 3.0Gb/SATA-II
LCD Display	2 Lines by 16 Characters		
Hot Swap and redundant	Yes (Power Supply, Drive and Fan).		
Hot Spare	Yes (Drive).		
Battery Back-Up Module	**Optional**, Support up to 72hrs battery back-up time (N.A.)		
Array Management Support	Yes.		
Automatic Bad-Sector & Error Recovery	Yes.		
Automatic Drive Rebuilds	Yes. Automatic Data rebuilds.		
Remote Terminal Configuration	Yes. Through Network port .or Terminal port		
Operating Systems	O/S Independent and Transparent		
Power Supply	460+460+460 watts Redundancy high quality power system, Three 460 watts module with PFC function. Load sharing type and cable-less design with **Redundancy Three Power inlet**	460+460 watts Redundancy high quality power system, two 460 watts module with PFC function. Load sharing type and cable-less design with **Redundancy Dual Power inlet**	375+375 watts Redundancy high quality power system, three 375 watts module with PFC function. Load sharing type and cableless design with **Redundancy Dual Power inlet**
Electrical	AC Voltage 100-240 VAC Ac Frequency 47-63Hz		
Temperature	Operating Temperature : 5 to 35 degree C. Non Operating Temperature : -40 to 60 degree C.		
Relative Humidity	20% to 80% non-condensing		
Dimensions	447mm(W)*550mm(D)*4U(H)	447mm(W)*496mm(D)*3U(H)	447mm(W)*496mm(D)*2U(H)

Specifications subject to change without notice.