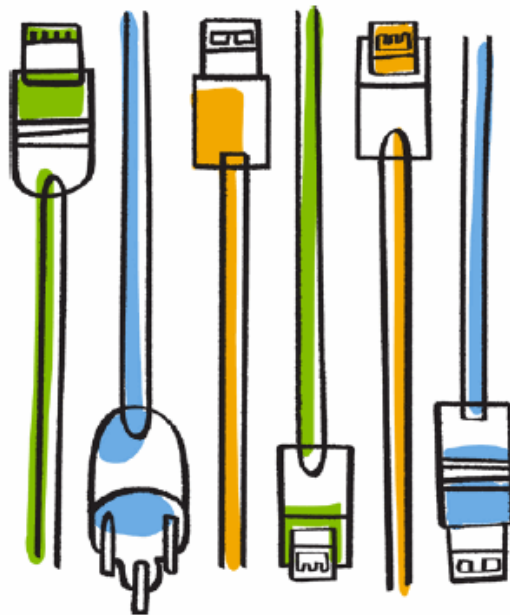




## NetApp® AltaVault Cloud Integrated Storage 4.1

### Installation and Service Guide for Physical Appliances



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## CHAPTER 1    NetApp AltaVault appliance setup preparation

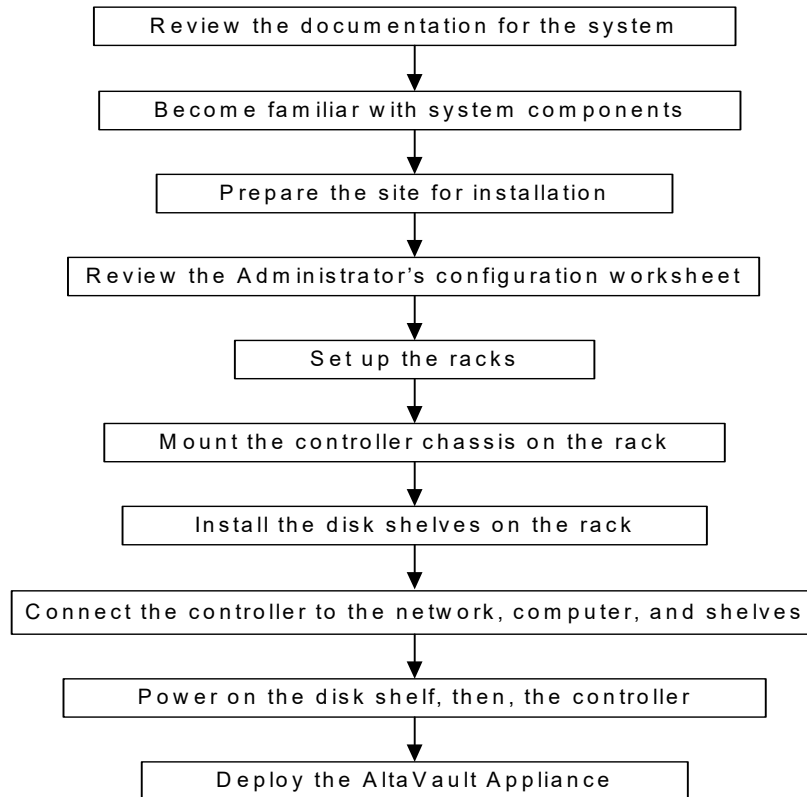
This section provides a list of prerequisites for successfully installing the NetApp AltaVault appliance. It includes the following sections:

- [“Workflow diagram” on page 8](#)
- [“Site clearance requirements” on page 8](#)
- [“Environmental site system requirements” on page 9](#)
- [“Controller electrical requirements” on page 9](#)
- [“Configuration worksheet” on page 9](#)
- [“Obtaining documentation and release notes” on page 10](#)

---

## Workflow diagram

Use the workflow diagram below as a guide to setting up your system.



---

## Site clearance requirements

When planning the site for installing an AltaVault system, you must allow sufficient clearance around the chassis. The same clearances are required for two-post rack and four-post rack installations.

The following table summarizes the clearance requirements for proper airflow for system cooling and regular hardware maintenance of a AltaVault system:

Clearance requirements	Location	Value
Airflow and cooling	System front	6 inches (15.2 cm)
	System rear	12 inches (30.5 cm)
Maintenance	System front	30 inches (76.2 cm)
	System rear	36 inches (91.4 cm)

---



## Environmental site system requirements

The following table summarizes the environmental requirements for the normal operation of the AltaVault system:

Environmental tolerances	Normal operating range
Operating temperature range	50 degrees F (10 degrees C) to 104degrees F (40degrees C)
Altitude	0 to 10,000 feet (0 to 3,048 m)
Relative humidity	20% to 80%, non-condensing

## Controller electrical requirements

The following table summarizes the electrical requirements for an AltaVault controller module in a single controller per chassis configuration. It shows data for a single-controller configuration with one functioning power supply (worst-case scenario) and the typical electrical requirements with two functioning power supplies:

Specifications	Number of power supply units (PSU)	100 to 120 VAC	200 to 240 VAC
Input current (Amps)	One PSU	4.55 A	2.49 A
	Two PSU	3.86 A	2.33 A
Input Power (Watts)	One PSU	610.06 W	577.29 W
	Two PSU	488.32	481.13 W
Thermal output (British Thermal Unit per hour)	One PSU	2082 BTU/Hr	1970 BTU/Hr
	Two PSU	1666 BTU/Hr	1642 BTU/Hr

## Configuration worksheet

Use the configuration worksheet to note any information that you require for the AltaVault deployment, including:

- [“Appliance information” on page 39](#)
- [“Cloud provider credentials and storage configuration” on page 39](#)
- [“Network connectivity” on page 40](#)
- [“Advance features” on page 41](#)

---

## Obtaining documentation and release notes

To obtain the most current versions of all NetApp documentation, including Release Notes, perform a search from the NetApp Support site at <https://mysupport.netapp.com>.

The AltaVault documentation set includes the following:

- *NetApp AltaVault Cloud Integrated Storage Installation and Service Guide for Physical Appliances*
- [\*SAS Disk Shelves Installation and Service Guide for DS4243, DS2246, DS4486, and DS4246\*](#)
- *NetApp AltaVault Cloud Integrated Storage Installation and Service Guide for Virtual Appliances*
- *NetApp AltaVault Cloud Integrated Storage Installation and Service Guide for Cloud Appliances*
- *NetApp AltaVault Cloud Integrated Storage Deployment Guide*
- *NetApp AltaVault Cloud Integrated Storage User's Guide*
- *NetApp AltaVault Cloud Integrated Storage Command-Line Interface Reference Guide*

## CHAPTER 2 Installing the controller chassis and shelves

This section provides information on installing an AltaVault Controller chassis and disk shelves in racks. It includes the following sections:

- [“Installations of controller chassis in two-post racks” on page 11](#)
- [“Installations of controller chassis in four-post racks” on page 14](#)
- [“Installing disk shelves and disk drives” on page 18](#)

---

### Installations of controller chassis in two-post racks

Install the AltaVault controller chassis in either a flush-mount or mid-mount position in a two-post rack. Use the two-post telco tray kit for both flush-mount and mid-mount installations. For mid-mount installations, use the mid-mount telco kit.

The controllers require 6U of rack space in addition to 4U for each shelf.

If you are installing multiple AltaVault systems and disk shelves, install them from the bottom to the top of the rack for the best stability. For consistency with AltaVault system stacking and for stability, position the controller above the storage stack as the storage stack is heavier than the controller.

---

**Caution:** If you are installing the controller chassis without using the mechanical lift, at least three people must be available to lift the controller chassis.

---

### Important considerations for successful installations

If you are installing the controller chassis in an equipment rack or NetApp cabinet, use a 4-post system. Do not use a Telco mounting kit in this cabinet. The cabinet has custom equipment mounting rails for this application.

Verify that your site meets the electrical and power requirements of the AltaVault controller using the steps described in the procedure, [“Controller electrical requirements” on page 9](#).

Verify that the rack is in its permanent position and the placement allows for adequate clearance for airflow and hardware maintenance using the steps described in the procedure, [“Site clearance requirements” on page 8](#).

Ensure you have the following parts and tools available to mount the controller chassis in a two-post rack:

- Two-post telco tray kit:
  - A two-piece telco tray with left and right halves that attach to the back of the equipment rack to support the back of the controller.
- Mid-mount telco kit
  - Two mid-mount mounting brackets
  - Six M5 screws and star washers that attach the mid-mounting brackets to the sides of the controller
- Bagged screws in the following sizes for mounting the two-piece telco tray and mid-mount brackets to the rack
  - 16 M5-0.8 x 20 Pilot screws
  - 16 M6-1 x 20 Pilot screws
  - 16 10-32 x.75 Pilot screws
  - 16 12-24 x.75 Pilot screws

---

**Note:** You do not need to use all the screws listed. Use the appropriate size screws that match the threading of the holes in your rack.

---

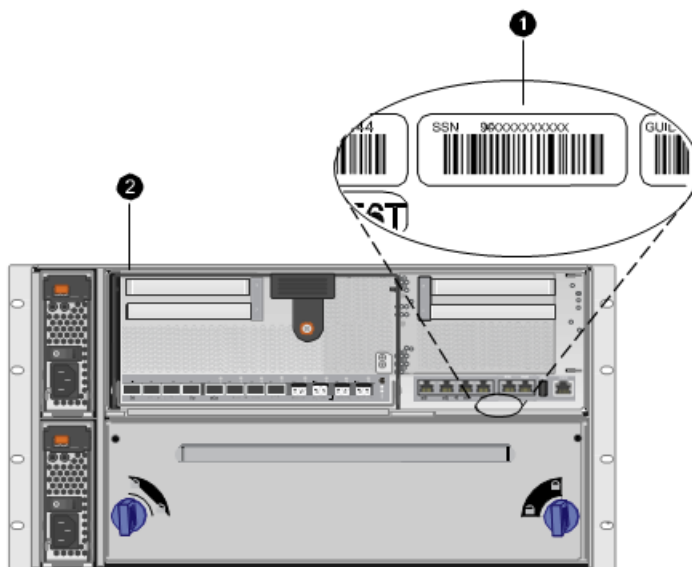
## Installing an AltaVault controller chassis in a two-post rack

Use the instructions that follow to install your controller chassis in a two-post rack.

### To install the AltaVault controller chassis in a two-post rack

1. Record the System Serial Number (SSN) of the controller you are installing.

The SSN label is on the metal lip just below port e0l and the maintenance port (wrench icon) on the controller as shown in the illustration below. This number is used to uniquely identify the controller in the AltaVault Setup Wizard during initial system setup.

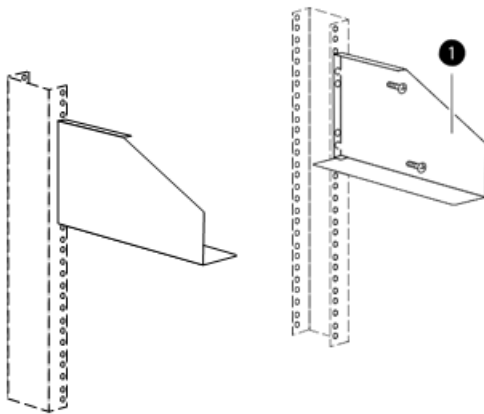


2. Identify components as described in this table:

Component	Description
1	SSN label
2	AltaVault controller module

3. Determine which holes in the two-post rack to install the telco tray. Ensure that you are using the same holes on both posts of the rack.
4. Align the holes on the left-post of the two-post rack with the holes on the left half of the telco tray. Secure the telco tray to the post with two mounting screws, of the appropriate size and type, that match the threading of your rack.

The following illustration displays the rear view of a post hole alignment of a two-post rack with the telco trays.



5. Identify components as described in this table:

Component	Description
1	Telco tray

6. For the right half of the telco tray installation, repeat Step 3 and Step 4.
7. Choose either a manual or lift installation:
- If you are installing the controller chassis using a lift, do the following:
    - For installing the controller chassis in a mid-mount position:  
Align the screw holes on one side of the controller chassis with the screw holes on the mid-mounting bracket. Secure the bracket to the chassis with M5 screws and star washers.
    - For other mount positions:  
Lift the controller chassis using the chassis handles and slide the chassis onto the telco tray. Align the screw holes on one side of the controller chassis with the screw holes on the mid-mounting bracket. Secure the bracket to the chassis with M5 screws and star washers.

---

**Note:** Do not over-tighten the screws when securing the equipment to the rack. Over-tightening screws can cause the mounting tabs on the chassis to bend.

---

- If you are installing the controller chassis manually, do the following:
  - Ensure that at least three people are available to lift the chassis if you are installing the controller chassis without using the mechanical lift.
  - Lift the controller chassis using the chassis handles and slide it onto the telco tray.
  - Secure the controller chassis to the rack using screws of the appropriate size and type that match the threading of your rack.

---

**Note:** Do not over-tighten the screws when securing the equipment to the rack. Over-tightening the screws may cause the mounting tabs on the chassis to bend.

---

8. If you are adding multiple AltaVault systems and disk shelves, repeat this procedure, as required, for each controller chassis you are installing.

---

**Note:** If multiple AltaVaults are being installed, it is recommended to group each controller with its corresponding shelves to maintain consistent cable lengths.

---

---

## Installations of controller chassis in four-post racks

Use the four-post rail kit that ships with the controller to mount the controller chassis in a four-post rack. NetApp recommends that you use the NetApp equipment rails in this application to be consistent with how AltaVault systems are treated.

If you are installing multiple AltaVault systems and disk shelves, you should install them from the bottom to the top of the rack for the best stability. For consistency with AltaVault system stacking and stability, position the controller above the storage stack as the storage stack is heavier than the controller.

---

**Caution:** If you are installing the controller chassis without using the mechanical lift, at least three people must be available to lift the controller.

---

## Important considerations for successful installations

Use the NetApp equipment rails that come with the controller in this application to be consistent with how AltaVault systems are treated.

If you are installing the controller chassis in an equipment rack or NetApp cabinet, use the NetApp equipment rails in this application to be consistent with how AltaVault systems are treated.

Verify that your site meets the electrical and power requirements of the controller using the steps described in the procedure, [“Controller electrical requirements” on page 9](#).

- Verify the rack is in its permanent position and the placement allows for adequate clearance for airflow and hardware maintenance using the steps described in the procedure, [“Site clearance requirements” on page 8](#).

---

**Note:** If you are installing the equipment in a non-NetApp system cabinet, you must calculate the thermal output of your equipment and compare the results against the target system cabinet’s thermal rating. You may need to remove the system cabinet doors to improve airflow through the system cabinet. See your system cabinet manufacturer’s guide for thermal rating information.

---

NetApp recommends using the NetApp kit for non-NetApp four-post racks that includes the following:

- One set of left-side rails and one set of right-side rails for four-post mounting
- Bagged screws in the following sizes:
  - 16 M5-0.8 x 20 Pilot screws
  - 16 M6-1 x 20 Pilot screws
  - 16 10-32 x.75 Pilot screws
  - 16 12-24 x.75 Pilot screws
- Bagged clip nuts in the following sizes:
  - 16 10-32 clip nuts
  - 16 12-24 clip nuts
  - 16 M5 clip nuts
  - 16 M6 clip nuts
- Clip nut tool

---

**Note:** The vast majority of four-post racks use square hole EIA posts, in which case, you need only to match the screw and clip nut threading. For prethreaded posts, the appropriate screw threading must be verified. Clip nuts are not used on these racks.

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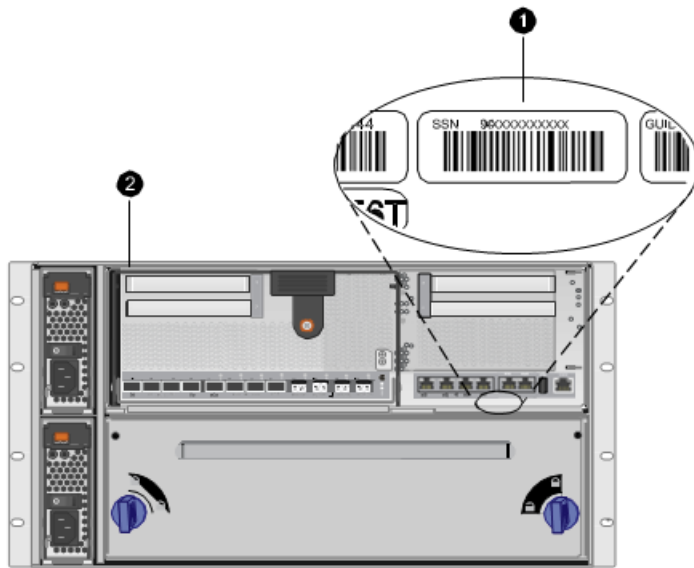
## Installing an AltaVault controller chassis in a four-post rack

Use the instructions that follow to install your controller chassis in a four-post rack.

### To install AltaVault controller chassis in a four-post rack

1. Record the System Serial Number (SSN) of the controller you are installing.

The SSN label is on the metal lip just below port e0l and the maintenance port (wrench icon) on the controller as shown in the illustration below. This number is used to uniquely identify the controller in the AltaVault Setup Wizard during initial system setup.



2. Identify components as described in this table.:

Component	Description
1	SSN label
2	AltaVault controller module

3. Determine the appropriate screw and clip nut size for your four-post rack.
4. Install the clip nuts on the left-side and right-side rails using the clip nut tool.

---

**Note:** You must install a minimum of four clip nuts per rail, at least two on the front and two on the rear side of each rail, except for NetApp cabinets, where a single screw is used per rail.

---

5. Locate the position the rail will occupy when installed, on the right rear of the four-post rack.

---

**Note:** When possible, install the equipment from the bottom of the rack up, so that you can use the equipment underneath as a guide for installing the next set of rails. Place controllers in the rack no higher than eye level so that the LED lights can be easily seen.

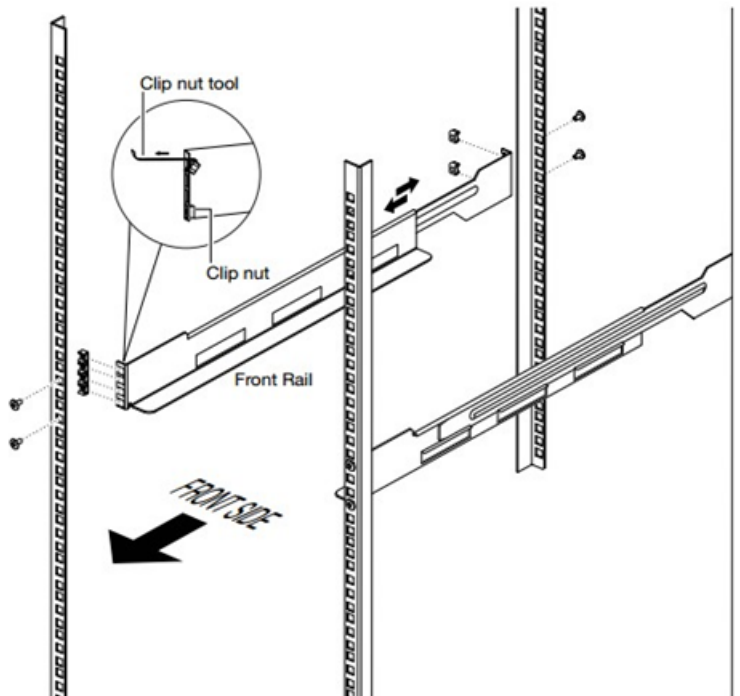
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6. Hold one of the rails against the rear post and center the square holes of the rail with the center of the mounting holes (square or round) of the rack post. This ensures that when you install the equipment, the oblong holes on the equipment mounting flanges or tabs align with the clip nuts on the rack post.
7. Secure the rail to the rear post, using the appropriate size and type mounting screws matching the threading of your equipment rack.



8. Slide the front of the rail to the front post of the rack and center the square holes of the rail with the center of the mounting holes (square or round) of the rack post.
9. Secure the rail to the front post, using the appropriate size and type mounting screws matching the threading of your equipment rack.
10. Repeat Step 4 through Step 8 for the left rail.

The following image illustrates the process of installing the rails in a four-post rack.



11. If you are installing the controller chassis using a lift, go to Step 12. If you are installing the controller chassis manually, at least three people must be available to lift the controller chassis.
12. Lift the controller chassis using the chassis handles and slide it onto the rail assemblies.
13. Use screws of the appropriate size and type that match the threading of your rack, to secure the controller chassis to the rack.
14. If you are adding multiple AltaVault systems and disk shelves, repeat this procedure for each controller chassis you are installing. If you are installing multiple AltaVaults, NetApp recommends grouping each controller with its corresponding shelves to maintain consistent cable lengths.

---

## Installing disk shelves and disk drives

For instructions on installing the AVA10S shelves, and for general safety guidelines, see the guide, [SAS Disk Shelves Installation and Service Guide](#) for DS4243, DS2246, DS4486, and DS4246. The AltaVault AVA10S shelf is identical to the DS4246 disk shelf.

You can add a new AVA10S shelf to a configured and running AVA400 or AVA800 appliance. The maximum number of supported shelves is three for the AVA400 and four for the AVA800 models.

### Installing additional preconfigured disk drives on a shelf

The AltaVault appliance can accept additional packs of disks into added AVA10S shelves of the appliance. The following steps apply when installing a newly preconfigured 12-pack of disk drives into the shelf. If you are installing two sets of 12-pack disk drives, install the entire 12-pack disk drives in either in the top half of the rack, which are slots 0 - 11, or the bottom half of the rack, which are slots 12-23. Do not mix up the disks of a disk pack between the top and bottom halves of the rack as they are preconfigured as a group.

#### To install a new set of preconfigured 12-pack disk drives into a shelf

1. Login to the AltaVault Command Line Interface (CLI).
2. Issue the following commands:

```
enable
config t
show raidgroups
```
3. From the output of the above command, look for the newly added RAID group which should be indicated with a message “raidgroup import <vd\_id>”, where <vd\_id> is the identifier of the new RAID group.
4. Issue the command to add the new disk pack to the AltaVault appliance: `raidgroup import <vd_id>`
5. Reissue the command below to verify the RAID group was imported successfully: `show raidgroups`

For information on replacing a faulty disk drive, see [“Replacing a faulty hard disk drive on an AltaVault AVA400 or AVA800 appliance”](#) on page 86.

## CHAPTER 3 Connecting the system

This section provides information about connecting the cabling for the controller and the shelf and starting the system. It includes the following sections:

- [“Connecting the controller and the shelves” on page 19](#)
- [“Cabling the controller to the AVA10S shelf” on page 27](#)
- [“Connecting the controller to the networks” on page 28](#)
- [“Connecting the controller to a computer” on page 28](#)
- [“Connecting the power and starting the system” on page 29](#)

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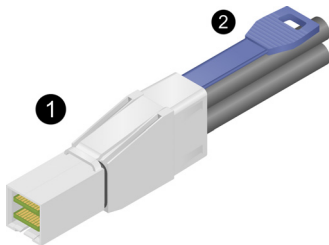
### Connecting the controller and the shelves

You can connect the AltaVault AVA400 to up to three shelves and the AVA800 model can connect to up to four shelves. The AltaVault controller and AVA10S disk shelves connect using a cable that contains a Mini-SAS cable connector on one end (below) and a QSFP cable connector on the other end. Each connector connects a Mini-SAS cable connector to a Mini-SAS HD port located on a RAID controllers on the back of the AltaVault appliance. The QSFP cable connector at the other end of the cable connects to one of the QSFP ports on the back of an AVA10S shelf.

---

**Note:** AltaVault systems have a unique cabling configuration; you must cable the system in the supported configuration for optimal system performance.

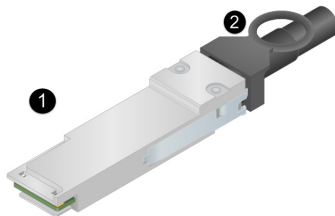
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The following table displays AltaVault components and descriptions:

Component	Description
1	Mini-SAS cable connector
2	Latch release

The following image is a QSFP cable connector and connects to a QSFP port on the rear of the disk shelf.



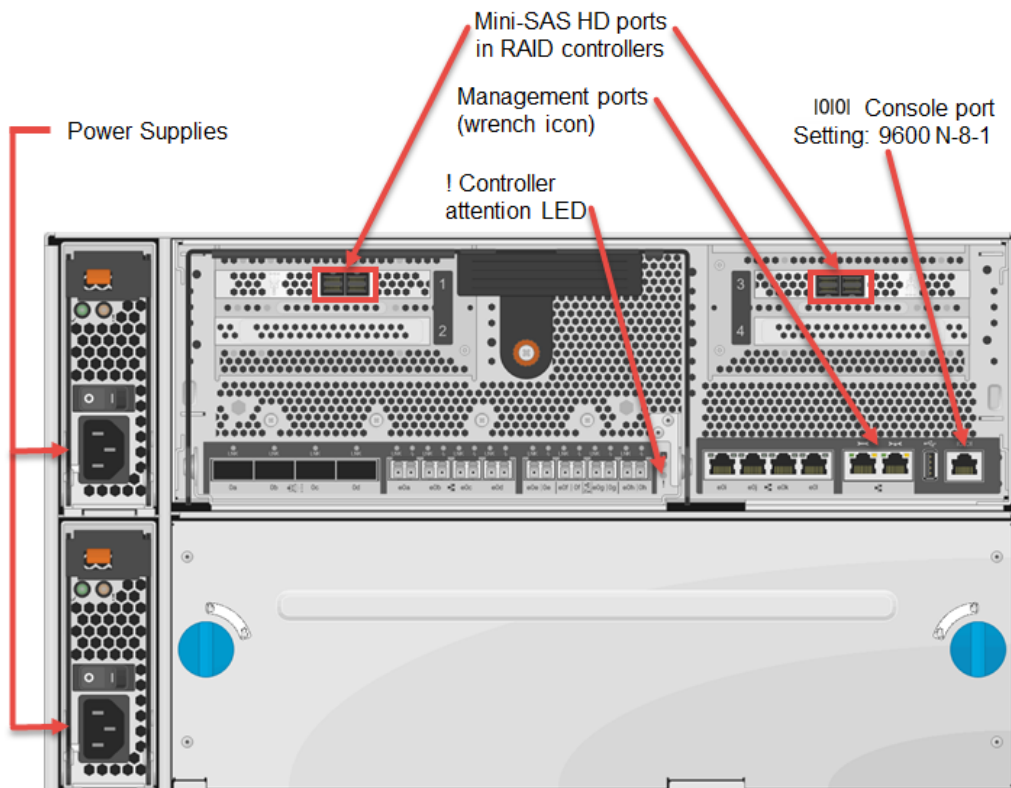
The following table displays AltaVault components and descriptions:

Component	Description
1	QSFP cable connector
2	Latch release

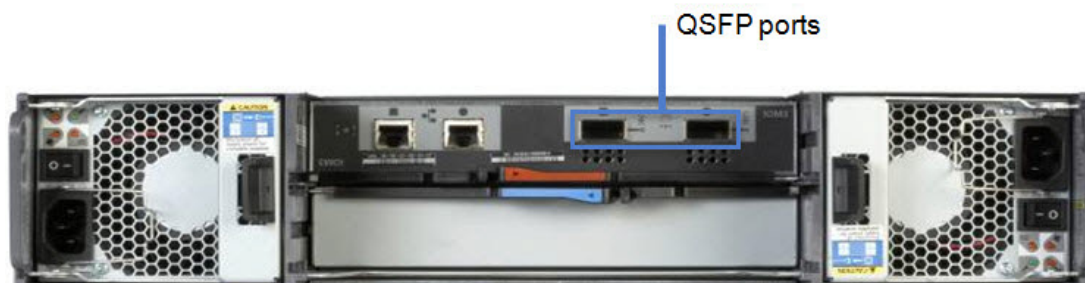
Altavault systems support controller to shelf cables (with mini SAS/QSFP connectors) in 1, 2, and 3 meter lengths. Shelf to shelf cables (QSFP/QSFP connectors) are supported in 0.5, 1, 2, 3, and 5 meter lengths.

The image below displays the rear view of an AltaVault controller. The RAID controllers are located in slots 1 and 3 and contain the mini-SAS HD ports used to connect the mini-SAS connector end of a cable.

### AltaVault controller rear view



The image below displays the QSFP ports on the rear of the disk shelf used to connect the QSFP connector end of a cable.



## Supported cable configurations

AltaVault systems support one AltaVault controller and a maximum of three disk shelf configurations. The controller and disk shelf are cabled together using the Mini-SAS ports on the controller and the QSFP ports on a shelf. To get optimal system performance, choose one of three recommended cabling configurations.

**Note:** Cable length varies with the supported cable configuration that you select.

## Networking options for ports

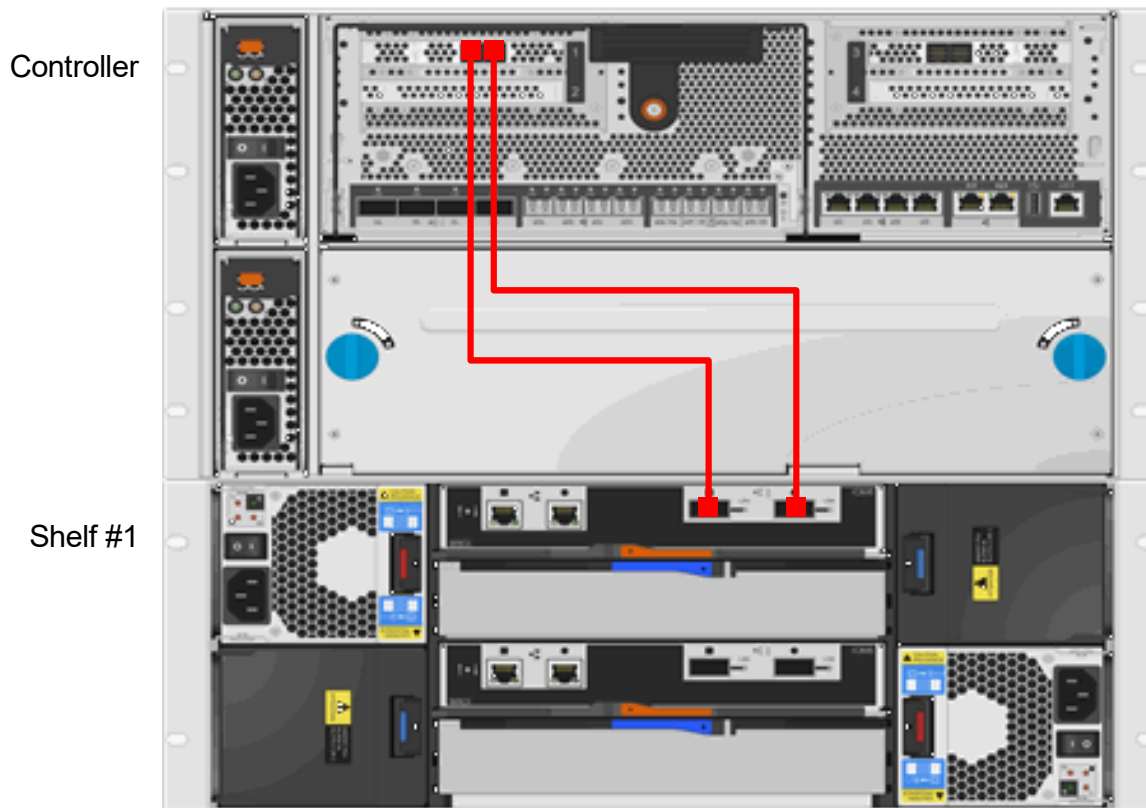
The following table lists networking options for ports:

Port Label	Function	Type	Description	NetApp Marketing Part Number	Notes
e0a,e0b,e0c,e0d	10GbE	Copper (Passive)	Cable, Cisco, Twinax 10 GbE Copper SFP+ 1m	X-SFP-H10GB-CU1M-R6	
			Cable, Cisco, Twinax 10 GbE Copper SFP+ 3m	X-SFP-H10GB-CU3M-R6	
			Cable, Cisco, Twinax 10 GbE Copper SFP+ 5m	X-SFP-H10GB-CU5M-R6	
		Optical	Cable, OM3, LC to LC cable, 2m	X6553-R6	
			Cable, OM3, LC to LC cable, 5m	X6536-R6	
			Cable, OM3, LC to LC cable, 15m	X6554-R6	
			Cable, OM3, LC to LC cable, 30m	X6537-R6	
Square and circle ports on IOMs	Shelf SAS	Copper (Passive)	SAS, QSFP, passive, 0.5m	X6557-R6	Only used for shelf to shelf connections
Ports on MegaRAID HBAs (PCIe slots 1 and 3)	12Gb SAS	Copper (Passive)	Cable, storage, mini-SAS HD, QSFP, 12G, 1m	X66020A-R6	
			Cable, storage, mini-SAS HD, QSFP, 12G, 2m	X66021A-R6	
			Cable, Storage, MiniSAS HD, QSFP, 12G, 5m	X66022A-R6	

## Supported cable configuration for an AltaVault controller and one shelf

The following diagram displays the supported cable configuration for one AltaVault controller (AVA400 or AVA800) and one AVA10S shelf.

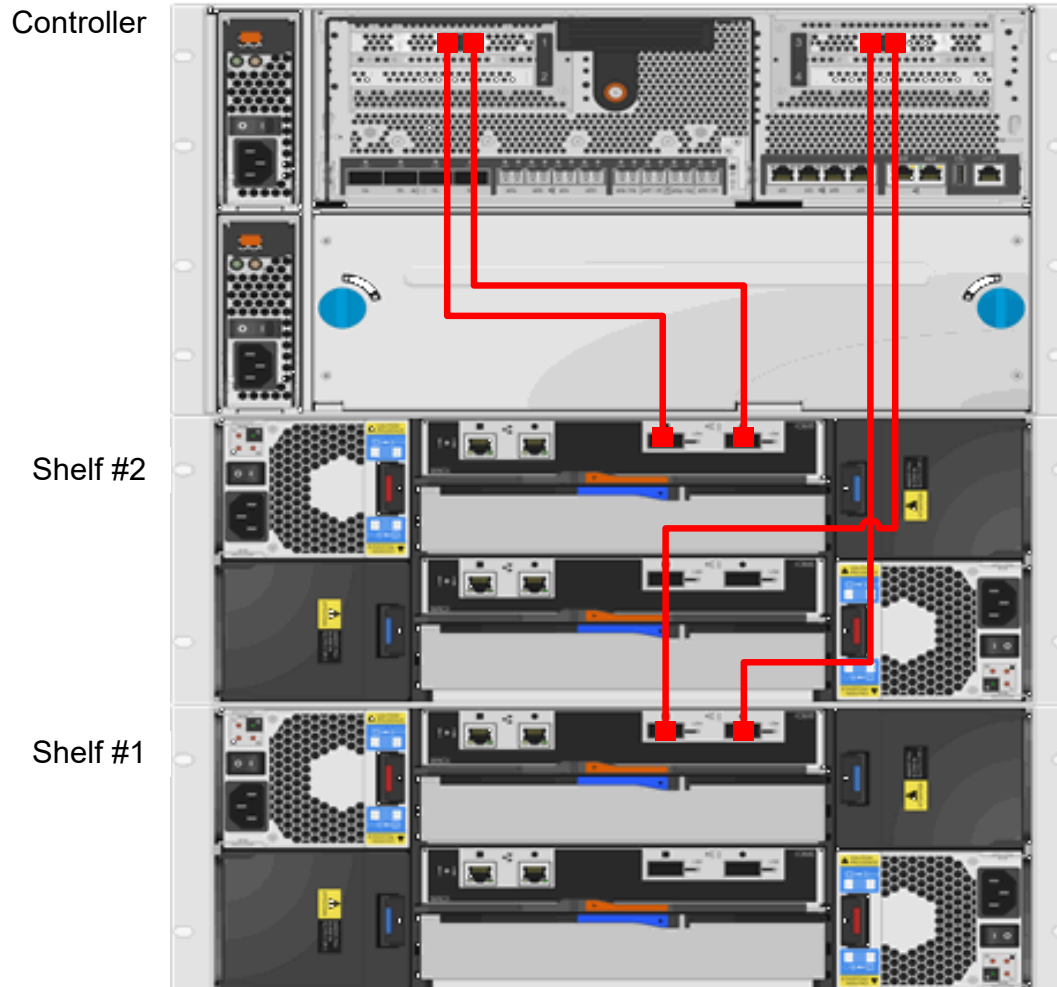
Cabling diagram for an AltaVault controller and one shelf



## Supported cable configuration for an AltaVault controller and two shelves

The following diagram displays the supported cable configuration for one AltaVault controller (AVA400 or AVA800) and two AVA10S shelves.

Cabling diagram for an AltaVault controller and two shelves

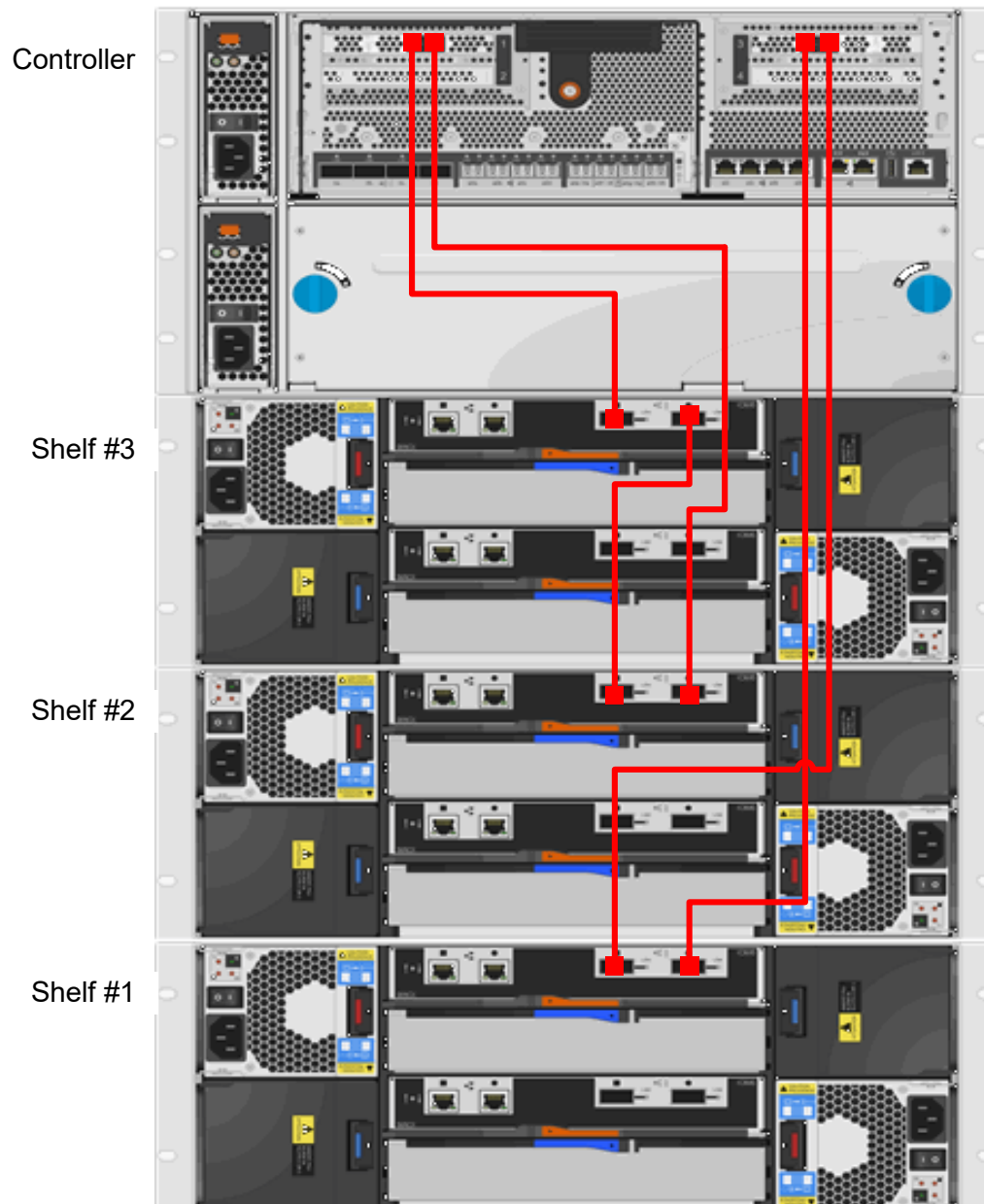




## Supported cable configuration for an AltaVault controller and three shelves

The following diagram displays the supported cable configuration for one AltaVault controller (AVA400 or AVA800) and three AVA10S shelves.

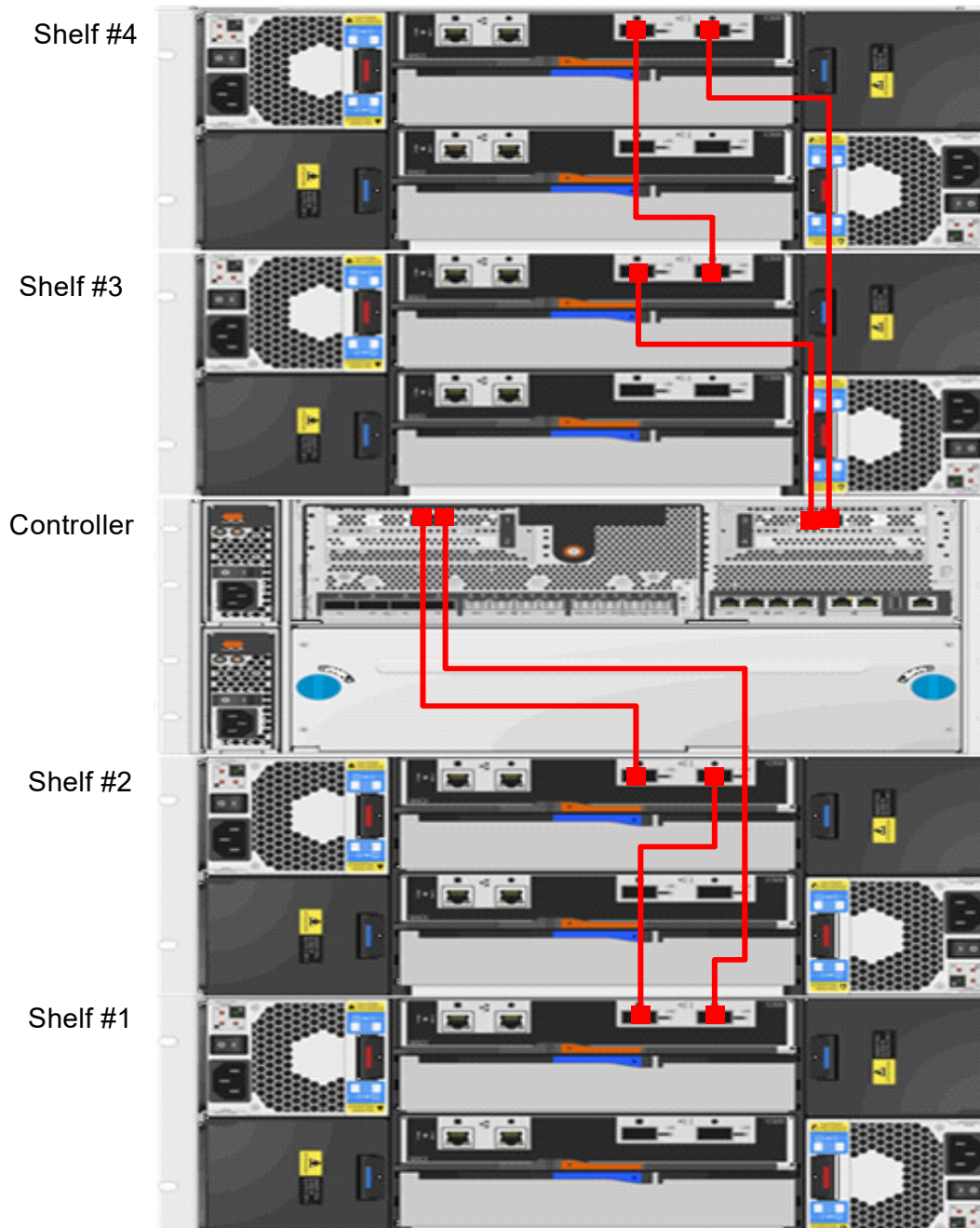
Cabling diagram for an AltaVault controller and three shelves



## Supported cable configuration for an AltaVault controller and four shelves

The following diagram displays the supported cable configuration for one AltaVault controller (AVA800) and four AVA10S shelves.

Cabling diagram for the AVA800 controller and four shelves



---

## Cabling the controller to the AVA10S shelf

The following system configuration provides:

- Specific paths to each QSFP port IOM on the rear of the disk shelf
- Maximum throughput to the shelf

Cabling the Mini-SAS HD ports on an AltaVault system involves cabling the shelf-to-controller connections and verifying that the Mini-SAS connections are correct.

---

**Note:** You must cable your AltaVault system using the recommended cabling configuration for optimal system performance. Incorrect cabling between the controller and the disk shelf ports impacts the system's performance.

---

### Before you begin

- The controller and disk shelf must already be installed in a rack.
- You must have the correct length of Mini-SAS HD cables required to cable the controller and the shelf. A Mini-SAS HD connector is on the controller end and a QSFP connector is on the shelf end.
- Choose a cable configuration for connecting one controller to a maximum of three shelves as described in the section, [“Supported cable configurations” on page 22](#).

### To connect the AltaVault controller to the disk shelf

1. Choose one of the supported cable configuration diagrams to follow for your deployment:
  - [“Supported cable configuration for an AltaVault controller and one shelf” on page 23](#)
  - [“Supported cable configuration for an AltaVault controller and two shelves” on page 24](#)
  - [“Supported cable configuration for an AltaVault controller and three shelves” on page 25](#)
  - [“Supported cable configuration for an AltaVault controller and four shelves” on page 26](#)
2. Locate the Mini-SAS HD port on the rear of the controller, see [Figure](#) .
3. Ensure that the latch release for the Mini-SAS end of the cable is facing up.
4. Insert the Mini-SAS end of the cable into Mini-SAS HD port on the controller based on the supported cable configuration selected in Step 1. You will hear a distinct click when the cable latches securely into the port.
5. Verify the latch is secure in the Mini-SAS HD port on the controller:
  - Tug the release latch to verify that the cable is latched securely.
  - If you do not hear the click sound or if the cable slips out easily, pull the latch release to remove the cable. and reinstall the cable.

---

**Note:** When oriented correctly into a Mini-SAS HD port, the Mini-SAS cable connector clicks into place and the Mini-SAS HD port link LED, LNK, illuminates green. Do not force a connector into a port.

---

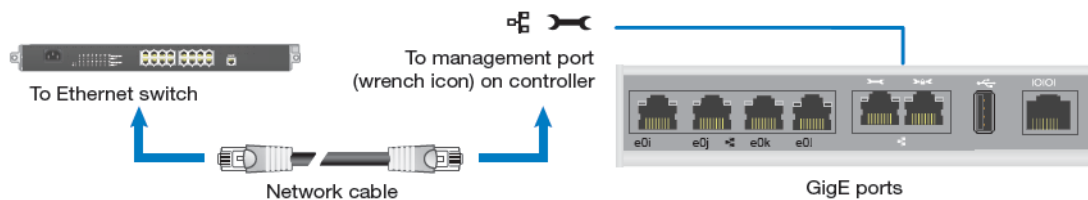
6. Locate the QSFP port on the rear of the disk shelf.

7. Ensure the latch release for the QSFP end of the cable is facing down.
8. Insert the QSFP end of the cable into QSFP port on the rear of the shelf. You will hear a distinct click when the cable latches securely into the port.
9. Verify the latch is secure in the Mini-SAS HD port on the controller:
  - Tug the release latch to verify that the cable is latched securely.
  - If you do not hear the click sound or if the cable slips out easily, pull the latch release to remove the cable, and reinstall the cable.
10. Based on the cabling diagram selected for your deployment, repeat the steps for each cable connection until all of the supported cable connections for the selected configuration are complete.

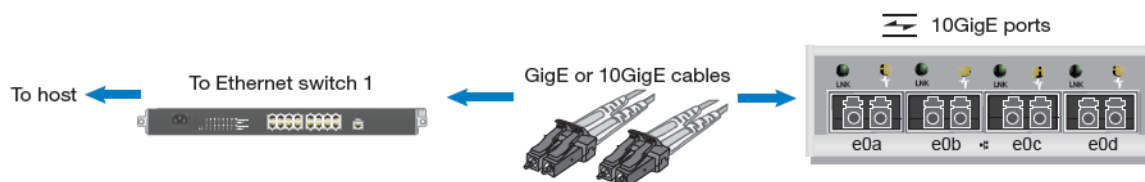
---

## Connecting the controller to the networks

Connect the management port (wrench icon) on your controller to the Ethernet switch in your management network, using a network cable. See your network administrator for help connecting to your switches:



Connect 10GigE ports or GigE ports for data connections:




---

## Connecting the controller to a computer

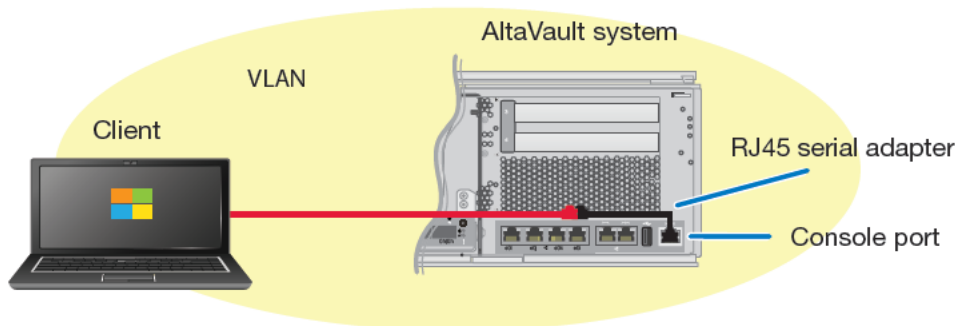
Use the serial console to configure an IP address for the management and serial console interfaces of the AltaVault appliance, using a Windows client. Afterward, further AltaVault configuration can be done using a Web browser and connecting to the management IP address.

### To connect the controller to a computer

1. Connect the network cable to the primary (wrench icon) port.

2. Connect the RJ45 end of the serial adapter to the serial console port on AltaVault appliance. Connect the serial end of the serial adapter to a serial cable, and have the serial cable connect to a system with a serial communications port and serial communications software (for example, PuTTY).

The image belows shows how to connect a Windows or Linux client to the console port.



---

## Connecting the power and starting the system

An AltaVault controller ships with two AC power supplies installed in the chassis and a geographically appropriate power cord. Cable the power supply before powering on the system. Ensure that the power switch for the power supply and the power source is in the off (O) position.

The information contained in this section assumes each chassis is connected directly to the building mains. If you are installing a chassis in a 4-post rack, the power is delivered through power distribution units (PDUs) that use C13-C14 jumper cords, in most cases. The input cord from each PDU connects to the mains.

Each chassis should be connected to separate PDUs or separate branch circuits to maintain power redundancy.

### To connect the power and start the system

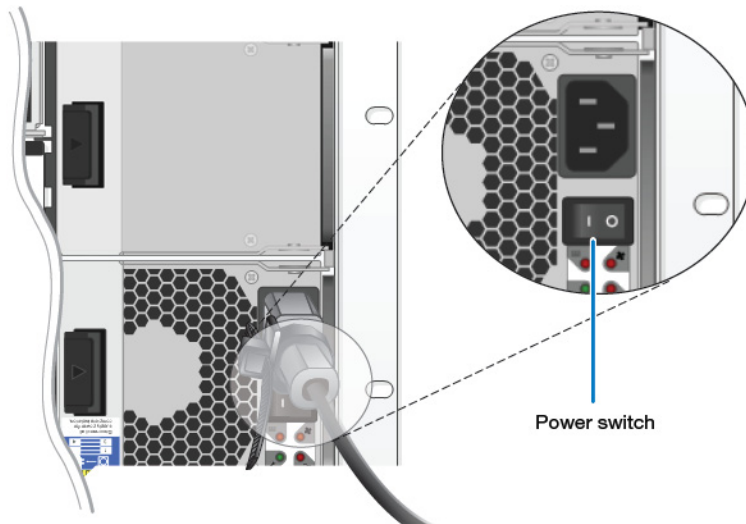
1. For the power supply in the AltaVault controller:
  - Connect one end of the power supply cable to the power cord inlet on the power supply.
  - Secure the power cable to the power supply using the retaining clip.
  - Connect the other end of the power supply cable to the power source.

---

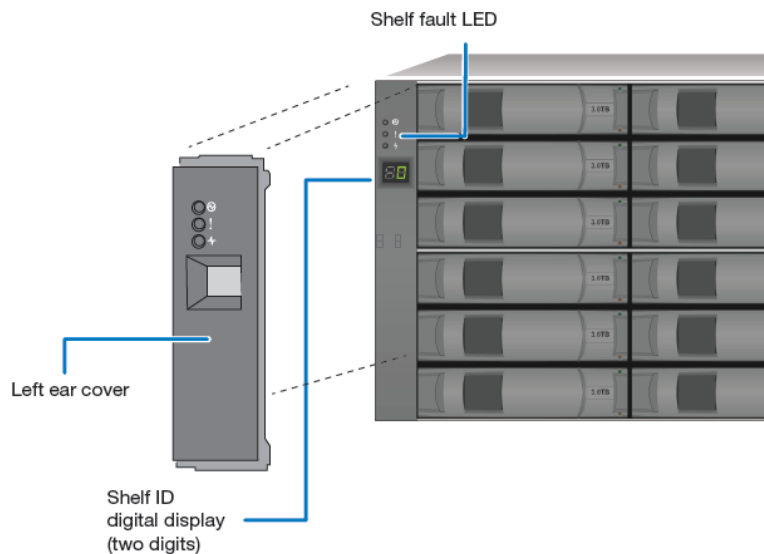
**Important:** You must power on the disk shelf before powering on the controller. Powering on the controller before the disk shelf prevents the AltaVault OS from operating normally. Additionally, you must power off the controller before powering off the shelf.

---

2. To power on the disk shelf for both power supplies, flip the power switches to the on (I) position, as seen below.

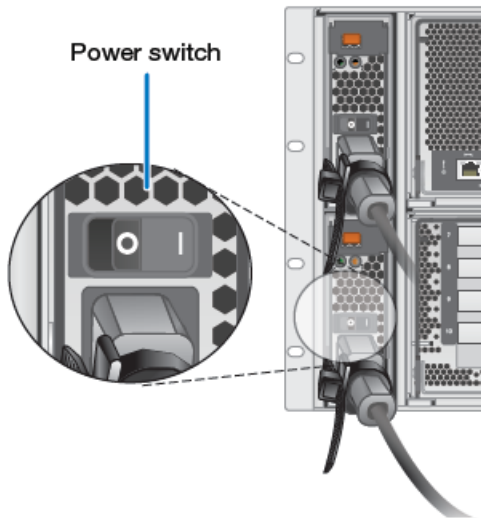


3. If you are initializing a shelf for the first time, ensure that each disk shelf has a unique shelf ID. A valid shelf ID for an AltaVault system could be one of 00, 01, 10, or 11. The default shelf ID is 00.
4. If a change to a shelf ID is required, perform the following steps:
  - a. Using one hand, hold the left ear cover between your thumb and index finger.
  - b. Pull either the top or the bottom of the cover until one end is released, then, pull off the left ear cover, as displayed below.



- c. Press and hold the shelf ID button until the first digit on the digital display blinks.
- d. Press the button until a number between 0 and 9 displays. This number continues to blink.
- e. Repeat steps b and c for the second digit.

- f. Press and hold the button until the second number stops blinking.  
Both numbers on the digital display should blink and the shelf fault LED illuminates within five seconds.  
The fault LED stays lit until you power-cycle the shelf.
  - g. Power-cycle the disk shelf to ensure the new disk shelf ID takes effect.
  - h. Replace the left ear cover.
5. Power on the controller by flipping the power switches to the on (I) position to power on the controller.



6. If the bezel was removed during installation, place it back on the appliance to complete the hardware installation.
7. When the AltaVault virtual appliance starts, the login prompt appears. Log in to the AltaVault appliance by opening a connection using a terminal program to the serial console port.
8. Log in to the AltaVault virtual appliance using the default login (`admin`) and default password (`password`). The initial configuration wizard appears.

```
NetApp AltaVault

NetApp AltaVault
amesiac login: admin
Password:
Last login: Sun Mar 22 10:24:18 on ttyS0

NetApp AltaVault configuration wizard.

Do you want to use the wizard for initial configuration? _
```

You can now configure the system using the CLI configuration wizard.





## CHAPTER 4 Deploying AltaVault

This section provides administrative information for deploying AltaVault. It includes the following sections:

- [“Running the AltaVault appliance CLI configuration wizard” on page 33](#)
- [“Setting the Service Processor password” on page 34](#)
- [“Configuring the Service Processor for remote management” on page 35](#)
- [“Validating remote access via the Service Processor” on page 36](#)
- [“Next steps” on page 37](#)

---

### Running the AltaVault appliance CLI configuration wizard

Use the command line interface (CLI) to configure the AltaVault appliance and access its management console after you install the AltaVault appliance.

Before you begin, ensure that you have serial console access to the AltaVault appliance. For more information, refer to [“Connecting the controller to a computer” on page 28](#).

The configuration wizard automatically starts when you log in to the AltaVault appliance for the first time. When the login prompt displays, log in using the default login (`admin`) and default password (`password`). You can now configure the system using the CLI configuration wizard.

#### To run the AltaVault appliance CLI configuration wizard

1. Complete the configuration wizard steps on the client side and server side.

Wizard prompt	Description	Example
Step 1: Admin password?	NetApp requires that you change the default administrator password ( <code>password</code> ) at this time. The new password must be a minimum of eight characters and cannot be the word <code>password</code> .	Admin password? xxxxyyyy
Step 2: Host name?	Enter the host name for the AltaVault appliance.	Hostname? amnesiac

Wizard prompt	Description	Example
Step 3: Use DHCP on the primary interface?	<p>You are given the option to enable the DHCP to automatically assign an IP address to the primary interface for the AltaVault appliance.</p> <p>For AltaVault virtual and physical appliances, DHCP is not recommended. For AltaVault cloud-based virtual appliances, DHCP is required.</p>	<p>Use DHCP? no</p> <p>If no, continue with Step 4.</p> <p>If yes, skip Steps 4 to 8.</p>
Step 4: Primary IP address?	Enter the IP address for the AltaVault appliance.	Primary IP address? 10.10.10.6
Step 5: Netmask?	Enter the netmask address.	Netmask? 255.255.0.0
Step 6: Default gateway?	Enter the default gateway for the AltaVault appliance.	Default gateway? 10.0.0.1
Step 7: Primary DNS server?	Enter the primary DNS server IP address. You must specify the primary DNS server for cloud provider name resolution. If you do not specify a valid DNS server, the system does not start.	Primary DNS server? 10.0.0.2
Step 8: Domain name?	<p>Enter the domain name for the network where the AltaVault appliance is to reside.</p> <p>If you set a domain name, you can enter host names in the system without the domain name.</p>	Domain name? example.com

The system confirms your settings.

- To change an answer, enter the step number to return to. Otherwise press <enter> to save changes and exit. The AltaVault appliance configuration wizard automatically saves your configuration settings. The CLI prompt appears:

```
amnesiac>
```

If you chose to use DHCP, you can get the IP address of the appliance by running the following commands:

```
amnesiac> enable
amnesiac# configure terminal
amnesiac (config)# show interfaces primary
```

- To log out of the system, enter exit at each of the command-level prompts.

## Setting the Service Processor password

The Service Processor (SP) is a subcomponent of the controller. There is no password on the Service Processor until you set the password. The Service Processor password must be set separately from the AltaVault administrator password.

### To set the SP password

- Log in to the CLI using either the serial connection, or an SSH session using the configured primary management interface set up using the CLI configuration wizard steps. For more information, see [“Running the AltaVault appliance CLI configuration wizard” on page 33](#).
- Enter configuration mode and set the Service Processor password in the controller using the following CLI commands:

```
CLI > enable
CLI # configure terminal
CLI (config) # sp password set
```

3. Use the new password when logging in to the Service Processor.

---

**Note:** After the AltaVault appliance is switched over to FIPS mode, the service processor password cannot be set anymore because of FIPS compliance restrictions. Set the service processor password prior to switching to FIPS mode. If the `sp password set` command is not working, check to see whether the AltaVault appliance is in FIPS mode.

---

## Configuring the Service Processor for remote management

The Service Processor is responsible for monitoring sensors, managing the physical environment of the system, capturing events, logs and forensics, and sending notifications and alerts. It also provides remote management features for administrators.

Access to the SP for remote management is accomplished by connecting through the serial console port or via SSH to the IP address of the Service Processor, after the SP is configured with an IP address and password.

### Before you begin

- Ensure that you have serial console access to the AltaVault appliance. For more information, refer to [“Connecting the controller to a computer” on page 28](#).
- Set the SP password as described in [“Setting the Service Processor password” on page 34](#).
- Provide an IP address for the SP (if not using DHCP) that is on the same subnet as the primary interface. The SSH connection to SP is established via the cabling to the Management Port (wrench port) on the AltaVault, and therefore the IP address assigned to the SP should be in the same subnet as the Management port or be routable to the Management port on the AltaVault.

### To setup the Service processor for remote management

1. Log in to the CLI using the serial console connection.
2. At the CLI prompt, reboot the appliance and interrupt the AUTOBOOT process by pressing CTRL + C. This halts the appliance at the LOADER prompt.

```
(config) # reload
Rebooting...
....
....
Starting AUTOBOOT press Ctrl-C to abort...
****Hit CTRL+C****
Autoboot of PRIMARY image aborted by user.
LOADER-A>
```

3. At the LOADER prompt, enter the command, `sp setup`, to setup the IP address for the Service Processor.

```
LOADER-A> sp setup
```

4. Based on your setup, choose one of the following:
  - To enable DHCP, enter the following:

```

LOADER-A> sp setup
Would you like to configure the SP? [y/n] y
Would you like to enable DHCP on the SP LAN interface? [y/n] y
Do you want to enable IPv6 on the SP? [y/n] n

```

```

Output sample:
Service Processor New Network Configuration
Ethernet Link: up, full duplex, auto-neg complete
Mgmt MAC Address: 00:A0:98:54:F9:F6
IPv4 Settings
Using DHCP: YES
IP Address: 172.16.33.154
Netmask: 255.255.252.0
Gateway: 172.16.33.1
IPv6: Disabledr

```

---

**Note:** Make a note of the IP address. It is used to validate remote access via the Service Processor.

---

- If you do not want to enable DHCP, enter the IP address, netmask, and gateway address from the command line. The IP address of the SP interface must be on the same subnet as the primary interface. The SP interface and primary interface are connected to the wrench port on the AltaVault by means of an internal switch.

```

Would you like to configure the SP? [y/n] y
Would you like to enable DHCP on the SP LAN interface? [y/n] n
Please enter the IP address for the SP [unknown]: 172.16.100.4
Please enter the netmask for the SP [unknown]: 255.255.255.0
Please enter the IP address for the SP gateway [unknown]: 172.16.100.1
Do you want to enable IPv6 on the SP? [y/n] n

```

```

Output sample:
Service Processor New Network Configuration
Ethernet Link: up, full duplex, auto-neg complete
Mgmt MAC Address: 00:A0:98:5D:34:BC
IPv4 Settings
Using DHCP:NO
IP Address:172.16.100.4
Netmask:255.255.255.0
Gateway:172.16.100.1
IPv6: Disabled

```

5. After the Service Processor is configured, run the `autoboot` command at the LOADER prompt to start the AltaVault appliance:

```
LOADER-A> autoboot
```

---

## Validating remote access via the Service Processor

The following commands show an example of how to validate the remote access using the SP.

1. Connect to the Service Processor using one of the following methods:
  - Connect to the serial console port and log in to the AltaVault. Press Ctrl+G to get into Service Processor mode. To exit service processor mode, press Ctrl+D.
  - SSH to the IP address of the Service Processor. Log in using the password set previously.

## 2. Obtain the Service Processor IP configuration and firmware version:

```
SP> sp status
Firmware Version:      3.0.2
Debug Mode: Enabled
Mgmt MAC Address:      00:A0:98:65:03:24
Ethernet Link:         Up, 1000Mb, Full-Duplex, Auto-neg enabled,completed
Using DHCP:            no
IPv4 configuration:
  IP Address:           172.16.33.154
  Netmask:              255.255.240.0
  Gateway:              172.16.33.1
IPv6 configuration: Disabled
```

## 3. Enter the following IPMI command to test the Service Processor feature:

```
SP> system sensors
```

Sample output (truncated):

Sensor Name	Current	Unit	Status	LCR	LNC	UNC	UCR
CPU0_Temp_Margin	-65.000	degrees C	ok	na	na	-5.000	0.000
CPU1_Temp_Margin	-65.000	degrees C	ok	na	na	-5.000	0.000
In_Flow_Temp	23.000	degrees C	ok	0.000	10.000	53.000	63.000
Out_Flow_Temp	35.000	degrees C	ok	0.000	10.000	61.000	71.000
Smart_Bat_Temp	31.000	degrees C	ok	0.000	10.000	59.000	69.000
CPU0_Error	0x0	discrete	Deasserted	na	na	na	na
CPU0_Therm_Trip	0x0	discrete	Deasserted	na	na	na	na
CPU0_Hot	0x0	discrete	Deasserted	na	na	na	na
Memory0_Hot	0x0	discrete	Deasserted	na	na	na	na
CPU1_Error	0x0	discrete	Deasserted	na	na	na	na
CPU1_Therm_Trip	0x0	discrete	Deasserted	na	na	na	na
CPU1_Hot	0x0	discrete	Deasserted	na	na	na	na
Memory1_Hot	0x0	discrete	Deasserted	na	na	na	na
PCH_Hot	0x0	discrete	Deasserted	na	na	na	na
P5V_STBY	5.026	volts	ok	4.246	4.343	5.661	5.807
P3V3_STBY	3.296	volts	ok	2.960	3.040	3.568	3.664
P1V8_STBY	1.804	volts	ok	1.630	1.659	1.950	1.969
P1V2_STBY	1.193	volts	ok	1.086	1.106	1.300	1.319
P0V9_STBY	0.892	volts	ok	0.805	0.854	0.951	0.999
P5V	5.051	volts	ok	4.246	4.343	5.661	5.807
P3V3	3.280	volts	ok	2.960	3.040	3.568	3.664
PVDDQ_DDR3_AB	1.339	volts	ok	0.010	0.019	2.454	2.464
PVTT_DDR3_AB	0.660	volts	ok	0.010	0.019	2.454	2.464
PVCCP_CPU0	0.980	volts	ok	0.010	0.019	2.454	2.464
PVDDQ_DDR3_CD	1.339	volts	ok	0.010	0.019	2.454	2.464
NVRAM_PG_3.3V	0x0	discrete	Asserted	na	na	na	na
NVRAM_PG_3.0V	0x0	discrete	Asserted	na	na	na	na
NVRAM_PG_1.8V	0x0	discrete	Asserted	na	na	na	na
NVRAM_PG_1.35V	0x0	discrete	Asserted	na	na	na	na
NVRAM_PG_2.5V	0x0	discrete	Asserted	na	na	na	na

## Next steps

After you log in to AltaVault appliance, the configuration wizard displays and allows you to choose from the following:

- Specify system settings, including time zone and DNS.
- Configure cloud settings, including cloud credentials, licenses, and data encryption.
- Configure data interfaces that are used to receive data from the backup application.
- Configure CIFS shares or NFS exports that the backup application can access.
- Optionally, configure peer monitoring, email alerts, SNMP, and additional login security.
- Export the Virtual AltaVault configuration for safe keeping in the event of a disaster.
- To manage Virtual AltaVault using the command-line interface, see the *NetApp AltaVault Cloud Integrated Storage Command-Line Interface Reference Guide*.



## APPENDIX A Administrator's configuration worksheet

### Configuration worksheet

1	Appliance information	Notes
1.1	Appliance host name: This is the name of the appliance and needs to be configured in DNS as well.	
1.2	IP address for Primary Interface: This IP address is required for configuring the PRI (Primary) / Management Interface when the CLI wizard runs automatically during the initial deployment. It is recommended to use a static IP address.	
1.3	Netmask	
1.4	Primary DNS server IP	
1.5	NTP Server	
1.6	FQN and IP address of SMTP Relay Server: This is required to configure and enable email notifications.	
1.7	Email address or alias for Notification of Events and Failures: There are two groups of notifications - "Events" Group and "Failure" Group.	
1.8	Domain name for the appliance: This needs to be configured in DNS as well to resolve fqdn of the appliance.	
1.9	Time zone in which the appliance will be installed	
2	Cloud provider credentials and storage configuration	Notes
2.1	Name of Preferred Cloud Provider: For example, AWS etc. The information required to configure the cloud provider is dependent on the specific cloud provider you have selected.	
2.2	Region: The information required to configure the cloud provider is dependent on the specific cloud provider you have selected.	
2.3	Credentials to Cloud Object Storage: For example, Amazon S3 access and secret key.	
2.4	Bucket name: The bucket name must be unique (across all of AWS).	

2	Cloud provider credentials and storage configuration	Notes
2.5	Is connectivity to cloud, in place - Yes/No? Connectivity to the cloud is mandatory in order for the appliance to be configured. WAN circuits, firewalls (port 443) etc. must be configured prior to commencing configuration. If not when will it be in place?	
2.6	What is the bandwidth to cloud?	
2.7	Encryption key: If you import from another AltaVault appliance, have key file or contents and key passphrase available (if required).	
2.8	Replication interface - Replication interface defaults to the Primary interface unless another interface is selected and configured.	
2.9	Number of shares to be created on the AltaVault appliance.	
2.10	CIFS Share Name(s) / naming convention to be used: Specify the share name(s) to be configured or whether any naming convention is to be followed.	
2.11	Will the AltaVault appliance be part of AD Domain? Yes / No. If Yes, Domain administrator credentials will be required to join the AD Domain and the Domain controller must be listed in the “_LDAP section” in the Primary DNS.	
2.12	Username(s) / Groups to be given access to the share	
2.13	NFS Export Name / naming convention to be used	
2.14	Is NFSv4 Kerberos required? If yes, Kerberos keytab and conf files are required.	
3	Network connectivity	Notes
3.1	Number of 1GbE/10GbE Data Interfaces to be used?	
3.2	Specify speed of Data (Backup) LAN - 1Gbe or 10Gbe? Specify if the Data LAN is be 1gb or 10gb NICs. AltaVault Appliance supports 4x1gb and 4x10gb NICs. IP addresses will be required for each port depending on type of NIC supplied (4x1gb or 2x10gb).	
3.3	Describe the LAN topology for Backup Data to the Appliance: Flat LAN or VLANs.	
3.4	Will Data Interfaces be connected to different subnets / VLANs? AltaVault does not support VLAN tagging. If multiple VLANs, use a separate interface for Data Interfaces from each VLAN.	
3.5	Do you want to configure a virtual interface (802.3ad link aggregation) for the Data Interfaces? If so does the LAN switch support 802.3ad?	
3.6	<ol style="list-style-type: none"> <li>1. Provide up to 4 x IP address / Netmask / Gateway for each 4x1Gbe port.</li> <li>2. Provide up to 4 x IP addresses / NetMask/Gateway for each 4x10Gbe port.</li> </ol>	
3.7	Specify the type of SFP for 10Gbe Optical NICs.	



4	Advance features	Notes
4.1	Bandwidth throttling for replication to cloud	
4.2	Alarms, Announcements, Logging, Scheduled Reports	
4.3	SNMP	



## APPENDIX B    System components

This section provides system specifications for the NetApp AltaVault appliance. It includes the following sections:

- [“AltaVault appliance components” on page 43](#)
- [“Using LEDs to check the status of the system” on page 45](#)
- [“Field replaceable units” on page 49](#)
- [“Fan modules and their LEDs” on page 50](#)
- [“Power supplies and their LEDs” on page 52](#)
- [“Controller components and their LEDs” on page 54](#)
- [“Controller components and their LEDs” on page 54](#)

---

### AltaVault appliance components

The AltaVault AVA400 or AVA800 chassis contains the following components:

- AVA400 or AVA800 controller
- Front panel with Power, Warning, and controller Activity LEDs
- Two field-replaceable 1300W, 100-240V AC auto-ranging, plug-in power supply units
- Three field-replaceable high-speed fan modules
- Rack mounting kit for standard racks

The AV10S disk shelf contains:

- Up to 24 hot-swappable 4TB (AVA400) or 6TB (AVA800) disk drives
- A front panel with Power, Warning, Activity, and Shelf ID LEDs
- Two field-replaceable 530W, 100-240V AC auto-ranging, plug-in power supply units
- 6Gb/s SAS IOMs for connectivity to the controller

- A rack mounting kit for standard racks (optional)

---

**Note:** Removing a drive out of a RAID group and moving it to a different RAID group is not supported. The disk drives have been formatted to a unique RAID configuration and should not be used for Hot-Swappable drive replacements.

---

## System chassis specifications

The following table summarizes the physical specifications for the system chassis:

Description	Controller
Rack units	6 U
Height	10.2 in. (25.9 cm)
Width	Without mounting flanges: 17.6 in. (44.68 cm) With mounting flanges: 19 in. (48.26 cm)
Depth	24.3 in. (61.72 cm)
Weight	105 lbs (47.6 kg)

## Supported expansion shelf models

You can use the following table to determine the possible AltaVault appliance and expansion shelf combinations:

AltaVault appliance	Expansion shelves (AVA10S)	RAID groups	Local disk cache capacity in TB	Maximum cloud capacity in TB
AVA400	1	1	32	160
AVA400	1	2	64	320
AVA400	2	3	96	480
AVA400	2	4	128	640
AVA400	3	5	160	800
AVA400	3	6	192	960
AVA800	1	1	48	240
AVA800	1	2	96	480
AVA800	2	3	144	720
AVA800	2	4	192	960
AVA800	3	5	240	1200
AVA800	3	6	288	1440
AVA800	4	7	336	1680
AVA800	4	8	384	1920

## What you need to know about expansion shelves

You must understand the following information for a successful installation:

- The system uses RAID6 controllers, twelve drives per RAID group, two RAID groups per shelf (AVA400/AVA800).
- You can hot-swap failed hard drives on an AltaVault expansion shelf, but you must run a CLI command to add it to the RAID array. For more information see, *NetApp AltaVault Cloud Integrated Storage User's Guide*.
- You must add a drive to the RAID controller using the Management Console or the command-line interface. New expansion shelves cannot be added when system is running. Drives are not added to the RAID array automatically. You must shut down the system, add the drives, and restart the system.
- The two power supplies on an AltaVault expansion shelf are field replaceable units (FRUs).
- The power supplies have fans:
  - The PSU fans are for PSU cooling and maintaining chassis thermals.
  - The fans continue to run, even if the power supply unit (PSU) itself fails.
- If the PSU fails, do not remove it from the chassis until a replacement is immediately available. It is recommended to replace the PSU as soon as possible to restore full redundancy.

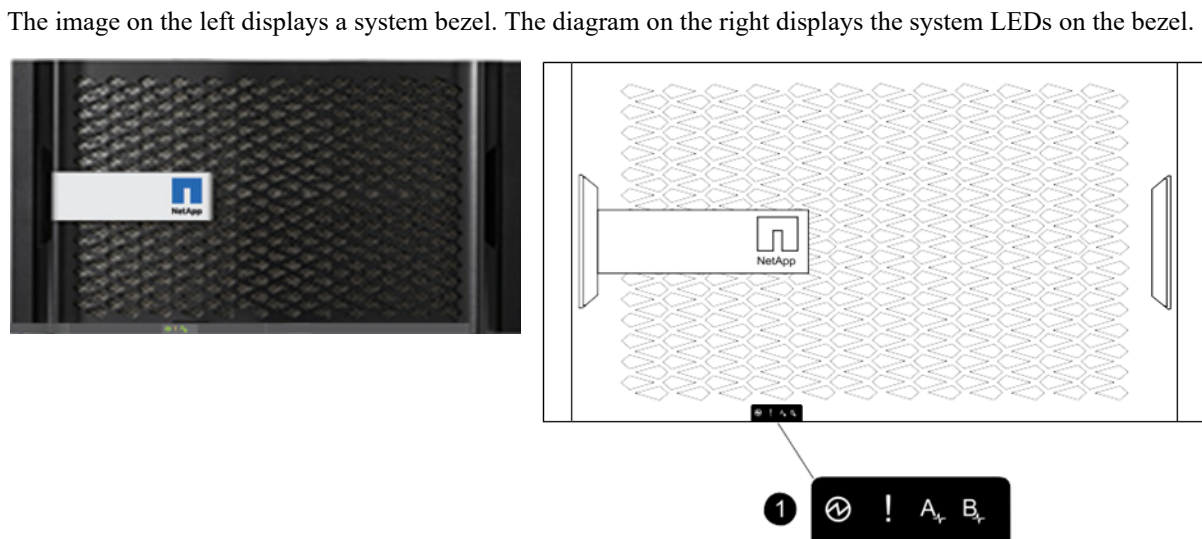
---

## Using LEDs to check the status of the system

You can check the front of the bezel to verify that the power is turned on, controller is active, system is halted, or whether a fault has occurred in the chassis.

### To check the status of the system

1. Locate the LEDs on the front of the bezel to verify the power is turned on, the controller is active, the system is halted, or whether a fault has occurred in the chassis.






## 2. Use the following table to understand the system LEDs:

Component	Description
1	<p>System LEDs</p> <p>When the bezel is in place, the LEDs are arranged horizontally in the following left-to-right order:</p> <ul style="list-style-type: none"> <li>• Power</li> <li>• Fault (System Attention LED)</li> <li>• Controller A activity (controller installed in the top bay only with no secondary controller)</li> </ul> <hr/> <p><b>Note:</b> When the bezel is removed, the system LEDs on the chassis are arranged in the same order as on the bezel, but in a top-to-bottom vertical orientation.</p> <hr/>

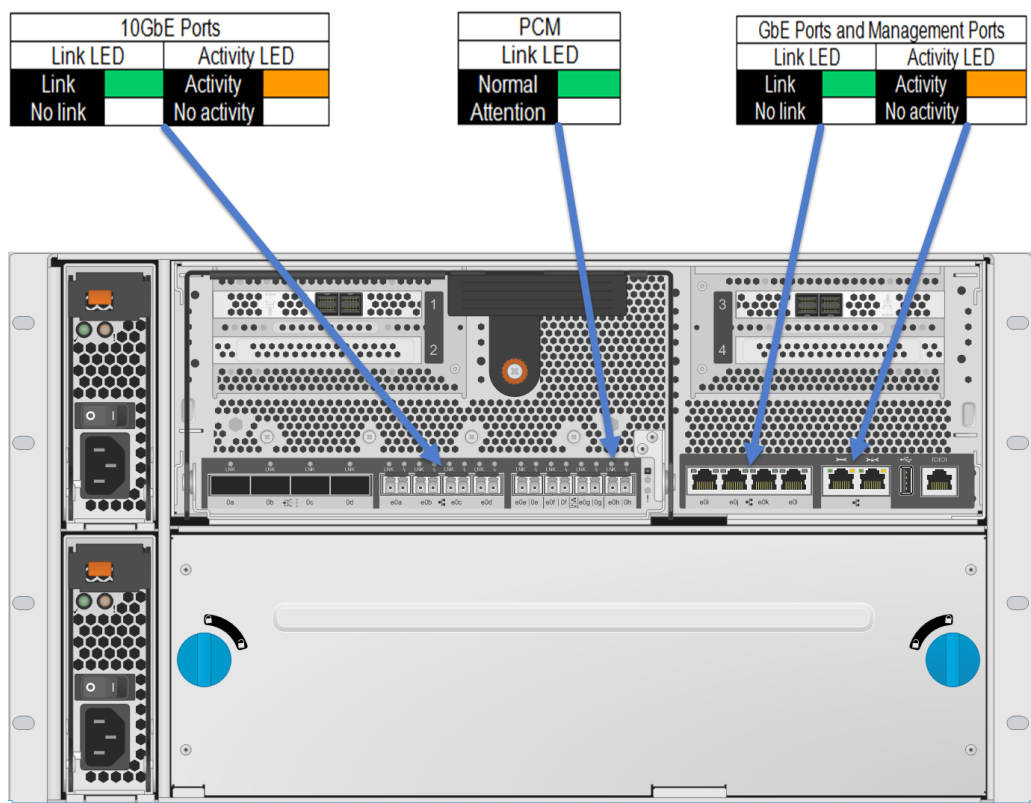
## 3. Use the following table to understand the AltaVault appliance system components on the chassis front:

Component	Description
Bezel	The bezel covers the front of the AltaVault system chassis. From the bottom of the front bezel, you can see four system LEDs (arranged horizontally) that indicate the status of the system.
Fan modules	<p>There are six redundant and hot-swappable fan modules installed in slots A1 through A3 and B1 through B3.</p> <p>The bottom row contains a blank.</p> <p>You have to remove the front bezel to see the fan modules. The Attention LED is set to Amber if the fan module is not working properly.</p>
System LEDs	<p>The chassis has four LEDs (arranged vertically) that indicate the status of the system:</p> <ul style="list-style-type: none"> <li>• Power</li> <li>• Attention</li> <li>• Activity A (Controller)</li> <li>• Activity B (unused in AltaVault)</li> </ul> <p>These LEDs are located behind the bezel. Remove the front bezel to see these LEDs.</p> <p>The system LEDs and the LEDs visible when the bezel is installed are the same, except that the bezel LEDs are aligned horizontally and the system LEDs are aligned vertically. Both sets of LEDs provide the same information about the system.</p>
Chassis handles	The chassis has two handles on each side that assist with lifting the system. The handles are integrated into the chassis and fold flush when not in use.

## 4. Use the following table to understand the behavior of the system LEDs:

LED label	LED name	LED status	Description
	Power	Green	At least one of the two power supplies (PSUs) is delivering power to the system.
		Clear (off)	Neither PSU is delivering power to the system.
	Fault (System Attention LED)	Amber	The system is shut down or a fault occurred in the chassis. The error might be in a PSU, fan, or controller. The LED also is lit when there is an internal FRU failure, or the system is in maintenance mode.  <b>Note:</b> You can check the fault LED on the back of each controller to see where the problem occurred.
		Clear (off)	The system is operating normally.
	Activity	Blinking green	The AltaVault OS is running. The length of time that the light remains on is proportional to the controller's activity.
		Clear (off)	There is no activity on the controller.

5. Locate port LEDs on the rear of the controller to verify link and activity status:



6. Use the following table to identify the rear controller components:

Component	Description
<b>10GbE Ports</b>	
Link LED	Displays green when the port is linked and displays white when there is no link.
Activity LED	Displays orange when the port is active and displays white when there is no activity.
PCM	PCM Attention LED is used on the AltaVault controller for debugging purposes.
<b>GbE and management ports</b>	
Link LED	Displays green when the port is linked and displays white when there is no link.
Activity LED	Displays orange when the port is active and displays white when there is no activity.
<b>Note:</b> Private management ports are unused on the AltaVault controller.	



## Field replaceable units

Field-replaceable units (FRUs) are components that you can replace at your site. AltaVault systems have two types of FRUs:

- **Hot-swappable FRUs:** You can remove and replace these FRUs while the system is still powered on without disrupting the operation of the system.
- **Non hot-swappable FRUs:** You must perform a clean shutdown of the system and then power it down to replace these FRUs.

You can swap the following system FRUs:

- **Fan modules:** Hot-swappable
- **Power supplies:** Hot-swappable
- **Controller module:** Not hot-swappable

Each controller module has internal FRUs. The controller module internal FRUs are not hot-swappable. Use the `reload halt` command to ensure a clean shutdown, and then power off the controller to replace these FRUs.

The following internal FRUs in an AltaVault controller module are not hot-swappable:

- Boot media device
- RAID controller assemblies
- Real-Time Clock (RTC) coin battery
- System DIMM

## Slot numbering and associated components

An AltaVault controller controls three fan modules. Controller A controls the fans in slots A1 through A3. If a controller is removed from the chassis, the fans in all three associated fan modules stop spinning.

Three fan modules are shipped preinstalled on the front of the chassis in the slots labeled A1 through A3. The chassis has six slots on the chassis front and four slots on the chassis rear. The bottom row of fan modules are replaced with a blank because these fan modules are not required.

### To locate chassis components in an AltaVault system

1. You must remove the front bezel to see the slots that contain the fan modules in the chassis.
2. Use the information that follows to locate the slots and the components that they accept:

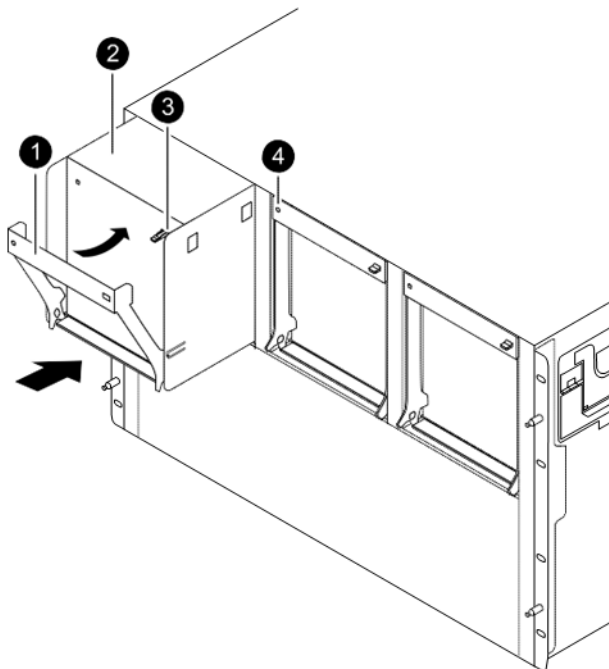
Location	Slot label	Slot component assignments	Description
Chassis front	A1	One fan module in each slot	The fan modules in these slots are controlled by the controller module installed in slot A on the chassis rear.
	A2		
	A3		
			<b>Note:</b> A blank is installed in Slots B1, B2, and B3.

Location	Slot label	Slot component assignments	Description
Chassis rear	A	One controller module in this slot	AltaVault systems support only one controller module in the chassis.
	B		A blank is installed over slot B.
	1	An AC power supply is located in slots 1 and 2.	Both power supplies are preinstalled.
	2		

## Fan modules and their LEDs

If the controller does not detect the presence of the associated fan module, the system fails to boot. Each fan module is a hot-swappable field-replaceable unit (FRU) that contains two fans.

Each fan module has a cam handle, a cam handle release latch, and an attention LED that indicates the status of the fan module. The image below displays the fan module component locations.

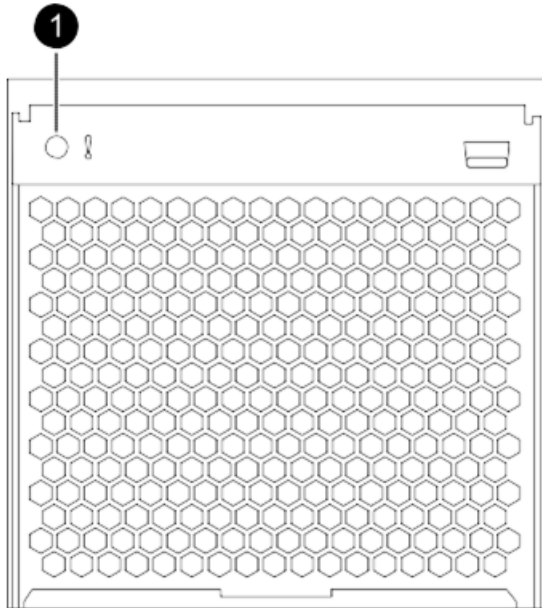


The following table displays the fan module components and descriptions:

Component	Description
1	Cam handle
2	Fan module
3	Cam handle release latch
4	Fan module attention LED

## To locate the fan modules and their LEDs

1. Remove the front bezel.
2. Check the attention LED on each fan module to determine whether the fan module is working properly.



An amber LED light indicates a fan module failure:

Icon	LED	Color	Description	Corrective action
!	Fan module attention LED	Amber	The fan module is not working properly.	Remove the faulty fan module and install a replacement module.
		Clear (off)	No errors.	None

3. Hot swap the fan module as required.

The system fails to start if the controller does not detect the presence of the associated fan module. You must replace a fan module within two minutes of removing it from the chassis to minimize disruption to the system's airflow. If the fan module is not replaced within two minutes, the system shuts down to avoid overheating. For information on replacing fan modules, see [“Hot-swapping controller fan modules” on page 67](#).

## Fan redundancy policy

The AltaVault system fan redundancy policy enables the system to continue operating with a single fan failure (one fan failure in any one fan module). Each fan module has two fans.

The following events indicate fan failure:

- The fans speed has fallen below the critical low threshold.
- One or both fans in the fan module have stopped spinning.

- The fan module is not present.
- The fans in the module are malfunctioning.

In all these events, the system issues a warning for fan failure on the system console, generates an AutoSupport notification, and boosts the speed of the remaining fans to the maximum. The system behaves differently for single fan failure scenarios versus multiple fan failure scenarios.

If one fan in a fan module fails (of the three fan modules installed per controller), the system remains operational and an alert displays in the UI:

- Single fan failures: If one fan in a fan module fails (of the three fan modules installed per controller), the system remains operational and an alert displays in the UI (Reports > Alarms Status).
- Multiple fan failures: In the event that two fans within the same fan module or multiple fans across different fan modules fail simultaneously, the system shuts down within two minutes if no action is taken. The AltaVault OS boosts the speed of the remaining fans to maximum to prevent the chassis from overheating. Replace the faulty fan modules within two minutes of the Alarm event email. The alarm can be checked on the UI (Reports -> Alarms Status).

---

## Power supplies and their LEDs

AltaVault systems ship with two AC power supplies preinstalled in the chassis, in the slots labeled 1 and 2. The AC power supplies are installed on the rear of the chassis. The power supplies are fully redundant, hot-swappable field-replaceable units (FRUs). The system remains operational even if one power supply fails.

---

**Note:** When you remove a failed power supply, you must replace it promptly to minimize disruption to the controller's airflow. The system continues to function normally. The AltaVault OS logs receive alert messages in the event log file about the degraded power supply until the power supply is replaced.

---

Each power supply contains the following:

- Two power supply LEDs
- One on/off power switch – Switch to the OFF ((O) position) before connecting or disconnecting power to the power supply.
- One power cord inlet
- One power cord retainer clip – Holds the power cord in place.
- One cam handle – Grip and move to an open position to remove and install the power supply.
- One cam handle release latch – Releases to unseat the power supply.
- Two integrated fans – Cools the power supplies

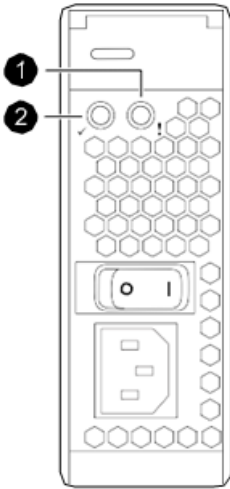
## Power supply LED behaviors

This section describes the AltaVault system LEDs, their behavior, and information about the power supplies used in the system.

You must power off the controller before powering off the AVA10S shelves.

## Locations and descriptions of system LEDs

Each AC power supply has two LEDs on its faceplate that display the status of the power supply. The image below displays the location of these LEDs.



The following table displays information about the power supply LEDs:

Component	Description
1	Power LED
2	Attention LED

The following table describes the behavior of the power supply LEDs. These LEDs help monitor the status of the power supply:

Icon	LED	Color	Description	Corrective action
!	Power supply attention LED	Amber	The power supply module is not working properly.	Remove the faulty fan module and install a replacement module.
		Clear (off)	No errors.	None.

The following table summarizes the specifications of the AC power supplies used in AltaVault systems:

Description	Value
AC input power frequency	50 to 60 Hz
AC input power voltage/operating range (auto-ranging)	100 to 120 VAC 200 to 240 VAC
AC output power	1300 W
PSU output power	1050W

---

## Controller components and their LEDs

The controller module is the component of the AltaVault system that runs the AltaVault OS (AVOS) operating system and controls its disk subsystem. The AltaVault system comes with one controller. You install the AltaVault controller on the rear of the chassis, in the slot labeled A, also referred to as *Controller 1* or *Controller A*, the storage controller or the controller. The bottom slot is empty and contains a blank.

---

**Note:** AltaVault systems support only one controller module per chassis.

---

Each AltaVault controller contains the following:

- Components for removing and installing controller
- Ports and LEDs on the AltaVault controller
- Internal FRUs and their LEDs

Use the components in this table to help remove or install a controller in a chassis:

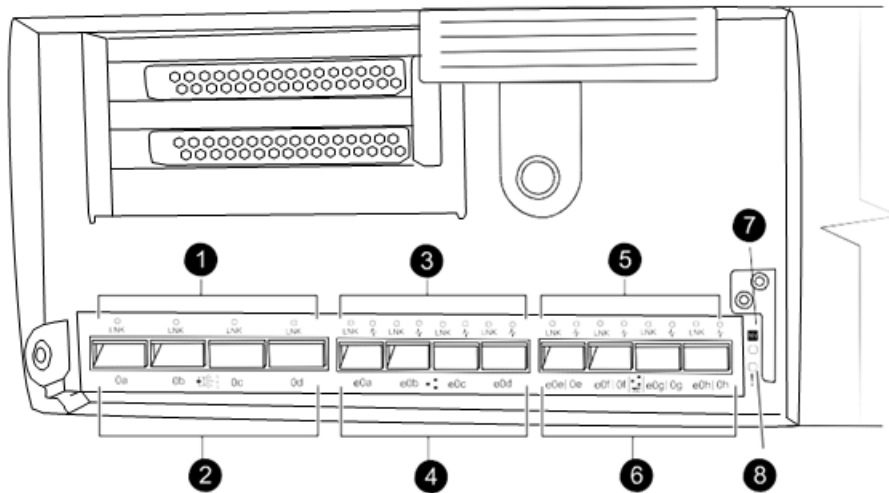
Component	Description
Cam handle	Use to install and remove the controller handle.
Thumb screw	Use to secure the controller module in the chassis.
Release latch stop	Prevents the controller from sliding out of the chassis by stopping the controller mid-way during removal. Press this latch stop to remove the controller from the system.

## Controller LED behaviors

The LEDs on the face plate of the controller display the status of its network or disk shelf connections and identifies the controller where a fault has occurred. To aid in understanding, the controller faceplate information is divided into two sections, the left and right side of the controller faceplate.

## Controller left side ports and LEDs





This section describes the controller ports and LEDs on the left side of the controller faceplate.



The following table describes ports and LEDs on the left side of the controller:

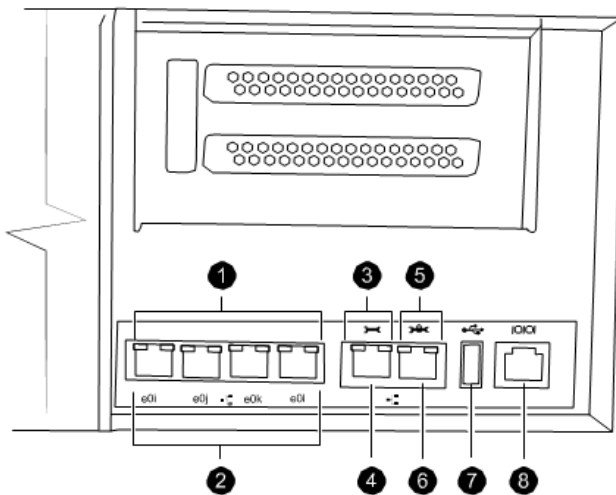
Component	Description
1	SAS port LEDs (not used)
2	SAS port (not used)
3	10 GbE port LEDs
4	10 GbE Ports
5	CNA port LEDs (not used)
6	CNA ports (not used)
7	NVRAM LED (not used) <b>Note:</b> The NVRAM is physically present, but not used in the AltaVault software.
8	Controller attention LED

The following table describes the ports and the status of the port LEDs:

Port labels	Port descriptions	LED labels	LED status	LED descriptions
e0a through e0d and 	10 GbE ports Each controller has four 10Gb Ethernet (10GbE) ports, identified with labels e0a, e0b, e0c, and e0d.	LNK 	Green  Amber flashing Off	A link is established between the port and some upstream device.  Traffic is flowing over the connection. No traffic is flowing over the connection.
	Controller attention LED		Amber  Off	A problem has occurred in the controller. This in turn has caused the system attention LED on the chassis front to become illuminated.  The controller is functioning properly.

## Controller right side ports and LEDs

This section describes the ports and LEDs on the right side of the controller faceplate.







Component	Description
1	1GbE port LEDs
2	1GbE ports
3	Management Ethernet port (wrench icon) LEDs
4	Management Ethernet port (wrench icon)
5	Private management Ethernet port (wrench lock icon) LEDs (not used)



Component	Description
6	Private management Ethernet port (wrench lock icon) (not used)
7	USB port (not used)
8	Console port

The following table describes the ports in use and the status of port LEDs:

Port label	Port description	LED labels	LED status	Description
e0i through e0l and 	GbE ports Each controller has four 1Gb Ethernet (GbE) ports, identified with labels e0i, e0j, e0k, and e0l.	LNK (Left LED)	Green	A link is established between the port and some upstream device.
			Off	No link is established.
		Activity (Right LED)	Amber flashing	Traffic is flowing over the connection.
			Off	No traffic is flowing over the connection.
 and 	Remote management The remote management port is labeled with a wrench symbol. It is identified as (primary) e0M in the CLI commands and output. This port is used for managing the AltaVault system.	LNK (Left LED)	Green	A link is established between the port and some upstream device.
			Off	No link is established.
		Activity (Right LED)	Amber flashing	Traffic is flowing over the connection.
			Off	No traffic is flowing over the connection.
	Serial console port The RJ-45 console port enables you to communicate with the controller directly even when a network connection is not available or when you set up the system for the first time by using the CLI.	No LED on this port.		

---

## Internal FRUs

The AltaVault controller has many internal FRUs. These FRUs are not hot-swappable. You must perform a clean shutdown and power down the system before replacing any of these components.

The controller has a FRU map printed on the CPU cover. This FRU map lists all the internal FRUs in the controller and their general location on the board to find the internal FRUs and their corresponding LEDs quickly.

The following table lists the AltaVault controller's internal FRUs:

Internal FRU	Description	Attention LED Label
Boot device	The boot device stores a primary and secondary set of system files (also called the boot image) that the system uses when it boots.  The attention LED is next to the boot device on the motherboard.	Not applicable
System DIMM	Each AltaVault controller has eight 32G DIMMs. All eight DIMMs must be installed for the system to be fully functional.	Not applicable
RAID Controller assemblies	The RAID controller assemblies are high performance PCI express to 12Gb/s SAS cards that provide reliability, high performance, and fault-tolerant disk subsystem management. The RAID controller assemblies are installed in PCIe slots 1 and 3.	Not applicable
Real-time clock (RTC) coin battery	The real-time clock (RTC) coin battery in the controller module provides power to the real-time clock so that the system's services and applications that depend on accurate time synchronization continue to function properly.  The attention LED is next to the battery on Riser-R.	Not applicable

For more information on replacing specific internal FRUs, see [“Replacing internal FRUs” on page 74](#).

## APPENDIX C    System maintenance

This section provides information on maintaining AltaVault system components. It includes the following sections:

- [“Migrating data from a SteelStore appliance to an AltaVault appliance” on page 60](#)
- [“Shutting down controllers” on page 60](#)
- [“Replacing controllers” on page 60](#)
- [“Installing a controller in a chassis” on page 64](#)
- [“Replacing a controller chassis” on page 65](#)
- [“Hot-swapping controller fan modules” on page 67](#)
- [“Hot-swapping controller power supplies” on page 70](#)
- [“Adding an additional RAID group to a configured appliance” on page 73](#)
- [“Replacing internal FRUs” on page 74](#)
- [“Replacing a boot device in a controller” on page 75](#)
- [“Replacing system DIMMs” on page 79](#)
- [“Replacing RAID controllers” on page 83](#)
- [“Replacing the RTC clock coin battery” on page 83](#)
- [“Replacing disk shelf power supplies and other FRUs” on page 86](#)
- [“Replacing a faulty hard disk drive on an AltaVault AVA400 or AVA800 appliance” on page 86](#)
- [“Returning failed parts” on page 86](#)
- [“Disposing of batteries” on page 86](#)

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**Note:** Best practices calls for allowing the replication queue to drain fully to the cloud prior to engaging in maintenance activities.

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## Migrating data from a SteelStore appliance to an AltaVault appliance

For information on migrating data from an older physical appliance to the latest AltaVault appliance, see *NetApp AltaVault Cloud Integrated Storage User's Guide, Chapter 11 Migrating data from a SteelStore appliance to an AltaVault appliance*.

---

**Note:** There is no support for directly migrating or upgrading from 3.x to 4.1 appliances. You must first migrate to 4.0, 4.0.0.1, or 4.0.1 and then upgrade to 4.1. This applies to both physical and virtual appliances.

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## Shutting down controllers

An AltaVault controller has field-replaceable units (FRUs) that are not hot-swappable. For a list of AltaVault system FRUs, see [“Field replaceable units” on page 49](#).

When you are replacing field-replaceable units (FRUs) that are not hot-swappable or when you are replacing the controller itself, shut down the controller. A clean shutdown of the AltaVault controller ensures that all data has been written to the storage subsystems. You must also disconnect power from the power supplies before these replacement procedures.

### To shut down a stand-alone AltaVault controller

1. To shut down the AltaVault controller, enter the following CLI command:

```
CLI> reload halt
```

When the shutdown is successful, the box powers off, there are no prompts or output to the console.

2. If *you* are not already grounded, properly ground *yourself*.
3. Turn off the power supplies by turning the on/off switch to the OFF (O) position. If the power source for this power supply has a on/off switch, turn the switch to the OFF (O) position.
4. Unplug the power cords from the power supplies and the power source:
  - Pinch the tab on the locking mechanism of the cable retainer clip, and open the retainer clip.
  - Slide the retainer clip off the cord.
  - Unplug the power cord from the power supply. Then, unplug the cord from the power source.
  - Repeat Step 4 for the second power supply.

---

## Replacing controllers

These instructions describe how to replace an AltaVault controller in the case of an RMA (Return Merchandise Authorization).

---

**Caution:** In most cases, replacing an AltaVault controller is performed by NetApp Support. Only experienced technicians should attempt to replace a controller because of the risk of losing data.

---

If you are replacing your AltaVault Controller because of a faulty appliance, NetApp recommends that you preserve the existing disk cache so that you do not need to download large amounts of data from the cloud, which can be expensive in terms of time, bandwidth, and costs.

When an AltaVault Controller is replaced by an RMA, you must physically swap the RAID cards between the old controller and the new one (provided the fault is not related to the RAID card assembly). Since both models are exactly the same, the total size of the disks remains unchanged. The disks must be installed in order, populating shelf space 1 through 11, they cannot be jumbled.

To preserve your data, ensure that you export the current configuration in your source AltaVault appliance using the Export Configuration Wizard (choose Settings > Setup Wizard from the management console). NetApp recommends that you export your configuration and store it in a secure location as a preventative measure against unexpected failures.

Replacing an AltaVault controller includes the following processes:

- [“Shutting down and removing the controller from the chassis” on page 61](#)
- [“Moving working FRUs from the controller” on page 62](#)
- [“Reinstalling and connecting the controller in the chassis” on page 63](#)

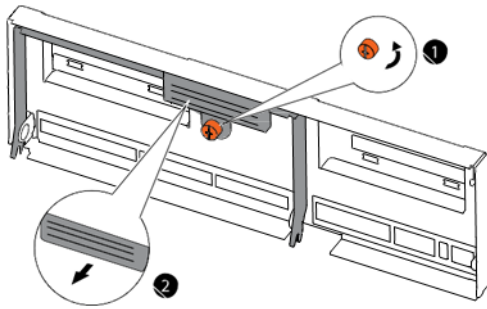
## Shutting down and removing the controller from the chassis

Before shutting down the controller, you must export the controller’s current configuration, shut down the controller, and remove it from the chassis.

### To shut down the controller and remove it from the chassis:

1. Ensure that the current configuration from the source appliance has been exported. For details, see the section, *Using the Export Configuration Wizard*, in the *NetApp AltaVault Cloud Integrated Storage User’s Guide*. Ensure that the exported configuration from the source appliance is safe and accessible.
2. Shut down the source AltaVault appliance by selecting the following from the management console:
  - a. Select Settings > Reboot/Shutdown.
  - b. Click **Shutdown**.
3. If you are not already grounded, properly ground yourself.
4. Unplug the various system cables and SFPs from the controller module. Keep track of where the cables were connected so that when you reinstall the controller, you can reattach the cables in the same configuration.

5. Loosen the thumbscrew on the cam handle.



6. Identify components as described in this table:

component	Description
1	Thumbscrew
2	Cam Handle

7. Pull the cam handle downward to unseat the controller and slide the controller module out of the chassis until it catches. Then, press the release latch on the left side of the controller module and slide the controller module completely out of the chassis, making sure that you support the base of the module with your free hand.
8. Place the controller module on a clean, flat surface.

## Moving working FRUs from the controller

Remove all the working field replaceable units (FRUs) from the impaired controller and move them to the new controller module. To reduce the possibility of damage to the components that are being moved, you should minimize the handling of the components by installing them in the replacement controller as soon as they are removed from the impaired controller. Then, install the replacement controller module in the system chassis.

### To move all the working FRUs from the impaired controller to the new controller module

1. Place the replacement controller module next to the impaired module and open the CPU cover and the left and right side panels to install system components.

---

**Note:** Do not power on your system until you have moved all the internal FRUs to the replacement module.

---

2. Move the eight system DIMMs to the replacement controller module.
  - For instructions on replacing the system DIMMs, see [“Replacing system DIMMs” on page 79](#).
  - Install the eight DIMMs using the steps described in the procedure, [“Installing system DIMMs” on page 81](#).
3. Move the boot device to the replacement controller module
  - a. For instructions on removing the boot media from the impaired module, see [“Replacing a boot device in a controller” on page 75](#).

- b. Open the boot device cover in the replacement controller module. Install the boot media in the boot media holder using the following procedure, [“Installing a boot device” on page 77](#).
- c. If the boot device is damaged or corrupted during the replacement process, contact technical support to assist you in restoring the system to a healthy state.

## Reinstalling and connecting the controller in the chassis

When you finish moving the internal FRUs to the replacement control, reinstall the controller module in the chassis.

### To reinstall the controller module in the chassis

1. Use the steps described in the procedure, [“Installing a controller in a chassis” on page 64](#) to reinstall the controller module in the chassis.
2. Swap the RAID card assembly from the source AltaVault controller to the target controller. Ensure that you move the RAID cards from the source controller into the corresponding slots on the target controller. Do not jumble the cards as position and order are important. Keep track of which RAID cards you have swapped.
3. Reconnect the Storage Shelves to the target controller in the same configuration as the source controller.
4. Restart the target AltaVault appliance. After swapping the disks, when you restart the target AltaVault appliance, the following message displays:  
  
The secure vault fails to unlock. This is because of the serial number mismatch between the appliances.  
You cannot use the data store because you cannot access the data store encryption key in the secure vault.
5. Connect to the target AltaVault appliance through the serial cable.
6. Log in using the default login admin and password.
7. At the command line, enter the following CLI commands:

```
CLI> enable
CLI> configuration terminal
CLI> update controller config
```

The CLI command, `update controller config`, does the following:

- Updates the add-on RAID groups with the new controller configuration.
  - Clears the secure vault. It is safe to run this CLI command because the information in the secure vault is already backed up.
  - Restarts the system.
8. After AltaVault appliance starts, import the previously-saved configuration into the target AltaVault appliance using the Import Configuration Wizard.
  9. Reset the Megastore GUID by entering the following CLI commands at the command line:  
  
CLI> enable  
CLI> configuration terminal  
CLI> megastore guid reset

The last command generates a new megastore GUID based on the serial number of the target AltaVault appliance. It is important to perform this step before restarting the storage optimization service.

---

## Installing a controller in a chassis

After internal FRU replacement or movement tasks are complete, reinstall the controller module in the system chassis.

### Before you begin

- Ensure that the chassis enclosure is securely installed in the rack or cabinet.
- Ensure the three fan modules associated with the controller module are installed in the system using the steps described in the procedure, [“Installing fan modules” on page 68](#).
- To ensure that the system has rebooted correctly, verify that the System attention LED on the chassis front and the Controller attention LED on the chassis rear are not lit after the system has finished rebooting.

### To install a Controller in a Chassis

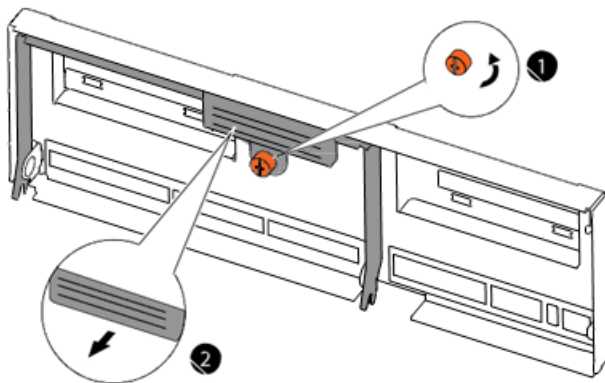
1. Align the controller module with the opening in the chassis and then gently push the controller module halfway into the system.
2. Re-cable the system:
  - Re-cable the QSFP connections to the disk shelf and the mini-SASHD connections to the controller. Remember to reinstall the media converters (SFPs) for FC cables.
  - Re-cable the management and console port connections.
3. With the cam handle in the open position, firmly push the controller module into the chassis until the controller module meets the mid-plane.

---

**Note:** Do not use excessive force when sliding the controller module into the chassis; you might damage the connectors on the rear of the module.

---

4. Close the cam handle so that the latch clicks into the locked position and the controller module is fully seated in the chassis. Tighten the thumbscrew.





5. Identify components as described in this table:

Component	Description
1	Thumbscrew
2	Cam handle

6. Reconnect the power cables to the power supplies and secure them using the cable retaining clips.
7. Reconnect the power cables to the power source.

---

**Note:** Power on the disk shelf attached to the AltaVault system and set the disk shelf ID before powering on the controller. For information on setting the disk shelf ID, see [“Connecting the power and starting the system” on page 29](#).

---

8. Turn the on/off switch on the power source and the power supply to the ON (I) position to start the boot process for the system.
9. If all the FRU replacements were successful, the system should boot normally.
- To ensure that the system has booted correctly, verify that the System attention LED on the chassis front and Controller attention LED on chassis rear are not lit after the system has finished booting.
  - Verify the health of your system and the system configuration using the command, `show info`.

Regarding the boot device:

- If the boot device is replaced, you must contact technical support to assist in the initialization of the device.
- If the boot device is damaged or corrupted during the replacement process, contact technical support for help in restoring the system to a healthy state.

---

## Replacing a controller chassis

The chassis is the external metal casing that houses the controller module, power supplies and fan modules. The chassis has mounting flanges that are used to install the chassis in a rack or cabinet. The chassis is not a hot-swappable field-replaceable unit (FRU); you must shut down your system before replacing the chassis.

To replace a chassis for an AltaVault system, you must remove the power supplies, fan modules, and controller module from the old chassis, remove the old chassis from the rack or cabinet, install the new chassis, and then reinstall the components in the new chassis.

### Before you begin

- You must perform a clean system shutdown to ensure that all data has been written to the storage subsystems. Use the `reload halt` command to shut down the system.
- If you cannot gracefully shut down the system, contact technical support for assistance. Power off the system and disconnect power from it. For detailed instructions on powering off the system and disconnecting the power as described in [“Shutting down controllers” on page 60](#).

### To remove a chassis

1. If *you* are not properly grounded, properly *ground yourself*.

2. Remove the two power supplies installed in the chassis using the steps described in the procedure, [“Removing power supplies” on page 70](#).
3. Set the power supplies aside. You will re-install them in the replacement chassis.
4. Removing the controller module from the chassis requires assistance from NetApp Support.
5. Set the controller module aside. You will re-install it in the replacement chassis.
6. Remove the fans modules installed on the chassis front using the steps described in the procedure, [“Removing fan modules” on page 67](#).
7. Set the fan module aside. You will re-install them in the replacement chassis.
8. Remove the screws from the chassis mount points.
9. With the help of two or three people, slide the empty chassis off the rails and set it aside.

## Installing the chassis

Before you begin, verify that the replacement chassis you are installing is an approved part from NetApp.

### To install the chassis

1. With the help of two or three people, slide the replacement chassis into the rack or cabinet by guiding the chassis onto the rails or brackets.
2. Slide the chassis all the way into the rack or cabinet.
3. Secure the front of the chassis to the rack or cabinet, using the screws you removed in the previous procedure.
4. Install the fan modules in the chassis as described in [“Installing fan modules” on page 68](#).

---

**Note:** You must install all three fan modules for a controller. If all three fan modules associated with a controller are not detected when the system boots, the system will crash. For details, see [“Slot numbering and associated components” on page 49](#).

---

5. Install both power supplies in the chassis using the steps described in the procedure, [“Installing power supplies on a controller” on page 71](#).

---

**Note:** Do not turn on the power supplies at this time.

---

6. Reinstall the controller module in the chassis as described in [“Installing a controller in a chassis” on page 64](#). AltaVault systems support only one controller per chassis. Install the blank panel over the second slot.
7. Turn the power switch on both power supplies and the power source to the ON (I) position. The system will start booting.
8. To ensure that the system has booted correctly, verify that the System attention LED on the chassis front and Controller attention LED on chassis rear are not lit after the system has finished booting.

---

## Hot-swapping controller fan modules

Fan modules in an AltaVault system are hot-swappable field-replaceable units (FRUs). You can hot-swap the fan modules while the system is powered on, without disrupting the normal operation of the system.

When a fan module fails, the system logs messages in the event log file and an alarm is raised, indicating which power supply has failed.

---

**Note:** When a fan module fails, an alarm is raised. The UI shows a degraded state with the appropriate alarm information, and if configured, an email is sent to the administrator.

---

## Removing fan modules

You must replace the fan module within two minutes of removing it from the chassis to minimize disruption to the system's airflow. System airflow is disrupted and the controller module associated with the failed fan module shuts down after two minutes to avoid overheating. To understand AltaVault system behavior for single and multiple fan failure scenarios, see [“Fan redundancy policy” on page 51](#).

### To remove a fan module

1. If *you* are not already grounded, properly *ground yourself*.
2. With two hands, grasp the openings on each side of the bezel and pull it toward you until the bezel releases from the four ball studs on the chassis frame.
3. Identify the fan module that you must replace by checking the error messages and looking at the attention LED on each fan module cam handle.

---

**Note:** If the fan attention LED is lit solid amber, the fan module has failed.

---

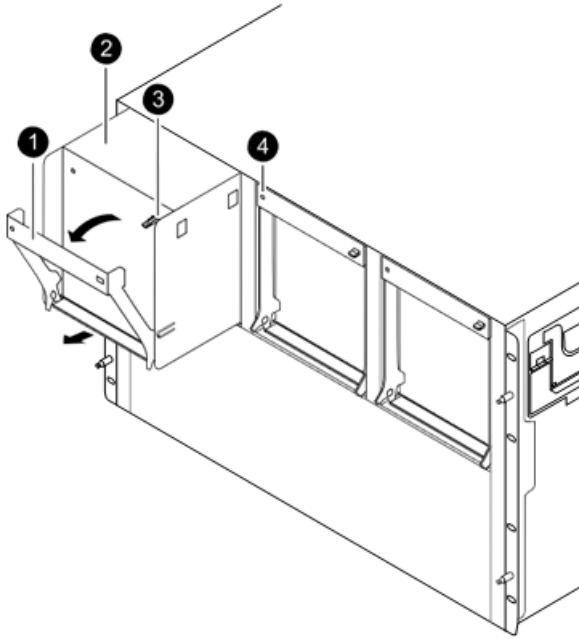
4. Press down the release latch on the fan module cam handle and pull the cam handle downward to unseat the fan module from the chassis.

5. Pull the fan module straight out from the chassis, as shown below. Make sure that you support the base of the fan module with your free hand, so that it does not fall out of the chassis.

---

**Note:** Controller fan modules are short. Always support the bottom of the module with your free hand, so that it does not suddenly drop free from the chassis.

---



6. Identify fan module components as described in this table:

Component	Description
1	Cam handle
2	Fan module
3	Cam handle release latch
4	Fan module attention LED

7. Set the failed fan module aside.
8. Before removing another fan module from the chassis, install a replacement fan module using the steps described in the procedure, [“Installing fan modules” on page 68](#).

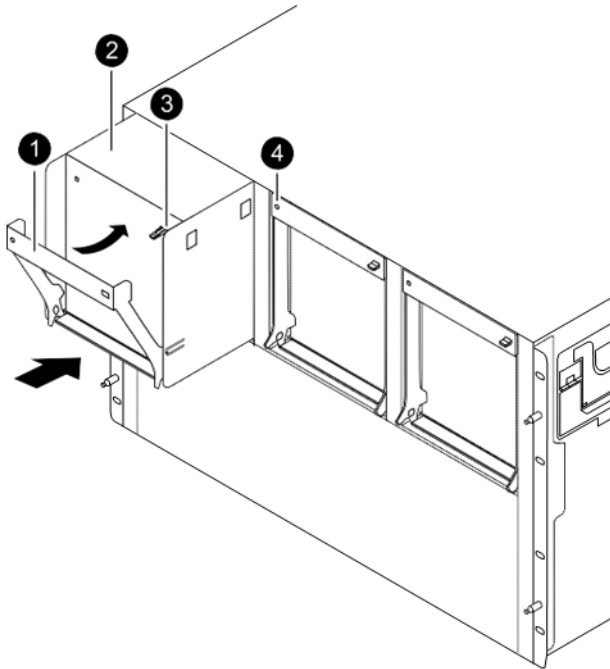
## Installing fan modules

Before you begin, verify that the controller fan module that you are installing is supported by your controller model.

### To install a fan module

1. If *you* are not already grounded, properly *ground yourself*.

2. Insert the replacement fan module into the chassis by aligning it with the opening and sliding it into the chassis.
3. Push firmly on the fan module housing to ensure that it is seated all the way into the chassis. The cam handle raises slightly when the fan module is completely seated.
4. Swing the cam handle up to its closed position, as shown below. Make sure that the cam handle release latch clicks into the locked position.



5. Identify fan module components as described in this table:

Component	Description
1	Cam handle
2	Fan module
3	Cam handle release latch
4	Fan module attention LED

6. Repeat the procedure for the remaining fan modules, if any.
7. After all fan modules have been replaced, align the bezel with the ball studs on the chassis and gently push it onto the ball studs.

---

## Hot-swapping controller power supplies

Power supply units (PSUs) in a AltaVault system are auto-ranging, redundant, hot-swappable field-replaceable units (FRUs). You can hot-swap the power supplies on a controller while the system is powered on without disrupting the normal operation of the system.

---

**Note:** When a power supply fails, an alarm is raised. The UI shows a degraded state with the appropriate alarm information, and if configured, an email is sent to the administrator.

---

### Before you begin

- If you are replacing more than one power supply on a controller, you must do so one at a time to prevent system downtime.
- If you must remove all power supplies, leaving the controller without any power, you must first shut down and then power off the system using the steps described in the procedure, [“Shutting down controllers” on page 60](#).

## Removing power supplies

This section describes how to remove a power supply.

---

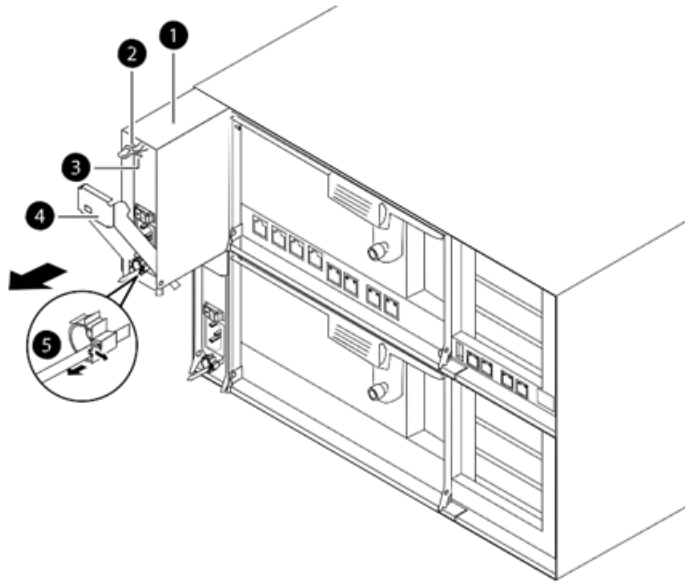
**Note:** Replace a failed power supply promptly to minimize disruption to the controller's airflow. The system continues to function normally, but the AltaVault OS logs alert messages in the event log file about the degraded power supply until the power supply is replaced.

---

### To remove a power supply

1. Identify the power supply you want to replace, based on the event log messages or through the amber fault LED on the power supply.
2. If *you* are not already grounded, properly *ground yourself*.
3. Turn off the target power supply by turning the on/off switch to the OFF (O) position. If the power source for this power supply has a on/off switch, turn the switch to the OFF (O) position.
4. Remove the power cord from the power supply, using the image below as a reference.
  - Pinch the tab on the locking mechanism of the power cord retainer clip, and open the retainer clip.
  - Slide the retainer clip off the cord.
  - Unplug the power cord from the power supply and the power source.
5. Press down the release latch on the power supply cam handle to unseat the power supply.

6. Lower the cam handle to the fully open position, and then slide the power supply out of the chassis, as shown below. Make sure that you support the power supply with your free hand.



7. Identify power supply components as described in this table:

Component	Description
1	Power supply
2	Cam handle release latch
3	Power and fault LEDs
4	Cam handle
5	Power cord locking mechanism

## Installing power supplies on a controller

Before you begin, verify that the power supply you are installing is supported by your controller model.

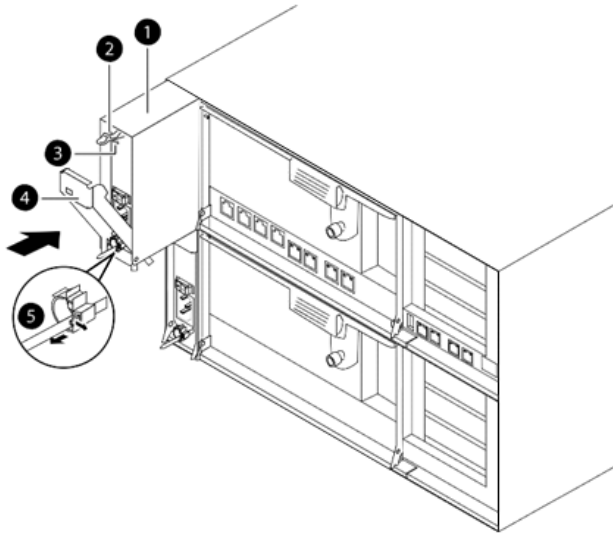
### To install a power supply

1. Verify that the on/off switch on the power supply is in the OFF (O) position. If the power source has an on/off switch, ensure that it is also set to the OFF (O) position.
2. If *you* are not already grounded, properly *ground yourself*.
3. With the cam handle in the open position, align the edges of the power supply with the opening in the system chassis and gently push the power supply into the chassis until it is almost flush with the chassis, as shown below.

---

**Important:** Do not use excessive force when sliding the power supply into the chassis; you can damage the connectors on the rear of the power supply.

---



4. Identify power supply components as described in this table:

Component	Description
1	Power supply
2	Cam handle release latch
3	Power and fault LEDs
4	Cam handle
5	Power cord locking mechanism

5. Push on the power supply to seat it all the way into the chassis, and then push the cam handle to the closed position, making sure that the cam handle release latch clicks into its locked position.
6. Reconnect the power cord, and secure it to the power supply using the power cord retainer clip.
7. Reconnect the power supply cable to the power source.
8. Turn the on/off switch on the power source and the power supply to the ON (I) position. Verify that the power supply is working correctly by observing that the power LED is lit green and the fault LED is not lit.
9. Repeat these steps for the remaining power supplies, if any.



---

## Adding an additional RAID group to a configured appliance

---

**Note:** Removing a drive out of a RAID group and moving it to a different RAID group is not supported. The disk drives have been formatted to a unique RAID configuration and should not be reused for hot-swappable drive replacements.

---

AltaVault appliance storage configurations support only homogeneous drive sizes; the AVA400 supports 4TB and the AVA800 supports 6TB drives.

You can add an additional 12-pack RAID group to a configured and running AltaVault appliance. Note that the maximum number of RAID supported groups is five. A RAID group ships with an initialized RAID volume. Use the following instructions when the shelf is half full (currently containing a 12-pack RAID group) and you want to add another 12-pack.

### Before you begin

- Ensure that customer has an empty AVA10S shelf or an existing shelf with 12 empty disk slots. The empty slots number from 0-11 and 12-23. If a shelf needs to be added, follow the procedure described in [“Installing disk shelves and disk drives” on page 18](#).
- Ensure the controller and the shelf are powered off. To shut down the controller, follow the procedure in the section, [“Shutting down controllers” on page 60](#).

### To add a 12-pack RAID group to a system

1. Place the 12 drives into the empty slots on the powered off disk shelf. The slots are numbered and grouped 0-11 and 12-23. Any drive in the 12-pack can go into any slot within the selected group.
2. Power on the shelf and then the controller.
3. Login as admin to the CLI using an SSH connection to the management NIC or serial console.
4. Enter the following CLI command in the configuration terminal:

```
CLI> show raidgroups
```

This command lists all the add-on RAID Groups connected to the AltaVault system. For the newly added RAID group, the following message displays: `raidgroup import <vd_id>`. The `vd_id` is an ID generated by the system.

5. Use the following command to import the newly added RAID Group into the AltaVault system and make it available for use.

```
CLI> raidgroup import <vd_id>
```

6. Confirm that the RAID group has been imported by running the following command:

```
show raidgroups
```

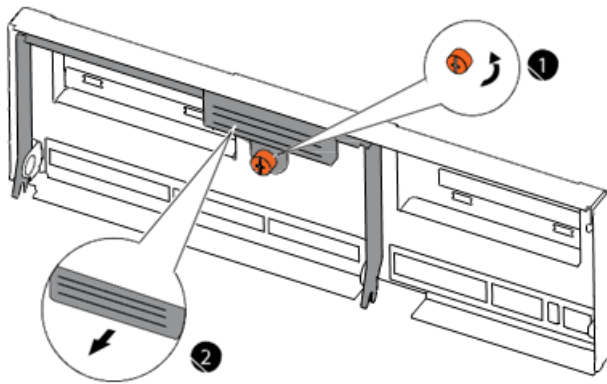
## Replacing internal FRUs

To replace internal field-replaceable units (FRUs) inside the AltaVault controller module, you must perform a clean shutdown of the system, remove the controller module from the chassis, replace the faulty internal FRU, then, re-install the controller module in the system chassis.

Before you begin, ensure that you replace the impaired controller with a controller module that you received from your provider.

### To replace an internal FRU

1. Use the `reload halt` command to perform a clean system shutdown of your system.
2. Power off the system and disconnect the power from the system using the steps described in the procedure, [“Shutting down controllers” on page 60](#).
3. If *you* are not already grounded, properly *ground yourself*.
4. Loosen the thumbscrew on the cam handle as shown below.



5. Identify the components as described in this table:

Component	Description
1	Thumbscrew
2	Cam handle

6. Pull the cam handle downward to unseat the controller and slide the controller module out of the chassis until it catches. Then press the release latch on the left side of the controller module and slide the controller module completely out of the chassis, making sure that you support the base of the module with your free hand.
7. Place the controller module on a clean, flat surface.

8. Use one or more of the following procedures for the FRU you are replacing:
  - [“Installing a controller in a chassis” on page 64](#)
  - [“Replacing system DIMMs” on page 79](#)
  - [“Replacing the RTC clock coin battery” on page 83](#)
  - [“Replacing a boot device in a controller” on page 75](#)
  - [“Replacing a controller chassis” on page 65](#)
  - [“Disposing of batteries” on page 86](#)
9. After you have completed replacing the internal FRU, reinstall the controller module in the chassis using the steps described in the procedure, [“Installing a controller in a chassis” on page 64](#).

---

## Replacing a boot device in a controller

The boot device stores a primary and secondary set of system files (also called the boot image) that the system uses when it boots. The boot device is not a hot-swappable field-replaceable unit (FRU).

The following error messages on the system console indicate that the boot media may have failed:

- Unrecoverable fsck error messages while the AltaVault OS is booting.

### Example

```
Could not load fat://boot0/AV/image1/vmlinuz:Device not found
ERROR: Error booting OS on: 'boot0' file: fat://boot0/mars/image1/vmlinuz (boot0,fat)

Autoboot of PRIMARY image failed. Device not found (-6)
```

- Unrecoverable write errors messages
- Alerts from mDir service concerning configuration backup (configbkp) or boot device.

Replacing the boot device involves keeping track of current system image, shutting down the system cleanly, removing the old boot media from the controller, installing the new boot device, copy system files to the new boot device, and rebooting the system.

---

**Note:** Re-installing the OS is not a supported procedure in this release. A Return Merchandise Authorization (RMA) is required for replacing a boot device in a controller. Contact technical support to help you determine if you need to replace this field-replaceable unit (FRU) and to assist you during the replacement procedure.

---

## Removing the boot device from the controller

Before you begin, note the details about the image installed on your system before you do a clean shutdown of the system for replacing the boot device. The same system image should be installed after boot device replacement.

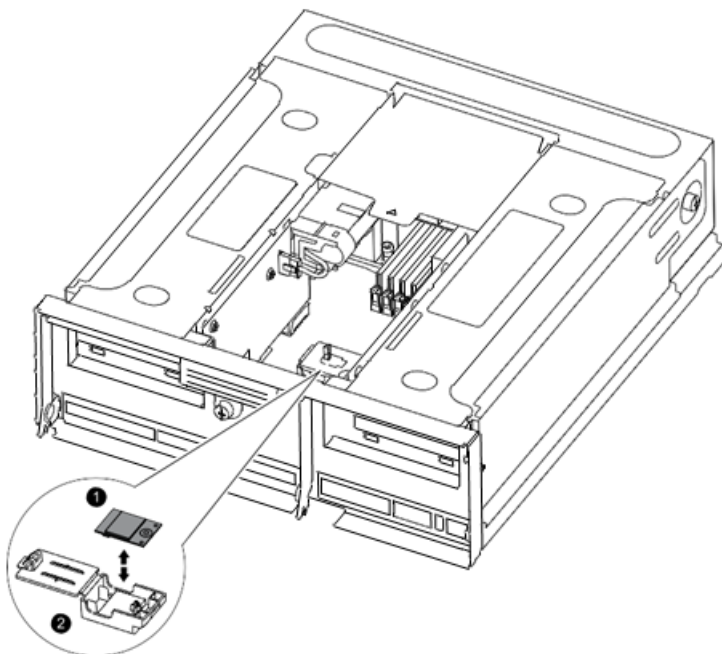
---

**Note:** You must connect to the console port of the AltaVault controller to carry out the tasks in this procedure.

---

### To remove the boot device from the controller

1. On the system console, type the following commands to note details of the operating system image that is installed on your system. This same OS version and revision should be installed after the boot device replacement.
  - `show info` to note the configuration details of your system
  - `show images` command to view the NetApp Release, Revision, Build date, Location, and Install Date
2. Perform a clean system shutdown using the `reload halt` command.
3. Power down your system and disconnect power from using the steps described in the procedure, [“Shutting down controllers” on page 60](#).
4. Remove the controller from the chassis using the steps described in the procedure, [“Replacing internal FRUs” on page 74](#).
5. If *you* are not already grounded, properly *ground yourself*.
6. Locate the boot device holder using the FRU map on the CPU cover in the controller. The attention LED next to the boot device holder is lit. The image below shows the boot device and holder.



7. Identify boot device components as described in this table:

Component	Description
1	Boot device
2	Boot device holder: not removable

8. Open the boot device cover. Hold the boot device by its edges, gently lift it straight upwards to remove it out of the holder. Lifting the boot device at an angle can bend or break the connector pins in the boot device.

---

**Note:** Do not remove the boot device holder from the controller; it is not a FRU.

---

9. Set the boot device aside.

## Installing a boot device

After you remove the faulty boot device from the controller, you must copy system files and restore configuration information to the replacement boot device.

---

**Note:** Re-installing the OS is not a supported procedure in this release. Contact technical support to help you determine if you need to replace this field-replaceable unit (FRU) and to assist you during the replacement procedure.

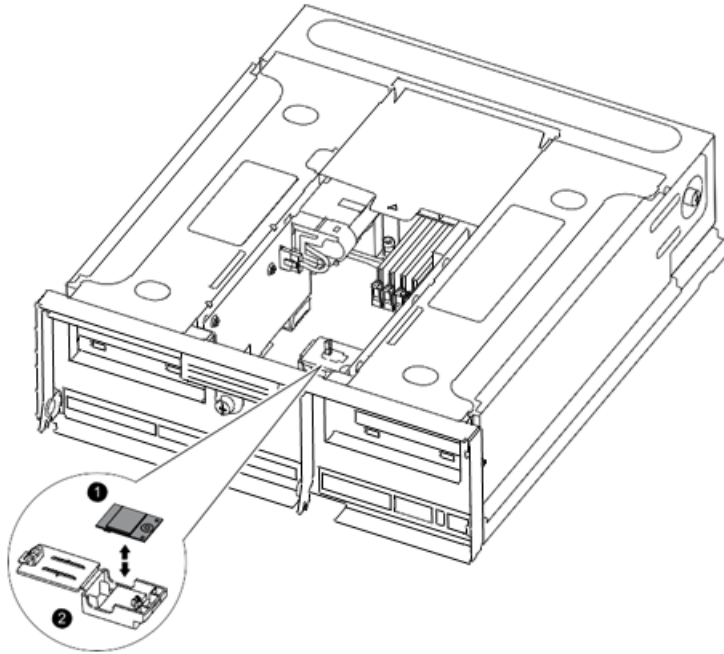
---

Before you begin, you must have the blank replacement boot device that you received from your provider.

### To install the boot device

1. If *you* are not already grounded, properly *ground yourself*.
2. Locate the boot device holder in the controller. Use the FRU map on the controller module to help you locate the boot device holder.
3. Open the boot device cover, if applicable.

4. Align the boot device with the boot device socket or connector, and then firmly push the boot device straight down into the socket or connector.



5. Identify boot device components as described in this table:

Component	Description
1	Boot device
2	Boot device holder: not removable

6. Check the boot device to make sure that it is seated squarely and completely in the socket or connector. If necessary, remove the boot device and reseal it into the socket.
7. Close the boot device cover.
8. Reinstall the controller module in the chassis and connect the power as described in [“Installing a controller in a chassis” on page 64](#). In this case, the system begins to boot but stops at the loader prompt.

---

**Note:** All subsequent steps in this procedure are done at the loader prompt.

---

9. For initializing the new boot media, you must contact technical support.

---

**Important:** This procedure requires advanced knowledge of AltaVault systems and should not be done without help from technical support. Contact technical support to assist you in copying the system files and OS version to the boot media and bringing your system back up to a healthy state, after the boot media replacement procedure.

---

---

## Replacing system DIMMs

An AltaVault controller has eight 32G DIMMs, also known as system memory. The DIMMs encounter correctable and uncorrectable errors during the normal operation of the system.

- With a uncorrectable memory errors, the system reboots.
- With correctable memory errors, the system does not reboot; the errors are recoverable and messages are recorded in the log.

When a DIMM encounters an uncorrectable error, the AltaVault system reboots. An AutoSupport notification with the reason for reboot is generated, alerting the user to the system reboot:

Example

```
DIMM1 encountered an uncorrectable error
```

The system continues to serve data. However, you should promptly replace the faulty DIMM.

## Removing system DIMMs

System DIMMs are not hot-swappable FRUs. To remove a system DIMM from the AltaVault controller, shut down the system and remove the controller module from the chassis. Replace the failed DIMM with a replacement DIMM that is supported on your storage system.

Before you begin

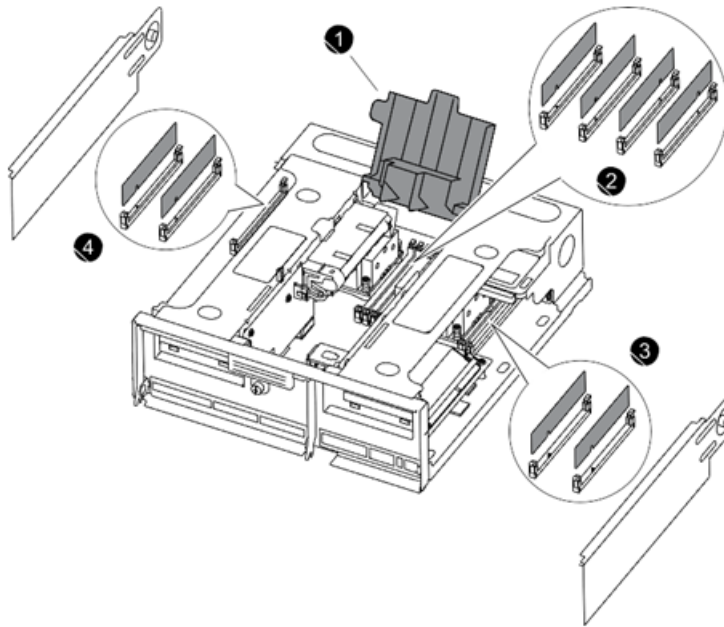
- Perform a clean system shutdown using the `reload halt` command.
- Power down the system and disconnect power from it. For detailed instructions on performing a clean system shutdown and disconnection power, see [“Shutting down controllers” on page 60](#).
- Remove the controller requires assistance from NetApp support.

### To remove a system DIMM

1. If *you* are not already grounded, properly *ground yourself*.
2. Open the CPU cover in the AltaVault controller to access DIMMs 1, 2, 5, and 6.  
Loosen the thumbscrew on the appropriate side panel and remove the side panel to access DIMMs 3, 4, 7, and 8; left side panel for DIMMs 3 and 4, and right side panel for DIMMs 7 and 8.

3. Locate the DIMM that needs to be replaced.

**Figure 4-1. Locating system DIMMs**

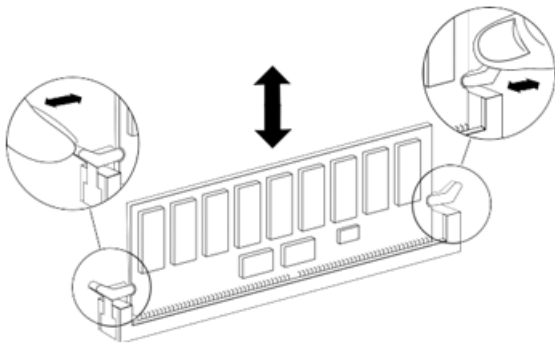


4. Identify DIMM components as described in this table:

Component	Description
1	CPU cover
2	DIMM 6, DIMM 5, DIMM 1, DIMM 2 (left to right)
3	DIMM 4, DIMM 3 (left to right)
4	DIMM 7, DIMM 8 (left to right)

5. Note the orientation of the DIMM in the socket so that you can insert the replacement DIMM in the proper orientation.
6. Press down simultaneously on the two DIMM ejector tabs on either side of the DIMM to eject the DIMM from its slot, and then carefully lift it out of the slot.

All system DIMMs have white ejector latches, shown in the image below.





---

**Important:** Carefully hold the DIMM by the edges to avoid pressure on the components on the DIMM circuit board.

---

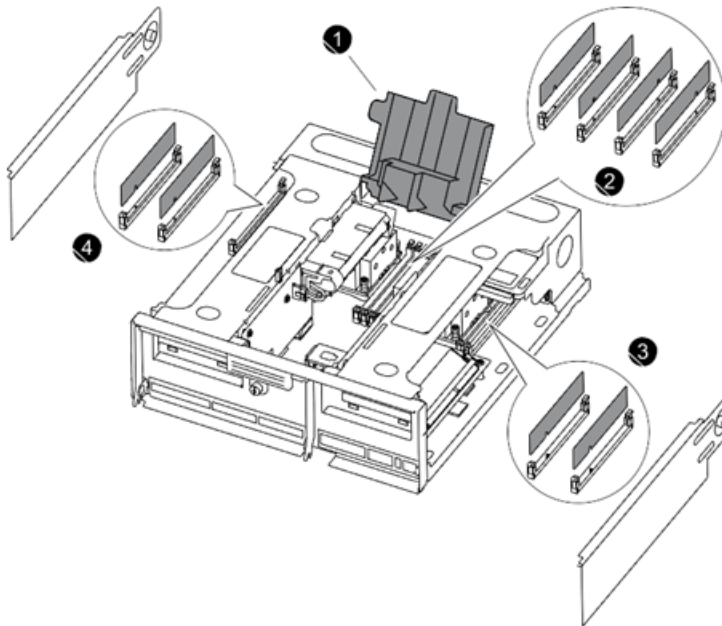
7. Place the DIMM in an anti-static bag.
8. Repeat these steps to remove additional DIMMs as needed.

## Installing system DIMMs

The AltaVault controller has eight 16GB system DIMMs installed; all eight DIMMs are required for optimal system performance. Before you begin, verify that the system DIMM you are installing is supported by your controller model.

### To install a system DIMM

1. If *you* are not already grounded, properly *ground yourself*.
2. Open the CPU cover in the AltaVault controller to access the slots for DIMMs 1, 2, 5, and 6.  
Loosen the thumbscrew on the appropriate side panel and remove the panel to access the slots for DIMMs 3, 4, 7, and 8; left side panel for DIMMs 3 and 4, and right side panel for DIMMs 7 and 8.
3. Locate the slot where you will be installing the new DIMM.
4. Ensure that the latches are in the open position.



5. Identify DIMM components as described in this table

Component	Description
1	CPU cover
2	DIMM 6, DIMM 5, DIMM 1, DIMM 2 (left to right)
3	DIMM 4, DIMM 3 (left to right)
4	DIMM 7, DIMM 8 (left to right)

6. Remove the replacement DIMM from the anti-static shipping bag, hold the DIMM by the corners, and align it over the slot. The notch among the pins on the DIMM should line up with the tab in the socket.

---

**Important:** Carefully hold the DIMM by the edges to avoid pressure on the components on the DIMM circuit board.

---

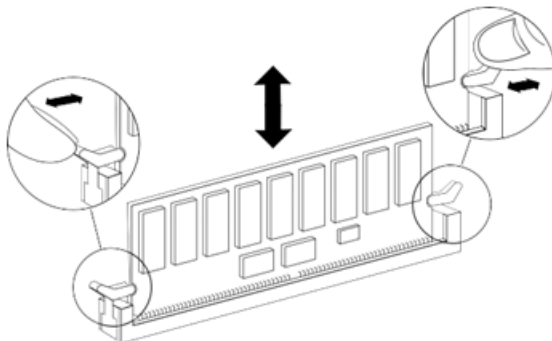
7. Insert the DIMM squarely into the slot. The DIMM fits tightly into the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.

---

**Important:** Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot.

---

8. Push carefully, but firmly, on the top edge of the DIMM until the latches snap into place over the notches at the ends of the DIMM, displayed below. An audible click sound indicates the DIMM is securely installed in the slot.



9. Repeat the preceding steps to install additional DIMMs as needed.
10. Close the CPU cover and close and lock the side panel.
11. Reinstall the controller module in the chassis, connect power and boot up the system using the steps described in the procedure, [“Installing a controller in a chassis” on page 64](#).
12. To ensure that the system has booted correctly, verify that the System attention LED on the chassis front and Controller attention LED on chassis rear are not lit after the system has finished booting.

---

## Replacing RAID controllers

RAID Controllers are assigned to slots 1 and 3 in the controller. The BBU cards are located in brackets that are attached to the existing controller shelves behind the installed cards.

For information on replacing a RAID controller, contact NetApp support. The procedure is complex and should only be done by field support.

---

**Note:** Perform a clean shutdown before replacing any RAID Controllers.

---

---

## Replacing the RTC clock coin battery

You must replace a faulty real-time clock (RTC) coin battery in the controller module to ensure that your system's services and applications that depend on accurate time synchronization continue to function properly.

### Removing an RTC battery

Removing an RTC battery entails shutting down the system, locating the battery in the controller module, and removing the battery.

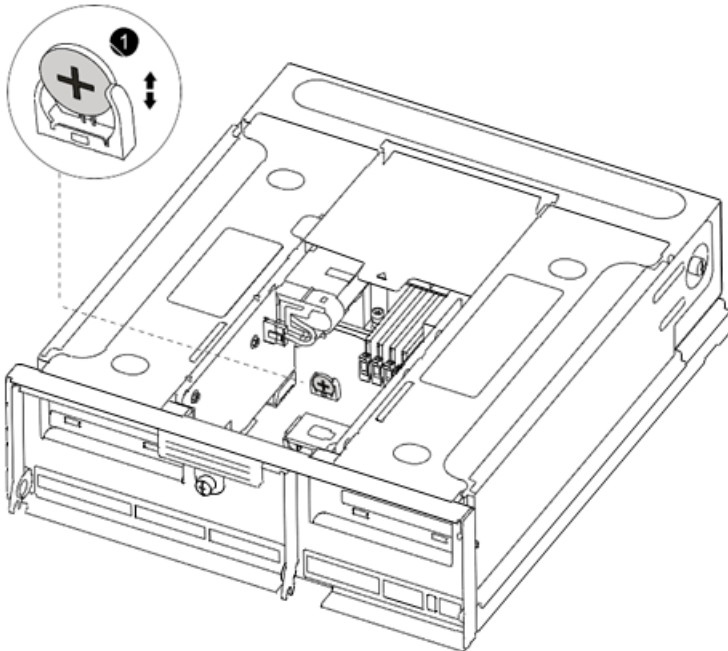
#### Before you begin

- Perform a clean system shutdown using the `reload halt` command.
- Power down the system and disconnect its power using the steps described in the procedure, [“Shutting down controllers” on page 60](#).
- Removing the controller from the chassis requires assistance from NetApp Support.

#### To remove an RTC battery

1. Locate the RTC coin battery in the controller module using the FRU map on the CPU cover. The attention LED next to the battery is lit.

The RTC coin battery in the AltaVault controller is located near the boot device, almost in the center of the controller as shown below.



2. Identify battery components as described in this table:

Component	Description
1	RTC battery and controller

3. Place your thumb or forefinger on the battery, gently push the battery away from the holder, and then lift the battery out of the holder.

---

**Note:** The polarity of the battery as you remove it from the holder. The battery is marked with a plus sign and must be positioned in the holder in the correct orientation, when replaced. A plus sign near the holder tells you how the battery should be positioned.

---

4. Place the battery on an anti-static surface.

## Installing an RTC battery

Before you begin, verify that the RTC battery you are installing is supported by your controller model.

### To install an RTC battery

1. If you are not already grounded, properly ground yourself.
2. Remove the replacement battery from the anti-static shipping bag.

3. Hold the battery such that the plus sign on the battery is facing you and away from the battery holder. You must install the battery in this orientation for the polarity to be correct.

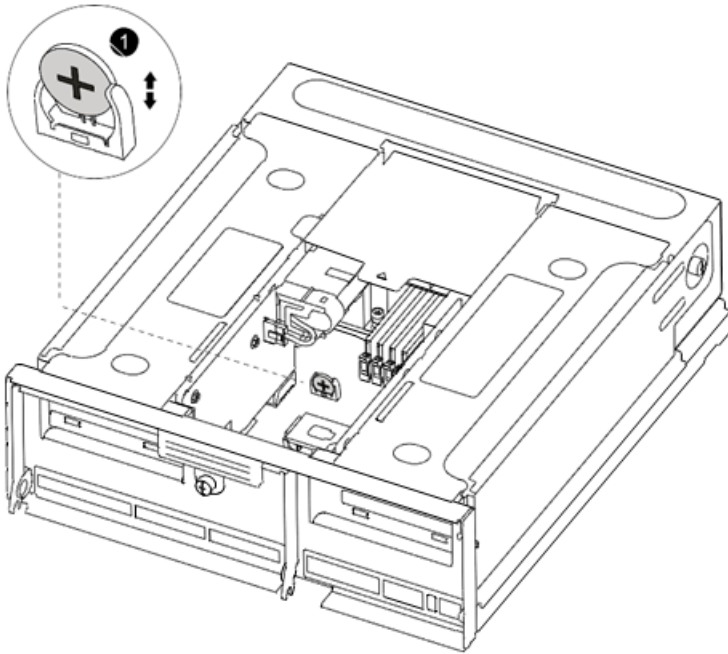
---

**Note:** A plus sign near the battery holder indicates the battery polarity and how the battery should be positioned in the chassis.

---

4. Locate the empty battery holder in the controller module and insert the battery into the holder by tilting the battery at an angle and gently pushing down.

The image below shows the RTC battery in the controller. The battery should slide easily into the battery holder. If it does not, remove the battery and try again.



5. Identify battery components as described in this table:

Component	Description
1	RTC battery and controller

6. Visually inspect the battery to make sure that it is completely installed into the holder and that the polarity is correct.
7. Reinstall the controller module in the chassis, connect power and reboot the system using the steps described in the procedure, [“Installing a controller in a chassis” on page 64](#).
8. To ensure that the system has booted correctly, verify that the System attention LED on the chassis front and Controller attention LED on chassis rear are not lit after the system has finished booting.

## Disposing of batteries

Dispose of batteries according to local regulations regarding battery recycling or disposal. If you cannot properly dispose of the battery, return it to NetApp, as described in the RMA instructions shipped with the kit.

---

## Replacing a faulty hard disk drive on an AltaVault AVA400 or AVA800 appliance

An alarm is raised when a disk drive fails. The alarm indicates which drive has failed and the state of the RAID being degraded. For information on replacing a faulty hard disk drive on an AltaVault AVA400 or AVA800 appliance, see KB Article number [KB1015503](#) on the NetApp Support site at <https://mysupport.netapp.com>. Because this process requires shell access, support assistance is required.

For information on installing a new preconfigured 12-pack of disk drives into the shelf, “[Installing additional preconfigured disk drives on a shelf](#)” on page 18.

---

## Replacing disk shelf power supplies and other FRUs

For replacing disk power supplies, and other disk shelf FRUs, see [SAS Disk Shelves Installation and Service Guide for DS4243, DS2246, DS4486, and DS4246](#).

---

## Returning failed parts

Return failed parts to NetApp as described in the RMA instructions shipped with the kit.

Contact technical support at [mysupport.netapp.com](https://mysupport.netapp.com), 888-463-8277 (North America/Canada), 00-800- 44-638277 (Europe/EMEA), or +800-800-80-800 (Asia/Pacific) if you need the RMA number or additional help with the replacement procedure.

---

## Disposing of batteries

Dispose of batteries according to local regulations regarding battery recycling or disposal. If you cannot properly dispose of the battery, return it to NetApp, as described in the RMA instructions shipped with the kit.

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