Oracle FS1-2 Flash Storage System

Customer Service Guide

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Related Documentation

- *Oracle Flash Storage Systems Glossary*
- *Oracle FS1-2 Flash Storage System Installation Guide (Racked)*
- *Oracle FS1-2 Flash Storage System Installation Guide (Not-Racked)*
- *Oracle Flash Storage System Administrator's Guide*
- *Oracle Flash Storage System CLI Reference*
- *Oracle FS1-2 Flash Storage System Release Notes*

Oracle Resources

Important: For the latest version of this document, visit the *SAN Storage – Oracle Flash Storage Systems* section at the Oracle Help Center (http://www.oracle.com/goto/fssystems/docs).

Table 1: Oracle resources

For help with...	Contact...
Support	*http://www.oracle.com/support* (www.oracle.com/support)
Training	*https://education.oracle.com* (https://education.oracle.com)
Documentation	• *SAN Storage – Oracle Flash Storage Systems*: (http://www.oracle.com/goto/fssystems/docs) • From Oracle FS System Manager (GUI): Help > Documentation • From Oracle FS System HTTP access: (*system-name-ip*/documentation.php where *system-name-ip* is the name or the public IP address of your system)
Documentation feedback	*http://www.oracle.com/goto/docfeedback* (http://www.orarcle.com/goto/docfeedback)
Contact Oracle	*http://www.oracle.com/us/corporate/contact/index.html* (http://www.oracle.com/us/corporate/contact/index.html)

CHAPTER 1

Introduction to Oracle FS1-2 System Service Procedures

Oracle FS System Service Procedures

Controller Components

When replacing a component, you must know its part number and whether it is hot serviceable. Having that information helps you to order the correct replacement component and to determine whether you can replace the component yourself. To locate part numbers, open *Oracle System Handbook* (https://support.oracle.com/handbook_private/index.html). The part numbers are listed in the Oracle FS1 Flash Storage System components list.

The Controller is a two rack-unit (2U) server and consists of several replaceable components. Many Controller components are customer replaceable (CRUs), while others are field replaceable units (FRUs) that require Oracle Customer Support to perform the replacement. Also, some components are hot-serviceable, meaning that they can be replaced, while the Controller is powered on. Some of the Controller component replacement procedures require the Controller to be powered off and/or removed from the rack. The following table provides a summary of the Controller FRUs and CRUs.

Table 2: Controller components and descriptions

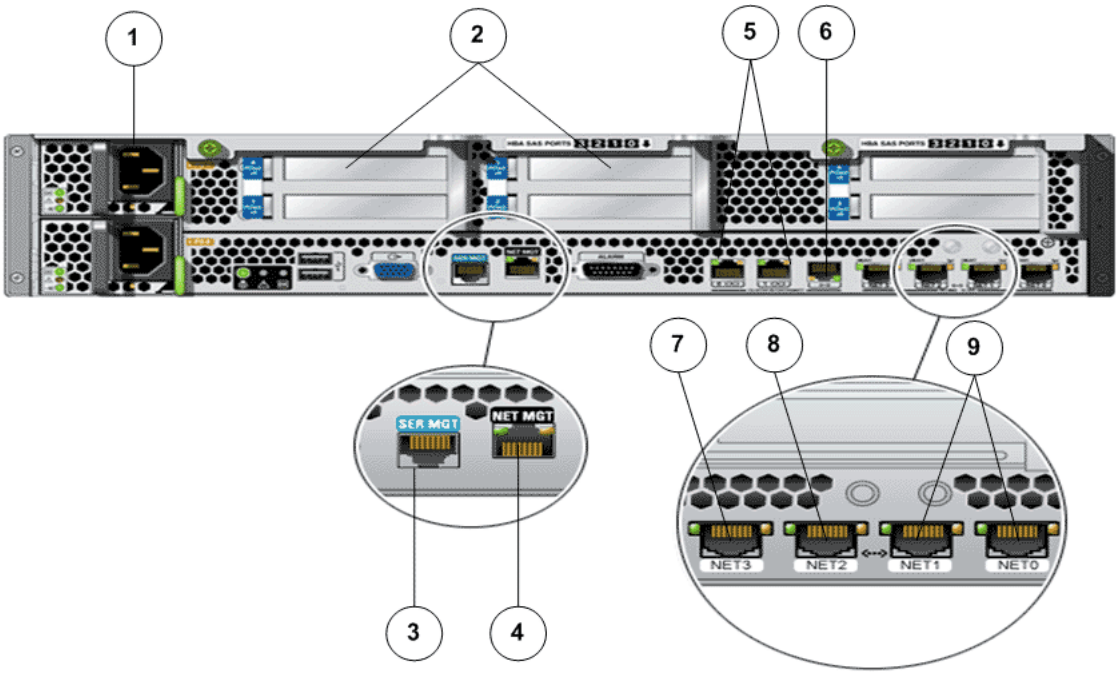
Controller component	Type	Hot serviceable
4 GB NVDIMM	FRU	No
16 GB DIMM module	CRU	No
Air filter	CRU	Yes
Battery	FRU	No
Central processing unit (CPU)	FRU	No
Disk backplane	FRU	No
Energy storage module (ESM)	FRU	No
Fan module	CRU	No
Controller identification display (CUID)	FRU	No
HBA [Sun Storage: 16 Gb/s Fibre Channel (FC) PCI-e]	CRU	No

Table 2: Controller components and descriptions (continued)

Controller component	Type	Hot serviceable
HBA [Sun Storage: 16 Gb/s FC optics]	CRU	No
HBA [Sun Storage: 10 Gb/s FCoE optics][iSCSI]	CRU	No
HBA [dual-port 10 GbE PCIe 2.0 Copper and Fiber SFP+]	CRU	No
HBA [8 Gb/s Dual-Port FC PCI-e]	CRU	No
Heat sink	FRU	No
LED alarm board assembly	FRU	No
Motherboard cable kit	FRU	No
Power distribution board (PDB)	FRU	No
Power supply	CRU	Yes
Rail kit assembly	FRU	No
Riser board assembly	CRU	No
SAS HBA (PCIe-3, 6 Gb/s, 4x4 port)	CRU	No

Some FRUs and CRUs can be accessed from the front or back of the Controller. For replacing other FRUs and CRUs, you must open the top cover of the Controller. The following figure shows the components located at the back of the Controller.

Figure 1: Controller back view

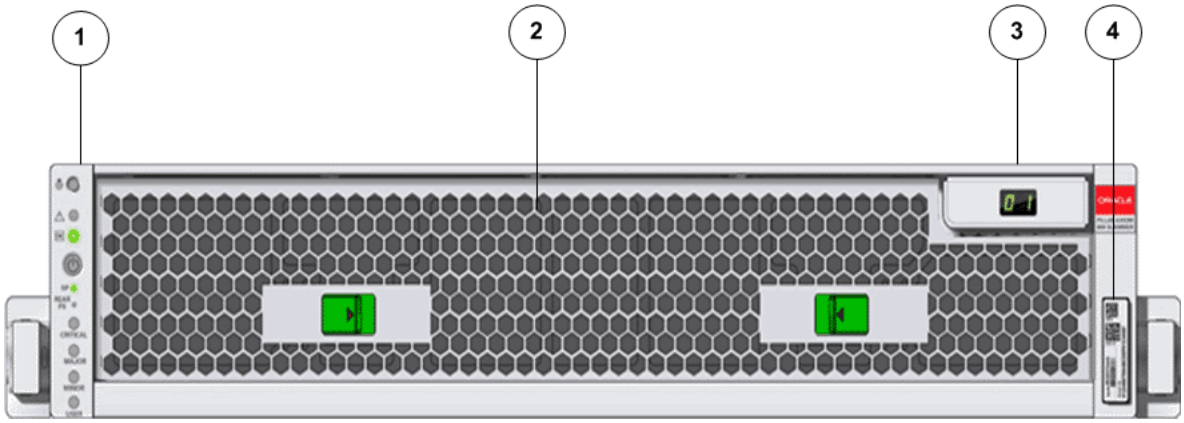


Legend

1 Power supplies	6 Network port to opposite Controller
2 HBA slots	7 Network port to Pilot PMI
3 Server management port	8 Network port to opposite Controller PMI
4 Network management port	9 Ports for NAS host connection
5 Serial link port to opposite Controller	

The following figure shows the front of the Controller with the air filter.

Figure 2: Controller front view with the air filter

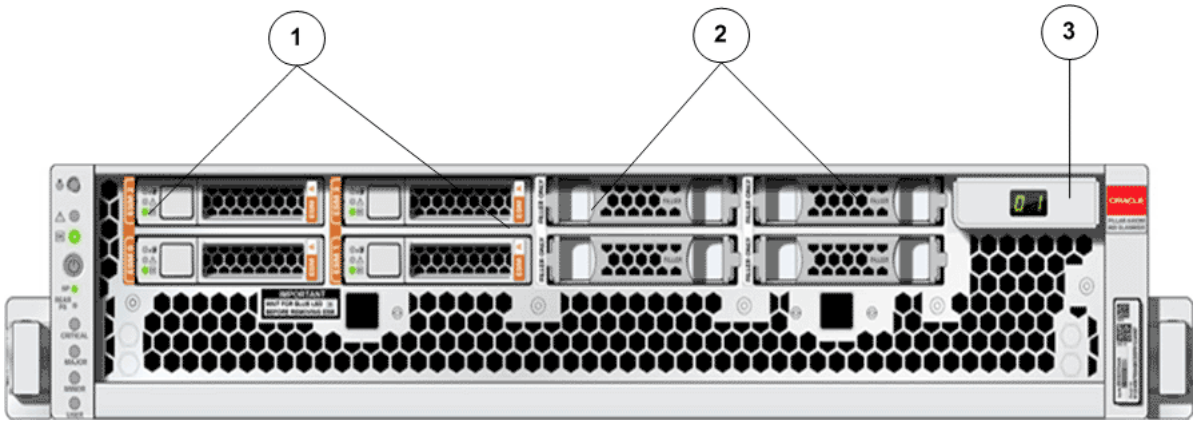


Legend

1 LED alarm board assembly	3 Controller identification display
2 Air filter	4 Controller RFID tag

The following figure shows the front of the Controller without the air filter.

Figure 3: Controller front view without the air filter

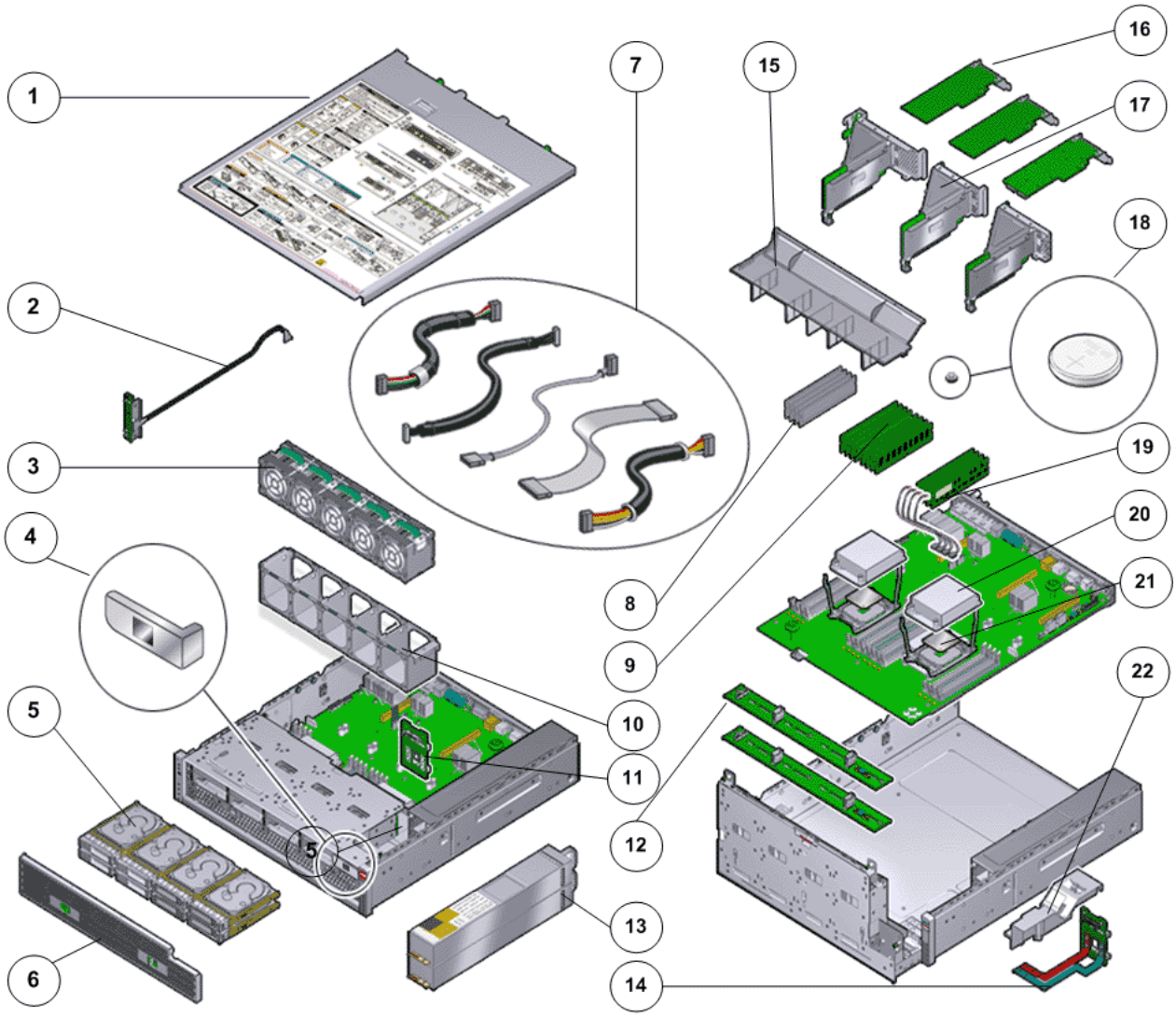


Legend

1 ESM modules (0,1,2,3)
2 Filler panels
3 Controller Unit Identification Display (CUID)

The following figure shows all the replaceable components of the Controller.

Figure 4: Exploded view of Controller replaceable components



Legend

1 Top cover (with service label)	9 DIMMs	17 Riser
2 LED assembly	10 Fan compartment	18 Battery
3 Fan modules	11 PDB risers	19 NV-DIMM
4 CUID	12 ESM backplane boards	20 Heat sink
5 Energy storage modules (ESMs)	13 Power supply	21 CPU
6 Air filter	14 PDB duct	22 PDB cover
7 Motherboard cable kit	15 Air duct	
8 Filler panels for DIMM slots	16 HBA	

Related Links

Replace a Controller Riser
Replace Controller Air Filter
Replace a Controller DIMM
Replace a Controller Energy Storage Module (ESM)
Replace a Controller Fan Module
Replace a Controller HBA
Replace a Controller Power Supply
Replace a Controller Riser

Drive Enclosure Components

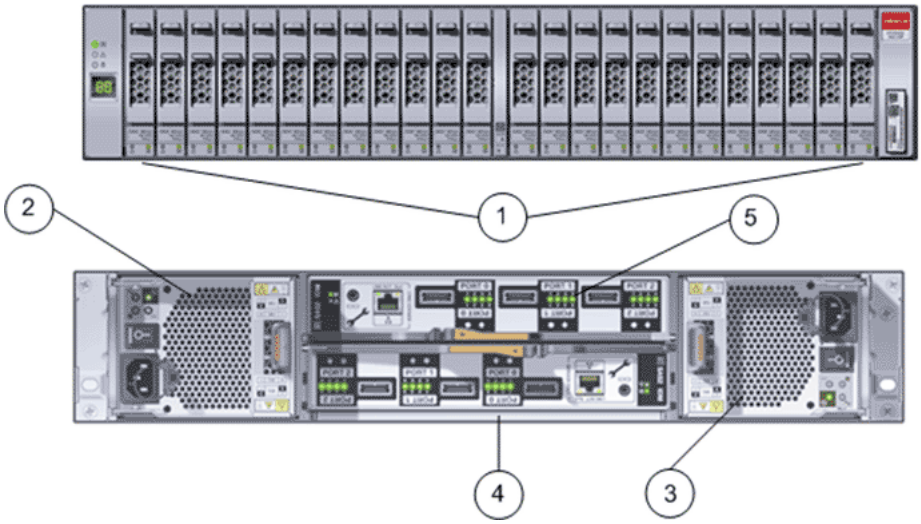
When replacing a component, you must know its part number and whether it is hot serviceable. Having that information helps you to order the correct replacement component and to determine whether you can replace the component yourself. To locate part numbers, open *Oracle System Handbook* (https://support.oracle.com/handbook_private/index.html). The part numbers are listed in the Oracle FS1 Flash Storage System components list.

The Drive Enclosure chassis is a field replaceable unit (FRU). The remaining components of both Drive Enclosure types are customer replaceable units (CRU). Drive Enclosure CRUs are hot serviceable.

Warning: Do not power-cycle a Drive Enclosure. Power-cycling a Drive Enclosure impacts the primary and secondary data paths in the Drive Enclosure and puts user data at risk.

The following figure shows the CRUs in the DE2-24P Drive Enclosure.

Figure 5: DE2-24P Drive Enclosure CRUs

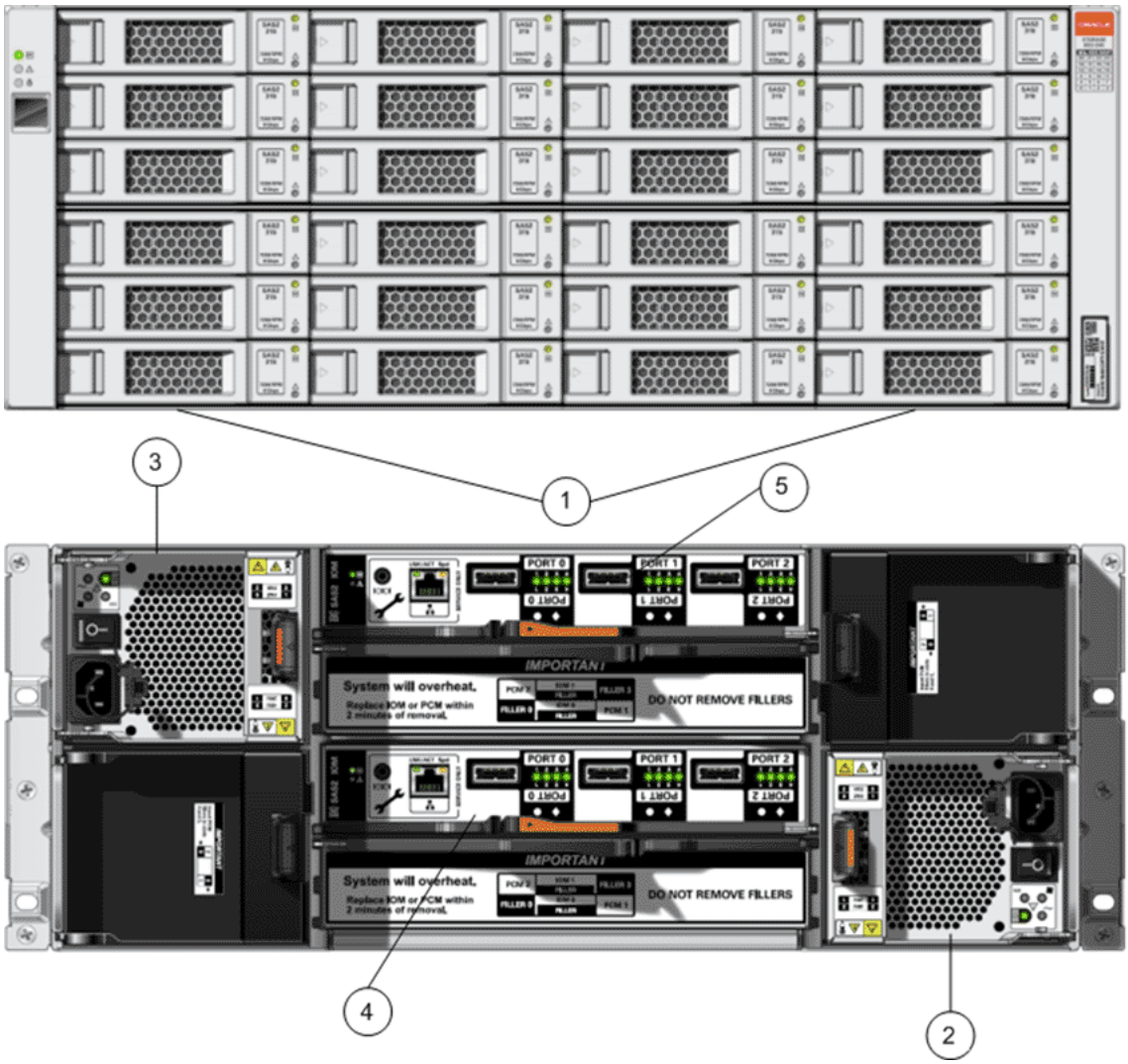


Legend

1 Drives	4 I/O module 0
2 Power cooling module 0	5 I/O module 1
3 Power cooling module 1	

The following figure shows the CRUs in the DE2-24C Drive Enclosure.

Figure 6: DE2-24C Drive Enclosure CRUs



Legend

1 Drives	4 I/O module 0
2 Power cooling module 1	5 I/O module 1
3 Power cooling module 2	

The following table provides a summary of the Drive Enclosure components.

Table 3: Drive Enclosure component descriptions

Drive Enclosure component	Component Type	Hot serviceable
Chassis for the DE2-24P Drive Enclosure	FRU	No
Chassis for the DE2-24C Drive Enclosure	FRU	No

Table 3: Drive Enclosure component descriptions (continued)

Drive Enclosure component	Component Type	Hot serviceable
Two I/O modules (EBOD modules)	CRU	Yes
Two power cooling modules	CRU	Yes

Drive Enclosure drives are customer replaceable and hot serviceable. The Oracle FS System release 6.1 supports the following drives:

Note: The list of supported drives can change. Refer to the release notes for your release of the Oracle FS System for the corresponding list of supported drives.

Table 4: Release 6.1 supported drives

Drives and configurations	Drive Enclosure type
• 2.5-inch (6.35-cm) SAS-2 small form factor (SFF) HDDs, 300 GB • 24 drives in a DE2-24P Drive Enclosure	DE2-24P Drive Enclosure
• 2.5-inch (6.35-cm) SAS-2 SFF HDDs, 900 GB • 24 drives in a DE2-24P Drive Enclosure	DE2-24P Drive Enclosure
• SSDs, 400 GB • Seven or 13 drives in a DE2-24P Drive Enclosure	DE2-24P Drive Enclosure
• SSDs, 1.6 TB • Seven, 13, or 19 drives in a DE2-24P Drive Enclosure	DE2-24P Drive Enclosure
• 3.5-inch (8.89-cm) SAS-2 large form factor (LFF) HDDs, 4 TB • 24 drives in a DE2-24C Drive Enclosure	DE2-24C Drive Enclosure

Pilot Components

When replacing a component, you must know its part number and whether it is hot serviceable. Having that information helps you to order the correct replacement component and to determine whether you can replace the component yourself. To locate a part number for the Pilot, open *Oracle System Handbook* (https://support.oracle.com/handbook_private/index.html) and go to

the Oracle FS1 Flash Storage System components list. Part numbers are listed in the components list.

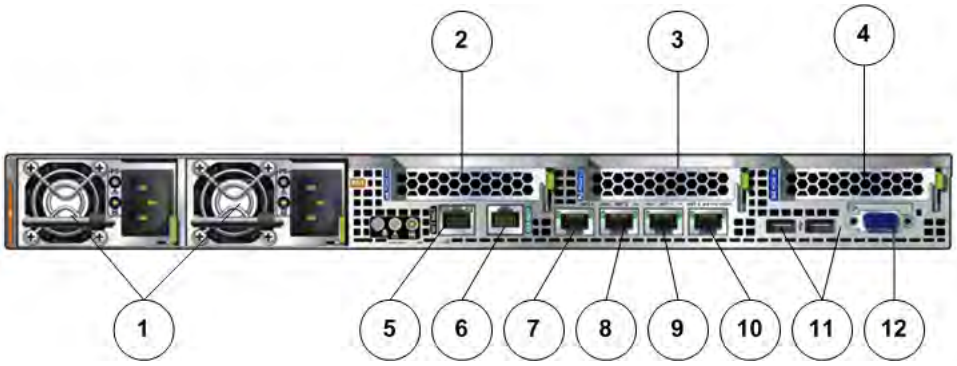
The Pilot is a one rack-unit (1U) server and consists of several replaceable components. Many Pilot components are customer replaceable (CRUs), while others are field replaceable units (FRUs) that require Oracle Customer Support to perform the replacement. Also, some components are hot-serviceable, meaning that they can be replaced, while the Pilot is powered on. The following table provides a summary of the Pilot FRUs and CRUs.

Table 5: Pilot components and descriptions

Pilot component	Type	Hot-serviceable
Battery	CRU	No
USB Oracle System Assistant (OSA) flash drive	CRU	No
Disk backplane	FRU	No
8 GB DIMM module	CRU	No
Cable kit	FRU	No
CPU	FRU	No
300 GB SAS HDD	FRU	No
Fan module	CRU	No **Note:** GM support is required to ensure that failover has occurred.
Riser	CRU	No
SAS HBA [6 Gb/s]	CRU	No
Heat sink	FRU	No
Power supply	CRU	Yes

The following figure shows the components located at the back of the Pilot.

Figure 7: Pilot back view



Legend

1 Power supplies	7 Ethernet port (ETH-0) labeled as NET-3
2 PCIe card slot 1	8 Ethernet port (ETH-1) labeled as NET-2
3 PCIe card slot 2	9 Ethernet port (ETH-2) labeled as NET-1
4 PCIe card slot 3 and PCIe 4 slot (PCIe 4 slot is for the internal SAS HBA card and is not visible from the back of the Pilot)	10 Ethernet port (ETH-3) labeled as NET-0
5 ILOM SP network management port (labeled as NET MGT port)	11 USB connectors
6 Serial management port (labeled as SRMGT port)	12 Video connector

The following figure shows the components located at the front of the Pilot.

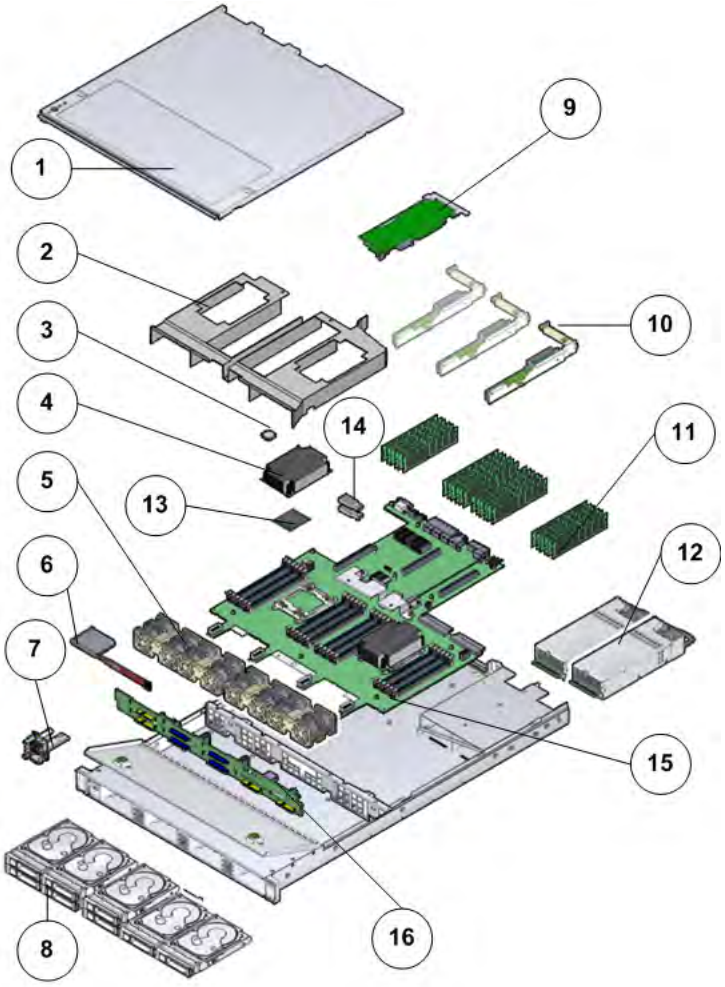
Figure 8: Pilot front view

Legend

1 Product serial number RFID tag	3 Front indicator module (FIM)
2 Power button	4 Pilot boot drive

The following figure shows an exploded view of the Pilot.

Figure 9: Exploded view of Pilot replaceable components



Legend

1. Pilot top cover	9 SAS HBA
2 Air baffle	10 Risers
3 Battery	11 DIMMs
4 Heat sink	12 Power supplies
5 Fan modules	13 CPU
6 Front Indicator Module (FIM)	14 USB OSA flash drive
7 Energy Storage Module (ESM) for Oracle 12 Gb/s SAS PCIe RAID HBA that goes into PCIe slot 4	15 Motherboard
8 SAS HDDs	16 Disk backplane boards

Related Links

Replace a Pilot Battery
Replace a Pilot SAS HDD
Replace a Pilot SAS HBA
Replace a Pilot Riser
Replace a Pilot Power Supply
Replace a Pilot Fan Module
Replace a Pilot DIMM
Replace a Pilot Chassis

Warnings and Cautions

Hazard signal words conform to the American National Standards Institute (ANSI) Z535.4-2002 meanings.

Caution: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

Danger: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

Tip: To indicate best practices for a process.

Important: To emphasize a point, to remind you of something, or to indicate potential problems in the outcome of the in-process task.

Electrostatic Discharge Precautions

Caution: Before you handle a component, make sure that you have taken electrostatic discharge (ESD) precautions:

- The minimum requirement is an anti-static wrist strap connected to a hard ground. Remove components from their packaging and place them on an ESD-qualified table that is equipped with ground points for wrist straps.
- Static charges can build up rapidly on rolling carts. If you transport a hardware component by cart, ground the cart with a drag chain on an ESD floor. If there is no ESD cart available or ESD floor, ground yourself before you touch a component that has been transported on a cart.

Required Tools

Before starting the installation of a Oracle Flash Storage System, be sure you have the needed equipment and tools available.

Table 6: Required tools

Tool	Purpose	Illustration
#1 and #2 Phillips screwdrivers	Remove and secure Oracle Flash Storage System hardware components.	
Offset box wrench, 13/32 inches (10 millimeters)	Work with adjustable mounting rail assemblies.	
Torx T20 screwdriver	Attach rail assemblies to the vertical channels and secure hardware components to the rails.	
Torx T30 screwdriver	Connect two racks.	
Wire cutters	Cut tie wraps.	

Note: These tools are not included with the Oracle Flash Storage System.

Rack Safety Precautions

Follow these safety precautions when installing the components in the rack.

Caution: If non-Oracle FS System equipment must be installed in the rack, additional care must be taken to ensure that this equipment does not cause overheating of the Oracle FS System components or block air flow. All Oracle FS System components meet these requirements, but ONLY if the installation and rack position guidelines are carefully followed.

Caution: Always load components into a rack from the bottom to the top so that the rack does not become top-heavy and tip over.

Caution: Avoid elevated operating ambient temperature. If the component is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment might be greater than room ambient temperature. Therefore, make sure that the environment is compatible with the maximum ambient temperature (TMA) specified for the component.

Caution: Make sure that there is sufficient amount of airflow required for safe operation of each component.

Caution: Mounting of a component in the rack should be such that a hazardous condition is not created due to uneven mechanical loading.

Caution: Consideration should be given to the connection of a component to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of component nameplate power ratings should be used when addressing this concern.

Caution: Reliable grounding of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Caution: Do not use slide-rail mounted equipment as a shelf.

Guided Maintenance

Guided Maintenance Overview

As a feature of Oracle FS System Manager (GUI), Guided Maintenance presents you with a sequence of dialogs that guides you through the process of replacing field replaceable units (FRUs) and customer replaceable units (CRUs). Prompt replacement of failed FRUs and CRUs helps maintain system reliability.

Guided Maintenance supports the identification and replacement of FRUs and CRUs for Controllers and Drive Enclosures. Guided Maintenance performs the following functions to help you replace FRUs and CRUs:

- Determines the status of the hardware based on events and diagnostics to accurately reflect the sate of the system.
- Identifies the affected Controller or Drive Enclosure. During the identify process, Guided Maintenance issues a command to light the LEDs on the affected chassis.

  If you are replacing a component on a Drive Enclosure, the following LEDs flash:

  Drive
  : Flashes the Locate LED on the Drive Enclosure chassis and the Fault LED on the selected drive.

  Power cooling module
  : Flashes the Locate LED on the Drive Enclosure chassis and the Fan Fail LED on the selected power cooling module.

  I/O module
  : Flashes the Locate LED on the Drive Enclosure chassis and the Fault/Locate LED on the selected I/O module.

  If you are replacing a component on the Controller, the following LEDs flash:

  Energy Storage Module (ESM)
  : Flashes the Locate LED on the front of the Controller chassis, the Status LED on the back of the Controller chassis, and the Ready to Remove LED on the ESM.

  All of the remaining Controller components
  : Flashes the Locate LED on the Controller chassis and the Status LED on the back of the Controller chassis.

  During reverse identify, Guided Maintenance issues a command to light the LEDs on all of the chassis except for the affected chassis.

- Prepares the Oracle FS System for component replacement. For FRUs and CRUs that require you to bring the chassis offline, Guided Maintenance issues commands to redirect activity from a failed component to a redundant component and then brings the chassis offline.
- Displays replacement procedures for the failed FRU or CRU. For hot-serviceable FRUs and CRUs, Guided Maintenance presents a sequence of dialogs with the replacement steps. For FRUs or CRUs that require you to bring the chassis offline, Guided Maintenance provides a link to documentation containing the replacement steps.

Note: Only administrator accounts set up with support role privileges can access Guided Maintenance to replace FRUs.

Providing accurate system status and replacing FRUs and CRUs are complex operations that involve many lower level components within the system. The Oracle FS System is designed to be maintained without requiring support from Oracle Customer Support.

Each FRU and CRU has its own diagnostics, which are called by the Pilot to verify that a FRU or CRU is accessible and functioning properly. The diagnostics are primarily used to verify FRUs and CRUs that have been added or replaced. The system also tracks parts that have failed and have been removed to prevent re-insertion of failed components. Diagnostics run automatically when you replace a FRU or CRU.

Accessing Procedures on a Mobile Device

Each HTML Guided Maintenance page provides a QR code. Scan the QR code to access the replacement procedures on your mobile device. Make sure your mobile device has a QR code reader installed. QR code readers are available as free downloads from App stores.

Guided Maintenance Replaceable Components

Depending upon the type of component being replaced, Guided Maintenance provides different interfaces to help guide you through the replacement process.

Controller and Drive Enclosure Replaceable Components

For hot-serviceable Controller and Drive Enclosure components, Guided Maintenance presents a sequence of dialogs with the component replacement instructions. Follow the instructions in Guided Maintenance to replace the following hot-serviceable Controller and Drive Enclosure components:

Table 7: Hot-serviceable components

Controller components	Drive Enclosure components
Power supply	• Drives • I/O modules • Power cooling modules

For components that require you to initiate failover and bring the Controller offline, Guided Maintenance provides a link to HTML pages containing the replacement instructions. Follow the instructions to replace the following components:

- Battery
- Controller Identification Display
- CPU
- DIMMs
- Energy storage module (ESM)
- ESM backplane
- Fan modules
- HBAs
- Heat sink
- LED alarm assembly
- Motherboard assembly
- Motherboard cables
- NVDIMMs
- Power distribution board
- Riser

Pilot Components

Replacing Pilot components requires assistance from Oracle Customer Support. Oracle Customer Support identifies the failed component for you. You then use Guided Maintenance to prepare the Pilots for component replacement. Guided Maintenance provides a link to HTML pages containing the replacement instructions. Follow the instructions to replace the following Pilot components:

Table 8: Pilot replaceable components

Hot serviceable Pilot components	Pilot components that require powering down the Pilot
• Fan module • Power supply	• Battery • CPU • DIMMs • Heat sink • Motherboard • Pilot chassis • Pilot disk backplane • Riser • SAS HBA • SAS HDD • USB OSA flash drive

Access Guided Maintenance

Use Oracle FS System Manager (GUI) to access Guided Maintenance.

Prerequisites:

If you plan to replace a Controller field replaceable unit (FRU), you must sign into the GUI with an administrator account set up with Support role privileges.

Access to Replace a Controller Component (1)

For the following Controller components, access Guided Maintenance through System > Hardware.

- CPUs
- DIMMs
- Energy Storage Modules (ESMs)
- Fan modules
- Motherboard
- NVDIMMs
- Power supplies

1. From Oracle FS System Manager (GUI), navigate to System > Hardware.
2. Select Controllers.
   The GUI displays the Controllers Overview page. The Controllers Overview pages displays the status of the Controller components.
3. Select the Controller containing the component that is to be replaced.

4 Select Actions > View.
The View Controller dialog displays the list of replaceable Controller components in the Replaceable Unit list.

5 From the Replaceable Unit list, select the component that you want to replace and click Replace Component.

Guided Maintenance displays the Introduction page and guides you through the steps to replace the Controller component.

Access to Replace a Controller Component (2)

For the following Controller components, access Guided Maintenance through Support > System Trouble.

- Battery
- Customer identification display
- ESM backplane
- Heat sink
- LED alarm assembly
- Motherboard cables
- Power distribution board
- PCIe Riser

1 From Oracle FS System Manager (GUI), navigate to Support > System Trouble.

2 Select the Controller that contains the component that is to be replaced.

3 Select Actions > Replace Component.
Guided Maintenance displays the list of replaceable components for the Controller.

Note: Field replaceable units (FRUs) can only be replaced by field technicians with support role privileges.

4 Select a component from the list.

Guided Maintenance displays the Introduction page and guides you through the steps to replace the Controller component.

Access to Replace a Drive Enclosure Component

1 From Oracle FS System Manager (GUI), navigate to System > Hardware.

2 Select Drive Enclosures.

The GUI displays the Drive Enclosures Overview page. The Drive Enclosures Overview page displays the status of the Drive Enclosure components.

3 Select the Drive Enclosure containing the component that you want to replace.

4 Select Actions > View.

The View Drive Enclosure dialog displays the list of replaceable Drive Enclosure components in the Replaceable Unit list.

5 From the Replaceable Unit list, select the component that you want to replace and click Replace Component.

Guided Maintenance displays the Introduction page, and guides you through the steps to replace the Drive Enclosure component.

Access to Replace a Pilot Component

1 From Oracle FS System Manager (GUI), navigate to System > Hardware.

2 Select Pilots.

The GUI displays the Pilots Overview page.

3 Select a Pilot.

4 Select Actions > Repair Pilot.

Guided Maintenance displays the Pilot Repair page and guides you through the steps to replace a Pilot component.

CHAPTER 2

Oracle FS1–2 Global Procedures

Component Placement

Oracle recommends the following rack unit (RU) locations for installing the components in the rack:

Table 9: Default component placement in racks

Component type	RU space for installation	RU space if a DE2-24C DE follows RU 18
Drive Enclosures	RU 1 to RU 20	RU 1 to RU 18
Pilot-1	RU 21	RU 19
Pilot-2	RU 22	RU 20
Controller-1	RU 23, RU 24	RU 21, RU 22
Controller-2	RU 25, RU 26	RU 23, RU 24
Remaining Drive Enclosures	RU 27 to RU 42	RU 25 to RU 28 (next DE2-24C DE) RU 29 to RU 42

If the Oracle FS System includes one Replication Engine, then follow the placement shown in the following table:

Table 10: Component placement with one Replication Engine

Component type	RU space for installation	RU space if a DE2-24C DE follows RU 16
Drive Enclosures	RU 1 to RU 18	RU 1 to RU 16
Replication Engine-1	RU 19, RU 20	RU 17, RU 18
Pilot-0	RU 21	RU19
Pilot-1	RU 22	RU20
Controller-1	RU 23, RU 24	RU 21, RU22

Table 10: Component placement with one Replication Engine (continued)

Component type	RU space for installation	RU space if a DE2-24C DE follows RU 16
Controller-2	RU 25, RU 26	RU 23, RU 24
Remaining Drive Enclosures	RU 27 to RU 42	RU 25 to RU 28 (next DE2-24C DE) RU 29 to RU 42

If the Oracle FS System includes two Replication Engines, then follow the placement shown in the following table:

Table 11: Component placement with two Replication Engines

Component type	RU space for installation	RU space if a DE2-24C DE follows RU 14
Drive Enclosures	RU 1 to RU 16	RU1 to RU14
Replication Engine-2	RU 17, RU18	RU 15, RU 16
Replication Engine-1	RU 19, RU 20	RU 17, RU18
Pilot-0	RU 21	RU 19
Pilot-1	RU 22	RU 20
Controller-1	RU 23, RU 24	RU 21, RU 22
Controller-2	RU 25, RU 26	RU 23, RU 24
Remaining Drive Enclosures	RU 27 to RU 42	RU 25 to RU 28 (next DE2-24C DE) RU 29 to RU 42

If the Oracle FS System includes three Replication Engines, then follow the placement shown in the following table:

Table 12: Component placement with three Replication Engines

Component type	RU space for installation	RU space if a DE2-24C DE follows RU 12
Drive Enclosures	RU 1 to RU 14	RU 1 to RU 12
Replication Engine-3	RU 15, RU 16	RU 13, RU14
Replication Engine-2	RU 17, RU 18	RU 15, RU 16
Replication Engine-1	RU 19, RU 20	RU 17, RU 18
Pilot-0	RU 21	RU 19
Pilot-1	RU 22	RU 20
Controller-1	RU 23, RU 24	RU 21, RU 22

Table 12: Component placement with three Replication Engines (continued)

Component type	RU space for installation	RU space if a DE2-24C DE follows RU 12
Controller-2	RU 25, RU 26	RU 23, RU 24
Remaining Drive Enclosures	RU 27 to RU 42	RU 25 to RU 28 (next DE2-24C DE) RU 29 to RU 42

If the Oracle FS System includes four Replication Engines, then follow the placement shown in the following table:

Table 13: Component placement with four Replication Engines

Component type	RU space for installation	RU space if a DE2-24C DE follows RU 10
Drive Enclosures	RU 1 to RU 12	RU1 to RU10
Replication Engine-4	RU 13, RU 14	RU 11, RU 12
Replication Engine-3	RU 15, RU 16	RU 13, RU 14
Replication Engine-2	RU 17, RU 18	RU 15, RU 16
Replication Engine-1	RU 19, RU 20	RU 17, RU 18
Pilot-0	RU 21	RU 19
Pilot-1	RU 22	RU 20
Controller-1	RU 23, RU 24	RU 21, RU 22
Controller-2	RU 25, RU 26	RU 23, RU 24
Remaining Drive Enclosures	RU 27 to RU 42	RU 25 to RU 28 (next DE2-24C DE) RU 29 to RU 42

Component Numbering

Oracle FS Systems support two Pilots (Pilot-1 and Pilot-2). Additionally, Oracle FS Systems support two Controllers (Controller-1 and Controller-2) and 1 to 30 Drive Enclosures (DE-1 to DE-30).

The chassis ID number of the Drive Enclosure is based on the order by which the Controller identifies the Drive Enclosures. Drive Enclosures are also assigned a chassis ID number in the Oracle FS System Manager GUI that is labeled Enclosure Chassis ID. The chassis ID number can be changed using the GUI. The chassis ID number displayed on the chassis must always match the Enclosure Chassis ID displayed on the GUI.

Tip: The Drive Enclosure sticker on the back of the chassis must be removed once the Drive Enclosure is installed in the rack because the seven segment display is now the preferred method to identify the Drive Enclosure.

Tip: The chassis ID in the Drive Enclosure identification display always matches the ID shown in the GUI. Drive Enclosures are identified by the serial number and the World Wide Name (WWN). Sometimes, the physical order in which the Drive Enclosures are stacked and cabled in might differ from the cabling order recommended in this document. If the Drive Enclosures appear out of order (not, 1 through 30 in sequence bottom up), then the customer can change it through the GUI. But the GUI and the identification display on the chassis must always match.

The Pilots, Controllers, and the Replication Engines must also be numbered sequentially from the bottom to the top of the rack. Refer to the following example for more information on component numbering of the rack-ready Oracle FS Systems.

The chassis ID numbers on the Controllers can also be manually changed from the GUI.

Figure 10: Component numbering in Oracle FS Systems

RU	Component
42	4U DE (12)
41	
40	
39	
38	4U DE (11)
37	
36	
35	
34	4U DE (10)
33	
32	
31	
30	4U DE (09)
29	
28	
27	
26	Controller Node 2
25	
24	Controller Node 1
23	
22	Pilot Node 2
21	Pilot Node 1
20	Replication Appliance 2
19	
18	Replication Appliance 1
17	
16	2U DE (08)
15	
14	2U DE (07)
13	
12	2U DE (06)
11	
10	2U DE (05)
9	
8	2U DE (04)
7	
6	2U DE (03)
5	
4	2U DE (02)
3	
2	2U DE (01)
1	

RU	Component
42	4U DE (14)
41	
40	
39	
38	4U DE (13)
37	
36	
35	
34	4U DE (12)
33	
32	
31	
30	4U DE (11)
29	
28	
27	
26	Controller Node 2
25	
24	Controller Node 1
23	
22	Pilot Node 2
21	Pilot Node 1
20	2U DE (10)
19	
18	2U DE (09)
17	
16	2U DE (08)
15	
14	2U DE (07)
13	
12	2U DE (06)
11	
10	2U DE (05)
9	
8	2U DE (04)
7	
6	2U DE (03)
5	
4	2U DE (02)
3	
2	2U DE (01)
1	

Note: The above example shows eight DE2–24P Drive Enclosures (2 RU), four DE2–24C Drive Enclosures (4 RU), and two Replication Engines.

System-Wide Procedures

Data Backups

Regular backups are prudent IT practice. When you service hardware components that directly affect user data paths, we highly recommend that you first back up all user data to external media.

Important: Extraordinary system hardware changes (such as replacing a Controller) and software configuration changes (such as resetting the system to a factory-fresh state) and all other modifications not specifically mentioned in this document should only be attempted after consultation with Oracle Customer Support. A backup of data should always be done prior to all but routine maintenance actions.

Full system backups to external media must be performed when you want to perform any of the following actions:

- Remove a Drive Enclosure permanently from the Oracle FS System.

  Note: You need not always perform a complete data backup to remove Drive Enclosures from an Oracle FS System. However, prior to removal make sure that all necessary resources have been migrated from the Drive Enclosure and the system configuration is not located on the Drive Enclosure. For more information, contact Oracle Customer Support.

- Clear the system configuration. This action removes all user and system data.

  Caution: Before you clear the system configuration, consult with Oracle Customer Support to avoid the risk of losing system configuration data.

To back up the system, refer to the documentation for your backup application.

Power Cycling

Contact Oracle Customer Support before power cycling an Oracle FS System except in the event of an emergency, in which case, drop all power and then contact Oracle Customer Support.

Contact Oracle Customer Support before touching any power cables or switches. There are some situations where not power cycling the entire system is the correct action.

For failure testing, do not power cycle individual components without first contacting Oracle Customer Support.

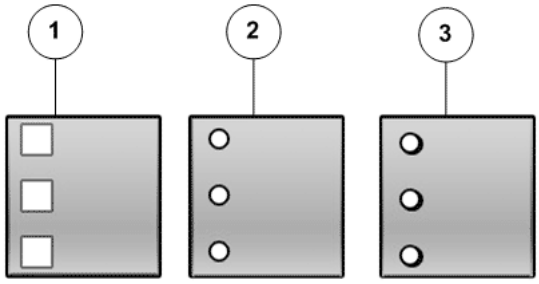
Controller Rails

Adding Controllers in the rack requires you to install rack rails in the rack and slide rails on the chassis for each Controller that you plan to add.

Controller rail kits can be installed in the Sun ™ Rack 900, the Sun Rack 1000, and third-party ANSI/EIA 310-D-1992 or IEC 60927 compliant racks with the following types of holes:

- Square
- Round
- Threaded

Figure 11: Examples of supported rack holes



Legend

1 Square holes
2 Round holes
3 Threaded holes

Caution: Oracle recommends that you install each Controller after you install the rail kit before installing the next combination of rail kit and Controller. Installing all of the rail kits and then inserting the Controllers is not always possible because of potential space limitations at some data centers. Also, you run the risk of not placing the Controllers in the correct rack position and causing possible cabling issues.

Note: Controller rails are packaged within the Pilot shipping carton (not the Controller shipping carton). Ensure that the Controller rails are not misplaced during unpacking.

Related Links

Controller Rail Kits

Controller Rail Kits

The Controller rail kit contains the following items:

- One slide rail that attaches to the rack posts
- One mounting bracket that attaches to the Controller chassis
- CMA with six pre-installed cable clips
- Package of mounting screws and nuts in assorted sizes to fit various types of racks and cabinets
- Manufacturer's instruction sheet for the CMA

The following table summarizes the mounting hardware packaged with the Controller rail kits.

Table 14: Controller rail kit mounting screws

Contents of the mounting screw packet	Quantity	Usage
10-32 pan head screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 pan head screw	4	Mount left and right rails to front of cabinet rails
Metric M6 pan head screw	8	• Mount left and right rails to back of cabinet rails • Secure front of chassis to left and right cabinet rails
6–32 flat head screw	2	Secure back of chassis to left and right side rails

Tip: Ensure that you have all of the parts in the Controller rail kit before you begin the installation of the Controller rails on the rack and the Controller chassis.

Note: To locate part numbers for the rail kits, open *Oracle System Handbook* (https://support.oracle.com/handbook_private/index.html) and go to the Oracle FS1 Flash Storage System components list. Part numbers are listed in the components list.

Related Links

Controller Rails

Install the Rack Rails for the Controller

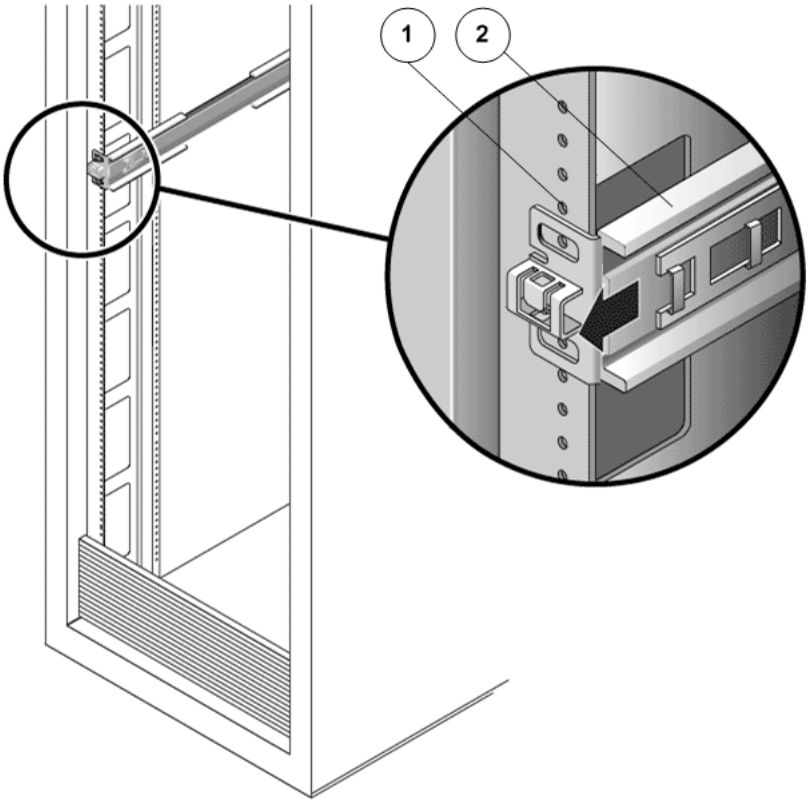
Prior to adding Controllers, install rails into the rack for each Controller that you plan to add.

Prerequisites:

- Ensure that you have adequate room to work around the rack while installing the rails and the Controller.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- If you are installing the rails in a rack with threaded holes, make sure you have a Torx Number 20 screwdriver.

1. Mark the rack mount hole where you plan to mount the Controller.
   The Controller requires two standard rack units (2U) of vertical space.
2. Remove the rails from the packaging.
3. Position the front of the left rail behind the left front rack rail.

Figure 12: Controller rack mount location



Legend

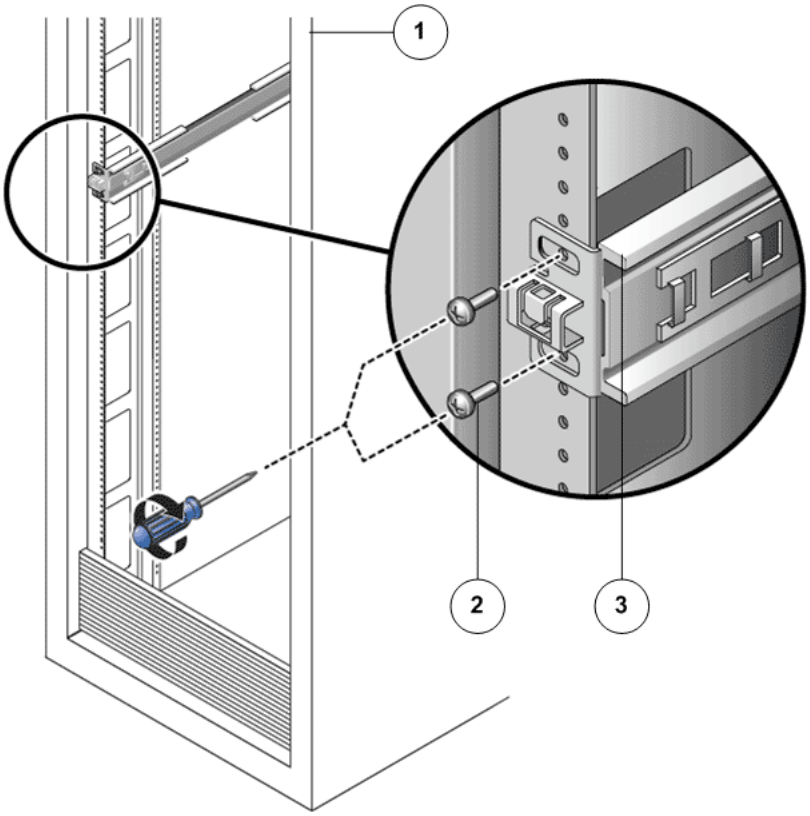
1 Rack mount holes
2 Left rail

4 Use a Phillips Number 2 screwdriver to insert and tighten two 8-32 panhead screws to secure the left rail to the front of the rack.

Note: Each Controller requires two standard mounting units (2U) of vertical space in the rack. Each standard mounting unit (U) has three mounting holes in the left and right rack rails.

Note: Insert the screws into the lowest holes in the top two mounting units of the 2U slot in which the chassis is to be mounted. These screws pass through the rack rail holes and screw into threaded holes in the left rail.

Figure 13: Left rail secured to the front of the rack



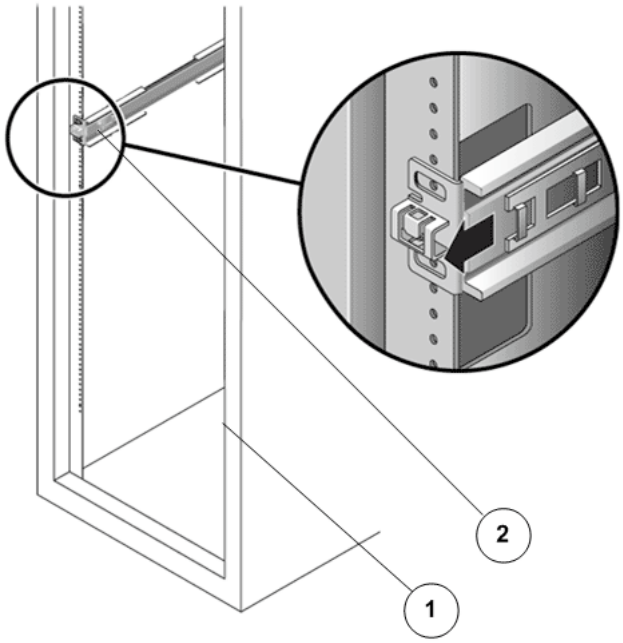
Legend

1 Rack
2 8–32 screws to secure left rail to rack
3 Left rail

5 Repeat the above two steps for the right rail.

6 At the back of the rack, adjust the length of the left rail as needed to fit the rack, and position the rail flange over the face of the rack rail.

Figure 14: Left rail adjusted at the back of the rack



Legend

1 Back of the rack
2 Left rail

7 Align the rail flange so that the mounting holes correspond to those at the front of the rack.

8 Use a Phillips screwdriver to insert and tighten four metric M6 screws (two on each side) at the back of the rail.

9 Repeat the above three steps for the right rail.

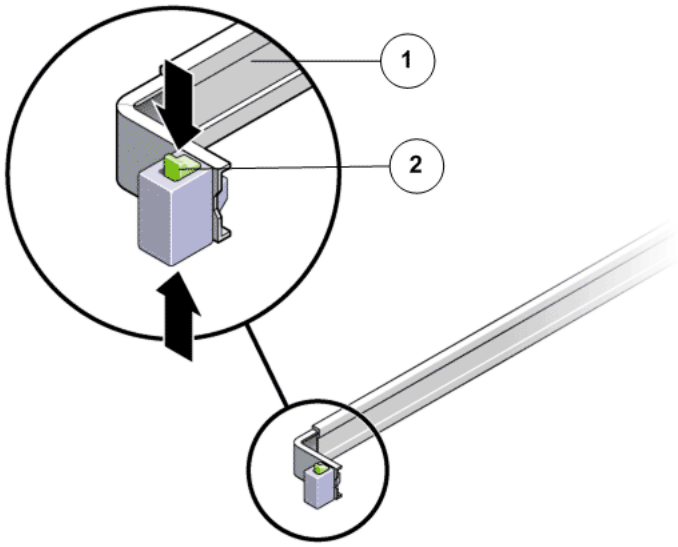
10 Using a Phillips Number 2 screwdriver, tighten the eight 10-32 panhead adjustment screws (four on each side) toward the back of each rail.

Install the Slide Rails for the Controller

1 Extend the mounting brackets completely out of their respective slide rails.

Tip: To extend the mounting brackets out of the slide rails, simultaneously press and hold the upper and lower lock buttons of the slide rail lock. Then, pull the mounting bracket out until it locks in the extended position.

Figure 15: Slide rail assembly unlocked

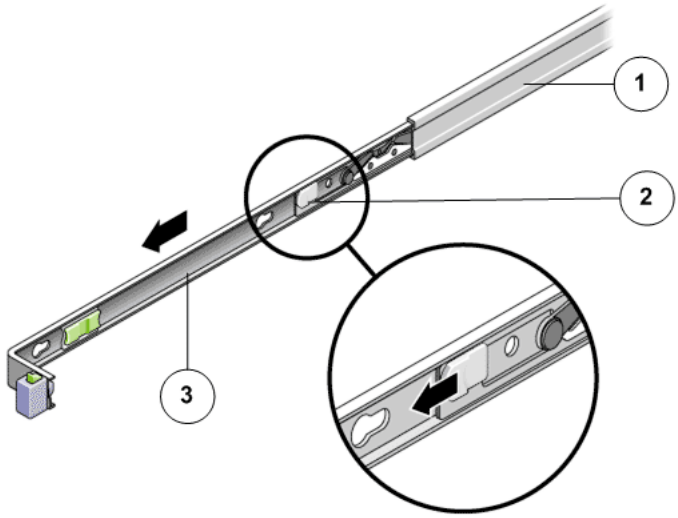


Legend

1	Slide rail assembly
2	Slide rail lock button

2 Slide the mounting bracket release button, and then slide the mounting bracket out of the slide rail.

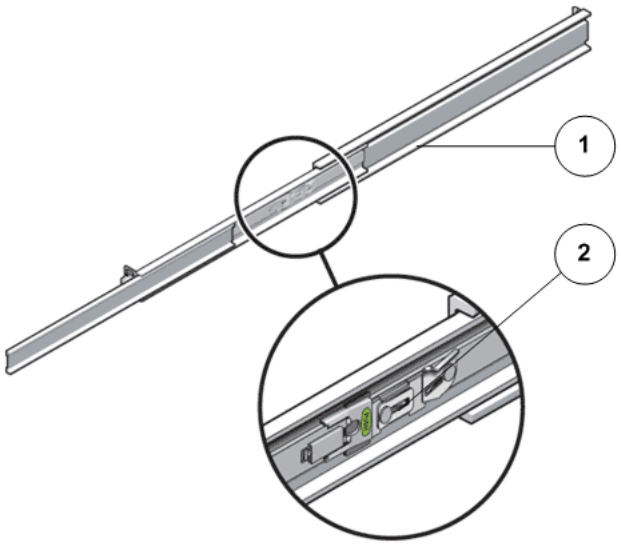
Figure 16: Mounting bracket release button



Legend

1 Slide rail
2 Mounting bracket release button
3 Mounting bracket

Figure 17: Slide rail middle section unlocked



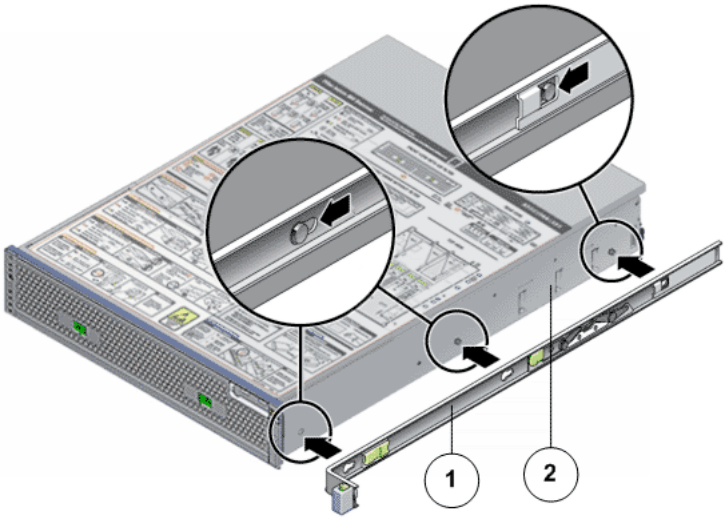
Legend

1 Slide rail
2 Metal lever

Tip: Press the metal lever on the middle section of the slide rail to unlock the slide rail, and then push the middle section back into the rack.

3 Attach a mounting bracket to the right side of the Controller chassis.

Figure 18: Mounting bracket attached to the chassis



Legend

1	Mounting bracket
2	Controller chassis

Tip: Position the mounting bracket against the Controller chassis so that the mounting bracket are aligned with screw holes and then install the screws.

4 Attach the second mounting bracket to the left side of the Controller chassis.

5 Determine which rack hole numbers to use when attaching the slide rails to the rack posts.

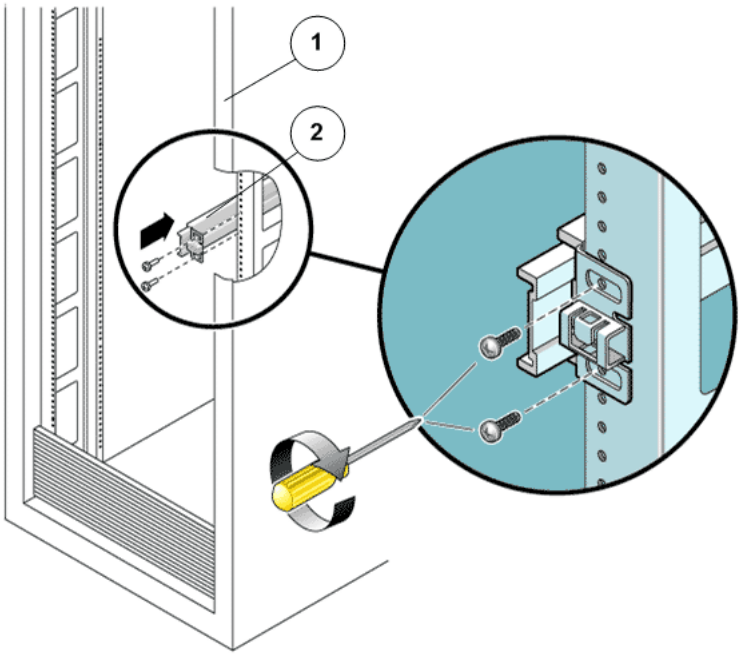
Note: The Controller is two rack units tall (2U). The slide rails will occupy the lower half of the 2U space.

6 Determine which screws you will use to mount the slide rails.

Tip: If your rack has threaded mounting holes in the rack posts, determine whether the threads are metric or standard. Select the appropriate screws from the package included in the mounting kit. If your rack does not have threaded mounting holes, the mounting screws are secured with a caged nut.

7 Attach a slide rail to the right front rack post.

Figure 19: Slide rail mounted on the rack post



Legend

1	Rack post
2	Slide rail

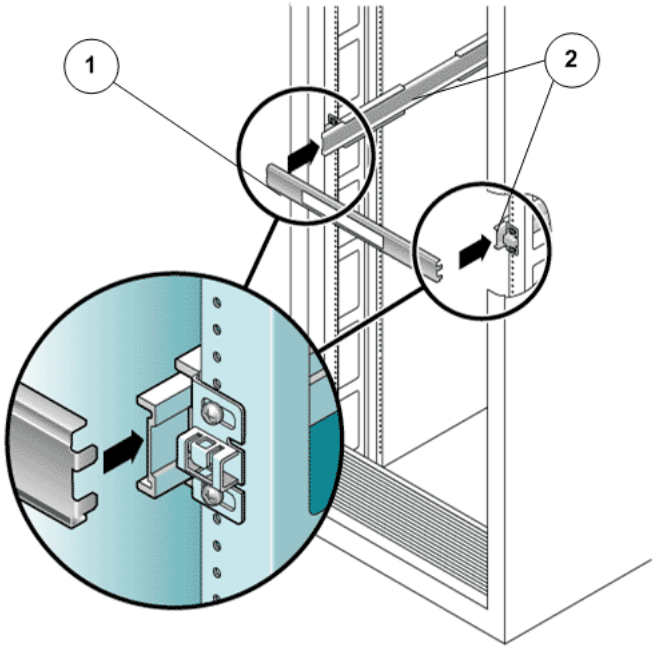
Tip: Loosely attach the front of a slide rail to the right front rack post using two screws but do not tighten the screws yet. Adjust the length of the slide rail by sliding the back mounting flange to reach the outside edge of the back rack post. Loosely attach the back of the slide rail to the back rack post with two screws.

8 Attach the second slide rail to the left rack posts in a similar manner.

Tip: Do not tighten the screws.

9 Use the slide rail spacing tool to adjust the distance between the slide rails.

Figure 20: Slide rail spacing tool



Legend

1 Spacing tool
2 Slide rails

Tip: At the front of the rack, plug the left side of the tool into slots at the end of the left rail. Insert the right side of the tool into the front end of the right rail, while sliding the end of the rail to the right or left as needed to allow the ends of the tool to enter the ends of both rails. The distance between the rails is now equal to the width of the Controller with mounting brackets.

10 Tighten the screws to lock the front ends of the rails in place.

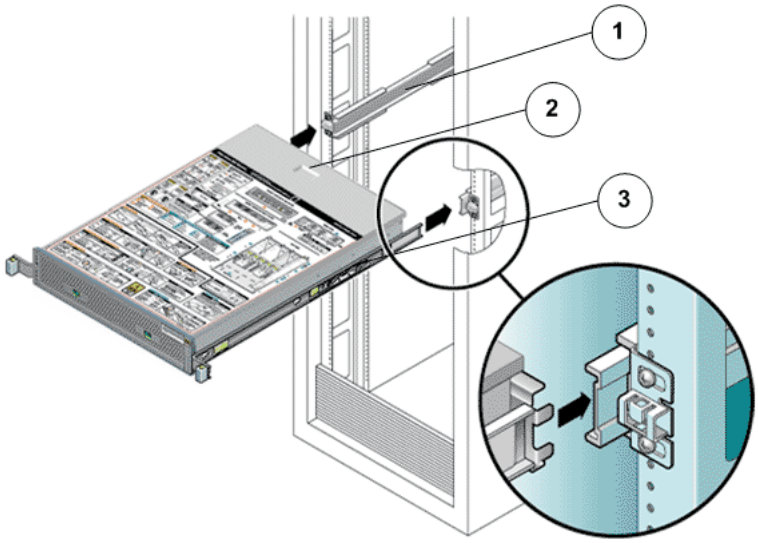
11 Repeat the steps for the back ends of the rails.

12 Deploy the anti-tilt mechanism on the rack, if any.

Caution: The weight of the Controller on extended slide rails can be enough to overturn a rack.

13 Insert the ends of the mounting brackets into the sliding rails.

Figure 21: Controller chassis mounted on the slide rails



Legend

1 Slide rails
2 Controller chassis
3 Mounting brackets

Caution: Work with a partner or use a mechanical lift for assistance. The Controller weighs approximately 70 lbs (31.75 kg). Two people are required to carry the chassis.

14 Simultaneously release the rail locks on each side of the sliding rails, and guide the Controller chassis into the rack.

Caution: Verify that the Controller is securely mounted in the rack, and that the slide rails are locked to the mounting brackets, before continuing.

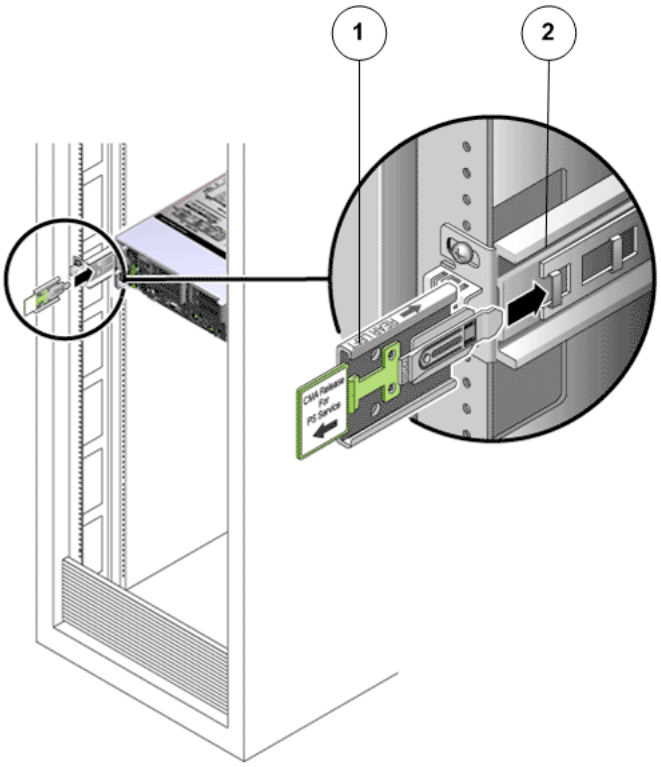
Install the Controller CMA

The cable management arm (CMA) clips into the ends of the left and right Controller slide rail assemblies. No screws are necessary for mounting the CMA. The right sides of the two CMA arms have hinged extensions. On the manufacturer's instruction sheet, the smaller extension is called the CMA Connector for Inner Member. It attaches to the right mounting bracket. The larger extension is called the CMA Connector for Outer Member, and attaches to the right sliding rail.

Note: The CMA shown in the graphics might vary slightly from the CMA shipped with your product.

1 At the back of the rack, plug the CMA rail extension into the end of the left slide rail assembly.

Figure 22: CMA rail extension inserted into the back of the left slide rail



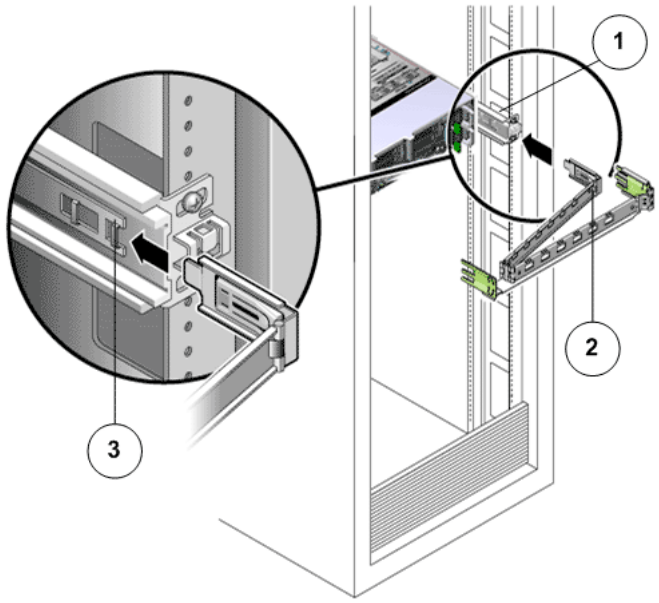
Legend

1	CMA rail extension
2	Slide rail

Caution: Support the CMA during this installation. Do not allow the assembly to hang by its own weight until it is secured by all three attachment points.

2 Insert the smaller extension into the clip located at the end of the mounting bracket.

Figure 23: Inner CMA connector mounted

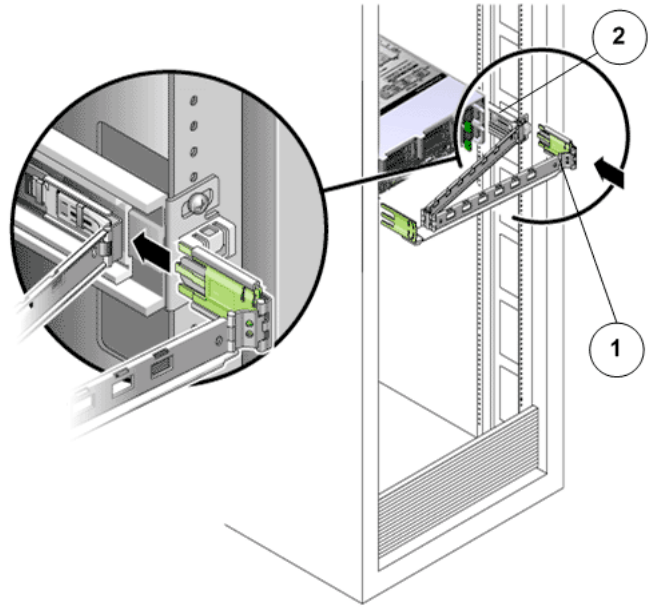


Legend

1 Slide rail
2 Inner CMA connector
3 Clip

3 Insert the outer CMA connector into the end of the right sliding rail.

Figure 24: Outer CMA connector attached

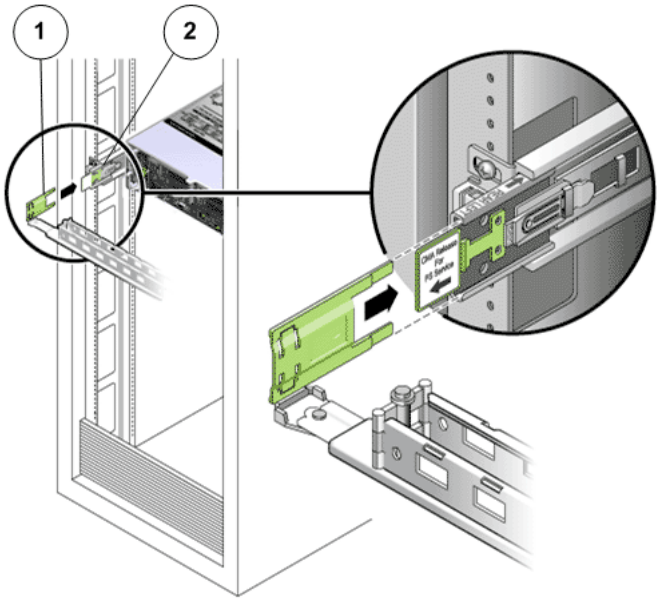


Legend

1	Outer CMA connector
2	Slide rail

4 Fully insert the hinged plastic connector at the left side of the CMA into the CMA rail extension.

Figure 25: Left side of the slide rail mounted



Legend

1	Plastic tab on CMA rail extension
2	Slide rail

Insert the Controller Into a Rack

Prerequisite:

Ensure that you have a magnetic-tipped Phillips Number 2 screwdriver with at least a four-inch shank.

Caution: Do not power on the Controller until all components have been installed and all internal private management interface (PMI) and private interconnect (PI) cables have been connected.

Caution: Work with a partner or use a mechanical lift for assistance. The Controller weighs approximately 41 lbs (18.59 kg). Two people are required to unmount and carry the chassis.

Caution: Deploy any rack anti-tilt mechanisms before installing the Controller into the rack to prevent the rack from tipping over during component installation.

Caution: Always load equipment into a rack from the bottom up so that the rack will not become top-heavy and tip over.

Caution: Slide-rail-mounted components are not to be used as a shelf or a work space.

Caution: Elevated operating ambient temperature: If the Controller is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment might be greater than room ambient temperature. Therefore, consideration should be given to installing the components in an environment compatible with the maximum ambient temperature (TMA) specified for the Controller.

1. Using two people, one at each side of the Controller, carefully lift and position the Controller on the bottom ledge of the left and right rails.

   Caution: Do not use the power supply handles to lift the chassis. Using the power supply handles to lift the chassis can damage the power supplies and disrupt electrical power to the Controller.

2. Carefully slide the Controller into the rack until the front flanges of the Controller touch the vertical face of the rack.
3. Use a Phillips screwdriver to install and tighten the four M6 panhead screws (two on each side) to secure the chassis to the front of the rack.
4. Install and tighten two 6-32 screws (one on each side) at the back of the chassis, to secure the back of the chassis to the rack.

Verify Operation of the Slide Rails and the CMA

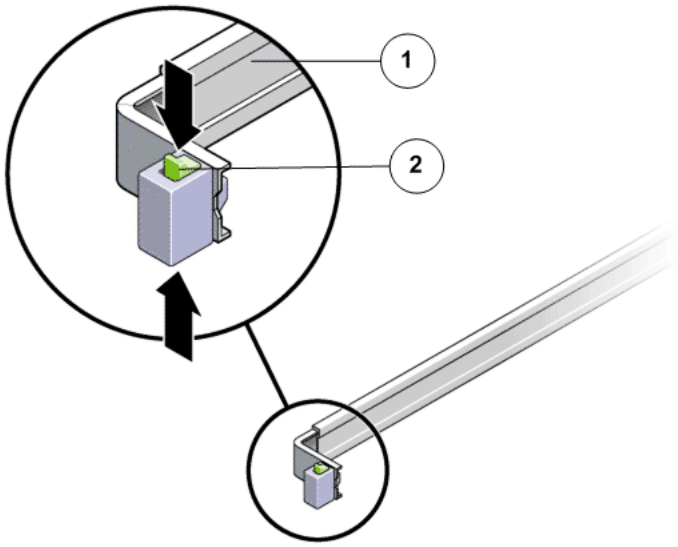
Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Two people are needed to verify the operation of the slide rails and the cable management arm (CMA): one to move the Controller in and out of the rack and one to observe the cables and CMA.
- To reduce the risk of personal injury, stabilize the expansion rack cabinet and extend all anti-tilt devices before extending the Controller from the rack.

Caution: Work with a partner or use a mechanical lift for assistance. The Controller weighs approximately 41 lbs (18.59 kg). Two people are required to unmount and carry the chassis.

1. Unlock the slide lock buttons at the right and left sides of the Controller chassis, and slowly pull the Controller out of the rack until the slide rails reach their stops.

Figure 26: Controller slide rails unlocked



Legend

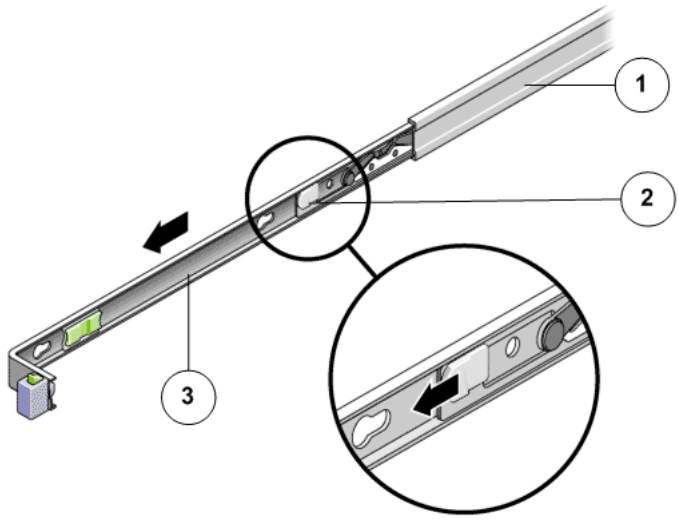
1	Slide rail assembly
2	Slide rail lock button

2 Inspect the attached cables for any binding or kinks.

3 Verify that the CMA extends fully and does not bind in the slide rails.

4 When the Controller is fully extended out, release the mounting bracket release button.

Figure 27: Mounting bracket release button



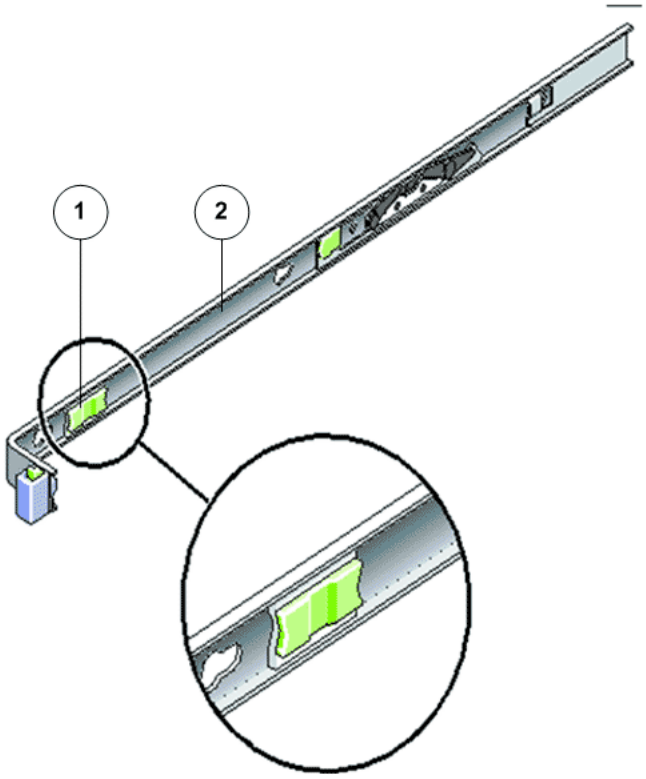
Legend

1	Slide rail
2	Mounting bracket release button
3	Mounting bracket

5 Slide the Controller back into the rack.

6 Simultaneously unlock both slide rail release buttons, and push the Controller completely into the rack.

Figure 28: Slide rail release button



Legend

1	Slide rail release button
2	Slide rail

Note: The Controller should stop after approximately 15 inches (40 cm) of travel.

7 Verify that the cables and the CMA retracted without binding.

8 Adjust the cable hangers and CMA as required.

Drive Enclosure Rails

To prepare a rack for adding Drive Enclosures to the Oracle Flash Storage System, you must install rails in the rack for each Drive Enclosure that you plan to add. Oracle includes rail kits in the Drive Enclosure packaging.

Use one of the following racks for the Drive Enclosure:

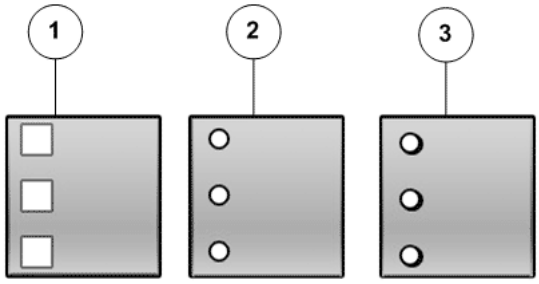
- Sun Rack II 1042/1242 rack
- Any 19-inch wide, four-post, EIA-compatible rack with a front-to-back depth between vertical cabinet rails of 24 inches to 36 inches (61 cm to 91 cm)

Drive Enclosures rail kits can be installed in racks with the following types of holes:

- Square
- Round
- Threaded (must be M6 or 10-32 racks)

The following figure shows examples of supported rack holes.

Figure 29: Examples of supported rack holes

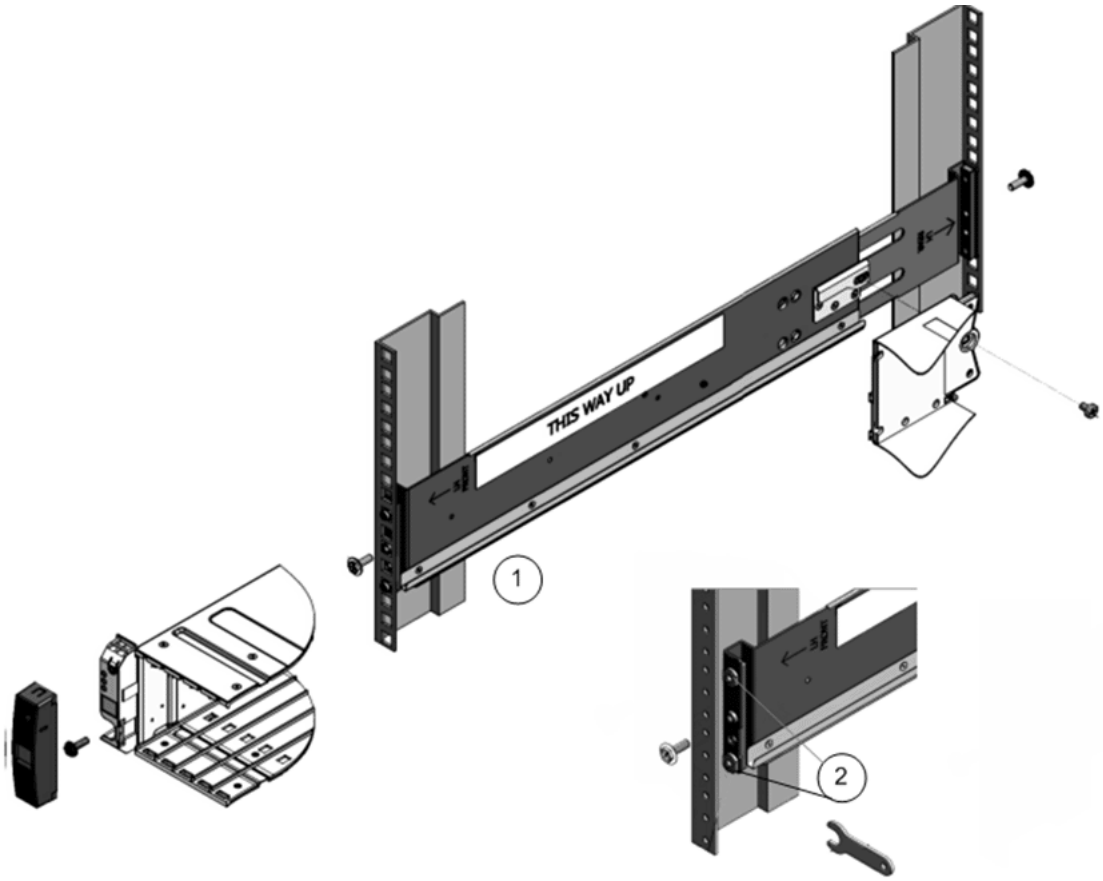


Legend

1 Square holes	3 Threaded holes
2 Round holes	

The following figures show the rails for both Drive Enclosure types.

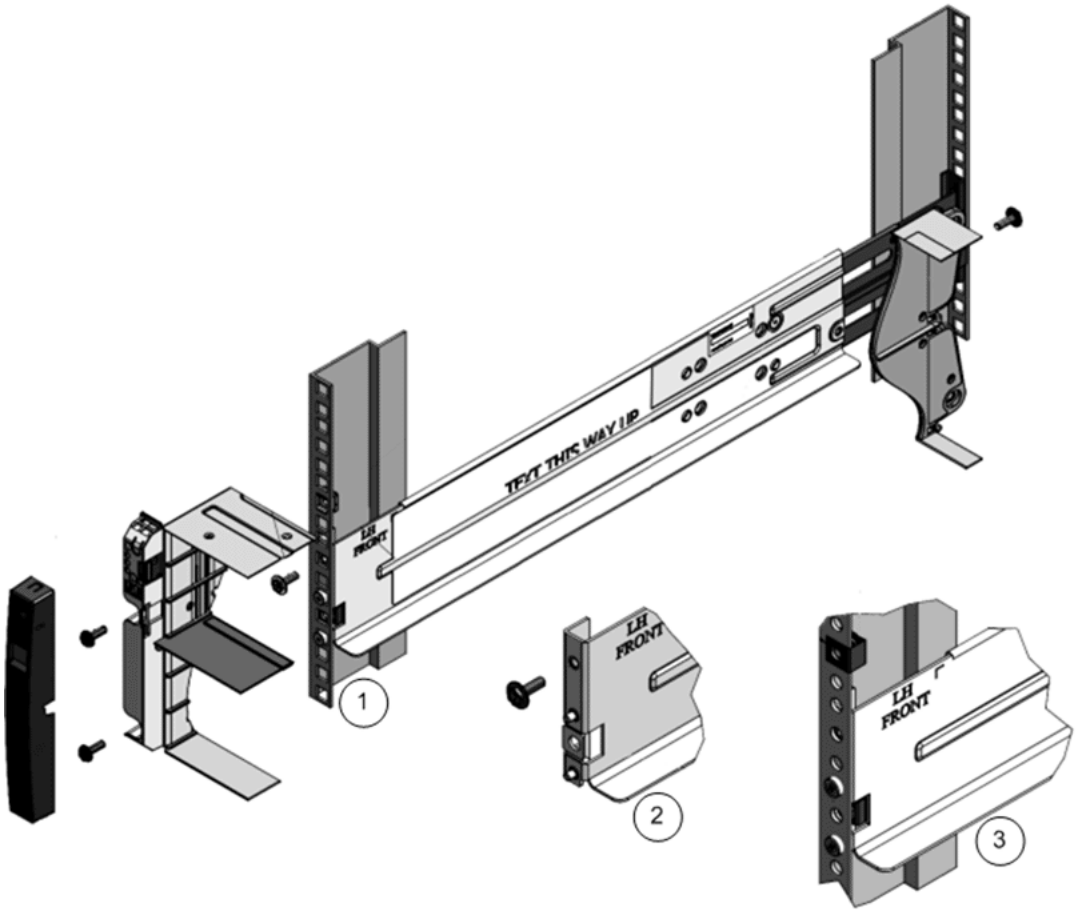
Figure 30: Rails for the DE2-24P Drive Enclosure



Legend

1 Left-side rail for square-hole and round-hole racks	2 Adaptor pins for threaded-hole racks

Figure 31: Rails for the DE2-24C Drive Enclosure



Legend

1 Left-side rail for square-hole racks	3 Round-hole racks
2 Threaded-hole racks	

Related Links

Install Drive Enclosure Rails
Drive Enclosure Rail Kits

Drive Enclosure Rail Kits

The following table summarizes the contents of the Drive Enclosure rail kits.

Table 15: Drive Enclosure rail kits

Type of Drive Enclosure	Contents
DE2-24P Drive Enclosure	2 Phillips Number 2 pan head screws with patch lock 2 Phillips hex flange head screws (11mm) 1 Left-hand rail assembly 1 Right-hand rail assembly 4 Phillips Number 2 ACR hex flange screws 1 10mm wrench 8 Threaded rack adaptor pegs 1 Threaded rack adaptor kit label 4 Phillips hex flange screws (13mm)
DE2-24C Drive Enclosure	2 Phillips Number 2 pan head screws with patch lock (M5 x 16) 1 Left-hand rail assembly 2 Phillips hex flange head screws (11mm) 1 Right-hand rail assembly 2 Cage nuts 4 Orange service screw labels 2 Clip nuts 8 Special screws for round hole rack 1 Rail kit user label 2 Phillips Number 2 pan head screws with patch lock (M5 x 6) 4 Phillips hex flange head screws (13mm) 4 Phillips Number 2 ACR hex flange head screws

To locate part numbers for the rail kits, open *Oracle System Handbook* (https://support.oracle.com/handbook_private/index.html) and go to the Oracle FS1 Flash Storage System components list. Part numbers are listed in the components list.

Related Links

Drive Enclosure Rails

Install Drive Enclosure Rails

Install Drive Enclosure Rails

Prior to adding Drive Enclosures, install rails into the rack for each Drive Enclosure that you plan to add.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- If you are installing the rails in a rack with threaded holes, make sure you have a Torx Number 20 screwdriver.
- Ensure that you have a flashlight to use when verifying that the Drive Enclosure is seated in the rack.

Related Links

Drive Enclosure Rail Kits

Install Rails for DE2-24P Drive Enclosures

The rails for the DE2-24P Drive Enclosure are preassembled with rail-location pegs on the front and back for installation in a square hole rack and a round hole rack. If you install the rails in a threaded, universal 19-inch rack, you must replace the rail-location pegs with adaptor pins before installing the rails in the rack.

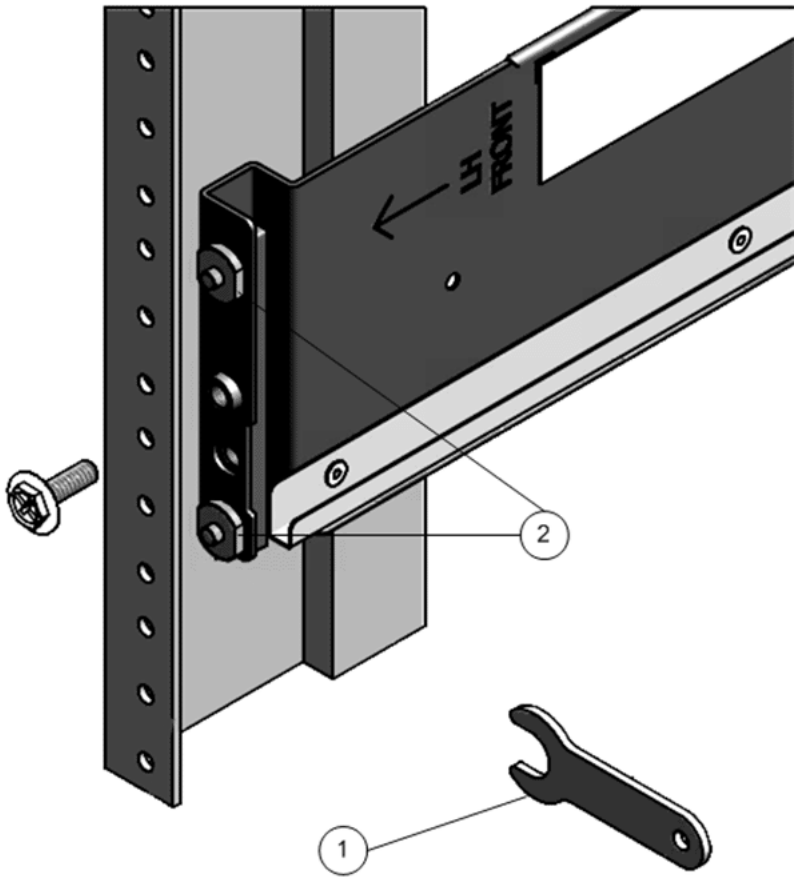
Note: To simplify the following procedures, install the left-side rail assembly first and then the right-side rail assembly.

Install Rails in Threaded Racks

1. Use a Torx Number 20 screwdriver to remove the rail-location pegs from the front and back of the rails.
2. Use a 10mm wrench to insert the adaptor pins into the ends of the rails where you removed the rail-location pegs.

   A 10mm wrench and adaptor pins are included in the rail kit packaging.

Figure 32: 10mm wrench and adaptor pins



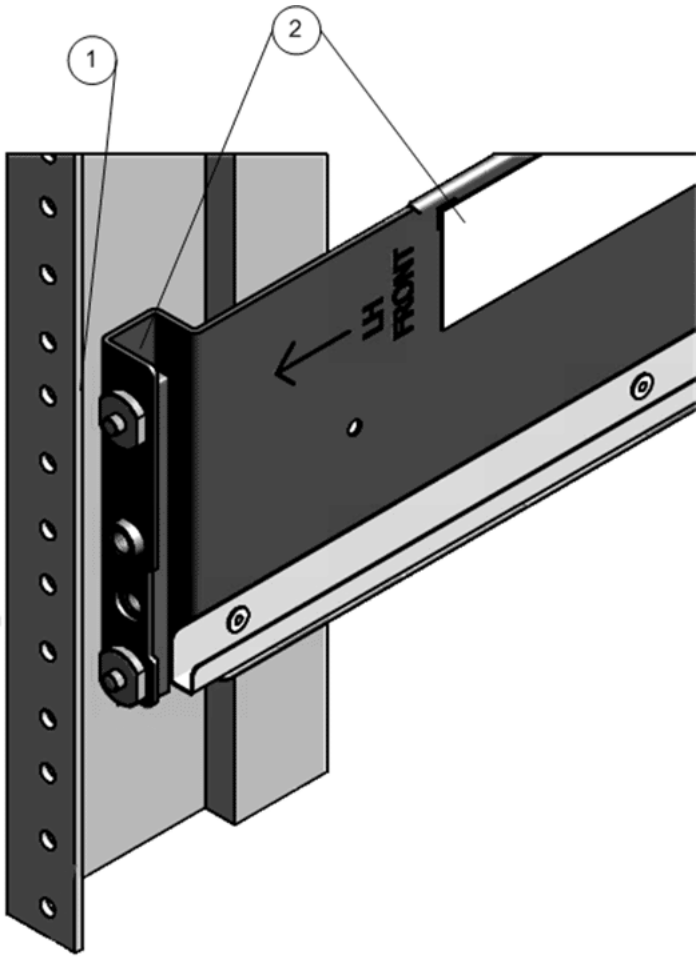
Legend

1 10mm wrench	2 Adaptor pins

3 Position the front of the rails inside of the rack, with the rail flange inside of the rack flange.

The rail label faces the inside of the rack. The pins should be fully located within the rack holes.

Figure 33: Rack flange, rail flange, and rail label (front)



Legend

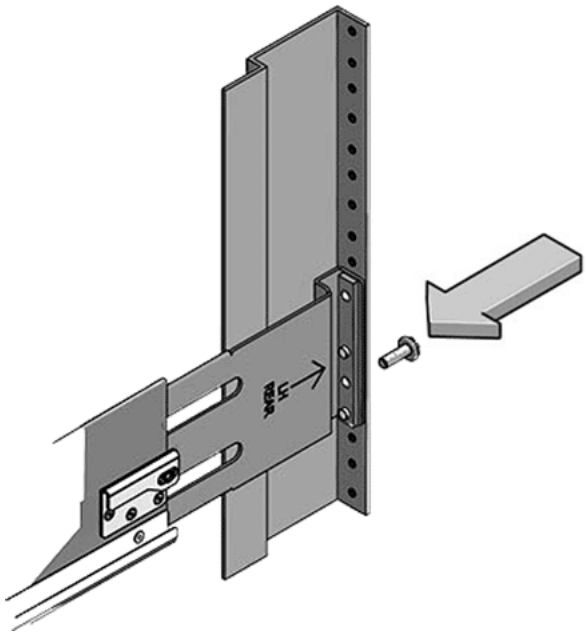
1 Rack flange	2 Rail flange and label

4 Insert and loosely tighten one screw through the front of the rack and into the top hole in the rails.

5 Adjust the rail lengths and locate the back pins inside the corresponding back rack holes.

6 Insert and loosely tighten one screw through the back of the rack and into the back of the rails.

Figure 34: Back-mounting screw



Install Rails in Square or Round Hole Racks

1. Locate the appropriate rack unit (RU) height.

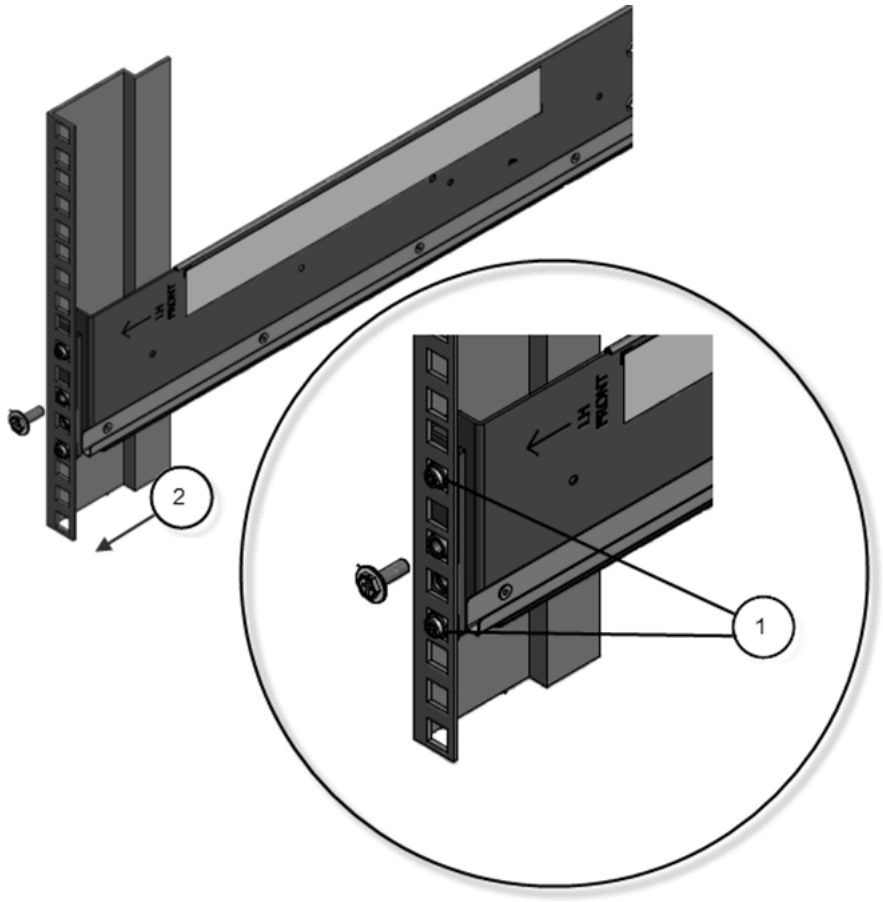
   The DE2-24P Drive Enclosure requires two standard mounting units (2U) of vertical space in the rack.

2. Remove the rails from the Drive Enclosure packaging.

3. Position the front rail-location pegs fully inside the holes in the front rack posts where you plan to add a Drive Enclosure.

   Make sure the rail label faces the inside of the rack. Align the rail flange inside of the rack flange. Position the rail-location pegs fully within the rack holes.

Figure 35: Front of the rack and rail-location pegs

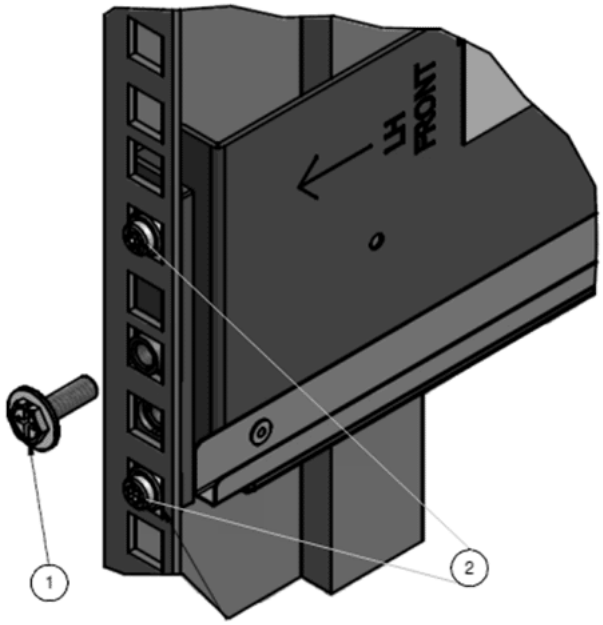


Legend

1 Rail-location pegs	2 Front rack post

4 Insert and tighten one Phillips 13mm head hex flange screw through the front rack hole and into the top hole of the rail.

Figure 36: A Phillips 13mm head hex flange screw and the front of a rack



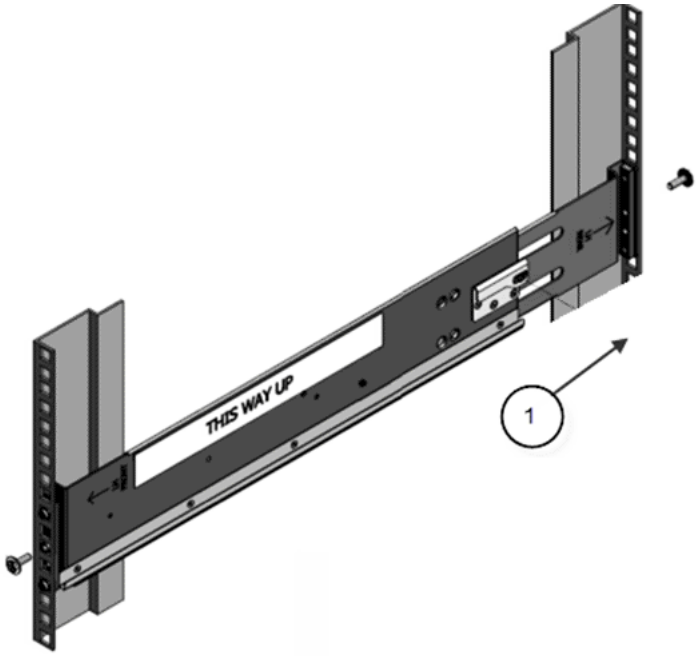
Legend

1 Phillips 13mm head hex flange screw	2 Rail-location pegs

5 From the back of the rack, position the pegs fully into the corresponding rack holes.

To position the pegs, extend the length of the rail to the back of the rack and position the pegs through the appropriate rack holes.

Figure 37: Extended rail to the back of the rack

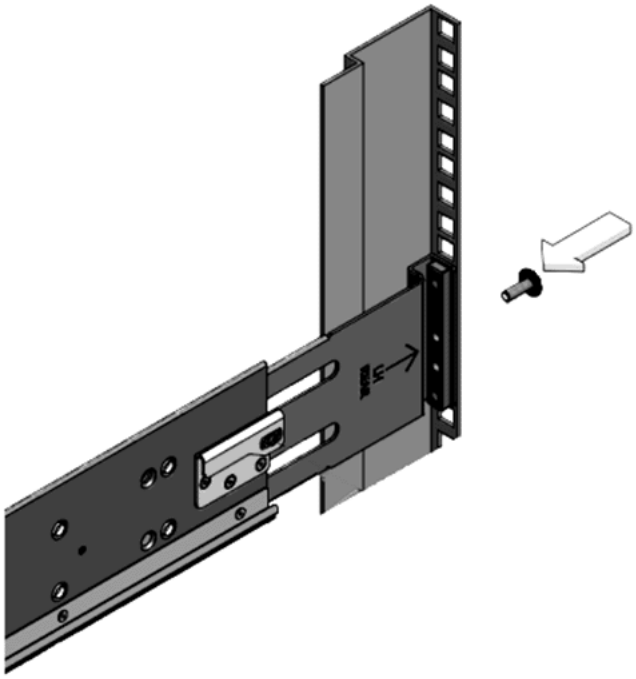


Legend

1 Back of the rack

6 Insert and tighten one Phillips 13mm head hex flange screw into the back of the rack and into the rail.

Figure 38: A Phillips 13mm head hex flange screw and the back of a rack



7 Repeat steps 1-6 to install the right-hand rail assembly.

Install Rails for DE2-24C Drive Enclosures

1 Locate the appropriate rack unit (RU) height.

The DE2-24C Drive Enclosure requires four standard rack units (4U) of vertical space.

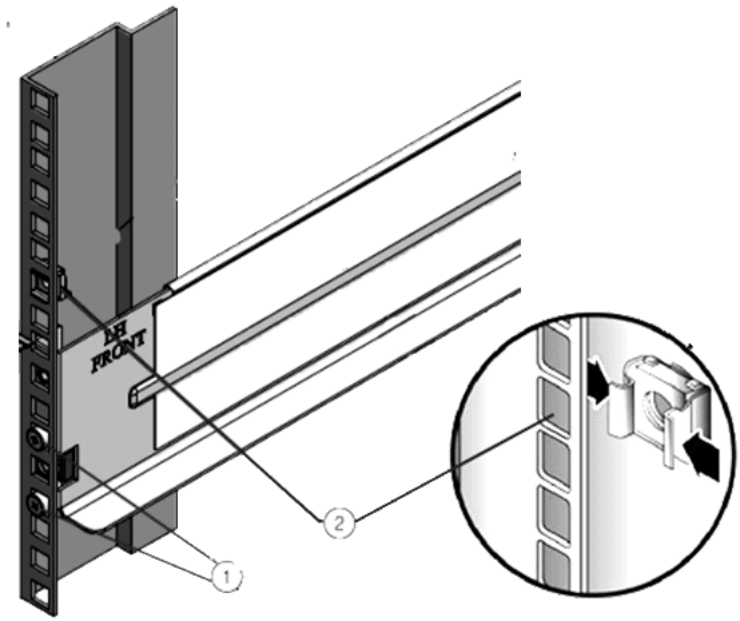
2 Remove the rails from the Drive Enclosure packaging.

3 If you are installing rails in a square-hole rack, snap one cage nut into the eighth rack hole on both sides of the rack.

To locate the eighth rack hole, count eight holes upward from the bottom rail location peg.

The following figure shows a cage nut installed in a square-hole rack.

Figure 39: Cage nut installed in a square-hole rack



Legend

1 Rail-location pegs	2 Cage nut

4 Prepare the screws in each rail end.

Square-hole racks

No preparation is required.

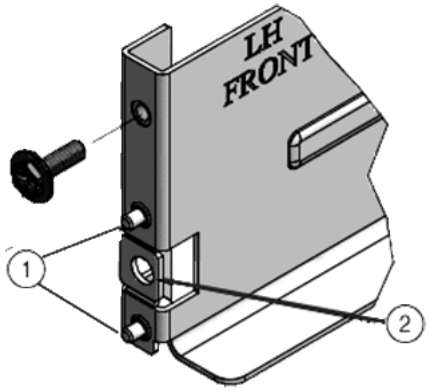
Round-hole racks

Remove the two rail-location pegs from each rail end and replace them with the special screws from the rail kit. The special screws are part number 0093340-02.

Threaded-hole rack

Remove the two rail-location pegs from each rail end and replace them in the opposite direction from inside of the rail flange. Remove and discard the clip nut from the front rail.

Figure 40: Rail-location pegs from inside of the rail flange and the clip nut



Legend

1 Rail location pegs from inside of the rail flange	2 Clip nut

5 Position the front of the rails inside of the rack.

Make sure the rail flange aligns with the inside of the rack flange and the rail label faces the inside of the rack.

Square-hole racks

The rail-location pegs fit inside of the rack holes.

Round-hole rack

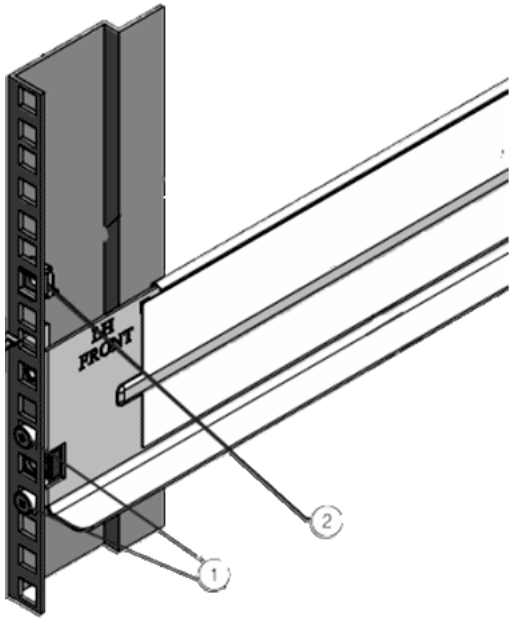
The special screws fit inside of the rack holes.

Threaded-hole rack

The rail-location pegs fit inside of the rack holes.

The following figure shows an example of the rail-location pegs inserted into a square-hole rack.

Figure 41: Rail-location pegs and a square-hole rack

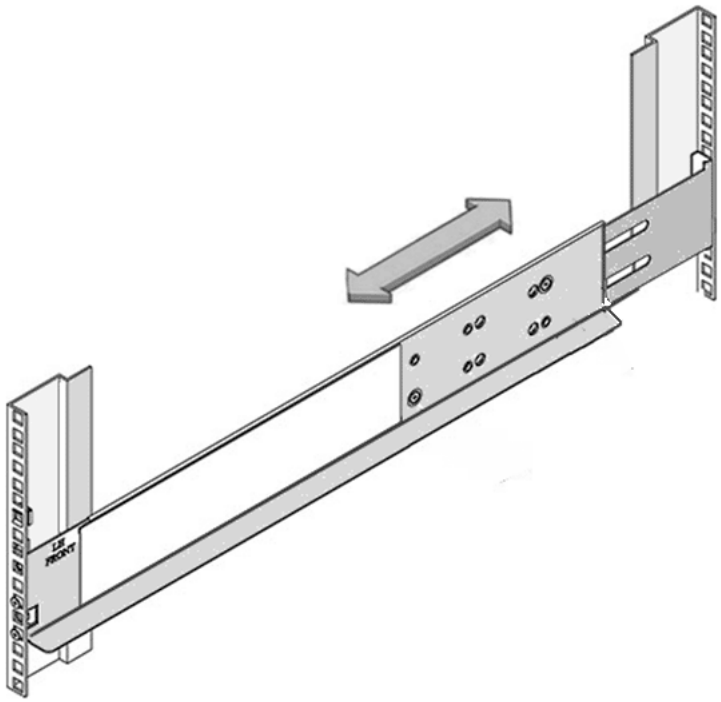


Legend

1 Rail-location pegs	2 Cage nut

6 Extend the rail length towards the back of the rack and into the rail holes at the back of the rack.

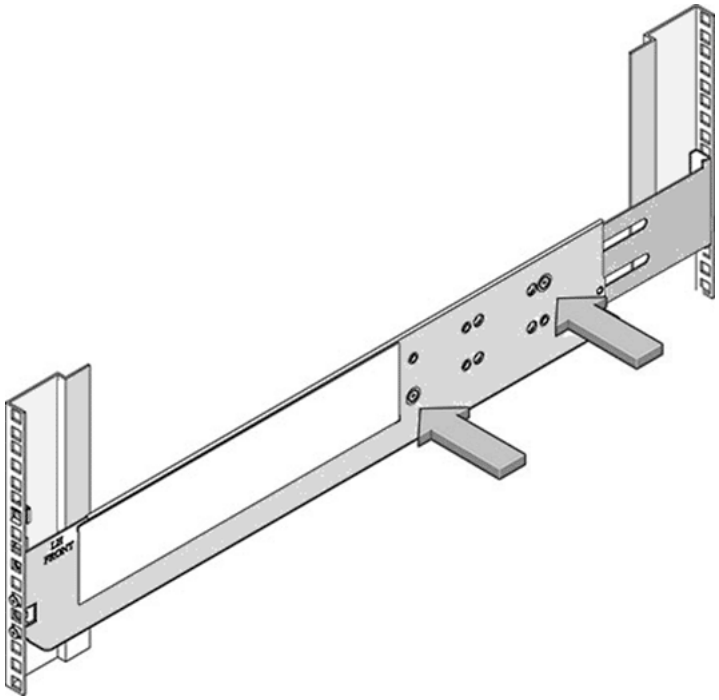
Figure 42: Rail extended to holes in the back of the rack



7 Insert and fully tighten one Phillips 13mm head hex flange screw through the back of the rack and into the rail.

8 Tighten the two locking screws in the side of the rail.

Figure 43: The locking screws and side of the rail



9 Repeat steps 1 - 8 to install the right-hand rail assembly.

Insert a DE2-24P Drive Enclosure Into a Rack

1 Carefully lift the Drive Enclosure to the location of the prepared slot and rest the Drive Enclosure on the bottom ledge of the left and right rails.

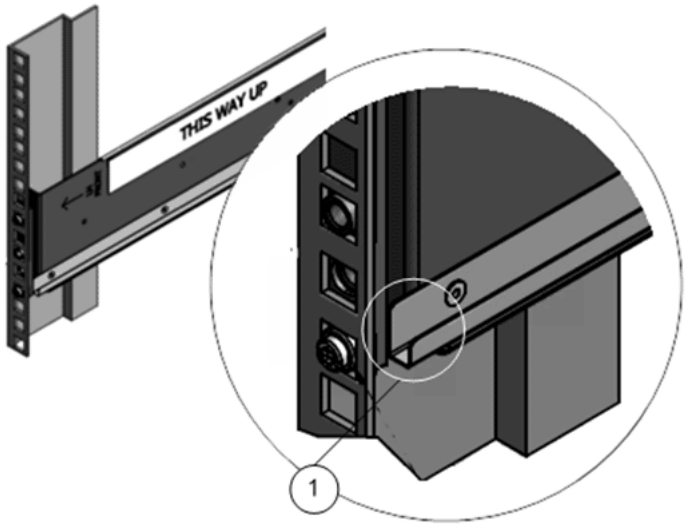
Caution:

- The DE2-24C Drive Enclosure weighs approximately 102 lbs (46 kg). The DE2-24P Drive Enclosure weighs approximately 53 lbs (24 kg). Use a mechanical lift when handling fully populated Drive Enclosures.
- If you are working alone or you do not have access to a mechanical lift, you can reduce the weight of a Drive Enclosure by removing the drives, the I/O modules, and the power cooling modules from the chassis. An empty DE2-24C Drive Enclosure chassis weighs approximately 20 lbs (9.07 kg). An empty DE2-24P Drive Enclosure chassis weighs approximately 15.6 lbs (7.07 kg).
- The reduced weight enables one person to handle an empty Drive Enclosure chassis. If you are not comfortable managing the weight of the chassis, request help from the local account team.
- Be careful not to drop a Drive Enclosure. Dropping a Drive Enclosure can cause damage and can reduce the life of the drives.

Caution: Do not use the power supply handles to lift the chassis. Using the power supply handles to lift the chassis can damage the power cooling modules and disrupt electrical power to the Drive Enclosure.

2 Angle the Drive Enclosure slightly to the left and align the left side slider on the Drive Enclosure so that it engages with the left rail channel.

Figure 44: Left rail channel



Legend

1 Left rail channel

3 Slightly tug the Drive Enclosure to the right and align the right side slider on the Drive Enclosure so that it engages with the right rail channel.

4 Apply even pressure to both sides of the Drive Enclosure and carefully slide the Drive Enclosure into the rails.

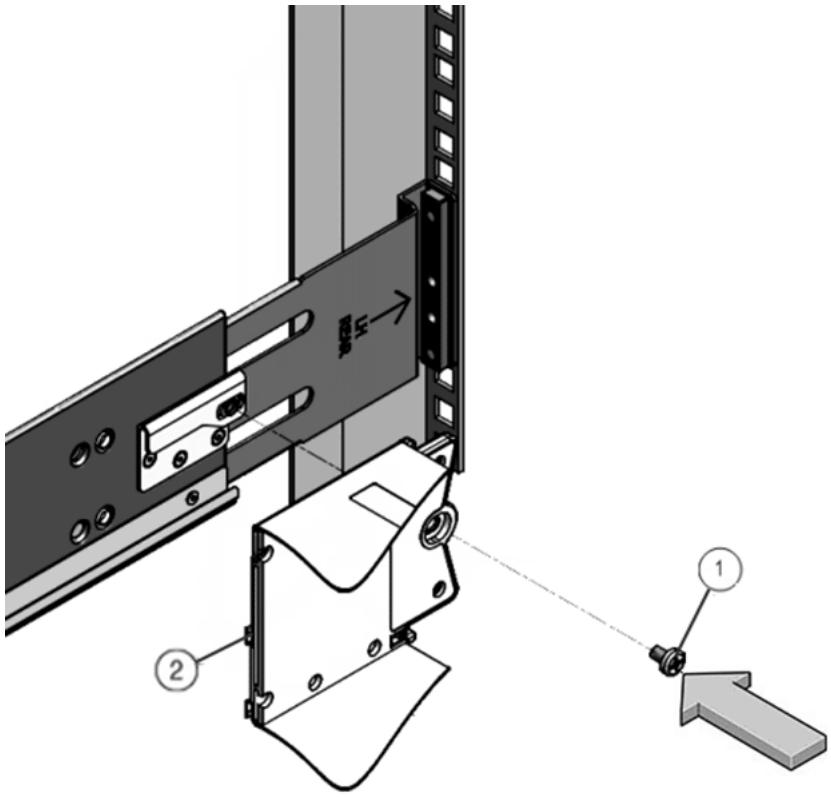
Note: The Drive Enclosure must be fully seated in the rack. To verify that the Drive Enclosure is fully seated, check for the following:

- Using a flashlight, visually check to see that the sliders on both sides of the Drive Enclosure are in the rail channels on both sides of the rack. If the Drive Enclosure side sliders are not in the rail channels, then the Drive Enclosure is not seated. You must reinsert the Drive Enclosure.
- Ensure that the Drive Enclosure slides smoothly into the rack and out of the rack. If the Drive Enclosure does not slide smoothly in and out of the rack, then the Drive Enclosure is not seated. You must reinsert the Drive Enclosure.
- Ensure that the screw hole at the back of the Drive Enclosure aligns with the screw hole on the rail. Do not secure the screw, yet. If the screw hole at the back of the Drive Enclosure does not align with the

screw hole on the rail, then the Drive Enclosure is not seated. You must reinsert the Drive Enclosure.

5 On both sides of the Drive Enclosure, insert a Phillips Number 2 pan head screw with patch lock through the hole at the back of the Drive Enclosure and secure it into the screw hole on the rail.

Figure 45: Back of the Drive Enclosure and Rail secured



Legend

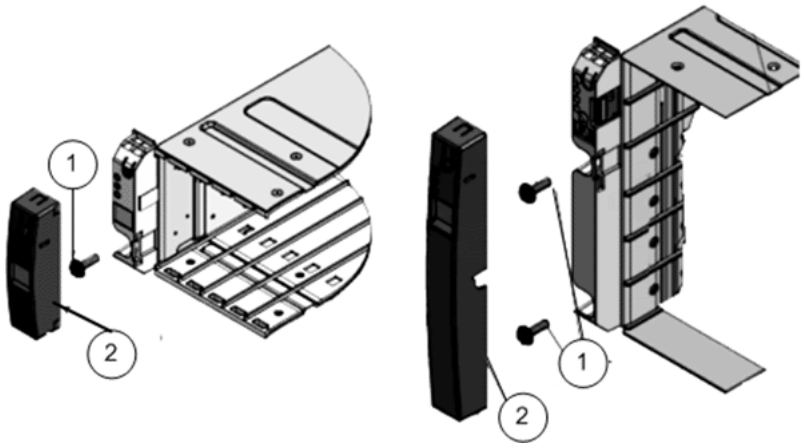
1 Phillips Number 2 pan head screw with patch lock	2 Back of the Drive Enclosure

Important: If you insert the screw through the hole at the back of the Drive Enclosure and the screw does not align with the screw hole on the rail, then the Drive Enclosure is not seated. You must reinstall the Drive Enclosure.

6 Remove the front-side caps on both sides of the Drive Enclosure and secure a Phillips 13mm head hex flange screw.

Note: The front-side cap on the right side of the Drive Enclosure contains the RFID tag, which uniquely identifies the Drive Enclosure. Take care not to mix up the right front-side caps among Drive Enclosures.

Figure 46: Left front-side cap and Phillips 13mm head hex flange screw



Legend

1 Phillips 13mm head hex flange screw	2 Left front-side cap

After you have secured the Drive Enclosure to the rails, attach the front-side caps to the Drive Enclosure.

7 Insert the I/O modules, the power cooling modules, and all of the drives into their corresponding slots in the chassis.

Insert a DE2-24C Drive Enclosure Into a Rack

1 Carefully lift the Drive Enclosure to the location of the prepared slot and rest the Drive Enclosure on the bottom ledge of the left and right rails.

Caution:

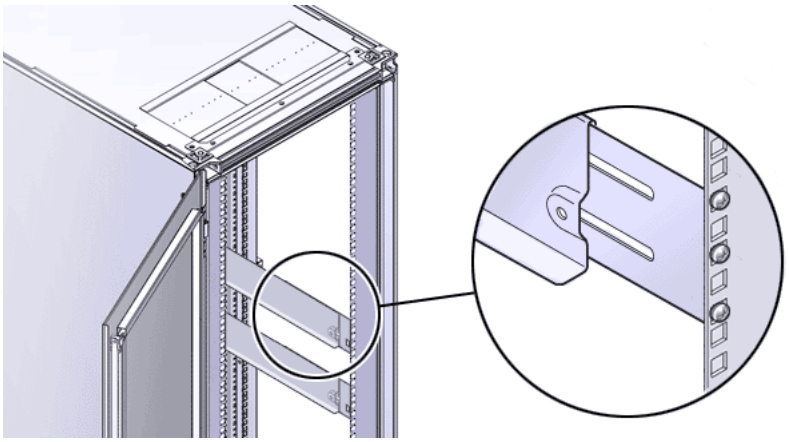
- The DE2-24C Drive Enclosure weighs approximately 102 lbs (46 kg). The DE2-24P Drive Enclosure weighs approximately 53 lbs (24 kg). Use a mechanical lift when handling fully populated Drive Enclosures.
- If you are working alone or you do not have access to a mechanical lift, you can reduce the weight of a Drive Enclosure by removing the drives, the I/O modules, and the power cooling modules from the chassis. An empty DE2-24C Drive Enclosure chassis weighs approximately 20 lbs (9.07 kg). An empty DE2-24P Drive Enclosure chassis weighs approximately 15.6 lbs (7.07 kg).
- The reduced weight enables one person to handle an empty Drive Enclosure chassis. If you are not comfortable managing the weight of the chassis, request help from the local account team.
- Be careful not to drop a Drive Enclosure. Dropping a Drive Enclosure can cause damage and can reduce the life of the drives.

Caution: Do not use the power supply handles to lift the chassis. Using the power supply handles to lift the chassis can damage the power cooling modules and disrupt electrical power to the Drive Enclosure.

2 Carefully slide the Drive Enclosure into the rack.

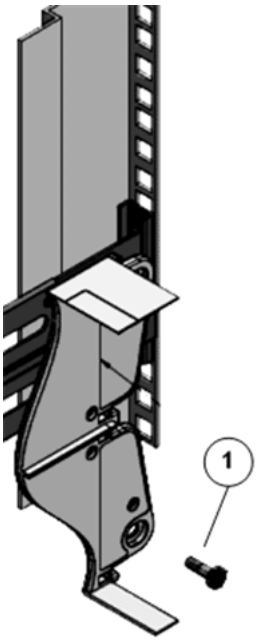
The DE2-24C Drive Enclosure rails have a ledge along the bottom of the rail to allow you to slide the Drive Enclosure into the rack. To verify that the Drive Enclosure is seated correctly in the rails, ensure that the bottom edges on both sides of the Drive Enclosure slide along the left and right rail ledges.

Figure 47: The rail ledge for the DE2-24C Drive Enclosure



3 At the back of the chassis, insert and fully tighten a Phillips Number 2 pan head screw with patch lock into the side of the rail.

Figure 48: Phillips Number 2 pan head screw with patch lock



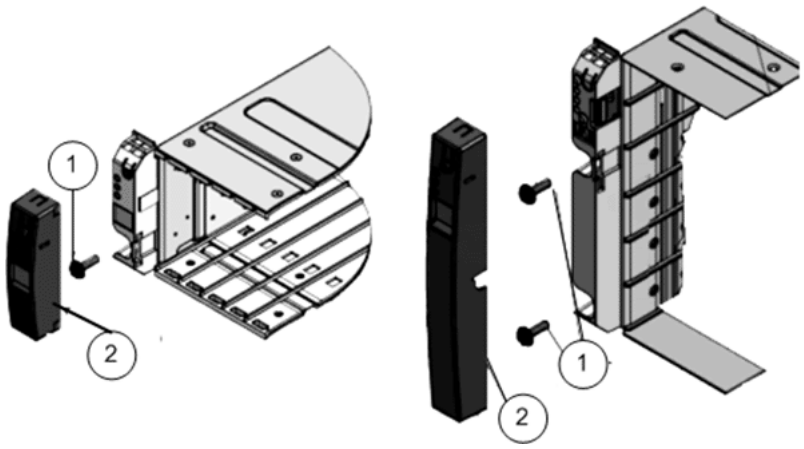
Legend

1 Phillips Number 2 pan head screw with patch lock	

4 Remove the front-side caps on both sides of the Drive Enclosure and secure a Phillips 13mm head hex flange screw.

Note: The front-side cap on the right side of the Drive Enclosure contains the RFID tag, which uniquely identifies the Drive Enclosure. Take care not to mix up the right front-side caps among Drive Enclosures.

Figure 49: Left front-side cap and Phillips 13mm head hex flange screw



Legend

1 Phillips 13mm head hex flange screw	2 Left front-side cap

After you have secured the Drive Enclosure to the rails, attach the front-side caps to the Drive Enclosure.

5 Insert the I/O modules, the power cooling modules, and all of the drives into their corresponding slots in the chassis.

Pilot Rails

Adding Pilots in the rack requires you to install rack rails in the rack and slide rails on the chassis for each Pilot that you plan to add.

Pilot rail kits can be installed in the Sun trademark Rack 900, the Sun Rack 1000, and third-party ANSI/EIA 310-D-1992 or IEC 60927 compliant racks with the following types of holes:

- Square (9.5 mm)
- Round (M6 or 1/4-20 threaded only)

Caution: We recommend that you install each Pilot after you install the rail kit before installing the next combination of rail kit and Pilot. Installing all of the rail kits and then inserting the Pilots is not always possible because of potential space

limitations in some data centers. Also, you run the risk of not placing the Pilot in the correct rack position and causing possible cabling issues.

Pilot Rail Kits

The Pilot rail kit contains the following items:

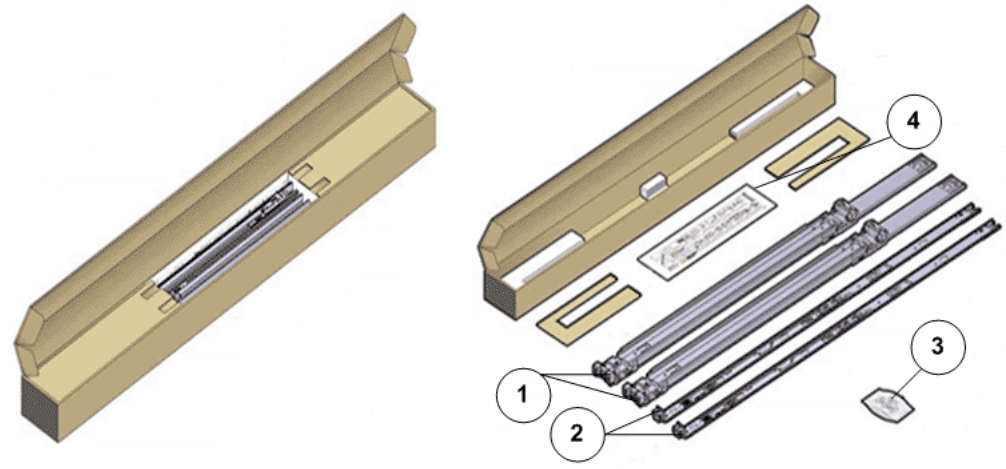
- One slide rail that attaches to the rack posts
- One mounting bracket that attaches to the Pilot chassis
- CMA with six pre-installed cable clips
- Four M4 x 5 fine-pitch mounting bracket securing screws (optional)
- Manufacturer's instruction sheet

Tip: Ensure that you have all of the parts in the Pilot rail kit before you begin the installation of the Pilot rails on the rack and the Pilot chassis.

Note: To locate part numbers for the rail kits, open *Oracle System Handbook* (https://support.oracle.com/handbook_private/index.html) and go to the Oracle FS1 Flash Storage System components list. Part numbers are listed in the components list.

The following figure shows the parts in the Pilot rail kit.

Figure 50: Pilot rail kit parts



Legend

1 Slide rails
2 Mounting brackets
3 Four M4 x 5 fine pitch mounting bracket securing screws (optional)
4 Installation card

Related Links

Install the Rack Rails for the Pilot

Install the Rack Rails for the Pilot

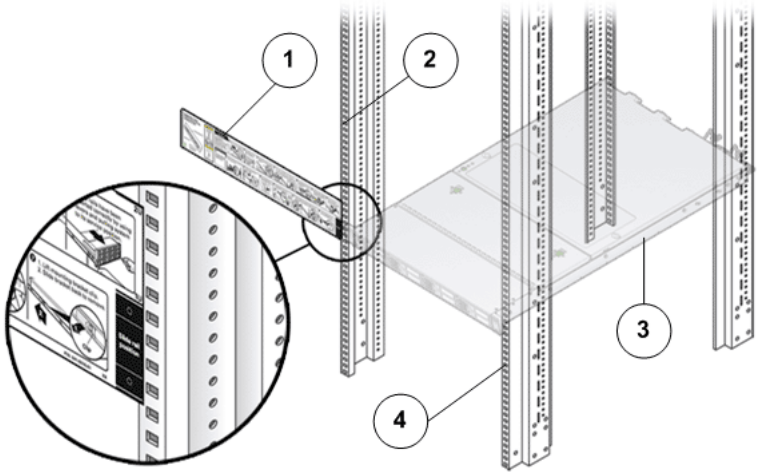
Install the rack rails on the rack prior to installing the Pilot.

Prerequisite:

Ensure that you have adequate room to work around the rack while installing the rails and the Pilot.

1 Place the rack-mount installation card against the front rails to identify the correct mounting holes for the slide rails.

Figure 51: Rack-mount installation card template



Legend

1 Installation card
2 Rack mount hole
3 Pilot chassis
4 Front rack post

Note: The Pilot requires one standard rack units (1U) of vertical space.

Tip: The bottom edge of the installation card must correspond to the bottom edge of the Pilot. Measure up from the bottom of the installation card.

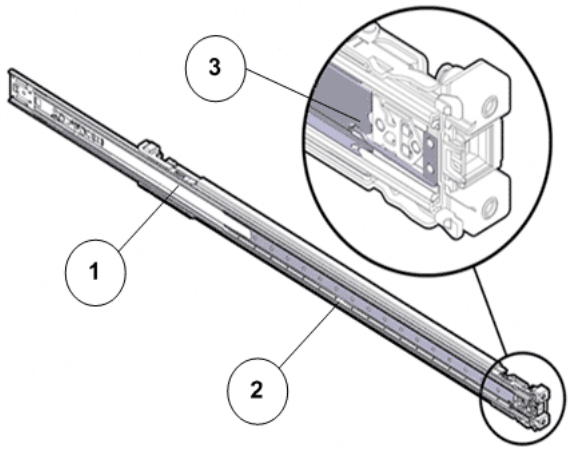
2 Mark the mounting holes for the front slide rails.

3 Mark the mounting holes for the back slide rails.

4 Remove the rails from the packaging.

5 Orient the slide-rail assembly so that the ball bearing track is forward and locked in place.

Figure 52: Slide rails oriented with the ball bearing track

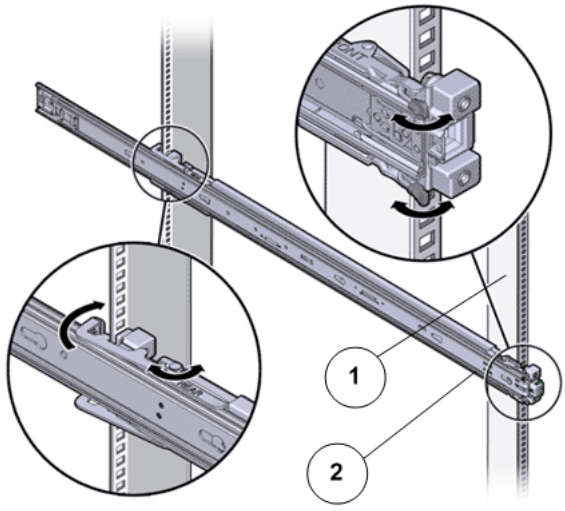


Legend

1 Slide rail
2 Ball bearing track
3 Locking mechanism

6 Starting with either the left or right side of the rack, align the rear of the slide-rail assembly against the inside of the rear rack rail, and push until the assembly locks into place with an audible click.

Figure 53: Slide rail assembly aligned with the rack



Legend

1 Back of the rack
2 Slide rail

7 Align the front of the slide-rail assembly against the outside of the front rack rail, and push until the assembly locks into place with an audible click.

8 Repeat steps to attach the slide-rail assembly to the other side of the rack.

Related Links

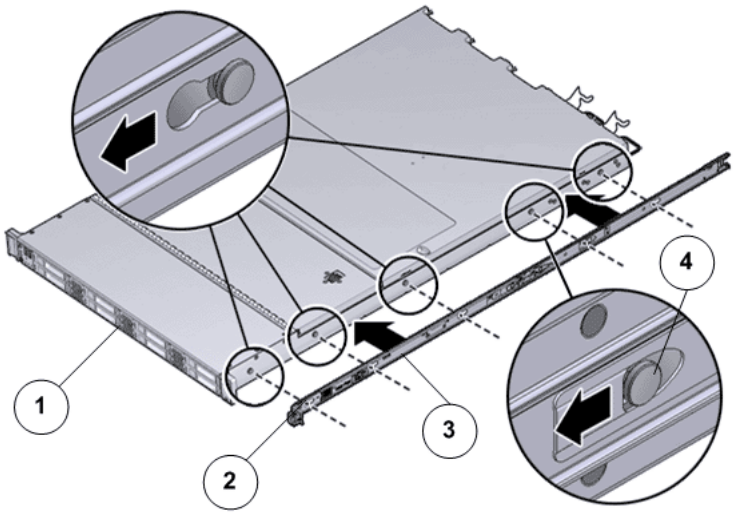
Pilot Rail Kits

Install the Slide Rails for the Pilot

Install the slide rails with mounting brackets on to the Pilot chassis before inserting it into the rack.

1 Position a mounting bracket against the Pilot chassis so that the slide rail lock is at the Pilot front, and the five keyhole openings on the mounting bracket are aligned with the five locating pins on the side of the Pilot chassis.

Figure 54: Mounting bracket aligned with the Pilot chassis



Legend

1 Pilot chassis front
2 Slide rail lock
3 Mounting bracket
4 Mounting bracket clip

2 With the heads of the five chassis locating pins protruding though the five keyhole openings in the mounting bracket, pull the mounting bracket toward the front of the Pilot chassis until the mounting bracket clip locks into place with an audible click.

3 Verify that the rear locating pin has engaged the mounting bracket clip.

4 Repeat steps to install the remaining slide rail mounting bracket on the other side of the Pilot chassis.

Install the Pilot CMA

Install the cable management arm (CMA) so that you can route the Pilot cables into the rack.

The CMA clips into the ends of the left and right Pilot slide rail assemblies. No screws are necessary for mounting the CMA. The right sides of the two CMA arms have hinged extensions.

Note: The CMA shown in the graphics might vary slightly from the CMA shipped with your product.

1 Unpack the CMA parts.

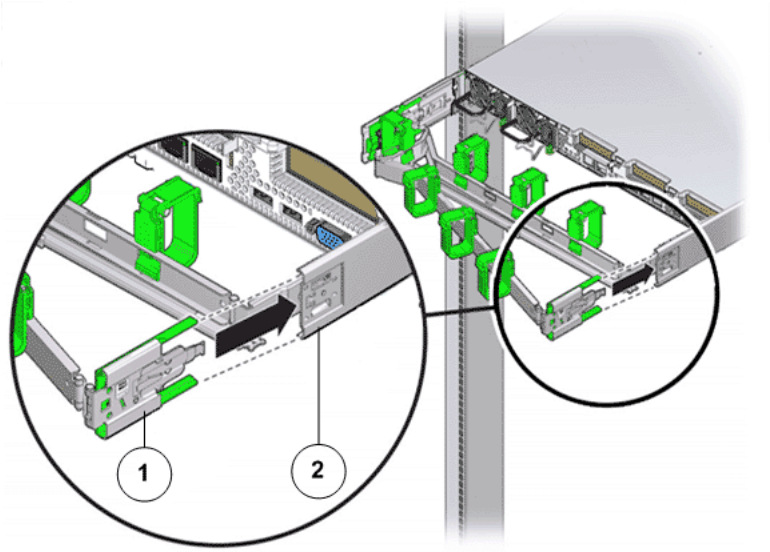
2 Take the CMA to the back of the rack, and ensure that you have adequate room to work around the back of the Pilot.

3 Remove the tape to separate the parts of the CMA.

4 Insert the CMA's mounting bracket connector into the back of the right slide rail until the connector locks into place with an audible click.

5 Insert the right CMA slide rail connector into the back of the right slide rail assembly until the connector locks into place with an audible click.

Figure 55: CMA slide rail connector inserted into the back of the right slide rail



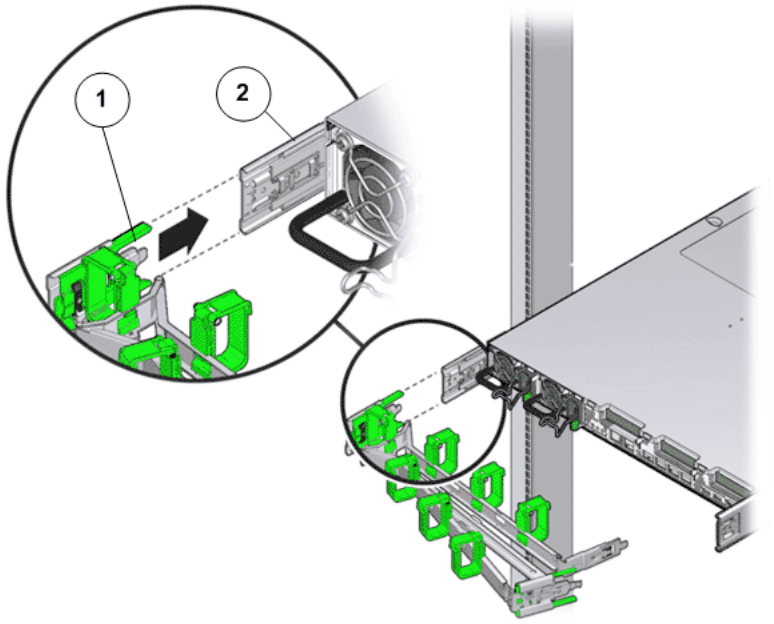
Legend

1	CMA slide rail connector
2	Right slide rail

Note: The CMA in the graphic is for representation only. The CMA shipped with your Pilot might be slightly different.

6 Insert the left CMA slide-rail connector into the back of the left slide rail assembly until the connector locks into place with an audible click.

Figure 56: CMA slide rail connector inserted into the back of the left slide rail



Legend

1	CMA slide rail connector
2	Left slide rail

Note: The CMA in the graphic is for representation only. The CMA shipped with your Pilot might be slightly different.

7 Install and route cables to the Pilot, as required.

Insert the Pilot into a Rack

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and ensure that you have an ESD mat. Stand on the ESD mat while replacing components

Caution: Do not connect the PDUs to any external power source until all components and internal cables have been installed.

Caution: Turn off all the PDUs or do not connect component power cords to PDUs until all components have been installed and all internal private

management interface (PMI) and private interconnect (PI) cables have been connected.

Caution: Work with a partner or use a mechanical lift for assistance. The Pilot weighs approximately 39.9 lbs (18.1 kg). Two people are required to carry the chassis.

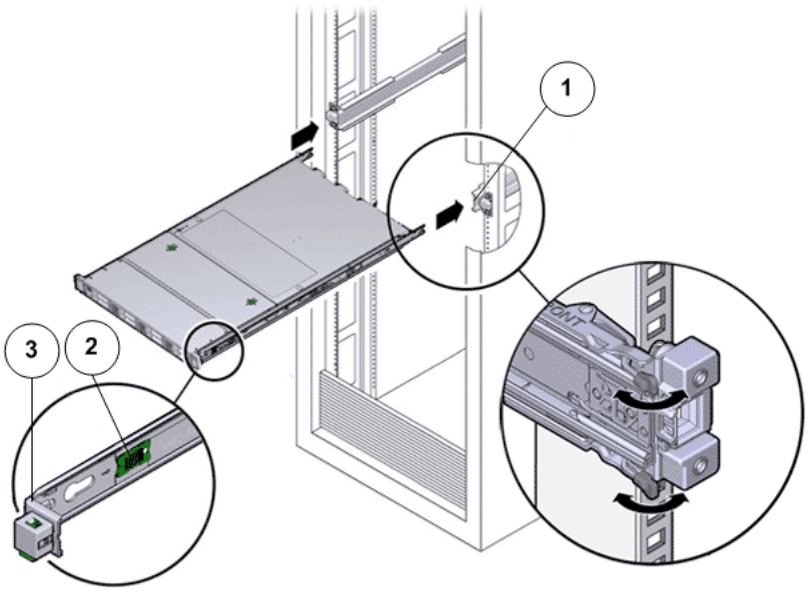
Caution: Deploy any rack anti-tilt mechanisms before installing the Pilot into the rack to prevent the rack from tipping over during component installation.

Caution: Always load equipment into a rack from the bottom up so that the rack will not become top-heavy and tip over.

Caution: Slide rail mounted components are not to be used as a shelf or a work space.

1. Push the slide rails as far as possible into the slide rail assemblies in the rack.
2. Using two people, one at each side of the Pilot, position the Pilot so that the back ends of the mounting brackets are aligned with the slide rail assemblies that are mounted in the rack.
3. Insert the mounting brackets into the slide rails, and then push the Pilot into the rack until the mounting brackets encounter the slide rail stops (approximately 30 cm, or 12 inches).

Figure 57: Pilot with mounting brackets inserted into the slide rails

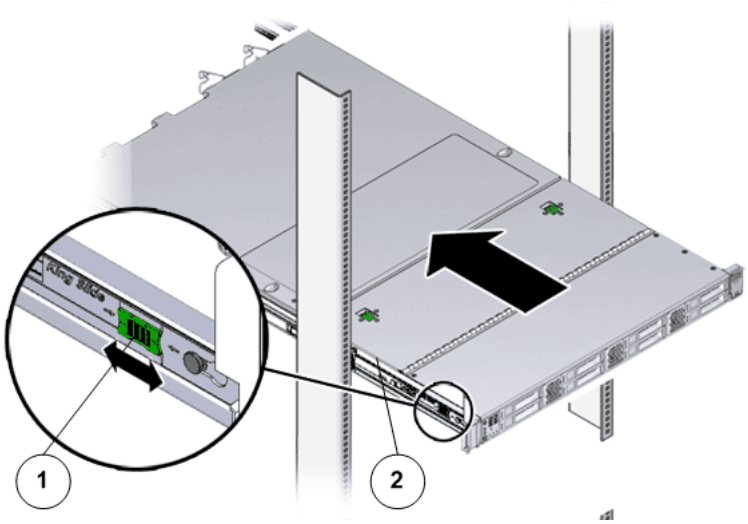


Legend

1 Mounting brackets inserted into the slide rail
2 Slide rail release button
3 Slide rail lock

4 Simultaneously push and hold the slide rail release buttons on each mounting bracket while you push the Pilot into the rack. Continue pushing the Pilot into the rack until the slide rail locks (on the front of the mounting brackets) engage the slide rail assemblies until you hear an audible click.

Figure 58: Pilot inserted into the rack



Legend

1 Slide rail button
2 Mounting bracket

Caution: Verify that the Pilot is securely mounted in the rack and that the slide rail locks are engaged with the mounting brackets before you install the cable management arm.

Verify Operation of the Slide Rails and the CMA

Prerequisites:

- Two people are needed to verify the operation of the slide rails and the cable management arm (CMA): one to move the Pilot in and out of the rack and one to observe the cables and CMA.
- To reduce the risk of personal injury, stabilize the expansion rack cabinet and extend all anti-tilt devices before extending the Pilot from the rack.

Caution: Work with a partner or use a mechanical lift for assistance. The Pilot weighs approximately 18.1 kilograms (39.9 pounds). Two people are required to carry the chassis.

1. Slowly pull the Pilot out of the rack until the slide rails reach their stops.
2. Verify that the CMA extends fully from the slide rails.
3. Push the Pilot back into the rack.

   When the Pilot is fully extended, you must release two sets of slide rail stops to return the Pilot to the rack:

   - The first set of stops are levers, located on the inside of each slide rail, just behind the back panel of the Pilot. These levers are labeled “PUSH.” Push in both levers simultaneously, and slide the Pilot toward the rack. The chassis slides in approximately 46 cm (18 inches) and stops. Verify that the cables and the CMA retract without binding before you continue.
   - The second set of stops are the slide rail release buttons, located near the front of each mounting bracket. Simultaneously push both of the green slide-rail release buttons, and push the Pilot completely into the rack until both slide-rail locks engage.
4. Adjust the cable straps and CMA, as required.

CHAPTER 3

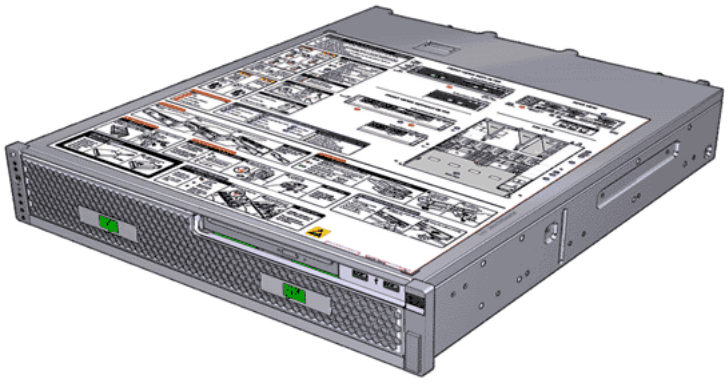
Controller Replacement Procedures

Controller Overview

Controllers provide I/O access to the customer LAN or SAN and provide an internal SAS interface that is used to interconnect all Drive Enclosures and other Controllers. The Oracle FS System supports two storage Controllers.

The following figure shows an Oracle FS System Controller.

Figure 59: Oracle FS System Controller

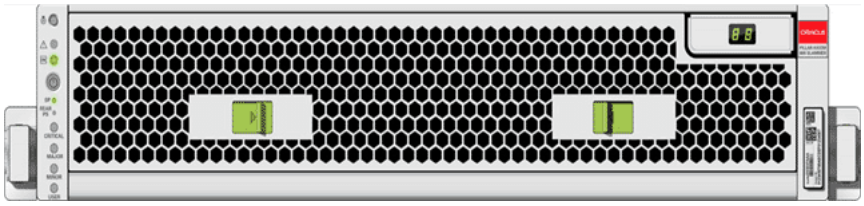


Replace Controller Air Filter

Air filters are designed to maintain proper airflow within the Controller by keeping the air circulating inside the chassis clear and free of dust.

Each Controller has an air filter covering the front of the chassis. Air filters are customer replaceable units (CRUs). Replacing the air filter does not require you to bring the Controller offline. The following figure shows the Controller air filter.

Figure 60: Controller air filter



Procedure Overview

1 *Remove an Air Filter*

2 *Insert an Air Filter*

Related Links

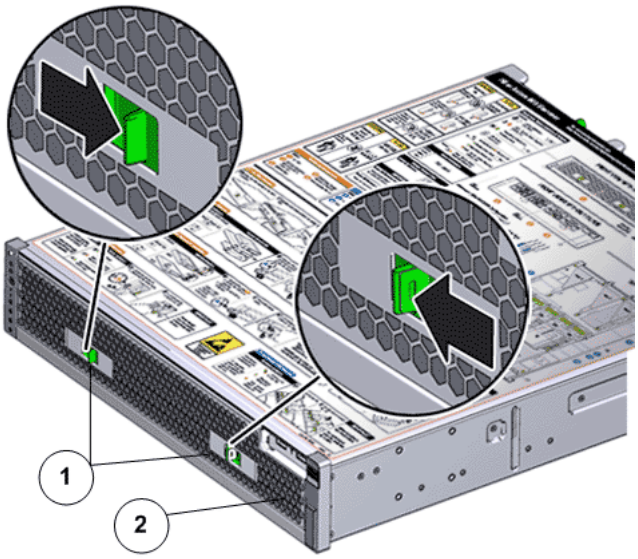
Controller Components

Remove an Air Filter

1 At the front of the Controller chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 61: Air filter release tabs



Legend

1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

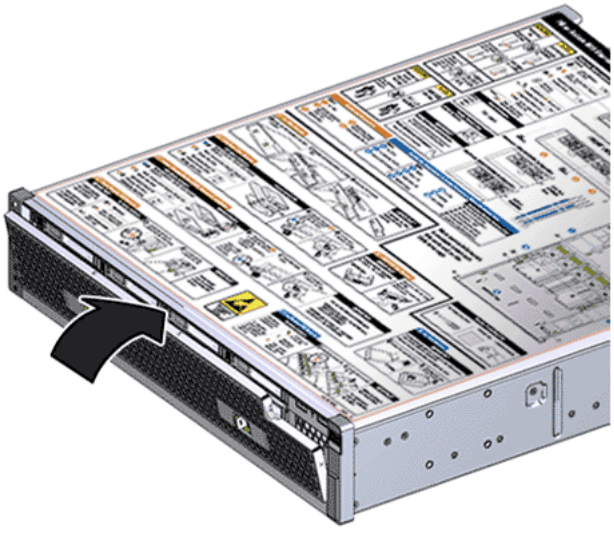
Figure 62: Remove air filter

4 Set the air filter aside.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 63: Insert air filter



Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Replace a Controller Fan Module

If a fan module fails, the system issues critical alerts. Replace failed fan modules as soon as possible.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Controller chassis.
- Fail over the Controller before replacing the component using Guided Maintenance.

  Note: The Controller must be failed over to prevent data loss or data corruption during the component replacement process.
- Initiate Guided Maintenance only when you are able to replace the fan module immediately.

Each Controller has five fan modules that are located side-by-side at the center inside the Controller chassis. A fan module is a customer replaceable unit (CRU). Replacing a fan module requires you to bring the Controller offline. The following figure shows a Controller fan module.

Figure 64: Fan module

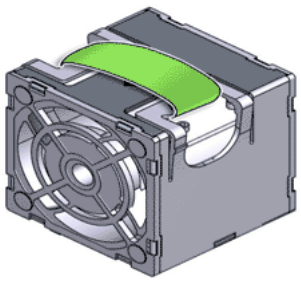
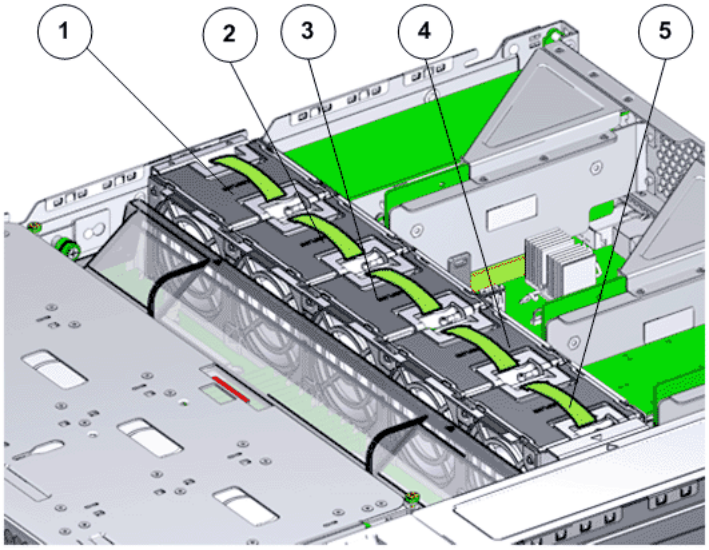


Figure 65: Fan module location



Legend

1 Fan module-0	2 Fan module-1
3 Fan module-2	4 Fan module-3
5 Fan module-4	

Note: The fan modules can be accessed only after removing the top cover over the Controller chassis.

Note: To replace a fan module, you do not need to remove the Controller from the rack but extend it along the Controller rails using the cable management arm (CMA).

Note: Ensure that all power is removed from the Controller before replacing the fan module. Disconnect the power cables before performing the fan module replacement procedure.

Note: For fan replacement, the Replaceable Unit list displays the names of each fan. Each power supply contains one fan, and each fan module contains two fans. If a fan fails in a power supply, replace the power supply. If a fan fails in a fan module, replace the fan module. The following list identifies the names of the fans and the corresponding customer replaceable unit (CRU).

If the following fan fails	Replace the following CRU
Fan 0	Power supply 0
Fan 1	Power supply 1
Fans 2, 3	Fan module 0

If the following fan fails	Replace the following CRU
Fans 4, 5	
Fan module 1	
Fans 6, 7	
Fan module 2	
Fans 8, 9	
Fan module 3	
Fans 10, 11	
Fan module 4	

Procedure Overview

1. *Prepare the Component for Replacement*
2. *Slide Controller to Service Position*
3. *Remove the Controller Power Supply Cords*
4. *Open the Controller Top Cover*
5. *Remove a Fan Module*
6. *Insert a Fan Module*
7. *Close the Controller Top Cover*
8. *Complete the Component Replacement*
9. *Verify Controller Component Status*

Related Links

Controller Components

Prepare the Component for Replacement

1. From Oracle FS System Manager (GUI), navigate to System > Hardware > Controllers and then select the Controller that contains the component that is to be replaced.
2. Select Actions > View.

   The View dialog displays the components in the Replaceable Unit list. The Status column lists the status of each component. A status of Normal requires no action.

   Note: Field replaceable units (FRUs) can only be replaced by field technicians with support role privileges.
3. Select a component from the list and click Replace Component.

   Guided Maintenance displays an image of the chassis.
4. Click Next.

   Guided Maintenance displays the Identify Hardware dialog.

5 From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

You can select one of the following methods to identify the chassis:

Identify

Flashes the LEDs on the chassis that contains the failed component.

Reverse Identify

Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.

6 Click Next.

Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.

7 Click Next.

For components that are not hot-serviceable, Guided Maintenance sends a request to bring the Controller offline and automatically initiate failover. Guided Maintenance also displays an HTML link that you use to access the instructions for component replacement.

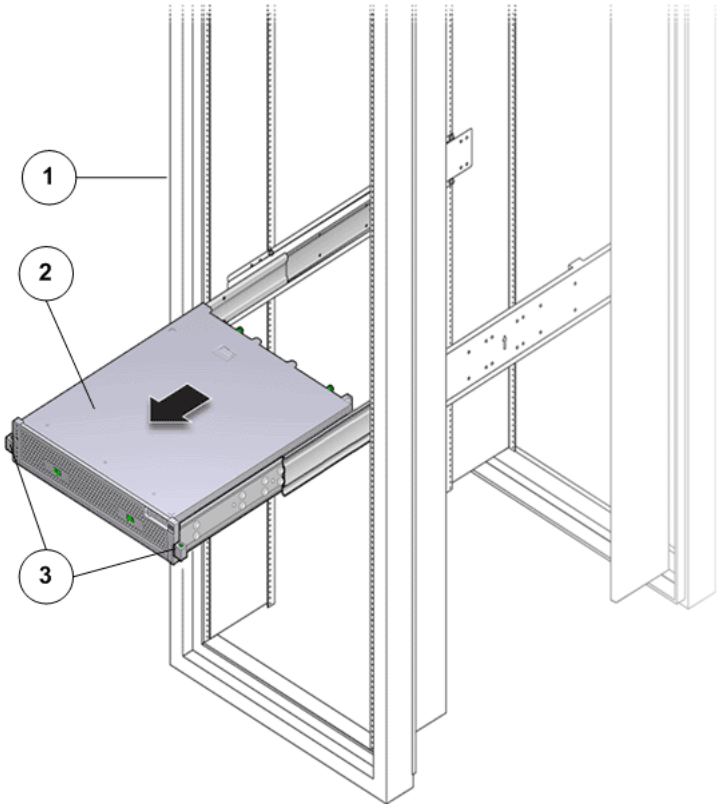
For hot-serviceable components, Guided Maintenance completes the process of preparing the system for component replacement and displays the Replace Hardware dialog. The Replace Hardware dialog instructs you to replace the component. You also receive a System Alert informing you that the component is ready for removal. To review System Alerts, navigate to System > Alerts and Events > System Alerts.

Slide Controller to Service Position

Squeeze the release buttons on either side of the Controller front panel at the same time and slide the Controller chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Controller slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Controller chassis.

Figure 66: Slide the Controller to service position



Legend

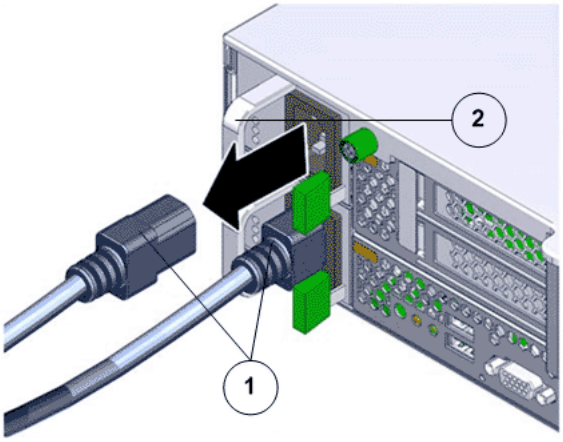
1	Rack
2	Controller chassis
3	Release buttons

Important: Before you slide the Controller chassis out, ensure that the cables do not interfere with the movement of the Controller chassis. Although the cable management arm (CMA) is hinged so that you can extend the Controller chassis, all cables and cords must be out of the way when you service the Controller components.

Remove the Controller Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 67: Remove power supply cords



Legend

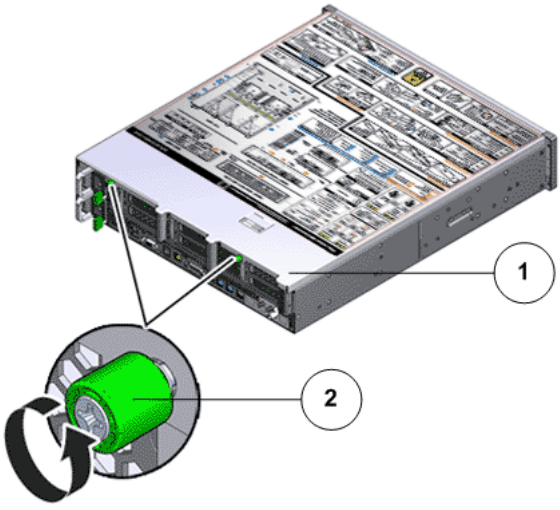
1	Power supply cords
2	Power supply handle

Tip: Always notify affected users that the Controller will be powered off.

Open the Controller Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 68: Captive thumb screws to remove the top cover



Legend

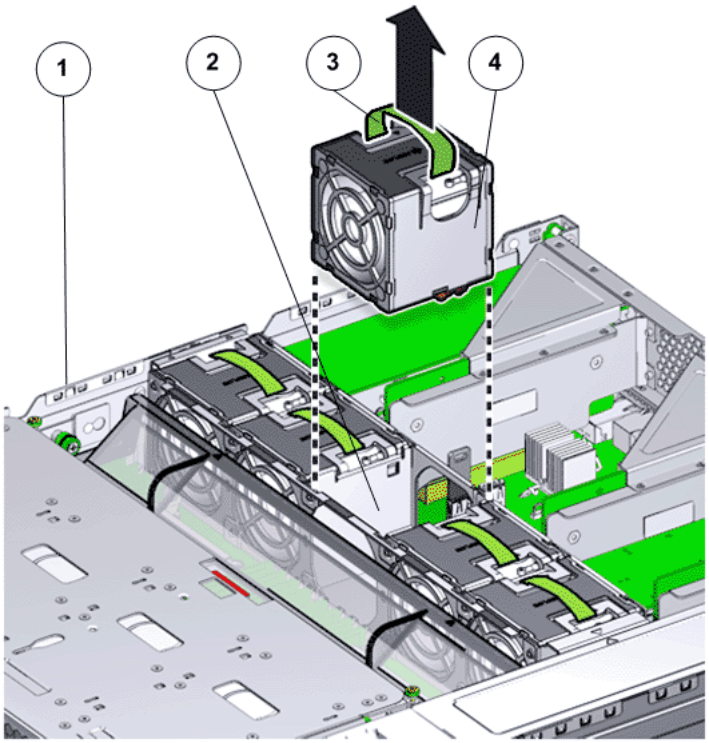
1 Controller top cover
2 Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Controller chassis.

Remove a Fan Module

1 Using your thumb and forefinger, grasp the removal tab and gently lift the fan module from the fan compartment.

Figure 69: Remove fan module



Legend

1 Controller chassis
2 Fan compartment
3 Removal tab
4 Fan module

Note: Pulling the green tab from the middle releases the locking tab for each individual fan.

Note: When removing a fan module, do not rock it back and forth. Rocking the fan module can cause damage to the motherboard connectors.

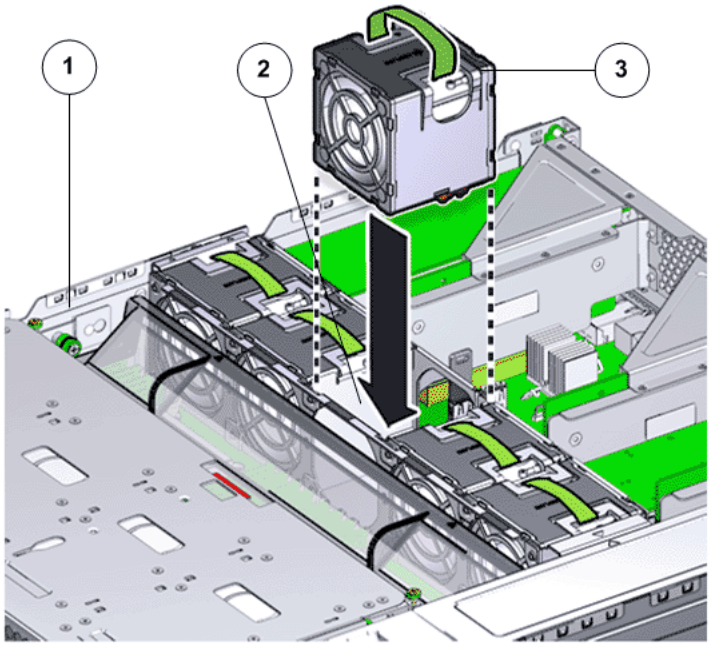
2 Set the fan module aside.

Note: The fan compartment might come out when the last fan module is removed.

Insert a Fan Module

Insert the replacement fan module into the Controller.

Figure 70: Insert fan module



Legend

1	Controller chassis
2	Fan compartment
3	Fan module

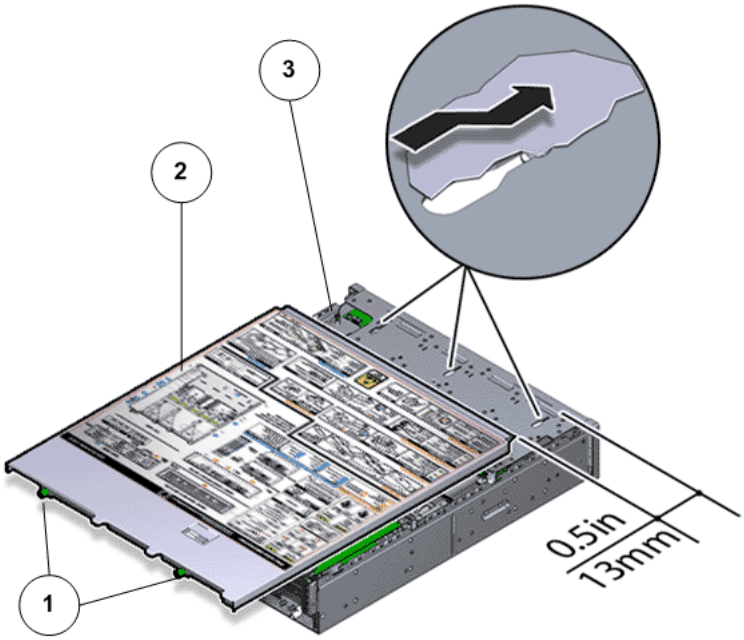
Note: Press down on the fan module and apply firm pressure to fully seat the fan module into the fan compartment. The fan modules are notched to ensure that they are installed in the correct orientation.

Note: Repeat for each additional fan module.

Close the Controller Top Cover

Place the top cover of the Controller and tighten the two thumb screws at the back of the Controller that secure the top cover.

Figure 71: Close Controller top cover



Legend

1	Thumb screws
2	Controller top cover
3	Controller

Complete the Component Replacement

1. Slide the Controller back into rack position.
2. Re-connect the cables that were removed from the Controller.

   Note: The Controller automatically powers up when the power cords are plugged in.

Verify Controller Component Status

1. From Guided Maintenance, verify that the status is Normal.

   You can also verify the status by navigating to System > Hardware and then selecting a chassis. The Overview page for the selected chassis lists the status of each component.

Note: The Controller status will be visible several minutes after being powered on. The Oracle FS1 Flash Storage System must load the operating system software on the Controller, then validate the status of the Controller and the hardware before it will allow the Controller to rejoin the system and return to Normal status.

2 Review the status of the LEDs to confirm a status of Normal.

Replace a Controller Power Supply

Power supplies, which exist in pairs, provide DC power to all of the Controller components. If one power supply fails, the other supply carries the full load. This situation creates a risk of Controller failure should the other power supply also fail.

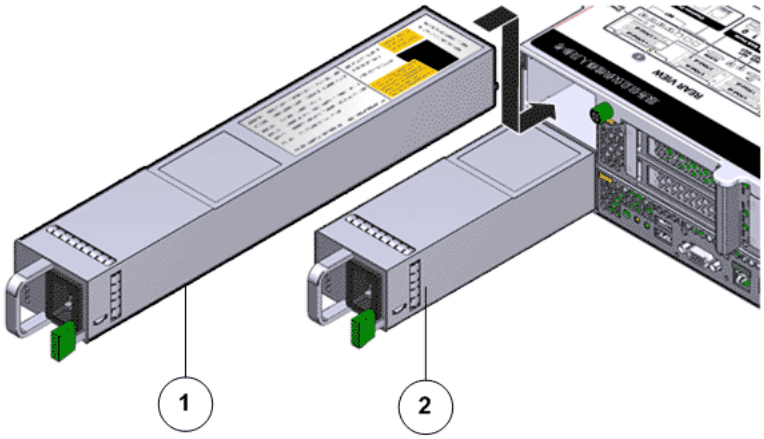
A failed Controller can cause data paths to drop.

Prerequisites:

- Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Controller.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Make sure you have a similar replacement power supply available before you start the replacement procedure.
- Initiate Guided Maintenance only when you are able to replace the power supplies immediately.

Each Controller has a pair of power supplies that are located at the back of the Controller. Power supplies are customer replaceable units (CRUs). Replacing a power supply does not require you to bring the Controller offline, provided that the other power supply is online and working. The following figure identifies the location of the Controller power supplies.

Figure 72: Power supply location



Legend

1	Power supply-1 (PS-1)
2	Power supply-0 (PS-0)

Note: To replace a power supply, you can access the faulted power supply from the back of the Controller module. To access the power supply located in the bottom slot (PS-0), the CMA clip must be disconnected to enable the power supply to clear the support arm.

Note: Replacing the power supply does not require you to slide the Controller into the extended rack position and can be performed while the Controller is in the rack position.

Note: Ensure that the power strain relief strap on the power supply is positioned correctly such that there is proper clearance and the power supplies can be re-inserted into the power supply compartment without interference.

Note: Ensure that the power cable is routed correctly and there is no interference with the Controller chassis.

Important: Do not remove the failed power supply until you have a replacement power supply to ensure proper airflow in the Controller.

Note: For fan replacement, the Replaceable Unit list displays the names of each fan. Each power supply contains one fan, and each fan module contains two fans. If a fan fails in a power supply, replace the power supply. If a fan fails in a fan module, replace the fan module. The following list identifies the names of the fans and the corresponding customer replaceable unit (CRU).

If the following fan fails	Replace the following CRU
Fan 0	Power supply 0

If the following fan fails	Replace the following CRU
Fan 1	Power supply 1
Fans 2, 3	Fan module 0
Fans 4, 5	Fan module 1
Fans 6, 7	Fan module 2
Fans 8, 9	Fan module 3
Fans 10, 11	Fan module 4

Procedure Overview

1. *Prepare the Component for Replacement*
2. *Remove the Power Cord*
3. *Remove a Power Supply*
4. *Insert a Power Supply*
5. *Insert the Power Cord*
6. *Verify Controller Component Status*

Related Links

Controller Components

Prepare the Component for Replacement

1. From Oracle FS System Manager (GUI), navigate to System > Hardware > Controllers and then select the Controller that contains the component that is to be replaced.
2. Select Actions > View.

   The View dialog displays the components in the Replaceable Unit list. The Status column lists the status of each component. A status of Normal requires no action.

   Note: Field replaceable units (FRUs) can only be replaced by field technicians with support role privileges.
3. Select a component from the list and click Replace Component.

   Guided Maintenance displays an image of the chassis.
4. Click Next.

   Guided Maintenance displays the Identify Hardware dialog.

5 From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

You can select one of the following methods to identify the chassis:

Identify

Flashes the LEDs on the chassis that contains the failed component.

Reverse Identify

Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.

6 Click Next.

Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.

7 Click Next.

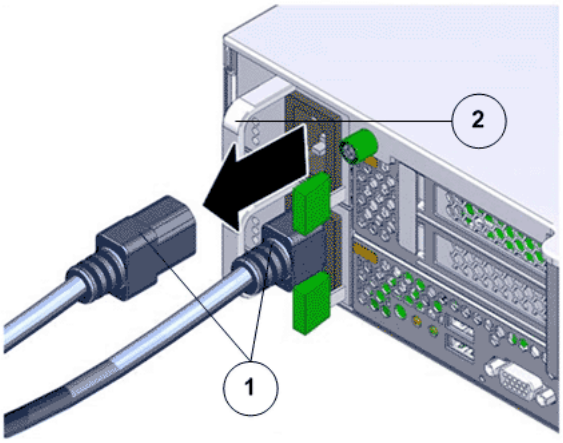
For components that are not hot-serviceable, Guided Maintenance sends a request to bring the Controller offline and automatically initiate failover. Guided Maintenance also displays an HTML link that you use to access the instructions for component replacement.

For hot-serviceable components, Guided Maintenance completes the process of preparing the system for component replacement and displays the Replace Hardware dialog. The Replace Hardware dialog instructs you to replace the component. You also receive a System Alert informing you that the component is ready for removal. To review System Alerts, navigate to System > Alerts and Events > System Alerts.

Remove the Power Cord

Disconnect the power cord from the power supply.

Figure 73: Disconnect the power cord



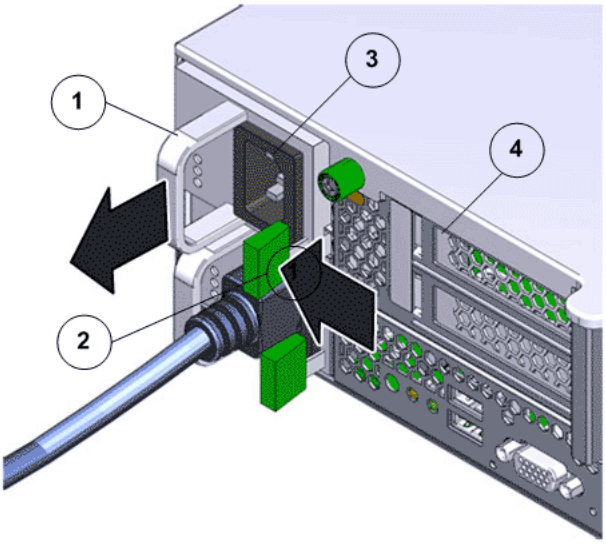
Legend

1 Power supply cord	
2 Power supply handle	

Remove a Power Supply

1. Remove the power supply by grasping the power supply handle and pushing the power supply latch to the left.

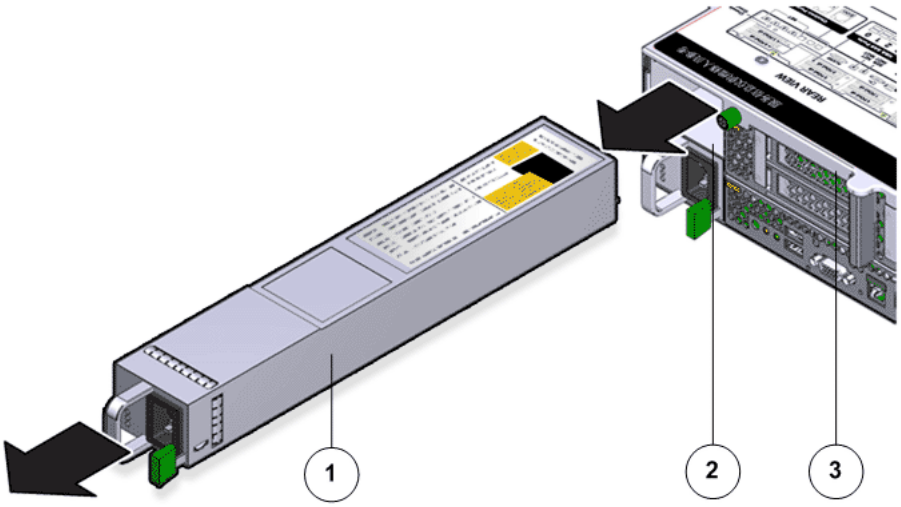
Figure 74: Controller power supply latch



Legend

1 Power supply handle	3 Power supply
2 Power supply latch	4 Controller back

Figure 75: Remove power supply



Legend

1	Power supply
2	Power supply compartment
3	Controller

2 If both power supplies must be removed, label the power supplies with the slot numbers from which they are removed.

Note: Removing both power supplies will result in the immediate powering off of the Controller. Do not pull both power supplies from an active and running Controller.

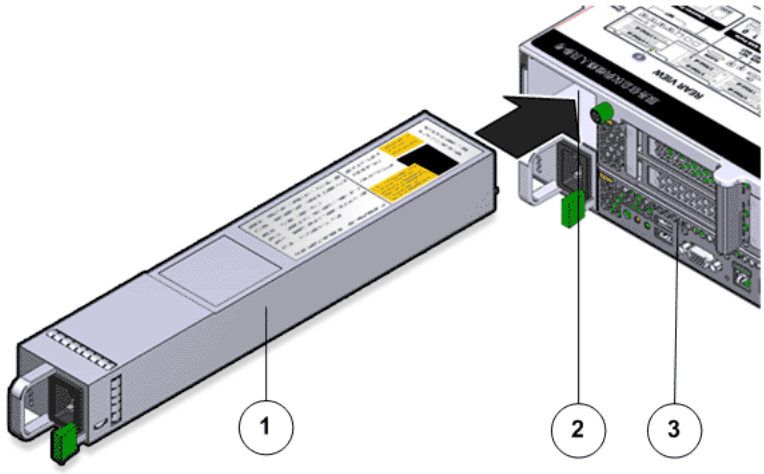
Note: The power supplies must be reinstalled into the same slots from which they were removed.

3 Pull the power supply out of the chassis and place it on an antistatic mat.

Insert a Power Supply

1 Slide the replacement power supply into the power supply compartment at the back of the Controller until it is fully seated.

Figure 76: Insert power supply



Legend

1	Power supply
2	Power supply compartment
3	Controller chassis

2 Listen for an audible click or feel the power supply engage to confirm that the power supply is properly seated.

Note: Repeat for each power supply. Also, replace the power supplies only into the slots from which they had been removed.

Insert the Power Cord

Connect the power cord to the power supply.

Verify Controller Component Status

1 From Guided Maintenance, verify that the status is Normal.

You can also verify the status by navigating to System > Hardware and then selecting a chassis. The Overview page for the selected chassis lists the status of each component.

Note: The Controller status will be visible several minutes after being powered on. The Oracle FS1 Flash Storage System must load the operating system software on the Controller, then validate the status of the Controller and the hardware before it will allow the Controller to rejoin the system and return to Normal status.

2 Review the status of the LEDs to confirm a status of Normal.

Replace a Controller Riser

A riser board assembly provides network and data-path connections for network or read and write operations. If the assembly fails, read and write operations carried by the HBAs will fail as well.

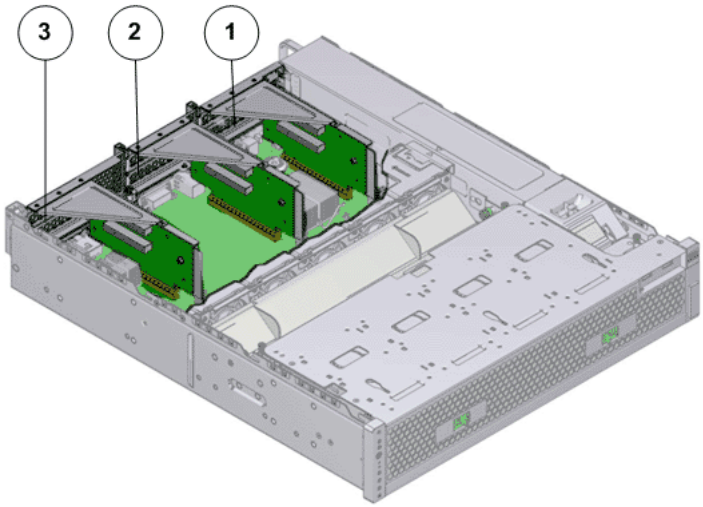
Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Disconnect any cables connected to the PCIe cards in the riser that must be replaced.

Each Controller contains three PCI-express (PCIe) risers that are located side by side at the back of the Controller. The three risers, though similar, are not interchangeable. Each riser hosts two PCIe3 slots and can accommodate two PCIe3 host bus adapters (HBAs). The risers are customer replaceable units (CRUs). Replacing a riser assembly requires you to bring the Controller offline. The following figure shows the location of the three risers.

Note: By design, the risers are mechanically dependent upon each other. Even if there are no PCIe3 HBAs installed, all risers must be installed.

Figure 77: Riser locations



Legend

1	Riser 1
2	Riser 2
3	Riser 3 with latch

Note: The risers can be accessed only after removing the top cover over the Controller chassis.

Note: To replace a riser, you do not need to remove the Controller from the rack but extend it along the Controller rails using the cable management arm (CMA).

Note: Ensure that all power is removed from the Controller before replacing the riser. Disconnect the power cords before performing the riser replacement procedure.

Procedure Overview

1. *Prepare the Component for Replacement*
2. *Slide Controller to Service Position*
3. *Remove the Controller Power Supply Cords*
4. *Disconnect Controller Cabling*
5. *Open the Controller Top Cover*
6. *Remove a Riser*
7. *Insert a Riser*
8. *Close the Controller Top Cover*
9. *Reconnect Controller Cabling*
10. *Complete the Component Replacement*
11. *Verify Controller Component Status*

Related Links

Controller Components

Prepare the Component for Replacement

1. From Oracle FS System Manager (GUI), navigate to Support > System Trouble.
2. Select the Controller that contains the component that is to be replaced.
3. Select Actions > Replace Component.
   Guided Maintenance displays the list of replaceable components for the Controller.

   Note: Field replaceable units (FRUs) can only be replaced by field technicians with support role privileges.
4. Select a component from the list.
5. Click Next.

   Guided Maintenance displays the Identify Hardware dialog.
6. From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

You can select one of the following methods to identify the chassis:

Identify

Flashes the LEDs on the chassis that contains the failed component.

Reverse Identify

Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.

7 Click Next.

Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.

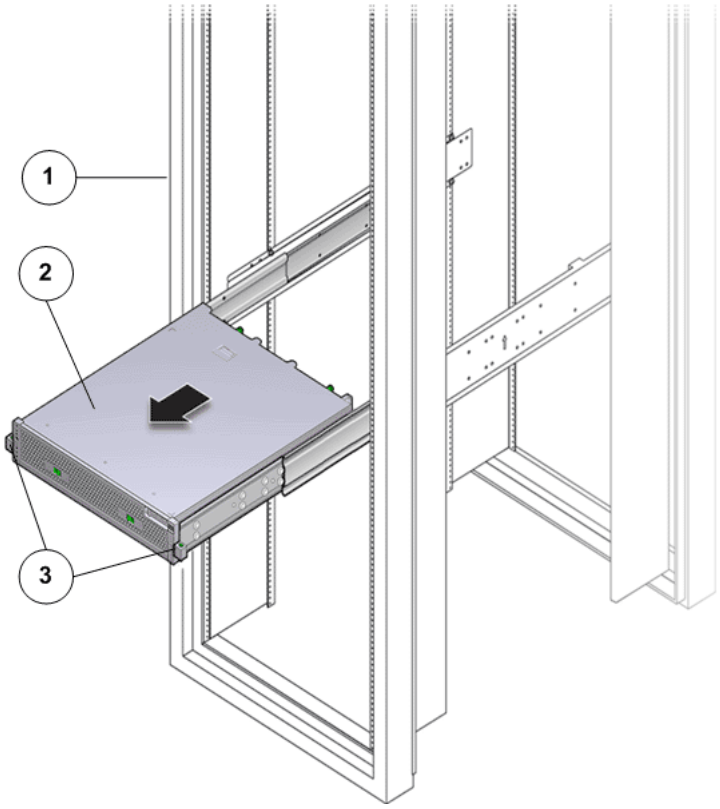
8 Click Next.
Guided Maintenance sends a request to shut down the software running on the Controller and automatically initiates failover. Guided Maintenance also displays an HTML link that you use to access the instructions for component replacement.

Slide Controller to Service Position

Squeeze the release buttons on either side of the Controller front panel at the same time and slide the Controller chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Controller slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Controller chassis.

Figure 78: Slide the Controller to service position



Legend

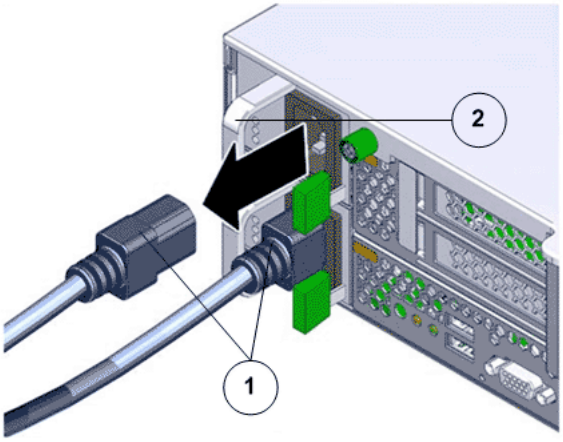
1	Rack
2	Controller chassis
3	Release buttons

Important: Before you slide the Controller chassis out, ensure that the cables do not interfere with the movement of the Controller chassis. Although the cable management arm (CMA) is hinged so that you can extend the Controller chassis, all cables and cords must be out of the way when you service the Controller components.

Remove the Controller Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 79: Remove power supply cords



Legend

1	Power supply cords
2	Power supply handle

Tip: Always notify affected users that the Controller will be powered off.

Disconnect Controller Cabling

Disconnect all data cables from the Controller.

Note: All cables must be disconnected from the Controller and labeled such that they can be reconnected accurately to the Controller after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Controller or result in a complete loss of functionality.

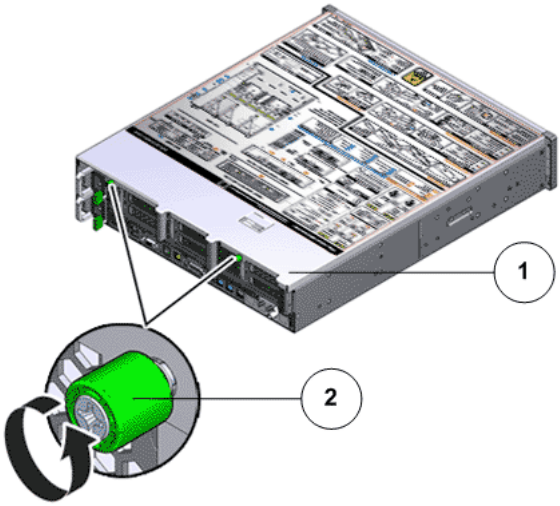
Note: Service the Controller components from the front of the Controller while the Controller is in service position.

Note: Do not lean on or place any weight on the Controller while the Controller is in the service position.

Open the Controller Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 80: Captive thumb screws to remove the top cover



Legend

1	Controller top cover
2	Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Controller chassis.

Remove a Riser

1 Disconnect any external cables that remain connected to the HBAs in the risers.

Note: Also disconnect any internal cables attached to the HBAs, if that will ease removing the HBA.

Tip: Make a note of the positions of all existing cable connections before removing any cables. Replacing HBAs or their cables into the incorrect position in the riser may result in a loss of performance or functionality.

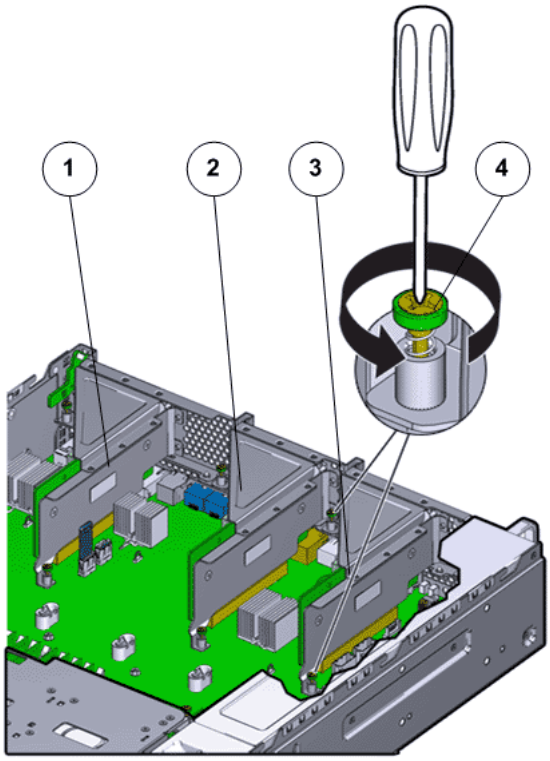
2 Note the position of the HBAs installed on the riser.

Tip: Make a note of the slot numbers of all existing HBAs before removing any HBAs.

3 Using a Phillips Number 2 screwdriver, loosen the two Phillips Number 2 captive screws on either side of the riser that hold the riser to the Controller motherboard.

Note: The riser on the opposite end of the power supply has a latch that must be disengaged to remove the riser from the Controller chassis

Figure 81: Captive screws to secure the risers

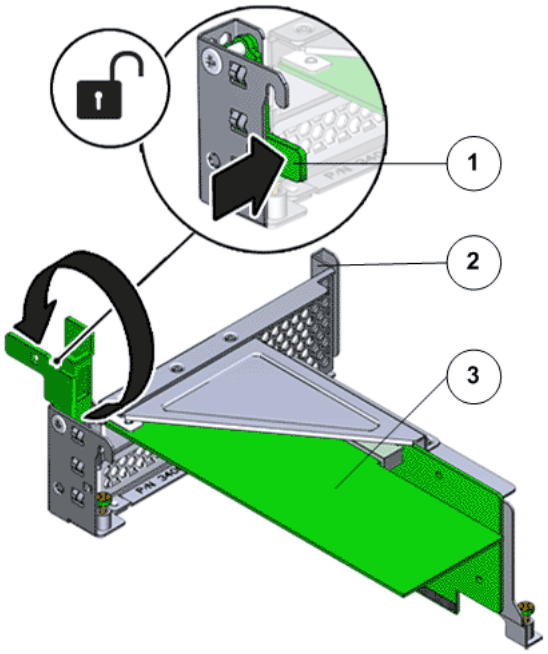


Legend

1 Riser 3 with latch	3 Riser 1
2 Riser 2	4 Captive screws that secure riser

To remove riser 3, unlock the latch to release the riser from the Controller motherboard.

Figure 82: Unlock Riser 3 latch

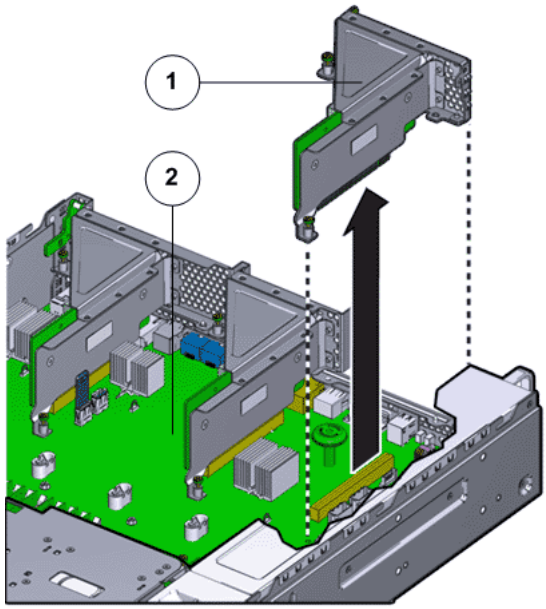


Legend

1 Riser 3 latch	3 HBA
2 Riser 3	

4 Carefully pull the riser straight up and place it aside.

Figure 83: Remove riser



Legend

1	Riser
2	Controller motherboard

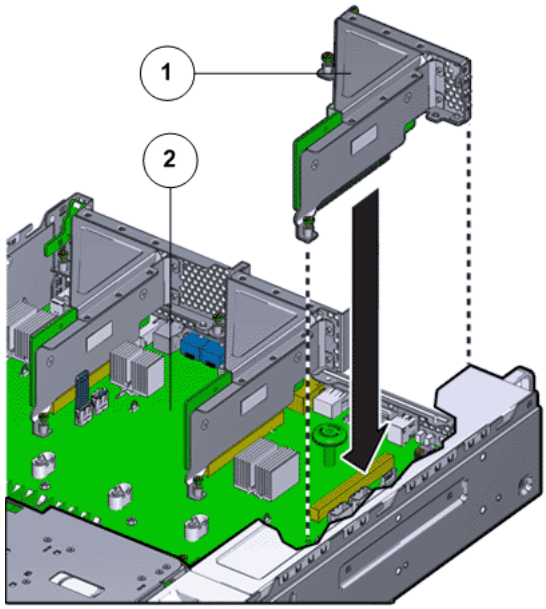
Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

Insert a Riser

1 Lower the riser onto the Controller motherboard and press the riser edge connector securely into the socket.

Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

Figure 84: Insert riser

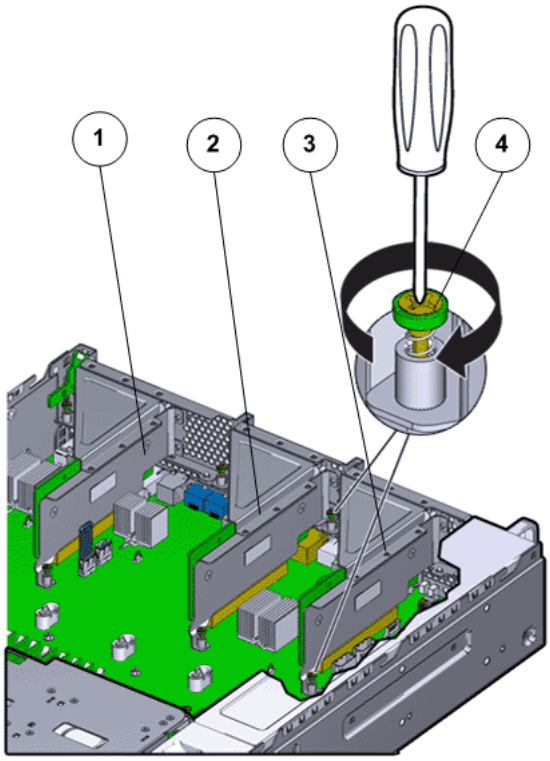


Legend

1	Riser
2	Controller motherboard

2 After the riser is seated properly inside the Controller, tighten the two captive Phillips screws on both sides of the riser to secure the riser on the Controller motherboard.

Figure 85: Captive screws to secure risers to the motherboard

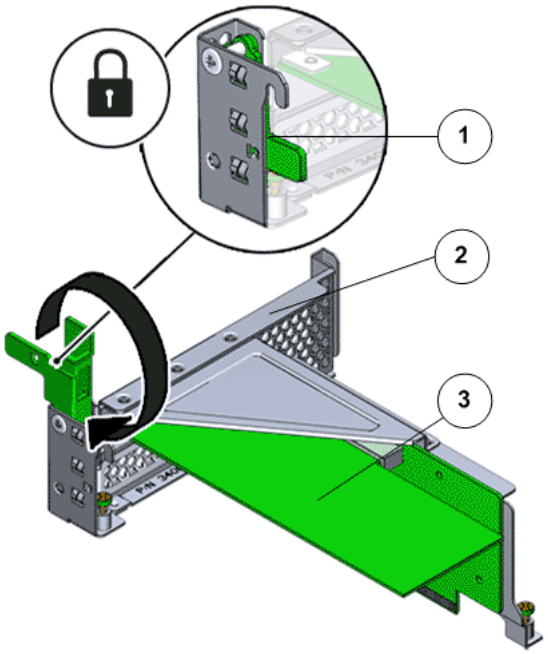


Legend

1 Riser 3 with latch	3 Riser 1
2 Riser 2	4 Captive screws

To install riser 3, lock the latch to secure the riser to the Controller motherboard.

Figure 86: Riser 3 latch locked



Legend

1 Riser 3 latch	3 HBA
2 Riser 3	

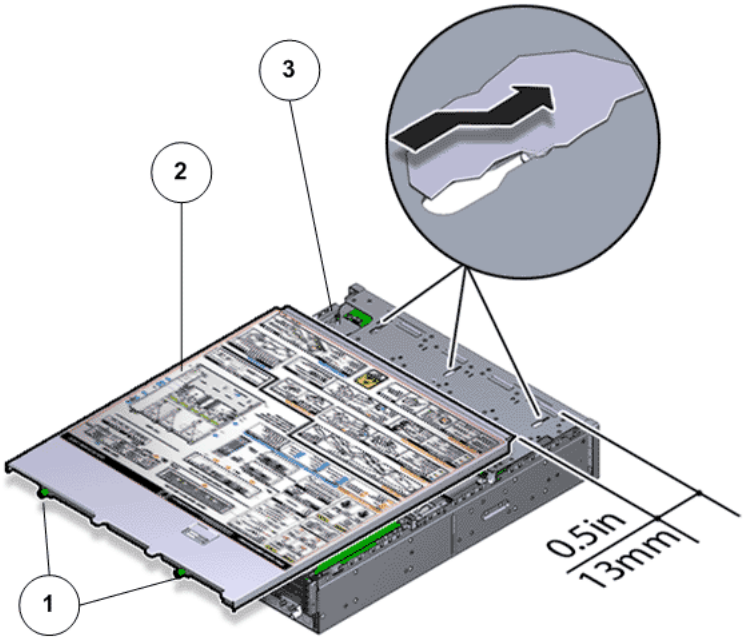
3 Reconnect any previously removed internal or external cables to any HBAs installed in the riser.

4 Repeat the above steps for any additional risers that you are installing.

Close the Controller Top Cover

Place the top cover of the Controller and tighten the two thumb screws at the back of the Controller that secure the top cover.

Figure 87: Close Controller top cover



Legend

1 Thumb screws
2 Controller top cover
3 Controller

Reconnect Controller Cabling

1. Reconnect all the data cables on the Controller.

   Note: Oracle Customer Support recommends labeling all cables connected to the Controller so that the cables can be reconnected accurately to the Controller after the replacement procedure is complete.
2. Reconnect the CMA to the Controller by attaching the release tab on the left and right side of the CMA.

Complete the Component Replacement

1. Slide the Controller back into rack position.
2. Re-connect the cables that were removed from the Controller.

   Note: The Controller automatically powers up when the power cords are plugged in.

Verify Controller Component Status

1 From Guided Maintenance, verify that the status is Normal.

You can also verify the status by navigating to System > Hardware and then selecting a chassis. The Overview page for the selected chassis lists the status of each component.

Note: The Controller status will be visible several minutes after being powered on. The Oracle FS1 Flash Storage System must load the operating system software on the Controller, then validate the status of the Controller and the hardware before it will allow the Controller to rejoin the system and return to Normal status.

2 Review the status of the LEDs to confirm a status of Normal.

Replace a Controller HBA

An HBA is a circuit board installed inside the Controller riser board assembly.

A failed HBA might cause a Controller failure that could result in the remaining Controllers to shoulder the load. Therefore, if failed, an HBA must be replaced immediately. Additional HBAs can also be added to existing configurations.

Prerequisites:

- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Keep filler panels available in case you only remove the HBA and do not plan to replace the HBA immediately.

  Note: Filler panels ensure proper airflow inside the Controller.
- Use only the filler panels provided with the Controller to maintain proper airflow and EMI conformance for empty slots inside the Controller.
- Fail over the Controller before replacing the component using Guided Maintenance.

  Note: The Controller must be failed over to prevent data loss or data corruption during the component replacement process.
- Label all cables connected to the Controller so that they can be reconnected accurately to the Controller after the replacement procedure is complete.

Note: Replacing an HBA might require changes to the port's world wide name (WWN).

Each Oracle Flash Storage System supports two types of HBA connectivity SAN (FC or iSCSI HBA 16Gb, optical only) and NAS (10 GbE HBA). The placement of the HBA inside the riser slot is based on the Oracle FS System configuration option selected. All HBAs supported in the Oracle FS System are customer replaceable units (CRUs). Replacement of an HBA requires you to bring the Controller offline. HBAs connecting to host servers must be placed into slots 1, 4, and 5 on the risers. HBAs connecting to Drive Enclosures must be placed into slots 2, 3, and 6 on the risers. You must install all HBAs according to the slot numbers listed in the following table.

HBA	System type	Slot number
16 Gb/s Fibre Channel (FC)	SAN	1, 4, 5
6 Gb/s SAS PCIe-3, 4x4 port	ALL	3, 6, 2
16 Gb/s Fibre Channel (FC) or 10GbE iSCSI universal HBA, QLogic	SAN	1, 4, 5

Note: Replacement of the HBA will result in a change to the world wide port name (WWPN) of the HBA, which may require modifying the external configuration. However, changing the SAS HBAs has no affect visible externally.

Note: If both Ethernet and FC HBA are used, insert the Ethernet HBA in the first slot of the riser.

Procedure Overview

1. *Prepare the Component for Replacement*
2. *Slide Controller to Service Position*
3. *Remove the Controller Power Supply Cords*
4. *Disconnect Controller Cabling*
5. *Open the Controller Top Cover*
6. *Remove a Riser*
7. *Remove an HBA*
8. *Insert an HBA*
9. *Insert a Riser*
10. *Close the Controller Top Cover*
11. *Reconnect Controller Cabling*
12. *Complete the Component Replacement*
13. *Verify Controller Component Status*

Related Links

Controller Components

Prepare the Component for Replacement

1. From Oracle FS System Manager (GUI), navigate to System > Hardware > Controllers and then select the Controller that contains the component that is to be replaced.
2. Select Actions > View.

   The View dialog displays the components in the Replaceable Unit list. The Status column lists the status of each component. A status of Normal requires no action.

   Note: Field replaceable units (FRUs) can only be replaced by field technicians with support role privileges.
3. Select a component from the list and click Replace Component.

   Guided Maintenance displays an image of the chassis.
4. Click Next.

   Guided Maintenance displays the Identify Hardware dialog.
5. From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

   You can select one of the following methods to identify the chassis:

   Identify
   : Flashes the LEDs on the chassis that contains the failed component.

   Reverse Identify
   : Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.
6. Click Next.

   Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.
7. Click Next.

   For components that are not hot-serviceable, Guided Maintenance sends a request to bring the Controller offline and automatically initiate failover. Guided Maintenance also displays an HTML link that you use to access the instructions for component replacement.

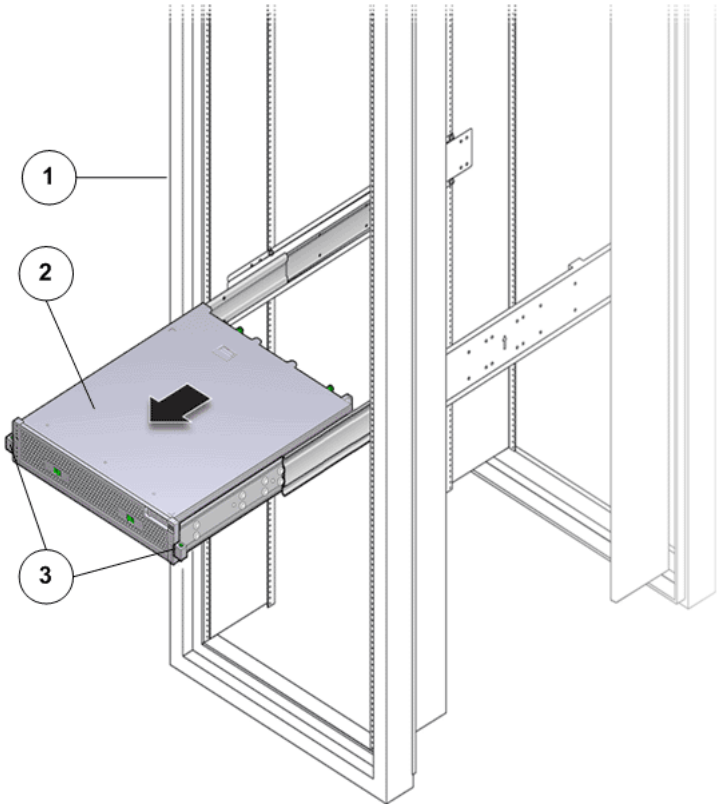
   For hot-serviceable components, Guided Maintenance completes the process of preparing the system for component replacement and displays the Replace Hardware dialog. The Replace Hardware dialog instructs you to replace the component. You also receive a System Alert informing you that the component is ready for removal. To review System Alerts, navigate to System > Alerts and Events > System Alerts.

Slide Controller to Service Position

Squeeze the release buttons on either side of the Controller front panel at the same time and slide the Controller chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Controller slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Controller chassis.

Figure 88: Slide the Controller to service position



Legend

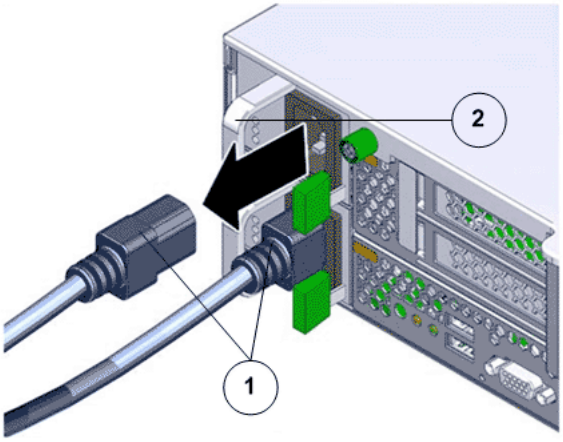
1 Rack
2 Controller chassis
3 Release buttons

Important: Before you slide the Controller chassis out, ensure that the cables do not interfere with the movement of the Controller chassis. Although the cable management arm (CMA) is hinged so that you can extend the Controller chassis, all cables and cords must be out of the way when you service the Controller components.

Remove the Controller Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 89: Remove power supply cords



Legend

1	Power supply cords
2	Power supply handle

Tip: Always notify affected users that the Controller will be powered off.

Disconnect Controller Cabling

Disconnect all data cables from the Controller.

Note: All cables must be disconnected from the Controller and labeled such that they can be reconnected accurately to the Controller after the replacement procedure is complete. Reconnecting cables to the incorrect position might impact the performance of the Controller or result in a complete loss of functionality.

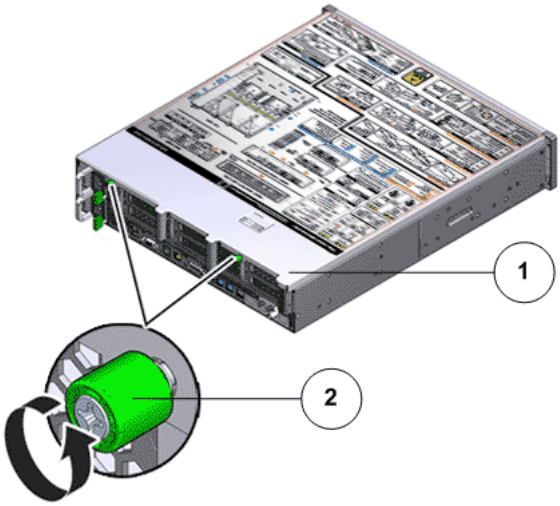
Note: Service the Controller components from the front of the Controller while the Controller is in service position.

Note: Do not lean on or place any weight on the Controller while the Controller is in the service position.

Open the Controller Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 90: Captive thumb screws to remove the top cover



Legend

1	Controller top cover
2	Captive screws

2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Controller chassis.

Remove a Riser

1 Disconnect any external cables that remain connected to the HBAs in the risers.

Note: Also disconnect any internal cables attached to the HBAs, if that will ease removing the HBA.

Tip: Make a note of the positions of all existing cable connections before removing any cables. Replacing HBAs or their cables into the incorrect position in the riser may result in a loss of performance or functionality.

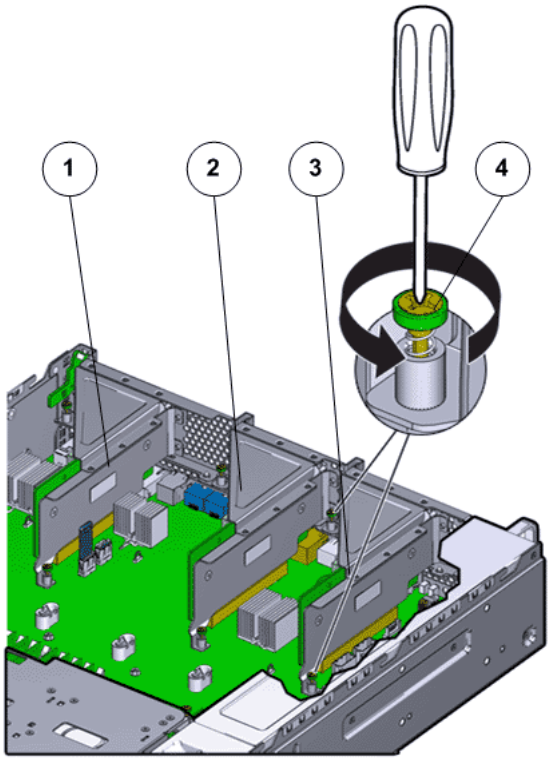
2 Note the position of the HBAs installed on the riser.

Tip: Make a note of the slot numbers of all existing HBAs before removing any HBAs.

3 Using a Phillips Number 2 screwdriver, loosen the two Phillips Number 2 captive screws on either side of the riser that hold the riser to the Controller motherboard.

Note: The riser on the opposite end of the power supply has a latch that must be disengaged to remove the riser from the Controller chassis

Figure 91: Captive screws to secure the risers

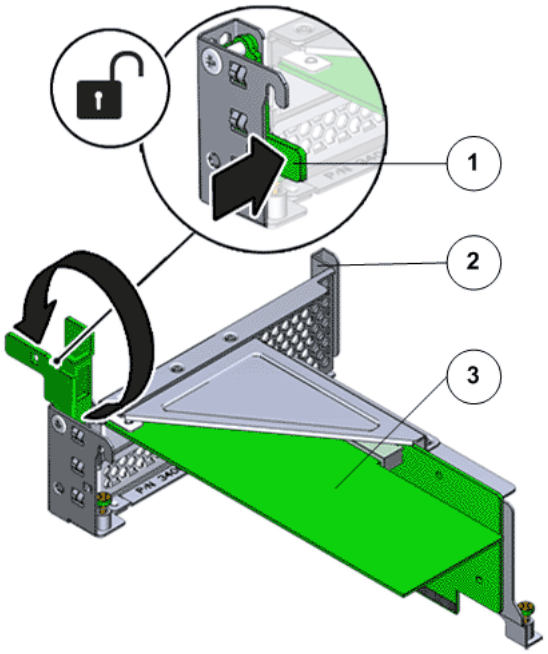


Legend

1 Riser 3 with latch	3 Riser 1
2 Riser 2	4 Captive screws that secure riser

To remove riser 3, unlock the latch to release the riser from the Controller motherboard.

Figure 92: Unlock Riser 3 latch

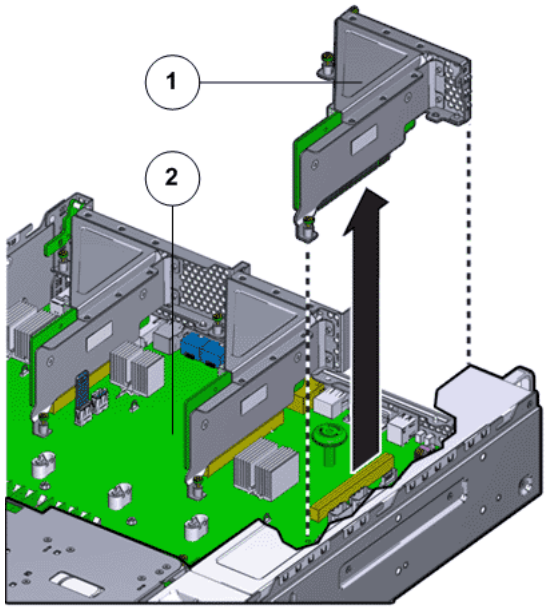


Legend

1 Riser 3 latch	3 HBA
2 Riser 3	

4 Carefully pull the riser straight up and place it aside.

Figure 93: Remove riser



Legend

1 Riser
2 Controller motherboard

Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

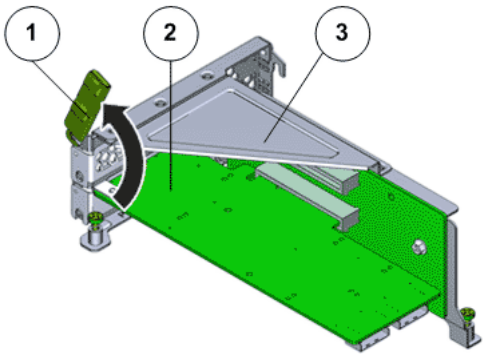
Remove an HBA

1. Disconnect any cables that are connected to the HBAs inside the riser.

   If you have not done so already, note the ports from which the cables are disconnected in the HBA, so that the cables can be reconnected to their original ports when the HBA is replaced.

2. Swing the riser retainer latch (for riser 3) to its fully open (180 degrees) position.

   Figure 94: Unlock riser retainer latch to release HBA

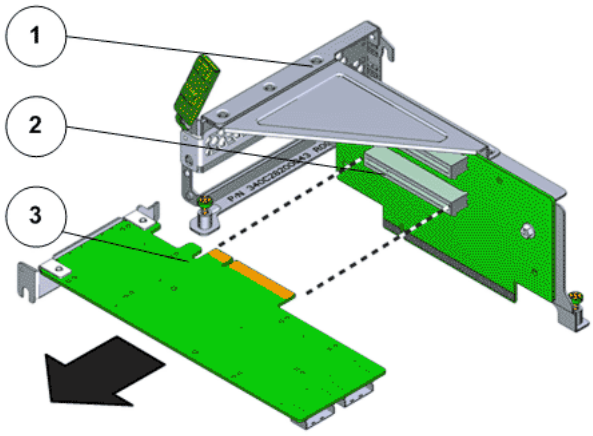


Legend

1 Riser retainer latch
2 HBA
3 Riser

3. Lift the HBA off of the alignment pin of the riser slot.

Figure 95: Remove HBA from riser slots



Legend

1 Riser
2 Riser slots
3 HBA

Insert an HBA

1 Unscrew the filler panels on the riser (if any), so that the HBAs can be inserted into the PCIe slots of the replacement riser.

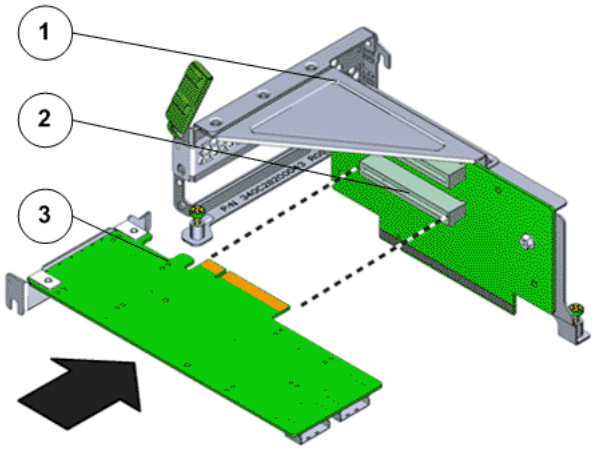
Note: If you are replacing an HBA from the riser with the retainer latch, swing the retainer latch to its fully open (180 degrees) position.

2 Orient the HBA so that the brackets of the HBA align with the alignment pin in the PCIe slot of the riser.

Important: Hold the HBA by the edges. Do not touch the metal contacts on the bottom of the card.

3 Push the connectors on the edge of the HBA into the PCIe slot by pushing firmly to seat the card.

Figure 96: Insert HBA into riser slot



Legend

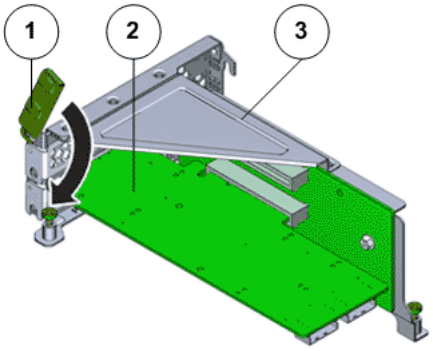
1 Riser
2 Riser slots
3 HBA

4 Apply firm pressure on each end of the HBA alternately until it clicks into place in the riser socket.

Caution: Support the HBA and the riser as necessary to prevent excessive flexure. Otherwise, the HBA or the riser card might be damaged.

5 When all HBAs have been installed in this riser, swing the retainer latch to its fully closed position. If there is resistance, check the alignment of the HBA and try again.

Figure 97: HBA retainer latch



Legend

1	Riser retainer latch
2	HBA
3	Riser

6 Repeat the procedure for any additional PCIe3 HBAs that might be installed in the other risers.

7 Reconnect any cables that had been disconnected from the HBAs.

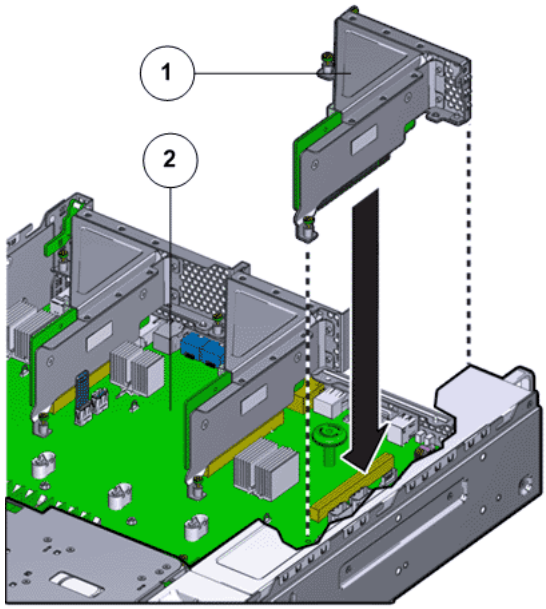
Note: Make sure that disconnected cables from the HBAs are connected to their original ports.

Insert a Riser

1 Lower the riser onto the Controller motherboard and press the riser edge connector securely into the socket.

Important: Ensure that any HBAs that must be removed from the failed riser and placed onto the replacement rise are inserted into the same slots on the replacement riser.

Figure 98: Insert riser

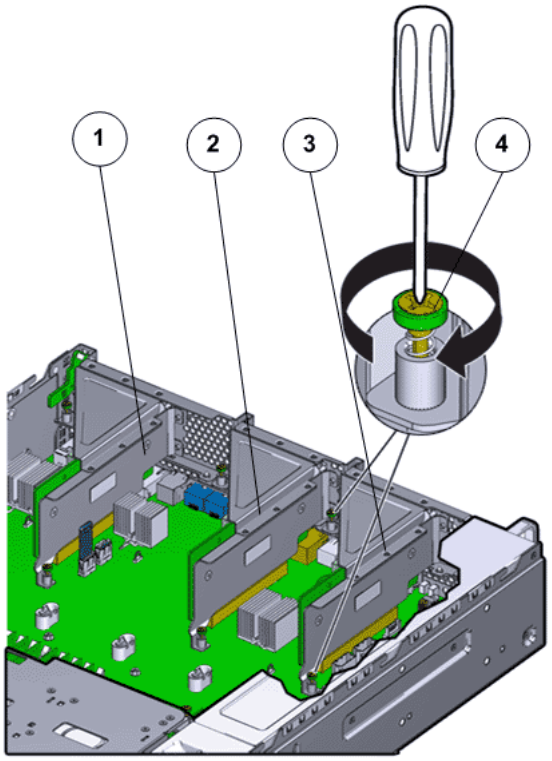


Legend

1 Riser	
2 Controller motherboard	

2 After the riser is seated properly inside the Controller, tighten the two captive Phillips screws on both sides of the riser to secure the riser on the Controller motherboard.

Figure 99: Captive screws to secure risers to the motherboard

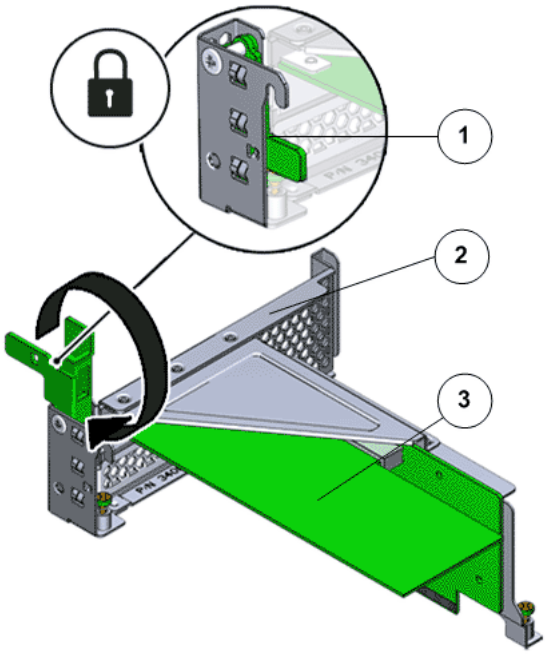


Legend

1 Riser 3 with latch	3 Riser 1
2 Riser 2	4 Captive screws

To install riser 3, lock the latch to secure the riser to the Controller motherboard.

Figure 100: Riser 3 latch locked



Legend

1 Riser 3 latch	3 HBA
2 Riser 3	

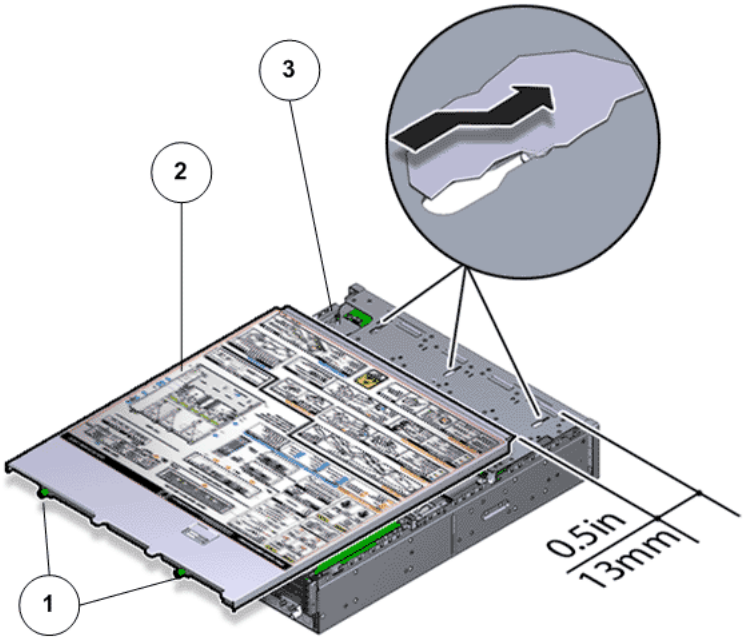
3 Reconnect any previously removed internal or external cables to any HBAs installed in the riser.

4 Repeat the above steps for any additional risers that you are installing.

Close the Controller Top Cover

Place the top cover of the Controller and tighten the two thumb screws at the back of the Controller that secure the top cover.

Figure 101: Close Controller top cover



Legend

1 Thumb screws
2 Controller top cover
3 Controller

Reconnect Controller Cabling

1 Reconnect all the data cables on the Controller.

Note: Oracle Customer Support recommends labeling all cables connected to the Controller so that the cables can be reconnected accurately to the Controller after the replacement procedure is complete.

2 Reconnect the CMA to the Controller by attaching the release tab on the left and right side of the CMA.

Complete the Component Replacement

1 Slide the Controller back into rack position.

2 Re-connect the cables that were removed from the Controller.

Note: The Controller automatically powers up when the power cords are plugged in.

Verify Controller Component Status

1 From Guided Maintenance, verify that the status is Normal.

You can also verify the status by navigating to System > Hardware and then selecting a chassis. The Overview page for the selected chassis lists the status of each component.

Note: The Controller status will be visible several minutes after being powered on. The Oracle FS1 Flash Storage System must load the operating system software on the Controller, then validate the status of the Controller and the hardware before it will allow the Controller to rejoin the system and return to Normal status.

2 Review the status of the LEDs to confirm a status of Normal.

Replace a Controller DIMM

Dual in-line memory modules (DIMMs) provide random access memory (RAM) for the central processing units (CPUs) configured in the Controller. DIMMs are connected to the DIMM slots located on both sides of the central processing unit (CPUs) and heat sinks on the Controller motherboard. A failed DIMM might cause the Controller to be brought offline and must be replaced as soon as possible.

Prerequisites:

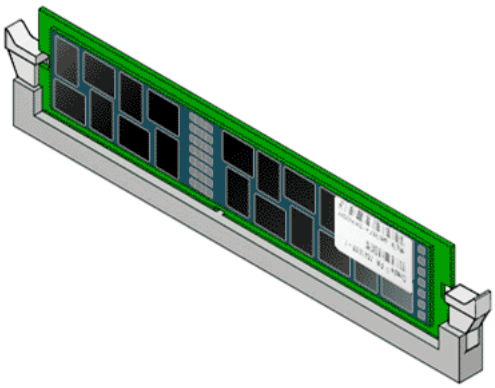
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Fail over the Controller before replacing the component using Guided Maintenance.

  Note: The Controller must be failed over to prevent data loss or data corruption during the component replacement process.
- Ensure that all DIMM slots are filled with either filler panels or DIMMs to ensure proper airflow.

A basic Oracle FS1 Flash Storage System has two standard DIMMs and a performance Oracle FS1 Flash Storage System has 12 standard DIMMs. Each DIMM in the Oracle FS1 Flash Storage System have 16 GB memory.

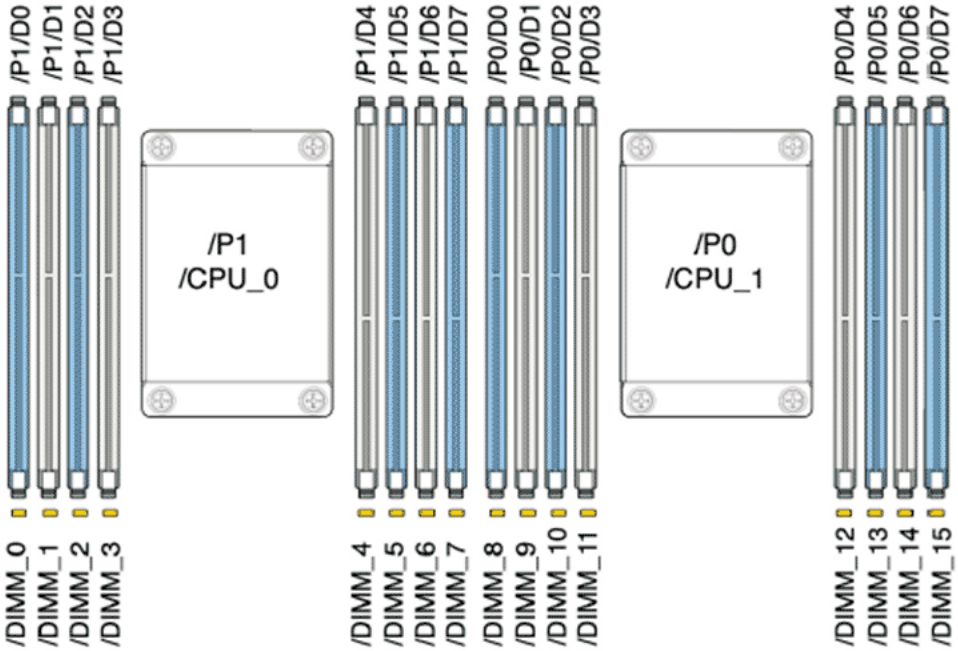
DIMMs are customer replaceable units (CRUs). Replacing a DIMM requires you to bring the Controller offline. The following figure depicts a DIMM memory module.

Figure 102: DIMM memory module



The following diagram indicates the location of the DIMMs in the DIMM slots.

Figure 103: DIMMs in DIMM slots



Note: The DIMMs can be accessed only after removing the cover over the Controller chassis.

Note: To replace a DIMM, you do not need to remove the Controller from the rack but extend it along the Controller rails using the cable management arm (CMA).

Note: All DIMM fault LEDs are located next to the DIMM slots along with the DIMM slot number.

Caution: Ensure that all power is removed from the Controller before removing or installing the DIMM.

Procedure Overview

1 *Prepare the Component for Replacement*
2 *Slide Controller to Service Position*
3 *Remove the Controller Power Supply Cords*
4 *Open the Controller Top Cover*
5 *Remove an Air Filter*
6 *Raise the Drive Compartment to Service Position*
7 *Remove an Air Duct*
8 *Remove a DIMM*
9 *Insert a DIMM*
10 *Lower the Drive Compartment*
11 *Insert an Air Duct*
12 *Insert an Air Filter*
13 *Close the Controller Top Cover*
14 *Complete the Component Replacement*
15 *Verify Controller Component Status*

Related Links

Controller Components

Prepare the Component for Replacement

1 From Oracle FS System Manager (GUI), navigate to System > Hardware > Controllers and then select the Controller that contains the component that is to be replaced.

2 Select Actions > View.

The View dialog displays the components in the Replaceable Unit list. The Status column lists the status of each component. A status of Normal requires no action.

Note: Field replaceable units (FRUs) can only be replaced by field technicians with support role privileges.

3 Select a component from the list and click Replace Component.

Guided Maintenance displays an image of the chassis.

4 Click Next.

Guided Maintenance displays the Identify Hardware dialog.

5 From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

You can select one of the following methods to identify the chassis:

Identify

Flashes the LEDs on the chassis that contains the failed component.

Reverse Identify

Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.

6 Click Next.

Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.

7 Click Next.

For components that are not hot-serviceable, Guided Maintenance sends a request to bring the Controller offline and automatically initiate failover. Guided Maintenance also displays an HTML link that you use to access the instructions for component replacement.

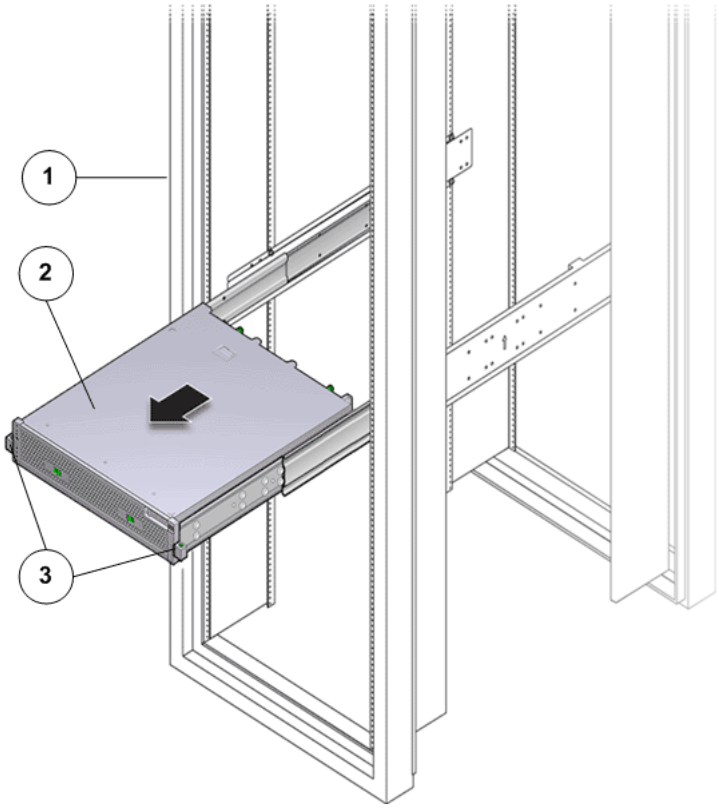
For hot-serviceable components, Guided Maintenance completes the process of preparing the system for component replacement and displays the Replace Hardware dialog. The Replace Hardware dialog instructs you to replace the component. You also receive a System Alert informing you that the component is ready for removal. To review System Alerts, navigate to System > Alerts and Events > System Alerts.

Slide Controller to Service Position

Squeeze the release buttons on either side of the Controller front panel at the same time and slide the Controller chassis forward until the slide rails lock into position. You might have to remove screws locking the front panel to the rack before the Controller slides forward.

Caution: Deploy any rack anti-tilt mechanism before releasing the release buttons and extending the Controller chassis.

Figure 104: Slide the Controller to service position



Legend

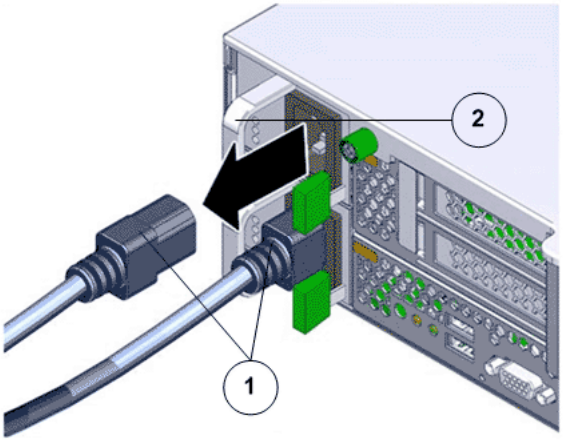
1	Rack
2	Controller chassis
3	Release buttons

Important: Before you slide the Controller chassis out, ensure that the cables do not interfere with the movement of the Controller chassis. Although the cable management arm (CMA) is hinged so that you can extend the Controller chassis, all cables and cords must be out of the way when you service the Controller components.

Remove the Controller Power Supply Cords

Disconnect the power cords from both power supplies.

Figure 105: Remove power supply cords



Legend

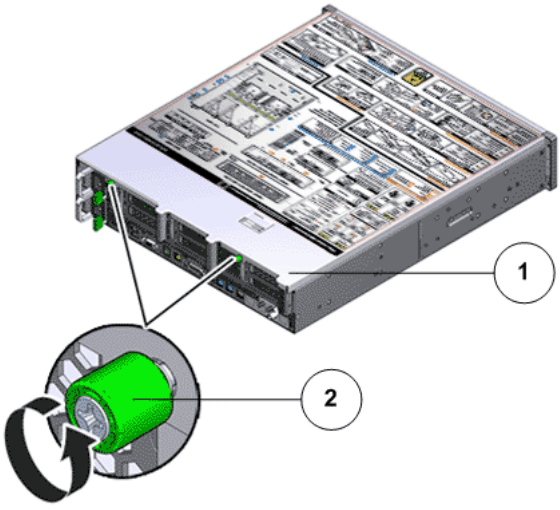
1	Power supply cords
2	Power supply handle

Tip: Always notify affected users that the Controller will be powered off.

Open the Controller Top Cover

1 Fully loosen the two captive thumb screws at the back of the top cover using the Phillips number 2 screwdriver, if necessary.

Figure 106: Captive thumb screws to remove the top cover



Legend

1 Controller top cover	
2 Captive screws	

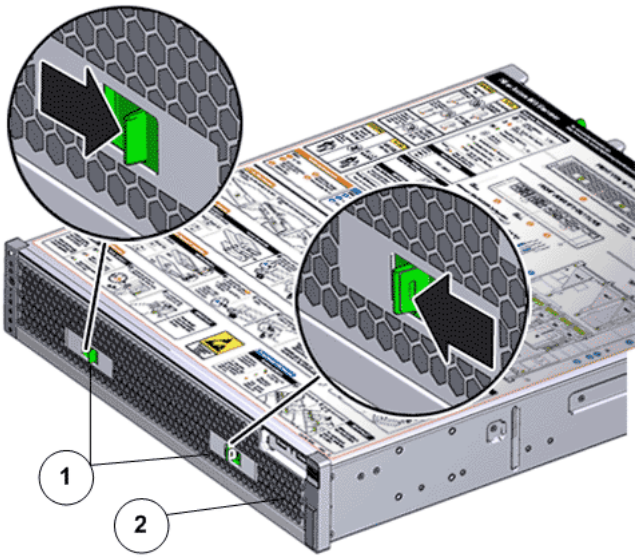
2 Slide the top cover backwards 0.5 inches (13 mm) and lift the top cover straight up and off the Controller chassis.

Remove an Air Filter

1 At the front of the Controller chassis, locate the air filter release tabs.

2 Press the release tabs inwards at the same time to unlock the tabs and disengage the air filter.

Figure 107: Air filter release tabs



Legend

1 Release tabs	2 Air filter

3 Carefully rotate the top of the air filter outwards and as the release tabs disengage, lift out the filter.

Figure 108: Remove air filter

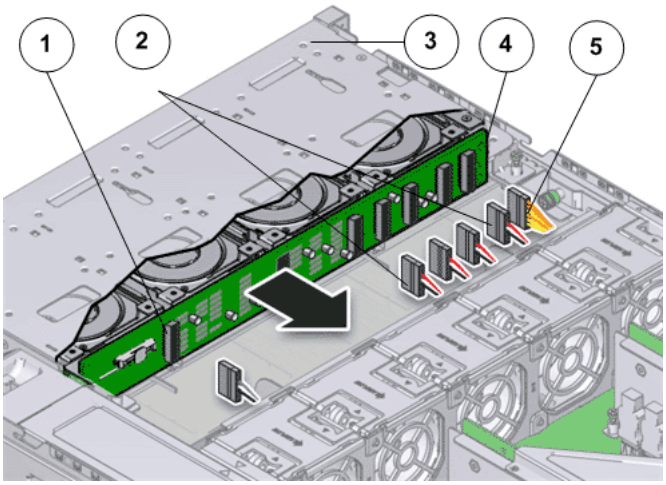
4 Set the air filter aside.

Raise the Drive Compartment to Service Position

1 Disconnect the cables attached to the backplane.
Cables that must be disconnected include:

- SATA or drive cable
- NV-DIMM cable
- Motherboard to HDD backplane cable
- USB board cable

Figure 109: Cables connected to the backplane



Legend

1 SATA or drive cable
2 NV-DIMM cables
3 Drive compartment
4 Backplane boards
5 Motherboard to HDD backplane cable

Note: The USB board cable is connected to the Controller display panel.

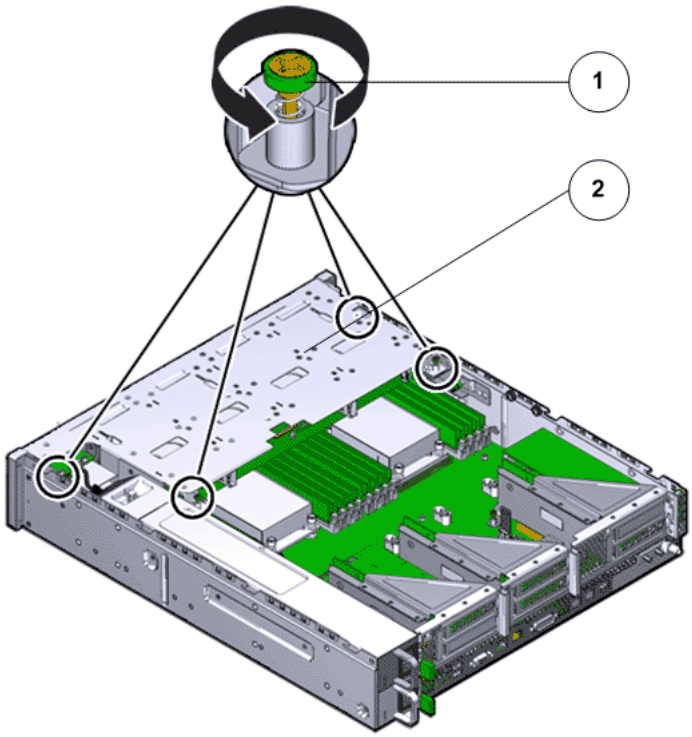
Note: All cables attached to the backplane must be disconnected before raising the drive compartment. Otherwise, the cables might get damaged or tear due to unnecessary flexure or pull.

Note: Note the location of all the cable connections to the backplane for later re-connection of the cables after the replacement procedure is completed.

Tip: Refer to the service label for more information on rotating the drive compartment.

2 Disengage the backplane by loosening the four Phillips Number 2 thumb screws on the four sides of the backplane using a Phillips Number 2 screwdriver and rotate the backplane at a 90 degrees angle.

Figure 110: Disengaging the backplane



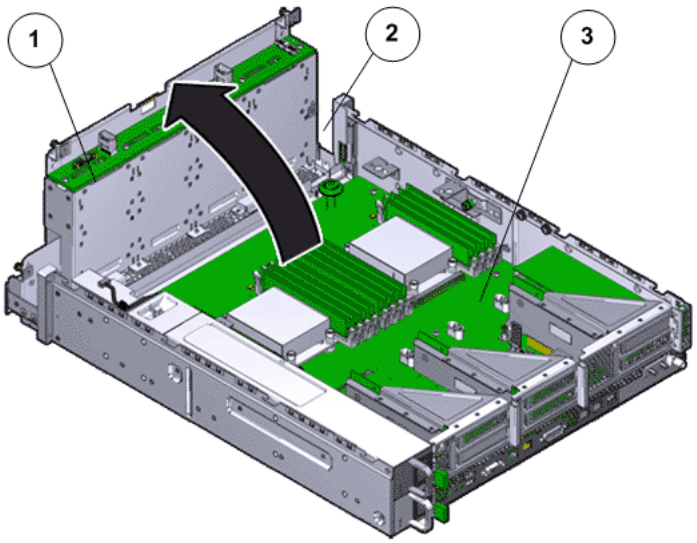
Legend

1 Thumb screws that secure the backplane
2 Backplane

Note: Use the screwdriver very carefully to avoid damaging the electrical circuitry inside the Controller.

3 Raise the backplane and drive compartment to the vertical position.

Figure 111: Drive compartment raised



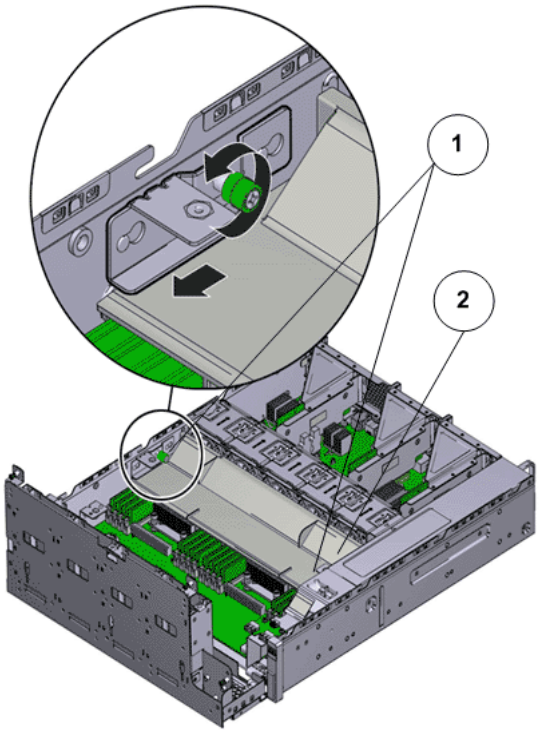
Legend

1 Backplane
2 Drive compartment
3 Controller motherboard

Remove an Air Duct

1 Remove the air duct by loosening the two brackets and the Phillips Number 2 thumb screws on both sides of the air duct.

Figure 112: Remove air duct



Legend

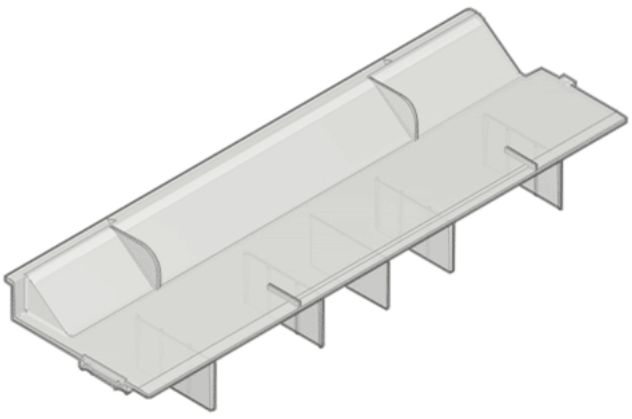
1	Screws that secure air duct
2	Air duct

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward and the right bracket slides back when facing the Controller in the service position.

2 Lift up the air duct from the Controller chassis and set it aside.

The following figure shows a Controller air duct:

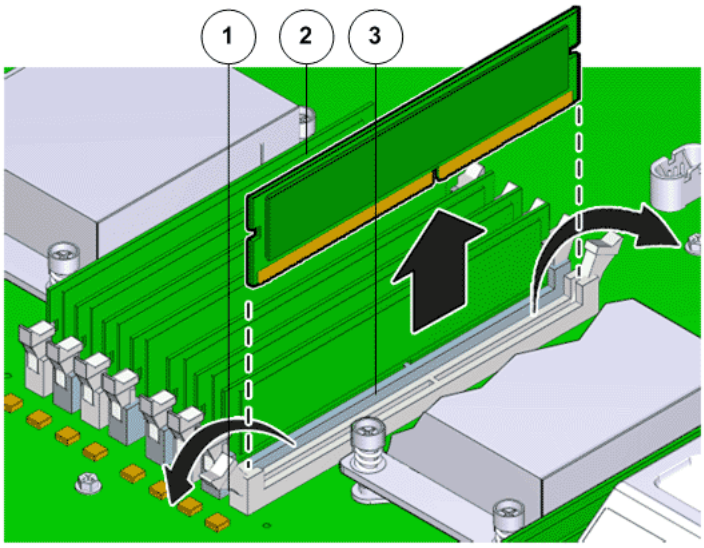
Figure 113: Air duct



Remove a DIMM

1 Remove the DIMMs by pressing down on the tabs on both sides of the DIMM to unlock it from the slot.

Figure 114: Remove DIMMs



Legend

1	Tabs to release DIMMs
2	DIMM
3	DIMM slot

Note: Pressing on the fault remind button on the motherboard lights up the fault LED. The fault remind button helps to identify the faulted DIMMs. However, press the fault remind button only when necessary, because the capacitor powering up the fault remind button can be sustained only for 60 seconds.

Note: While inserting or removing DIMMs, ensure that there is no interference with the cables. Pulling or pressing down on the cables might cause damage to the cables during the replacement procedure.

2 Lift out the DIMM and set aside on an antistatic mat.

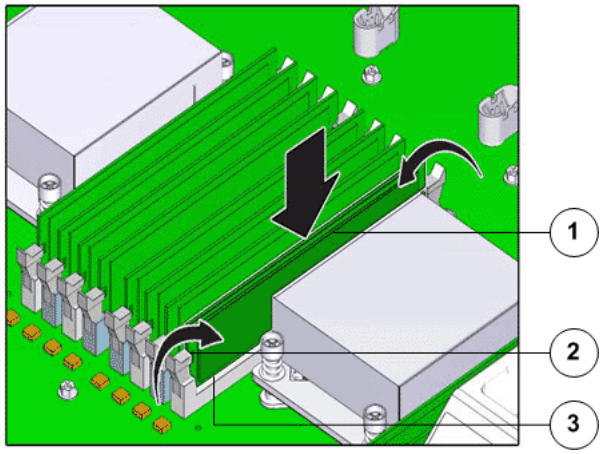
Note: Visually inspect the slots and the memory for physical damage by checking for cracked or broken plastic in the slot.

Note: Sometimes memory might fault because of dust or improper alignment or damaged slots. Use only compressed air to dust the memory.

Insert a DIMM

Press the DIMM fully into the DIMM slot and ensure that the tabs on both sides of the DIMM are locked.

Figure 115: Insert Controller DIMM

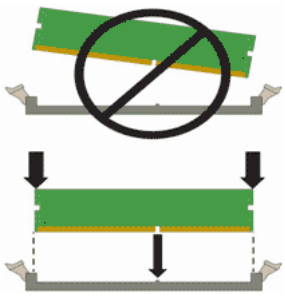


Legend

1 DIMM
2 Tabs to secure DIMMs
3 DIMM notch aligns with the DIMM slots

Note: While inserting DIMMs, ensure that there is no interference with the cables. Pulling or pressing down on the cables might cause damage to the cables during the replacement procedure.

Figure 116: DIMM alignment over DIMM slots



Important: Ensure that the notch in the DIMM lines up with the key in the slot.

Note: Replace only one DIMM at a time to make sure that they are inserted into the correct slots. Attempting to insert multiple DIMMs into the slots might damage the DIMMs due to excessive flexure.

Note: Never leave a DIMM slot unpopulated. Insert fillers into empty slots to ensure proper air flow inside the Controller.

Lower the Drive Compartment

1. Rotate the drive compartment and backplane back into position inside the Controller and ensure that the alignment pins engage.

   Note: To confirm that the backplane is locked into position, listen for an audible click or feel the backplane engage with the Controller.

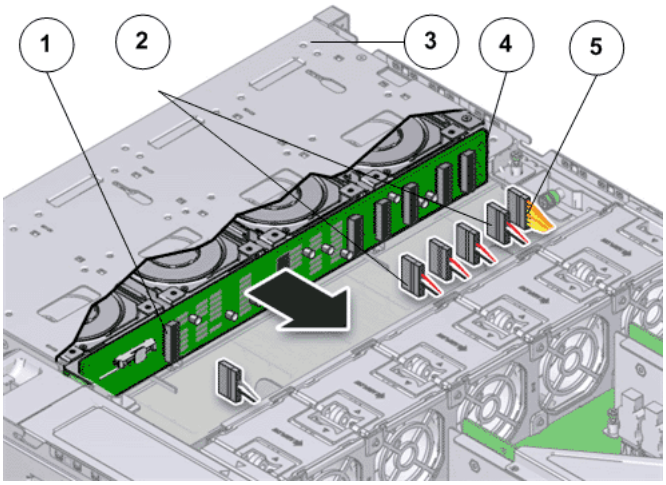
2. Secure the backplane inside the Controller by inserting the four Phillips Number 2 thumb screws on the four sides of the backplane and tightening them using a Phillips Number 2 screwdriver.

3. Reconnect all the cables that had been previously disconnected from the backplane.

   Cables that must be reconnected include:

   - SATA or drive cable
   - NV-DIMM cable
   - Motherboard to HDD backplane cable

Figure 117: Reconnect cables to the backplane



Legend

1 SATA or drive cable
2 NV-DIMM cable
3 Drive compartment
4 Backplane boards
5 Motherboard to HDD backplane cable

Insert an Air Duct

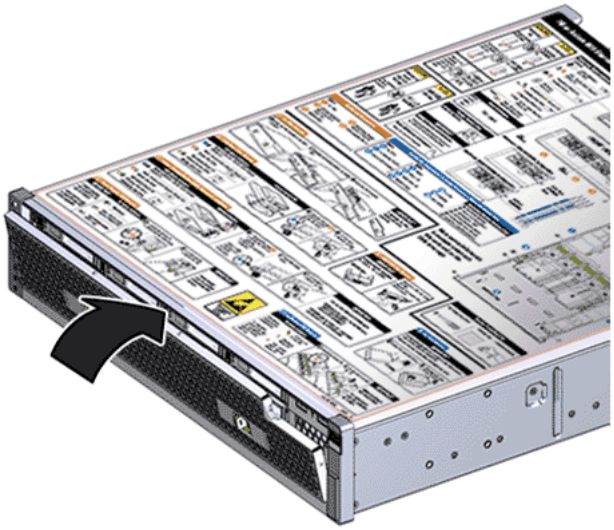
Secure the air duct inside the Controller by tightening the two Phillips Number 2 screws into position.

Note: The brackets that secure the air duct are labeled L (left) and R (right). The left bracket slides forward, the right bracket slides back when facing the Controller in the service position.

Insert an Air Filter

1 Tilt the top of the air filter slightly towards you and insert the bottom two hooks into the mounting tabs.

Figure 118: Insert air filter



Important: Ensure that nothing interferes with the edges of the air filter and that the air filter seats properly.

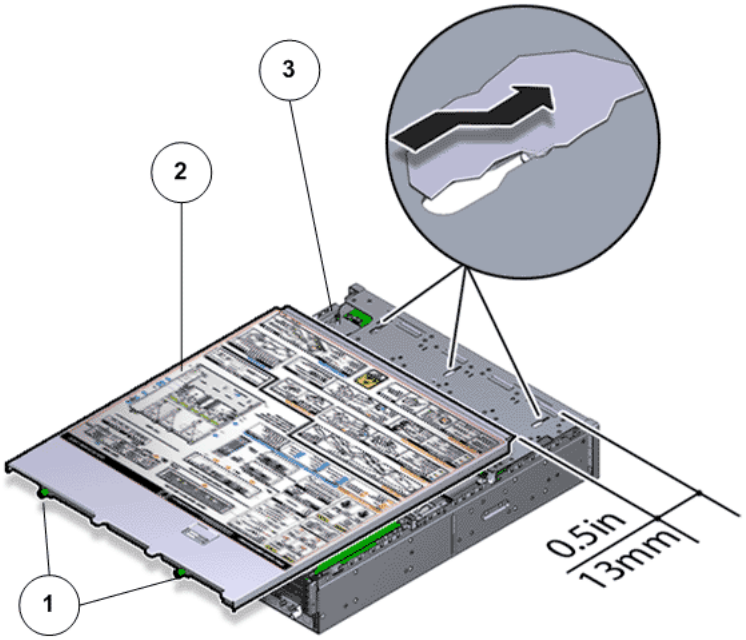
2 Press the top corners of the air filter to engage the top two air filter hooks with the top rail tabs.

3 Press both air filter release tabs until they lock in place.

Close the Controller Top Cover

Place the top cover of the Controller and tighten the two thumb screws at the back of the Controller that secure the top cover.

Figure 119: Close Controller top cover



Legend

1 Thumb screws
2 Controller top cover
3 Controller

Complete the Component Replacement

1 Slide the Controller back into rack position.

2 Re-connect the cables that were removed from the Controller.

Note: The Controller automatically powers up when the power cords are plugged in.

Verify Controller Component Status

1 From Guided Maintenance, verify that the status is Normal.

You can also verify the status by navigating to System > Hardware and then selecting a chassis. The Overview page for the selected chassis lists the status of each component.

Note: The Controller status will be visible several minutes after being powered on. The Oracle FS1 Flash Storage System must load the operating

system software on the Controller, then validate the status of the Controller and the hardware before it will allow the Controller to rejoin the system and return to Normal status.

2 Review the status of the LEDs to confirm a status of Normal.

CHAPTER 4

Drive Enclosure Replacement Procedures

Drive Enclosure Overview

Drive Enclosures are used as back-end storage for the Oracle Flash Storage System. The Oracle FS System can be configured for as many as 30 Drive Enclosures. The two types of Drive Enclosure are the DE2-24P Drive Enclosure and the DE2-24C Drive Enclosure. Both Drive Enclosure types can co-exist in the same system.

Drive Enclosure are high-availability, serial-attached SCSI (SAS-2) storage enclosures. The DE2-24P Drive Enclosure has a 2U chassis that supports the following types of drives:

- Twenty four small form factor (SFF), 2.5-inch (6.35-cm) hard disk drives (HDDs)
- Configurations of seven or 13 performance solid state drives (SSDs)
- Configurations of seven, 13, or 19 capacity SSDs

The DE2-24C Drive Enclosure has a 4U chassis that supports 24 large form factor (LFF), 3.5-inch (8.89-cm) HDDs.

The following figures show the front of the DE2-24P Drive Enclosure and the DE2-24C Drive Enclosure.

Figure 120: DE2-24P Drive Enclosure (front view)

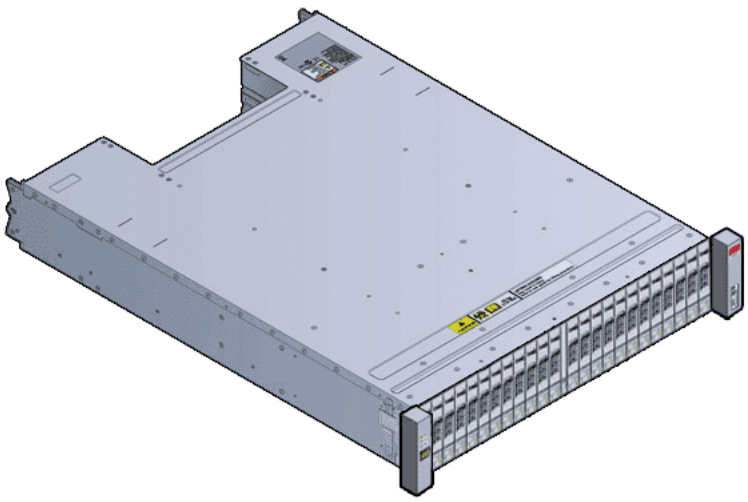
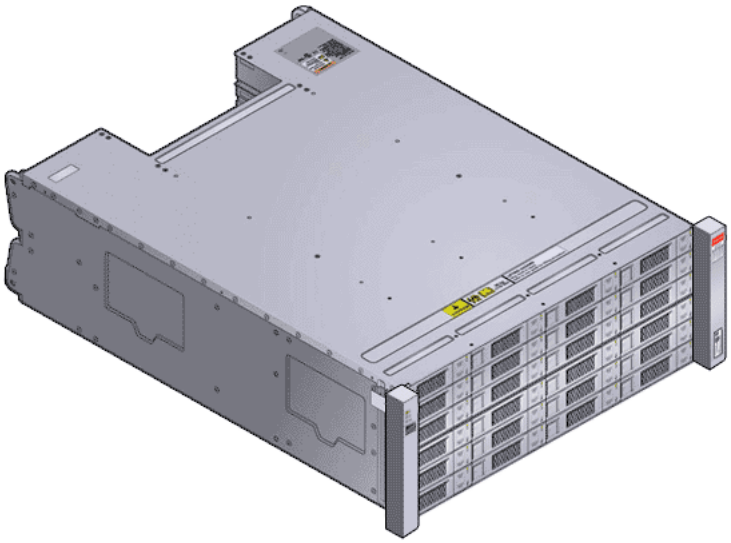


Figure 121: DE2-24C Drive Enclosure (front view)



Both types of Drive Enclosures have the following physical configuration:

- Two hot-serviceable I/O modules with two interface slots that comply with the Storage Bridge Bay (SBB) standard
- Two hot-serviceable 580W power cooling modules with dual load-sharing power supplies and integrated fans
- 19-inch rack-compatible enclosure
- Front access to all drives
- Back access to the I/O modules and the power cooling modules
- LEDs with status information for the I/O modules, the drives, and the power cooling modules

The following figures show the back of the DE2-24P Drive Enclosure and the DE2-24C Drive Enclosure.

Figure 122: DE2-24P Drive Enclosure (back view)

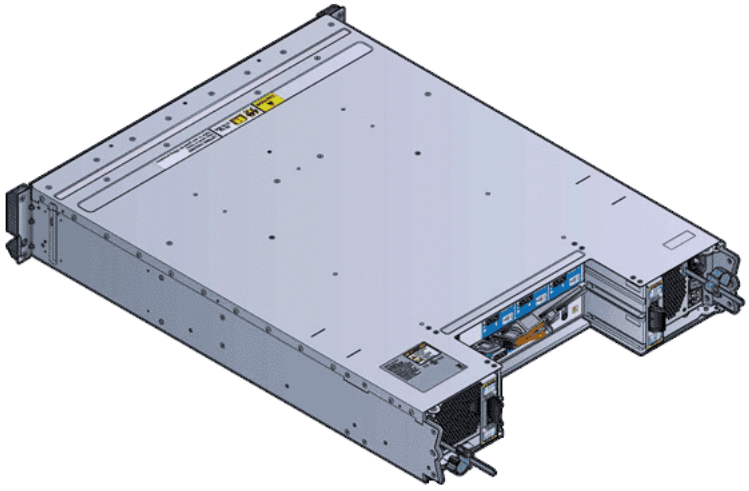
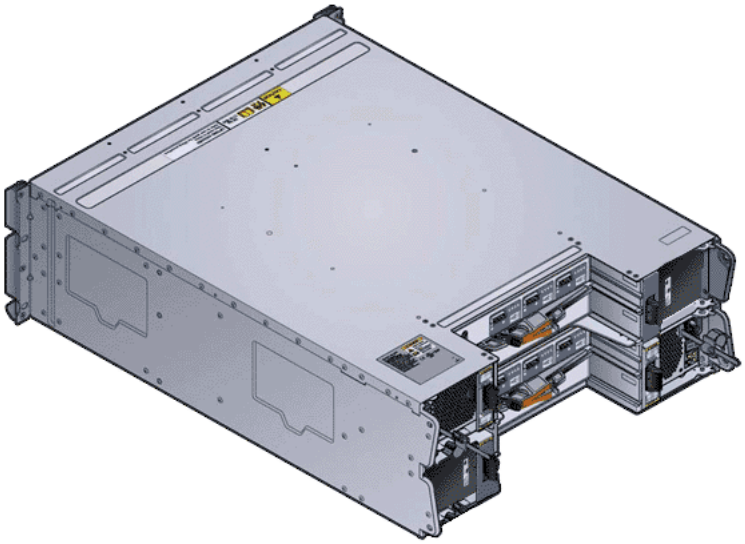


Figure 123: DE2-24C Drive Enclosure (back view)



Drive Enclosure Drive Replacement

Each Drive Enclosure has drives located on the front of the chassis. Drives are customer replaceable units (CRUs). Replacing a drive is a hot-serviceable process.

The DE2-24P Drive Enclosure supports the following drive configuration options:

- 300GB hard disk drives (HDDs) fully populated with 24 drives
- 900GB HDDs fully populated with 24 drives
- 400GB solid state drives (SSDs) in the following configurations:
  - Six drives and one spare

- 12 drives and one spare
- Six drive upgrade to the current configuration

- 1.6TB SSDs with the following configurations:
  - Six drives and one spare
  - 12 drives and one spare
  - 18 drives and one spare
  - Six drive upgrade to the current configuration

Important: The Oracle FS System accepts only Oracle-supplied drives. The capacity and the type of a replacement drive must be same as the other drives in the Drive Enclosure.

The 24 drive locations are numbered 0 to 23 from left to right. The following figure shows the location of the drives on the DE2-24P Drive Enclosure.

Figure 124: DE2-24P Drive Enclosure drives

The DE2-24C Drive Enclosure can only be configured with 24, 4TB HDDs.

The 24 drive locations are numbered 0 to 23 from the lower left of the Drive Enclosure to the upper right of the Drive Enclosure. The following figure shows the location of the drives on the DE2-24C Drive Enclosure.

Figure 125: DE2-24C Drive Enclosure drives

Caution: Make sure you can replace the FRU or CRU within 10 minutes of removing the FRU or CRU. Do not remove a FRU or CRU if you cannot replace it within 10 minutes with a FRU or CRU or with a filler panel. If a FRU or CRU slot is left empty, the system can overheat due to improper airflow.

Important: Make sure that you remove the correct drive. Removing a drive other than the failed drive can disrupt data access and possibly corrupt data.

The system generates an alert to notify you of a failed drive. The system also notifies you when it detects that a drive might fail soon.

Replace a Drive Enclosure Drive

A failed Drive Enclosure drive degrades data throughput. Additionally, if more than one drive begins to fail, data loss can occur. Replace a failed drive with a drive of the same type and capacity as soon as possible.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Make sure that the replacement drive has the same capacity and same type as the drive to be replaced.

Procedure Overview

1 *Prepare a Drive Enclosure for Component Replacement*

2 *Remove a Drive*

3 *Insert a Drive*

4 *Verify the Status of a Drive Enclosure Component*

Prepare a Drive Enclosure for Component Replacement

1 From Oracle FS System Manager (GUI), navigate to System > Hardware.

2 Select Drive Enclosures.

The GUI displays the Drive Enclosures Overview page. The Drive Enclosures Overview page displays the status of the Drive Enclosure components.

3 Select the Drive Enclosure containing the component that you want to replace.

4 Select Actions > View.

The View Drive Enclosure dialog displays the list of replaceable Drive Enclosure components in the Replaceable Unit list.

5 From the Replaceable Unit list, select the component that you want to replace and click Replace Component.

Guided Maintenance displays the Introduction page, and guides you through the steps to replace the Drive Enclosure component.

6 Click Next.

Guided Maintenance displays the Identify Hardware dialog.

7 From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

You can select one of the following methods to identify the chassis:

Identify

Flashes the LEDs on the chassis that contains the failed component.

Reverse Identify

Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.

8 Click Next.

Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.

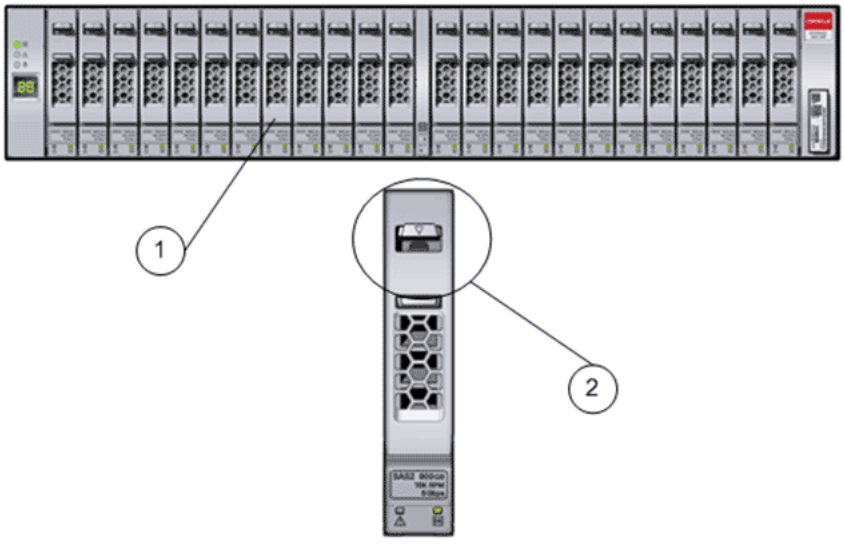
9 Click Next.

Guided Maintenance completes the process of preparing a Drive Enclosure for component replacement. After Guided Maintenance prepares the Drive Enclosure for replacing a component, it displays the Replace Hardware dialog box. The Replace Hardware dialog box instructs you to replace the component. You also receive a System Alert informing you that the component is ready for removal. To review System Alerts, select System > Alerts and Events > System Alerts.

Remove a Drive

1 Press the drive carrier latch to disengage the drive.

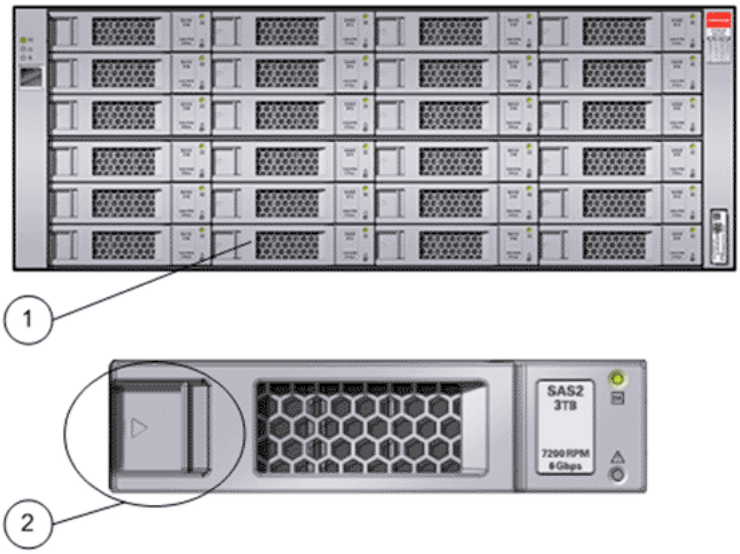
Figure 126: A DE2-24P Drive Enclosure drive and drive carrier latch



Legend

1 A drive	2 Drive carrier latch (closeup)

Figure 127: A DE2-24C Drive Enclosure drive and drive carrier latch



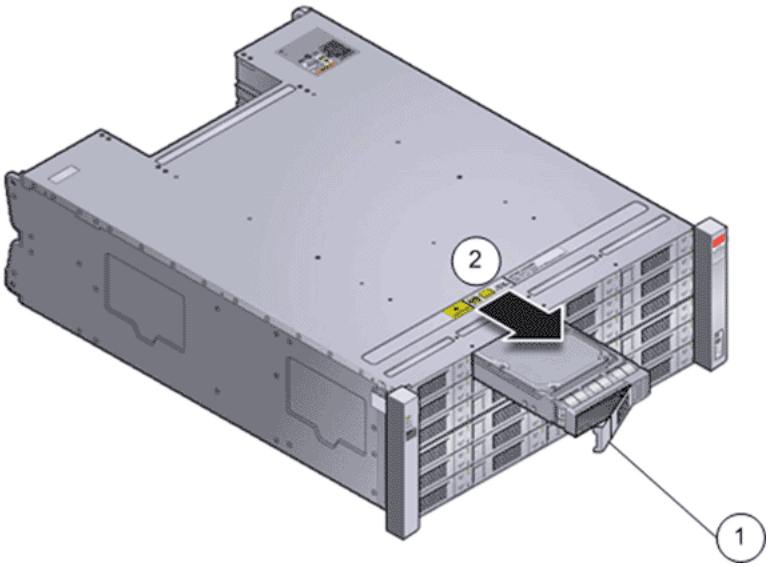
Legend

1 A drive	2 Drive carrier latch (closeup)

2 Pull the drive carrier handle fully open to unlock and partially eject the drive from the Drive Enclosure chassis.

Caution: Do not force open the drive carrier handle. You can damage the drive carrier handle if you apply too much force.

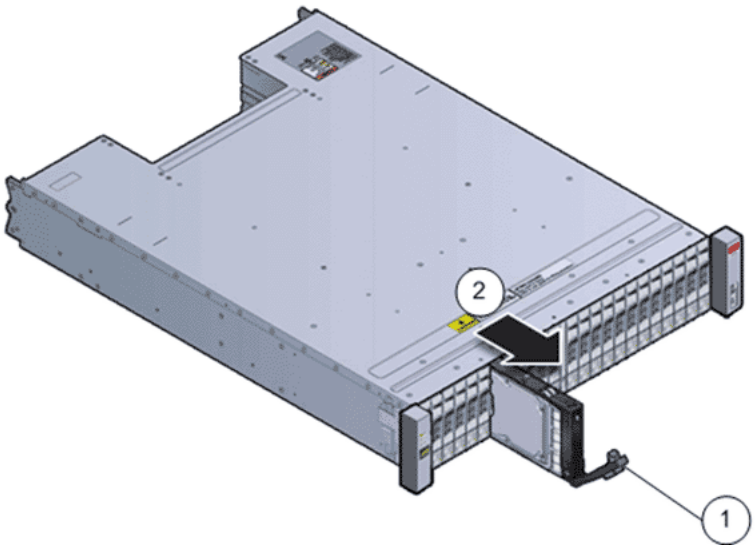
Figure 128: A drive removed from a DE2-24C Drive Enclosure



Legend

1 Drive carrier handle	2 Removing the drive

Figure 129: A drive removed from a DE2-24P Drive Enclosure



Legend

1 Drive carrier handle	2 Removing the drive

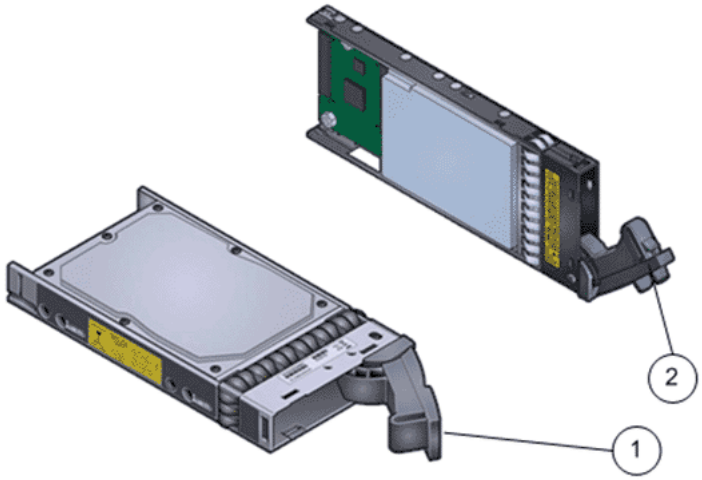
3 Grasp the middle of the drive body and pull the drive completely out of the Drive Enclosurechassis.

Place the drive into an antistatic bag or on an ESD-qualified surface .

Insert a Drive

1 Make sure that the drive carrier handle on the drive is in the fully extended position.

Figure 130: Extended drive carrier handles



Legend

1 Drive carrier handle DE2-24C Drive Enclosure	2 Drive carrier handle DE2-24P Drive Enclosure

2 Slide the drive all the way into the Drive Enclosure chassis slot.

Figure 131: DE2-24C Drive Enclosure and inserted drive

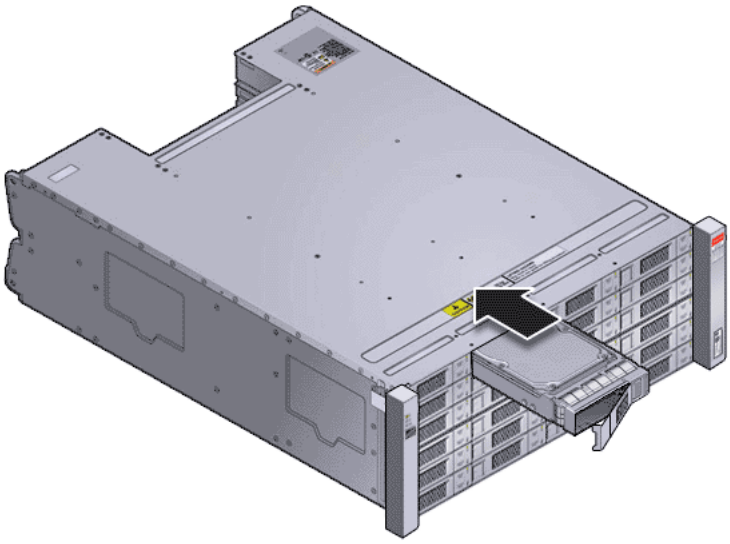
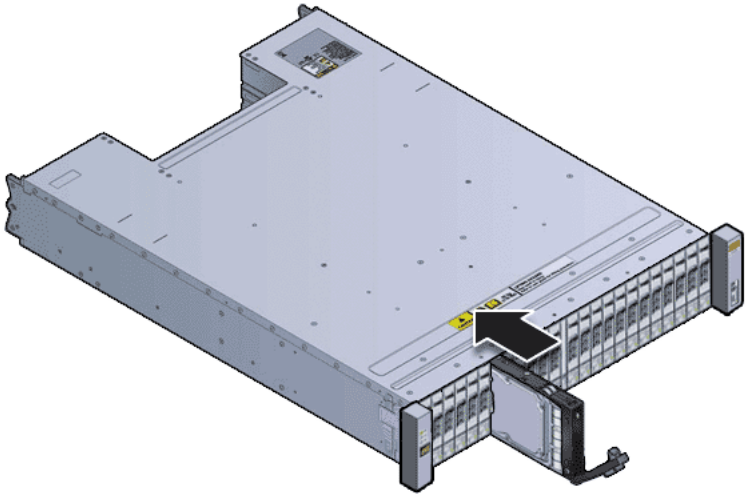


Figure 132: DE2-24P Drive Enclosure and inserted drive



3 Press the drive carrier handle closed until it locks into place.

Verify the Status of a Drive Enclosure Component

1 From Guided Maintenance, verify that the status of the component is Normal.

Guided Maintenance displays a message stating the component status. A status of Normal requires no action.

2 Close Guided Maintenance.

You can also verify component status by navigating to System > Hardware > Drive Enclosures. The Drive Enclosure overview page lists the status of each component.

Replace an I/O Module

I/O modules provide the input and output transfer of data. Failure of a single I/O module degrades connectivity and data availability. Failure of two I/O modules in the same Drive Enclosure results in data being unavailable on that Drive Enclosure and might affect the data availability of other Drive Enclosures on the same string. Replace a failed I/O module as soon as possible.

Prerequisites:

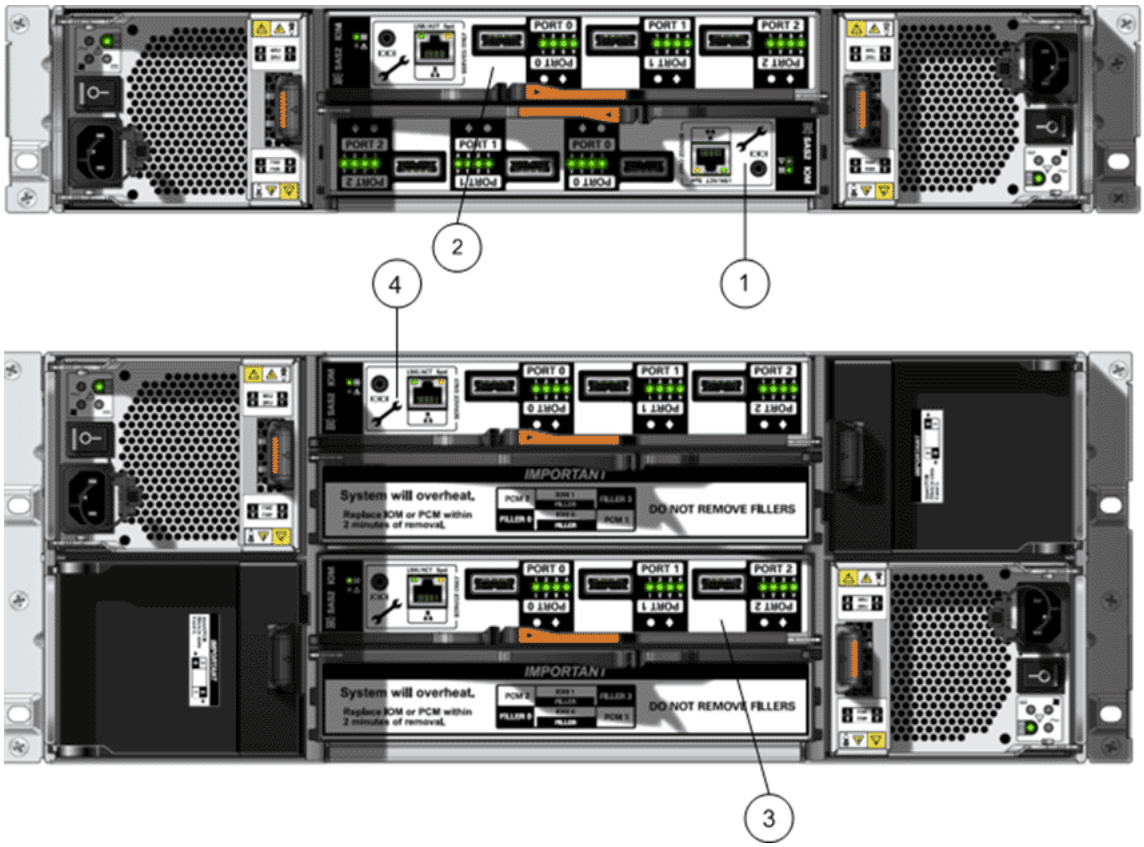
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.

Each Drive Enclosure has two I/O modules located at the back of the Drive Enclosure. I/O modules are customer replaceable units (CRUs). You can replace a failed I/O module without powering down the Drive Enclosure only if the other I/O module is operational with a status of Normal.

The following figure shows the I/O modules on the back of the DE2-24P and DE2-24C Drive Enclosure types.

Note: Notice that I/O module 0 in the DE2-24P Drive Enclosure is inverted.

Figure 133: I/O modules on DE2-24P and DE2-24C Drive Enclosure types



Legend

1 I/O module 0 (DE2-24P Drive Enclosure)	3 I/O module 0 (DE2-24C Drive Enclosure)
2 I/O module 1 (DE2-24P Drive Enclosure)	4 I/O module 1 (DE2-24C Drive Enclosure)

Caution: Make sure you can replace the FRU or CRU within 10 minutes of removing the FRU or CRU. Do not remove a FRU or CRU if you cannot replace it within 10 minutes with a FRU or CRU or with a filler panel. If a FRU or CRU slot is left empty, the system can overheat due to improper airflow.

Note: Prior to replacement, ensure that only one I/O module has failed and that the other I/O module shows a status of Normal.

Procedure Overview

1 *Prepare a Drive Enclosure for Component Replacement*

2 *Remove an I/O Module*

3 *Insert an I/O Module*

4 *Verify the Status of a Drive Enclosure Component*

Prepare a Drive Enclosure for Component Replacement

1. From Oracle FS System Manager (GUI), navigate to System > Hardware.
2. Select Drive Enclosures.

   The GUI displays the Drive Enclosures Overview page. The Drive Enclosures Overview page displays the status of the Drive Enclosure components.
3. Select the Drive Enclosure containing the component that you want to replace.
4. Select Actions > View.

   The View Drive Enclosure dialog displays the list of replaceable Drive Enclosure components in the Replaceable Unit list.
5. From the Replaceable Unit list, select the component that you want to replace and click Replace Component.

   Guided Maintenance displays the Introduction page, and guides you through the steps to replace the Drive Enclosure component.
6. Click Next.

   Guided Maintenance displays the Identify Hardware dialog.
7. From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

   You can select one of the following methods to identify the chassis:

   Identify
   : Flashes the LEDs on the chassis that contains the failed component.

   Reverse Identify
   : Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.
8. Click Next.

   Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.
9. Click Next.

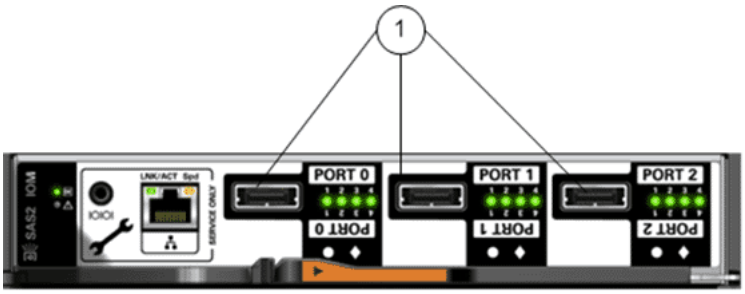
   Guided Maintenance completes the process of preparing a Drive Enclosure for component replacement. After Guided Maintenance prepares the Drive Enclosure for replacing a component, it displays the Replace Hardware dialog box. The Replace Hardware dialog box instructs you to replace the component. You also receive a System Alert informing you that the component is ready for removal. To review System Alerts, select System > Alerts and Events > System Alerts.

Remove an I/O Module

1. When Guided Maintenance prompts you to remove the component, label and disconnect the SAS interface cables that are attached to the I/O module.

After replacing the I/O module, you will be required to restore the SAS interface connectors to the same configuration as prior to replacement.

Figure 134: I/O module SAS connector ports

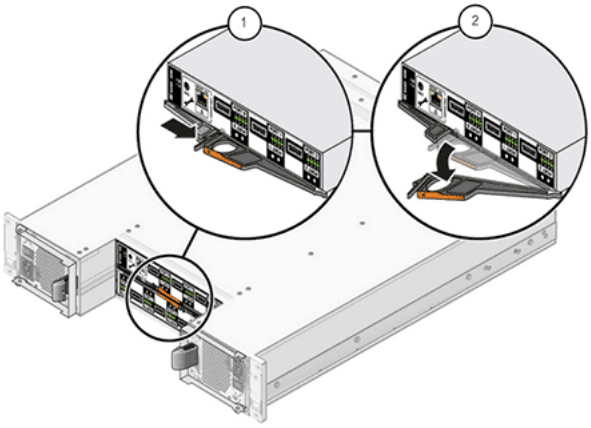


Legend

1	SAS connector ports

2 Using your thumb and forefinger, squeeze the release button toward the lever hole to release the lever.

Figure 135: Remove the I/O module



Legend

1	Release button	2	Lever

3 Pull the lever and remove the I/O module from the Drive Enclosure.

Note: Be careful not to damage the connector pins.

Insert an I/O Module

1 With the lever of the I/O module in the open position, slide the I/O module into the Drive Enclosure chassis.

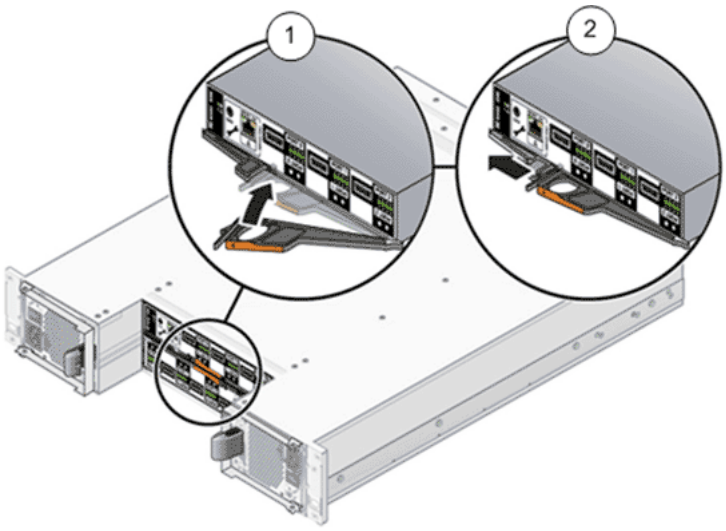
Note: Be careful not to damage the connector pins.

Note: Notice that I/O module 0 in the DE2-24P Drive Enclosure is inverted.

2 As the I/O module contacts the chassis midplane, close the lever and reattach the release button.

To confirm that the I/O module is properly closed, listen for an audible click or feel the I/O module engage with the chassis midplane.

Figure 136: Insert the I/O module



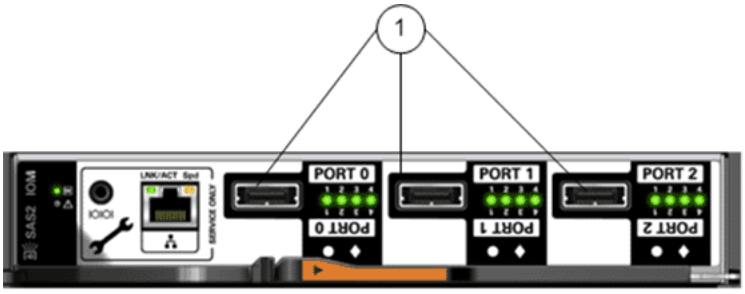
Legend

1	Lever
2	Release button

3 Reconnect the SAS cables to the SAS ports on the I/O module.

Make sure to connect the SAS cables in the exact same configuration as prior to removal.

Figure 137: I/O module SAS connector ports



Legend

1	SAS connector ports

4 Wait approximately 60 seconds for the I/O module to restart.

When the startup process completes, the following indicators should be present:

- The Power LED emits a steady green light.
- The Fault LED is off.
- All four Activity LEDs emit a green light for each SAS-2 port that has an SAS interface cable connected to it.

Verify the Status of a Drive Enclosure Component

1. From Guided Maintenance, verify that the status of the component is Normal.

   Guided Maintenance displays a message stating the component status. A status of Normal requires no action.

2. Close Guided Maintenance.

   You can also verify component status by navigating to System > Hardware > Drive Enclosures. The Drive Enclosure overview page lists the status of each component.

Replace a Power Cooling Module

The power cooling modules provide redundant power control and cooling of the system. If one power cooling module fails, the other power cooling module maintains the power supply and cooling while you replace the failed power cooling module. Electrical overload, inadequate internal and external airflow, dirt and dust, incorrect input voltage, or a short circuit can damage a power cooling module. Replace a failed power cooling module immediately; otherwise, damage from overheating and data loss can occur.

Prerequisites:

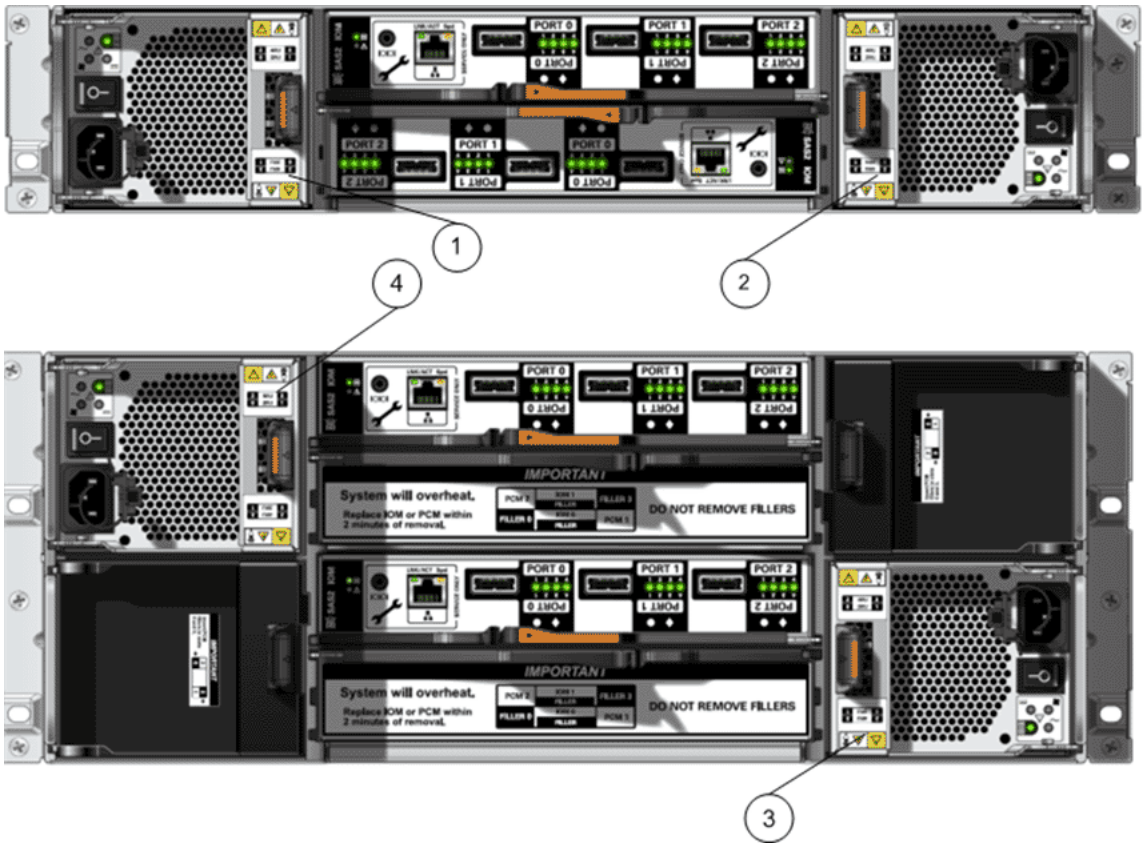
- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.

Warning: Do not remove covers from the power cooling modules. Power cooling modules produce a high-energy hazard.

Each Drive Enclosure has two power cooling modules located at the back of the Drive Enclosure. Power cooling modules are customer replaceable units (CRUs). You can replace a failed power cooling module without powering down the Drive Enclosure only if the other power cooling module is operational with a status of Normal.

The following figure shows the power cooling modules on the DE2-24P Drive Enclosure and the DE2-24C Drive Enclosure.

Figure 138: Power cooling modules (DE2-24P and DE2-24C Drive Enclosures)



Legend

1 Power cooling module 0 (DE2-24P Drive Enclosure)	3 Power cooling module 0 (DE2-24C Drive Enclosure)
2 Power cooling module 1 (DE2-24P Drive Enclosure)	4 Power cooling module 1 (DE2-24C Drive Enclosure)

Caution: Make sure you can replace the FRU or CRU within 10 minutes of removing the FRU or CRU. Do not remove a FRU or CRU if you cannot replace it within 10 minutes with a FRU or CRU or with a filler panel. If a FRU or CRU slot is left empty, the system can overheat due to improper airflow.

Procedure Overview

1. *Prepare a Drive Enclosure for Component Replacement*
2. *Remove a Power Cooling Module*
3. *Insert a Power Cooling Module*
4. *Verify the Status of a Drive Enclosure Component*

Prepare a Drive Enclosure for Component Replacement

1. From Oracle FS System Manager (GUI), navigate to System > Hardware.
2. Select Drive Enclosures.

The GUI displays the Drive Enclosures Overview page. The Drive Enclosures Overview page displays the status of the Drive Enclosure components.

3 Select the Drive Enclosure containing the component that you want to replace.

4 Select Actions > View.

The View Drive Enclosure dialog displays the list of replaceable Drive Enclosure components in the Replaceable Unit list.

5 From the Replaceable Unit list, select the component that you want to replace and click Replace Component.

Guided Maintenance displays the Introduction page, and guides you through the steps to replace the Drive Enclosure component.

6 Click Next.

Guided Maintenance displays the Identify Hardware dialog.

7 From the Identify Hardware dialog, specify how you want to identify the chassis so that you can locate it in the data center.

You can select one of the following methods to identify the chassis:

Identify

Flashes the LEDs on the chassis that contains the failed component.

Reverse Identify

Flashes the LEDs on all of the chassis in the system except for the chassis that contains the failed component.

8 Click Next.

Based on the method you selected to identify the chassis, the corresponding LEDs flash to help you locate the chassis in the data center.

9 Click Next.

Guided Maintenance completes the process of preparing a Drive Enclosure for component replacement. After Guided Maintenance prepares the Drive Enclosure for replacing a component, it displays the Replace Hardware dialog box. The Replace Hardware dialog box instructs you to replace the component. You also receive a System Alert informing you that the component is ready for removal. To review System Alerts, select System > Alerts and Events > System Alerts.

Remove a Power Cooling Module

1 When Guided Maintenance prompts you to remove the component, power off the failed power cooling module.

Note: Do not power off the healthy power cooling module.

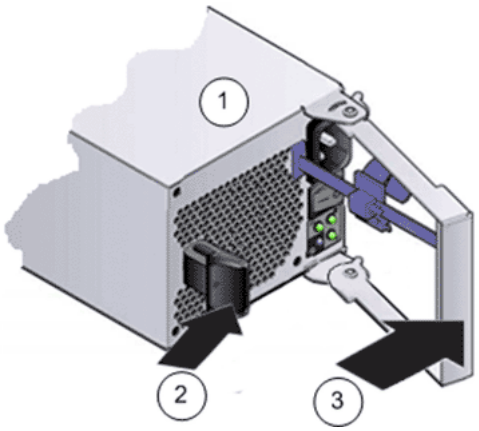
2 Disconnect the power cord tie strap from the faulted power cooling module.

3 Unplug the power cord from the failed power cooling module.

4 Release the attachment lever.

To release the attachment lever, squeeze together the latch and the opposite side of the failed power cooling module.

Figure 139: Attachment lever and latch on the power cooling module



Legend

1 Power cooling module	3 Attachment lever
2 Latch	

5 Gently pull the failed power cooling module out of the Drive Enclosure chassis.

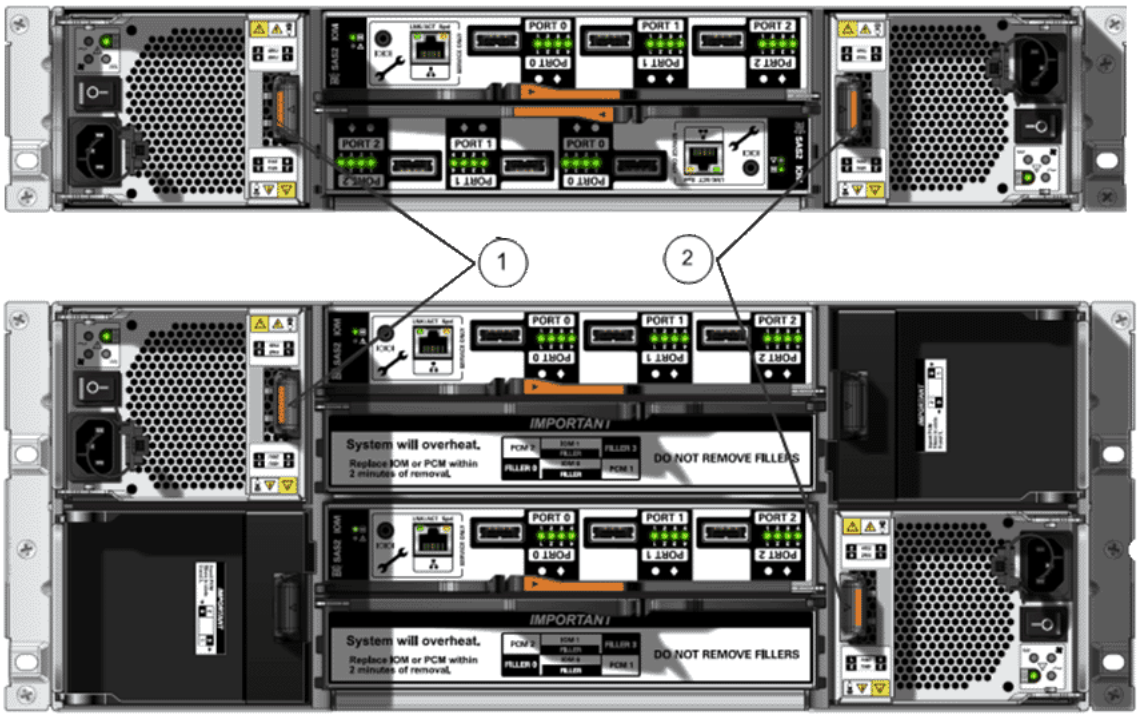
Note: Be careful not to damage the connector pins.

Insert a Power Cooling Module

Before sliding a power cooling into the Drive Enclosure, ensure that the power cooling module is oriented correctly. To ensure correct orientation, align the latch on the power cooling module with the inner area of the Drive Enclosure.

Caution: Inserting a power cooling module that is not oriented correctly into a Drive Enclosure can damage the power cooling module and the Drive Enclosure.

Figure 140: Power cooling module orientation

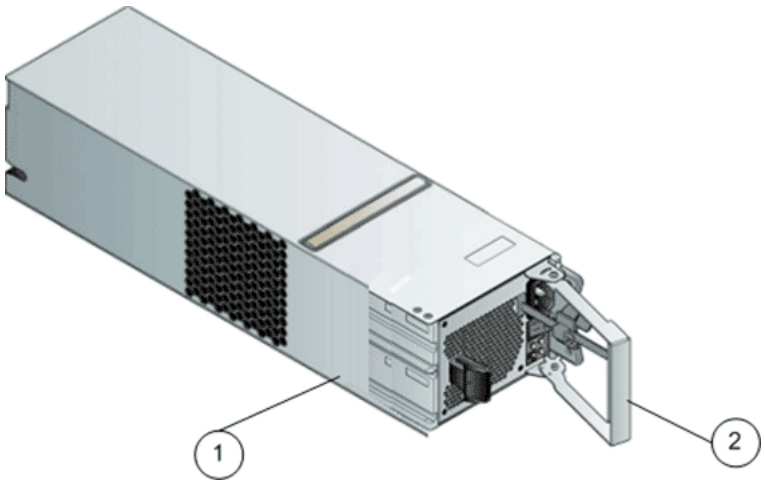


Legend

1 Latch on the left power cooling module	2 Latch on the right power cooling module

1 With the attachment lever fully open, orient the power cooling module so that the latch aligns with the inner area of the Drive Enclosure and slide the power cooling module into the chassis slot.

Figure 141: Power cooling module with a fully open attachment lever



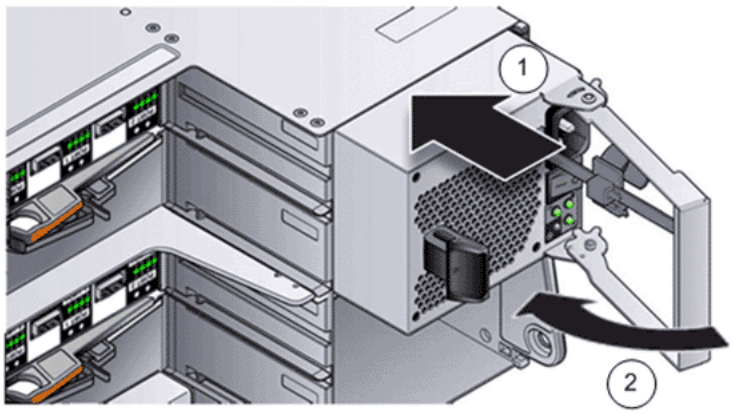
Legend

1 Power cooling module	2 Opened attachment lever

2 As the power cooling module contacts the Drive Enclosure chassis midplane, close the attachment lever.

To confirm that the power cooling module is properly closed, listen for an audible click or feel the part engage with the Drive Enclosure chassis midplane.

Figure 142: Power cooling module (right side)



Legend

1 Slide replacement power cooling module into Drive Enclosure chassis slot	2 Close the attachment lever

3 Make sure that the power switch is off for the power cooling module.

4 Plug the power cord into the power cooling module.

5 Attach the power cord tie strap to the power cord.

6 Power on the replacement power cooling module.

When the power-on process completes, the following indicators should be present:

- The Power status LED emits a steady green light.
- All other LEDs are off.

Verify the Status of a Drive Enclosure Component

1 From Guided Maintenance, verify that the status of the component is Normal.

Guided Maintenance displays a message stating the component status. A status of Normal requires no action.

2 Close Guided Maintenance.

You can also verify component status by navigating to System > Hardware > Drive Enclosures. The Drive Enclosure overview page lists the status of each component.

CHAPTER 5

Pilot Replacement Procedures

Pilot Overview

The Pilot is an out-of-band management controller (1U) that directs and manages all system activity.

Each Oracle FS System has one active Pilot and one standby Pilot.

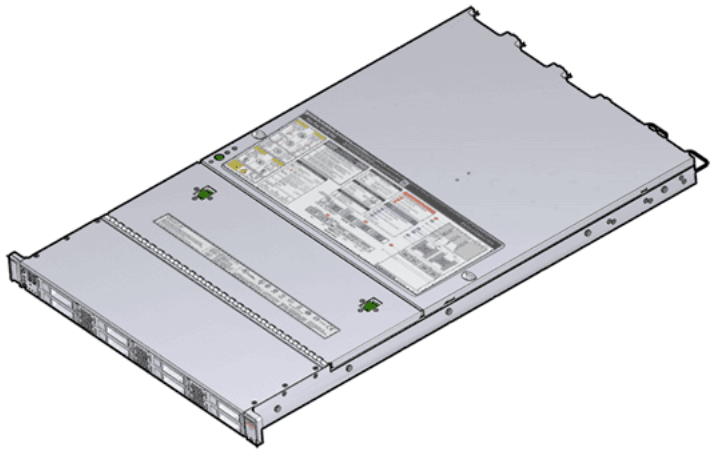
The Pilot provides access to the following:

- All management functions for the Oracle FS System
- System monitoring, alerts, log collection, and automatic log transmission
- Management for restarting, replacing, updating, and recovering Controller and Drive Enclosure resources

The two models available for the Pilot are X4–2 and X5–2. The following figure is an isometric illustration of the Pilot.

Note: The X4-2 and X5-2 Pilot models cannot coexist in the same Oracle FS System. Both Pilots must be X4 or both Pilots must be X5.

Figure 143: Pilot



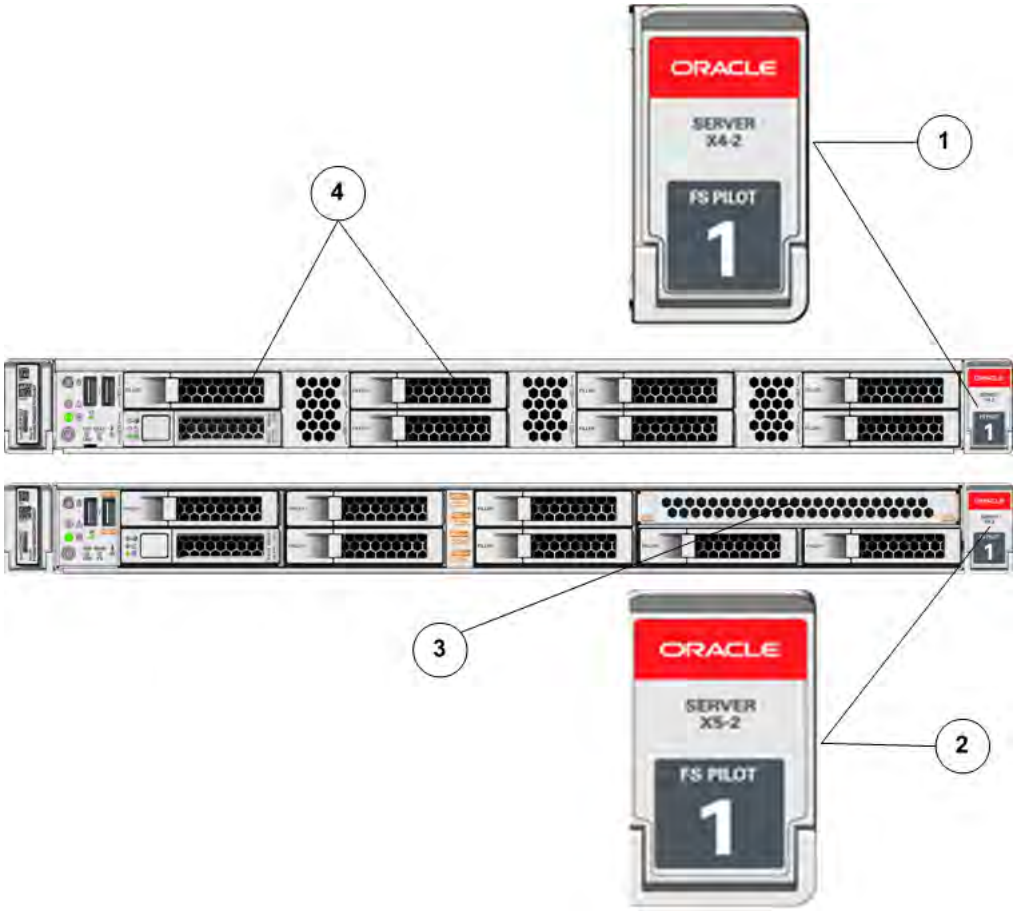
You can distinguish between the X4–2 and X5–2 models of the Pilot by using the Oracle FS System Manager (GUI) or identifying the visual differences on the Pilot chassis.

The drive slot spacing on the front panel of the Pilot is different for the X4–2 and the X5–2 models. The X4–2 Pilot has eight drive bays that are evenly spaced

along the front with vent holes between groups of two drive bays. The X5–2 Pilot has six drive bays on the left and center of the chassis and no vent holes except in the drive carrier. In the X5–2 Pilot, there is a DVD blank panel at the top right corner of the front panel and two drive bays directly below.

The right ear nameplate indicates the model name (X4–2 or X5–2).

Figure 144: Identifying X4-2 and X5-2 Pilot front panels



Legend

1 X5–2 Pilot right ear nameplate	3 DVD blank panel
2 X4–2 Pilot right ear nameplate	4 Drive bays

The service label on the top cover of the Pilot also indicates the model name.

Figure 145: Identifying X4-2 and X5-2 Pilot service labels

Replace a Pilot Battery

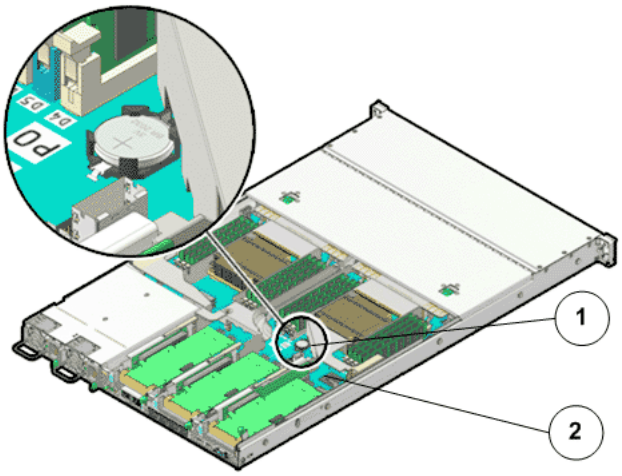
The lithium coin-cell battery in the Pilot maintains system time when the Pilot is powered off and a time server is unavailable. The battery also powers the CMOS BIOS system settings of the Oracle FS System. Replace the battery if the Pilot fails to maintain proper time or the battery gets discharged due to age.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure you have a screwdriver or any kind of sharp pointed object.

Each Pilot has a battery located on the Pilot motherboard. Batteries are customer replaceable units (CRUs) and are not hot-serviceable. Replacing the battery requires you to power off the Pilot. The following figure identifies the location of the battery inside the Pilot motherboard.

Figure 146: Pilot battery



Legend

1	Pilot battery
2	Pilot motherboard

Note: Ensure that all power is removed from the Pilot before removing or installing the battery. You must disconnect the power cords from the Pilot before performing these procedures.

Note: The battery can be accessed only after removing the cover over the Pilot chassis.

Procedure Overview

1. *Prepare a Pilot for Component Replacement*
2. *Slide Pilot to Service Position*
3. *Power Off the Pilot*
4. *Open Pilot Fan Door*
5. *Open Pilot Top Cover*
6. *Remove a Battery*
7. *Insert a Battery*
8. *Close Pilot Top Cover*
9. *Close Pilot Fan Door*
10. *Slide Pilot to Rack Position*
11. *Connect Power Cords On the Pilot*
12. *Verify Component Replacement on the Standby Pilot*
13. *Verify Component Replacement on the Active Pilot*

Related Links

Pilot Components

Prepare a Pilot for Component Replacement

1. Contact Oracle Customer Support prior to replacing a Pilot component.

   Oracle Customer Support identifies the failed component on the Pilot for you.
2. From Oracle FS System Manager (GUI), navigate to System > Hardware > Pilots and select the Pilot that contains the component that you want to replace.
3. Select Actions > Repair Pilot.

   Guided Maintenance displays the list of Pilot components.
4. Based on the information from your Oracle Customer Support representative, select the correct component from the list.

5 Click Next.

Guided Maintenance sends a request to flash the white locate LED on the Pilot to help you identify the Pilot in the data center.

6 Click Next.

Guided Maintenance displays a link that you use to access the instructions for component replacement.

7 Click the link to open and print the procedure.

8 Click Next.

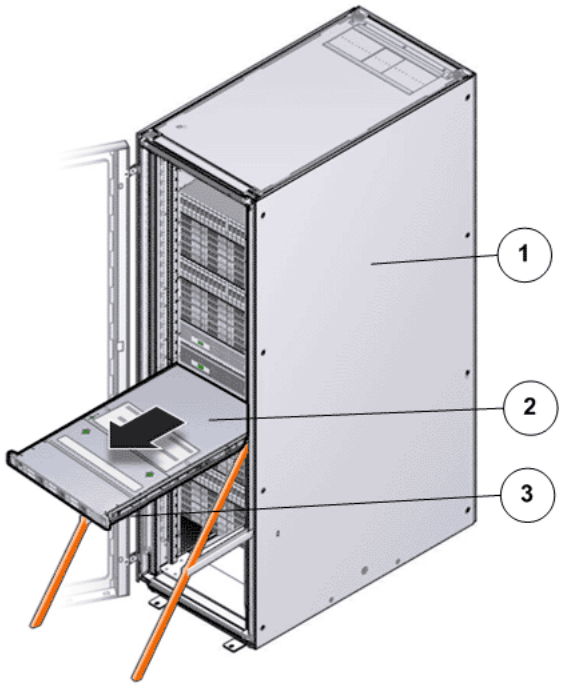
- If you are replacing a component located on the active Pilot, Guided Maintenance brings the active Pilot offline and fails over to the standby Pilot. After the active Pilot is offline, the GUI closes. When the failover is complete, you can log back into the GUI.
- If you are replacing a component located on the standby Pilot, Guided Maintenance brings the standby Pilot offline. When servicing the standby Pilot, failover is not required.
- If you are replacing a power supply or a fan module, you are not required to bring the Pilot offline. The power supplies and fan modules are hot-serviceable.

  Note: You can replace one power supply without bringing the Pilot offline, as long as the second power supply remains online and operational.

Slide Pilot to Service Position

1 Extend the rack's anti-tilt legs.

Figure 147: Pilot position during component replacement

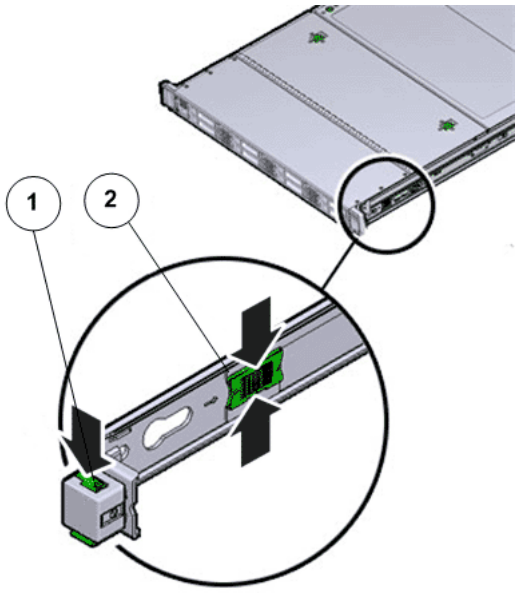


Legend

1	Rack
2	Pilot chassis
3	Pilot rails

2 Slide the Pilot chassis fully forward until the slide lockout release tabs lock into position.

Figure 148: Pilot slide lockout release tabs



Legend

1 Slide rail lock
2 Slide lockout release tabs

Note: The slide-rail locks are located behind the flip-down handles on the front of the Pilot chassis. The slide-rail locks are released when the flip-down handles are pulled down. The slide lockout release tabs must be released to push the Pilot chassis back into the rack.

Power Off the Pilot

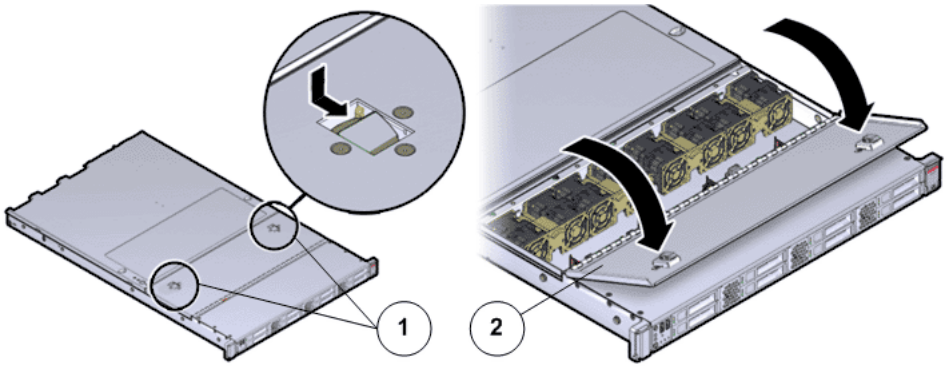
1. Notify affected users that the Pilot will be powered off.
2. Ensure that the Pilot on which the replacement procedure must be performed is powered off.
3. Disconnect the power cords from the back of the Pilot.

Open Pilot Fan Door

Press the two fan door release tabs simultaneously forward and swing the Pilot fan door to the open position.

Note: Servicing the Pilot fan modules and other components located in the front of the Pilot, such as the front indication module (FIM) and the disk backplanes, require that the fan door be opened. It is also easier to remove the Pilot's top cover if you open the fan door first.

Figure 149: Pilot with fan door open



Legend

1 Fan door release tabs
2 Pilot fan door in open position

Caution: Close the Pilot fan door within 60 seconds to maintain adequate airflow to properly cool the server.

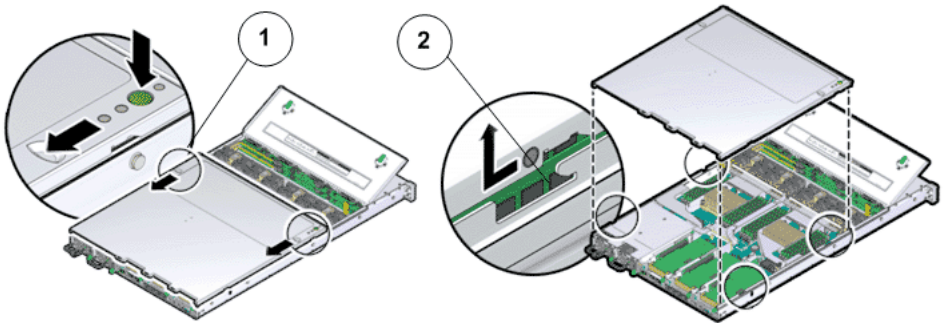
Open Pilot Top Cover

1 Press down on the push button on the Pilot top cover to release the top cover and use the recessed areas to slide the top cover toward the back of the Pilot about 0.5 inches (12.7 mm).

Caution: Before removing the top cover of the Pilot, power off the Pilot using Guided Maintenance. Removing the Pilot top cover before powering off the Pilot might cause damage to the operating system on the Pilot.

Tip: Slide out the Pilot top cover by pressing down on the grooves located on both sides of the cover.

Figure 150: Pilot top cover removal



Legend

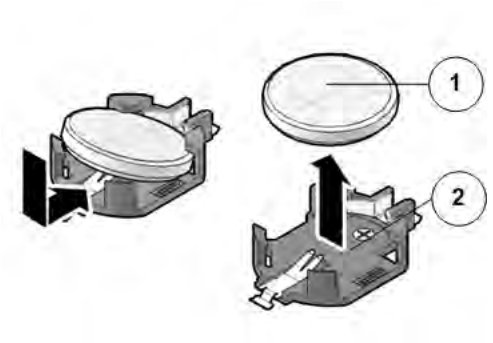
1 Push button to release top cover
2 Grooves to slide out top cover

2 Lift the cover off the Pilot chassis and set it aside.

Remove a Battery

1 Remove the battery by placing your finger or a pointed tool like a screwdriver under the battery on the side nearest to the back of the Pilot and gently lifting the battery out of the retainer.

Figure 151: Battery removal



Legend

1	Pilot battery
2	Battery socket

2 Place the battery on an antistatic mat.

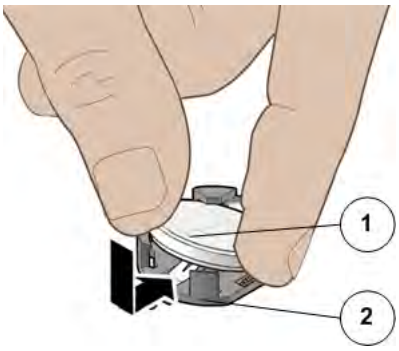
Insert a Battery

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Press the replacement battery into the battery retainer with the positive side (+) facing upwards.

Figure 152: Battery insertion



Legend

1	Pilot battery
2	Battery socket

If the Pilot is configured to synchronize with a network time server using the Network Time Protocol (NTP), the Oracle ILOM clock is reset as soon

as the Pilot is powered on and connected to the network. Otherwise, proceed to the next step.

3 If the Pilot is not configured to use NTP, reset the Oracle ILOM clock using the Oracle ILOM CLI or the web interface. You can also reprogram the BIOS Setup utility to reprogram the host clock.

For instructions, on setting the Oracle ILOM clock, see the Oracle Integrated Lights Out Manager (ILOM) 3.1 Documentation Library.

Close Pilot Top Cover

1 Place the top cover of the Pilot onto the chassis.

Tip: Place the top cover down so that it hangs over the back of the Pilot by about 13 mm (0.5 inches) and the side latches align with the slots in the sides of the Pilot chassis.

Note: There are three latching tabs on the sides of the Pilot top cover, two on the right side and one on the left side when viewing the Pilot from the front. There is also a latch on the underside of the top cover in the front left corner near the release button.

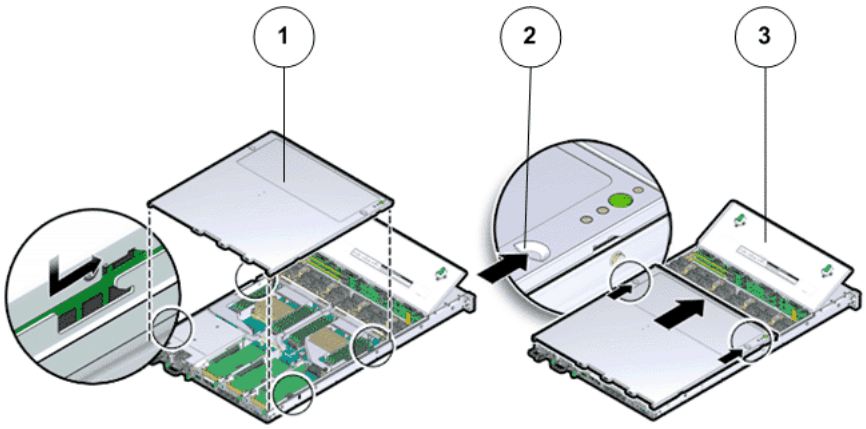
2 Check both sides of the Pilot chassis to ensure that the four corners of the top cover are fully down and flush with the chassis.

Note: If the cover corners are not flush with the Pilot chassis, slide the cover towards the back of the chassis until you can position the cover correctly.

Note: If the top cover is not correctly positioned before attempting to slide the cover forward, the internal latch that is on the underside of the cover might be damaged.

3 Gently slide the top cover along the grooves of the Pilot by pressing down on either side of the top cover until it locks into place and you hear an audible click.

Figure 153: Pilot top cover installed



Legend

1 Top cover
2 Grooves to slide the top cover
3 Fan door

Close Pilot Fan Door

Close the Pilot fan door by pressing the two release tabs on both sides of the fan door until it locks into place.

Connect Power Cords On the Pilot

Reconnect the power cords to the Pilot.

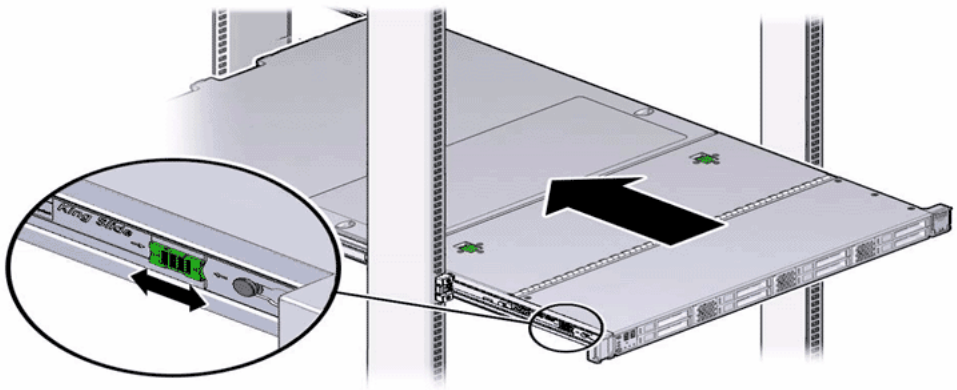
Note: After the power cords are connected, the SP (ILOM) LED blinks first. The OK LED does not comes on until the SP is solid green.

Note: If you need to stop the Pilot from booting in order to check the BIOS, you must wait until the SP LED is solid green and then press the power button, which is located near the OK LED for 7-10 seconds. The OK LED subsequently displays a slow blink.

Slide Pilot to Rack Position

1 Simultaneously pull and hold the two release tabs, one on each side of the Pilot, toward the front of the Pilot while you push the Pilot into the rack.

Figure 154: Location of the Pilot release tabs



Note: As you push the Pilot into the rack, verify that the cable management arm (CMA) retracts without binding.

Note: To pull the Pilot release tab, place your finger in the center of the tab, not on the end, and apply pressure as you pull the tab toward the front of the Pilot.

2 Continue pushing the Pilot into the rack until the slide-rail locks on the front of the Pilot engage the slide-rail assemblies.

Note: The Pilot locks into the rack position with an audible click.

Verify Component Replacement on the Standby Pilot

If you replaced a component on the standby Pilot, complete the following steps to verify the status of the Pilot:

1 Return to Guided Maintenance and click Finish.

Guided Maintenance closes and the GUI displays the Pilot Overview page.

2 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Verify Component Replacement on the Active Pilot

If you replaced a component on the active Pilot, complete the following steps to verify the status of the Pilot:

1 Restart Oracle FS System Manager (GUI).

2 Navigate to System > Hardware > Pilots.

The GUI displays the Pilot Overview page.

3 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Replace a Pilot SAS HBA

A serial attached SCSI (SAS) host bus adapter (HBA) provides access to the SAS hard disk drive (HDD) in the Pilot. A damaged SAS HBA can result in losing access to the SAS HDD to which the SAS HBA connects using the SAS cable bundle and must be replaced as soon as possible.

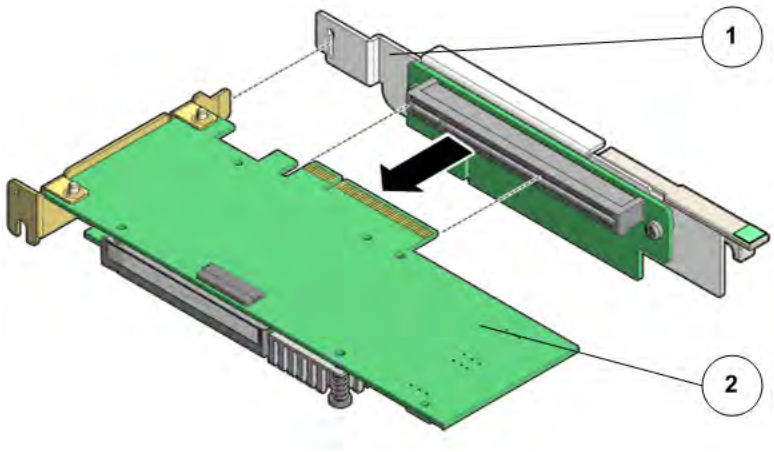
Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.

- Use only the filler panels provided with the Pilot to maintain proper airflow and EMI conformance for empty slots inside the Pilot.
- Fail over the Pilot before replacing the component using Guided Maintenance

Each Pilot supports a single 6 Gb/s SAS HBA on the PCIe slot of its riser. The SAS HBA is installed in the internal PCIe 4 slot of riser 3 and is not visible from the back of the Pilot. To service a SAS HBA, the PCIe risers inside the Pilot and the filler panels inside the riser must be removed. The SAS HBA is a customer replaceable unit (CRU) and is not hot-serviceable. However, replacing a SAS HBA will require failing over all operations to the other Pilot. The following figure shows the location of the SAS HBA inside a riser board assembly.

Figure 155: SAS HBA



Legend

1	Riser board assembly
2	SAS HBA

Note: The SAS HBA can be accessed only after removing the cover over the Pilot chassis.

Note: To replace a SAS HBA, you do not need to remove the Pilot from the rack but extend it along the Pilot rails using the cable management arm (CMA).

Note: The riser that contains the failed SAS HBA must be removed before servicing the HBA.

Procedure Overview

1 *Prepare a Pilot for Component Replacement*

2 *Slide Pilot to Service Position*

3 *Power Off the Pilot*

4 *Open Pilot Fan Door*

5 *Open Pilot Top Cover*

6 *Remove a SAS HBA*

7 *Insert a SAS HBA*

8 *Close Pilot Top Cover*

9 *Close Pilot Fan Door*

10 *Slide Pilot to Rack Position*

11 *Connect Power Cords On the Pilot*

12 *Verify Component Replacement on the Standby Pilot*

13 *Verify Component Replacement on the Active Pilot*

Related Links

Pilot Components

Prepare a Pilot for Component Replacement

1 Contact Oracle Customer Support prior to replacing a Pilot component.

Oracle Customer Support identifies the failed component on the Pilot for you.

2 From Oracle FS System Manager (GUI), navigate to System > Hardware > Pilots and select the Pilot that contains the component that you want to replace.

3 Select Actions > Repair Pilot.

Guided Maintenance displays the list of Pilot components.

4 Based on the information from your Oracle Customer Support representative, select the correct component from the list.

5 Click Next.

Guided Maintenance sends a request to flash the white locate LED on the Pilot to help you identify the Pilot in the data center.

6 Click Next.

Guided Maintenance displays a link that you use to access the instructions for component replacement.

7 Click the link to open and print the procedure.

8 Click Next.

- If you are replacing a component located on the active Pilot, Guided Maintenance brings the active Pilot offline and fails over to the standby Pilot. After the active Pilot is offline, the GUI closes. When the failover is complete, you can log back into the GUI.
- If you are replacing a component located on the standby Pilot, Guided Maintenance brings the standby Pilot offline. When servicing the standby Pilot, failover is not required.

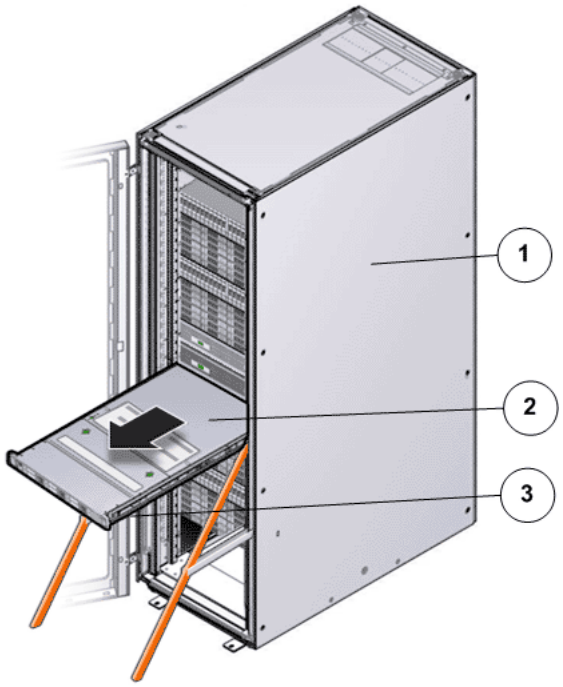
- If you are replacing a power supply or a fan module, you are not required to bring the Pilot offline. The power supplies and fan modules are hot-serviceable.

  Note: You can replace one power supply without bringing the Pilot offline, as long as the second power supply remains online and operational.

Slide Pilot to Service Position

1 Extend the rack's anti-tilt legs.

Figure 156: Pilot position during component replacement

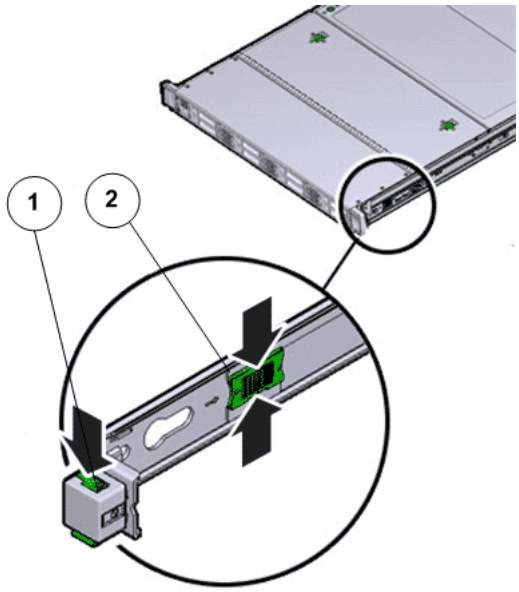


Legend

1	Rack
2	Pilot chassis
3	Pilot rails

2 Slide the Pilot chassis fully forward until the slide lockout release tabs lock into position.

Figure 157: Pilot slide lockout release tabs



Legend

1	Slide rail lock
2	Slide lockout release tabs

Note: The slide-rail locks are located behind the flip-down handles on the front of the Pilot chassis. The slide-rail locks are released when the flip-down handles are pulled down. The slide lockout release tabs must be released to push the Pilot chassis back into the rack.

Power Off the Pilot

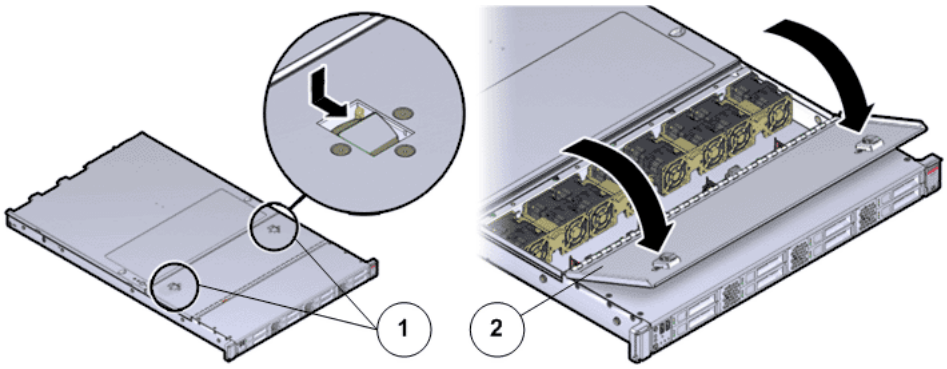
1. Notify affected users that the Pilot will be powered off.
2. Ensure that the Pilot on which the replacement procedure must be performed is powered off.
3. Disconnect the power cords from the back of the Pilot.

Open Pilot Fan Door

Press the two fan door release tabs simultaneously forward and swing the Pilot fan door to the open position.

Note: Servicing the Pilot fan modules and other components located in the front of the Pilot, such as the front indication module (FIM) and the disk backplanes, require that the fan door be opened. It is also easier to remove the Pilot's top cover if you open the fan door first.

Figure 158: Pilot with fan door open



Legend

1	Fan door release tabs
2	Pilot fan door in open position

Caution: Close the Pilot fan door within 60 seconds to maintain adequate airflow to properly cool the server.

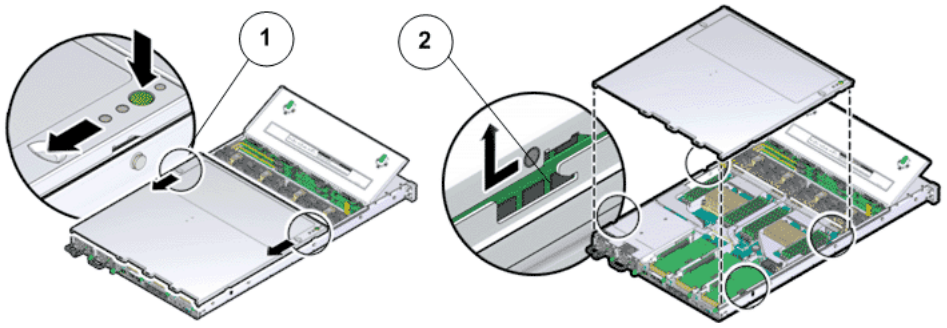
Open Pilot Top Cover

1. Press down on the push button on the Pilot top cover to release the top cover and use the recessed areas to slide the top cover toward the back of the Pilot about 0.5 inches (12.7 mm).

   Caution: Before removing the top cover of the Pilot, power off the Pilot using Guided Maintenance. Removing the Pilot top cover before powering off the Pilot might cause damage to the operating system on the Pilot.

   Tip: Slide out the Pilot top cover by pressing down on the grooves located on both sides of the cover.

   Figure 159: Pilot top cover removal



Legend

1 Push button to release top cover
2 Grooves to slide out top cover

2 Lift the cover off the Pilot chassis and set it aside.

Remove a SAS HBA

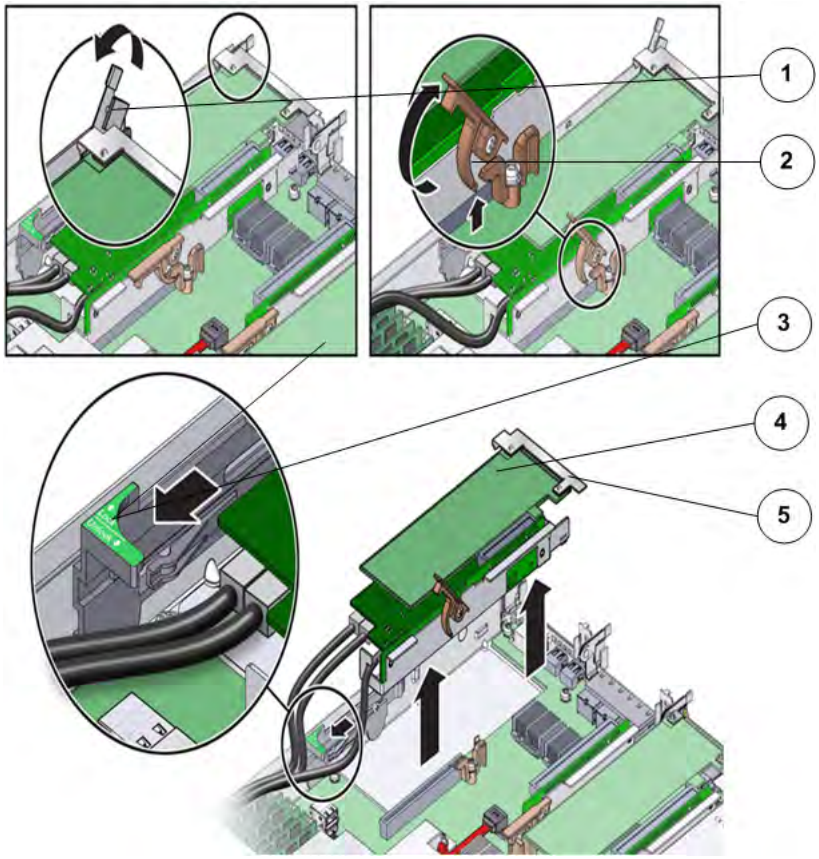
1 Press on the retention clip that secures faceplate of the riser and release the riser from the Pilot motherboard.

Note: There are three riser board assemblies inside the Pilot chassis. The SAS HBA is located on the third riser and the other risers are empty.

Caution: Do not disconnect the SAS cable from the internal SAS HBA until after you have removed the riser from the Pilot.

2 Carefully pull up the PCIe riser lever on the riser to release the riser and HBA card (if any).

Figure 160: Remove the riser



Legend

1 Retention clip
2 PCIe riser lever
3 Slide card retainer
4 Riser and HBA assembly
5 Riser faceplate

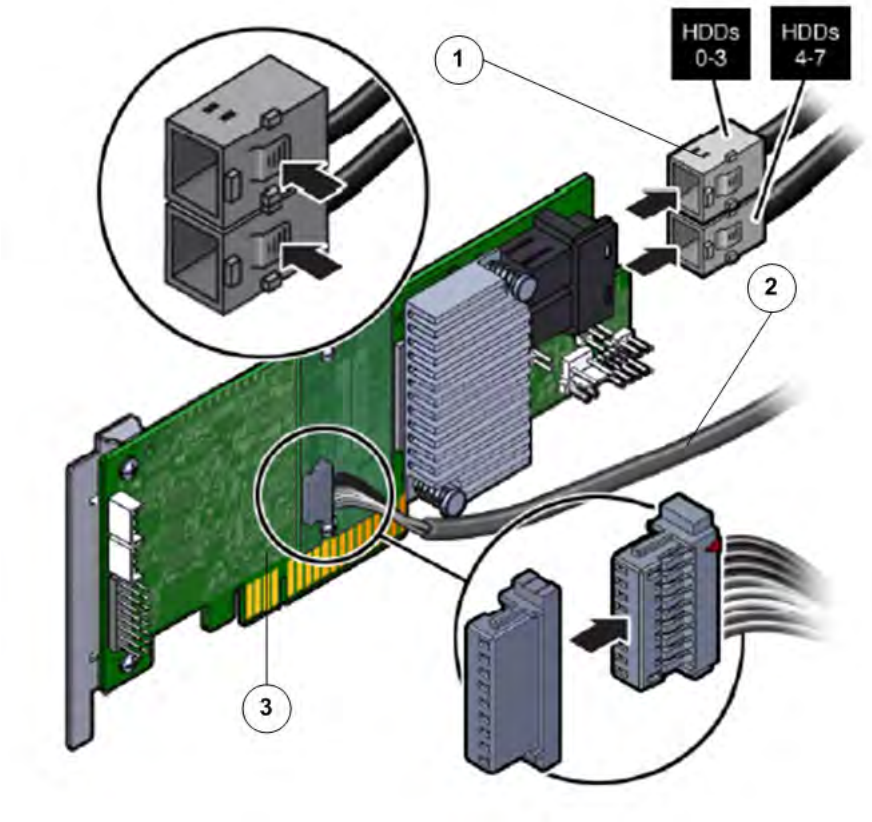
3 Unlock the slide card retainer to release the riser from the Pilot.

Tip: You might need to remove fan module (FM–0), which is the left most fan when viewing the Pilot from the front.

4 Using the PCIe riser lever, pull the riser straight up.

5 Disconnect the SAS cable bundle that connects the SAS HBA and the Pilot disk backplane and set aside.

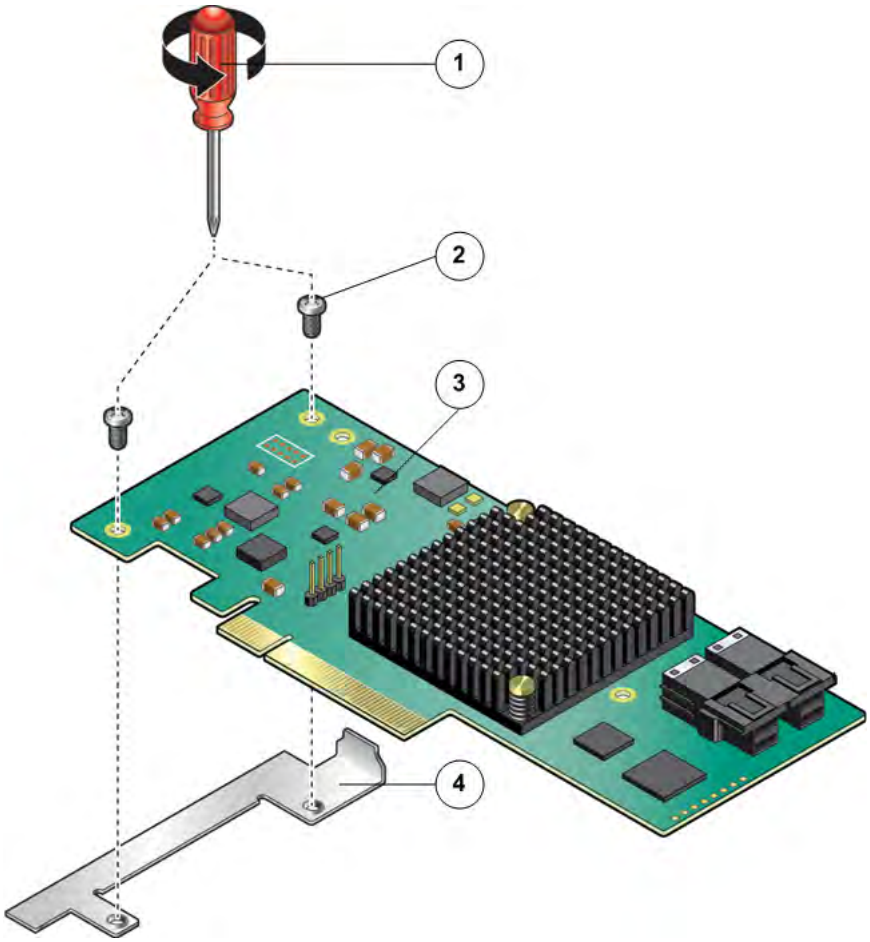
Figure 161: Disconnect SAS cable bundle



6 Hold the riser in one hand and use your other hand to carefully remove the SAS HBA card from PCIe slot 4 of riser 3.

7 Using a Phillips Number 2 screwdriver, remove the two screws to disconnect the rear bracket attached to the SAS HBA from the rear of the PCIe riser.

Figure 162: Disconnect the bracket from the SAS HBA



Legend

1 Phillips Number 2 screwdriver
2 Screws that secure the bracket
3 SAS HBA
4 Bracket

Insert a SAS HBA

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Transfer the internal bracket from the faulted SAS HBA to the replacement SAS HBA.

Note: The new SAS HBA is not shipped with an internal bracket, which is why the bracket must be transferred from the faulted SAS HBA to the replacement HBA.

3 Orient the SAS HBA so that the brackets of the HBA align with the alignment pin in the PCIe slot of the riser.

Important: Hold the SAS HBA by the edges. Do not touch the metal contacts on the bottom of the card.

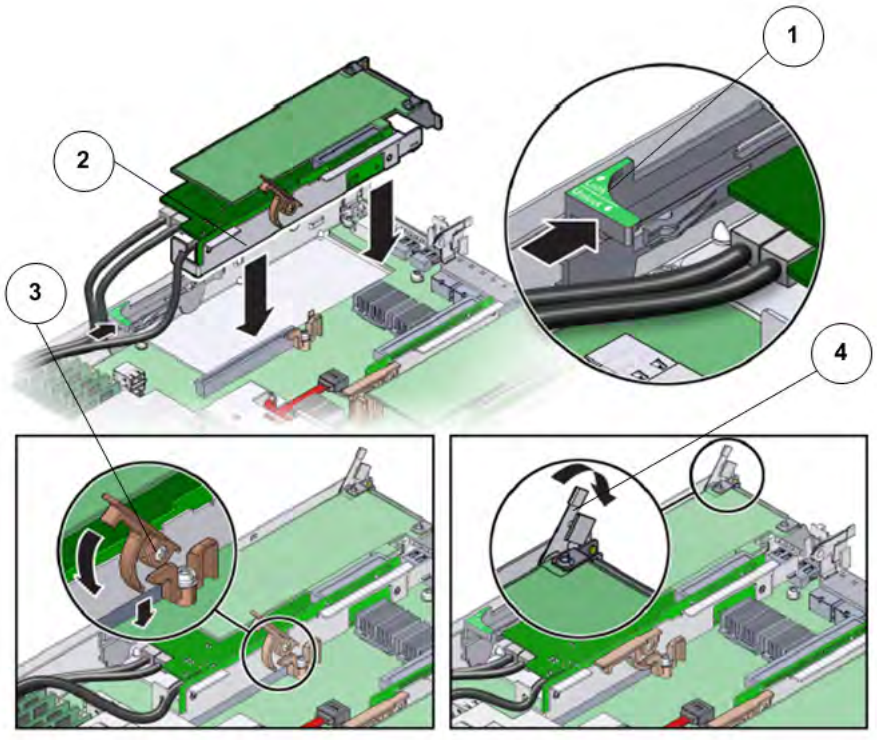
4 Push the connectors on the edge of the SAS HBA into the PCIe slot by pushing firmly to seat the card and apply firm pressure on each end of the SAS HBA alternately until it clicks into place in the riser socket.

Caution: Support the SAS HBA and the riser as necessary to prevent excessive flexure. Otherwise, the SAS HBA or the riser card might break.

5 Guide the SAS cables that connects to the disk backplane through the chassis mid-wall towards the front of the Pilot and reconnect the SAS cable bundle into the into the internal HBA inside the riser.

6 Insert the riser into the PCIe slot on the Pilot motherboard and secure the riser in position using the three locking mechanisms.

Figure 163: Pilot riser insertion



Legend

1	Slide card retainer
2	Riser
3	PCIe riser lever
4	Retention clip that secures the riser faceplate

Note: The three locking mechanisms that secure the riser in position on the Pilot motherboard include:

- Slide card retainer that secures the riser to the Pilot.
- Retention clip that secures the riser faceplate.
- PCIe riser lever that secures the riser to the PCIe slot on the Pilot motherboard.

Note: If you had removed the fan module (FM-0), replace the fan module back in the fan compartment.

Note: Ensure that the rear bracket on the internal SAS HBA card in PCIe slot 4 is connected to the slot in the Pilot chassis side wall. If the bracket is not connected, remove the riser and reposition it so that the rear bracket connects to the side wall, and then gently press the riser into the motherboard connector.

Close Pilot Top Cover

1 Place the top cover of the Pilot onto the chassis.

Tip: Place the top cover down so that it hangs over the back of the Pilot by about 13 mm (0.5 inches) and the side latches align with the slots in the sides of the Pilot chassis.

Note: There are three latching tabs on the sides of the Pilot top cover, two on the right side and one on the left side when viewing the Pilot from the front. There is also a latch on the underside of the top cover in the front left corner near the release button.

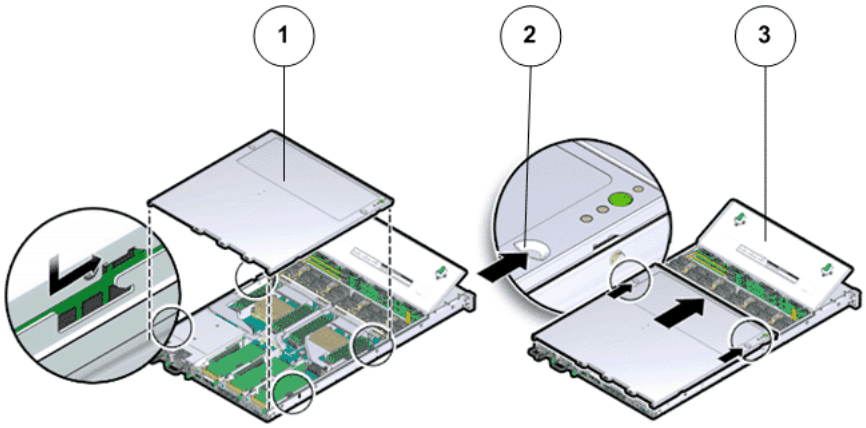
2 Check both sides of the Pilot chassis to ensure that the four corners of the top cover are fully down and flush with the chassis.

Note: If the cover corners are not flush with the Pilot chassis, slide the cover towards the back of the chassis until you can position the cover correctly.

Note: If the top cover is not correctly positioned before attempting to slide the cover forward, the internal latch that is on the underside of the cover might be damaged.

3 Gently slide the top cover along the grooves of the Pilot by pressing down on either side of the top cover until it locks into place and you hear an audible click.

Figure 164: Pilot top cover installed



Legend

1 Top cover
2 Grooves to slide the top cover
3 Fan door

Close Pilot Fan Door

Close the Pilot fan door by pressing the two release tabs on both sides of the fan door until it locks into place.

Connect Power Cords On the Pilot

Reconnect the power cords to the Pilot.

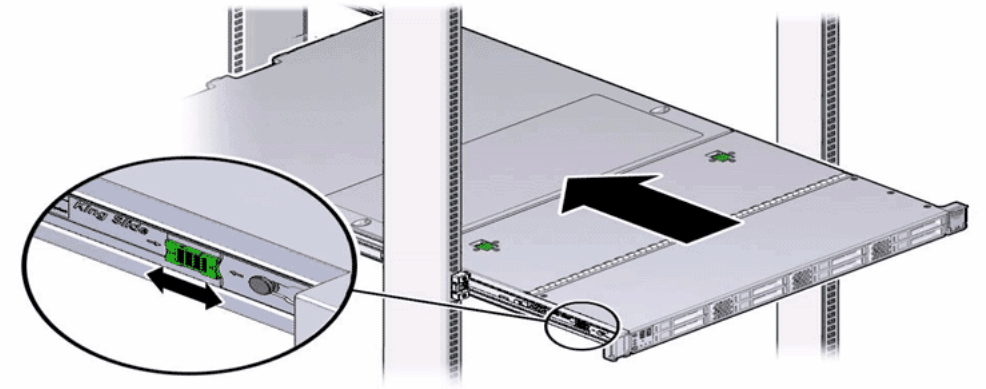
Note: After the power cords are connected, the SP (ILOM) LED blinks first. The OK LED does not comes on until the SP is solid green.

Note: If you need to stop the Pilot from booting in order to check the BIOS, you must wait until the SP LED is solid green and then press the power button, which is located near the OK LED for 7-10 seconds. The OK LED subsequently displays a slow blink.

Slide Pilot to Rack Position

1 Simultaneously pull and hold the two release tabs, one on each side of the Pilot, toward the front of the Pilot while you push the Pilot into the rack.

Figure 165: Location of the Pilot release tabs



Note: As you push the Pilot into the rack, verify that the cable management arm (CMA) retracts without binding.

Note: To pull the Pilot release tab, place your finger in the center of the tab, not on the end, and apply pressure as you pull the tab toward the front of the Pilot.

2 Continue pushing the Pilot into the rack until the slide-rail locks on the front of the Pilot engage the slide-rail assemblies.

Note: The Pilot locks into the rack position with an audible click.

Verify Component Replacement on the Standby Pilot

If you replaced a component on the standby Pilot, complete the following steps to verify the status of the Pilot:

1 Return to Guided Maintenance and click Finish.

Guided Maintenance closes and the GUI displays the Pilot Overview page.

2 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Verify Component Replacement on the Active Pilot

If you replaced a component on the active Pilot, complete the following steps to verify the status of the Pilot:

1 Restart Oracle FS System Manager (GUI).

2 Navigate to System > Hardware > Pilots.

The GUI displays the Pilot Overview page.

3 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Replace a Pilot Riser

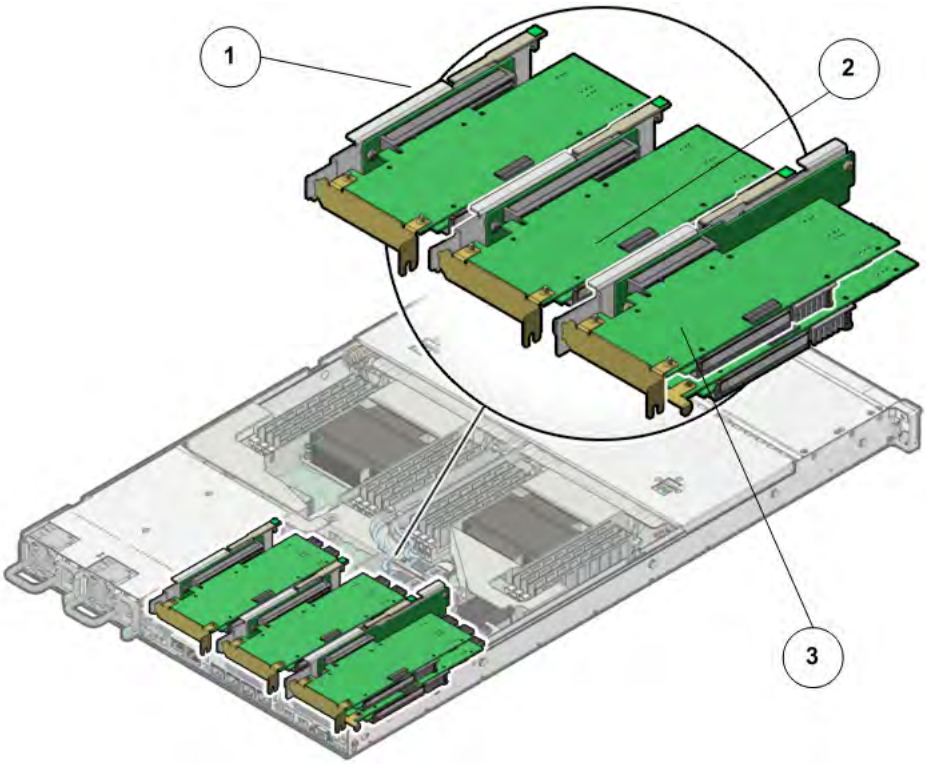
Riser board assemblies include printed circuit boards and PCIe slots in which HBAs can be inserted based on system type and configuration. A failed riser board assembly can cause read and write errors because the HBAs will not be able to function properly. Replace a failed riser board as soon as possible.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that you have a Phillips Number 2 screwdriver with at least a 4-inch shaft.
- Fail over the Pilot before replacing the component using Guided Maintenance.

Each Pilot contains three riser board assemblies (R1 to R3 – left to right) located side-by-side at the back of the Pilot next to the power supplies. Risers are customer replaceable units (CRUs). The SAS HBA is the only HBA that is inserted into the Pilot riser. Replacing a riser requires you to power off the Pilot. The following figure shows the location of the riser board assemblies on the Pilot motherboard.

Figure 166: Riser locations



Legend

1 Riser R1
2 Riser R2
3 Riser R3

Note: In the Oracle FS System, riser R1 and riser R2 do not contain any HBAs. Only riser R3 contains the PCIe slot for the internal SAS HBA and might need to be replaced in case of failure.

Note: The risers can be accessed only after removing the cover over the Pilot chassis.

Note: To replace a riser, you do not need to remove the Pilot from the rack but extend the Pilot along the Pilot rails using the cable management arm (CMA).

Procedure Overview

1. *Prepare a Pilot for Component Replacement*
2. *Slide Pilot to Service Position*
3. *Power Off the Pilot*
4. *Open Pilot Fan Door*
5. *Open Pilot Top Cover*
6. *Remove a Riser*
7. *Insert a Riser*
8. *Close Pilot Top Cover*
9. *Close Pilot Fan Door*
10. *Slide Pilot to Rack Position*
11. *Connect Power Cords On the Pilot*
12. *Verify Component Replacement on the Standby Pilot*
13. *Verify Component Replacement on the Active Pilot*

Related Links

Pilot Components

Prepare a Pilot for Component Replacement

1. Contact Oracle Customer Support prior to replacing a Pilot component.

   Oracle Customer Support identifies the failed component on the Pilot for you.
2. From Oracle FS System Manager (GUI), navigate to System > Hardware > Pilots and select the Pilot that contains the component that you want to replace.

3 Select Actions > Repair Pilot.

Guided Maintenance displays the list of Pilot components.

4 Based on the information from your Oracle Customer Support representative, select the correct component from the list.

5 Click Next.

Guided Maintenance sends a request to flash the white locate LED on the Pilot to help you identify the Pilot in the data center.

6 Click Next.

Guided Maintenance displays a link that you use to access the instructions for component replacement.

7 Click the link to open and print the procedure.

8 Click Next.

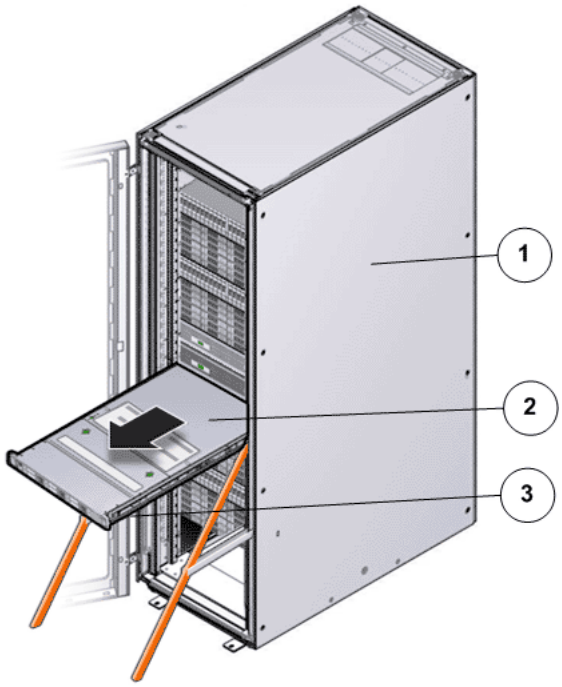
- If you are replacing a component located on the active Pilot, Guided Maintenance brings the active Pilot offline and fails over to the standby Pilot. After the active Pilot is offline, the GUI closes. When the failover is complete, you can log back into the GUI.
- If you are replacing a component located on the standby Pilot, Guided Maintenance brings the standby Pilot offline. When servicing the standby Pilot, failover is not required.
- If you are replacing a power supply or a fan module, you are not required to bring the Pilot offline. The power supplies and fan modules are hot-serviceable.

  Note: You can replace one power supply without bringing the Pilot offline, as long as the second power supply remains online and operational.

Slide Pilot to Service Position

1 Extend the rack's anti-tilt legs.

Figure 167: Pilot position during component replacement

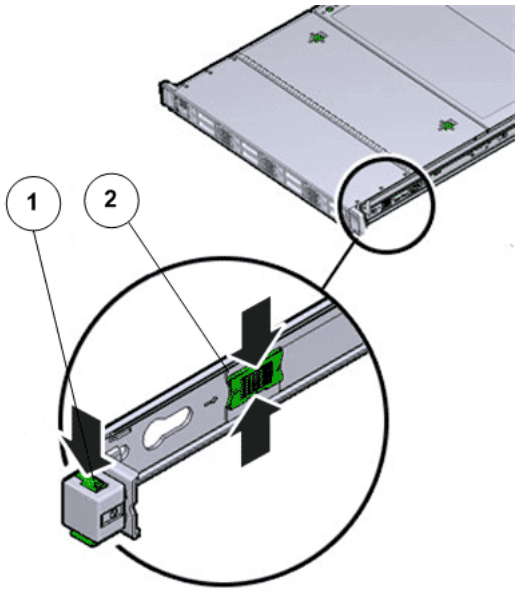


Legend

1	Rack
2	Pilot chassis
3	Pilot rails

2 Slide the Pilot chassis fully forward until the slide lockout release tabs lock into position.

Figure 168: Pilot slide lockout release tabs



Legend

1 Slide rail lock
2 Slide lockout release tabs

Note: The slide-rail locks are located behind the flip-down handles on the front of the Pilot chassis. The slide-rail locks are released when the flip-down handles are pulled down. The slide lockout release tabs must be released to push the Pilot chassis back into the rack.

Power Off the Pilot

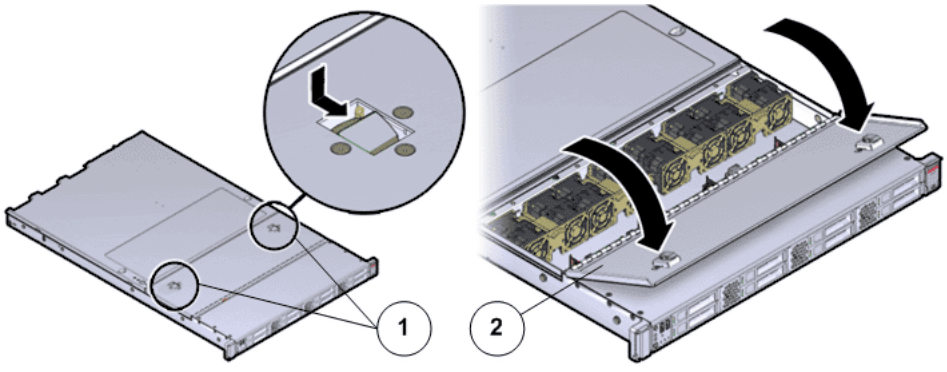
1. Notify affected users that the Pilot will be powered off.
2. Ensure that the Pilot on which the replacement procedure must be performed is powered off.
3. Disconnect the power cords from the back of the Pilot.

Open Pilot Fan Door

Press the two fan door release tabs simultaneously forward and swing the Pilot fan door to the open position.

Note: Servicing the Pilot fan modules and other components located in the front of the Pilot, such as the front indication module (FIM) and the disk backplanes, require that the fan door be opened. It is also easier to remove the Pilot's top cover if you open the fan door first.

Figure 169: Pilot with fan door open



Legend

1 Fan door release tabs
2 Pilot fan door in open position

Caution: Close the Pilot fan door within 60 seconds to maintain adequate airflow to properly cool the server.

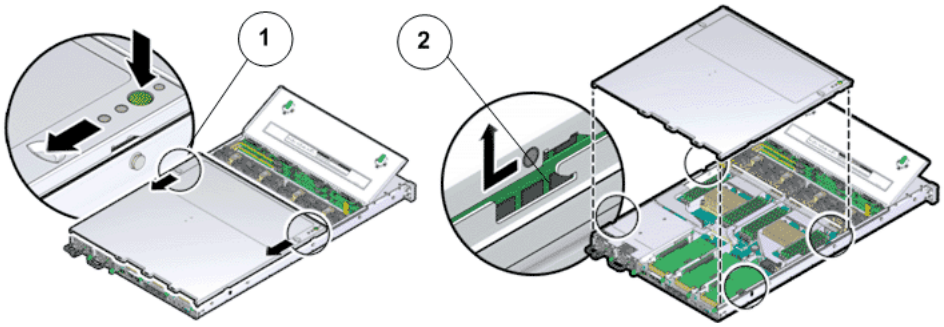
Open Pilot Top Cover

1 Press down on the push button on the Pilot top cover to release the top cover and use the recessed areas to slide the top cover toward the back of the Pilot about 0.5 inches (12.7 mm).

Caution: Before removing the top cover of the Pilot, power off the Pilot using Guided Maintenance. Removing the Pilot top cover before powering off the Pilot might cause damage to the operating system on the Pilot.

Tip: Slide out the Pilot top cover by pressing down on the grooves located on both sides of the cover.

Figure 170: Pilot top cover removal



Legend

1 Push button to release top cover
2 Grooves to slide out top cover

2 Lift the cover off the Pilot chassis and set it aside.

Remove a Riser

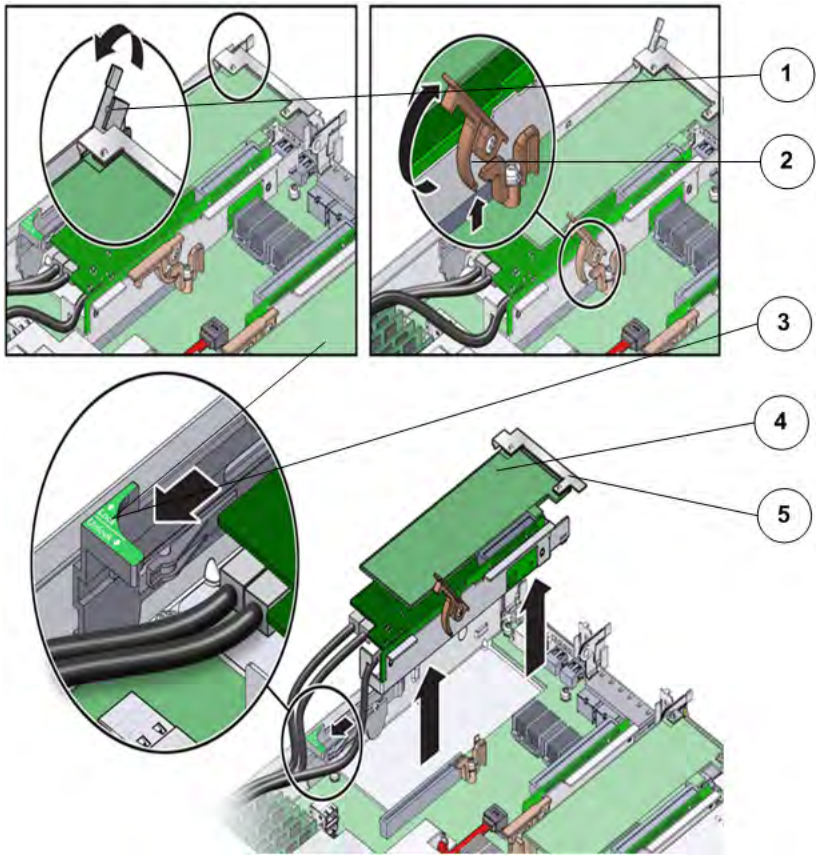
1 Press on the retention clip that secures faceplate of the riser and release the riser from the Pilot motherboard.

Note: There are three riser board assemblies inside the Pilot chassis. The SAS HBA is located on the third riser and the other risers are empty.

Caution: Do not disconnect the SAS cable from the internal SAS HBA until after you have removed the riser from the Pilot.

2 Carefully pull up the PCIe riser lever on the riser to release the riser and HBA card (if any).

Figure 171: Remove the riser



Legend

1 Retention clip
2 PCIe riser lever
3 Slide card retainer
4 Riser and HBA assembly
5 Riser faceplate

3 Unlock the slide card retainer to release the riser from the Pilot.

Tip: You might need to remove fan module (FM–0), which is the left most fan when viewing the Pilot from the front.

4 Using the PCIe riser lever, pull the riser straight up.

Insert a Riser

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Insert the SAS HBA that was placed aside and insert it in the lower PCIe slot as before within the replacement riser.

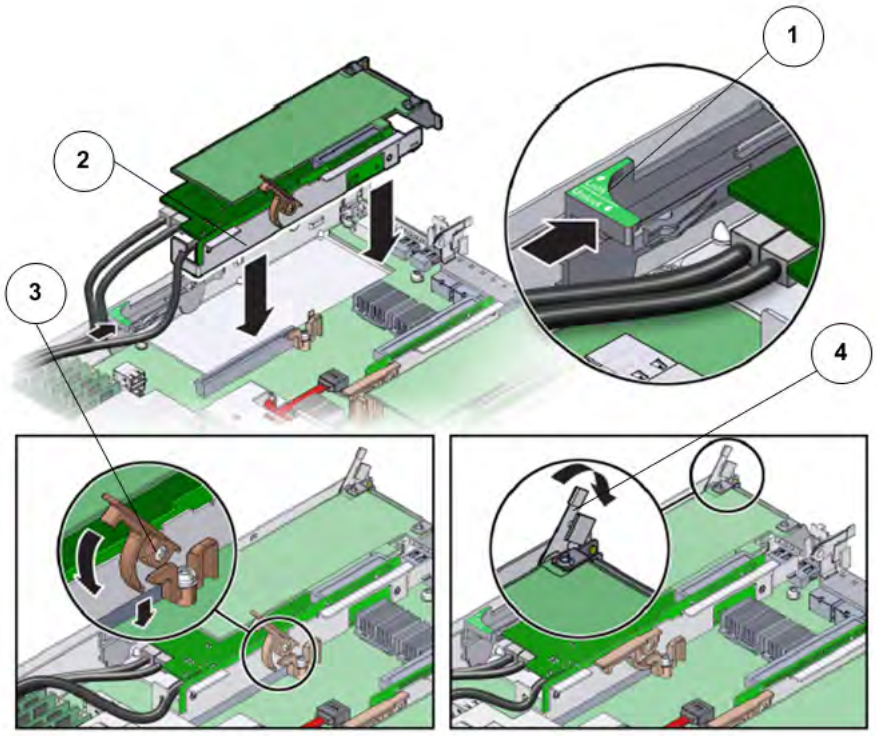
Note: This step applies only to the HBA replacement procedure, when the HBA must be taken out of the riser and the SAS cable bundle must be disconnected.

3 Reconnect the SAS cable bundle into the HBA inside the riser, if you had disconnected it.

Note: This step applies only to the HBA replacement procedure, when the HBA must be taken out of the riser and the SAS cable bundle must be disconnected.

4 Insert the riser into the PCIe slot on the Pilot motherboard and secure the riser in position using the three locking mechanisms.

Figure 172: Pilot riser insertion



Legend

1 Slide card retainer
2 Riser
3 PCIe riser lever
4 Retention clip that secures the riser faceplate

Note: The three locking mechanisms that secure the riser in position on the Pilot motherboard include:

- Slide card retainer that secures the riser to the Pilot.
- Retention clip that secures the riser faceplate.

- PCIe riser lever that secures the riser to the PCIe slot on the Pilot motherboard.

Note: If you had removed the fan module (FM-0), replace the fan module back in the fan compartment.

Note: Ensure that the rear bracket on the internal SAS HBA card in PCIe slot 4 is connected to the slot in the Pilot chassis side wall. If the bracket is not connected, remove the riser and reposition it so that the rear bracket connects to the side wall, and then gently press the riser into the motherboard connector.

5 Insert the filler panels, if any, inside the riser.

Close Pilot Top Cover

1 Place the top cover of the Pilot onto the chassis.

Tip: Place the top cover down so that it hangs over the back of the Pilot by about 13 mm (0.5 inches) and the side latches align with the slots in the sides of the Pilot chassis.

Note: There are three latching tabs on the sides of the Pilot top cover, two on the right side and one on the left side when viewing the Pilot from the front. There is also a latch on the underside of the top cover in the front left corner near the release button.

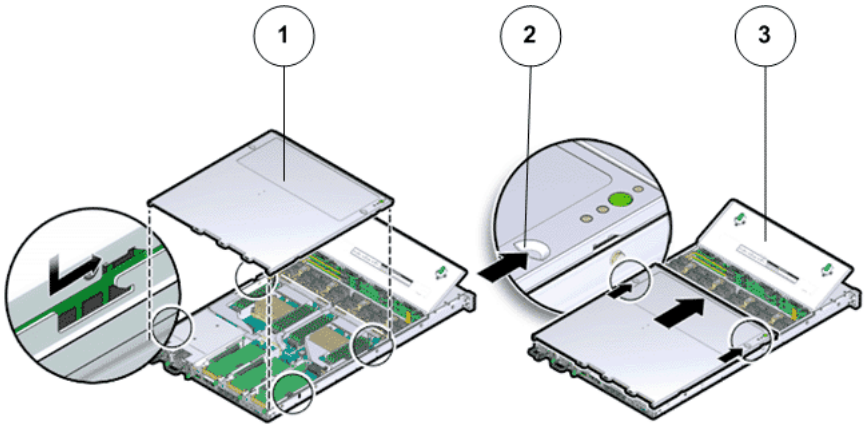
2 Check both sides of the Pilot chassis to ensure that the four corners of the top cover are fully down and flush with the chassis.

Note: If the cover corners are not flush with the Pilot chassis, slide the cover towards the back of the chassis until you can position the cover correctly.

Note: If the top cover is not correctly positioned before attempting to slide the cover forward, the internal latch that is on the underside of the cover might be damaged.

3 Gently slide the top cover along the grooves of the Pilot by pressing down on either side of the top cover until it locks into place and you hear an audible click.

Figure 173: Pilot top cover installed



Legend

1	Top cover
2	Grooves to slide the top cover
3	Fan door

Close Pilot Fan Door

Close the Pilot fan door by pressing the two release tabs on both sides of the fan door until it locks into place.

Connect Power Cords On the Pilot

Reconnect the power cords to the Pilot.

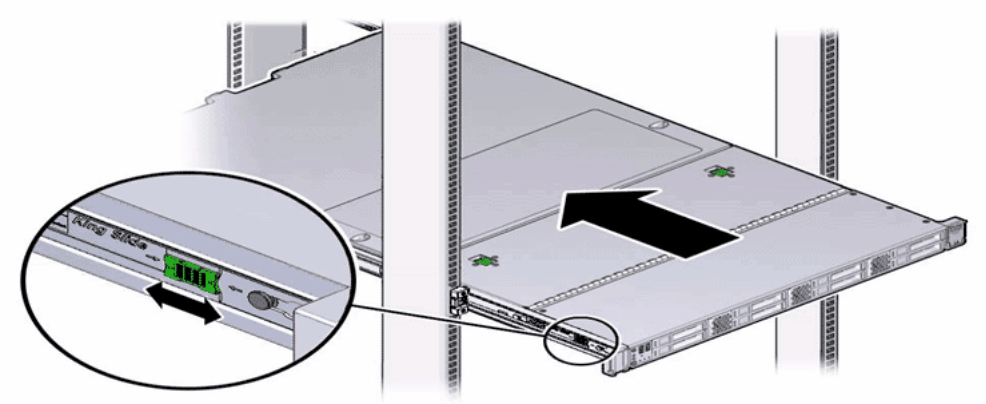
Note: After the power cords are connected, the SP (ILOM) LED blinks first. The OK LED does not comes on until the SP is solid green.

Note: If you need to stop the Pilot from booting in order to check the BIOS, you must wait until the SP LED is solid green and then press the power button, which is located near the OK LED for 7-10 seconds. The OK LED subsequently displays a slow blink.

Slide Pilot to Rack Position

1 Simultaneously pull and hold the two release tabs, one on each side of the Pilot, toward the front of the Pilot while you push the Pilot into the rack.

Figure 174: Location of the Pilot release tabs



Note: As you push the Pilot into the rack, verify that the cable management arm (CMA) retracts without binding.

Note: To pull the Pilot release tab, place your finger in the center of the tab, not on the end, and apply pressure as you pull the tab toward the front of the Pilot.

2 Continue pushing the Pilot into the rack until the slide-rail locks on the front of the Pilot engage the slide-rail assemblies.

Note: The Pilot locks into the rack position with an audible click.

Verify Component Replacement on the Standby Pilot

If you replaced a component on the standby Pilot, complete the following steps to verify the status of the Pilot:

1 Return to Guided Maintenance and click Finish.

Guided Maintenance closes and the GUI displays the Pilot Overview page.

2 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Verify Component Replacement on the Active Pilot

If you replaced a component on the active Pilot, complete the following steps to verify the status of the Pilot:

1 Restart Oracle FS System Manager (GUI).

2 Navigate to System > Hardware > Pilots.

The GUI displays the Pilot Overview page.

3 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Replace a Pilot Power Supply

Power supplies, which exist in pairs, provide DC to all of the Pilot components. If one power supply fails, the other supply carries the full load. This situation creates a risk of Pilot failure should the other power supply also fail.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that you have a similar replacement power supply available before you start the replacement procedure.
- Initiate Guided Maintenance only when you are able to replace the power supplies immediately.

Each Pilot has a pair of power supplies that are located at the back of the Pilot. Power supplies are customer replaceable units (CRUs). Replacing a failed power supply does not require you to bring the Pilot offline, provided that the other power supply is online and working. The following figure shows the location of the Pilot power supplies.

Figure 175: Location of the Pilot power supplies

Legend

1	Power supply (PS-0 on left)
2	Power supply (PS-1 on right)

Note: To replace a power supply, the left side of the CMA must be disengaged from the end of the slide before the power supply can be pulled out. Disengaging the CMA reduces the risk of damaging the cables.

Important: Do not remove the failed power supply until you have a replacement power supply to ensure proper airflow in the Pilot.

Note: After you have replaced power supply (PS–0), you must reset the Oracle ILOM service processor (SP) to propagate the key identity properties (KIP) data to the new power supply. Power supply (PS–1) does not contain KIP data, and therefore does not require an SP reset after replacement.

Procedure Overview

1. *Prepare a Pilot for Component Replacement*
2. *Remove a Power Supply*
3. *Insert a Power Supply*
4. *Verify Power Supply Replacement on a Pilot*

Related Links

Pilot Components

Prepare a Pilot for Component Replacement

1. Contact Oracle Customer Support prior to replacing a Pilot component.

   Oracle Customer Support identifies the failed component on the Pilot for you.
2. From Oracle FS System Manager (GUI), navigate to System > Hardware > Pilots and select the Pilot that contains the component that you want to replace.
3. Select Actions > Repair Pilot.

   Guided Maintenance displays the list of Pilot components.
4. Based on the information from your Oracle Customer Support representative, select the correct component from the list.
5. Click Next.

   Guided Maintenance sends a request to flash the white locate LED on the Pilot to help you identify the Pilot in the data center.
6. Click Next.

   Guided Maintenance displays a link that you use to access the instructions for component replacement.
7. Click the link to open and print the procedure.
8. Click Next.

   - If you are replacing a component located on the active Pilot, Guided Maintenance brings the active Pilot offline and fails over to the standby Pilot. After the active Pilot is offline, the GUI closes. When the failover is complete, you can log back into the GUI.
   - If you are replacing a component located on the standby Pilot, Guided Maintenance brings the standby Pilot offline. When servicing the standby Pilot, failover is not required.
   - If you are replacing a power supply or a fan module, you are not required to bring the Pilot offline. The power supplies and fan modules are hot-serviceable.

     Note: You can replace one power supply without bringing the Pilot offline, as long as the second power supply remains online and operational.

Remove a Power Supply

1. Proceed to step 3 if you have already removed the power cord. Otherwise, from the back of the Pilot, remove the velcro that holds the power cord from the failed power supply.

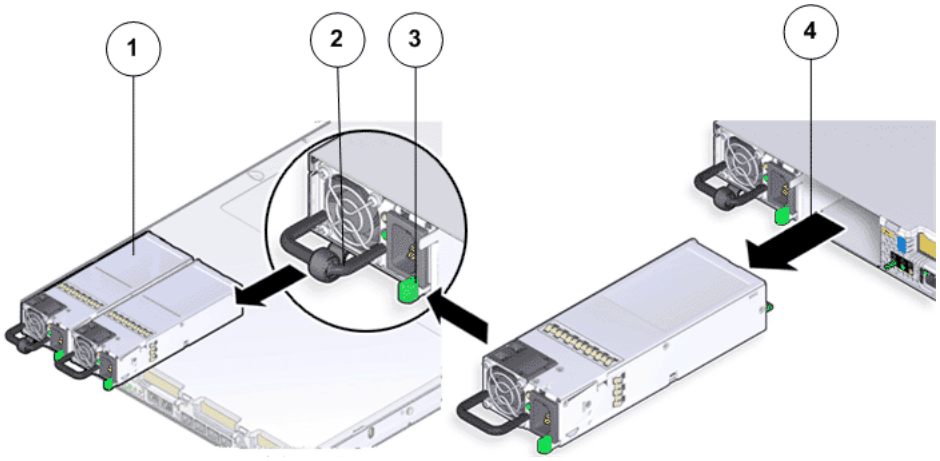
   Caution: Do not remove both power cords if it is not necessary. Removing both power cords might crash the Pilot.

   Note: You might need to swing the cable management arm (CMA) out of the way to access the power supplies. If the CMA is still in the way, extend the Pilot approximately 20 cm (8 inches) out of the front of the rack.

   Note: The fans of a failed power supply may still be spinning when the system is powered on. You can remove a power supply while the fans are still spinning.

2. Disconnect the power cord from the failed power supply.
3. While holding the power supply handle with one hand, use the other hand to push the power supply latch to the left.

   Figure 176: Power supply removal



Legend

1	Power supplies (PS0 and PS1)
2	Power supply handle
3	Power supply latch
4	Power supply compartment

4. Pull the power supply out of the chassis and place the power supply on an antistatic mat.

   Caution: Whenever you remove a power supply, you should replace it with another power supply; otherwise, the Pilot might overheat due to improper airflow.

Insert a Power Supply

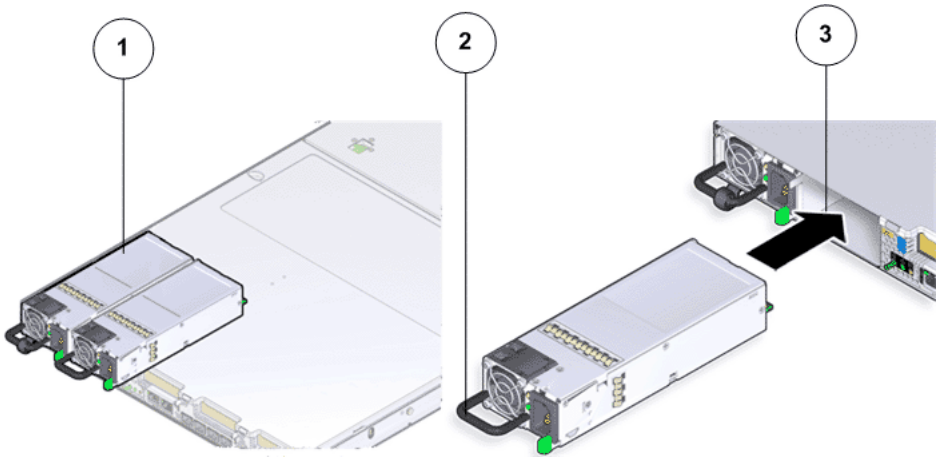
1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Align the replacement power supply with the empty power supply compartment.

3 Slide the power supply into the bay until it is fully seated.

Figure 177: Power supply insertion



Legend

1	Power supplies (PS0 and PS1)
2	Power supply handle
3	Power supply compartment

Note: Listen for an audible click or feel the power supply engage to confirm that the power supply is properly seated.

4 Re-connect the power cord into the replacement power supply.

5 Attach the power cord velcro to the power supply.

Note: If you pulled the Pilot out of the rack to make it easier to remove the power supply, push the Pilot into the rack until the slide-rail locks at the front of the Pilot engage the slide-rail assemblies.

Verify Power Supply Replacement on a Pilot

1 Return to Guided Maintenance and click Finish.

Guided Maintenance closes and the GUI displays the Pilot Overview page.

2 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Replace a Pilot Fan Module

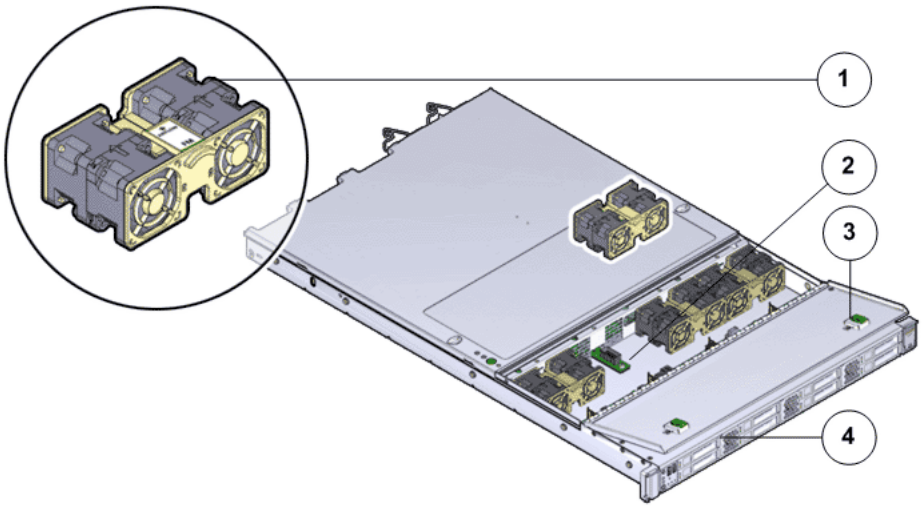
If a fan module fails, the Pilot internal temperature rises quickly. If the temperature exceeds normal thresholds, the system issues critical alerts. Replace fan modules as soon as possible to prevent high-temperature buildup.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- If you need to replace multiple fan module, replace only one fan module at a time and within five minutes.
- Initiate Guided Maintenance only when you are able to replace the fan module immediately.

Each Pilot has four fan modules that are located side-by-side at the center inside the Pilot chassis. A fan module is a customer replaceable unit (CRU) and is hot-serviceable. Replacing a fan module does not require you to bring the Pilot offline. The following figure shows the location of the Pilot fan modules.

Figure 178: Fan module location



Legend

1	Fan module
2	Fan compartment
3	Fan door
4	Pilot

Note: The fan module can be accessed only after removing the cover over the Pilot chassis.

Note: To replace a fan module, you do not need to remove the Pilot from the rack but extend it along the Pilot rails using the cable management arm (CMA).

Procedure Overview

1 *Prepare a Pilot for Component Replacement*
2 *Slide Pilot to Service Position*
3 *Open Pilot Fan Door*
4 *Remove a Fan Module*
5 *Insert a Fan Module*
6 *Close Pilot Fan Door*
7 *Slide Pilot to Rack Position*
8 *Verify Component Replacement on the Standby Pilot*
9 *Verify Component Replacement on the Active Pilot*

Related Links

Pilot Components

Prepare a Pilot for Component Replacement

1 Contact Oracle Customer Support prior to replacing a Pilot component.

Oracle Customer Support identifies the failed component on the Pilot for you.

2 From Oracle FS System Manager (GUI), navigate to System > Hardware > Pilots and select the Pilot that contains the component that you want to replace.

3 Select Actions > Repair Pilot.

Guided Maintenance displays the list of Pilot components.

4 Based on the information from your Oracle Customer Support representative, select the correct component from the list.

5 Click Next.

Guided Maintenance sends a request to flash the white locate LED on the Pilot to help you identify the Pilot in the data center.

6 Click Next.

Guided Maintenance displays a link that you use to access the instructions for component replacement.

7 Click the link to open and print the procedure.

8 Click Next.

- If you are replacing a component located on the active Pilot, Guided Maintenance brings the active Pilot offline and fails over to the

standby Pilot. After the active Pilot is offline, the GUI closes. When the failover is complete, you can log back into the GUI.

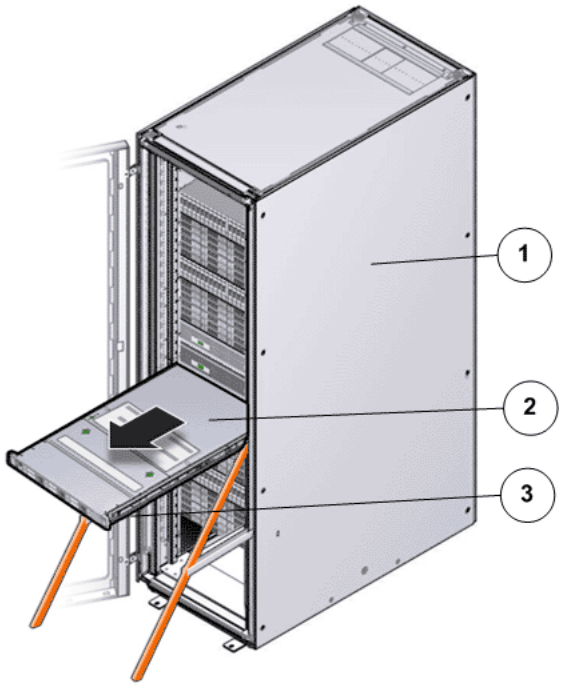
- If you are replacing a component located on the standby Pilot, Guided Maintenance brings the standby Pilot offline. When servicing the standby Pilot, failover is not required.
- If you are replacing a power supply or a fan module, you are not required to bring the Pilot offline. The power supplies and fan modules are hot-serviceable.

  Note: You can replace one power supply without bringing the Pilot offline, as long as the second power supply remains online and operational.

Slide Pilot to Service Position

1 Extend the rack's anti-tilt legs.

Figure 179: Pilot position during component replacement

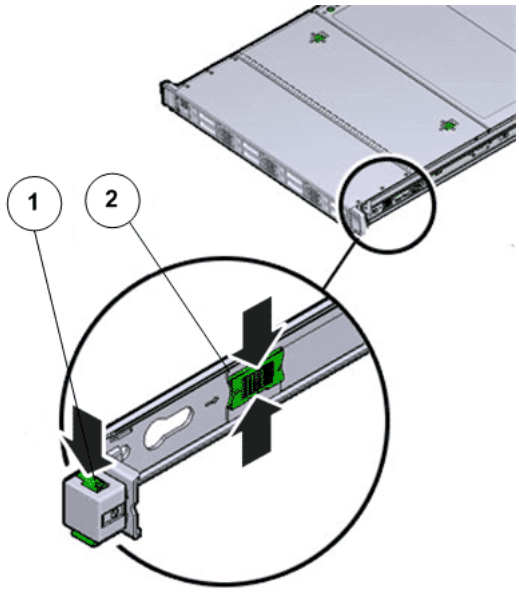


Legend

1	Rack
2	Pilot chassis
3	Pilot rails

2 Slide the Pilot chassis fully forward until the slide lockout release tabs lock into position.

Figure 180: Pilot slide lockout release tabs



Legend

1	Slide rail lock
2	Slide lockout release tabs

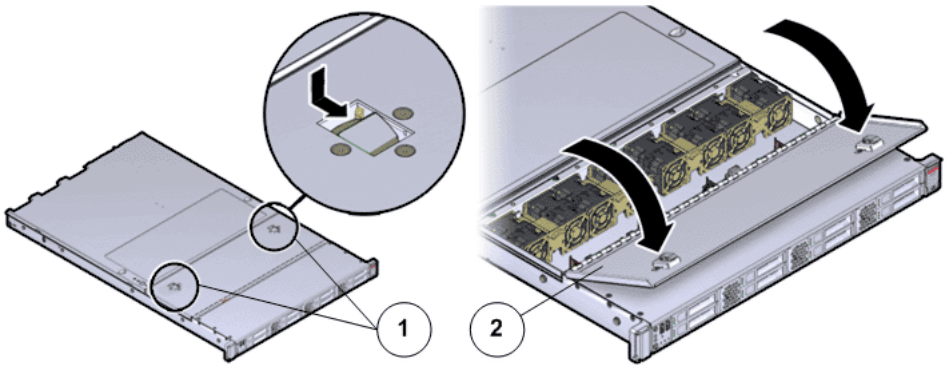
Note: The slide-rail locks are located behind the flip-down handles on the front of the Pilot chassis. The slide-rail locks are released when the flip-down handles are pulled down. The slide lockout release tabs must be released to push the Pilot chassis back into the rack.

Open Pilot Fan Door

Press the two fan door release tabs simultaneously forward and swing the Pilot fan door to the open position.

Note: Servicing the Pilot fan modules and other components located in the front of the Pilot, such as the front indication module (FIM) and the disk backplanes, require that the fan door be opened. It is also easier to remove the Pilot's top cover if you open the fan door first.

Figure 181: Pilot with fan door open



Legend

1	Fan door release tabs
2	Pilot fan door in open position

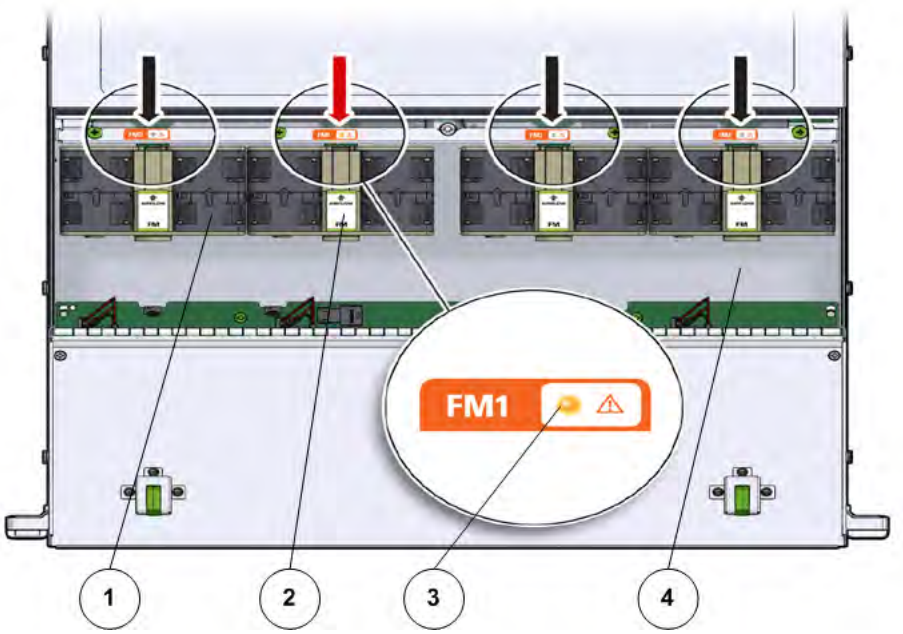
Caution: Close the Pilot fan door within 60 seconds to maintain adequate airflow to properly cool the server.

Remove a Fan Module

1. Identify the faulted fan module and then, using your thumb and forefinger on both sides of the fan module tab, gently lift the fan module from the fan compartment.

   Each fan module has a status indicator (LED). If the LED is off, the fan is operational. If the LED is lit amber, the fan has faulted. The LEDs are located on the chassis mid-wall, adjacent to and aligned with the fan modules.

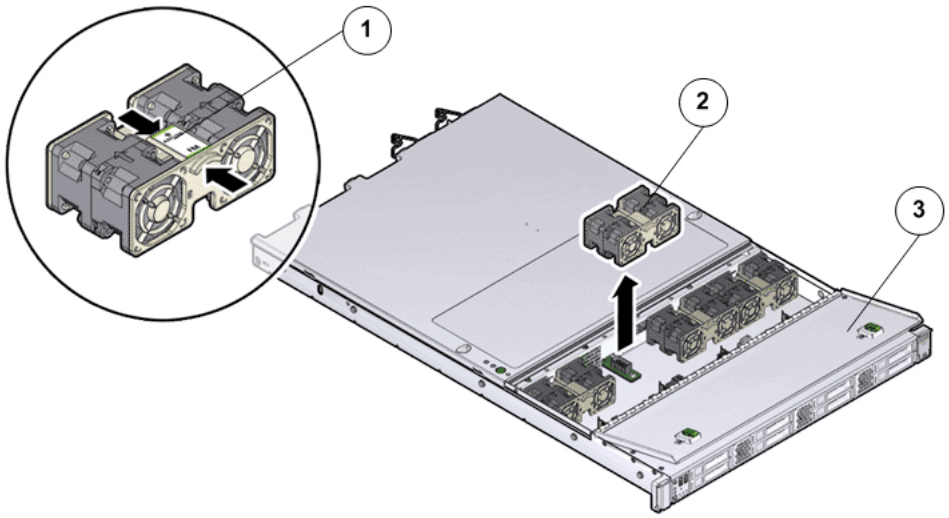
Figure 182: Fan module status indicator



Legend

1 Fan module
2 Fan module tab
3 Fan module status indicator
4 Fan door

Figure 183: Pilot fan module removal



Legend

1 Fan module tab
2 Fan modules
3 Fan door

Note: When removing a fan module, do not rock it back and forth. Rocking the fan module can cause damage to the motherboard connectors.

2 Set the fan module aside on an antistatic mat.

Note: When replacing a fan module, do not service any other components unless the system is shut down and the power cords are removed.

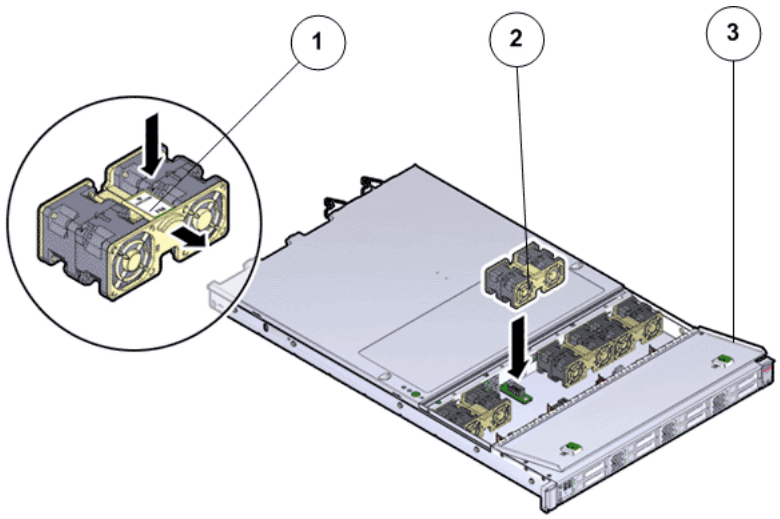
Insert a Fan Module

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Grasp the fan module tabs and press the fan down firmly into the fan module compartment.

Figure 184: Fan module insertion



Legend

1 Fan module tab
2 Fan modules
3 Fan door

Note: Apply firm pressure to fully seat the fan module into the fan compartment. The fan modules are notched to ensure that they are installed in the correct orientation.

3 Press down on the fan module and apply firm pressure to fully seat the fan module.

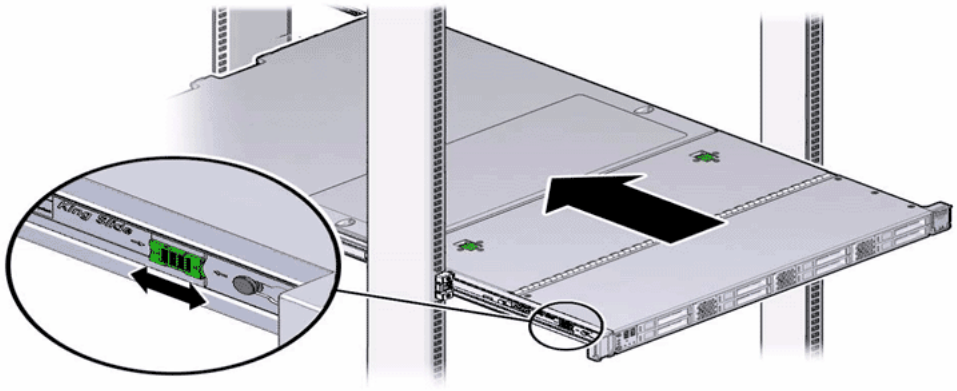
Close Pilot Fan Door

Close the Pilot fan door by pressing the two release tabs on both sides of the fan door until it locks into place.

Slide Pilot to Rack Position

1 Simultaneously pull and hold the two release tabs, one on each side of the Pilot, toward the front of the Pilot while you push the Pilot into the rack.

Figure 185: Location of the Pilot release tabs



Note: As you push the Pilot into the rack, verify that the cable management arm (CMA) retracts without binding.

Note: To pull the Pilot release tab, place your finger in the center of the tab, not on the end, and apply pressure as you pull the tab toward the front of the Pilot.

2 Continue pushing the Pilot into the rack until the slide-rail locks on the front of the Pilot engage the slide-rail assemblies.

Note: The Pilot locks into the rack position with an audible click.

Verify Component Replacement on the Standby Pilot

If you replaced a component on the standby Pilot, complete the following steps to verify the status of the Pilot:

1 Return to Guided Maintenance and click Finish.

Guided Maintenance closes and the GUI displays the Pilot Overview page.

2 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Verify Component Replacement on the Active Pilot

If you replaced a component on the active Pilot, complete the following steps to verify the status of the Pilot:

1 Restart Oracle FS System Manager (GUI).

2 Navigate to System > Hardware > Pilots.

The GUI displays the Pilot Overview page.

3 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Replace a Pilot DIMM

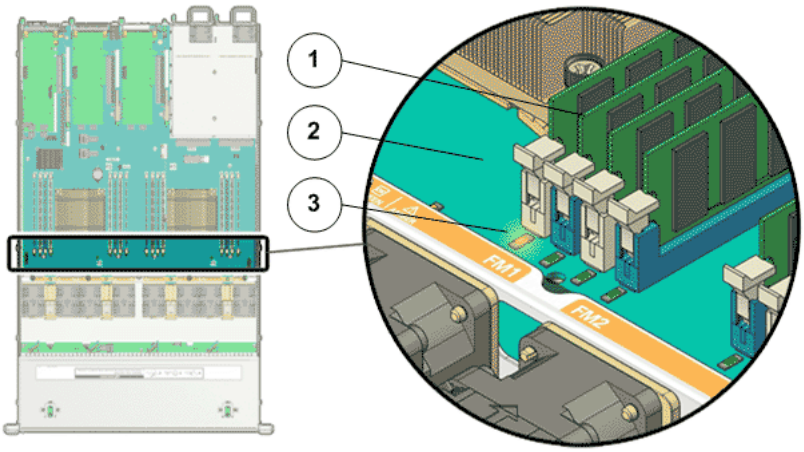
Dual in-line memory modules (DIMMs) provide random access memory (RAM) for the central processing units (CPUs) in the Pilot. A failed DIMM would cause the Pilot to fail and must be replaced as soon as possible.

Prerequisites:

- Before handling a component, touch a grounded surface to discharge any static electricity.
- Attach an electrostatic discharge (ESD) wrist strap to your wrist, and stand on an ESD mat while replacing components.
- Ensure that all DIMM slots are filled with either filler panels or DIMMs to ensure proper airflow.
- Fail over the Pilot before replacing the component using Guided Maintenance.

Each Pilot has two standard DIMMs with an 8 GB memory. DIMMs are connected to the DIMM slots located on both sides of the central processing unit (CPUs) and heatsinks on the Pilot motherboard. DIMMs are customer replaceable units (CRUs) but are not hot-swappable. Replacing a DIMM requires you to power off the Pilot. The following figure shows the location of the DIMMs on the Pilot motherboard and DIMM LEDs.

Figure 186: Location of the DIMMs on the Pilot motherboard



Legend

1 DIMMs
2 Motherboard
3 DIMM LED

Note: The illustration displays multiple DIMMs, but only two DIMMs are populated on the Pilot.

Note: If a DIMM is faulty, pressing the Fault Remind button on the motherboard signals the service processor to light the fault LEDs associated with the faulted DIMMs.

Note: The DIMMs can be accessed only after removing the cover over the Pilot chassis.

Note: To replace a DIMM, you do not need to remove the Pilot from the rack but extend it along the Pilot rails using the cable management arm (CMA).

Procedure Overview

1 *Prepare a Pilot for Component Replacement*
2 *Slide Pilot to Service Position*
3 *Power Off the Pilot*
4 *Open Pilot Fan Door*
5 *Open Pilot Top Cover*
6 *Remove a Pilot DIMM*
7 *Insert a Pilot DIMM*
8 *Close Pilot Top Cover*
9 *Close Pilot Fan Door*
10 *Slide Pilot to Rack Position*

11 *Connect Power Cords On the Pilot*

12 *Verify Component Replacement on the Standby Pilot*

13 *Verify Component Replacement on the Active Pilot*

Related Links

Pilot Components

Prepare a Pilot for Component Replacement

1 Contact Oracle Customer Support prior to replacing a Pilot component.

Oracle Customer Support identifies the failed component on the Pilot for you.

2 From Oracle FS System Manager (GUI), navigate to System > Hardware > Pilots and select the Pilot that contains the component that you want to replace.

3 Select Actions > Repair Pilot.

Guided Maintenance displays the list of Pilot components.

4 Based on the information from your Oracle Customer Support representative, select the correct component from the list.

5 Click Next.

Guided Maintenance sends a request to flash the white locate LED on the Pilot to help you identify the Pilot in the data center.

6 Click Next.

Guided Maintenance displays a link that you use to access the instructions for component replacement.

7 Click the link to open and print the procedure.

8 Click Next.

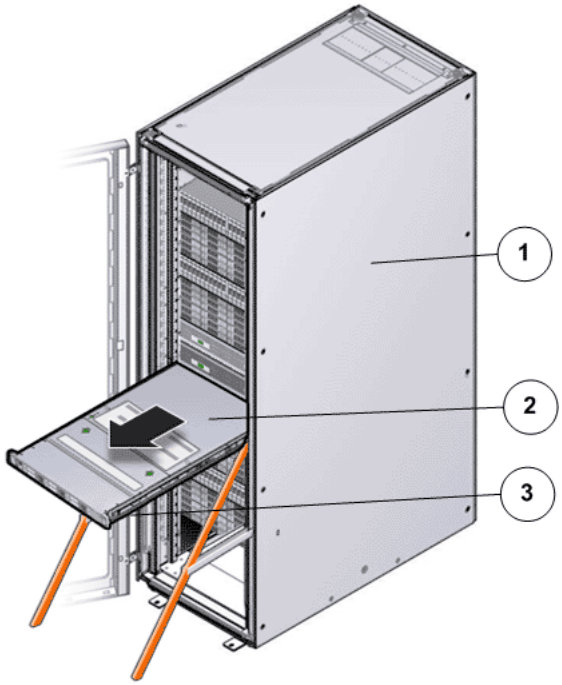
- If you are replacing a component located on the active Pilot, Guided Maintenance brings the active Pilot offline and fails over to the standby Pilot. After the active Pilot is offline, the GUI closes. When the failover is complete, you can log back into the GUI.
- If you are replacing a component located on the standby Pilot, Guided Maintenance brings the standby Pilot offline. When servicing the standby Pilot, failover is not required.
- If you are replacing a power supply or a fan module, you are not required to bring the Pilot offline. The power supplies and fan modules are hot-serviceable.

  Note: You can replace one power supply without bringing the Pilot offline, as long as the second power supply remains online and operational.

Slide Pilot to Service Position

1 Extend the rack's anti-tilt legs.

Figure 187: Pilot position during component replacement

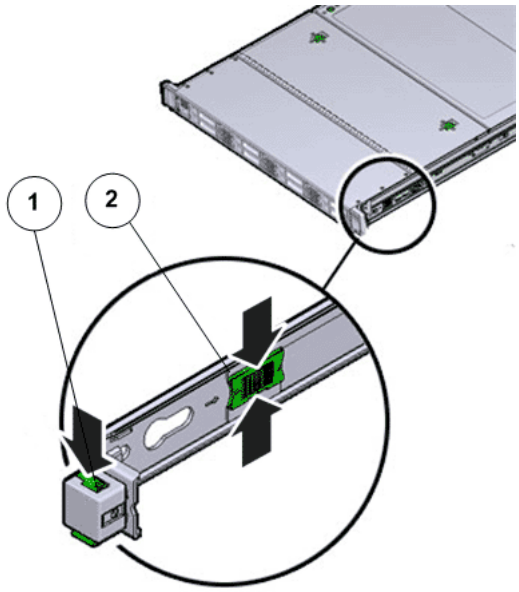


Legend

1 Rack
2 Pilot chassis
3 Pilot rails

2 Slide the Pilot chassis fully forward until the slide lockout release tabs lock into position.

Figure 188: Pilot slide lockout release tabs



Legend

1	Slide rail lock
2	Slide lockout release tabs

Note: The slide-rail locks are located behind the flip-down handles on the front of the Pilot chassis. The slide-rail locks are released when the flip-down handles are pulled down. The slide lockout release tabs must be released to push the Pilot chassis back into the rack.

Power Off the Pilot

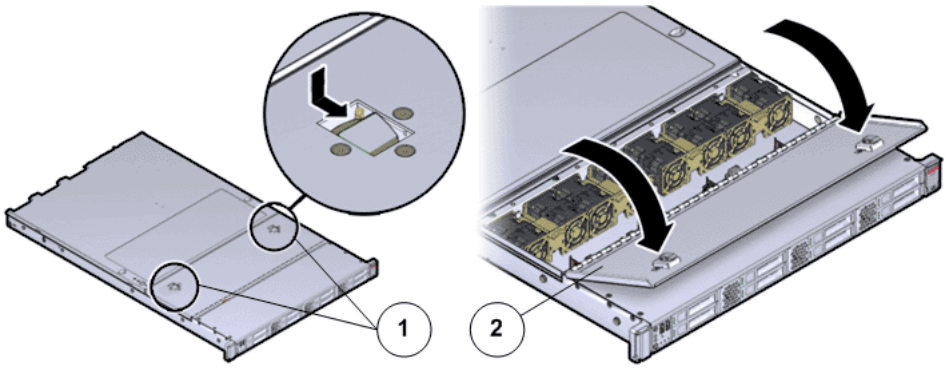
1. Notify affected users that the Pilot will be powered off.
2. Ensure that the Pilot on which the replacement procedure must be performed is powered off.
3. Disconnect the power cords from the back of the Pilot.

Open Pilot Fan Door

Press the two fan door release tabs simultaneously forward and swing the Pilot fan door to the open position.

Note: Servicing the Pilot fan modules and other components located in the front of the Pilot, such as the front indication module (FIM) and the disk backplanes, require that the fan door be opened. It is also easier to remove the Pilot's top cover if you open the fan door first.

Figure 189: Pilot with fan door open



Legend

1	Fan door release tabs
2	Pilot fan door in open position

Caution: Close the Pilot fan door within 60 seconds to maintain adequate airflow to properly cool the server.

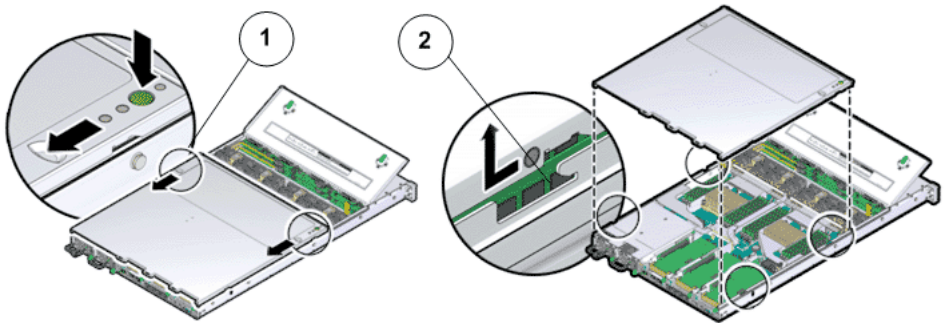
Open Pilot Top Cover

1. Press down on the push button on the Pilot top cover to release the top cover and use the recessed areas to slide the top cover toward the back of the Pilot about 0.5 inches (12.7 mm).

   Caution: Before removing the top cover of the Pilot, power off the Pilot using Guided Maintenance. Removing the Pilot top cover before powering off the Pilot might cause damage to the operating system on the Pilot.

   Tip: Slide out the Pilot top cover by pressing down on the grooves located on both sides of the cover.

   Figure 190: Pilot top cover removal



Legend

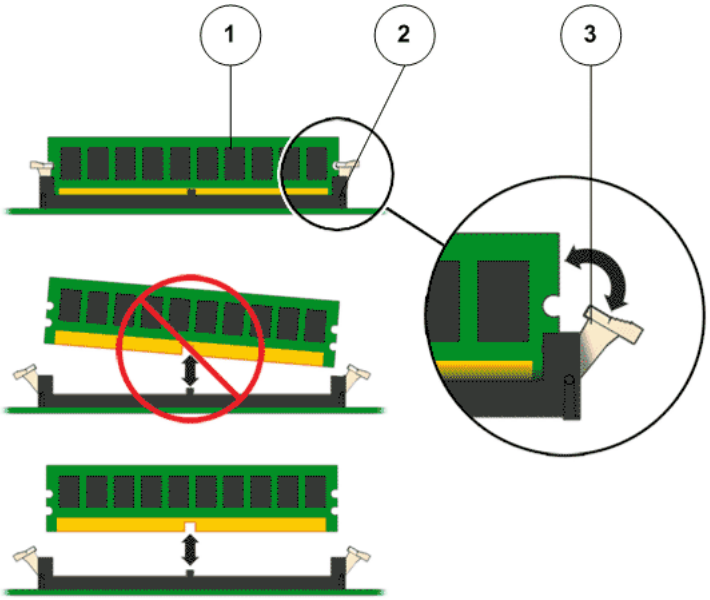
1 Push button to release top cover
2 Grooves to slide out top cover

2 Lift the cover off the Pilot chassis and set it aside.

Remove a Pilot DIMM

1 Remove the DIMM by pressing down on the tabs on both sides of the DIMM to unlock it from the slot.

Figure 191: Pilot DIMM removal



Legend

1 DIMM
2 DIMM slot
3 DIMM tab

Note: While inserting or removing DIMMs, ensure that there is no interference with the cables. Pulling or pressing down on the cables might cause damage to the cables during the replacement procedure.

2 Lift out the DIMM and set aside on an antistatic mat.

Note: Visually inspect the DIMM slots, and the DIMM, for physical damage by checking for cracked or broken plastic in the slot.

Note: Sometimes DIMMs might fault because of dust or improper alignment or damaged slots. Use only compressed air to dust DIMMs.

Insert a Pilot DIMM

1 Unpack the component from its shipping carton.

Note: Place the component on an antistatic mat if it must be set aside for any reason.

2 Press the DIMM fully into the DIMM slot and ensure that the tabs on both sides of the DIMM are locked.

Important: Ensure that the notch in the DIMM lines up with the key in the slot.

Note: Replace only one DIMM at a time to make sure that they are inserted into the correct slots. Attempting to insert multiple DIMMs into the slots might damage the DIMMs due to excessive flexure.

Note: Never leave a DIMM slot unpopulated. Insert filler panels into empty DIMM slots to ensure proper air flow inside the Pilot.

Close Pilot Top Cover

1 Place the top cover of the Pilot onto the chassis.

Tip: Place the top cover down so that it hangs over the back of the Pilot by about 13 mm (0.5 inches) and the side latches align with the slots in the sides of the Pilot chassis.

Note: There are three latching tabs on the sides of the Pilot top cover, two on the right side and one on the left side when viewing the Pilot from the front. There is also a latch on the underside of the top cover in the front left corner near the release button.

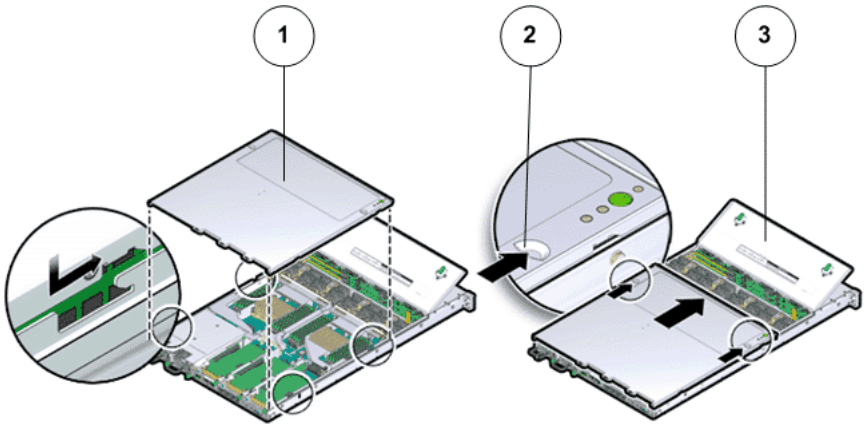
2 Check both sides of the Pilot chassis to ensure that the four corners of the top cover are fully down and flush with the chassis.

Note: If the cover corners are not flush with the Pilot chassis, slide the cover towards the back of the chassis until you can position the cover correctly.

Note: If the top cover is not correctly positioned before attempting to slide the cover forward, the internal latch that is on the underside of the cover might be damaged.

3 Gently slide the top cover along the grooves of the Pilot by pressing down on either side of the top cover until it locks into place and you hear an audible click.

Figure 192: Pilot top cover installed



Legend

1	Top cover
2	Grooves to slide the top cover
3	Fan door

Close Pilot Fan Door

Close the Pilot fan door by pressing the two release tabs on both sides of the fan door until it locks into place.

Connect Power Cords On the Pilot

Reconnect the power cords to the Pilot.

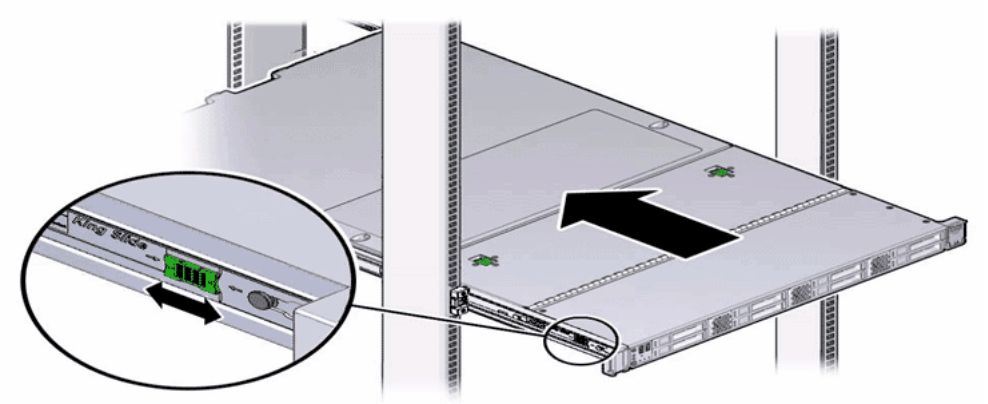
Note: After the power cords are connected, the SP (ILOM) LED blinks first. The OK LED does not comes on until the SP is solid green.

Note: If you need to stop the Pilot from booting in order to check the BIOS, you must wait until the SP LED is solid green and then press the power button, which is located near the OK LED for 7-10 seconds. The OK LED subsequently displays a slow blink.

Slide Pilot to Rack Position

1 Simultaneously pull and hold the two release tabs, one on each side of the Pilot, toward the front of the Pilot while you push the Pilot into the rack.

Figure 193: Location of the Pilot release tabs



Note: As you push the Pilot into the rack, verify that the cable management arm (CMA) retracts without binding.

Note: To pull the Pilot release tab, place your finger in the center of the tab, not on the end, and apply pressure as you pull the tab toward the front of the Pilot.

2 Continue pushing the Pilot into the rack until the slide-rail locks on the front of the Pilot engage the slide-rail assemblies.

Note: The Pilot locks into the rack position with an audible click.

Verify Component Replacement on the Standby Pilot

If you replaced a component on the standby Pilot, complete the following steps to verify the status of the Pilot:

1 Return to Guided Maintenance and click Finish.

Guided Maintenance closes and the GUI displays the Pilot Overview page.

2 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

Verify Component Replacement on the Active Pilot

If you replaced a component on the active Pilot, complete the following steps to verify the status of the Pilot:

1 Restart Oracle FS System Manager (GUI).

2 Navigate to System > Hardware > Pilots.

The GUI displays the Pilot Overview page.

3 From the Pilot Overview page, review the status of the Pilot.

A status of Normal requires no action.

APPENDIX A

Oracle FS System Hardware Specifications

Oracle FS System Hardware Specifications

An Oracle Flash Storage System is an assembly of Pilots, Controllers, Drive Enclosures, power distribution units (PDUs), racks, and cables. Replication Engines are an optional component of the Oracle FS System.

The following table indicates the basic components that constitute an Oracle Flash Storage System.

Table 16: Basic components of an Oracle Flash Storage System

Component	Oracle Flash Storage System
Pilot	• Two Pilots for failover and failback • Management commands flow from the active Pilot to the Controllers
Controller	• Two Controllers for failover and failback • Provide network I/O access to customer facilities and provides a storage fabric interface between all Drive Enclosures and other Controllers.
Drive Enclosure	• 1 to 30. The two types of Drive Enclosure are the DE2-24P Drive Enclosure and the DE2-24C Drive Enclosure. • Used as back-end storage for the Oracle FS Systems.
PDU	• Two PDUs are required in each rack that is used for the installation of rack-ready Oracle FS Systems. • PDUs are built-in to the Oracle racks.
Rack	• At least one rack. **Note:** The number of racks is based on the number of Drive Enclosures and whether there are any Replication Engines included in the system. The number of racks depends on the number and the distribution of the hardware components.

The following table provides the maximum dimensions of an Oracle Flash Storage System that is fully integrated at the factory in the supported Oracle rack with Oracle PDUs.

Table 17: Maximum physical dimensions of an Oracle Flash Storage System

Component	Oracle Flash Storage System
Height	42U or 1998 mm (78.7 in)
Width	600 mm (23.6 in)
Depth (front door handle to back door handle)	1200 mm (47.2 in)
Depth (doors removed)	1112 mm (43.8 in)
Maximum weight	696.6 kg (1535.7 lb)

Note: The weight of an Oracle Flash Storage System depends on the distribution of Drive Enclosures in the rack and whether any Replication Engines are included, as well as the Pilots and Controllers.

Related Links

Component Chassis Hardware Specifications
PDU Hardware Specifications
System Power Requirements
System Packaging and Transportation
System Environmentals

Component Chassis Hardware Specifications

The following tables provide information on the hardware specifications and the power characteristics of the Pilot, Controller, and Drive Enclosures.

Dimensions and Weight

Table 18: Pilot dimensions and weight

Attribute	Value
Height	1.68 in (4.26 cm)
Width	Server chassis (not including ears): 17.19 in (43.65 cm) Server chassis (with bezel): 18.90 in (48.24 cm)
Depth (not including power supply handles)	29.00 in (73.66 cm)
Weight	40 lb (18.1437 kg): Weight of one Pilot.

Table 19: Controller dimensions and weight

Attribute	Value
Height	3.45 in (8.76 cm)
Width	17.52 in (44.55 cm)
Depth	20.25 in (51.435 cm)
Weight	41 lb (18.59 kg)

Table 20: DE2-24P Drive Enclosure dimensions and weight

Attribute	Value
Height	3.46 in (8.79 cm); 2U
Weight (with drives)	55 lb (24.9 kg) **Note:** The final weight of the Drive Enclosure depends on the drive type and the number of drives in each Drive Enclosure.
Width	Width across mounting flange: 19 in (48.26 cm) Width across body of enclosure: 17.44 in (44.29 cm)
Depth	24.8 in (62.99 cm)

Table 21: DE2-24C Drive Enclosure dimensions and weight

Attribute	Value
Height	6.92 in (17.57 cm); 4U
Weight (with drives)	110 lb (49.9 kg)
Width	Width across mounting flange: 19.00 in (48.26 cm) Width across body of enclosure: 17.44 in (44.29 cm)
Depth	24.80 in (62.99 cm)

Power Characteristics

Table 22: Pilot power characteristics

Power characteristic	Value
Frequency	50–60Hz
AC voltage	100–240V
Maximum power consumption for both nodes	314 VA
Current draw for both nodes	1.42A, 208V
Maximum heat dissipation	1102 BTU/hr
AC receptacle type	IEC 60320 C14 inlet

Table 23: Controller power characteristics

Power characteristic	Value
Frequency (nominal)	50–60 Hz (47–63 Hz range)
Voltage (nominal)	100 to 127/200 to 240 Volts AC
Input current (maximum) for both nodes	13.6 A at 100–120 Volts AC (approximately) 8 A at 200–240 Volts AC (approximately)
Maximum power consumption for both nodes	874 VA (power at maximum FS1 Controller configuration)
Maximum heat dissipation	2830 BTU/hr
AC receptacle type	IEC 60320 C14 inlet

Table 24: Drive Enclosure power characteristics

Power characteristic	Value
Maximum output power	Maximum power consumption depends on the type of Drive Enclosure (DE2-24P or DE2-24C), its size (2U/4U), and configuration. • 4U HDD= 376VA (4TB HDD) • 2U SFF = 260VA (900GB SFF HDD) • 2U SSD = 307VA (19 x 1.6TB SSD)
Frequency	50–60 Hz
Voltage range	100–240 Volts AC rated
Maximum range selection	47–63 Hz
Maximum inrush current	20A

PDU Hardware Specifications

The PDUs used in a not-racked Oracle FS System installation must provide redundancy for both external AC power source and internal AC power distribution to the components. The PDUs must provide sufficient current to meet the sum of the requirements for the Oracle FS System components.

Oracle PDUs might be purchased for use with non-Oracle racks. The Oracle FS System component power cords have been designed to work with vertical style Oracle or third party PDUs. Non-Oracle PDUs must be compatible with Oracle component power cord lengths and plug types. Non-Oracle PDUs must be mounted in a manner such that the power cords provided by Oracle might be used and the PDUs do not obstruct the ability to replace field replaceable units (FRUs) and customer serviceable units (CRUs).

While planning rack-space, ensure that adequate space is also allocated for the PDUs, if using non-Oracle PDUs.

The following tables provide information on the various PDUs for the Oracle FS Systems, with the assumption that there are two PDUs in each rack.

Note: The term “Ph” stands for “phase” in the above tables.

Table 25: Low voltage dual phase PDU for Oracle Flash Storage Systems

Low Voltage	2Ph (2W + ground)
kVA size	10 kVA
Marketing part number	7104982
Phase	1 Phase No grounded neutral conductors are provided in the two input cords.
Voltage input	2x [2Ph (2W+ground)], 208Vac, 50/60 Hz, maximum. 24A per phase Can be connected to input sources in the range of 200V – 240V AC (nominal)
Number of input cords and plug type	2x NEMA L6-30P
Number of data center receptacles and type	2x NEMA L6-30R
Maximum input current for each cord	24A
Outlet receptacles (number/type)	42/C13 (seven for each outlet group) 6/C19 (one for each outlet group)
Outlet groups for each PDU	6
PDU power cord length	2 meters (6.6 feet) PDU power cords are 4 m (13 ft) long, but only 2 m (6.6 ft) are usable outside of the cabinet.

Table 26: Low voltage three-phase PDU for Oracle Flash Storage Systems

Low Voltage	3Ph (3W + ground)
kVA size	15 kVA
Marketing part number	7104979
Phase	3 No grounded neutral conductors are provided in the input cords.

Table 26: Low voltage three-phase PDU for Oracle Flash Storage Systems (continued)

Low Voltage	3Ph (3W + ground)
Voltage input	3Ph [(3W+ground)] 208Vac, 50/60 Hz, maximum. 40A per phase Can be connected to Ph-Ph input sources in the range of 190V – 220V AC (nominal)
Number of input cords and plug type	1x IEC 309, 60A (Hubbell C460P9W or equivalent)
Number of data center receptacles and type	1x IEC 309, 60A (Hubbell 460R9S or equivalent)
Maximum input current for each cord	40A
Outlet receptacles (number/type)	42/C13 (seven for each outlet group) 6/C19 (one for each outlet group)
Outlet groups for each PDU	6
PDU power cord length	2 meters (6.6 feet) PDU power cords are 4 meters (13 feet) long, but sections are connected for internal routing in the rack.

Table 27: High voltage single phase PDU for Oracle Flash Storage Systems

High Voltage	1Ph (2W + ground)
kVA size	10 kVA
Marketing part number	7104983
Phase	1
Voltage input	2x [2Ph. (2W+ground)] 230Vac, 50 Hz, maximum. 25A per phase Can be connected to Ph-N input sources in the range of 220V – 240V AC (nominal)
Number of input cords and plug type	2x IEC 309, 32A (Hubbell 332P6S or equivalent)
Number of data center receptacles and type	2x IEC 309, 32A (Hubbell 332R6S or equivalent)

Table 27: High voltage single phase PDU for Oracle Flash Storage Systems (continued)

High Voltage	1Ph (2W + ground)
Maximum input current for each cord	25A
Outlet receptacles (number/type)	42/C13 (seven for each outlet group) 6/C19 (one for each outlet group)
Outlet groups for each PDU	6
PDU power cord length	2 meters (6.6 feet) PDU power cords are 4 meters (13 feet) long, but sections are connected for internal routing in the rack.

Table 28: High voltage three-phase PDU for Oracle Flash Storage Systems

High Voltage	3Ph (5W + ground)
kVA size	15 kVA
Marketing part number	7104980
Phase	3
Voltage input	[3Ph. (4W+ground)] 230/400Vac, 50/60 Hz, maximum. 25A per phase Can be connected to Ph-N input sources in the range of 220V – 240V AC (nominal)
Number of input cords and plug type	1x IEC 309, 32A (Hubbell 532P6S or equivalent)
Number of data center receptacles and type	1x IEC 309, 32A (Hubbell 532R6S or equivalent)
Maximum input current for each cord	25A
Outlet receptacles (number/type)	42/C13 (seven for each outlet group) 6/C19 (one for each outlet group)

Table 28: High voltage three-phase PDU for Oracle Flash Storage Systems (continued)

High Voltage	3Ph (5W + ground)
Outlet groups for each PDU	6
PDU power cord length	2 meters (6.6 feet) PDU power cords are 4 meters (13 feet) long, but sections are connected for internal routing in the rack.

System Power Requirements

The total power consumed by the Oracle FS1 Flash Storage System is dependent on the configuration of the system. To determine the system electrical input ratings for Oracle Flash Storage Systems that use the Oracle supported PDUs, refer to the PDU information provided for Oracle Flash Storage Systems.

Oracle Flash Storage Systems require redundant input power feeds for proper fault tolerant operation.

Note: Ensure that you have the exact power load and current requirements for your specific Oracle FS System at hand.

If non-Oracle PDUs are used, you must determine the electrical input ratings of the Oracle FS System configuration.

System Packaging and Transportation

All packaging and transportation are tested in accordance with Oracle Shipping Package Test, Doc. No. 950-1291-01.

System Environmentals

Table 29: System altitude specifications

Mode	Elevation
Operational	–196 to 10498.7 feet (–60 to 3,200 meters)
Non-operational	–196 to 40026.2 feet (–60 to 12,200 meters)

Table 30: System temperature and humidity specifications

Mode	Ambient temperature	Non-condensing humidity	Max wet bulb temperature	Gradient
Operational	Up to 7000–feet elevation: +41 to 104°F (+5 to 40°C) Up to 10,000–feet elevation: +41 to 95°F (+5 to 35°C)	10–85% 10%/hr gradient	86°F (30°C)	36°F/hr (20°C/hr)
Non-operational	-45.4 to 154.4 °F (-43 °C to 68 °C)	5–95% 10%/hr gradient	104°F (40°C)	54°F/hr (30°C/hr)

APPENDIX B

Oracle FS System LED Status

Oracle FS System LEDs

An Oracle FS System includes LEDs to indicate the status of the hardware components. To restore reliability to the Oracle FS System, locate the specific failed component so that you can replace it. Hardware LED configuration helps you identify the failed component.

Important: If you cannot locate the hardware component that must be replaced, contact Oracle Customer Support.

The Guided Maintenance feature of the Oracle FS System Manager triggers the chassis with the failed component to blink, or it triggers all of the other chassis to blink, except for the one with the failed component. This blinking pattern helps you to identify component status.

Note: LED interpretations in this appendix apply to a system after it has been powered on.

Related Links

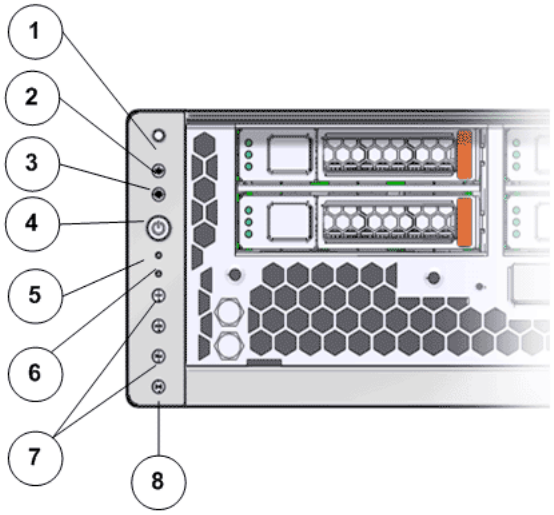
Controller LED Indicators
Drive Enclosure LED Indicators
Pilot LED Indicators
Pilot Drive LED Indicators
Pilot Fan LED Indicators
Pilot Port LED Indicators
Pilot Motherboard LED Indicators
Pilot Power Supply LED Indicators

Controller LED Indicators

The LED alarm assembly is a high-level status indicator of the Controller and Controller components. Use these diagnostic LEDs to determine if a component has failed in the Controller. The LED alarm assembly also includes a power button to power on the Controller. Besides, the LED alarm assembly there is the Controller Identification Display (CID) that identifies the Controller by its numeric identifier.

The following figure shows the front display panel of the LED alarm assembly on the Controller:

Figure 194: LED alarm assembly front display



Legend

1 Chassis identification LED or Locator LED	5 Service processor LEDs
2 Service Action Required LED or Caution or Fault LED	6 Back power supply LED
3 Motherboard or Power or OK LED	7 Fault or Alarm LEDs (Critical, Major, Minor)
4 Power switch	8 User Alarm LED

The following table provides status information on the LEDs on the front display panel of the LED alarm assembly on the Controller:

Table 31: Controller LED status and description (front panel)

No.	LED	LED color	Status
1	Chassis identification LED or Locator LED button	White	The Locator LED can be turned on to identify a particular system. When on, the LED blinks rapidly. Pressing and holding the Locator button for 5 seconds lights up all the LEDs that are controlled by ILOM for 15 seconds.
2	Service Action Required LED	Amber	Indicates that service is required. Under some fault conditions, individual component fault LEDs are turned on in addition to the Service Required LED.

Table 31: Controller LED status and description (front panel) (continued)

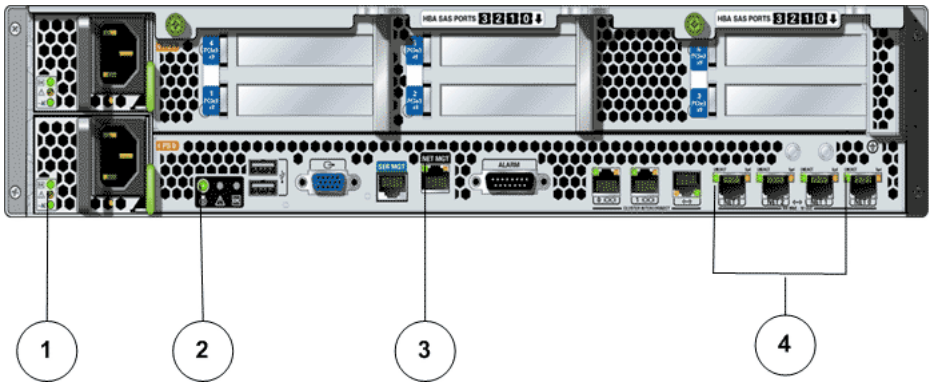
No.	LED	LED color	Status
3	Controller OK LED	Green	Indicates these conditions: • Off – Indicates that the system is not running in its normal state. System power might be off. The SP might be running. • Steady on – Indicates that the system is powered on and is running in its normal operating state. No service actions are required. • Standby blink: Indicates that the system is running in standby mode and can be quickly returned to full function. (200ms-On: 2800ms-Off) • Slow blink: Indicates that a normal but transitory activity is taking place. Slow blinking might indicate that system diagnostics are running or that the system is booting.
5	Service processor LED	Green	Indicates the state of the service processor: • Slow blink: Indicates the SP is booting. • Steady: Indicates a steady state, no service action is required.
6	Back power supply LED	Amber	Indicates the state of the power supplies: • Off – Indicates a steady state, no service action is required. • On – Indicates a fault with one of the power supplies.

Table 31: Controller LED status and description (front panel) (continued)

No.	LED	LED color	Status
7	Fault or Alarm LEDs (Critical, Major, Minor)	• Critical Alarm LED : Red • Major Alarm LED: Red • Minor Alarm LED: Amber	**Note:** The alarm indicators appear on the front panel of the Controller but are not applicable for the Oracle FS System.
8	User Alarm LED	Amber	Indicates a user alarm condition. **Note:** The alarm indicators appear on the front panel of the Controller but are not applicable for the Oracle FS System.

The following figure shows the LEDs at the back of the Controller:

Figure 195: Controller back LEDs



Legend

1 Power supply status LEDs	3 Network management LED
2 Chassis Status LEDs	4 Net0 to Net3 status LEDs

The following table provides information on the LEDS at the back of the Controller:

Table 32: Controller LED status and description (back panel)

No.	LED	LED color	Status
1	Power supply status LEDs:	• (Top) Output Power OK LED: Green • (Middle) Service Action Required LED: Amber • (Bottom) AC or DC Input Power OK LED: Green	• Output Power OK LED: Indicates that output power is without fault. • Service Action Required LED: Indicates that service for the power supply is required. • AC or DC Input Power OK LED: Indicates that input power is without fault.

2	Chassis Status LEDs	• (Left) Locator LED and button: White
		• (Center) Service Action Required LED: Amber
		• (Right) Main Power OK LED: Green
			• Locator LED and button: The Locator LED can be turned on to identify a particular system.
			• Service Action Required LED: Indicates that service is required. Under some fault conditions, individual component fault LEDs are turned on in addition to the Service Required LED.
			• Main Power OK LED: Indicates these conditions:
			  • Off – System is not running in its normal state. System power might be off. The SP might be running.
			  • Steady on – System is powered on and is running in its normal operating state. No service actions are required.

Table 32: Controller LED status and description (back panel) (continued)

No.	LED	LED color	Status
			• Fast blink – System is running in standby mode and can be quickly returned to full function. • Slow blink – A normal but transitory activity is taking place. Slow blinking might indicate that system diagnostics are running or that the system is booting.

Table 32: Controller LED status and description (back panel) (continued)

No.	LED	LED color	Status

3	Network management LED	• (Left) Link and Activity LED: Green
		• (Right) Speed LED: Green, amber, or OFF
			Indicates these conditions:
			• Link and Activity LED:
			  • On or blinking – A link is established.
			  • Off – No link is established.
			• Speed LED:
			  • On or blinking – The link is operating as a 100-Mbps connection.
			  • Off – The link is operating as a 10-Mbps connection.

4	Net0 to Net3 status LEDs	• (Left) Link and Activity LED: Green
		• (Right) Speed LED: Amber
			Indicates the state of the service processor:
			• Link and Activity LED:
			  • On or blinking – A link is established.
			  • Off – No link is established.
			• Speed LED:
			  • Amber – The link is operating as a Gigabit connection (1000-Mbps).
			  • Green – The link is operating as a 100-Mbps connection.
			  • Off – The link is operating as a 10-Mbps connection or there is no link.

Related Links

Oracle FS System LEDs

Controller Power Supply LED Indicators

The LED indicators on the power supplies are at the left of the fan of each power supply and provide power activity status.

Table 33: Controller power supply LED status and description

Icon	Location	Name	Color	Status and meaning
	Top	OK	Green	• On – Power supply is functional without fault. • Off – Power supply is off or initializing. • Flashing – No function.
	Middle	Attention Service Required	Amber	• On – Normal fault detected. • Off – No faults detected. • Flashing – No function.
	Bottom	AC or DC	Green	• On – Input power present and good. • Off – Input power not present. • Flashing – No function.

Controller Fan LED Indicators

A single bi-color LED represents the status of each fan module. The LEDs are on the motherboard near each fan module, and are visible from the back panel of the Controller when you look through the grill below the risers.

Table 34: Controller fan LED status and description

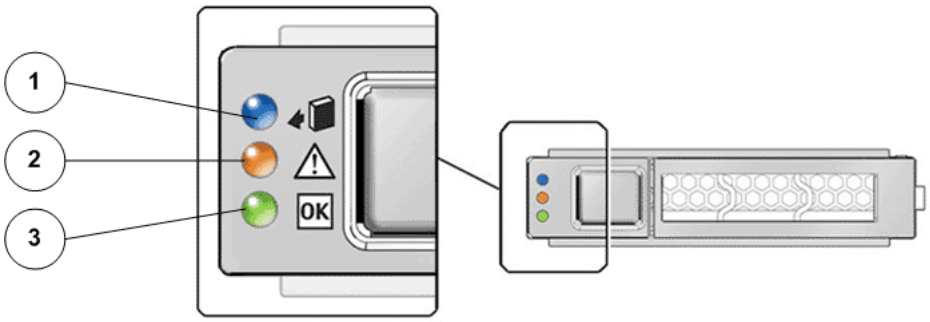
Color	Status and meaning
Green	The fan module is functional without fault.
Amber	The fan module has experienced a fault.

Note: There are two LEDs near the status LED for the third fan module. Do not confuse the FPGA Good and FPGA Diagnostic LEDs with the status LED for the third fan module.

Controller ESM LED Indicators

Three LEDs represent the status of each energy storage module (ESM). The LEDs are above the release button of each drive.

Figure 196: Controller drive LEDs

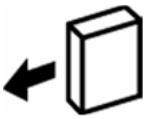


Legend

1 Ready to Remove LED	3 OK/Activity LED
2 Attention Service Required LED	

This following table describes the functionality of the ESM LEDs:

Table 35: Controller ESM LED status and description

Icon	Location	Name	Color	Status and meaning
	Top	Ready to Remove	Blue	• On – ESM can be removed as a hot-swap operation. • Off – Do not remove the ESM. • Flashing – ESM is initializing.
	Middle	Attention Service Required	Amber	• On – Normal fault is detected. • Off – No faults are detected. • Flashing – No function.
	Bottom	OK/Activity	Green	• On – ESM is functional without fault. • Off – ESM is off or initializing. • Flashing – ESM read and write activity.

Drive Enclosure LED Indicators

The LED indicators on the operator panel of the Drive Enclosures provide system status. The LED display identifies the Drive Enclosure by its numeric identifier.

The following figures show the operator panel LEDs for both types of Drive Enclosure.

Figure 197: Operator panel LEDs (DE2-24P Drive Enclosure)

Legend

1 System power indicator	3 Locate indicator and logical fault indicator
2 Module fault indicator	4 Chassis ID

Figure 198: Operator panel LEDs (DE2-24C Drive Enclosure)

Legend

1 System power indicator	3 Locate indicator and logical fault indicator
2 Module fault indicator	4 Chassis ID

The following table provides status information on the operator panel LEDs.

Table 36: Drive Enclosure LED status and description (operator panel)

LED	LED color	Status
System power indicator	Green	The status is normal.
Module fault indicator	Amber	A module fault is present.
Locate indicator	White	The DE is located.
LED display	Green number between 01 and 30	The numeric identifier of a DE is displayed.

Related Links

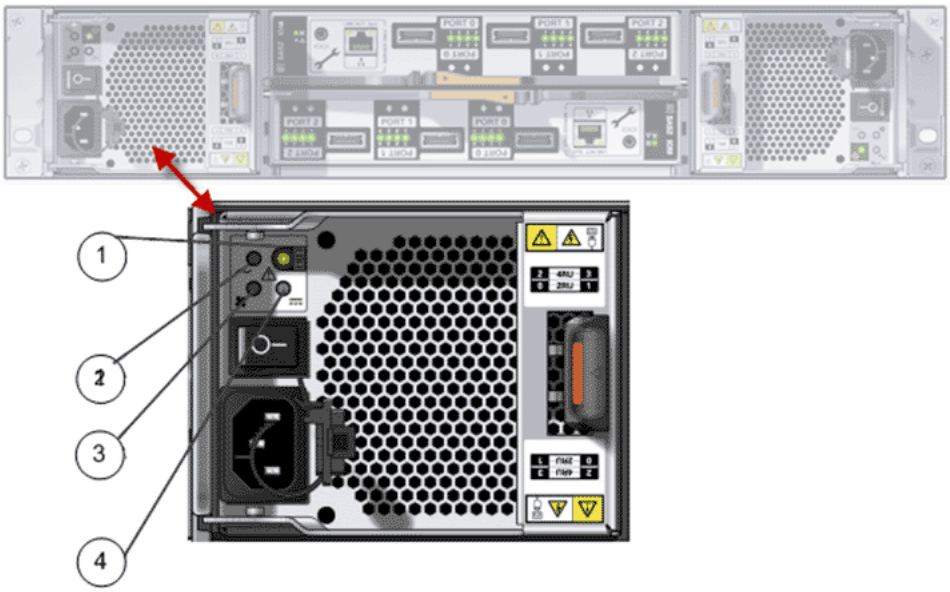
Oracle FS System LEDs

Power Cooling Module LED Indicators

The LED indicators on the power cooling modules provide power activity status, fan and temperature fault conditions, and firmware upgrade status.

The following figure shows the power cooling module LEDs.

Figure 199: Power cooling module LEDs



Legend

1 Status indicator	3 Fan fail indicator
2 AC fail indicator	4 DC output fail indicator

The following table provides status information on the power cooling module LEDs.

Table 37: Drive Enclosure LED status and description (power cooling module)

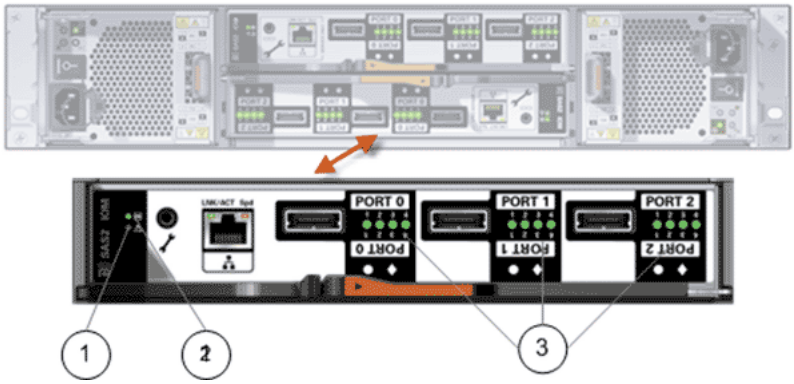
Status	Status indicator (green)	Fan fail indicator (amber)	AC fail indicator (amber)	DC fail indicator (amber)
AC power is not available on either power cooling module.	Off	Off	Off	Off
AC power is not available on this power cooling module.	Off	Off	On	On
AC power is present, and the status of the power cooling module is normal.	On	Off	Off	Off
The power cooling module fan is outside of acceptable limits.	Off	On	Off	Off
The power cooling module fan failed.	Off	On	Off	Off
A fault is present (over temperature, over volts, over current).	Off	On	On	On
The power cooling module is in standby mode.	Flashing	Off	Off	Off
The power cooling module is downloading firmware.	Off	Flashing	Flashing	Flashing

I/O Module LED Indicators

The LED indicators on the I/O modules provide power activity status, locate indicators, fault conditions, and host port activity.

The following figure shows the I/O module LEDs.

Figure 200: I/O module LEDs



Legend

1 Fault and locate indicator	3 Host port activity indicator
2 Power and OK indicator	

The following table provides status information on the I/O module LEDs.

Table 38: Drive Enclosure LED status and description (I/O module)

Status	Fault and locate indicator (amber)	Power and OK indicator (green)	Host port activity (green)
The status is normal.	Off	On	Not applicable
An I/O module fault is present.	On	Off	Not applicable
The I/O module is located.	Flash	On	Not applicable
A vital product data (VPD) error is present.	Not applicable	Flash	Not applicable
The host port is not connected.	Not applicable	Not applicable	Off

Table 38: Drive Enclosure LED status and description (I/O module) (continued)

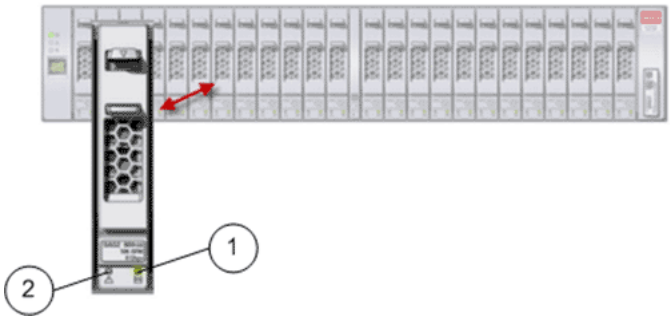
Status	Fault and locate indicator (amber)	Power and OK indicator (green)	Host port activity (green)
The host port is not active.	Not applicable	Not applicable	On
The host port activity is normal.	Not applicable	Not applicable	Flashing

Drive LED Indicators

The LED indicators on the Drive Enclosure drives provide power activity status, locate indicators, and fault conditions of each drive.

The following figures show the drive LEDs for both types of Drive Enclosure.

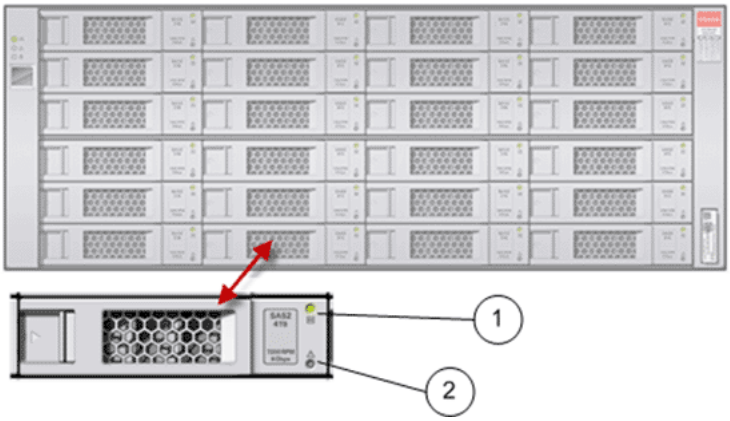
Figure 201: Drive LEDs (DE2-24P Drive Enclosure)



Legend

1 Power and activity indicator	2 Drive fault indicator

Figure 202: Drive LEDs (DE2-24C Drive Enclosure)



Legend

1 Power and activity indicator	2 Drive fault indicator

The following table provides status information on the drive LEDs.

Table 39: Drive Enclosure LED status and description (drives)

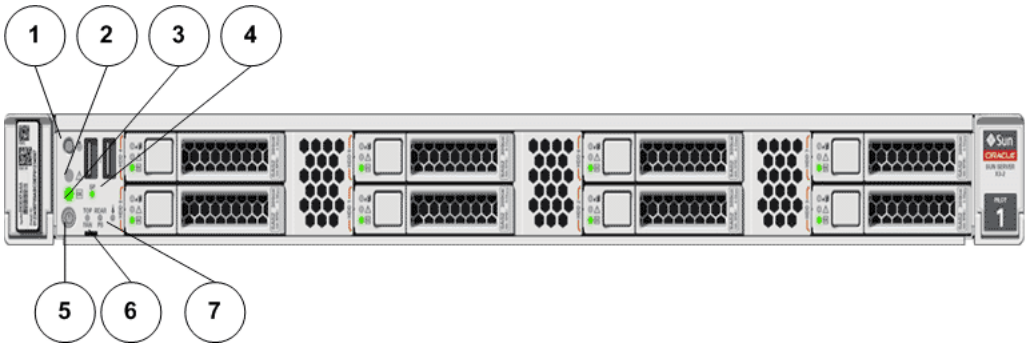
Status	Power/Activity Indicator (green)	Drive Fault indicator (amber)
Drive is installed and operational.	On and blinking with startup or activity	Off
The drive is located.	On	Flash one second on and one second off
A drive fault is present.	On	On In addition to the continuous amber light on the Drive Fault LED, the Locate LED on the operator panel is also a continuous amber light.
A failure occurred in the power control circuit.	Off	On In addition to the continuous amber light on the Drive Fault LED, the Module Fault LED on the operator panel is also a continuous amber light.
A failure occurred in the disk array.	On	Flash three seconds on and one second off. In addition to the flashing amber light on the Drive Fault LED, the Locate LED on the operator panel is also a continuous amber light.

Pilot LED Indicators

The Pilot LEDs are on the front panel of the Pilot. Use these diagnostic LEDs to determine if a component has failed in the Pilot.

The following figure shows the LEDs at the front of the Pilot:

Figure 203: LEDs at the front of the Pilot

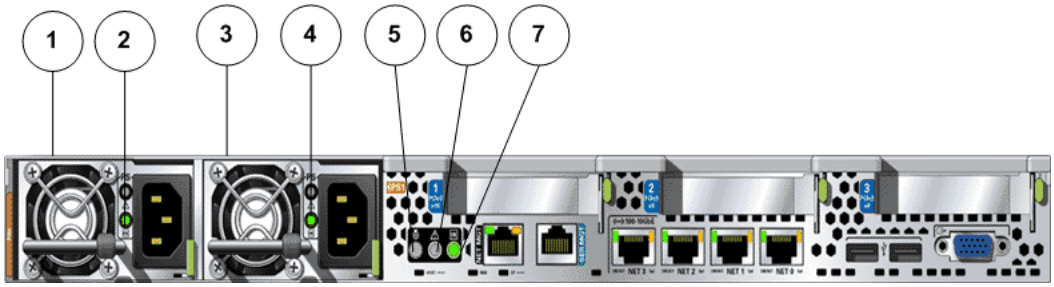


Legend

1 Locator LED / Locator button: white	5 Power button
2 Service Action Required LED or Caution or Fault LED: Amber	6 Fan fault LED: amber
3 OK LED: green	7 Power supply fault LED: amber
4 Service processor LED: green	

The following figure shows the LEDs at the back of the Pilot:

Figure 204: LEDs at the back of the Pilot



Legend

1 Poser supply 0 (PS0)	5 Locator LED: white
2 Power supply LEDs: Service Required LED (amber) and AC OK LED (green)	6 Service Required LED: amber
3 Power supply 1 (PS1)	7 Power or OK LED: green
4 Power supply LEDs: Service Required LED (amber) and AC OK LED (green)	

There are six, system-level status indicators (LEDs), that are on the Pilot front panel and the Pilot back panel. The following table provides status information on these Pilot LEDs:

Table 40: Pilot LED status and description

LED	Icon	LED color	Status
Locator LED button		White	• OFF – Pilot is operating normally • FAST BLINK – To locate a particular system quickly and easily. • Pressing the Locate button toggles the LED fast blink on or off.
Service Action Required LED		Amber	• OFF – Normal operation • STEADY ON – Fault present on the Pilot. This LED lights whenever a fault indicator lights for a Pilot replaceable component. **Note:** When this indicator lights up, there is a system console message that includes a recommended service action.

Table 40: Pilot LED status and description (continued)

LED	Icon	LED color	Status

Power or OK LED		Green	Indicates the operational state of the chassis. This indicator can be in the following states:
			• OFF – AC power is not present.
			• STEADY BLINK – Standby power is on, but the chassis power is off.
			• SLOW BLINK – Startup sequence has been initiated on the host. This pattern begins soon after you power on the Pilot. This status indicates either: (1) POST code checkpoint tests are running on the Pilot host system, or (2) the host is transitioning from the powered-on state to the standby state on shutdown.
			• STEADY ON – The Pilot is powered on, and all host POST code checkpoint tests are complete. The Pilot is in one of the following states:
			  • 1) The Pilot host is booting the operating system (OS).
			  • 2) The Pilot host is running the OS.

Service Processor LED		Green	• OFF – Service processor (SP) is not running. • SLOW BLINK – SP is booting. • STEADY ON – SP is fully operational.

Table 40: Pilot LED status and description (continued)

LED	Icon	LED color	Status
Top Fan, Processor, Memory Failure LED	TOP	Amber	Indicates that one or more of the internal fan modules, processors, or memory DIMMs have failed. • OFF – Indicates steady state; no service is required. • STEADY ON – Indicates service required; service the fan modules, processors, or memory DIMMs.
Rear Power Supply Failure LED	REAR	Amber	Indicates that one of the Pilot power supplies has failed. • OFF – Indicates steady state; no service is required. • STEADY ON – Indicates service required; service the power supply.
Over Temperature Warning LED		Amber	• OFF – Normal operation; no service is required. • STEADY ON – The system is experiencing an over-temperature warning condition. **Note:** This is a warning indication, not a fatal over temperature. Might result in the system overheating and shutting down unexpectedly.

Related Links

Oracle FS System LEDs

Pilot Drive LED Indicators

There are three LEDs on each Pilot drive. There is only one drive in each Pilot.

Table 41: Pilot drive LED status and description

LED	Icon	LED color	Status
OK to Remove		Blue	The storage drive can be removed safely during a hot-swap operation.
Service Required		Amber	• OFF – Normal operation. • STEADY ON – The system has detected a fault with the storage drive.
OK/Activity		Green	• OFF – Power is off or the system does not recognize the installed drive. • STEADY ON – The drive is engaged and is receiving power. • STEADY BLINK – There is disk activity. Indicator blinks on and off to indicate activity

Related Links

Oracle FS System LEDs

Pilot Fan LED Indicators

Each Pilot fan module has one bicolored LED. These LEDs are on the Pilot side wall next to the fan modules and are visible when the top cover fan door is open.

Table 42: Pilot fan LED status and description

LED	Icon	LED color	Status
Fan Status LED	NONE	Bicolored: Amber/ Green	• Amber – There is a fan fault. • Green – Fan is properly installed and operating correctly. No fan errors detected.

Related Links

Oracle FS System LEDs

Pilot Port LED Indicators

The Pilot has LED indicators for Network Management ports and the Ethernet ports.

Network Management Port Status LEDs

The Pilot has one 10/100BASE-T Ethernet management domain interface, labeled NET MGT. There are two LEDs on this port. These indicators are visible from the back of the Pilot.

Table 43: Network management port LED status and description

LED	Location	LED color	Status
Link speed	Top left	Amber or Green	• Amber on - 10BASE-T link • Green on - 100BASE-T link • Off - No link or link down • Flashing - No function
Activity	Top right	Green	• On - No function • Off - No activity • Flashing - Packet activity

Ethernet Port Status LEDs

The Pilot has four Ethernet ports (NET 3, NET 2, NET 1, NET 0). There are two LEDs on each port. These LEDs are visible from the back of the Pilot.

Table 44: Ethernet port LED status and description

LED	Location	LED color	Status
Link speed	Top left	Green	• On - No function. • Off - No activity • Flashing - Packet activity
Activity	Top right	Amber or Green	• Amber on - 100BASE-T link • Green on - 1000/10GBBASE-T link • Off - No link or link down • Flashing - No function

Related Links

Oracle FS System LEDs

Pilot Motherboard LED Indicators

The Pilot motherboard and modules that are installed on the motherboard contain several LEDs.

Table 45: Motherboard LED status and description

LED	Description
DDR3 DIMM Fault LED	Each of the 16 DDR3 DIMM slots on the motherboard has an amber fault LED associated with it. If a DIMM is faulty, pressing the Fault Remind button on the motherboard signals the service processor to light the fault LEDs associated with the faulted DIMMs.
Processor Fault LED	The motherboard includes a fault status indicator (LED) next to each of the two processor (CPU) sockets. These LEDs indicate when a processor is faulty. For example, if on reboot the BIOS detects that there are uncorrectable processor errors recorded in the machine check architecture (MCA) registers apparently left over from the previous boot, then the BIOS records and diagnoses these errors. If it is determined that a processor is faulty, pressing the Fault Remind button on the motherboard signals the service processor to light the fault LED associated with the faulted processor.
Fault Remind Power LED	This LED is located next to the Fault Remind button and is powered from the super capacitor that powers the fault LEDs on the motherboard. This LED lights to indicate that the fault remind circuitry is working properly in cases where no components have failed and, as a result, none of the component fault LEDs illuminate.
Standby Power Good LED	The service instructions for all internal components require that all AC power is removed from the power supplies before the top cover of the Pilot is removed. This green LED is labeled STBY PWRGD and is located on the back of the Pilot near PCIe slot 2. This LED lights to inform a service technician that the motherboard is receiving standby power from at least one of the power supplies. This LED is provided to help prevent service actions on the Pilot's internal components while the AC power cords are installed and power is being supplied to the Pilot.

Related Links

Oracle FS System LEDs

Pilot Power Supply LED Indicators

There are two LEDs on each power supply. These LEDs are visible from the back of the Pilot.

Table 46: Pilot Drive LED status and description

LED	Icon	LED color	Status
AC OK/DC OK		Green	• OFF – No AC power is present. • SLOW BLINK – Normal operation. Input power is within specification. DC output voltage is not enabled. • STEADY ON – Normal operation. Input AC power and DC output voltage are within specification.
Service Required		Amber	• OFF – Normal operation; no service required. • STEADY ON – The power supply (PS) has detected a PS fan failure, PS over-temperature, PS over current, or PS over or under voltage.

Related Links

Oracle FS System LEDs

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