



# Maintain

## Install and maintain

NetApp  
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# Maintain

## Replace the boot media - NS224 shelves

You can replace a failed boot media in an NS224 shelf. Replacing the boot media can be done nondisruptively, while the drive shelf is powered on, and I/O is in progress.

### Before you begin

- **NS224 with NSM100 modules only:** Your HA pair must already be running ONTAP 9.7 or later, which has the minimum supported version of NSM firmware.

You can enter the `storage shelf show -module` command at the console of either controller to verify the version of NSM firmware on your shelf.



If your shelf is not running NSM firmware version 0111 or later, you cannot replace the boot media, you must replace the NSM.

[Replace an NSM - NS224 shelves](#)

- **NS224 with NSM100 modules only:** You need a Phillips #1 screwdriver.

The screw used to secure the boot media to the board requires a Phillips #1 screwdriver; using a different type of screwdriver could strip the screw.

- The shelf's partner NSM must be up and running, and be cabled correctly so that your shelf maintains connectivity when you remove the NSM with the failed FRU (target NSM).

[NetApp Downloads: Config Advisor](#)

- All other components in the system must be functioning properly.

### About this task

- After the boot media is replaced, the boot image from the shelf's partner NSM is automatically copied to the replacement boot media.

This can take up to five minutes.

- Allow at least 70 seconds between removal and installation of the NVMe shelf module (NSM).

This allows enough time for ONTAP to process the NSM removal event.

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the *shelf\_name* of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- After replacing the boot media, you can return the failed part to NetApp as described in the RMA instructions shipped with the kit.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

## NSM100 modules

You can use the following animation or the written steps to replace the boot media.

### Replace the NS224 shelf boot media

#### Steps

1. Make sure that both NSMs in the shelf are running the same version of firmware: version 0200 or later.
2. Properly ground yourself.
3. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM, later in this procedure.

4. Remove the NSM from the shelf:
  - a. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are removing the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- b. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.

The latching mechanisms raise, clearing the latching pins on the shelf.

- c. Gently pull until the NSM is about one third of the way out of the shelf, grasp the NSM sides with both hands to support its weight, and then place it on a flat stable surface.

When you begin pulling, the latching mechanism arms extend from the NSM and lock in their fully extended position.

5. Loosen the NSM cover thumb screw and open the cover.
6. Physically locate the failed boot media.

The boot media is located along the shelf chassis wall opposite from the power supply.

7. Replace the boot media:
  - a. Using the Phillips #1 screwdriver, carefully remove the screw securing the bottom (notched) end of the boot media to the board.
  - b. Remove the boot media by rotating the notched end up slightly and then gently pulling it towards you until it releases from the socket.

You can hold the boot media by placing your thumb and forefinger on the side edges, at the notched end.

- c. Unpack the boot media from the antistatic bag.
- d. Insert the replacement boot media by pushing it gently into the socket until it is seated squarely and completely in the socket.

You can hold the boot media by placing your thumb and forefinger on the side edges, at the notched end. Make sure that the side with the heat sink is facing up.

When correctly seated, and when you let go of the boot media, the notched end of the boot media is angled up, away from the board, because it is not yet secured with the screw.

- e. Gently hold down the notched end of the boot media as you insert and tighten the screw with the screwdriver to secure the boot media in place.



Tighten the screw just enough to hold the boot media securely in place, but do not overtighten.

8. Close the NSM cover, and then tighten the thumb screw.

9. Reinsert the NSM into the shelf:

- a. Make sure that the latching mechanism arms are locked in the fully extended position.
- b. Using both hands, gently slide the NSM into the shelf until the weight of the NSM is fully supported by the shelf.
- c. Push the NSM into the shelf until it stops (about half an inch from the back of the shelf).

You can place your thumbs on the orange tabs on the front of each finger loop (of the latching mechanism arms) to push in the NSM.

- d. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are inserting the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- e. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.
- f. Gently push forward to get the latches over the stop.
- g. Release your thumbs from the tops of the latching mechanisms, and then continue pushing until the latching mechanisms snap into place.

The NSM should be fully inserted into the shelf and flush with the edges of the shelf.

10. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power

supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

11. Verify that the attention (amber) LEDs on the NSM containing the failed boot media and the shelf operator display panel are no longer illuminated.

It can take between 5 to 10 minutes for the attention LEDs to turn off. This is the amount of time it takes the NSM to reboot and the boot media image copy to complete.

If the fault LEDs remain on, the boot media might not be seated correctly or there might be another issue and you should contact technical support for assistance.

12. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

### **NSM100B modules**

You can use the following steps to replace the failed boot media.

#### **Steps**

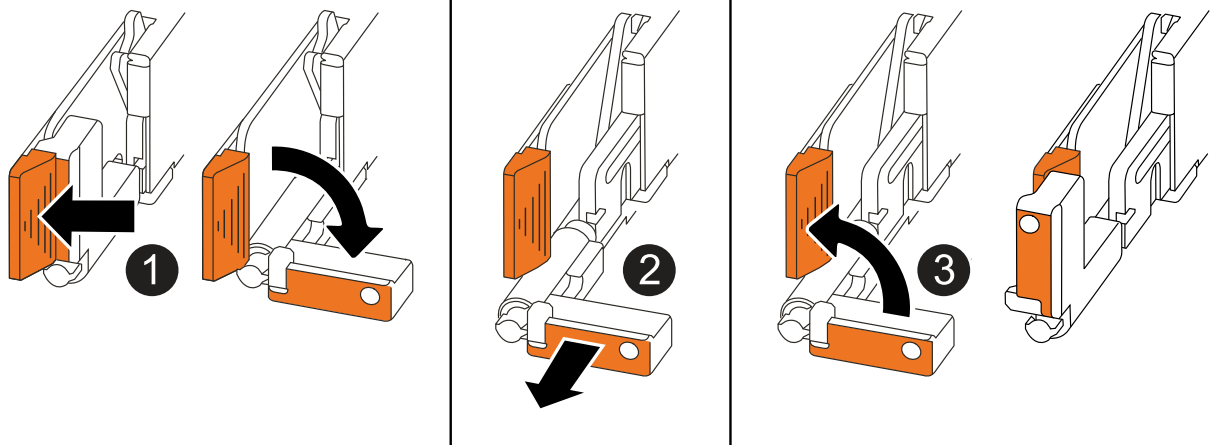
1. Properly ground yourself.
2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM, later in this procedure.

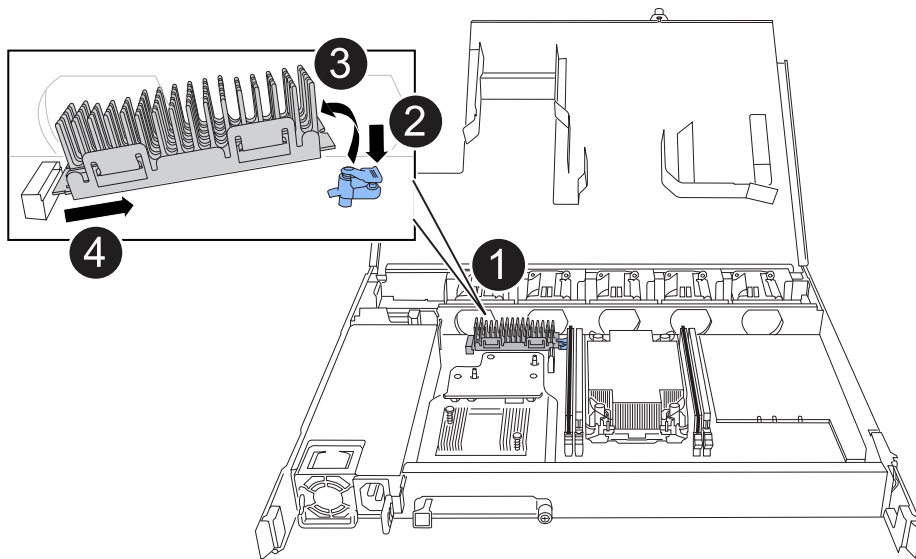
3. Remove the NSM:



1	On both ends of the NSM, push the vertical locking tabs outward to release the handles.
2	<ul style="list-style-type: none"> <li>• Pull the handles towards you to unseat the NSM from the midplane.</li> </ul> <p>As you pull, the handles extend out from the shelf. When you feel some resistance, keep pulling.</p> <ul style="list-style-type: none"> <li>• Slide the NSM out of the shelf and place it on a flat, stable surface.</li> </ul> <p>Make sure that you support the bottom of the NSM as you slide it out of the shelf.</p>
3	Rotate the handles upright (next to the tabs) to move them out of the way.

4. Open the NSM cover by turning the thumbscrew counterclockwise to loosen it, and then open the cover.
5. Physically locate the failed boot media.
6. Remove the boot media:





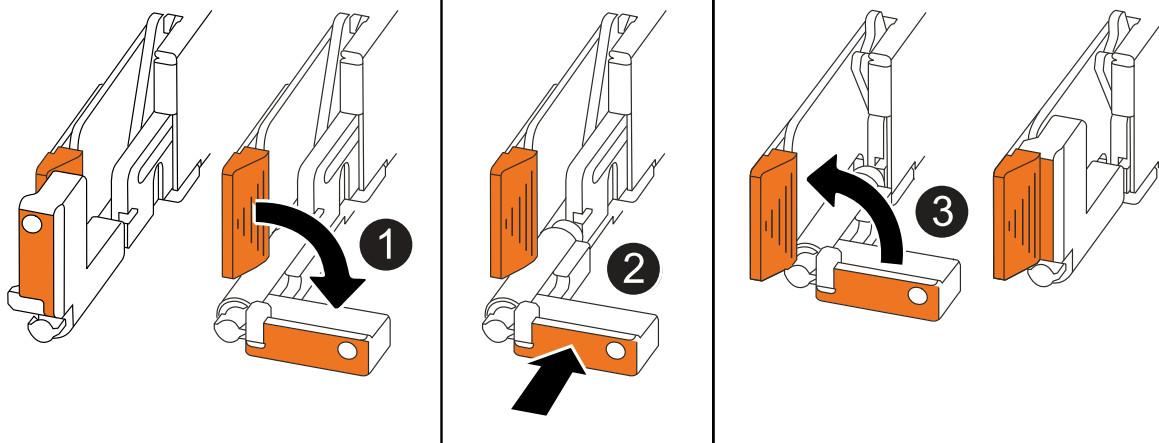
1	Boot media location
2	Press down on the blue tab to release the right end of the boot media.
3	Lift the right end of the boot media up at a slight angle to get a good grip along the sides of the boot media.
4	Gently pull the left end of the boot media out of its socket.

7. Install the replacement boot media:

- a. Align the edges of the boot media with the socket housing, and then gently push it squarely into the socket.
- b. Rotate the boot media down toward the locking button.
- c. Push the locking button, rotate the boot media all the way down, and then release the locking button.

8. Close the NSM cover, and then tighten the thumb screw.

9. Insert the NSM into the shelf:



1	If you rotated the NSM handles upright (next to the tabs) to move them out of the way while you serviced the NSM, rotate them down to the horizontal position.
2	Align the rear of the NSM with the opening in the shelf, and then gently push the NSM using the handles until it is fully seated.
3	Rotate the handles to the upright position and lock in place with the tabs.

10. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

11. Verify that the attention (amber) LEDs on the NSM containing the failed boot media and the shelf operator display panel are no longer illuminated.

It can take between 5 to 10 minutes for the attention LEDs to turn off. This is the amount of time it takes the NSM to reboot and the boot media image copy to complete.

If the fault LEDs remain on, the boot media might not be seated correctly or there might be another issue and you should contact technical support for assistance.

12. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

## Replace a DIMM - NS224 shelves

You can replace a faulty DIMM nondisruptively in an NS224 drive shelf that is powered on, and while I/O is in progress.

### Before you begin

- The shelf's partner NSM must be up and running, and be cabled correctly so that your shelf maintains connectivity when you remove the NSM with the failed FRU (target NSM).

[NetApp Downloads: Config Advisor](#)

- All other components in the system, including the other three DIMMs in the NSM100 module and one DIMM in the NSM100B module, must be functioning properly.

### About this task

- Allow at least 70 seconds between removal and installation of the NVMe shelf module (NSM).

This allows enough time for ONTAP to process NSM removal event.

- **Best practice:** The best practice is to have current versions of NVMe shelf module (NSM) firmware and drive firmware on your system before replacing FRU components.

[NetApp Downloads: Disk Shelf Firmware](#)

[NetApp Downloads: Disk Drive Firmware](#)



Do not revert firmware to a version that does not support your shelf and its components.

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the *shelf\_name* of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- When you unpack the replacement DIMM, save all packing materials for use when you return the failed DIMM.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

## NSM100 modules

You can use the following animation or the written steps to replace a DIMM.

### Replace a DIMM in an NS224 shelf

#### Steps

1. Properly ground yourself.
2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM, later in this procedure.

3. Remove the NSM from the shelf:
  - a. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are removing the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- b. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.

The latching mechanisms raise, clearing the latching pins on the shelf.

- c. Gently pull until the NSM is about one third of the way out of the shelf, grasp the NSM sides with both hands to support its weight, and then place it on a flat stable surface.

When you begin pulling, the latching mechanism arms extend from the NSM and lock in their fully extended position.

4. Loosen the NSM cover thumb screw and open the cover.

The FRU label on the NSM cover shows the location of the four DIMMs, two on either side of the heat sink, in the center of the NSM.

5. Physically identify the faulty DIMM.

When a DIMM is faulty, the system logs a warning message to the system console indicating which DIMM is faulty.

6. Replace the faulty DIMM:

- a. Note the orientation of the DIMM in the slot so that you can insert the replacement DIMM using the same orientation.
- b. Eject the DIMM from its slot by slowly pushing apart the ejector tabs at both ends of the DIMM

slot, and then lift the DIMM out of the slot.



Carefully hold the DIMM by the corners or edges to avoid pressure on the DIMM circuit board components.

The ejector tabs remain in the open position.

- c. Remove the replacement DIMM from its antistatic shipping bag.
- d. Hold the DIMM by the corners, and then insert the DIMM squarely into a slot.

The notch on the bottom of the DIMM, among the pins, should line up with the tab in the slot.

When inserted correctly, the DIMM should go in easily but fit tightly in the slot. If not, reinsert the DIMM.

- e. Push down carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at both ends of the DIMM.
7. Close the NSM cover, and then tighten the thumb screw.
8. Reinsert the NSM into the shelf:

- a. Make sure that the latching mechanism arms are locked in the fully extended position.
- b. Using both hands, gently slide the NSM into the shelf until the weight of the NSM is fully supported by the shelf.
- c. Push the NSM into the shelf until it stops (about half an inch from the back of the shelf).

You can place your thumbs on the orange tabs on the front of each finger loop (of the latching mechanism arms) to push in the NSM.

- d. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are inserting the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- e. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.
- f. Gently push forward to get the latches over the stop.
- g. Release your thumbs from the tops of the latching mechanisms, and then continue pushing until the latching mechanisms snap into place.

The NSM should be fully inserted into the shelf and flush with the edges of the shelf.

9. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

10. Verify that the attention (amber) LEDs on the NSM containing the failed DIMM and the shelf operator display panel are no longer illuminated.

The NSM attention LEDs turn off after the NSM reboots and no longer detects a DIMM issue. This can take three to five minutes.

11. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

## NSM100B modules

### Steps

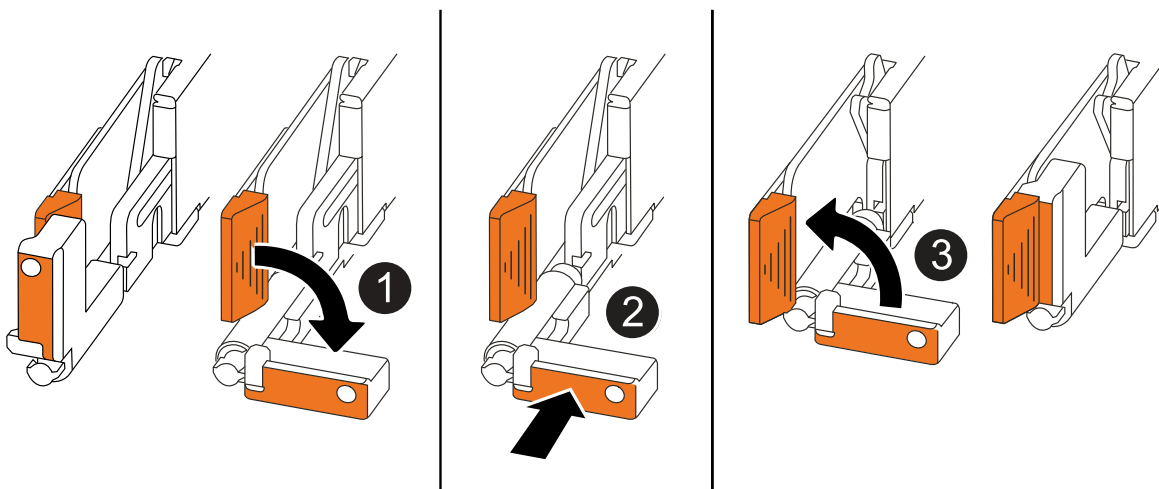
1. Properly ground yourself.
2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM, later in this procedure.

3. Insert the NSM into the shelf:



1	If you rotated the NSM handles upright (next to the tabs) to move them out of the way while you serviced the NSM, rotate them down to the horizontal position.
2	Align the rear of the NSM with the opening in the shelf, and then gently push the NSM using the handles until it is fully seated.
3	Rotate the handles to the upright position and lock in place with the tabs.

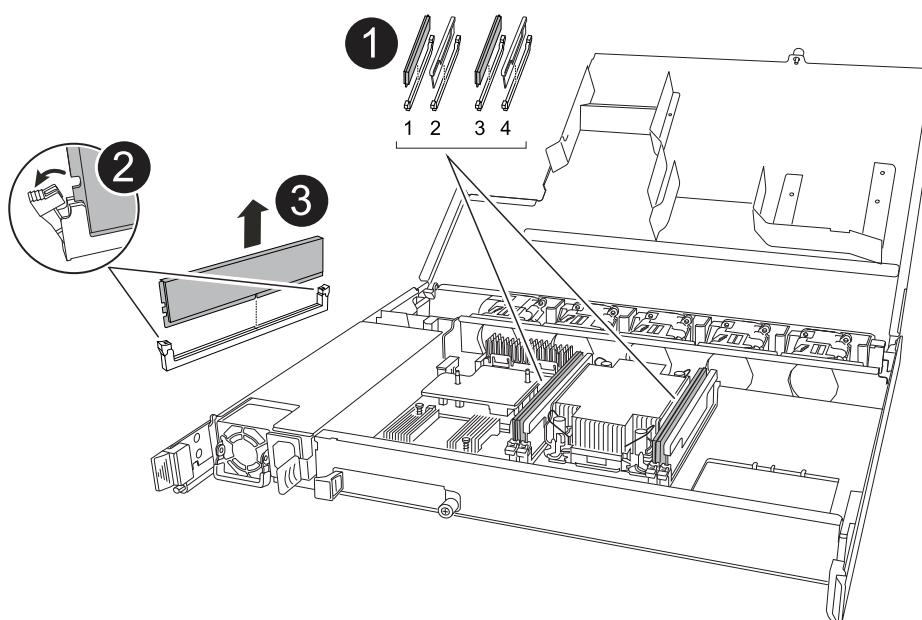
4. Open the NSM cover by turning the thumbscrew counterclockwise to loosen, and then open the cover.

The FRU label on the NSM cover shows the location of the two DIMMs and two DIMM Blanks in the NSM.


5. Physically identify the faulty DIMM.

When a DIMM is faulty, the system logs a warning message to the system console indicating which DIMM needs to be replaced.

6. Remove the faulty DIMM:



1	<p>DIMM slot numbering and positions.</p> <p>The NSM contains DIMMs in slots 1 and 3, and DIMM Blanks in slots 2 and 4.</p>
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<p>2</p>	<ul style="list-style-type: none"> <li>• Note the orientation of the DIMM in the socket so that you can insert the replacement DIMM using the same orientation.</li> <li>• Eject the faulty DIMM by slowly pushing apart the two DIMM ejector tabs on both ends of the DIMM slot.</li> </ul> <div>  <p>Carefully hold the DIMM by the corners or edges to avoid pressure on the DIMM circuit board components.</p> </div>
<p>3</p>	<p>Lift the DIMM up and out of the slot.</p> <p>The ejector tabs remain in the open position.</p>

7. Replace the DIMM:

- Remove the replacement DIMM from its antistatic shipping bag.
- Hold the DIMM by the corners, and then insert the DIMM squarely into a slot.

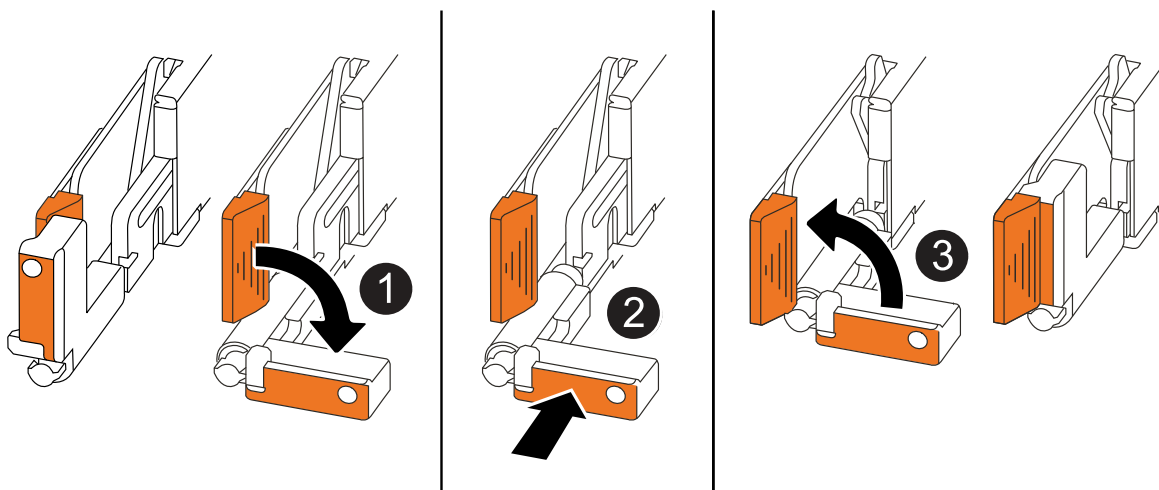
The notch on the bottom of the DIMM, among the pins, should line up with the tab in the slot.

When inserted correctly, the DIMM should go in easily but fit tightly in the slot. If not, reinsert the DIMM.

- Push down carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at both ends of the DIMM.

8. Close the NSM cover, and then tighten the thumb screw.

9. Insert the NSM into the shelf:



<p>1</p>	<p>If you rotated the NSM handles upright (next to the tabs) to move them out of the way while you serviced the NSM, rotate them down to the horizontal position.</p>
<p>2</p>	<p>Align the rear of the NSM with the opening in the shelf, and then gently push the NSM using the handles until it is fully seated.</p>



**3**

Rotate the handles to the upright position and lock in place with the tabs.

10. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

11. Verify that the attention (amber) LEDs on the NSM containing the failed DIMM and the shelf operator display panel are no longer illuminated.

The NSM attention LEDs turn off after the NSM reboots and no longer detects a DIMM issue. This can take three to five minutes.

12. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

## Hot-swap a drive - NS224 shelves

You can replace a failed drive nondisruptively in an NS224 drive shelf that is powered on, and while I/O is in progress.

### Before you begin

- The drive that you are installing must be supported by the NS224 shelf.

[NetApp Hardware Universe](#)

- If SED authentication is enabled, you must use the SED replacement instructions in the ONTAP documentation.

Instructions in the ONTAP documentation describe additional steps you must perform before and after replacing an SED.

[NetApp encryption overview with the CLI](#)

- All other components in the system must be functioning properly; if not, contact technical support.
- Verify that the drive you are removing is failed.

You can verify that the drive is failed by running the `storage disk show -broken` command. The failed drive appears in the list of failed drives. If it does not, you should wait, and then run the command again.



Depending on the drive type and capacity, it can take up to several hours for the drive to appear in the list of failed drives.

### About this task

- **Best practice:** The best practice is to have the current version of the Disk Qualification Package (DQP) installed before hot-swapping a drive.

Having the current version of the DQP installed allows your system to recognize and use newly qualified drives. This avoids system event messages about having noncurrent drive information and prevention of drive partitioning because drives are not recognized. The DQP also notifies you of noncurrent drive firmware.

[NetApp Downloads: Disk Qualification Package](#)

- **Best practice:** The best practice is to have current versions of NVMe shelf module (NSM) firmware and drive firmware on your system before replacing FRU components.

[NetApp Downloads: Disk Shelf Firmware](#)

[NetApp Downloads: Disk Drive Firmware](#)



Do not revert firmware to a version that does not support your shelf and its components.

- Drive firmware is automatically updated (nondisruptively) on new drives that have non-current firmware versions.



Drive firmware checks occur every two minutes.

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the *shelf\_name* of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- When you unpack the replacement drive, save all packing materials for use when you return the failed drive.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

### Steps

1. If you want to manually assign drive ownership for the replacement drive, you need to disable automatic drive assignment if it is enabled.



You need to manually assign drive ownership if drives in the shelf are owned by both controller modules in the HA pair. You complete this task later in this procedure.

- a. Verify whether automatic drive assignment is enabled: `storage disk option show`

You can enter the command on either controller module.

If automatic drive assignment is enabled, the output shows `on` in the `Auto Assign` column (for each controller module).

- b. If automatic drive assignment is enabled, disable it: `storage disk option modify -node node_name -autoassign off`

You must disable automatic drive assignment on both controller modules.

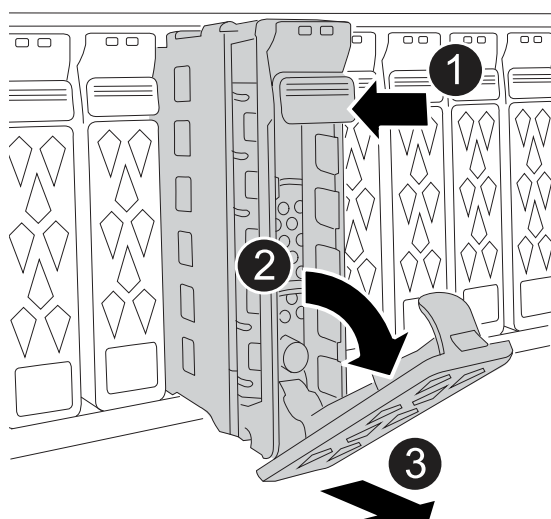
2. Properly ground yourself.
3. Physically identify the failed drive.

When a drive fails, the system logs a warning message to the system console indicating which drive failed. Additionally, the attention (amber) LED on the drive shelf operator display panel and the failed drive illuminate.



The activity (green) LED on a failed drive can be illuminated (solid), which indicates that the drive has power, but should not be blinking, which indicates I/O activity. A failed drive has no I/O activity.

4. Remove the failed drive:



1	Press the release button on the drive face to open the cam handle.
2	Rotate the cam handle downward to disengage the drive from the midplane.

**3**

Slide the drive out of the shelf using the cam handle and supporting the drive with your other hand.

5. Wait a minimum of 70 seconds before inserting the replacement drive.

This allows the system to recognize that a drive was removed.

6. Insert the replacement drive:

- a. With the cam handle in the open position, use both hands to insert the drive.
- b. Gently push until the drive stops.
- c. Close the cam handle so that the drive is fully seated into the mid plane and the handle clicks into place.

Be sure to close the cam handle slowly so that it aligns correctly with the face of the drive.

7. Verify that the drive's activity (green) LED is illuminated.

When the drive's activity LED is solid, it means that the drive has power. When the drive's activity LED is blinking, it means that the drive has power and I/O is in progress. If the drive firmware is automatically updating, the LED blinks.

8. If you are replacing another drive, repeat the preceding steps.

9. If you disabled automatic drive assignment earlier in this procedure, manually assign drive ownership, and then reenables automatic drive assignment if needed:

- a. Display all unowned drives: `storage disk show -container-type unassigned`

You can enter the command on either controller module.

- b. Assign each drive: `storage disk assign -disk disk_name -owner owner_name`

You can enter the command on either controller module.

You can use the wildcard character to assign more than one drive at once.

- c. Reenable automatic drive assignment if needed: `storage disk option modify -node node_name -autoassign on`

You must reenables automatic drive assignment on both controller modules.

## Drive shelf

### Overview of shelf maintenance - NS224 shelves

You can take the following actions to maintain your NS224 shelf:

- [Hot-add a drive](#)
- [Cold-replace a shelf](#)
- [Hot-remove a shelf](#)

- [Monitor shelf LEDs](#)

## Cold-replace a shelf - NS224 shelves

When replacing a drive shelf in a production system that has disks in use, you need to perform a cold shelf replacement. This is a disruptive procedure. It requires you to halt the controllers in your HA pair.

Use the NetApp Knowledge Base article [How to replace a shelf chassis using a cold shelf removal procedure](#).

## Hot-add a drive - NS224 shelves

You can add new drives to a powered-on shelf non-disruptively, even during I/O operations.

Use the NetApp Knowledge Base article [Best practices for adding disks to an existing shelf or cluster](#).

## Hot-remove a shelf - NS224 shelves

You can hot-remove an NS224 drive shelf that has had the aggregates removed from the drives, in an HA pair that is up and serving data (I/O is in progress).



This procedure does not apply to ASA r2 systems.

### Before you begin

- Your HA pair cannot be in a takeover state.
- You must have removed all aggregates from the drives (the drives must be spares) in the shelf you are removing.



If you attempt this procedure with aggregates on the shelf you are removing, you could fail the system with a multidisk panic.

You can use the `storage aggregate offline -aggregate aggregate_name` command and then the `storage aggregate delete -aggregate aggregate_name` command.

To review more information on this step and avoid potential IO issues, see the [Disks and aggregates overview](#).

- If your system shipped in a system cabinet, you need a Phillips screwdriver to remove the screws securing the shelf to the cabinet rack rails.

### About this task

- If you are hot-removing more than one shelf, you remove one shelf at a time.
- **Best practice:** The best practice is to clear drive ownership after you remove the aggregates from the drives in the shelf you are removing.

Clearing ownership information from a spare drive allows the drive to be properly integrated into another node (as needed).

The procedure for removing ownership from drives can be found in the disks and aggregates content:



The procedure requires you to disable automatic drive assignment. You reenable automatic drive assignment at the end of this procedure (after you have hot-removed the shelf).

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the *shelf\_name* of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- After disconnecting a shelf from non-dedicated RoCE capable ports (on board the controllers, on RoCE capable PCIe cards, a combination of both, or on I/O modules), you have the option of reconfiguring these ports for networking use.

If your HA pair is running ONTAP 9.7 or later, you do not need to reboot the controllers, unless one or both controllers are in maintenance mode. This procedure assumes that neither controller is in maintenance mode.

### Steps

1. Properly ground yourself.
2. Verify that the drives in the shelf you are removing have no aggregates (are spares) and that ownership is removed:
  - a. Enter the following command to list all of the drives in the shelf that you are removing: `storage disk show -shelf shelf_number`

You can enter the command on either controller module.

- b. Check the output to verify that there are no aggregates on the drives.

Drives with no aggregates have a dash in the `Container Name` column.

- c. Check the output to verify that ownership is removed from the drives.

Drives with no ownership have a dash in the `Owner` column.



If you have failed drives, they display `broken` in the `Container Type` column. (Failed drives do not have ownership.)

The following output shows drives on the shelf being removed (shelf 2) are in a correct state for removing the shelf. The aggregates are removed on all of the drives; therefore, a dash appears in the `Container Name` column for each drive. Ownership is also removed on all of the drives; therefore, a dash appears in the `Owner` column for each drive.

```
cluster1::> storage disk show -shelf 2
```

Disk	Usable Size	Shelf	Bay	Disk Type	Container Type	Container Name	Owner
...							
2.2.4	-	2	4	SSD-NVM	spare	-	-
2.2.5	-	2	5	SSD-NVM	spare	-	-
2.2.6	-	2	6	SSD-NVM	broken	-	-
2.2.7	-	2	7	SSD-NVM	spare	-	-
...							

3. Physically locate the shelf you are removing.

4. Disconnect the cabling from the shelf you are removing:

- Disconnect the power cords from the power supplies by opening the power cord retainer if they are AC power supplies, or unscrewing the two thumb screws if they are DC power supplies, and then unplug the power cords from the power supplies.

Power supplies do not have a power switch.

- Disconnect the storage cabling (from the shelf to the controllers).

5. Physically remove the shelf from the rack or cabinet.



A fully loaded NS224 shelf can weigh up to 66.78 lbs (30.29 kg) with NSM100 modules or an average of 56.8 lbs (25.8 kg) with NSM100B modules and requires two people to lift or use of a hydraulic lift. Avoid removing shelf components (from the front or rear of the shelf) to reduce the shelf weight, because shelf weight will become unbalanced.



If your system was shipped in a cabinet, you must first unscrew the two Phillips screws securing the shelf to the rack rails. The screws are located on the inside shelf walls of the bottom NSM. You should remove both NSMs to access the screws.

6. If you are removing more than one shelf, repeat the preceding steps.

Otherwise, go to the next step.

7. If you disabled automatic drive assignment when you removed ownership from the drives, reenable it:  
`storage disk option modify -autoassign on`

You run the command on both controller modules.

8. You have the option of reconfiguring the non-dedicated RoCE capable ports for networking use, by completing the following substeps. Otherwise, you are done with this procedure.

- Verify the names of the non-dedicated ports, currently configured for storage use: `storage port show`

You can enter the command on either controller module.



The non-dedicated ports configured for storage use are displayed in the output as follows: If your HA pair is running ONTAP 9.8 or later, the non-dedicated ports display `storage` in the `Mode` column. If your HA pair is running ONTAP 9.7, the non-dedicated ports, which display `false` in the `Is Dedicated?` column, also display `enabled` in the `State` column.

- b. Complete the set of steps applicable to the version of ONTAP your HA pair is running:

If your HA pair is running...	Then...
ONTAP 9.8 or later	<p>a. Reconfigure the non-dedicated ports for networking use, on the first controller module: <code>storage port modify -node node name -port port name -mode network</code></p> <p>You must run this command for each port you are reconfiguring.</p> <p>b. Repeat the above step to reconfigure the ports on the second controller module.</p> <p>c. Go to substep 8c to verify all port changes.</p>
ONTAP 9.7	<p>a. Reconfigure the non-dedicated ports for networking use, on the first controller module: <code>storage port disable -node node name -port port name</code></p> <p>You must run this command for each port you are reconfiguring.</p> <p>b. Repeat the above step to reconfigure the ports on the second controller module.</p> <p>c. Go to substep 8c to verify all port changes.</p>

- c. Verify that the non-dedicated ports of both controller modules are reconfigured for networking use:
- ```
storage port show
```

You can enter the command on either controller module.

If your HA pair is running ONTAP 9.8 or later, the non-dedicated ports display `network` in the `Mode` column.

If your HA pair is running ONTAP 9.7, the non-dedicated ports, which display `false` in the `Is Dedicated?` column, also display `disabled` in the `State` column.

## Monitor drive shelf LEDs - NS224 shelves

You can monitor the health of your drive shelf by understanding the location and status conditions of the LEDs on your drive shelf components.

- The location (blue) LEDs, on a shelf's operator display panel (ODP) and both NSMs, can be activated to aid in physically locating the shelf that needs servicing: `storage shelf location-led modify`



```
-shelf-name shelf_name -led-status on
```

If you do not know the *shelf\_name* of the affected shelf, run the `storage shelf show` command.

Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- An LED state can be:
  - "On": The LED illumination is solid/steady
  - "Off": The LED is not illuminated
  - "Blink": The LED turns on and off at varying intervals depending on the FRU status
  - "Any state": The LED can be "On", "Off", or "Blink"

### Operator display panel LEDs

The LEDs on the drive shelf front operator display panel (ODP) indicate whether your drive shelf is functioning normally or there are problems with the hardware.

The following illustration and table describes the three LEDs on the ODP:



| LED icon | LED name & color | State | Description                                                        |
|----------|------------------|-------|--------------------------------------------------------------------|
| ⏻        | Power (Green)    | On    | One or more power supplies are supplying power to the drive shelf. |

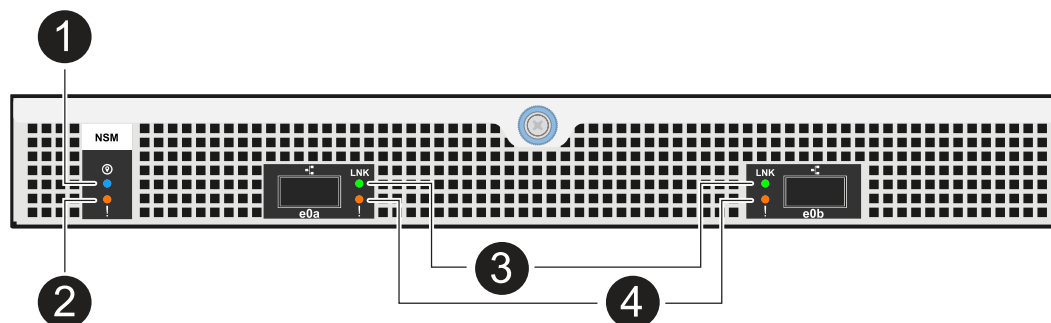
| LED icon | LED name & color  | State | Description                                                                                                                                                                                                                                                                                                                                                                                |
|----------|-------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| !        | Attention (Amber) | On    | <ul style="list-style-type: none"> <li>An error occurred with the function of one of more shelf FRUs.</li> </ul> <p>Check event messages to determine corrective action to take.</p> <ul style="list-style-type: none"> <li>If the two-digit shelf ID is also blinking, the shelf ID is in a pending state.</li> </ul> <p>Power cycle the drive shelf for the shelf ID to take affect.</p> |
| 📍        | Location (Blue)   | On    | The system administrator activated this LED function.                                                                                                                                                                                                                                                                                                                                      |

## NSM LEDs

The LEDs on an NSM indicate whether the module is functioning normally, whether it is ready for I/O traffic, and whether there are any problems with the hardware.

The following illustration and tables describe NSM LEDs associated with the function of a module and the function of each NVMe port on a module.

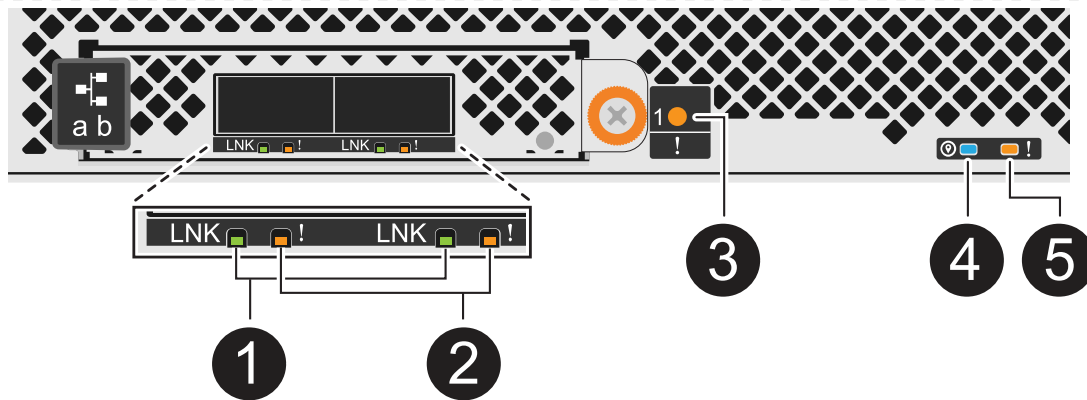
## NSM100 modules



| Call out | LED icon | Color | Description               |
|----------|----------|-------|---------------------------|
| 1        | 📍        | Blue  | NSM: Location             |
| 2        | !        | Amber | NSM: Attention            |
| 3        | LNK      | Green | NVMe port/link: status    |
| 4        | !        | Amber | NVMe port/link: attention |

| Status                                   | NSM Attention (Amber) | Port LNK (Green)                | Port Attention (Amber) |
|------------------------------------------|-----------------------|---------------------------------|------------------------|
| NSM normal                               | Off                   | Any state                       | Off                    |
| NSM fault                                | On                    | Any state                       | Any state              |
| NSM VPD Error                            | On                    | Any state                       | Any state              |
| No host port connection                  | Any state             | Off                             | Off                    |
| Host port connection link active         | Any state             | On/Blinks with activity         | Any state              |
| Host port connection w/ fault            | On                    | On/Off if all lanes are faulted | On                     |
| BIOS boot from BIOS image after power up | Blink                 | Any state                       | Any state              |

## NSM100B modules



| Call out | LED icon | Color | Description               |
|----------|----------|-------|---------------------------|
| 1        | LNK      | Green | NVMe port/link: status    |
| 2        | !        | Amber | NVMe port/link: attention |
| 3        | !        | Amber | I/O module: attention     |
| 4        | 📍        | Blue  | NSM: Location             |
| 5        | !        | Amber | NSM: Attention            |

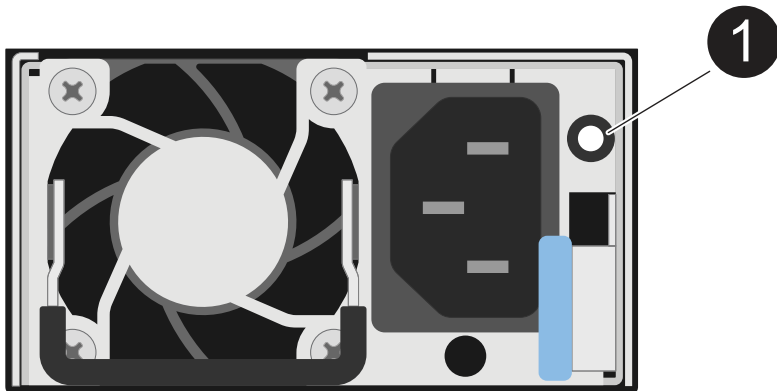
| Status                                   | NSM Attention (Amber) | Port LNK (Green)                | Port Attention (Amber) | I/O Module Attention |
|------------------------------------------|-----------------------|---------------------------------|------------------------|----------------------|
| NSM normal                               | Off                   | Any state                       | Off                    | Off                  |
| NSM fault                                | On                    | Any state                       | Any state              | Off                  |
| NSM VPD Error                            | On                    | Any state                       | Any state              | Off                  |
| No host port connection                  | Any state             | Off                             | Off                    | Off                  |
| Host port connection link active         | Any state             | On/Blinks with activity         | Any state              | Off                  |
| Host port connection w/ fault            | On                    | On/Off if all lanes are faulted | On                     | Off                  |
| BIOS boot from BIOS image after power up | Blink                 | Any state                       | Any state              | Off                  |

| Status                | NSM Attention (Amber) | Port LNK (Green) | Port Attention (Amber) | I/O Module Attention |
|-----------------------|-----------------------|------------------|------------------------|----------------------|
| I/O Module is missing | On                    | N/A              | N/A                    | On                   |

## Power supply LEDs

The LEDs on an AC or DC power supply (PSU) indicate whether the PSU is functioning normally or there are hardware problems.

The following illustration and tables describe the LED on a PSU. (The illustration is an AC PSU; however, the LED location is the same on the DC PSU):



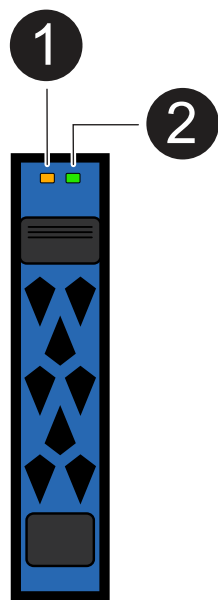
| Call out | Description                                                                |
|----------|----------------------------------------------------------------------------|
| 1        | The bi-color LED indicates power/activity when green and a fault when red. |

| Status                                   | Power/activity (Green) | Attention (Red) |
|------------------------------------------|------------------------|-----------------|
| No AC/DC power to the enclosure          | Off                    | Off             |
| No AC/DC power to the PSU                | Off                    | On              |
| AC/DC power on, but PSU not in enclosure | Blink                  | Off             |
| PSU operating correctly                  | On                     | Off             |
| PSU failure                              | Off                    | On              |
| Fan failure                              | Off                    | On              |
| Firmware update mode                     | Blink                  | Off             |

Drive LEDs

The LEDs on an NVMe drive indicates whether it is functioning normally or there are problems with the hardware.

The following illustration and tables describe the two LEDs on an NVMe drive:



| Call out | LED name       | Color |
|----------|----------------|-------|
| 1        | Attention      | Amber |
| 2        | Power/activity | Green |

| Status                          | Power/Activity (Green)  | Attention (Amber) | Associated ODP LED       |
|---------------------------------|-------------------------|-------------------|--------------------------|
| Drive installed and operational | On/Blinks with activity | Any state         | N/A                      |
| Drive failure                   | On/Blinks with activity | On                | Attention (Amber)        |
| SES device identify set         | On/Blinks with activity | Blinks            | Attention (Amber) is off |
| SES device fault bit set        | On/Blinks with activity | On                | Attention (Amber)        |
| Power control circuit failure   | Off                     | Any state         | Attention (Amber)        |

# Replace a fan module - NS224 shelves

If one or both of the fans in your fan module fail, you can replace your fan module. This procedure can be completed nondisruptively in an NS224 drive shelf that is powered on with I/O in progress.

## Before you begin

The shelf's partner NSM must be up and running, and be cabled correctly so that your shelf maintains connectivity when you remove the NSM with the failed FRU (target NSM).

[NetApp Downloads: Config Advisor](#)

## About this task

- Allow at least 70 seconds between removal and installation of the NVMe shelf module (NSM).

This allows enough time for ONTAP to process the NSM removal event.

- **Best practice:** The best practice is to have current versions of NVMe shelf module (NSM) firmware and drive firmware on your system before replacing FRU components.
  - To update your [NetApp Downloads: Disk Shelf Firmware](#)

[NetApp Downloads: Disk Drive Firmware](#)



Do not revert firmware to a version that does not support your shelf and its components.

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the *shelf\_name* of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- When you unpack the replacement fan, save all packing materials for use when you return the failed fan.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

## NSM100 modules

You can use the following animation to assist in replacing a fan in an NS224 with NSM100 modules.

### Replace a fan in an NS224 shelf

#### Steps

1. Properly ground yourself.
2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM later in this procedure.

3. Remove the NSM from the shelf:
  - a. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are removing the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- b. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.

The latching mechanisms raise, clearing the latching pins on the shelf.

- c. Gently pull until the NSM is about one third of the way out of the shelf, grasp the NSM sides with both hands to support its weight, and then place it on a flat stable surface.

When you begin pulling, the latching mechanism arms extend from the NSM and lock in their fully extended position.

4. Loosen the NSM cover thumb screw and open the cover.



The FRU label on the NSM cover shows the location of the five fans, along the rear wall of the NSM.

5. Physically identify the failed fan.

When a fan fails, the system logs a warning message to the system console indicating which fan failed.

6. Replace the failed fan:

- a. Remove the failed fan by firmly grasping the sides, where the blue touch points are located, and then lift it vertically to disconnect it from the socket.



- b. Insert the replacement fan by aligning it within the guides, and then push down until the fan module connector is fully seated in the socket.

7. Close the NSM cover, and then tighten the thumb screw.

8. Reinsert the NSM into the shelf:

- a. Make sure that the latching mechanism arms are locked in the fully extended position.
- b. Using both hands, gently slide the NSM into the shelf until the weight of the NSM is fully supported by the shelf.
- c. Push the NSM into the shelf until it stops (about half an inch from the back of the shelf).

You can place your thumbs on the orange tabs on the front of each finger loop (of the latching mechanism arms) to push in the NSM.

- d. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are inserting the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- e. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.
- f. Gently push forward to get the latches over the stop.
- g. Release your thumbs from the tops of the latching mechanisms, and then continue pushing until the latching mechanisms snap into place.

The NSM should be fully inserted into the shelf and flush with the edges of the shelf.

9. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

10. Verify that the attention (amber) LEDs on the NSM containing the failed fan and the shelf operator display panel are no longer illuminated.

The NSM attention LEDs turn off after the NSM reboots and no longer detects a fan issue. This can take three to five minutes.

11. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

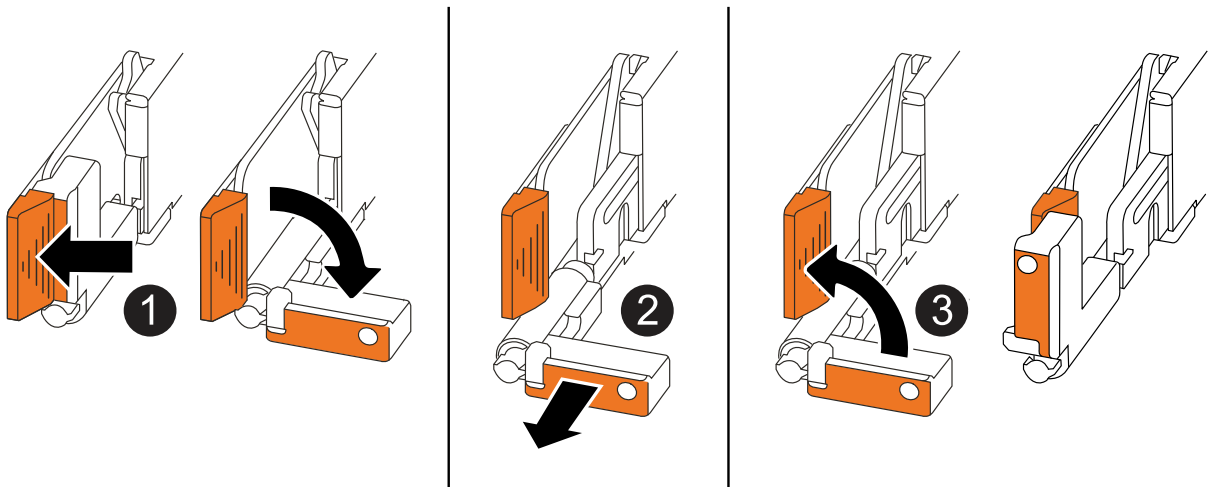
## NSM100B modules

### Steps

1. Properly ground yourself.
2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.
  - Power supplies do not have a power switch.
  - b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM later in this procedure.

3. Remove the NSM:



|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | On both ends of the NSM, push the vertical locking tabs outward to release the handles.                                                                                                                                                                                                                                                                                                                                                            |
| 2 | <ul style="list-style-type: none"> <li>• Pull the handles towards you to unseat the NSM from the midplane.</li> </ul> <p>As you pull, the handles extend out from the shelf. When you feel some resistance, keep pulling.</p> <ul style="list-style-type: none"> <li>• Slide the NSM out of the shelf and place it on a flat, stable surface.</li> </ul> <p>Make sure that you support the bottom of the NSM as you slide it out of the shelf.</p> |
| 3 | Rotate the handles upright (next to the tabs) to move them out of the way.                                                                                                                                                                                                                                                                                                                                                                         |

4. Open the NSM cover by turning the thumbscrew counterclockwise to loosen, and then open the cover.

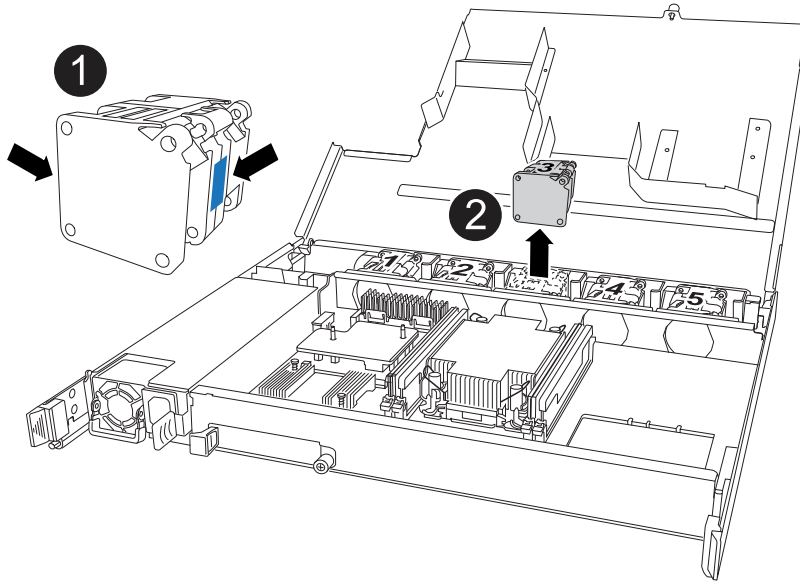


The FRU label on the NSM cover shows the location of the five fans, along the rear wall of the NSM.

5. Physically identify the failed fan.

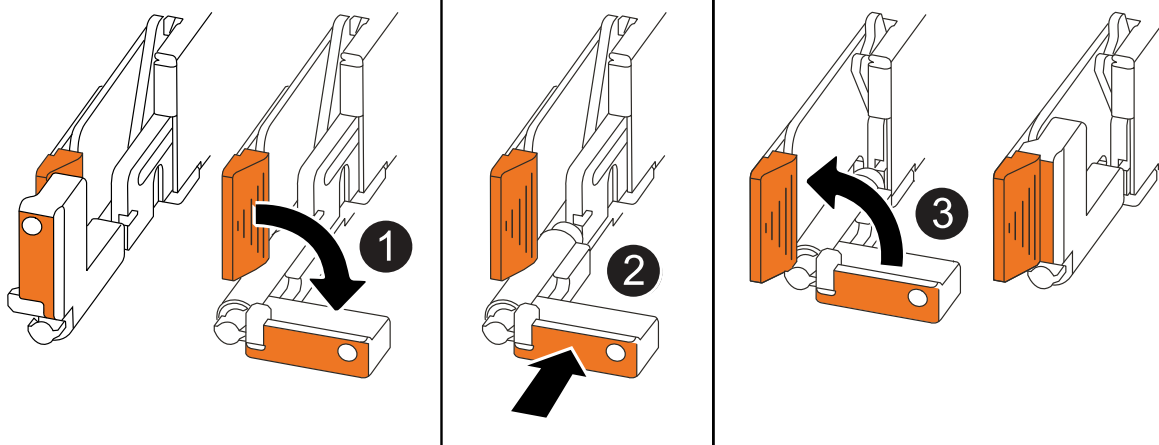
When a fan fails, the system logs a warning message to the system console indicating which fan failed.

6. Replace the failed fan:



|   |                                                                                                                                             |
|---|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Remove the failed fan by firmly grasping the sides where the blue touch points are located, and then pull it straight up out of its socket. |
| 1 | Insert the replacement fan by aligning it within the guides, and then push down until the fan connector is fully seated in the socket.      |

7. Close the NSM cover, and then tighten the thumb screw.
8. Insert the NSM into the shelf:



|   |                                                                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | If you rotated the NSM handles upright (next to the tabs) to move them out of the way while you serviced the NSM, rotate them down to the horizontal position. |
| 2 | Align the rear of the NSM with the opening in the shelf, and then gently push the NSM using the handles until it is fully seated.                              |
| 3 | Rotate the handles to the upright position and lock in place with the tabs.                                                                                    |

9. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

10. Verify that the attention (amber) LEDs on the NSM containing the failed fan and the shelf operator display panel are no longer illuminated.

The NSM attention LEDs turn off after the NSM reboots and no longer detects a fan issue. This can take three to five minutes.

11. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

# Replace the Ethernet I/O module - NS224 shelves with NSM100B modules

You can replace a failed Ethernet I/O module nondisruptively in an NS224 drive shelf that is powered on, and while I/O is in progress. This procedure only applies to NS224 shelves with NSM100B modules.

## Before you begin

- The shelf's partner NSM must be up and running, and be cabled correctly so that your shelf maintains connectivity when you remove the failed NSM.

[NetApp Downloads: Config Advisor](#)

- All other components in the system must be functioning properly.

## About this task

- Allow at least 70 seconds between removal and installation of the NVMe shelf module (NSM).

This allows enough time for ONTAP to process the NSM removal event.

- **Best practice:** The best practice is to have current versions of NVMe shelf module (NSM) firmware and drive firmware on your system before replacing FRU components.

[NetApp Downloads: Disk Shelf Firmware](#)

[NetApp Downloads: Disk Drive Firmware](#)



Do not revert firmware to a version that does not support your shelf and its components.

- Shelf (NSM) firmware is automatically updated (nondisruptively) on a new NSM that has a non-current firmware version.

NSM firmware checks occur every 10 minutes. An NSM firmware update can take up to 30 minutes.

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the `shelf_name` of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- When you unpack the replacement NSM, save all packing materials for use when you return the failed NSM.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

## Steps

1. Properly ground yourself.

2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:

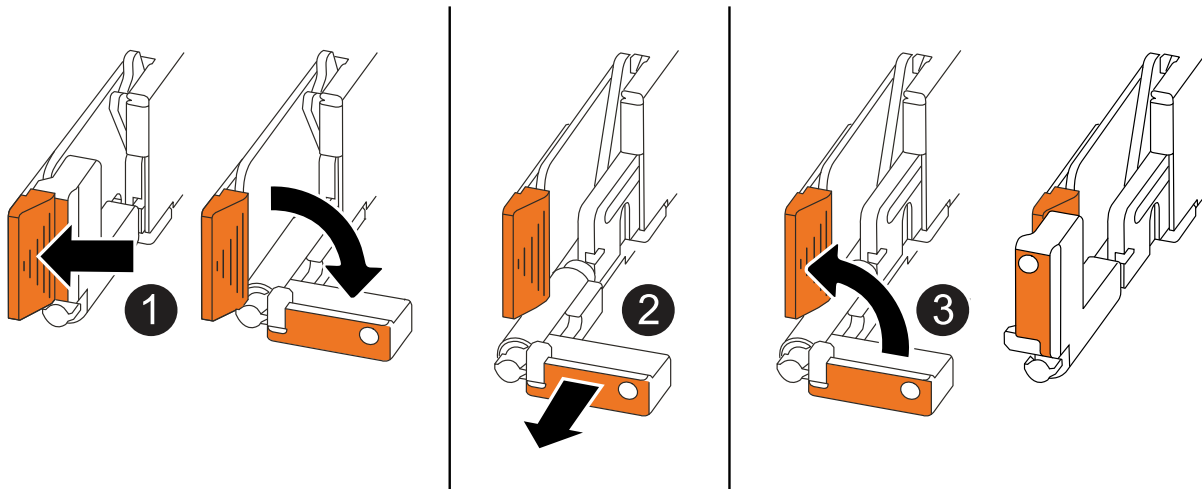
- a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

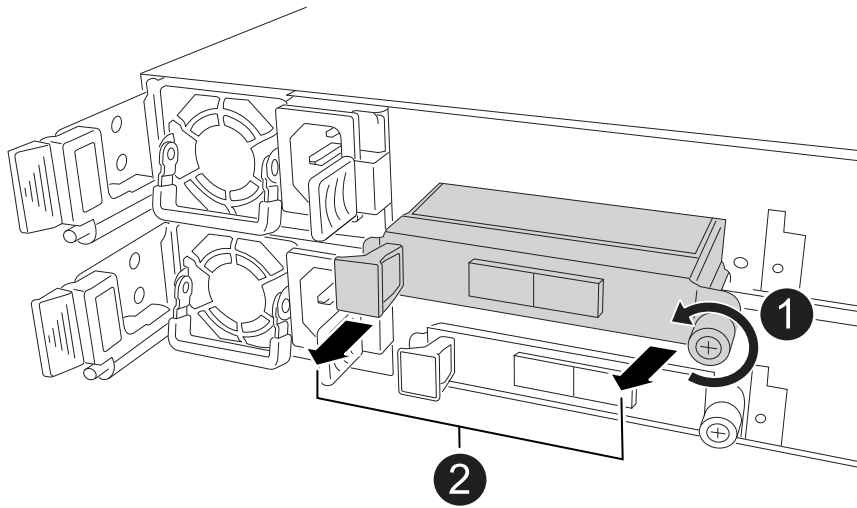
Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM, later in this procedure.

3. Remove the NSM:



|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | On both ends of the NSM, push the vertical locking tabs outward to release the handles.                                                                                                                                                                                                                                                                                                                                                        |
| 2 | <ul style="list-style-type: none"><li>• Pull the handles towards you to unseat the NSM from the midplane.</li></ul> <p>As you pull, the handles extend out from the shelf. When you feel some resistance, keep pulling.</p> <ul style="list-style-type: none"><li>• Slide the NSM out of the shelf and place it on a flat, stable surface.</li></ul> <p>Make sure that you support the bottom of the NSM as you slide it out of the shelf.</p> |
| 3 | Rotate the handles upright (next to the tabs) to move them out of the way.                                                                                                                                                                                                                                                                                                                                                                     |

4. Remove the failed I/O module from the NSM:



|   |                                                                                             |
|---|---------------------------------------------------------------------------------------------|
| 1 | Turn the I/O module thumbscrew counterclockwise to loosen.                                  |
| 2 | Pull the I/O module out of the NSM using the port label tab on the left and the thumbscrew. |

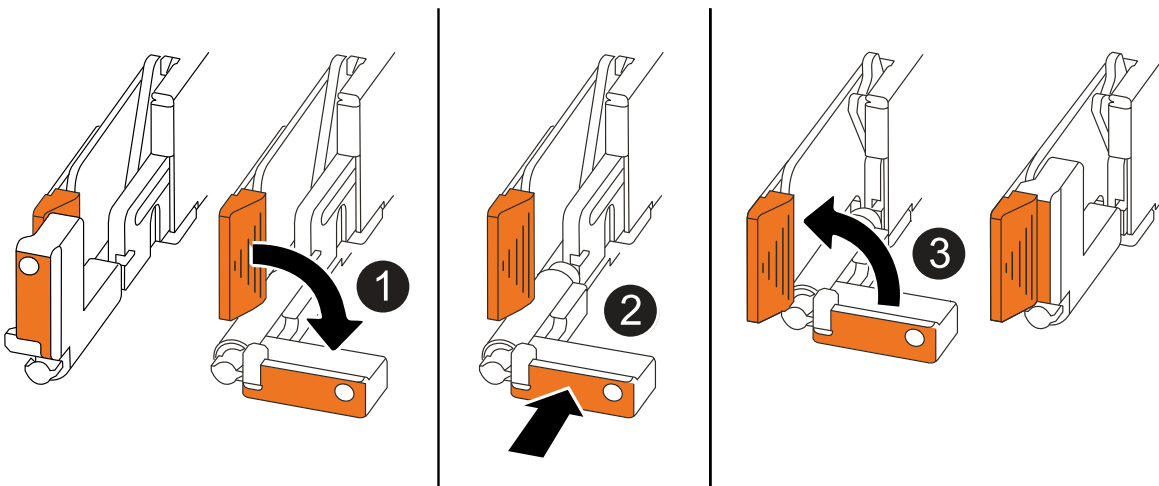
5. Install the replacement I/O module into the target slot:

- a. Align the I/O module with the edges of the slot.
- b. Gently push the I/O module all the way into the slot, making sure to properly seat the module into the connector.

You can use the tab on the left and the thumbscrew to push in the I/O Module.

- c. Turn the thumbscrew clockwise to tighten.

6. Insert the NSM into the shelf:



|   |                                                                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | If you rotated the NSM handles upright (next to the tabs) to move them out of the way while you serviced the NSM, rotate them down to the horizontal position. |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------|

|   |                                                                                                                                   |
|---|-----------------------------------------------------------------------------------------------------------------------------------|
| 2 | Align the rear of the NSM with the opening in the shelf, and then gently push the NSM using the handles until it is fully seated. |
| 3 | Rotate the handles to the upright position and lock in place with the tabs.                                                       |

## 7. Recable the NSM.

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

## 8. Verify that the attention (amber) LEDs on the NSM containing the failed I/O module and the shelf operator display panel are no longer illuminated

The NSM attention LEDs turn off after the NSM reboots and no longer detects an I/O module issue. This can take three to five minutes.

## 9. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

# Replace an NSM - NS224 shelves

You can replace an impaired NVMe shelf module (NSM) nondisruptively in an NS224 drive shelf that is powered on, and while I/O is in progress.

## Before you begin

- The shelf's partner NSM must be up and running, and be cabled correctly so that your shelf maintains connectivity when you remove the failed NSM.

[NetApp Downloads: Config Advisor](#)

- All other components in the system must be functioning properly.

## About this task

- Replacing the NSM involves moving the following:
  - **NSM100 modules:** DIMMs, fans and power supply from the impaired NSM to the replacement NSM.
  - **NSM100B modules:** DIMMs, fans, boot media, I/O module, and power supply from the impaired NSM to the replacement NSM.



You do not move the real-time clock (RTC) battery. They come preinstalled in the replacement NSM.

- Allow at least 70 seconds between removal and installation of the NVMe shelf module (NSM).

This allows enough time for ONTAP to process the NSM removal event.

- **Best practice:** The best practice is to have current versions of NVMe shelf module (NSM) firmware and drive firmware on your system before replacing FRU components.

[NetApp Downloads: Disk Shelf Firmware](#)

[NetApp Downloads: Disk Drive Firmware](#)



Do not revert firmware to a version that does not support your shelf and its components.

- Shelf (NSM) firmware is automatically updated (nondisruptively) on a new NSM that has a non-current firmware version.

NSM firmware checks occur every 10 minutes. An NSM firmware update can take up to 30 minutes.

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the `shelf_name` of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- When you unpack the replacement NSM, save all packing materials for use when you return the failed NSM.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

## NSM100 modules

You can use the following animation or the written steps to replace an NSM.

### Replace an NSM in an NS224 shelf

#### Steps

1. Properly ground yourself.
2. Physically identify the impaired NSM.

The system logs a warning message to the system console indicating which module is impaired. Additionally, the attention (amber) LED on the drive shelf operator display panel and the impaired module illuminate.

3. Disconnect the cabling from the impaired NSM:

- a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumbs screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports on the replacement NSM, later in this procedure.

4. Remove the NSM from the shelf:

- a. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are removing the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- b. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.

The latching mechanisms raise, clearing the latching pins on the shelf.

- c. Gently pull until the NSM is about one third of the way out of the shelf, grasp the NSM sides with both hands to support its weight, and then place it on a flat stable surface.

When you begin pulling, the latching mechanism arms extend from the NSM and lock in their fully extended position.

5. Unpack the replacement NSM, and set it on a level surface near the impaired NSM.
6. Open the cover of the impaired NSM and the replacement NSM by loosening the thumbscrew on each cover.



The FRU label on the NSM cover shows the location of the DIMMs and fans.

7. Move the DIMMs from the impaired NSM to the replacement NSM:

- a. Note the orientation of the DIMMs in the slots so that you can insert the DIMMs into the replacement NSM using the same orientation.
- b. Eject a DIMM from its slot by slowly pushing apart the ejector tabs at both ends of the DIMM slot, and then lift the DIMM out of the slot.



Carefully hold the DIMM by the corners or edges to avoid pressure on the DIMM circuit board components. The ejector tabs remain in the open position.

- c. Hold the DIMM by the corners, and then insert the DIMM squarely into a slot on the replacement NSM.

The notch on the bottom of the DIMM, among the pins, should line up with the tab in the slot.

When inserted correctly, the DIMM should go in easily but fit tightly in the slot. If not, reinsert the DIMM.

- d. Push down carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at both ends of the DIMM.
- e. Repeat substeps 7a through 7d for the remaining DIMMs.

8. Move the fans from the impaired NSM to the replacement NSM:

- a. Firmly grasp a fan from the sides, where the blue touch points are located, and then lift it vertically to disconnect it from the socket.

You might need to gently rock the fan back and forth to disconnect it before lifting it out.

- b. Align the fan with the guides in the replacement NSM, and then push down until the fan module connector is fully seated in the socket.
- c. Repeat substeps 8a and 8b for the remaining fans.

9. Close the cover of each NSM, and then tighten each thumbscrew.

10. Move the power supply from the impaired NSM to the replacement NSM:

- a. Rotate the handle up, to its horizontal position, and then grasp it.
- b. With your thumb, press the blue tab to release the locking mechanism.
- c. Pull the power supply out of the NSM while using your other hand to support its weight.
- d. Using both hands, support and align the edges of the power supply with the opening in the replacement NSM.
- e. Gently push the power supply into the NSM until the locking mechanism clicks into place.



Do not use excessive force or you might damage the internal connector.

- f. Rotate the handle down, so it is out of the way of normal operations.

11. Insert the replacement NSM into the shelf:

- a. Make sure that the latching mechanism arms are locked in the fully extended position.
- b. Using both hands, gently slide the NSM into the shelf until the weight of the NSM is fully supported by the shelf.
- c. Push the NSM into the shelf until it stops (about half an inch from the back of the shelf).

You can place your thumbs on the orange tabs on the front of each finger loop (of the latching mechanism arms) to push in the NSM.

- d. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are inserting the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- e. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.
- f. Gently push forward to get the latches over the stop.
- g. Release your thumbs from the tops of the latching mechanisms, and then continue pushing until the latching mechanisms snap into place.

The NSM should be fully inserted into the shelf and flush with the edges of the shelf.

## 12. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

## 13. Verify that the attention (amber) LED on the shelf operator display panel is no longer illuminated.

The operator display panel attention LED turns off after the NSM reboots. This can take three to five minutes.

## 14. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

## 15. Make sure that both NSMs in the shelf are running the same version of firmware: version 0200 or later.

### NSM100B modules

#### Steps

1. Properly ground yourself.
2. Physically identify the impaired NSM.

The system logs a warning message to the system console indicating which module is impaired. Additionally, the attention (amber) LED on the drive shelf operator display panel and the impaired

module illuminate.

3. Disconnect the cabling from the impaired NSM:

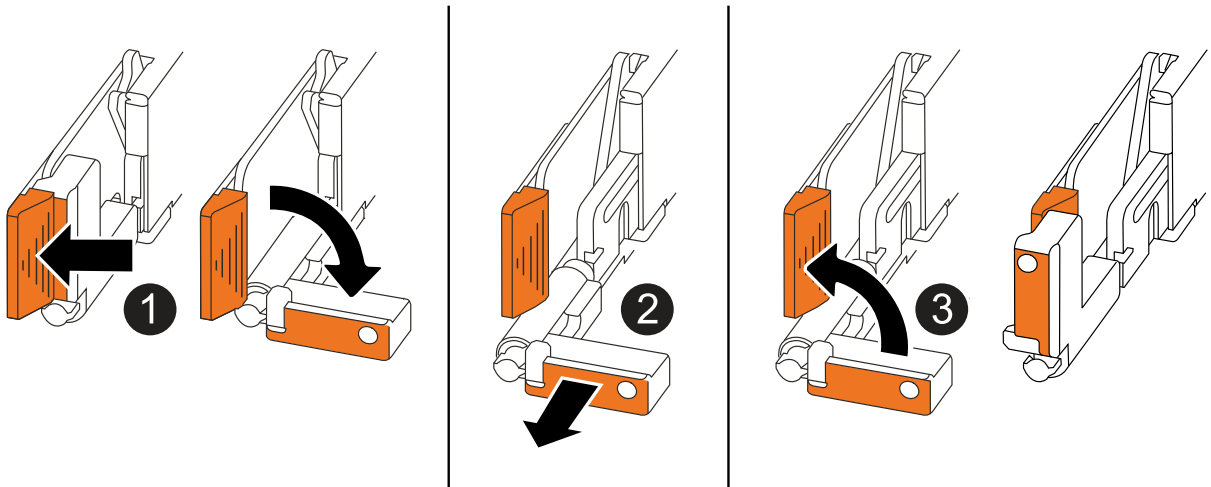
- a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumbs screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports on the replacement NSM, later in this procedure.

4. Remove the NSM:



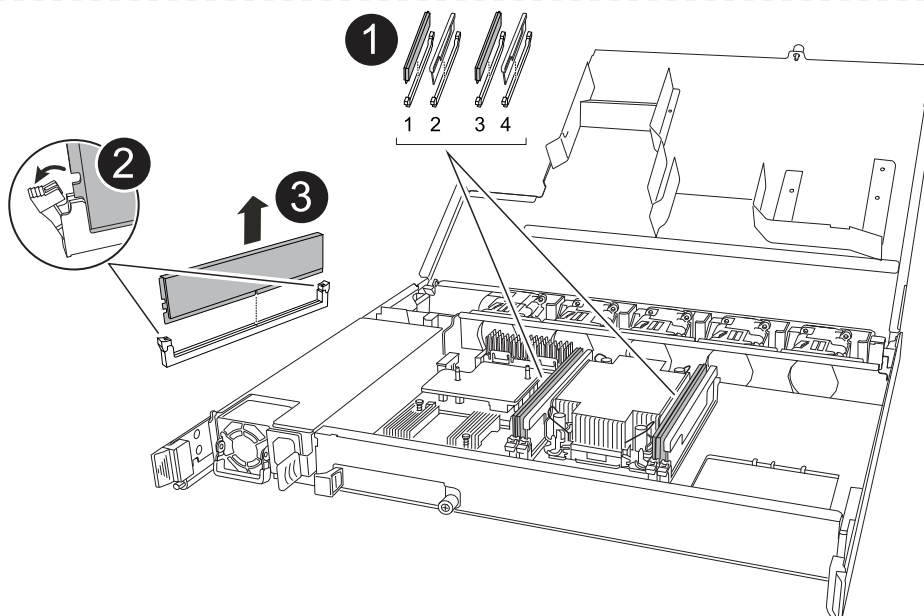
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | On both ends of the NSM, push the vertical locking tabs outward to release the handles.                                                                                                                                                                                                                                                                                                                                                        |
| 2 | <ul style="list-style-type: none"><li>• Pull the handles towards you to unseat the NSM from the midplane.</li></ul> <p>As you pull, the handles extend out from the shelf. When you feel some resistance, keep pulling.</p> <ul style="list-style-type: none"><li>• Slide the NSM out of the shelf and place it on a flat, stable surface.</li></ul> <p>Make sure that you support the bottom of the NSM as you slide it out of the shelf.</p> |
| 3 | Rotate the handles upright (next to the tabs) to move them out of the way.                                                                                                                                                                                                                                                                                                                                                                     |

5. Unpack the replacement NSM, and set it on a level surface near the impaired NSM.

6. Open the covers of both NSMs by loosening the thumbscrew on each cover.

7. Move the DIMMs from the impaired NSM to the replacement to the replacement NSM:

- a. Remove DIMM from the impaired NSM:



|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1</b></p> | <p>DIMM slot numbering and positions.</p> <p>The NSM contains DIMMs in slots 1 and 3, and DIMM Blanks in slots 2 and 4.</p>                                                                                                                                                                                                                                                                                                                                                    |
| <p><b>2</b></p> | <ul style="list-style-type: none"> <li>• Note the orientation of the DIMM in the socket so that you can insert it into the replacement DIMM using the same orientation.</li> <li>• Eject the faulty DIMM by slowly pushing apart the two DIMM ejector tabs on both ends of the DIMM slot.</li> </ul> <div data-bbox="532 1144 592 1207"> <p><b>i</b></p> </div> <p>Carefully hold the DIMM by the corners or edges to avoid pressure on the DIMM circuit board components.</p> |
| <p><b>3</b></p> | <p>Lift the DIMM up and out of the slot.</p> <p>The ejector tabs remain in the open position.</p>                                                                                                                                                                                                                                                                                                                                                                              |

b. Install DIMM in the replacement NSM:

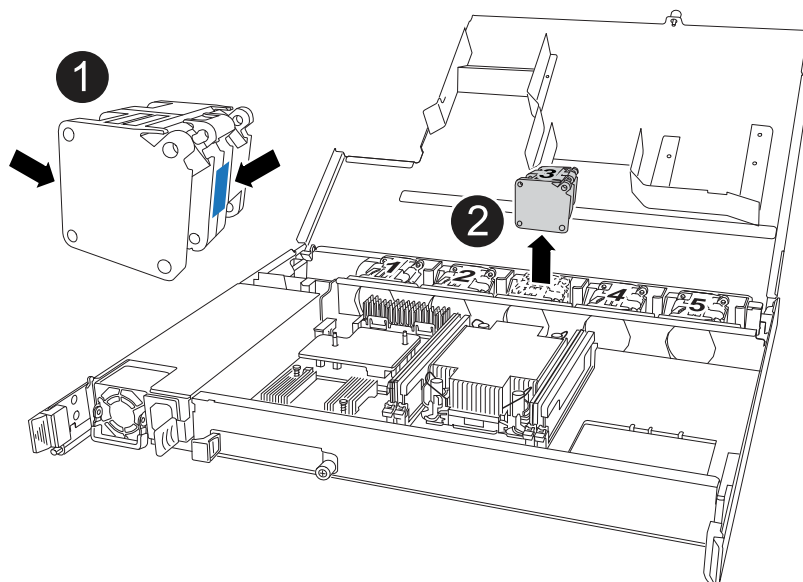
- i. Hold the DIMM by the corners, and then insert the DIMM squarely into a slot.

The notch on the bottom of the DIMM, among the pins, should line up with the tab in the slot.

When inserted correctly, the DIMM should go in easily but fit tightly in the slot. If not, reinsert the DIMM.

- ii. Push down carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at both ends of the DIMM.
- iii. Repeat for the other DIMM.

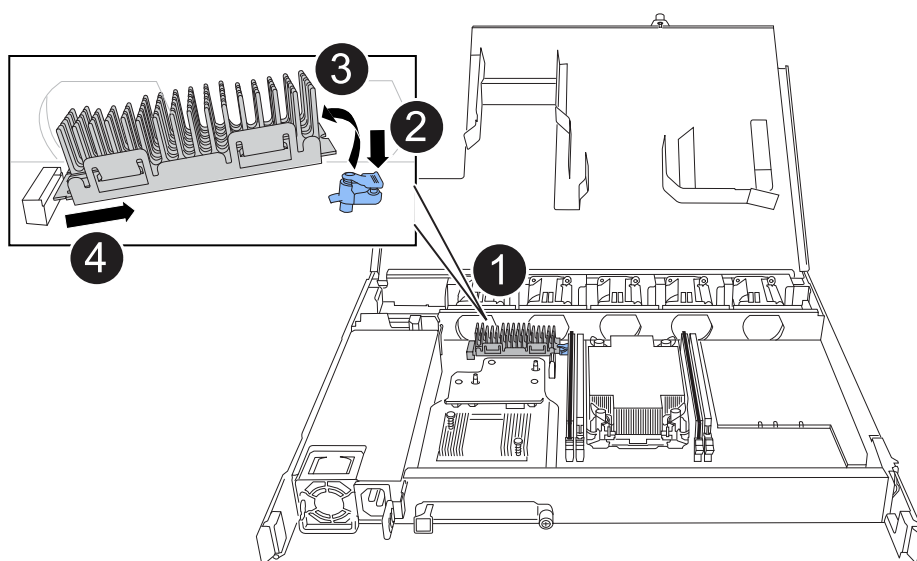
8. Move all fans from the impaired NSM to the replacement NSM:



|   |                                                                                                                                             |
|---|---------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Remove the failed fan by firmly grasping the sides where the blue touch points are located, and then pull it straight up out of its socket. |
| 1 | Insert the replacement fan by aligning it within the guides, and then push down until the fan connector is fully seated in the socket.      |

9. Move the boot media to the replacement NSM:

a. Remove the boot media from the impaired NSM:



|   |                                                                        |
|---|------------------------------------------------------------------------|
| 1 | Boot media location                                                    |
| 2 | Press down on the blue tab to release the right end of the boot media. |

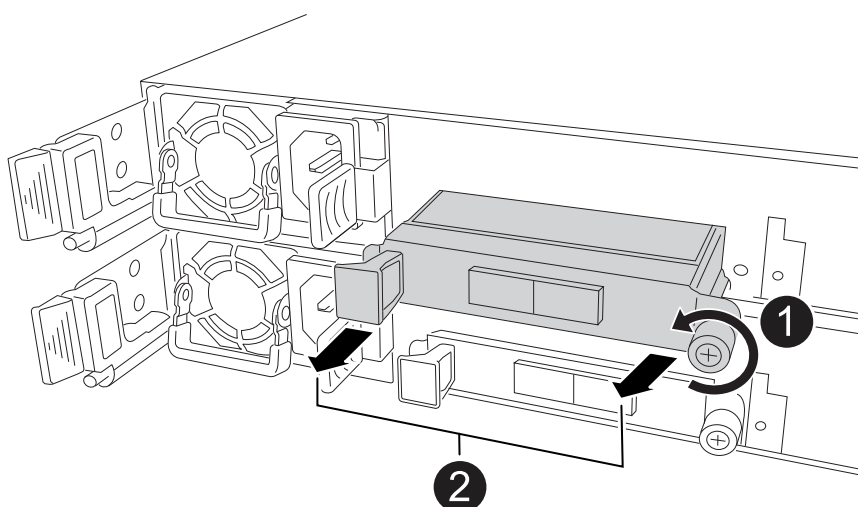
|   |                                                                                                                 |
|---|-----------------------------------------------------------------------------------------------------------------|
| 3 | Lift the right end of the boot media up at a slight angle to get a good grip along the sides of the boot media. |
| 4 | Gently pull the left end of the boot media out of its socket.                                                   |

b. Install the boot media in the replacement NSM:

- i. Align the edges of the boot media with the socket housing in the replacement NSM, and then gently push it squarely into the socket.
- ii. Rotate the boot media down toward the locking button.
- iii. Push the locking button, rotate the boot media all the way down, and then release the locking button.

10. Move the I/O module from the impaired NSM to the replacement NSM.

a. Remove I/O module from the impaired NSM:



|   |                                                                                             |
|---|---------------------------------------------------------------------------------------------|
| 1 | Turn the I/O module thumbscrew counterclockwise to loosen.                                  |
| 2 | Pull the I/O module out of the NSM using the port label tab on the left and the thumbscrew. |

b. Install I/O module in the replacement NSM:

- i. Align the I/O module with the edges of the slot in the replacement NSM.
- ii. Gently push the I/O module all the way into the slot, making sure to properly seat the module into the connector.

You can use the tab on the left and the thumbscrew to push in the I/O module.

11. Close the cover of each NSM, and then tighten each thumbscrew.

12. Move the power supply from the impaired NSM to the replacement NSM:

- a. Rotate the handle up, to its horizontal position, and then grasp it.
- b. With your thumb, press the blue tab (AC PSU) or terra cotta tab (DC PSU) to release the locking



mechanism.

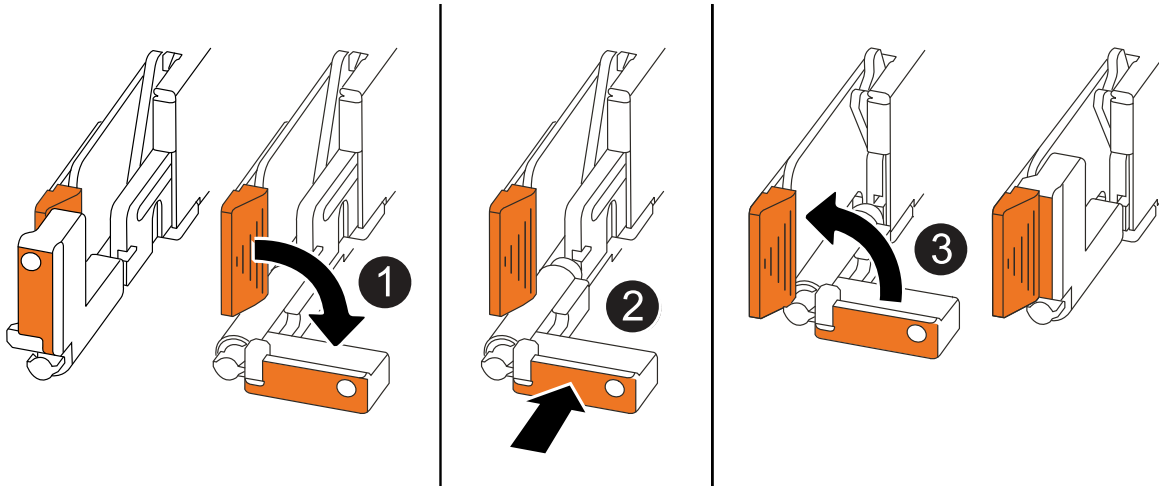
- c. Pull the power supply out of the NSM while using your other hand to support its weight.
- d. Using both hands, support and align the edges of the power supply with the opening in the replacement NSM.
- e. Gently push the power supply into the NSM until the locking mechanism clicks into place.



Do not use excessive force or you might damage the internal connector.

- f. Rotate the handle down, so it is out of the way of normal operations.

13. Insert the NSM into the shelf:



|   |                                                                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | If you rotated the NSM handles upright (next to the tabs) to move them out of the way while you serviced the NSM, rotate them down to the horizontal position. |
| 2 | Align the rear of the NSM with the opening in the shelf, and then gently push the NSM using the handles until it is fully seated.                              |
| 3 | Rotate the handles to the upright position and lock in place with the tabs.                                                                                    |

14. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

15. Verify that the attention (amber) LED on the shelf operator display panel is no longer illuminated.

The operator display panel attention LED turns off after the NSM reboots. This can take three to five minutes.

16. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

17. Make sure that both NSMs in the shelf are running the same version of firmware: version 0300 or later.

## Hot-swap a power supply - NS224 shelves

You can replace a failed power supply nondisruptively in an NS224 drive shelf that is powered on, and while I/O is in progress.

### About this task

- This procedure applies to NS224 shelves with either NSM100 or NSM100B modules.
- Do not mix power supplies with different efficiency ratings or with different input types.

Always replace like for like.

- If you are replacing more than one power supply, you must do so one at a time so that the shelf maintains power.
- **Best practice:** The best practice is to replace the power supply within two minutes of removal from the NSM.

If you exceed the two minutes, the shelf continues to function, but ONTAP sends messages to the console about the degraded power supply until the power supply is replaced.

- Do not revert firmware to a version that does not support your shelf and its components.
- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the `shelf_name` of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- When you unpack the replacement power supply, save all packing materials for use when you return the failed power supply.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

- If you are replacing an AC power supply for an NS224 shelf, you can watch the following animation to

familiarize yourself with the procedure before beginning. The animation shows an NS224 with NSM100 modules, but the steps are the same for shelves with NSM100B modules.

### **Replace AC power supply for NS224**

[Hot-swap an AC power supply in an NS224 shelf](#)

Use the appropriate procedure for your type of PSU: AC or DC.

### Option 1: Replace an AC power supply

Complete the following steps to replace an AC power supply.

#### Steps

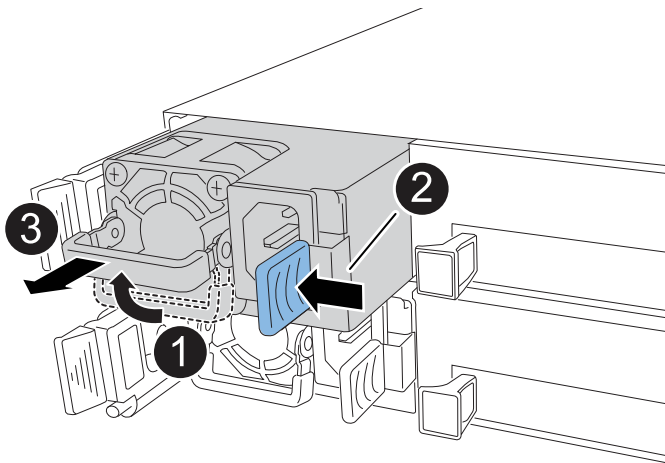
1. Properly ground yourself.
2. Physically identify the failed power supply.

The system logs a warning message to the system console indicating which power supply failed. Additionally, the attention (amber) LED on the shelf operator display panel illuminates and the bicolored LED on the failed power supply illuminates red.

3. Disconnect the power cord from the power supply by opening the power cord retainer, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

4. Remove the power supply:



|   |                                                                                         |
|---|-----------------------------------------------------------------------------------------|
| 1 | Rotate the handle up, to its horizontal position, and then grasp it.                    |
| 2 | With your thumb, press the blue tab to release the locking mechanism.                   |
| 3 | Pull the power supply out of the NSM while using your other hand to support its weight. |

5. Insert the replacement power supply:
  - a. Using both hands, support and align the edges of the power supply with the opening in the NSM.
  - b. Gently push the power supply into the NSM until the locking mechanism clicks into place.



Do not use excessive force or you might damage the internal connector.

- c. Rotate the handle down, so it is out of the way of normal operations.

6. Connect the power cord to the power supply and secure the power cord with the power cord retainer.

When functioning correctly, a power supply's bicolored LED illuminates green.

### Option 2: Replace a DC power supply

To replace a DC power supply, complete the following steps.

1. Properly ground yourself.
2. Physically identify the failed power supply.

The system logs a warning message to the system console indicating which power supply failed. Additionally, the attention (amber) LED on the shelf operator display panel illuminates and the bicolored LED on the failed power supply illuminates red.

3. Disconnect the power supply:
  - a. Unscrew the two thumb screws on the D-SUB DC power cable connector.

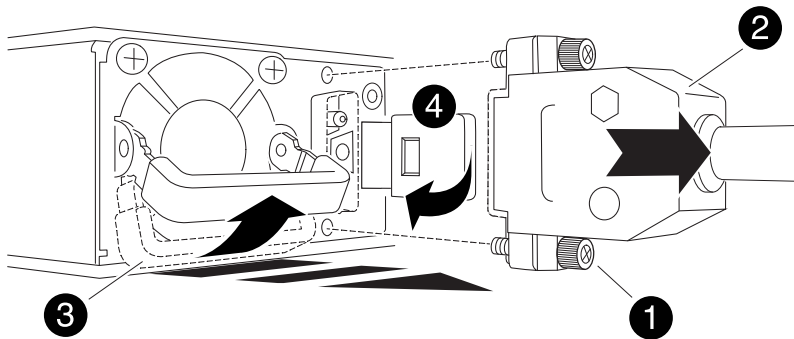
The illustration and table in step 4 shows the two thumb screws (item #1) and the D-SUB DC power cable connector (item #2).

- b. Unplug the D-SUB DC power cable connector from the power supply and set it aside.

4. Remove the power supply:
  - a. Rotate the handle up, to its horizontal position, and then grasp it.
  - b. With your thumb, press the terra-cotta tab to release the locking mechanism.
  - c. Pull the power supply out of the NSM while using your other hand to support its weight.



The power supply is short. Always use two hands to support it when removing it from the NSM so that it does not swing free from the NSM and injure you.



|   |                                           |
|---|-------------------------------------------|
| 1 | Thumb screws                              |
| 2 | D-SUB DC power cable connector            |
| 3 | Power supply handle                       |
| 4 | Blue/Terra cotta power supply locking tab |

5. Insert the replacement power supply:

- a. Using both hands, support and align the edges of the power supply with the opening in the NSM.
- b. Gently push the power supply into the NSM until the locking mechanism clicks into place.

A power supply must properly engage with the internal connector and locking mechanism. Repeat this step if you feel the power supply is not properly seated.



Do not use excessive force or you might damage the internal connector.

- c. Rotate the handle down, so it is out of the way of normal operations.

6. Reconnect the D-SUB DC power cable:

Once power is restored to the power supply, the status LED should be green.

- a. Plug the D-SUB DC power cable connector into the power supply.
- b. Tighten the two thumb screws to secure the D-SUB DC power cable connector to the power supply.

## Replace the real-time clock battery - NS224 shelves

You can replace a failed real-time clock (RTC) battery nondisruptively in an NS224 drive shelf that is powered on, and while I/O is in progress.

### Before you begin

- The shelf's partner NSM must be up and running, and be cabled correctly so that your shelf maintains connectivity when you remove the NSM with the failed FRU (target NSM).

[NetApp Downloads: Config Advisor](#)

- All other components in the system must be functioning properly.

### About this task

- Allow at least 70 seconds between removal and installation of the NVMe shelf module (NSM).

This allows enough time for ONTAP to process the NSM removal event.

- After you replace the RTC battery, reinstall the NSM, and the module boots, the real-time clock time is updated by ONTAP.
- **Best practice:** The best practice is to have current versions of NVMe shelf module (NSM) firmware and drive firmware on your system before replacing FRU components.

[NetApp Downloads: Disk Shelf Firmware](#)

[NetApp Downloads: Disk Drive Firmware](#)



Do not revert firmware to a version that does not support your shelf and its components.

- If needed, you can turn on the shelf's location (blue) LEDs to aid in physically locating the affected shelf:  
`storage shelf location-led modify -shelf-name shelf_name -led-status on`

If you do not know the `shelf_name` of the affected shelf, run the `storage shelf show` command.

A shelf has three location LEDs: one on the operator display panel and one on each NSM. Location LEDs remain illuminated for 30 minutes. You can turn them off by entering the same command, but using the `off` option.

- When you unpack the replacement RTC battery, save all packing materials for use when you return the failed RTC battery.

If you need the RMA number or additional help with the replacement procedure, contact technical support at [NetApp Support](#), 888-463-8277 (North America), 00-800-44-638277 (Europe), or +800-800-80-800 (Asia/Pacific).

## NSM100 modules

For NSM100 modules, you can use the following animation or the written steps to replace an RTC battery.

### Replace an RTC battery in an NS224 shelf

#### Steps

1. Properly ground yourself.
2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

Power supplies do not have a power switch.

- b. Disconnect the storage cabling from the NSM ports.

Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM, later in this procedure.

3. Remove the NSM from the shelf:
  - a. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are removing the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

- b. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.

The latching mechanisms raise, clearing the latching pins on the shelf.

- c. Gently pull until the NSM is about one third of the way out of the shelf, grasp the NSM sides with both hands to support its weight, and then place it on a flat stable surface.

When you begin pulling, the latching mechanism arms extend from the NSM and lock in their fully extended position.

4. Loosen the NSM cover thumb screw and open the cover.

The FRU label on the NSM cover shows the location of the RTC battery, near the front of the NSM and to the right of the power supply.

5. Physically identify the failed RTC battery.

6. Replace the RTC battery:

- a. Remove the battery by gently pushing it away from the holder until it is at an inclined angle (tilted away from the holder), and then lift it out of the holder.
  - b. Insert the replacement battery into the holder at an inclined angle (tilted away from the holder), push it into an upright position, and then press it firmly into the connector until it is fully seated.





The positive side of the battery, marked with a plus sign, is oriented outward (away from the holder), corresponding to the plus sign marked on the NSM board.

7. Close the NSM cover, and then tighten the thumb screw.
8. Make sure that the latching mechanism arms are locked in the fully extended position.
9. Using both hands, gently slide the NSM into the shelf until the weight of the NSM is fully supported by the shelf.
10. Push the NSM into the shelf until it stops (about half an inch from the back of the shelf).

You can place your thumbs on the orange tabs on the front of each finger loop (of the latching mechanism arms) to push in the NSM.

11. Loop your index fingers through the finger holes of the latching mechanisms on either side of the NSM.



If you are inserting the bottom NSM, and if the bottom rail is obstructing access to the latching mechanisms, place your index fingers through the finger holes from the inside (by crossing your arms).

12. With your thumbs, press down and hold the orange tabs on top of the latching mechanisms.
13. Gently push forward to get the latches over the stop.
14. Release your thumbs from the tops of the latching mechanisms, and then continue pushing until the latching mechanisms snap into place.

The NSM should be fully inserted into the shelf and flush with the edges of the shelf.

15. Reconnect the cabling to the NSM:

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

16. Verify that the attention (amber) LEDs on the NSM containing the failed RTC battery and the shelf operator display panel are no longer illuminated

The NSM attention LEDs turn off after the NSM reboots and no longer detects an RTC battery issue. This can take three to five minutes.

17. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

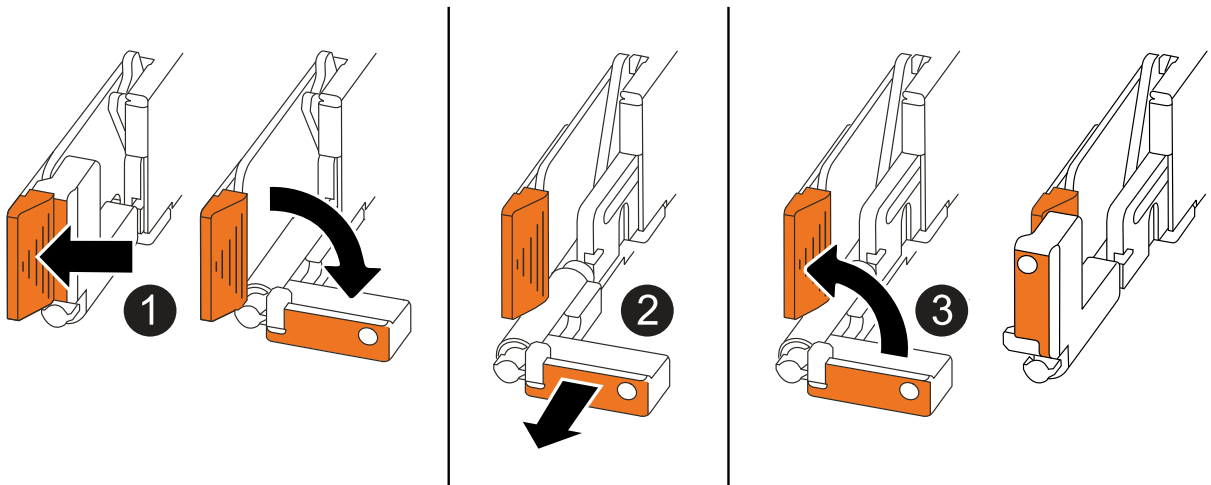
## NSM100B modules

### Steps

1. Properly ground yourself.
2. Disconnect the cabling from the NSM that contains the FRU that you are replacing:
  - a. Disconnect the power cord from the power supply by opening the power cord retainer if it is an AC power supply, or unscrewing the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.
  - Power supplies do not have a power switch.
  - b. Disconnect the storage cabling from the NSM ports.

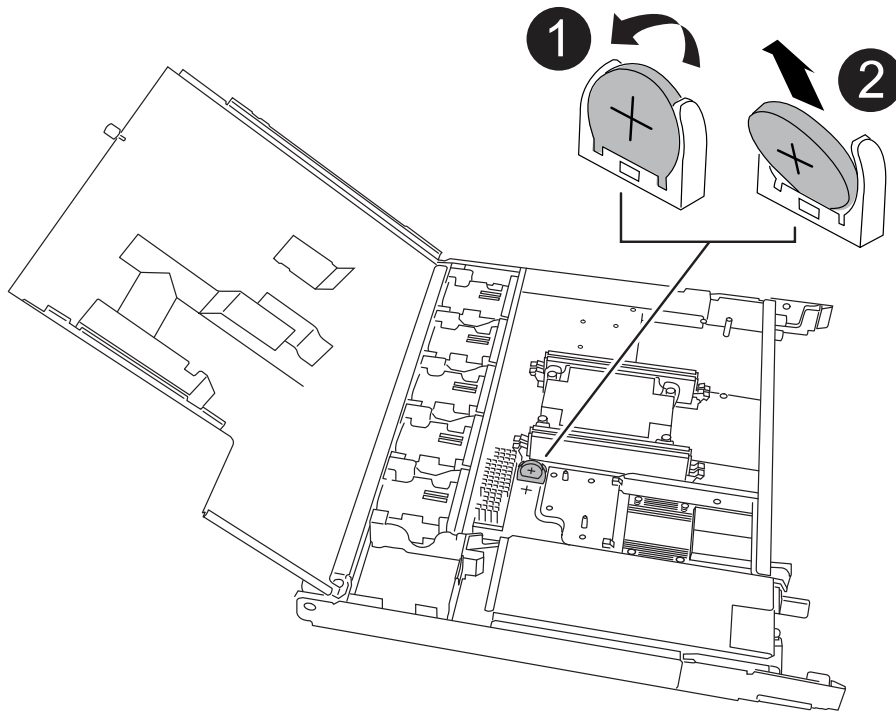
Make a note of the NSM ports that each cable is connected to. You reconnect the cables to the same ports when you reinsert the NSM, later in this procedure.

3. Remove the NSM:



|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | On both ends of the NSM, push the vertical locking tabs outward to release the handles.                                                                                                                                                                                                                                                                                                                                                            |
| 2 | <ul style="list-style-type: none"> <li>• Pull the handles towards you to unseat the NSM from the midplane.</li> </ul> <p>As you pull, the handles extend out from the shelf. When you feel some resistance, keep pulling.</p> <ul style="list-style-type: none"> <li>• Slide the NSM out of the shelf and place it on a flat, stable surface.</li> </ul> <p>Make sure that you support the bottom of the NSM as you slide it out of the shelf.</p> |
| 3 | Rotate the handles upright (next to the tabs) to move them out of the way.                                                                                                                                                                                                                                                                                                                                                                         |

4. Open the module cover by turning the thumbscrew counterclockwise to loosen, and then open the cover.
5. Locate the RTC battery and replace it.
  - a. Remove the failed battery:



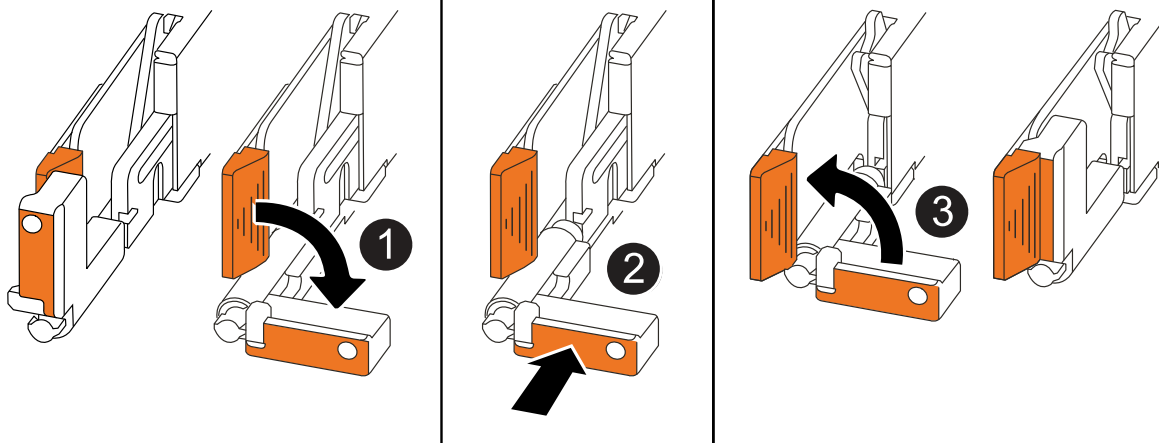
|   |                                                                 |
|---|-----------------------------------------------------------------|
| 1 | Gently rotate the RTC battery at an angle away from its holder. |
| 2 | Lift the RTC battery out of its holder.                         |

- b. Remove the replacement battery from the antistatic shipping bag.
  - c. Note the polarity of the RTC battery, and then insert it into the holder by tilting the battery at an angle and pushing down.



You must ensure that the plus sign on the battery corresponds to the plus sign on the motherboard.

- d. Visually inspect the battery to make sure that it is completely installed into the holder and that the polarity is correct.
6. Close the NSM cover and turn the thumbscrew clockwise until tightened.
7. Insert the NSM into the shelf:



|   |                                                                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | If you rotated the NSM handles upright (next to the tabs) to move them out of the way while you serviced the NSM, rotate them down to the horizontal position. |
| 2 | Align the rear of the NSM with the opening in the shelf, and then gently push the NSM using the handles until it is fully seated.                              |
| 3 | Rotate the handles to the upright position and lock in place with the tabs.                                                                                    |

#### 8. Recable the NSM.

- a. Reconnect the storage cabling to the same two NSM ports.

Cables are inserted with the connector pull-tab facing up. When a cable is inserted correctly, it clicks into place.

- b. Reconnect the power cord to the power supply, and then secure the power cord with the power cord retainer if it is an AC power supply, or tighten the two thumb screws if it is a DC power supply, and then unplug the power cord from the power supply.

When functioning correctly, a power supply's bicolored LED illuminates green.

Additionally, both NSM port LNK (green) LEDs illuminate. If a LNK LED does not illuminate, reseal the cable.

#### 9. Verify that the attention (amber) LEDs on the NSM containing the failed RTC battery and the shelf operator display panel are no longer illuminated

The NSM attention LEDs turn off after the NSM reboots and no longer detects an RTC battery issue. This can take three to five minutes.

#### 10. Verify that the NSM is cabled correctly, by running Active IQ Config Advisor.

If any cabling errors are generated, follow the corrective actions provided.

[NetApp Downloads: Config Advisor](#)

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