# DiskShelf14mk2 FC and DiskShelf14mk4 FC Hardware and Service Guide

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## Copyright information



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# Table of Contents

# Safety Information (Sicherheitshinweise)

## Safety rules

All products are Class 1 laser devices, except the NVRAM5 cluster media converter, which is Class 1M. You must follow these safety rules when working with this equipment:

**DANGER**

Failure to follow these directions could result in bodily harm or death.

- When using an NVRAM5 cluster media converter, the system must be installed in a restricted access location.
- **Switzerland only—for FAS900, GF900, R200, and C6200 systems:** This equipment relies on fuses/circuit breakers in the building installation for overcurrent protection. Each power supply must receive power from a separately dedicated outlet with a 10A fuse/circuit breaker.
- When installing disk shelves and a system into a movable cabinet or rack, install from the bottom up for best stability.
- DC-based systems must be installed in a restricted access location and the two input power terminals for the DC power supply must be connected to separate isolated branch circuits.
- To reduce the risk of personal injury or equipment damage, allow internal components time to cool before touching them and ensure that the equipment is properly supported or braced when installing options.
- This equipment is designed for connection to a grounded outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to the equipment, do not disable this feature.
- This equipment has one or more replaceable batteries. There is danger of explosion if the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

## For units with multiple power cords

If your system or disk shelf has multiple power cords and you need to turn the unit off, heed the following warning:

**DANGER**

This unit has more than one power supply cord. To reduce the risk of electrical shock, disconnect all power supply cords before servicing.

## Sicherheitsvorgaben

Alle Produkte sind Lasergeräte der Klasse 1, mit Ausnahme des NVRAM5 Cluster-Medienkonverters, der in Klasse 1M fällt. Beim Einsatz dieser Geräte sind die Sicherheitsvorschriften zu beachten:

**Vorsicht**

Nichtbeachtung dieser Vorschriften kann zu Verletzungen oder Tod führen.

- Bei der Verwendung eines NVRAM5 Cluster-Medienkonverters muss das Speichersystem an einem Standort mit beschränktem Zugriff installiert werden.
- **Nur für die Schweiz - Systeme FAS900, GF900, R200 und C6200:** Diese Geräte erfordern den Festeinbau von Sicherungen zum Überstromschutz. Jeder Netzanschluss muss mit Strom aus getrennten, speziell für diesen Zweck vorgesehenen Steckdosen versorgt werden, die jeweils mit einer 10A-Sicherung geschützt sind.
- Werden die Plattenregale und das Speichersystem in einen beweglichen Schrank oder Turm eingebaut, ist wegen der höheren Stabilität der Einbau von unten nach oben vorzunehmen.
- Gleichstrom-Systeme müssen an Betriebsstaette mit beschraenktem Zutritt installiert sein und die beiden Eingangsstromklemmen für das Gleichstrom-Netzteil müssen an separate und isolierte Abzweigleitungen angeschlossen sein.
- Zum Schutz vor Körperverletzung oder Sachschäden am Gerät lassen Sie die inneren Bauteile stets vor dem Berühren abkühlen. Sorgen Sie dafür, dass das Gerät richtig abgestützt ist oder fest aufrecht steht, bevor Sie neues Zubehör einbauen.
- Dieses Gerät ist für die Einspeisung aus einer geerdeten Netzverbindung ausgelegt. Der Netzstecker mit Erdungsvorrichtung ist ein wichtiger Sicherheitsschutz. Zum Schutz vor elektrischem Schlag oder Sachschäden am Gerät die Erdung nicht abschalten.
- Das Gerät ist mit einer oder mehreren auswechselbaren Batterien ausgestattet. Bei unsachgemäßem Auswechseln der Batterie besteht Explosionsgefahr. Batterien nur mit dem vom Hersteller empfohlenen Typ oder entsprechenden Typen ersetzen. Gebrauchte Batterien sind gemäß den Anweisungen des Herstellers zu entsorgen.

## Für Geräte mit mehrfachen Netzanschlussleitungen

Wenn Ihr Speichersystem oder Plattenregal über mehrere Stromkabel verfügt und Sie die Einheit ausschalten müssen, folgenden Warnhinweis beachten:

**ACHTUNG**

**Gerät besitzt zwei Netzanschlussleitungen. Vor Wartung alle Anschlüsse vom Netz trennen.**

# Installation Roadmap for the Disk Shelf 1

**About this chapter**

This chapter provides a roadmap for installing the DS14mk2 FC and DS14mk4 FC disk shelf.

**Topics in this chapter**

This chapter discusses the following topics:

# Differences between the various disk shelf models

## Differences between the disk shelves

The following table lists the differences between the various disk shelf models.

**Note**

See the *System Configuration Guide* at http://now.netapp.com for information about the system supporting the disk shelf configuration. Not all disk shelves or shelf modules are supported by all systems or operating systems.

| Features | DS14mk2 FC | DS14mk4 FC |
|---|---|---|
| Shelf chassis | **Front:** Drive bays are keyed to prevent the use of unsupported drives.<br><br>**Back:** Power supply bays are keyed to prevent the use of older power supplies that are incompatible.<br><br>Existence of a 1-Gb/2-Gb loop-speed switch.<br>◆ The 1-Gb loop speed setting must be used if the disk shelf is connected to the FAS270.<br>◆ The 2-Gb loop speed setting must be used if there is any component on any part of the loop that is only capable of 2-Gb operation. Examples of these components are this disk shelf model, SFPs, or HBAs. | **Front:** Drive bays are keyed to prevent the use of unsupported drives.<br><br>**Back:** Power supply bays are keyed to prevent the use of older power supplies that are incompatible.<br><br>Existence of a 1-Gb/2-Gb/ 4-Gb loop-speed switch.<br>◆ The 1-Gb loop speed setting must be used if there is any component on any part of the loop that is only capable of 1-Gb operation. Examples of these components are the FAS270 or the DS14..<br>◆ The 2-Gb loop speed setting must be used if there is any component on any part of the loop that is only capable of 2-Gb operation. Examples of these components are the DS14mk2FC, SFPs, HBAs, or drives. |

| Features | DS14mk2 FC | DS14mk4 FC |
|---|---|---|
| | | ◆ For the 4-Gb loop speed setting to be used, all components on any part of the loop must be of 4-Gb capable. Examples of these components are this disk shelf model, SFPs, HBAs, or drives. |
| Drives in drive carriers | Drive carriers are keyed and can be used with all shelf models. | Drive carriers are keyed and can be used with all shelf models. |
| Power supplies | Power supplies are keyed and can be used with all shelf models. | Power supplies are keyed and can be used with all shelf models.. |
| ESH4 | ◆ ESH4 functions at 1-Gb or 2-Gb loop speed, depending on the system configuration.<br>◆ Does not have a terminate switch. | ◆ ESH4 functions at 1-Gb, 2-Gb, or 4-Gb loop speed, depending on the system configuration.<br>◆ Does not have a terminate switch. |
| ESH2 | ◆ ESH2 functions at 1-Gb or 2-Gb loop speed, depending on the system configuration.<br>◆ Does not have a terminate switch. | Does not support the use of ESH2. |

# Before you begin your installation

## About disk shelf installation

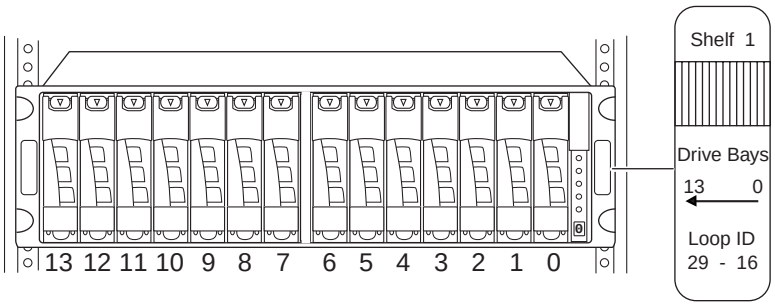
Before you install one or more disk shelves in a rack, you need to understand the following information:

- Disk shelf numbering
- Loop IDs
- Supported disk drives
- Drive bay requirements

## Disk shelf numbering

Each disk shelf in a loop must have a unique ID. A valid shelf ID is from 1 through 7, with disk shelf 1 connected to the system. If you install a second or third loop of disk shelves, the disk shelf IDs in each loop must start at 1. The ID of a single disk shelf must be 1.

Each disk shelf is shipped with its assigned ID set on its back panel. You must ensure that the disk shelf has the correct ID number on the label. The ID label is on the right side of the disk shelf, as shown in the following illustration.




NetApp sets the disk shelf IDs at the factory on configured systems, using an ID switch on the back panel. If you order additional disk shelves, you must set the disk shelf ID.

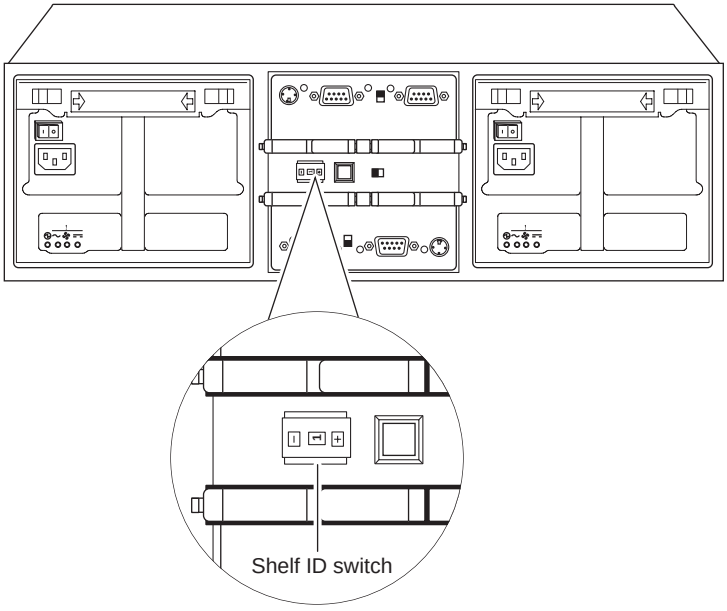
**Attention**

If you change a disk shelf ID, you must power-cycle the disk shelf for the new ID to take effect. The disk shelf ID display on the front of the disk shelf blinks until you power-cycle the disk shelf.

**Note**

If you enter a shelf ID that is not from 1 through 7, the drive addresses default to those of a shelf with the ID switch set to 7 even though the Shelf ID indicator in the front operation panel displays a dash (-).

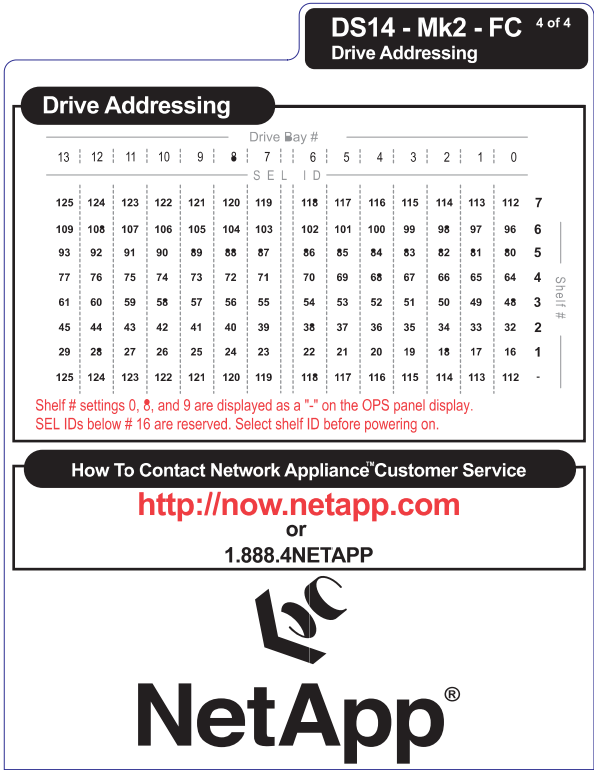
The example in the following illustration shows a DS14mk2 FC with the disk shelf ID set to 1.




## Loop IDs

In addition to identifying the disk shelf ID and the direction of the drive bays, the ID label on the right side of the disk shelf includes the loop ID. The loop ID identifies the disks in the disk shelf. The last sheets of the quick reference cards that come with your disk shelf shows the seven disk shelf IDs and their corresponding loop IDs.

**For DS14mk2 FC:**



DS14 - Mk2 - FC 4 of 4
Drive Addressing

Drive Addressing

Drive Bay #

| 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SEL ID | | | | | | | | | | | | | | |
| 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | 7 |
| 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 6 |
| 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 5 |
| 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 4 |
| 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 3 |
| 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 2 |
| 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 1 |
| 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 | - |

Shelf #

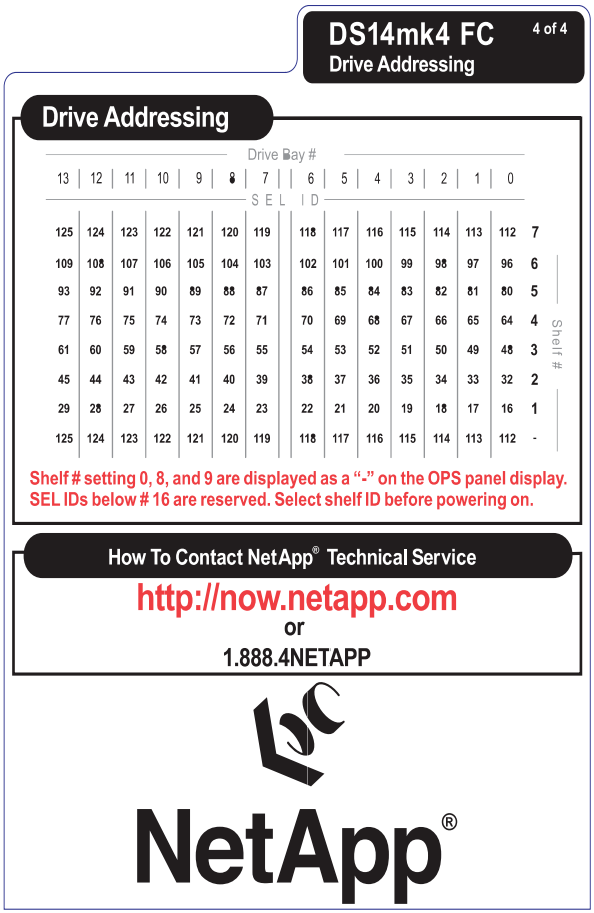
Shelf # settings 0, 8, and 9 are displayed as a "-" on the OPS panel display.
SEL IDs below # 16 are reserved. Select shelf ID before powering on.

How To Contact Network Appliance™ Customer Service

http://now.netapp.com
or
1.888.4NETAPP

NetApp®

**For DS14mk4 FC:**



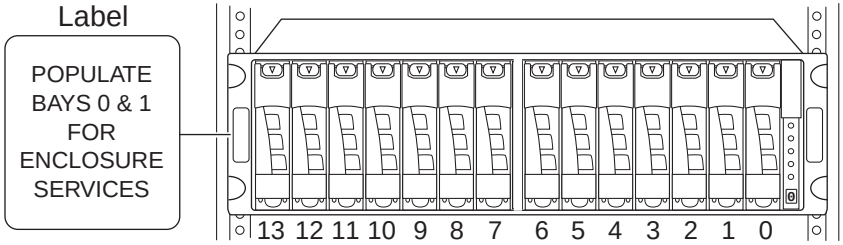

**Supported disk drives**

See the *System Configuration Guide* at http://now.netapp.com for more information on supported drives and platforms.

**Drive bay requirements**

For enclosure services monitoring to work, drive bays 0 and 1 must contain a disk.

This requirement is posted on the label on the left flange of the disk shelf. The 14 drive bays in the disk shelf are numbered 0 through 13 from right to left, as shown in the following illustration.




The system uses the enclosure services monitoring method to monitor environmental conditions of the disk shelf. Enclosure services conditions are communicated to the system through the ESH2 or ESH4 module.

The following table describes the three stages of enclosure services monitoring.

| Stage | Device | What it does... |
|---|---|---|
| **1** | System | Uses a subset of SCSI-3 commands to monitor the disk shelf for data related to disk presence, temperature, power supply units, and fan status. |
| **2** | System | Sends the commands through its Fibre Channel interface to drive bays 0 and 1 on the disk shelf. |
| **3** | Drive bays 0 and 1 | Communicate the request to the ESH2 or ESH4 module and send the data to the system. |
| | ESH2 or ESH4 module | Collects the requested data and sends it to drive bays 0 and 1. |

# The installation process

## The installation process

The following table provides a guide to the disk shelf installation process.

| Stage | Procedure | Is the procedure required? | For instructions, go to... |
|---|---|---|---|
| **1** | Install the system in a freestanding rack. | Only if the disk shelf installation is part of a new system installation. | *Installation and Setup Instructions* for your system. |
| **2** | Install the disk shelves in the rack. | Yes, if the disk shelf is an addition to your existing system or if your new system was not shipped in a system cabinet. | *Installation and Setup Instructions* for your system. |
| **3** | Connect the disk shelf to the system. | Only in the following scenarios:<br>◆ If the disk shelf installation is part of a new system installation. | *Installation and Setup Instructions* for your system. |
| | | ◆ If the disk shelf is the first in an additional loop to your existing system. | "Hot-adding a disk shelf to an existing adapter in your system" on page 62 |
| **4** | Connect the disk shelves. | Only in the following scenarios:<br>◆ If the new system installation has multiple disk shelves. | *Installation and Setup Instructions* for your system. |
| | | ◆ If the disk shelf is an addition to your existing system. | "Hot-adding a disk shelf to an existing loop" on page 57 |
| **5** | Ground the Fibre Channel disk shelves and system. | Yes. | *Installation and Setup Instructions* for your system, "Installing a disk shelf in a rack" on page 38, or Appendix A, "Hot-adding a Disk Shelf to an Existing System," on page 55. |

| Stage | Procedure | Is the procedure required? | For instructions, go to... |
|---|---|---|---|
| **6** | Connect the disk shelves to a power source. | Yes. | *Installation and Setup Instructions* for your system, "Installing a disk shelf in a rack" on page 38, or Appendix A, "Hot-adding a Disk Shelf to an Existing System," on page 55. |
| | | If the system was shipped in a system cabinet, you must connect the system cabinet to a power source. | See the *System Cabinet Guide*. |
| **7** | Configure the system. | Yes, if the disk shelf installation is part of a new system installation. | See the *Data ONTAP Software Setup Guide*. |

# Monitoring the Disk Shelf 2

## About this chapter

This chapter describes how to monitor the disk shelf from the error messages displayed on the console that is connected to the system and identifies the location of the various LEDs on the disk shelf.

**Note**

The quick reference cards in the slide-out tray at the base of the disk shelf describe the functions of each LED on the disk shelf and the suggested course of action.

## Topics in this chapter

This chapter discusses the following topics:

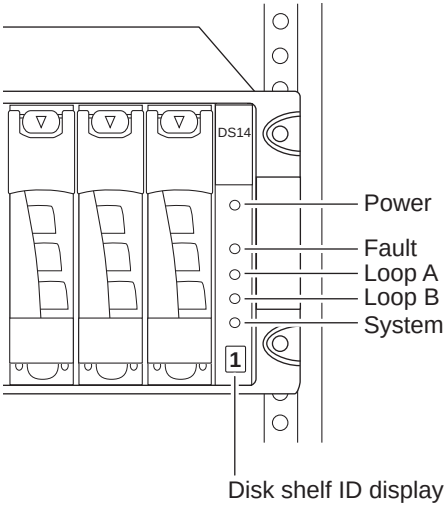
# Monitoring the front operation panel

## About monitoring the front operation panel

The front operation panel has five LEDs and a disk shelf ID display. The LEDs indicate whether your disk shelf is functioning normally or there are problems with the hardware. You can also identify any hardware failure associated with the front operation panel of the disk shelf from the error messages displayed on your system console.

## Location of LEDs

The following illustration shows the location of the disk shelf ID display and the front panel LEDs.




**Note**

The Fault and System LEDs are amber. The other three LEDs are green. See "LED status on the front operation panel" on page 13 for an illustrated explanation of how the LEDs function.

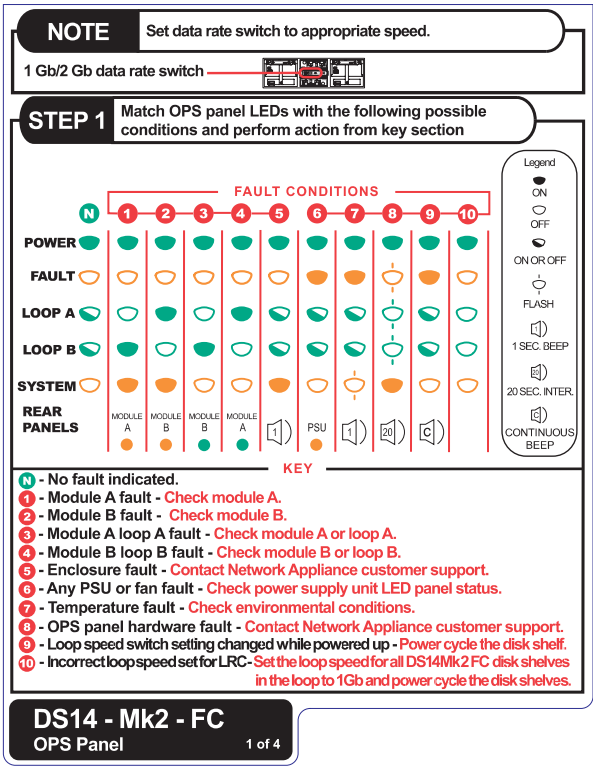
## Monitoring the disk shelf ID

When you use the thumbwheel switch on the back of the disk shelf to change the disk shelf ID, the disk shelf ID display on the front panel blinks until you power-cycle the disk shelf to make the change take effect.

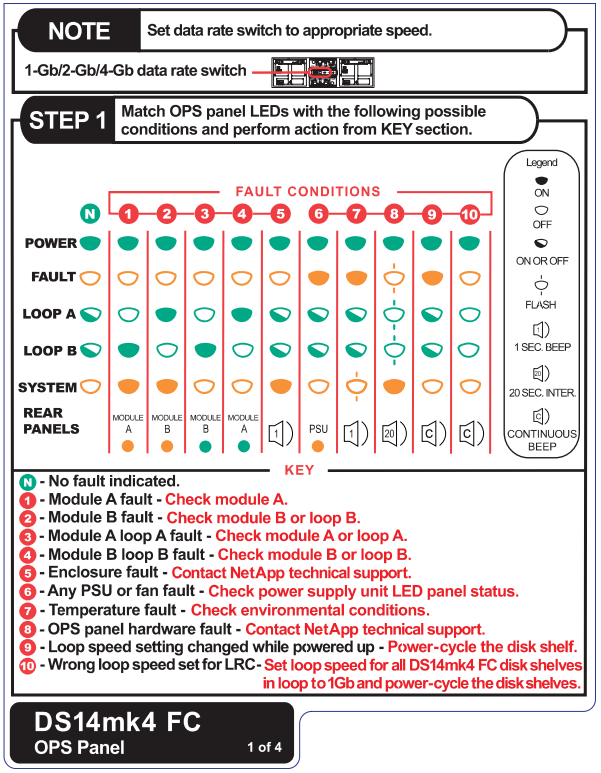
## LED status on the front operation panel

The following illustrations are of the first sheets of the quick reference cards that come with your disk shelf. They shows the normal and fault conditions that the LEDs indicate and recommends a corrective action.

### For DS14mk2 FC:



**For DS14mk4 FC:**




## Front operation panel console error messages

The following error messages appear on your system console if an SES element on the front operation panel fails. For information about replacing a disk shelf, see “Replacing a disk shelf” on page 32.

| Error message | Action required |
|---|---|
| `Temperature sensor Element 1: failed` | The temperature sensor on the front operation panel failed. Contact technical support to replace the disk shelf. |
| `Alarm Element 1: failed` | The alarm on the front operation panel failed. Contact technical support to replace the disk shelf. |
| `Display Element 1: failed` | The alarm on the front operation panel failed. Contact technical support to replace the disk shelf. |

# Monitoring the ESH2 or ESH4 modules

## About monitoring the modules

All the modules have LEDs that indicate whether it is functioning normally or if there are any problems with the hardware. The following table identifies the type of LED that is available for each type of module.

**Note**

The Fault LED is amber. The input and output LEDs are green. See "LED status on the modules" on page 16 for an illustrated explanation of the LED functions. On ESH4, the appropriate loop speed LED lights up to indicate the speed of operation.

| LED indicating... | ESH2 | ESH4 |
|---|---|---|
| Input | X | X |
| Output | X | X |
| Fault | X | X |
| 1-Gb operation | - | X |
| 2-Gb operation | X | X |
| 4-Gb operation | - | X |
| ELP (future functionality) | - | X |

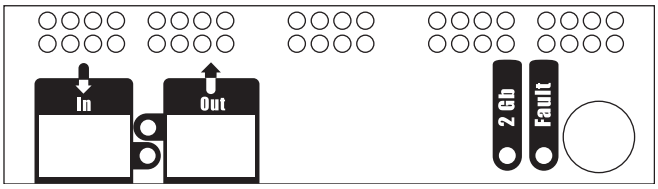
You can also identify any hardware failure associated with the module from the error messages displayed on your system console.

This section also describes the different types of messages that appear on the system console in response to a command monitoring the ESH2 or ESH4.

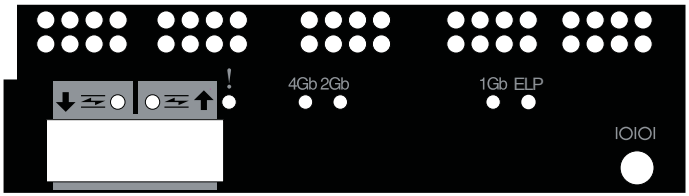
## Location of the module LEDs

The modules are in the middle of the back of the disk shelf. Because module A is inverted, the location of the module A LEDs is the inverse of what is shown in some of the illustrations.

The following illustration shows the location of the LEDs for an ESH2.



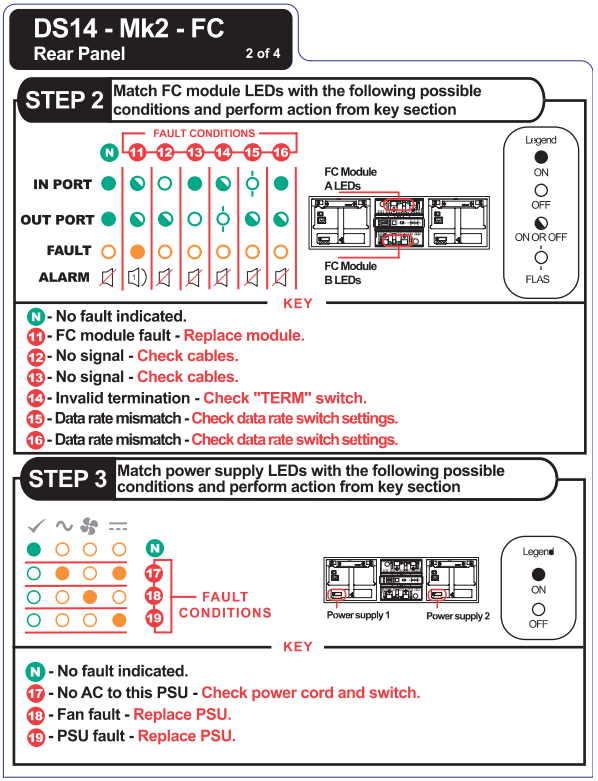

The following illustration shows the location of the LEDs for an ESH4. The LED for ELP is for future functionality.



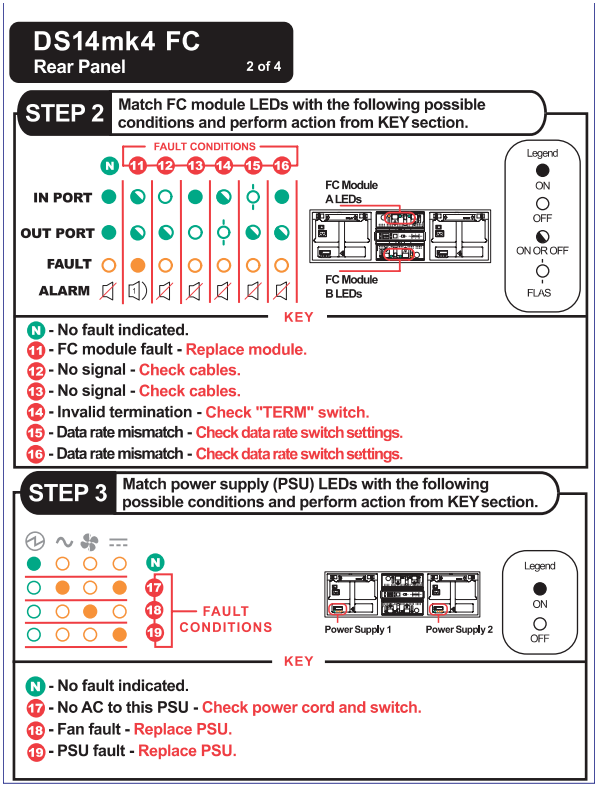

## LED status on the modules

The following illustrations are of the second sheets of the quick reference cards that come with your disk shelf. The rest of the second sheet of the quick reference card identifies the LED status conditions for the power supply and the integrated fan module.

**For DS14mk2 FC:**



**For DS14mk4 FC:**




## Console error messages for the modules

The following error messages appear on your system console if an SES element on the module fails. For information about replacing the module, see “Replacing an ESH2/ESH4 module” on page 48.

| Error message | Action required |
|---|---|
| `SES electronics Element 1: component is from a different product family` | Module A was replaced and the shelf has the unsupported configuration of ESH2 and ESH4.<br><br>This error message occurs during the process of hot-upgrading. |

| Error message | Action required |
|---|---|
| `SES electronics Element 2: component is from a different product family` | Module B was replaced and the shelf has the unsupported configuration of ESH2 and ESH4.<br>This error message occurs during the process of hot-upgrading. |
| `SES electronics Element 1: failed` | Module A on the top back of the disk shelf failed. Contact technical support to replace the module. |
| `SES electronics Element 2: failed` | Module B on the bottom back of the disk shelf failed. Contact technical support to replace the module. |
| `Temperature sensor Element 2: not installed or failed` | Communication was possible with the temperature sensor on ESH2/ESH4 module A at one point, but it is not possible now. Even if traffic is flowing through the Fibre Channel loop, contact technical support to replace the ESH2/ESH4. |
| `Temperature sensor Element 3: not installed or failed` | Communication was possible with the temperature sensor on ESH2/ESH4 module B at one point, but it is not possible now. Even if traffic is flowing through the Fibre Channel loop, contact technical support to replace the ESH2/ESH4. |
| `SES electronics Element 1: not installed or failed` | Communication was possible with ESH2/ESH4 module A at one point, but it is not possible now. Even if traffic is flowing through the Fibre Channel loop, contact technical support to replace the ESH2/ESH4. |
| `Vendor-specific Element 1: not installed or failed` | |
| `SES electronics Element 2: not installed or failed` | Communication was possible with ESH2/ESH4 module B at one point, but it is not possible now. Even if traffic is flowing through the Fibre Channel loop, contact technical support to replace the ESH2/ESH4. |
| `Vendor-specific Element 2: not installed or failed` | |

### Monitoring the ESH2/ESH4

**Command to use:** Use the following commands to enable you to monitor the ESH2/ESH4.

| If the disk shelf connects to a... | Use the commands... |
|---|---|
| System with Data ONTAP 7.x or earlier installed | ◆ `storage show hub`<br>◆ `environ shelf` |
| System with Data ONTAP 10.x installed | ◆ `storage show hub`<br>◆ `environ shelf`<br>But you must do the following before you can use the above commands:<br>**1.** Log into the system and enter the following command at the console to go to the shell command mode:<br>**`ngsh`**<br>**2.** Enter the following command at the console to go to the command line interface:<br>**`dbladecli`** |

**Sample output:** The following is an example of the output from the `storage show hub` command. The exact messages that appear on your system console depend on your system configuration.

**Note**

For the ESH2/ESH4, the following output shows the *Term switch* status as N/A or not applicable because the ESH2/ESH4 does not have a terminate switch.

```
Hub name: 9.shelf2
Channel: 9
Loop: B
Shelf id: 2
Shelf UID: 50:05:0c:c0:02:00:24:02
Term switch: ON
Shelf state: ONLINE
ESH state:   OK
```

```
Disk    Disk   Port      Loop    Invalid   Invalid   Clock   Inser   Stall   Uti    LIP
ID      Bay    State     up      CRC       Word      Delta   t       Count   l %    Count
                         Count   Count     Count             Count

[IN]           OK        8       0         0         0       20      0       0      0
[OUT]          TERM      8       0         0         -8      6       0       0      0
[32]    0      OK        10      0         0         0       6       0       0      0
[33]    1      OK        8       0         0         -8      9       0       0      0
[34]    2      OK        10      0         0         -8      6       0       0      0
[35]    3      OK        10      0         0         0       8       0       0      0
[36]    4      OK        10      0         0         0       9       0       0      0
[37]    5      OK        10      0         0         -16     7       0       0      0
[38]    6      OK        10      0         0         0       6       0       0      0
[39]    7      OK        10      0         0         16      16      0       0      0
[40]    8      BYP/TBI   10      0         0         0       8       0       0      0
[41]    9      OK        8       0         0         -8      6       0       0      0
[42]    10     OK        8       0         0         0       6       0       0      0
[43]    11     EMPTY     8       0         0         0       15      0       0      0
[44]    12     OK        8       0         0         8       4       0       0      0
[45]    13     OK        10      0         0         16      8       0       0      0
```

### Description of hub status information

You might receive some of the following status reports in response to the `storage show hub` command.

**Shelf state:** The following table lists and describes the shelf status responses.

| Shelf state | Description |
|---|---|
| *ONLINE* | Shelf is fully configured and operational. |
| *INIT REQD* | Shelf needs to configure one or both ESH2/ESH4 modules. |
| *OFFLINE* | Contact was lost with shelf (SES drive access is down). |
| *MISSING* | Shelf was removed from the system entirely (all paths). |
| *FAILED* | Failure occurred on the shelf. |

**ESH2/ESH4 state:** The following table lists and describes the ESH2/ESH4 status responses.

| Shelf state | Description |
|---|---|
| *OK* | ESH2/ESH4 is fully operational. |

| Shelf state | Description |
|---|---|
| *MISSING* | ESH2/ESH4 is missing from the specified slot. |
| *XPORT ERROR* | Communication with the ESH2/ESH4 is not possible. |

**Terminate (Term) switch state:** The following table lists and describes the terminate switch status.

**Note**

The information in the following table is not applicable to the ESH2 because it does not have a terminate switch.

| Shelf state | Description |
|---|---|
| *OK* | Terminate switch is in the Off position. This DS14mk2 FC is connected to another DS14mk2 FC in the loop. |
| *TERM* | Terminate switch is in the On position. This DS14mk2 FC is the last shelf in the loop. |
| *TERM-ERR* | Forced terminate event. The terminate switch is in the On position even though this DS14mk2 FC is connected to another DS14mk2 FC in the loop. The output port LED flashes to indicate this configuration error. |
| *AUTO-TERM* | Terminate switch is in the Off position. The output port is no longer connected to another DS14mk2 FC in the loop, but it once was. The output port LED flashes to indicate this configuration error. |

**ESH2/ESH4 port state:** The following table lists and describes the ESH2/ESH4 status responses.

| Shelf state | Description |
|---|---|
| *OK* | Port is functioning normally. |
| *EMPTY* | No drive is present in bay. |
| *BYP/TBI* | Port failed loop test before insert and was not allowed into loop. |

| Shelf state | Description |
|---|---|
| *BYP/XMIT* | Port bypassed due to transmitter default. |
| *BYP/LIPF8* | Port bypassed due to drive generating LIP F8s. |
| *BYP/DTO* | Port bypassed due to data timeout errors. |
| *BYP/RLOS* | Port bypassed due to receiver loss of signal. |
| *BYP/CLOS* | Port bypassed due to comma loss of signal. |
| *BYP/RPRT* | Port bypassed due to redundant port connection. |
| *BYP/STALL* | Port bypassed due to excessive stall errors. |
| *BYP/WRD* | Port bypassed due to excessive word errors. |
| *BYP/CRC* | Port bypassed due to excessive CRC errors. |
| *BYP/CLK* | Port bypassed due to excessive clock delta. |
| *BYP/MIR* | Port bypassed due to cluster mirror bit being set (check partner). |
| *BYP/LIPF7* | Port bypassed due to drive transmitting LIP F7s. |
| *BYP/GEN* | Port bypassed due to a “generic” error. |
| *BYP/MAN* | Port was manually bypassed (Manufacturing test only). |
| *BYP/LIP* | Port bypassed due to drive generating excessive LIP requests. |
| *BYP/OSC* | Port bypassed due to excessive port state changes. |
| *BYP/INIT* | Port bypassed as part of ESH Power-On Self-Test. |
| *///:0xXX* | ESH Admin unable to decode port state XX. |

**Hub statistic:** The following table lists and describes the hub statistic responses.

| Hub statistic | Description | Common values | Failure? |
|---|---|---|---|
| *Loop up Count* | Number of times this port saw the loop come up or transition to up. | Depends on the number of insertions and removals of disks and LIPs that occur in the loop. | No |
| *Invalid CRC Count* | Number of times this port saw a CRC error. | Is zero under normal operation. Removal and addition of disks, and a reset of the adapter, might generate some CRC errors. CRC errors on a port pinpoint the failure location. Excessive CRC errors for a continuous time period cause the ESH2/ESH4 firmware to bypass this port. | Yes, if drive was bypassed. |
| *Invalid Word Count* | Number of times this port saw invalid FC-AL words transmitted. | Is zero under normal operation. Removal and addition of disks, and a reset of the adapter, might generate some word errors. Word errors on a port pinpoint the failure location. Excessive word errors for a continuous time period causes the ESH2/ESH4 firmware to bypass this port. | Yes, if drive was bypassed. |
| *Clock Delta* | The clock delta between this port in respect to the ESH2/ESH4 clock and seven other ports. | It is normal for the FC-AL sync clocks to drift with respect to each other. This is a signed drift value. A value exceeding 6,400 PPM causes the ESH2/ESH4 firmware to bypass this port. | Yes, if drive was bypassed. |
| *Insert Count* | Number of times this port was inserted into the loop. | Depends on the number of insertions and removals of disks and LIPs that occur in the loop. | No |

| Hub statistic | Description | Common values | Failure? |
|---|---|---|---|
| *Stall Count* | Number of times this port exceeded the open/close (OPN/CLS) maximum threshold. | Is zero under normal operation. Removal and addition of disks, and a reset of the adapter, might generate some stall errors. Excessive stall errors for a continuous time period cause the ESH2/ESH4 firmware to bypass this port. | Yes, if drive was bypassed. |
| *Utilization %* | Relative use of this port versus other ports in the ESH2/ESH4. | This value does not reflect the real-time use of what the ports are currently achieving and is only obtained when extended status is available from the ESH/ESH2. It indicates the relative use from the last time extended status was available. | No |
| *LIP Count* | Number of loop initializations on any ESH2 or ESH4 port only. | Is zero under normal operation on the drive ports. | No |

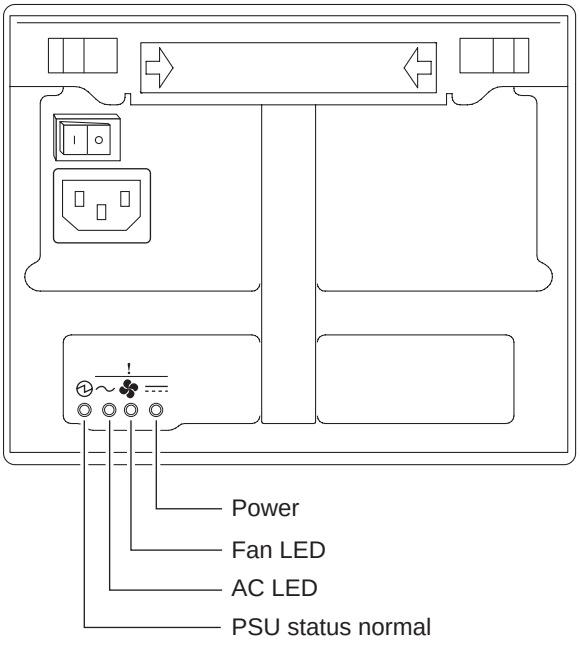
# Monitoring the power supply

## LEDs on the power supply

The power supply has four LEDs. The LEDs indicate whether the power supply or the integrated fan module is functioning normally or there are problems with the hardware. You can also identify any hardware failure associated with the power supplies from the error messages displayed on your system console.

## Location of LEDs

Each power supply, which contains two LEDs, is encased in a device carrier and housed at the rear of the disk shelf. The following illustration shows the location of the power supply LEDs.




**Note**

The PSU status LED is green. The other three LEDs are amber. See “LED status on the modules” on page 16 for an illustrated explanation of how the LEDs function.

## Power supply console error messages

The following error messages appear on your system console if an SES element on the power supply fails. For information about replacing the power supply, see “Replacing a power supply in a disk shelf” on page 44.

| Error message | Action required |
|---|---|
| `Power supply Element 1: failed` | The power supply unit on the left at the back of the disk shelf failed. Contact technical support to replace the power supply. |
| `Power supply Element 2: failed` | The power supply unit on the right at the back of the disk shelf failed. Contact technical support to replace the power supply. |
| `Cooling element Element 1: failed` | The integrated fan module in the power supply unit on the left at the back of the disk shelf failed. Contact technical support to replace the power supply. |
| `Cooling element Element 2: failed` | The integrated fan module in the power supply unit on the right at the back of the disk shelf failed. Contact technical support to replace the power supply. |

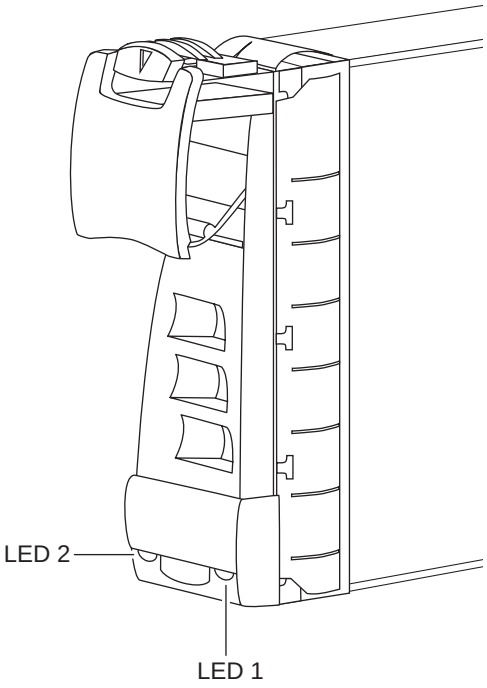
# Monitoring the Fibre Channel disk

### About monitoring the Fibre Channel disk

The Fibre Channel disk has two LEDs. The LEDs indicate whether the disk is functioning normally or there are problems with the hardware.

### Location of LEDs

The following illustration shows the Fibre Channel disk, which has two LED indicators on the front.



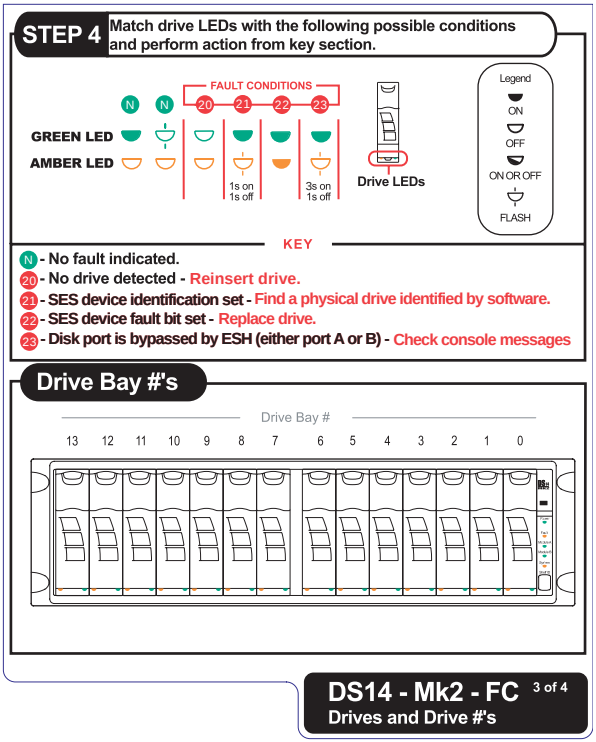
## LED status on the Fibre Channel disks

The following illustrations are of the third sheets of the quick reference cards that come with your disk shelf.

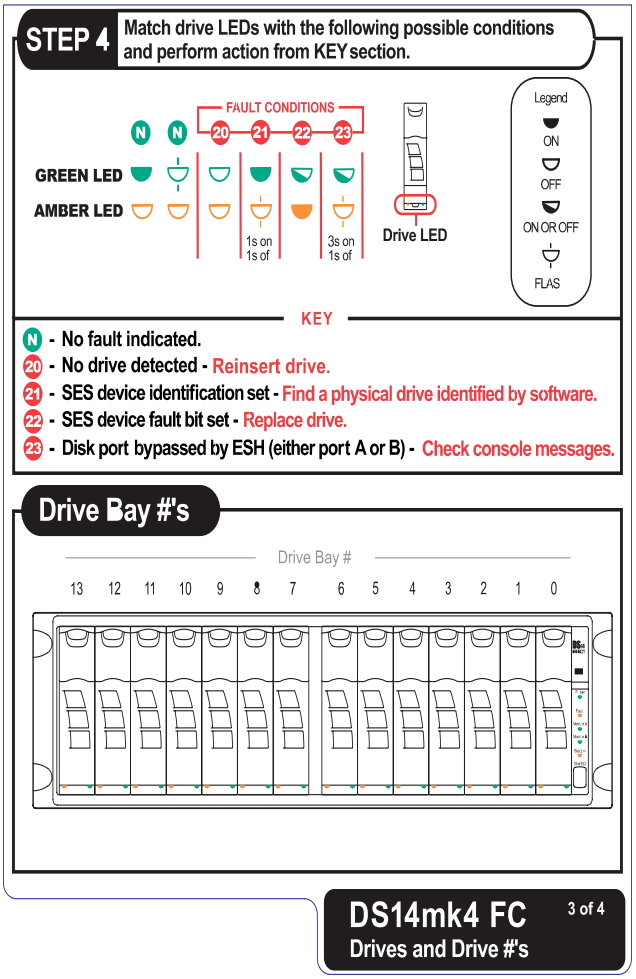
**Note**

As of Data ONTAP 6.4.2 and later, drives that are idle perform a media scan in the background resulting in the LEDs pulsing every half second.

**For DS14mk2 FC:** The following illustration is a correction of the third sheet of the quick reference cards that come with your disk shelf.



**For DS14mk4 FC:**



# Replacing Disk Shelf Devices 3

**About this chapter**

This chapter describes how to replace disk shelves in a rack, disks in a disk shelf, and other devices.

**Topics in this chapter**

This chapter discusses the following topics:

# Replacing a disk shelf

## About this section

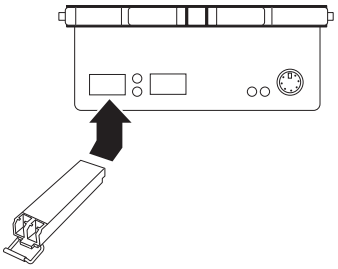
This section discusses how to disconnect a disk shelf from a system, how to remove a disk shelf from a loop, and how to install a disk shelf. It does not discuss how to hot-add a disk shelf to a system. For information about hot-adding a disk-shelf, see Appendix A, “Hot-adding a Disk Shelf to an Existing System,” on page 55.

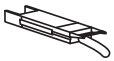
**Attention**

Hot removal of disk shelves is not supported. Shutdown of system is required to remove shelves from system.

## Disk shelf cabling requirements

The following table lists the cabling requirements for the disk shelves.

| Cable type and connector | Where used | Additional requirements |
|---|---|---|
| LC-to-LC:  | To connect system optical adapters to the ESH2 or ESH4 module | Requires optical SFP connector in the input port of the following modules:<br>◆ ESH2<br>◆ ESH4<br>◆ FAS270/FAS270c, if applicable<br>  |

| Cable type and connector | Where used | Additional requirements |
|---|---|---|
| SFP-to-SFP  | To connect disk shelves with ESH2 and ESH4 modules | None |

**For detailed information**

For detailed information about removing a disk shelf from a rack, see the following topics:

- "Removing a disk shelf from a single disk shelf configuration" on page 34
- "Removing a disk shelf from a loop" on page 36
- "Installing a disk shelf in a rack" on page 38

# Removing a disk shelf from a single disk shelf configuration

## Removing a disk shelf

To remove a disk shelf from a single disk shelf configuration, complete the following steps.

| Step | Action | |
|---|---|---|
| 1 | Ground yourself to the system chassis using the grounding leash. | |
| 2 | **If the disk shelf connects to a...** | **Then...** |
| | System with Data ONTAP 7.x or earlier installed | Shut down the system by entering the following command at the console<br>`halt`<br>**Attention**<br>Always use the `halt` command to perform a clean shutdown. |
| | System with Data ONTAP 10.x installed | **1.** Log into the system and enter the following command at the console to go to the shell command mode:<br>`ngsh`<br>**2.** Enter the following command at the console to go to the command line interface:<br>`dbladecli`<br>**3.** Shut down the system by entering the following command at the console:<br>`halt`<br>**Attention**<br>Always use the `halt` command to perform a clean shutdown. |

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td>3</td><td colspan="2">Verify that the LCD display at the front of your system displays the following message:<br><br><code>Halted</code></td></tr>
<tr><td rowspan="3">4</td><td>If the disk shelf has...</td><td>Then...</td></tr>
<tr><td>AC power supplies</td><td>Turn off the power switch on the disk shelf.</td></tr>
<tr><td>DC power supplies</td><td>Turn off and unplug the cables from the power source.</td></tr>
<tr><td>5</td><td colspan="2">Disconnect the two disk shelf power cords from the disk shelf.</td></tr>
<tr><td>6</td><td colspan="2">Disconnect the Fibre Channel cable connecting the disk shelf and system.</td></tr>
<tr><td>7</td><td colspan="2">Disconnect the grounding strap connecting the disk shelf and system.</td></tr>
<tr><td>8</td><td colspan="2">Use a Phillips screwdriver to remove the screws securing the disk shelf to the telco tray, the mid-mount bracket, or the four-post rack.</td></tr>
<tr><td>9</td><td colspan="2">With the help of another person, remove the disk shelf from the rack.<br><br>CAUTION<br>The disk shelf is very heavy when fully loaded and requires at least two people to remove.</td></tr>
</table>

# Removing a disk shelf from a loop

## Removing a daisy-chained disk shelf

To remove a disk shelf from a loop of disk shelves, complete the following steps.

| Step | Action | |
|---|---|---|
| 1 | Ground yourself to the system chassis using the grounding leash. | |
| 2 | **If the disk shelf connects to a...** | **Then...** |
| | System with Data ONTAP 7.x or earlier installed | Shut down the system by entering the following command at the console<br>`halt`<br>**Attention**<br>Always use the `halt` command to perform a clean shutdown. |
| | System with Data ONTAP 10.x installed | **1.** Log into the system and enter the following command at the console to go to the shell command mode:<br>`ngsh`<br>**2.** Enter the following command at the console to go to the command line interface:<br>`dbladecli`<br>**3.** Shut down the system by entering the following command at the console<br>`halt`<br>**Attention**<br>Always use the `halt` command to perform a clean shutdown. |

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td>3</td><td colspan="2">Verify that the LCD display at the front of your system displays the following message:<br><br><code>Halted</code></td></tr>
<tr><td rowspan="3">4</td><td>If the disk shelf has...</td><td>Then...</td></tr>
<tr><td>AC power supplies</td><td>Turn off the power switch on the disk shelf.</td></tr>
<tr><td>DC power supplies</td><td>Turn off and unplug the cables from the power source.</td></tr>
<tr><td>5</td><td colspan="2">Disconnect the two disk shelf power cords from the disk shelf that you are going to remove.</td></tr>
<tr><td>6</td><td colspan="2">Disconnect the Fibre Channel cables connecting the disk shelf to the other disk shelves or the system.</td></tr>
<tr><td>7</td><td colspan="2">Disconnect the grounding strap connecting the disk shelf to the other disk shelves or the system.</td></tr>
<tr><td>8</td><td colspan="2">Use a Phillips screwdriver to remove the screws from the flanges of the disk shelf retention bracket.</td></tr>
<tr><td>9</td><td colspan="2">With the help of another person, remove the disk shelf from the rack.<br><br>CAUTION<br>Because the disk shelf is very heavy when fully loaded, it is advised that at least two people remove the disk shelf.</td></tr>
<tr><td rowspan="3">10</td><td>If you are...</td><td>Then...</td></tr>
<tr><td>Not installing a replacement disk shelf for the disk shelf you removed and it is the first in the loop or in the middle of the loop</td><td>Reestablish the loop by connecting the disconnected disk shelves or by connecting the unconnected disk shelf to the system.</td></tr>
<tr><td>Installing replacement disk shelf</td><td>See “Installing a disk shelf in a rack” on page 38.</td></tr>
</table>

# Installing a disk shelf in a rack

## Installing a disk shelf

To install the disk shelf in a rack, complete the following steps.

**DANGER**

You must install each disk shelf with either the two-post telco tray kit or the four-post rail kit that came in your shipment package. If you choose to mid-mount the disk shelf, use the mid-mount brackets with the two-post telco tray kit. Do not ear-mount the disk shelf into a telco-type rack; the disk shelf will collapse from the rack under its own weight.

| Step | Action |
|---|---|
| **1** | Verify that your system meets the minimum software requirements to support the disk shelf. See the *System Configuration Guide* at http://now.netapp.com for more information. |
| **2** | Verify that you received the envelope with the disk shelf ID labels. |
| **3** | Ground yourself to the system chassis using the grounding leash. |
| **4** | Use the rail kit installation flyer in the rail kit box to install the appropriate rail kits on the rack. |
| **5** | Install and secure the disk shelf onto the support brackets and rack. |
| **6** | Change the disk shelf ID with the following procedure:<br>**1.** Press the thumbwheel switch on the rear of the disk shelf and use the + button to raise the number and the - button to lower the number to a valid ID from 1 through 7.<br>**2.** Power-cycle the disk shelf for the new ID to take effect. The disk shelf ID display on the front of the disk shelf blinks until you power-cycle the disk shelf.<br>**3.** Select the correct label from the envelope identified in Step 2 and attach it to the right flange of the new disk shelf. |
| **7** | If you are adding multiple disk shelves on the same loop, repeat Step 5 and Step 6 to install the remaining disk shelves. |

| Step | Action |
|---|---|
| **8** | Set the loop speed:<br>◆ The 1-Gb loop speed setting must be used if the loop is connected to a FAS270.<br>◆ The 2-Gb loop speed setting must be used if there is any component on any part of the loop that is only capable of 2-Gb operation. Examples of these components are the DS14mk2FC, SFPs, HBAs, or drives.<br>◆ For the 4-Gb loop speed setting to be used, all components on any part of the loop must be of 4-Gb capable. Examples of these components are this disk shelf model, SFPs, HBAs, or drives.<br>**Attention**<br>An incorrectly set loop speed causes the system to panic. |
| **9** | Use the appropriate cable to connect both modules of the disk shelf to the other disk shelves or to your system. See “Disk shelf cabling requirements” on page 32 for additional requirements. |
| **10** | Connect the two disk shelf power cords to each disk shelf that you are adding. |
| **11** | Turn on the power first to the disk shelves and then to the system. |
| **12** | Reboot the system. |

# Replacing a disk in a disk shelf

## Reasons to replace a disk

You can replace a disk in a disk shelf for any reason. However, the most common reason is disk failure. If a disk fails, the system logs a warning message to the system console indicating which disk on which loop failed.

In addition, a disk shelf with an ESH2/ESH4 module identifies any one of the following situations as disk failure:

- A disk is bypassed.
- The system boots with the presence of bypassed disks.
- The system detects an eminent threshold bypass.

The following autosupport warning message is then sent:

```
DISK FAIL!! - Bypassed by ESH
```

## Preparing to replace a disk

Before you replace a disk in a disk shelf, you must first check the disk shelf to ensure that after you remove the disk you still have enough disks installed to meet the enclosure services requirements. For information about these requirements, see “Drive bay requirements” on page 7.

## About replacing a disk in a disk shelf

Replacing a disk in a disk shelf consists of the following procedures:

- “Removing a disk” on page 41
- “Installing a disk” on page 43

**Note**

If you are replacing several disks in a disk shelf or if you are installing several disks into a half-empty disk shelf, replace or install the disks one at a time to allow your system to recognize the existence of each new disk.

### Removing a disk

To remove a disk, complete the following steps.

| Step | Action | |
|---|---|---|
| 1 | **If the disk shelf connects to a...** | **Then...** |
| | System with Data ONTAP 7.x or earlier installed | If you are removing disk that is a member of a volume, enter:<br>**`disk fail`** ***`disk_name`***<br>Or:<br>If you are removing disk that is a spare disk, enter:<br>**`disk remove`** ***`disk_name`***<br>Either command causes the amber fault LED on the disk to illuminate.<br>For more information about LEDs, see “Monitoring the Fibre Channel disk” on page 28.<br>For more information about disk commands, see the Data ONTAP *System Administrator’s Guide*. |

| Step | Action | |
|---|---|---|
| | System with Data ONTAP 10.x installed | **1.** Log into the system and enter the following command at the console to go to the shell command mode:<br>`ngsh`<br>**2.** Enter the following command at the console to go to the command line interface:<br>`dbladecli`<br>**3.** If you are removing disk that is a member of a volume, enter:<br>`disk fail disk_name`<br>Or:<br>If you are removing disk that is a spare disk, enter:<br>`disk remove disk_name`<br>Either command causes the amber fault LED on the disk to illuminate.<br>For more information about LEDs, see “Monitoring the Fibre Channel disk” on page 28. |
| **2** | Put on the antistatic wrist strap and grounding leash. | |
| **3** | To remove the disk, press down on its release mechanism with one hand while grasping the top flange of the disk shelf with the other hand. | |
| **4** | Gently slide the disk until it disengages. Wait 30 seconds for the disk to stop spinning; then continue removing the disk from the chassis.<br>**CAUTION**<br>When removing a disk, always use two hands to support its weight. | |
| **5** | If you are removing another disk, repeat Step 1 through Step 4. | |

### Installing a disk

To install a disk in a disk shelf, complete the following steps.

| Step | Action |
|---|---|
| **1** | Put on the antistatic wrist strap and grounding leash. |
| **2** | Orient the device carrier so that the release mechanism is at the top. |
| **3** | Insert the device carrier into the guide slot in the disk shelf and firmly push it in until it engages the backplane and you see the release mechanism click into place.<br>**Attention**<br>Do not slam the device carrier into place. |
| **4** | If you are installing another disk, repeat Step 1 through Step 3. |
| **5** | Make sure that disks are installed in drive bays 0 and 1 for Enclosure Services to work. |

# Replacing a power supply in a disk shelf

## About this section

Replacing a power supply in a disk shelf consists of the following procedures:

- "Removing a power supply" on page 44
- "Installing a power supply" on page 46

## Rules for replacing power supplies

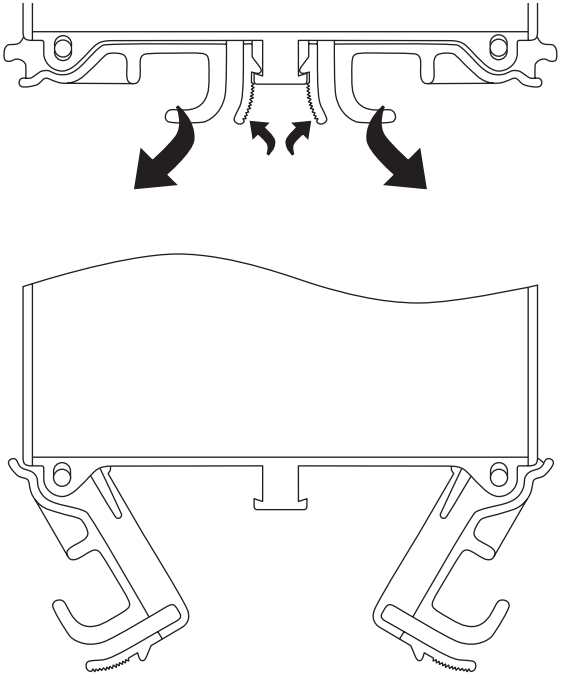
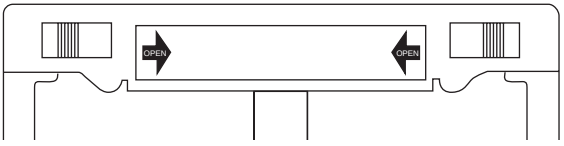
When replacing the power supply on your disk shelf, observe the following rules:

- You do not need to turn off the power when you replace one power supply.
- If you are replacing both power supplies in the same disk shelf, replace them one at a time to avoid powering down the disk shelf.

## Removing a power supply

To remove a power supply, complete the following steps.

| Step | Action | |
|---|---|---|
| 1 | Put on the antistatic wrist strap and grounding leash. | |
| 2 | **If you have a disk shelf with...** | **Then...** |
| | An AC power supply | **1.** Turn off the switch on the power supply that you are replacing.<br>**2.** Lift up the clip lock and unplug the power cord from the system power supply. |
| | A DC power supply | **1.** Turn off and unplug the cable to the power supply you are replacing from the power source.<br>**2.** Using a #2 Phillips screwdriver, remove and save the screws securing the connections to the power supply in the following order:<br>❖ For positive ground installations: first negative (–), then positive (+), then ground (⏚)<br>❖ For negative ground installations: first positive (+), then negative (–), then ground (⏚) |

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="4">3</td><td>If the CAM mechanism on the power supply is...</td><td>Then...</td></tr>
<tr><td>In the middle of the rear of the unit</td><td>Using the thumb and index finger of both hands, press the CAM mechanism levers in the middle of the power supply to release it.</td></tr>
<tr><td colspan="2">The following figure shows how to release the CAM mechanism.<br>  </td></tr>
<tr><td>At the top of the rear of the unit</td><td>Using your thumb and index finger, press the CAM mechanism levers toward each other to release the power supply handle.</td></tr>
<tr><td colspan="2">The following figure shows how to press the levers on the CAM mechanism and release the power supply handle.<br> 
</td></tr>
</table>

| Step | Action |
|---|---|
| 4 | Use the handle to pull the power supply out of the disk shelf.<br><br>**CAUTION**<br>When removing a power supply, always use two hands to support its weight. |

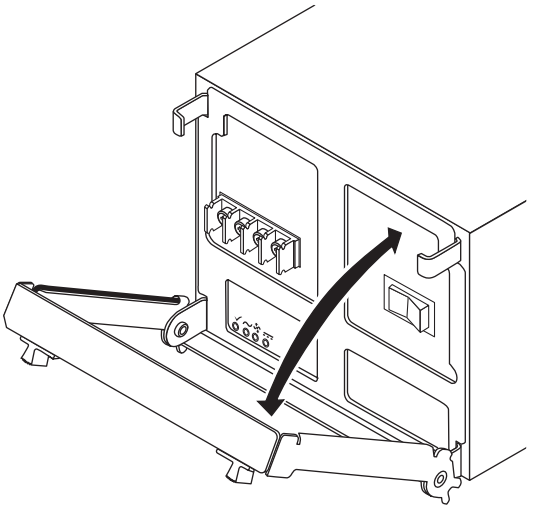
## Installing a power supply

To install a power supply in a disk shelf, complete the following steps.

**Attention**

Do not use excessive force when sliding the power supply into the disk shelf. You can damage the connector.

| Step | Action | |
|---|---|---|
| 1 | Put on the antistatic wrist strap and grounding leash. | |
| 2 | **If the power supply CAM mechanism is...** | **Then slide the power supply in the power supply bay...** |
| | In the middle of the rear of the unit | And push the CAM mechanism levers into place. |
| | At the top of the rear of the unit | **1.** Until you hear the power supply connect with the connector inside the disk shelf chassis.<br>**2.** Raise the handle and push it into place.<br>**3.** Using your thumb and index finger, press the CAM mechanism levers toward each other to engage the power supply into place. |

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td></td><td colspan="2">The following figure shows how to raise the handle into place.<br>  </td></tr>
<tr><td rowspan="3">3</td><td>If the disk shelf has...</td><td>Then...</td></tr>
<tr><td>An AC power supply</td><td>1. Plug the power cord into the power receptacle and fasten it with the clamp.<br>2. Plug the other end of the power cord into a grounded AC power source.</td></tr>
<tr><td>A DC power supply</td><td>1. Connect the positive, negative, and ground wires to the power supply.<br>2. Plug the other end of each power cord into a power source.</td></tr>
<tr><td>4</td><td colspan="2">Turn on the power switch.</td></tr>
</table>

# Replacing an ESH2/ESH4 module

## About a module

The ESH2/ESH4 module in a DS14mk2 FC or DS14mk4 FC includes a SCSI-3 Enclosure Services Processor. It maintains the integrity of the loop when disks are swapped and provides signal retiming for enhanced loop stability. There are two modules in the middle of the rear of the disk shelf, one for Channel A and one for Channel B.

**Note**

The Input and Output ports on module A on the disk shelves are inverted from module B.

**Connectors in a module:** The modules have the following connectors.

| Module connector | Function |
|---|---|
| Input | Provides the interface between the disk shelf and the system. |
| Output | Provides the interface between two disk shelves to create a loop of daisy-chained disk shelves. |

## For detailed information

This section provides information about the following topics:


- "Removing a module" on page 49
- "Installing a module" on page 51
- "Hot-swapping a module" on page 52
- "Hot-adding a Disk Shelf to an Existing System" on page 55

# Removing a module

**Assumption about this procedure**

This procedure is based on the assumption that the disk shelf is in a configuration which fulfils one or all of the following requirements:

- It has a single path connection
- It is not in a cluster
- It does not use synchronous mirroring

**Removing a module**

To remove a module that is connected to the Fibre Channel loop, complete the following steps.

| Step | Action | |
|---|---|---|
| 1 | Put on the antistatic wrist strap and grounding leash. | |
| 2 | **If the disk shelf connects to a...** | **Then...** |
| | System with Data ONTAP 7.x or earlier installed | Shut down the system by entering the following command at the console<br>`halt`<br>**Attention**<br>Always use the `halt` command to perform a clean shutdown. |

| Step | Action | |
|---|---|---|
| | System with Data ONTAP 10.x installed | **1.** Log into the system and enter the following command at the console to go to the shell command mode:<br>`ngsh`<br>**2.** Enter the following command at the console to go to the command line interface:<br>`dbladecli`<br>**3.** Shut down the system by entering the following command at the console<br>`halt`<br>**Attention**<br>Always use the `halt` command to perform a clean shutdown. |
| **3** | Verify that the LCD display at the front of your system displays the following message:<br>`Halted` | |
| **4** | Disconnect the module from the Fibre Channel cabling. | |
| **5** | Using the thumb and index finger of both hands, press the levers on the CAM mechanism on the module to release it. | |
| **6** | Pull the module out of the disk shelf. | |
| **7** | Go to “Installing a module” on page 51. | |

# Installing a module

## Installing an module

To install a module into the disk shelf, complete the following steps.

**Attention**

Observe the "Disk shelf cabling requirements" on page 32 and do not mix ESH2/ESH4 modules within a shelf.

| Step | Action |
|---|---|
| **1** | Verify that your system meets the minimum software requirements to support the disk shelf and module combination. See the *System Configuration Guide* at http://now.netapp.com for more information. |
| **2** | Put on the antistatic wrist strap and grounding leash. |
| **3** | Push apart the levers on the CAM mechanism and slide the module into the slot at the rear of the disk shelf, then push the levers of the CAM mechanism into place.<br>**Attention**<br>Do not use excessive force when sliding the module into the disk shelf; you might damage the connector. |
| **4** | Reconnect the Fibre Channel cabling. |
| **5** | Turn on the power to the disk shelves. |
| **6** | Reboot the system. |

# Hot-swapping a module

## Assumptions about this procedure

The assumptions about this procedure are that you are replacing either one or both modules of a single disk shelf, that the modules on the disk shelf have multipath connections to the system, and that you are hot-swapping one of the following:

- An ESH2 with another ESH2
- An ESH2 with an ESH4
- An ESH4 with another ESH4

**Note**

A hot-swap of an ESH2 with an ESH4 requires that you perform a minimum upgrade to Data ONTAP 6.4.4 or later and replace both modules in the disk shelf.

Depending on the module or modules you are hot-swapping and their position in the loop, you might need to order additional cables appropriate to the modules. See "Disk shelf cabling requirements" on page 32 for additional requirements.

**Attention**

If you attempt to hot-swap the module on a disk shelf that does not have multipath connections, you lose all access to the drives on this disk shelf as well as those below it.

## Hot-swapping a module

To hot-swap a module, complete the following steps.

**Note**

To hot-swap a module on a disk shelf in a cluster, see the *High-Availability Configuration Guide* or the *Active/Active Configuration Guide*.

| Step | Action |
|---|---|
| 1 | Verify that your system meets the minimum software requirements to support the disk shelf and module combination. See the *System Configuration Guide* at http://now.netapp.com for more information. |
| 2 | Ground yourself to the system chassis using the grounding leash. |

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="3">3</td><td>If the disk shelf connects to a...</td><td>Then...</td></tr>
<tr><td>System with Data ONTAP 7.x or earlier installed</td><td>From the system console, enter the following command to disable the loop in which the failed module is a connection:<br><tt>storage disable adapter adaptername</tt><br>The Data ONTAP System Administrator's Guide (7.0.1 or later) provides more information about these commands.</td></tr>
<tr><td>System with Data ONTAP 10.x installed</td><td>1. Log into the system and enter the following command at the console to go to the shell command mode:<br><tt>ngsh</tt><br>2. Enter the following command at the console to go to the command line interface:<br><tt>dbladecli</tt><br>3. Enter the following command to disable the loop in which the failed module is a connection:<br><tt>storage disable adapter adaptername</tt></td></tr>
<tr><td>4</td><td colspan="2">If you are hot-swapping like modules, disconnect the module that you are removing from the Fibre Channel cabling.</td></tr>
<tr><td>5</td><td colspan="2">Using the thumb and index finger of both hands, press the levers on the CAM mechanism on the module to release it and pull it out of the disk shelf.</td></tr>
<tr><td>6</td><td colspan="2">Slide the module into the slot at the rear of the disk shelf and push the levers of the CAM into place.<br>Attention<br>Do not use excessive force when sliding the module into the disk shelf; you might damage the connector.</td></tr>
<tr><td>7</td><td colspan="2">Use the appropriate cable to reconnect both modules of the disk shelf to the other disk shelves or to your system. See “Disk shelf cabling requirements” on page 32 for additional requirements.</td></tr>
</table>

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="3">8</td><td>If the disk shelf connects to a...</td><td>Then...</td></tr>
<tr><td>System with Data ONTAP 7.x or earlier installed</td><td>From the system console, enter the following command to enable the loop in which the replacement module is a connection:<br><code>storage enable adapter adaptername</code></td></tr>
<tr><td>System with Data ONTAP 10.x installed</td><td>1. Log into the system and enter the following command at the console to go to the shell command mode:<br><code>ngsh</code><br>2. Enter the following command at the console to go to the command line interface:<br><code>dbladecli</code><br>3. Enter the following command to enable the loop in which the replacement module is a connection:<br><code>storage enable adapter adaptername</code></td></tr>
<tr><td>9</td><td colspan="2">Repeat Step 3 through Step 8 for Loop B.</td></tr>
</table>

# Hot-adding a Disk Shelf to an Existing System A

## About this appendix

This appendix provides information about how to hot-add a DS14mk2 FC/ DS14mk4 FC to an existing system. It also tabulates the error messages that appear on your system console if the attempt at hot-adding was unsuccessful.

**Note**

Only hot-add disk shelves that your system supports.

NetApp recommends that you hot-add one disk shelf at a time.

**Attention**

Failure to follow this recommendation may cause the loop to crash.

## Error messages

The following error messages appear on your system console if your attempt at hot-adding the DS14mk2 FC is unsuccessful.

| Error message | Explanation |
|---|---|
| `Speed mismatch termination` | The modules on the disk shelf detected a speed mismatch between the preceding disk shelf and this disk shelf and is reporting them as automatic terminate errors. |
| `Open loop panic` | One of three reasons cause this error message to appear:<br>◆ The shelf-to-shelf cable between the now second-to-last disk shelf and the newly added disk shelf is defective or is not securely fastened.<br>◆ The speed of the newly added DS14mk2 FC/ DS14mk4 FC disk shelf is incorrectly set. |
| `Soft address panic` | One of two reasons cause this error message to appear:<br>◆ There is an invalid disk shelf ID.<br>◆ The power was turned on before the disk shelf ID was changed and the disk shelf was not power-cycled after the disk shelf ID was changed. |

## For detailed information

For detailed information about hot-adding a disk shelf, see the following topics:

◆ “Hot-adding a disk shelf to an existing loop” on page 57

- “Hot-adding a disk shelf to an existing adapter in your system” on page 62

# Hot-adding a disk shelf to an existing loop

## Hot-adding a disk shelf to an existing loop

To hot-add a disk shelf to an existing loop, complete the following steps.

**Note**

To hot-add disk shelves to a High availability or Active/active configuration, see the *High-Availability Configuration Guide* or the *Active/Active Configuration Guide*.

| Step | Action |
|---|---|
| **1** | Verify that your system meets the minimum software requirements to support the disk shelf and module combination. See the *System Configuration Guide* at http://now.netapp.com for more information. |
| **2** | Verify that you received the envelope with the disk shelf ID labels. |
| **3** | Ground yourself to the system chassis using the grounding leash. |
| **4** | Use the rail kit installation flyer in the rail kit box to install the appropriate rail kits on the rack. |
| **5** | Install and secure the disk shelf onto the support brackets and rack. |
| **6** | If you are adding multiple disk shelves on the same loop, repeat Step 4 and Step 5 to install the remaining disk shelves in ascending numerical order, according to the IDs on their labels. |
| **7** | Connect the grounding strap connecting the disk shelf to the other disk shelves or your system. |

| Step | Action |
|---|---|
| **8** | Set the loop speed:<br>◆ The 1-Gb loop speed setting must be used if the system is an FAS270.<br>◆ The 2-Gb loop speed setting must be used if there is any component on any part of the loop that is only capable of 2-Gb operation. Examples of these components are the DS14mk2FC, SFPs, HBAs, or drives.<br>◆ For the 4-Gb loop speed setting to be used, all components on any part of the loop must be of 4-Gb capable. Examples of these components are this disk shelf model, SFPs, HBAs, or drives.<br>**Attention**<br>An incorrectly set loop speed causes the system to panic. |
| **9** | Connect the two disk shelf power cords of each disk shelf that you are adding to a power source.<br>**Attention**<br>Do not turn on the power to the disk shelf yet. |

| Step | Action | |
|---|---|---|
| 10 | **If the disk shelf connects to a...** | **Then change the disk shelf ID with the following procedure...** |
| | System with Data ONTAP 7.x or earlier installed | **1.** Verify that the disk shelf ID is not being used in the loop by entering the following command at the console<br>`fcstat device_map` ***`adaptername`***<br>**Attention**<br>An invalid disk shelf ID causes the system to panic.<br>**2.** Press the thumbwheel switch on the rear of the disk shelf and use the + button to raise the number and the - button to lower the number to a valid ID from 1 through 7.<br>**3.** Select the correct label from the envelope identified in Step 2 and attach it to the right flange of the new disk shelf. |

| Step | Action | |
|---|---|---|
| | System with Data ONTAP 10.x installed | **1.** Log into the system and enter the following command at the console to go to the shell command mode:<br>`ngsh`<br>**2.** Enter the following command at the console to go to the command line interface:<br>`dbladecli`<br>**3.** Verify that the disk shelf ID is not being used in the loop by entering the following command at the console<br>`fcstat device_map` ***`adaptername`***<br>**Attention**<br>An invalid disk shelf ID causes the system to panic.<br>**4.** Press the thumbwheel switch on the rear of the disk shelf and use the + button to raise the number and the - button to lower the number to a valid ID from 1 through 7.<br>**5.** Select the correct label from the envelope identified in Step 2 and attach it to the right flange of the new disk shelf. |
| **11** | Turn on the power to the disk shelf and you must wait 30 seconds for the shelf electronics to finish initializing. | |
| **12** | Connect one end of the provided cable to the module A Output on the last disk shelf in the existing loop. | |
| **13** | Connect the other end of the cable to the module A Input on the new disk shelf. | |
| **14** | Connect one end of the provided cable to the module B Output on the last disk shelf in the existing loop. | |

| Step | Action |
|---|---|
| **15** | Connect the other end of the cable to the module B Input on the new disk shelf. |
| **16** | Verify that all the cables are securely fastened.<br>**Attention**<br>Poorly secured cables cause the system to panic over an open loop.<br>**Result:** In 60 seconds, the system recognizes the hot-added disk shelf. |

# Hot-adding a disk shelf to an existing adapter in your system

## Requirements for this procedure

The following requirements must be met for this procedure:

- Your system must have Data ONTAP 7.2 or later.
- There must be an available but unused adapter on your system to do this procedure.
  - If you have an available dual-port and an available quad-port adapter, the dual-port adapter should be used first.
  - If you only have an available quad-port adapter and you are hot-adding a single loop of disk shelves, then Ports A and B are defined as a port pair and Ports C and D are defined as a port pair. For the purposes of incorporating redundancy, Module A connects to Port A or Port B and Module B connects to Port C or Port D.

## Hot-adding a disk shelf to an existing adapter

To hot-add a disk shelf to an existing loop, complete the following steps.

**Note**

To hot-add disk shelves to a High availability or Active/active configuration, see the *High-Availability Configuration Guide* or the *Active/Active Configuration Guide*.

| Step | Action |
|---|---|
| **1** | Verify that your system meets the minimum software requirements to support the disk shelf and module combination. See the *System Configuration Guide* at http://now.netapp.com for more information. |
| **2** | Verify that you received the envelope with the disk shelf ID labels. |
| **3** | Ground yourself to the system chassis using the grounding leash. |
| **4** | Use the rail kit installation flyer in the rail kit box to install the appropriate rail kits on the rack. |
| **5** | Install and secure the disk shelf onto the support brackets and rack. |
| **6** | If you are adding multiple disk shelves on the same loop, repeat Step 4 and Step 5 to install the remaining disk shelves in ascending numerical order, according to the IDs on their labels. |

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td>7</td><td colspan="2">Connect the grounding strap connecting the disk shelf to the other disk shelves or your system.</td></tr>
<tr><td>8</td><td colspan="2">Set the loop speed:<ul><li>The 1-Gb loop speed setting must be used if the system is an FAS270.</li><li>The 2-Gb loop speed setting must be used if there is any component on any part of the loop that is only capable of 2-Gb operation. Examples of these components are the DS14mk2FC, SFPs, HBAs, or drives.</li><li>For the 4-Gb loop speed setting to be used, all components on any part of the loop must be of 4-Gb capable. Examples of these components are this disk shelf model, SFPs, HBAs, or drives.</li></ul>Attention<br>An incorrectly set loop speed causes the system to panic.</td></tr>
<tr><td>9</td><td>If the disk shelf connects to a...</td><td>Then change the disk shelf ID with the following procedure...</td></tr>
<tr><td></td><td>System with Data ONTAP 7.x or earlier installed</td><td>1. Verify that the disk shelf ID is not being used in the loop by entering the following command at the console<br><tt>fcstat device_map adaptername</tt><br>Attention<br>An invalid disk shelf ID causes the system to panic.<br>2. Press the thumbwheel switch on the rear of the disk shelf and use the + button to raise the number and the - button to lower the number to a valid ID from 1 through 7.<br>3. Select the correct label from the envelope identified in Step 2 and attach it to the right flange of the new disk shelf.</td></tr>
</table>

| Step | Action | |
|---|---|---|
| | System with Data ONTAP 10.x installed | **1.** Log into the system and enter the following command at the console to go to the shell command mode:<br>`ngsh`<br>**2.** Enter the following command at the console to go to the command line interface:<br>`dbladecli`<br>**3.** Verify that the disk shelf ID is not being used in the loop by entering the following command at the console<br>`fcstat device_map` ***`adaptername`***<br>**Attention**<br>An invalid disk shelf ID causes the system to panic.<br>**4.** Press the thumbwheel switch on the rear of the disk shelf and use the + button to raise the number and the - button to lower the number to a valid ID from 1 through 7.<br>**5.** Select the correct label from the envelope identified in Step 2 and attach it to the right flange of the new disk shelf. |
| **10** | Turn on the power to the disk shelf and you must wait 30 seconds for the shelf electronics to finish initializing. | |
| **11** | Connect one end of the provided cable to the adapter in your system. | |
| **12** | Connect the other end of the cable to the module A Input on the new disk shelf. | |
| **13** | Connect one end of the provided cable to the adapter in your system. | |

| Step | Action |
|---|---|
| **14** | Connect the other end of the cable to the module B Input on the new disk shelf. |
| **15** | Verify that all the cables are securely fastened.<br>**Attention**<br>Poorly secured cables cause the system to panic over an open loop.<br>**Result:** In 60 seconds, the system recognizes the hot-added disk shelf. |

# Recommended Power Line Sizes B

**About this appendix**

This appendix describes how to determine the power line lengths running from the system to the power source.

**Topics in this appendix**

This appendix discusses the following information:

# Recommended AC power line sizes

## About AC power feeds

Longer AC power feeds need to be properly designed to preserve voltage levels to the equipment. The wiring from the breaker panel to the power strip, which supplies power to the system and disk shelves, can often exceed 50 feet.

**Note**

Total AC wire length = breaker to wall or ceiling outlet + extension cable or ceiling drop.

The following table lists the recommended conductor size for 2% voltage drop for a particular distance in feet (taken from the Radio Engineer's Handbook).

| **110V, single-phase** | **20A circuit** | **30A circuit** | **40A circuit** | **50A circuit** |
|---|---|---|---|---|
| 25 feet | 12 AWG | 10 AWG | 8 AWG | 8 AWG |
| 50 feet | 8 AWG | 6 AWG | 6 AWG | 4 AWG |
| 75 feet | 6 AWG | 4 AWG | 4 AWG | 2 AWG |

| **220V, single-phase** | **20A circuit** | **30A circuit** | **40A circuit** | **50A circuit** |
|---|---|---|---|---|
| 25 feet | 14 AWG | 12 AWG | 12 AWG | 10 AWG |
| 50 feet | 12 AWG | 10 AWG | 8 AWG | 8 AWG |
| 75 feet | 10 AWG | 8 AWG | 6 AWG | 6 AWG |

The following table list the approximate equivalent wire gauge (American Wire Gauge (AWG) to Harmonized Cordage).

| **AWG** | 8 | 10 | 12 |
|---|---|---|---|
| **Harmonized, mm-mm**<br><br>mm-mm = millimeter squared | 4.0 | 2.5 | 1.5 |

# Calculating the length of DC wires

### Use these variable definitions

To calculate the maximum combined length of the positive and negative wires between the DC source and DC power supplies, use the following variable definitions:

- $V_{SOURCE}$ — Voltage across the internal source resistance
- $V_{OC}$ — Voltage across an open circuit of the input source
- $V_{LOAD}$ — Voltage across a load, $R_{TEST}$, connected to the input source
- $R_{TEST}$ — Test resistor of known value, that is, 10Ω at 300W
- $R_{CABLE}$ — DC resistance of the cable at a given length
- $R_{SOURCE}$ — DC resistance of the source
- $R_{TOTAL}$ — Combined DC resistance of the cable and DC source:

  $R_{TOTAL} = R_{SOURCE} + R_{CABLE}$
- $V = IR$ — Ohm's Law
- $V_{OC} = V_{SOURCE} + V_{LOAD}$ — Kirchoff's Voltage Law

### How to calculate the length

The following two examples show how to calculate the maximum combined length of the positive and negative wires that connect the DC power supply to the DC source.

**Example 1:** This example uses the following given values.

**Given**

| | | |
|---|---|---|
| $V_{DROP}$ | = 2V | Maximum voltage drop through input source and cable |
| $V_{MIN}$ | = 40V | Minimum input voltage |
| $I_{MAX}$ | = 8.6V | Maximum input current at 40V |
| $V_{OC}$ | = 48V | Measured |
| $V_{LOAD}$ | = 47.5V | Measured |
| $R_{TEST}$ | = 10Ω | (300W) |

**Solution**

$$V_{DROP} = I_{MAX}R_{TOTAL}$$

$$2 = 8.6\ R_{TOTAL}$$

$$R_{TOTAL} = 2/8.6$$

$$R_{TOTAL} = .233\Omega$$

$$V_{LOAD} = I\ R_{TEST}$$

$$I = V_{LOAD}/R_{TEST}$$

$$V_{OC} = V_{SOURCE} + V_{LOAD}$$

$$V_{OC} = IR_S + V_{LOAD}$$

$$R_S = \frac{V_{OC} - V_{LOAD}}{I}$$

$$R_S = \frac{(V_{OC} - V_{LOAD})}{V_{LOAD}/R_{TEST}}$$

$$R_S = \frac{V_{OC} - V_{LOAD}}{V_{LOAD}} \times R_{TEST}$$

$$= \frac{48V - 47.5V}{47.5V} \times 10\Omega$$

$$= 0.105\Omega$$

$$R_{TOTAL} = R_{CABLE} + R_{SOURCE}$$

$$R_{CABLE} = R_{TOTAL} - R_{SOURCE}$$

$$R_{CABLE} = 0.233\Omega - 0.105\Omega$$

$$= 0.128\Omega$$

For example, if you have a 12 gauge wire, solid strand, at room temperature, use the following calculation.

$$\text{Total cable length} = \frac{R_{CABLE}}{\text{DC resis.}^{1}}$$

$$\text{Total cable length} = \frac{.128\Omega}{.0017\Omega/\text{ft}} = 75 \text{ ft}$$

| AWG | Strand | DC resistance(1) [Ω/ft.] | | Total cable length(2) [ft] | |
|---|---|---|---|---|---|
| | | 25° C | 75° C | 25° C | 75° C |
| 12 | Solid | .0017 | .0020 | 75 | 64 |
| 12 | 7/20 | .0015 | .0018 | 85 | 71 |
| 12 | 19/25 | .0017 | .0020 | 75 | 64 |
| 12 | 65/30 | .0018 | .0022 | 71 | 58 |
| 12 | 165/34 | .0016 | .0019 | 80 | 67 |

**1**. Data from Alpha Wire, wire manufacturer
**2.** Combined positive and negative run

**Example 2:** This example uses the following given values.

**Given**

$V_{DROP}$ = 2V Maximum voltage drop through input source and cable

$V_{MIN}$ = 40V Minimum input voltage

$I_{MAX}$ = 8.6V Maximum input current at 40V

$R_{SOURCE} \cong 0$

**Solution**

$$V_{DROP} = I_{MAX}R_{TOTAL}$$

$$R_{TOTAL} = \frac{V_{DROP}}{I_{MAX}}$$

$$R_{TOTAL} = 2/8.6$$

$$R_{TOTAL} = 0.233\Omega$$

$$R_{TOTAL} = R_{SOURCE} + R_{CABLE}$$

$$R_{CABLE} = R_{TOTAL} - R_{SOURCE}$$

$$R_{CABLE} = 0.233 - 0$$

$$R_{CABLE} = 0.233$$

For example, if you have a solid strand 12 gauge wire at room temperature, use the following calculation.

$$\text{Total cable length} = \frac{R_{CABLE}}{\text{DC resis.}^1}$$

$$\text{Total cable length} = \frac{.233\Omega}{.0017\Omega/\text{ft}} = 136 \text{ ft}$$

| AWG | Strand | DC resistance[1] [Ω/ft.] | | Total cable length[2] [ft] | |
|---|---|---|---|---|---|
| | | 25° C | 75° C | 25° C | 75° C |
| 12 | Solid | .0017 | .0020 | 136 | 116 |
| 12 | 7/20 | .0015 | .0018 | 155 | 129 |
| 12 | 19/25 | .0017 | .0020 | 136 | 116 |
| 12 | 65/30 | .0018 | .0022 | 129 | 105 |
| 12 | 165/34 | .0016 | .0019 | 145 | 122 |

1. Data from Alpha Wire, wire manufacturer.
2. Combined positive and negative run

### About using other wire sizes

If you need a longer run for your combined positive and negative DC wires, choose a wire with a lower resistance and calculate the total cable length. For example, a solid #10 AWG has a lower DC resistance than a solid #12 AWG.

# Feature Update Record

C

## Feature update history

The following table lists and describes the history of changes made to this manual. When a change is implemented, it applies to the release in which it was implemented and all subsequent releases, unless otherwise specified.

| Feature updates | Feature first implemented in | Feature release date |
|---|---|---|
| ◆ Initial release of this manual | Data ONTAP 6.0.2 | March 2001 |
| ◆ Update to include support for NetCache appliances<br>◆ Hot-adding of disk shelves to NetCache appliances is not supported | NetCache 5.1 | April 2001 |
| ◆ Updates to multiloop cabling section | Data ONTAP 6.1.1 | July 2001 |
| ◆ Update to include hot-adding of disk shelves to NetCache appliances | NetCache 5.2 | August 2001 |
| ◆ Update to include FAS900 series | Data ONTAP 6.3 | August 2002 |
| ◆ Update to include DS14mk2FC<br>◆ Update to include ESH | Data ONTAP 6.4.1<br>Data ONTAP 6.2 | May 2003 |
| ◆ Update to specify ESH support for C6200<br>◆ Address BURT on hot-adding disk shelves | NetCache 5.5<br>Data ONTAP 6.5 | December 2003 |
| ◆ Update to include ESH2<br>◆ Connecting an ESH2 to a NetCache appliance is not supported. | Data ONTAP 6.4.4 and 6.5.1 | May 2004 |
| ◆ Fix for BURT 140959<br>◆ Support for DC power supplies on DS14mk2FC disk shelves.<br>◆ Support for 300-GB drives | N.A.<br>Data ONTAP 6.5.4 and 7.0.1 | March 2005 |
| ◆ Address BURT on hot-swapping, hot-adding drives one at a time<br>◆ Address BURT on hot-adding disk shelves one at a time<br>◆ Hot-adding to an existing adapter | Data ONTAP 7.2 | March 2006 |

| Feature updates | Feature first implemented in | Feature release date |
|---|---|---|
| ◆ Update to include DS14mk4 FC<br>◆ Update to include ESH4 | Data ONTAP 6.4.4 and later for selected platforms. See the *System Configuration Guide* at http://now.netapp.com for information. | February 2007 |
| ◆ Update to specify loop speed usage requirements | Data ONTAP 6.4.4 and later for selected platforms. See the *System Configuration Guide* at http://now.netapp.com for information. | May 2007 |
| ◆ Update to include support for FlexCache appliances | Data ONTAP 7.2.5.1 and later. | November 2008 |
| ◆ Update to include support for V30xx, V31xx, and V60xx systems | Data ONTAP 7.3 and later for selected platforms. | |
| ◆ Update to include Data ONTAP 10.0.x commands for procedures | Data ONTAP 10.0.x and later for selected platforms. | |
| ◆ Update to remove obsolete hardware references | N.A. | April 2011 |

# Communications Regulations D

**About this appendix** This appendix lists the regulatory notices you need to be aware of when installing and operating your NetApp equipment.

# Regulatory notices

## FCC notices (U.S. only)

NetApp devices are designed for a CFR 47 (Code Federal Regulations) Part 15 Class A environment.

The FCC and NetApp guarantee the user's rights to operate this equipment only if the user complies with the following rules and regulations:

- Install and operate this equipment in accordance with the specifications and instructions in this guide.
- Modify this equipment only in the ways specified by NetApp.
- Use shielded cables with metallic RFI/EMI connector hoods to maintain compliance with applicable emissions standards.
- If the system has nine or more Fibre Channel disk shelves, install the system in two or three NetApp System Cabinets to maintain performance within Part 15 of CFR 47 regulations.

## Compliance with Part 15 of CFR 47

This equipment has been tested and found compliant with Part 15 of the CFR 47 rules for Class A digital devices. These rules are designed to provide reasonable protection from interference to electronics equipment operated in a commercial environment.

Operation of this device is subject to the following two conditions:

- This device cannot cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

## Compliance with ICES-003

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A conforme à la norme NMB-003 du Canada.

## Compliance with EN regulations

Marking by the symbol CE indicates compliance of this NetApp device to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this NetApp device meets the technical standards listed in "Declaration of Conformity," later in this appendix.

**Attention**

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

### Bureau of Standards, Metrology, and Inspections notice (BSMI, Taiwan only)

警告使用者:

這是甲類的資訊產品, 在居住的環境中使用時, 可能會造成射頻干擾, 在這種情況下, 使用者會被要求采取某些適當的對策.

Translation of the BSMI notice:

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

### Voluntary Control Council for Interference by Information Technology Equipment (VCCI, Japan)

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Translation of the VCCI-A notice:

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. If such trouble occurs, the user may be required to take corrective actions.

# Declaration of Conformity

**Declaration of Conformity**

**NetApp, Inc.**
**495 East Java Drive**
**Sunnyvale, CA 94089, U.S.A,**

declare under our sole responsibility that the products

| Type of equipment | Description | Model number | Year of manufacture |
|---|---|---|---|
| Disk drive storage shelf | Fibre Channel disk shelf | DS14 | 2001 |
| | | DS14mk2 FC | 2003 |

to which this declaration relates conform to the following standards:

EN 60950:2002, Information Technology Equipment (Safety)

EN 55022:1998, Emissions Requirements for Information Technology Equipment

EN 50024:1998, Immunity Requirements for Information Technology Equipment

EN 60825-1, Safety of Laser/LED Equipment

EN 61000-3-2:2002 Limits for Harmonic Current Emissions

EN 61000-3-3:1995/A1:2001 Limitation of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems

following the provisions of the directives listed below:

73/23/EEC, Low Voltage Directive (Product Safety)

89/336/EEC, Electromagnetic Compatibility Directive

Part number: 210-02616

# Index

## L



## P



## Q



## R

## S



## T