Controller

Install and maintain

NetApp
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Controller

Controller replacement workflow - AFX 1K

Get started with replacing the controller in your AFX 1K storage system by shutting down the impaired controller, removing and replacing the controller, restoring the system configuration, and verifying system operations.

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To replace the controller module, you must meet certain requirements.

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Requirements to replace the controller - AFX 1K

Before replacing the controller in your AFX 1K storage system, ensure you meet the necessary requirements for a successful replacement. This includes verifying all other components in the system are functioning properly, verifying that you have the correct replacement controller, and saving the controller's console output to a text log file.

Review the requirements for replacing the controller.

- It is important that you apply the commands in these steps on the correct systems:

    - The *impaired* controller is the controller that is being replaced.
    - The *replacement* controller is the new controller that is replacing the impaired controller.
    - The *healthy* controller is the surviving controller.
- All drive shelves must be working properly.
- The healthy controller must be able to take over the controller that is being replaced (referred to in this procedure as the “impaired controller”).
- You must replace the failed component with the field-replaceable unit (FRU) you received from NetApp.
- You must replace a controller module with a controller module of the same model type. You cannot upgrade your system by just replacing the controller module.
- You cannot change any drives or drive shelves as part of this procedure.
- You must always capture the controller’s console output to a text log file.

  This provides you a record of the procedure so that you can troubleshoot any issues that you might encounter during the replacement process.

What’s next?

After reviewing the requirements to replace your AFX 1K controller, turn off the controllers.

Shut down the impaired controller - AFX 1K

Shut down the impaired controller in your AFX 1K storage system to prevent data loss and ensure system stability when replacing the controller.

Shut down the controller module using one of the following options.

To shut down the impaired controller, you must determine the status of the controller and, if necessary, perform a storage failover takeover of the controller so that the healthy controller continues to serve data from the impaired controller storage.

About this task

- If you have a cluster with more than four nodes, it must be in quorum. To view cluster information about your nodes, use the `cluster show` command. For more information about the `cluster show` command, see View node-level details in an ONTAP cluster.
- If the cluster is not in quorum or if the health or eligibility of any controller (other than the impaired controller) shows as false, you must correct the issue before shutting down the impaired controller. See Synchronize a node with the cluster.

Steps

1. If AutoSupport is enabled, suppress automatic case creation by invoking an AutoSupport message:

   ```
   system node autosupport invoke -node * -type all -message MAINT=<# of hours>h
   ```

   The following AutoSupport message suppresses automatic case creation for two hours:

   ```
   cluster1:> system node autosupport invoke -node * -type all -message MAINT=2h
   ```

2. Disable automatic giveback from the console of the impaired controller:

```
storage failover modify -node impaired-node -auto-giveback-of false
```

When you see *Do you want to disable auto-giveback?*, enter `y`.

a. If you are running ONTAP version 9.17.1 and the impaired controller cannot be brought up or is already taken over, you must take the HA interconnect link down from the healthy controller before booting up the impaired controller. This prevents the impaired controller from performing automatic giveback.

```
system ha interconnect link off -node healthy-node -link 0

system ha interconnect link off -node healthy-node -link 1
```

3. Take the impaired controller to the LOADER prompt:

If the impaired controller is displaying…	Then…
The LOADER prompt	Go to the next step.
System prompt or password prompt	Take over or halt the impaired controller from the healthy controller: `storage failover takeover -ofnode` *`impaired_node_name`* `-halt` *`true`* The *-halt true* parameter brings the impaired node to the LOADER prompt.

What's next?

After shutting down the controller, replace the controller.

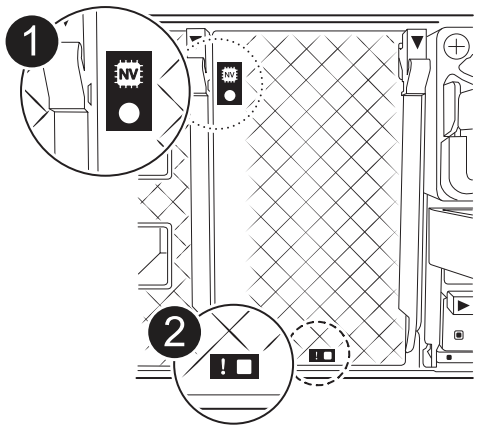
Replace the controller - AFX 1K

Replace the controller in your AFX 1K storage system when a hardware failure requires it. The replacement process involves removing the impaired controller, moving the components to the replacement controller, installing the replacement controller, and rebooting it.

Step 1: Remove the controller module

You must remove the controller module from the enclosure when you replace the controller module or replace a component inside the controller module.

1. Check the NVRAM status LED located in slot 4/5 of the system. There is also an NVRAM LED on the front panel of the controller module. Look for the NV icon:

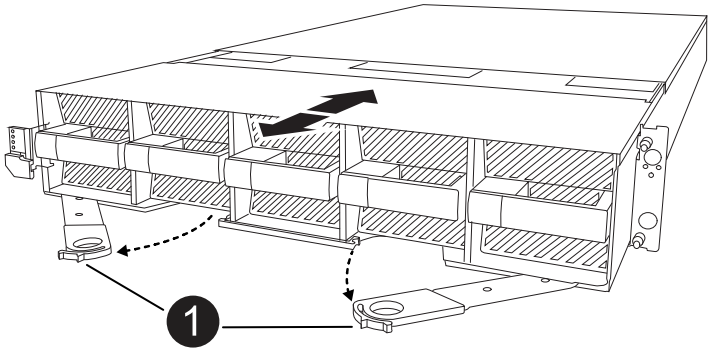


1	NVRAM status LED
2	NVRAM attention LED

- If the NV LED is off, go to the next step.
- If the NV LED is flashing, wait for the flashing to stop. If flashing continues for longer than 5 minutes, contact Technical Support for assistance.

2. If you are not already grounded, properly ground yourself.
3. Remove the bezel (if necessary) with two hands, by grasping the openings on each side of the bezel and pulling towards you until the bezel releases from the ball studs on the chassis frame.
4. On the front of the unit, hook your fingers into the holes in the locking cams, squeeze the tabs on the cam levers, and gently, but firmly rotate both latches toward you at the same time.

   The controller module moves slightly out of the enclosure.



1	Locking cam latches

5. Slide the controller module out of the enclosure and place it on a flat, stable surface.

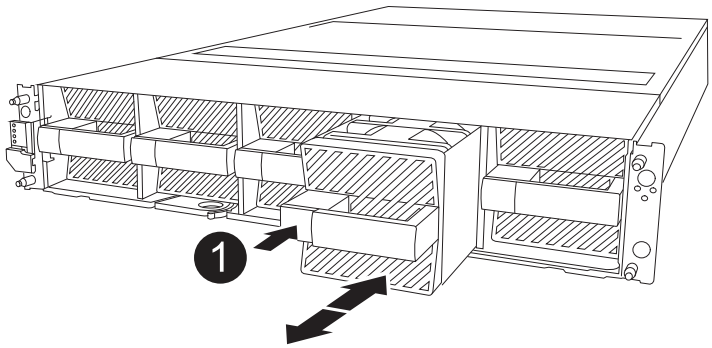
   Make sure that you support the bottom of the controller module as you slide it out of the enclosure.

Step 2: Move the fans

You must remove the five fan modules from the impaired controller module to the replacement controller module.

1. If you are not already grounded, properly ground yourself.
2. Remove the bezel (if necessary) with two hands, by grasping the openings on each side of the bezel, and then pulling it toward you until the bezel releases from the ball studs on the chassis frame.
3. Press the gray locking button on the fan module and pull the fan module straight out of the chassis, making sure that you support it with your free hand.

> The fan modules are short. Always support the bottom of the fan module with your free hand so that it does not suddenly drop free from the chassis and injure you.



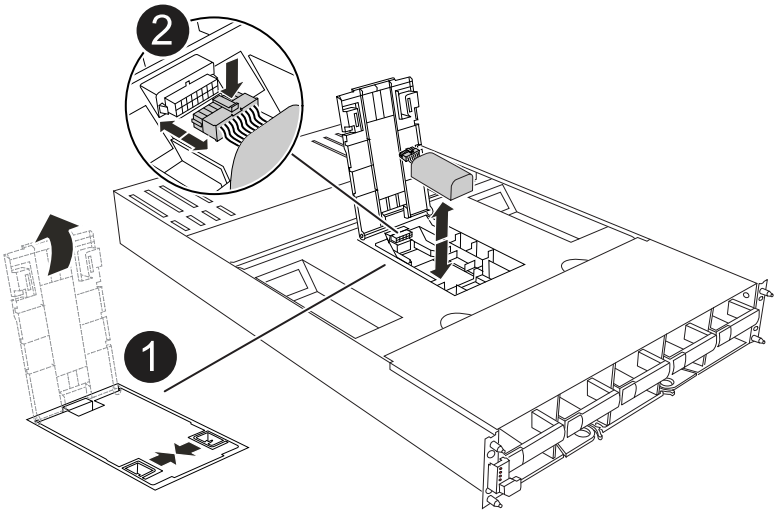
1	Black locking button

4. Install the fan in the replacement controller module:
   a. Align the edges of the fan housing with the opening in the front of the replacement controller module.
   b. Gently slide the fan module all the way into the replacement controller module until it locks in place.
5. Repeat the preceding steps for the remaining fan modules.

Step 3: Move the NV battery

Move the NV battery to the replacement controller.

1. Open the NV battery air duct cover and locate the NV battery.



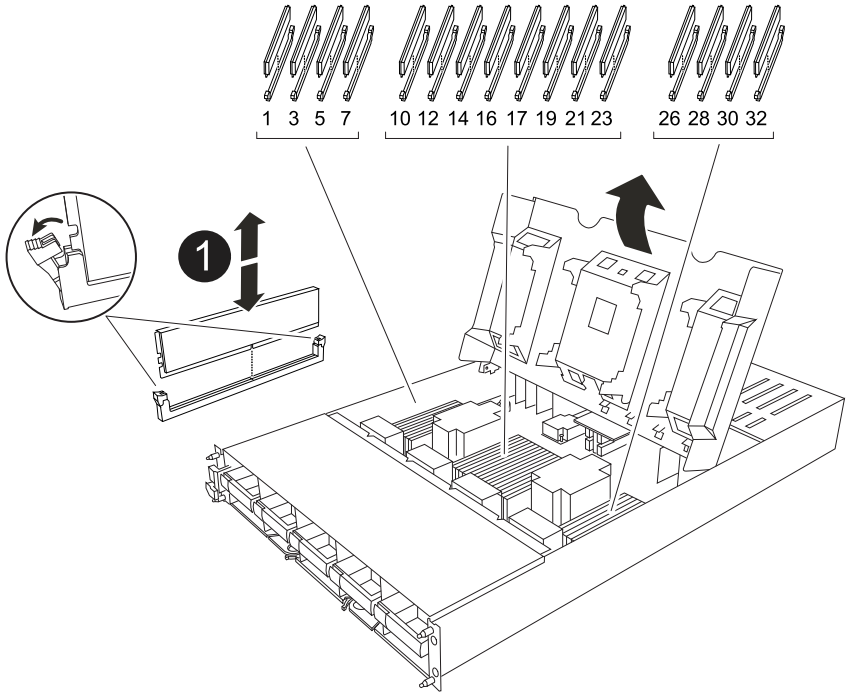
1	NV battery air duct cover
2	NV battery plug
3	NV battery pack

2. Lift the battery up to access the battery plug.
3. Squeeze the clip on the face of the battery plug to release the plug from the socket, and then unplug the battery cable from the socket.
4. Lift the battery out of the air duct and controller module.
5. Move the battery pack to the replacement controller module and then install it in the NV battery air duct:
   a. Open the NV battery air duct in the replacement controller module.
   b. Plug the battery plug into the socket and make sure that the plug locks into place.
   c. Insert the battery pack into the slot and press firmly down on the battery pack to make sure that it is locked into place.
   d. Close the air duct cover.

Step 4: Move system DIMMs

Move the DIMMs to the replacement controller module.

1. Open the motherboard air duct and locate the DIMMs.



1	System DIMM

2. Note the orientation of the DIMM in the socket so that you can insert the DIMM in the replacement controller module in the proper orientation.
3. Eject the DIMM from its slot by slowly pushing apart the two DIMM ejector tabs on either side of the DIMM, and then slide the DIMM out of the slot.

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

4. Locate the slot where you are installing the DIMM in the replacement controller module.
5. Insert the DIMM squarely into the slot.

   The DIMM fits tightly in the slot, but you should be able to insert it easily. If not, realign the DIMM with the slot and reinsert it.

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

6. Push carefully, but firmly, on the top edge of the DIMM until the ejector tabs snap into place over the notches at the ends of the DIMM.
7. Repeat these steps for the remaining DIMMs. Close the motherboard air duct.

Step 5: Install the controller module

Reinstall the controller module and boot it.

1. Ensure the air duct is completely closed by rotating it down as far as it will go.

   It must lie flush against the controller module sheet metal.

2. Align the end of the controller module with the opening in the enclosure, and slide the controller module into the chassis with the levers rotated away from the front of the system.
3. Once the controller module stops you from sliding it farther, rotate the cam handles inward until they latch back under the fans

   Do not use excessive force when sliding the controller module into the enclosure to avoid damaging the connectors.

   The controller boots to the LOADER prompt as soon as it is fully seated.

4. From the LOADER prompt, enter `show date` to display the date and time on the replacement controller. Date and time are in GMT.

   Time is displayed in local time and 24-hour format.

5. If necessary, set the current date with the `set date mm/dd/yyyy` command.
6. If necessary, set the time, in GMT, using the `set time hh:mm:ss` command.
   a. You can get the current GMT from the partner node with the `date -u` command.

What's next?

After replacing the impaired AFX 1K controller, restore the system settings.

Restore and verify the system configuration - AFX 1K

Verify that the controller's HA configuration is active and functioning correctly in your AFX 1K storage system, and confirm that the system's adapters list all the paths to the disks.

Step 1: Verify HA config settings

You must verify the `HA` state of the controller module and, if necessary, update the state to match your system configuration.

1. Boot to maintenance mode: `boot_ontap maint`
   a. Enter `y` when you see *Continue with boot?*.

      If you see the *System ID mismatch* warning message, enter `y`.

2. Enter `sysconfig -v` and capture the display contents.

   If you see *PERSONALITY MISMATCH* contact customer support.

3. From the `sysconfig -v` output, compare the adapter card information with the cards and locations in the replacement controller.

Step 2: Verify disk list

1. Verify that the adapter lists the paths to all disks:

```
storage show disk -p
```

If you see any issues, check cabling and reseat cables.

2. Exit Maintenance mode:

```
halt
```

What's next?

After restoring and verifying the AFX 1K storage system configuration, give back the controller.

Give back the controller - AFX 1K

Return control of storage resources to the replacement controller so your AFX 1K storage system can resume normal operation. The give back procedure varies based on the encryption type used by your system: no encryption, or Onboard Key Manager (OKM) encryption.

No encryption

Return the impaired controller to normal operation by giving back its storage.

Steps

1. From the LOADER prompt, enter

   ```
   boot_ontap
   ```

2. Press <enter> when console messages stop.
   - If you see the *login* prompt, go to the next step at the end of this section.
   - If you do not see login prompt, press the <enter> key, if still no prompt, log into the partner node.
3. Give back only the root with override-destination-checks option:

   ```
   storage failover giveback -ofnode impaired-node -only-root true -override
   -destination-checks true
   ```

   > The following command is only available in the Diagnostic mode privilege level. For more information on privilege levels, see Understand the privilege levels for ONTAP CLI commands.

   If you encounter errors, contact NetApp Support.

4. Wait 5 minutes after the giveback report completes, then check failover and giveback status:

   `storage failover show` and `storage failover show-giveback`

   > The following command is only available in the Diagnostic mode privilege level.

5. If the HA internconnect links were taken down, bring them back up:

   ```
   system ha interconnect link on -node healthy-node -link 0

   system ha interconnect link on -node healthy-node -link 1
   ```

6. Return the impaired controller to normal operation by giving back its storage:

   ```
   storage failover giveback -ofnode impaired_node_name
   ```

7. If automatic giveback was disabled, reenable it:

   ```
   storage failover modify -node local -auto-giveback-of true
   ```

8. If AutoSupport is enabled, restore/unsuppress automatic case creation:

   ```
   system node autosupport invoke -node * -type all -message MAINT=END
   ```

OKM encryption

Reset onboard encryption and return the controller to normal operation.

Steps

1. From the LOADER prompt, enter:

   `boot_ontap maint`

2. Boot to the ONTAP menu from the LOADER prompt `boot_ontap menu` and select option 10.
3. Enter the OKM passphrase. You can get this passphrase from the customer, or contact NetApp Support.

   You will be prompted twice for the passphrase.

4. Enter the backup key data when prompted.
5. At the boot menu, enter option `1` for normal boot.
6. Move the console cable to the partner node and enter the following login:

   `admin`

7. Give back only the root with override-destination-checks option:

   ```
   storage failover giveback -ofnode impaired-node -only-root true -override
   -destination-checks true
   ```

   The following command is only available in the Diagnostic mode privilege level. For more information on privilege levels, see Understand the privilege levels for ONTAP CLI commands.

   If you encounter errors, contact NetApp Support.

8. Wait 5 minutes after the giveback report completes, then check failover and giveback status:

   `storage failover show` and `storage failover show-giveback`

   The following command is only available in the Diagnostic mode privilege level.

9. Move the console cable to the replacement node and enter the following:

   `security key-manager onboard sync`

   You will be prompted for the cluster-wide passphrase of OKM for the cluster.

10. Check status of the keys with the following command:

    `security key-manager key query -key-type svm-KEK`

    If the *Restored* column shows anything but *true*, contact NetApp Support.

11. Return the impaired controller to normal operation by giving back its storage:

    `storage failover giveback -ofnode impaired_node_name`

    a. If the HA interconnect links were taken down, bring them back up to resume automatic giveback:

```
system ha interconnect link on -node healthy-node -link 0

system ha interconnect link on -node healthy-node -link 1
```

12. If automatic giveback was disabled, reenable it:

```
storage failover modify -node local -auto-giveback-of true
```

13. If AutoSupport is enabled, restore/unsuppress automatic case creation:

```
system node autosupport invoke -node * -type all -message MAINT=END
```

What's next?

After transferring storage resource ownership to the replacement controller, finish replacing the controller.

Complete controller replacement - AFX 1K

Verify that the logical interfaces (LIFs) are reporting to their home port, perform a cluster health check, and then return the failed part to NetApp to complete the final step in the AFX 1K controller replacement procedure.

Step 1: Verify LIFs and check cluster health

Before returning the replacement node to service, ensure the logical interfaces are on their home ports, check cluster health, and reset automatic giveback.

Steps

1. Verify that the logical interfaces are reporting to their home server and ports:

   ```
   network interface show -is-home false
   ```

   If any logical interfaces are listed as false, return them to their home ports:

   ```
   network interface revert -vserver * -lif *
   ```

2. Check the health of your cluster. See the How to perform a cluster health check with a script in ONTAP KB article for more information.

Step 2: Return the failed part to NetApp

Return the failed part to NetApp, as described in the RMA instructions shipped with the kit. See the Part Return and Replacements page for further information.

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