Quantum

40U Cabinet Installation Guide

StorNext QD7000

Firmware 8.40.xx.xx

6-68682-01 Rev A

40U Cabinet Installation Guide, 6-68682-01 Rev A, March 2018 Product of USA.

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Quantum specifications are subject to change.

Preface

Note: The 8.40.xx.xx firmware (Madrid) is used in the QD7000 (E5600, Titan RAID controller, only). Refer to the NetApp to Quantum Naming Decoder section for additional information.

This section provides the following information:

- Audience
- Prerequisites
- NetApp to Quantum Naming Decoder
- Product Safety Statements
- Contacts
- Comments
- Quantum Global Services

Audience

This manual is intended for storage customers and technicians.

Prerequisites

Prerequisites for installing and using this product include knowledge of:

- Servers and computer networks
- Network administration
- Storage system installation and configuration
- Storage area network (SAN) management and direct attach storage (DAS)
- Fibre Channel (FC) and Ethernet protocols

NetApp to Quantum Naming Decoder

Use Table 1 to correlate the NetApp product nomenclature to the equivalent Quantum-storage naming conventions.

Table 1 Product Nomenclature

E-Series NetApp Product	Quantum-Storage	Description
Controller-Drive Tray	Base System	Quantum uses Base System when referring to a drive tray with the RAID controllers.
Drive Tray	Expansion Unit	Quantum uses Expansion Unit when referring to a drive tray with the environmental services modules (ESMs).
E5600 (Code Name: Titan)	RAID Controller	Four 16Gb/s FC SFP+ host ports
E5500 (Code Name: Soyuz)	RAID Controller	Four 16Gb/s FC SFP+ host ports
E5400 (Code Name: Pikes Peak)	RAID Controller	Four 8Gb/s FC SFP+ host ports
DE6600 (Code Name: Wembley)	4U 60-drive enclosure	Sixty 3.5 inch disk drives

E-Series NetApp Product	Quantum-Storage	Description
E5660 • DE6600 4U drive enclosure • With E5600 RAID controllers (Titan)	Quantum StorNext QD7000	
E5560 • DE6600 4U drive enclosure • With E5500 RAID controllers (Soyuz)	Quantum StorNext QD7000	
E5460 • DE6600 4U drive enclosure • With E5400 RAID controllers (Pikes Peak)	Quantum StorNext QD6000	

E-Series NetApp Product	Quantum-Storage	Description
E5424 • DE5600 24-drive 2U drive enclosure • Code Name: Camden • With E5400 RAID controllers (Pikes Peak)	Quantum StorNext QS2400	
E5412 • DE1600 12-drive 2U drive enclosure • Code Name: Ebbets • With E5400 RAID controllers (Pikes Peak)	Quantum StorNext QS1200	

Product Safety Statements

Quantum will not be held liable for damage arising from unauthorized use of the product. The user assumes all risk in this aspect.

This unit is engineered and manufactured to meet all safety and regulatory requirements. Be aware that improper use may result in bodily injury, damage to the equipment, or interference with other equipment.

WARNING: Before operating this product, read all instructions and warnings in this document and in the system, safety, and regulatory guide.

警告	在使用本产品之前，请先阅读本文档及系统、安全和法规信息指南中所有的说明和警告信息。

警告	操作本產品前，請先閱讀本文件及系統、安全與法規資訊指南中的指示與警告說明。

ADVERSAL	Læs alle instruktioner og advarsler i dette dokument og i *Vejledning om system-sikkerheds- og lovgivningsoplysninger*, før produktet betjenes.

AVERTISSEMENT	Avant d'utiliser ce produit, lisez la totalité des instructions et avertissements de ce document et du *Guide d'informations sur le système, la sécurité et la réglementation*.

HINWEIS	Lesen Sie vor der Verwendung dieses Produkts alle Anweisungen und Warnhinweise in diesem Dokument und im System, Safety, and Regulatory Information Guide (Info-Handbuch: System, Sicherheit und Richtlinien).

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E-Series and EF-Series

3040 40U Cabinet Installation Guide

August 2016 | 215-11212_A0
doccomments@netapp.com

NetApp®

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Deciding whether to use this guide

This guide includes instructions and related information for installing a 3040 40U cabinet.

What products are covered in this guide

This guide provides the power requirements and maximum weights for the following E-Series and EF-Series controller-drive trays and expansion drive trays.

- E2612, E2624, and E2660 controller-drive trays
- E2712, E2724, and E2760 controller-drive trays
- E5412, E5424, and E5460 controller-drive trays
- E5512, E5524, and E5560 controller-drive trays
- E5612, E5624, and E5660 controller-drive trays
- EF540, EF550, and EF560 flash arrays
- DE1600, DE5600, and DE6600 drive trays

This guide does not provide specifications for the following controller shelves and drive shelves, which can also be installed in the cabinet.

- E2812 and E2824 controller shelves
- DE212C and DE224C drive shelves

For specifications for the SAS-3 controller shelves and drive shelves listed above, refer to the *E-Series and EF-Series Site Preparation Guide*.

Where to find the latest information about the product

You can find information about the latest version of the product, including new features and fixed issues, and a link to the latest documentation at the following address: *mysupport.netapp.com*.

Specifications of the model 3040 40U cabinet

The model 3040 40U cabinet has these standard features:

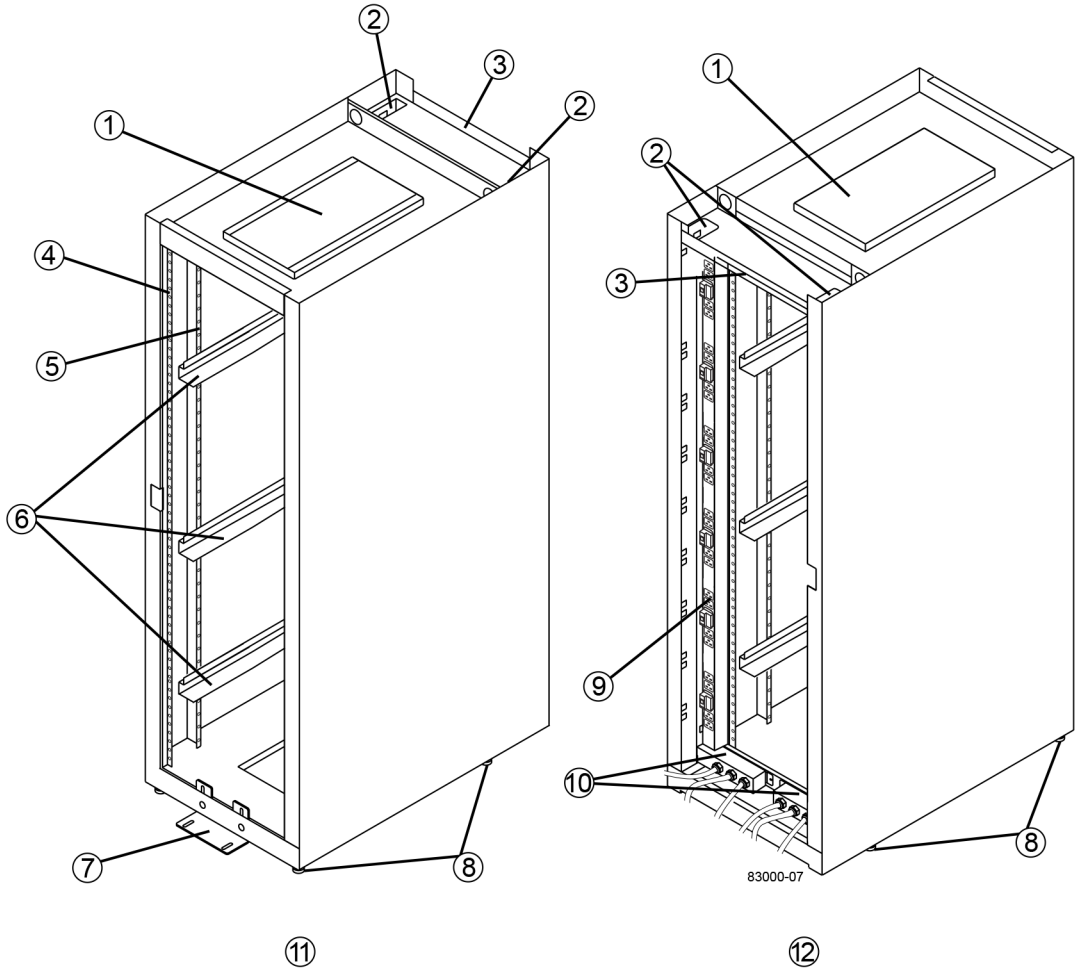
- A rear door that can be latched and locked
- Standard Electronic Industry Association (EIA) support rails that provide mounting holes for installing devices into a standard 48.3-cm (19-in.) wide cabinet
- Four roller casters and four adjustable leveling feet that are located beneath the cabinet for moving the cabinet and then leveling the cabinet in its final location
- A stability foot that stabilizes the cabinet after it is installed in its permanent location
- Access openings for interface cables
- Two AC power distribution units (PDUs) that provide integrated power connection and power handling capacity

Warning: Risk of bodily injury – If the bottom half of the cabinet is empty, do not install components in the top half of the cabinet. If the top half of the cabinet is too heavy for the bottom half, the cabinet might fall and cause bodily injury. Always install a component in the lowest available position in the cabinet.

Warning: Risk of bodily injury – Only move a populated cabinet with a forklift or adequate help from other persons. Always push the cabinet from the front to prevent it from falling over. A fully populated cabinet can weigh more than 2000 lb (909 kg). The cabinet is difficult to move, even on a flat surface. If you must move the cabinet along an inclined surface, remove the components from the top half of the cabinet, and make sure that you have adequate help.

Note: If you are loading DE6600 trays into a 3040 cabinet, a fully populated cabinet can weigh more than 2756 lb (1250.1 kg).

The following figures show a front view (left) and a rear view (right) of the cabinet.



1.	Ventilation cover
2.	Interface cable access openings
3.	Rear plate
4.	EIA support rails
5.	Vertical support rails
6.	Cabinet mounting rails
7.	Stability foot
8.	Adjustable leveling feet
9.	Power distribution unit (one of two)
10.	AC power entry boxes
11.	Front of the cabinet
12.	Rear of the cabinet

Power requirements and heat dissipation

The 3040 40U cabinet is rated at 200 VAC to 240 VAC at 50 Hz to 60 Hz, and it operates to ±10 percent of that range. The cabinet includes two identical AC power distribution units (PDUs), with each PDU providing up to 72A of usable power. The PDUs are mounted vertically at the back of the cabinet, and each PDU includes six 12A power banks. Each power bank contains four IEC 60320-C19 power outlets and a 15A circuit breaker. Each PDU has a total of 24 outlets and 6 circuit breakers.

Each of the two PDUs has three power entry boxes, which are located at the bottom of the cabinet. Each power entry box provides power to eight of the power outlets, as follows:

- Power entry box 1, which has power cord C1, supplies power to the bottom eight outlets
- Power entry box 2, which has power cord C2, supplies power to the middle eight outlets
- Power entry box 3, which has power cord C3, supplies power to the top eight outlets

The power entry boxes are labeled C1, C2, and C3 where the power cords connect to the modules.

Table 1: Power calculations and heat calculations for the cabinet

Component	kVA	Watts	BTU/Hr
Cabinet PDU (72A PDUs)	14.4	14400	49176
Cabinet PDU/12A bank (72A PDUs)	2.40*	2400*	8196*
E2612 controller-drive tray	0.437	433	1476
E2624 controller-drive tray	0.487	482	1644
E2660 controller-drive tray	1.128	1117	3810
E2712 controller-drive tray	0.516	511	1744
E2724 controller-drive tray	0.561	555	1894
E2760 controller-drive tray	1.205	1193	4072
E5412 controller-drive tray	0.558	552	1883
E5424 controller-drive tray and the EF540 flash array	0.607	601	2051
E5460 controller-drive tray	1.254	1242	4237
E5512 controller-drive tray	0.587	581	1982
E5524 controller-drive tray and the EF550 flash array	0.637	630	2150
E5560 controller-drive tray	1.285	1272	4342
E5612 controller-drive tray	0.625	619	2111
E5624 controller-drive tray and the EF560 flash array	0.675	668	2279
E5660 controller-drive tray	1.325	1312	4477
DE1600 drive tray	0.325	322	1099
DE5600 drive tray	0.375	371	1267

Component	kVA	Watts	BTU/Hr
DE6600 drive tray	0.1.011	1001	3415
* The maximum ratings at 200 VAC. The BTU calculation is based on the maximum current rating that the power distribution unit can provide.			

Maximum number of trays

The maximum number of trays that you can install in a 3040 40U cabinet depends on the height of each tray in rack units (U). Each rack unit is 1.75 inches (4.45 cm). For example, you can install up to ten 4U trays, up to twenty 2U trays, or a combination of 2U and 4U trays, up to 40U.

Table 2: Tray heights in rack units (U)

Tray	Rack units (U)
E2x12 or E2x24 controller-drive tray	2U
E2x60 controller-drive tray	4U
E5x12 or E5x24 controller-drive tray	2U
E5x60 controller-drive tray	4U
EF5x0 Flash Array	2U
DE1600 drive tray	2U
DE5600 drive tray	2U
DE6600 drive tray	4U

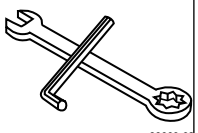
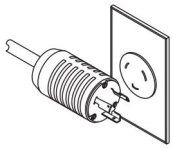
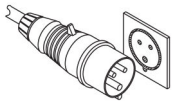
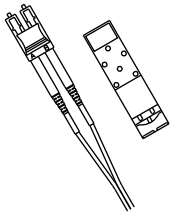
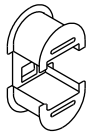
Installing the cabinet

Because the cabinet is a large and heavy piece of equipment, cabinet installation requires planning with attention to detail during the installation process.

Gathering the required tools and equipment

You need additional tools and equipment to complete the installation tasks.

Table 3: Required for cabinet installation

	Item	Included with the cabinet
	**3/4-in. wrench** (supplied in the shipping crate) – To raise and lower the leveling feet under the cabinet. **1/4-in. Allen wrench** – To raise and lower the stability foot in the front of the cabinet.	✓
NEMA L6-30  **IEC-60309** 	**AC power cords** – To connect the cabinet to external power sources (wall plugs). • The NEMA L6-30 connectors are for use in the USA and Canada. • The IEC-60309 connectors are for use worldwide, except for USA and Canada. **Note:** Each PDU must be connected to an independent power source.	✓
	**SAS cables** (optional) – Two cables are included with each drive tray, while host side cables must be purchased separately. **Communication cables** (optional) – To attach the tray to the host. Refer to the appropriate controller-drive tray installation guide for additional required items.	
	**Mountable cable spools** – Installed along both sides of the vertical power distribution outlets to accommodate excess cable length and cable routing. Two cable spools are included with each controller-drive tray. Cable spools are also shipped with standalone drive trays.	✓

	Item	Included with the cabinet
	Shears – To cut the metal bands on the shipping crate.	
	Forklift (optional) – To remove the cabinet from the shipping pallet.	
	Front panel kits (optional) – To cover the empty bays at the front of the cabinet.	
	Antistatic bags (optional) – To protect components that are removed during the installation procedure for the cabinet.	

Preparing to move the cabinet

Before you move the cabinet from its location in your receiving area, you must complete these tasks:

1. Estimate the total weight of the cabinet and the trays that are to be installed in it.
2. Acclimate the cabinet.
3. Remove the packing materials.
4. Check the shipping contents.
5. Remove selected components from the cabinet.

Estimating the cabinet weight

The cabinet reliably and safely transports up to 909.1 kg (2000 lb) of capacity. You need to know the approximate weight of the cabinet so that you can safely move it.

Caution: Remove all drives from the DE6600 drive tray before moving the cabinet to its final position.

Attention: Possible equipment damage – Cabinets with DE6600 drive trays ship without drives to reduce shipping weight. Because a fully-populated cabinet with DE6600 drive trays can weigh more than 1247.3 kg (2750 lb), make sure that you move the cabinet into place before you load the drives, and make sure that the floor load capability of the cabinet's destination supports that much weight.

Attention: Possible damage to tray components – Do not place a DE6600 drive tray on a flat surface. Install the DE6600 drive tray in the cabinet before operating or moving drawers.

The total weight of the cabinet depends on the number and type of trays that are installed in the cabinet. The following table lists the weights of the components that might be installed in the cabinet and the weight of the empty cabinet. Use this table to calculate the approximate total weight of your cabinet. Make sure that you have adequate personnel and equipment to safely move the cabinet.

Note: For more detailed descriptions of the controller-drive trays, flash arrays, and drive trays listed below, refer to the *Storage System Site Preparation Guide* or the appropriate controller-drive tray installation guide.

Table 4: Cabinet and tray weights

Component	Weight	Notes
Cabinet	138.80 kg (306.0 lb)	Empty with the rear door installed

Component	Weight	Notes
Power distribution units (PDUs [pair])	19.96 kg (44.0 lb)	
Mounting rails (pair)	1.59 kg (3.50 lb)	
E2612 controller-drive tray	27 kg (59.52 lb)	Maximum configuration
E2624 controller-drive tray	26.12 kg (57.32 lb)	Maximum configuration
E2660 controller-drive tray	105.2 kg (232 lb)	Maximum configuration
E2712 controller-drive tray	27.12 kg (59.8 lb)	Maximum configuration
E2724 controller-drive tray	26 kg (57.32 lb)	Maximum configuration
E2760 controller-drive tray	105.2 kg (232 lb)	Maximum configuration
E5412 controller-drive tray	27.92 (61.52 lb)	Maximum configuration
E5424 controller-drive tray	26.92 kg (59.32 lb)	Maximum configuration
E5460 controller-drive tray	105.2 kg (232 lb)	Maximum configuration
E5512 controller-drive tray	28.89 kg (63.7 lb)	Maximum configuration
E5524 controller-drive tray	27.9 kg (61.52 lb)	Maximum configuration
E5560 controller-drive tray	107.13 kg (236.2 lb)	Maximum configuration
E5612 controller-drive tray	28.89 kg (63.7 lb)	Maximum configuration
E5624 controller-drive tray	27.9 kg (61.52 lb)	Maximum configuration
E5660 controller-drive tray	107.13 kg (236.2 lb)	Maximum configuration
EF540 flash array	23.64 kg (52.12 lb)	Maximum configuration
EF550 flash array	24.63 kg (54.32 lb)	Maximum configuration
EF560 flash array	24.63 kg (54.32 lb)	Maximum configuration
DE1600 drive tray	26.3 kg (58 lb)	Maximum configuration
DE5600 drive tray	25.31 kg (55.8 lb)	Maximum configuration
DE6600 drive tray	104.1 kg (229.6 lb)	Maximum configuration

Acclimating the cabinet

Attention: Possible damage to tray components – If the outdoor temperature is below 0°C (32°F) when you receive your cabinet and trays, do not immediately unpack them or uncrate them. Exposing cold components to warm indoor temperatures can cause condensation, which results in component damage or failures.

Make sure that the cabinet and the trays are acclimated to the indoor environment before removing the packing materials. If the outdoor temperature is below 0°C (32°F), leave the cabinet and trays inside of their crates indoors for at least 24 hours to prevent condensation. Increase or decrease the 24-hour stabilization period depending on the outside temperature upon arrival. After the cabinet and the trays have acclimated to the indoor environment, you can unpack them.

Removing the packing material

After the cabinet has acclimated to the indoor temperature, refer to the unpacking instructions included on the front of the shipping crate, and remove the packing material.

Checking the shipping contents

Compare the packing list with the equipment that you received to make sure that all equipment arrived at the site. If any items are missing, contact your sales representative.

Removing the components

Before you move the cabinet, remove some of the heavier components that are located in the top of the cabinet. Removing these components ensures maximum stability and keeps the center of gravity as close to the floor as possible while the cabinet is being moved. Make sure the maximum weight does not exceed 2000 lbs before you move the cabinet.

About this task

After the cabinet is moved to its permanent location, you will reinstall these components in the cabinet in their original locations. Make sure that you note the location of each component before you remove it.

Attention: Possible address conflict of loss of data access – To prevent address conflicts and loss of data access, note the location of each tray, component, and cable before removing it, so that you can reinstall each item in its original location.

Steps

1. Record the cable configuration for future reassembly if any cables must be disconnected.
2. Remove the drive trays and controller-drive trays in the top half of the cabinet. Keep all of the components from the same tray together.

   Note: You do not need to remove the power supplies or other components from the rear of each tray.
3. Place each component in a separate antistatic bag. If the original shipping boxes are available, use them to transport the components.

Moving the cabinet

The 3040 40U cabinet has heavy-duty casters that enable you to move the cabinet to its permanent location.

About this task

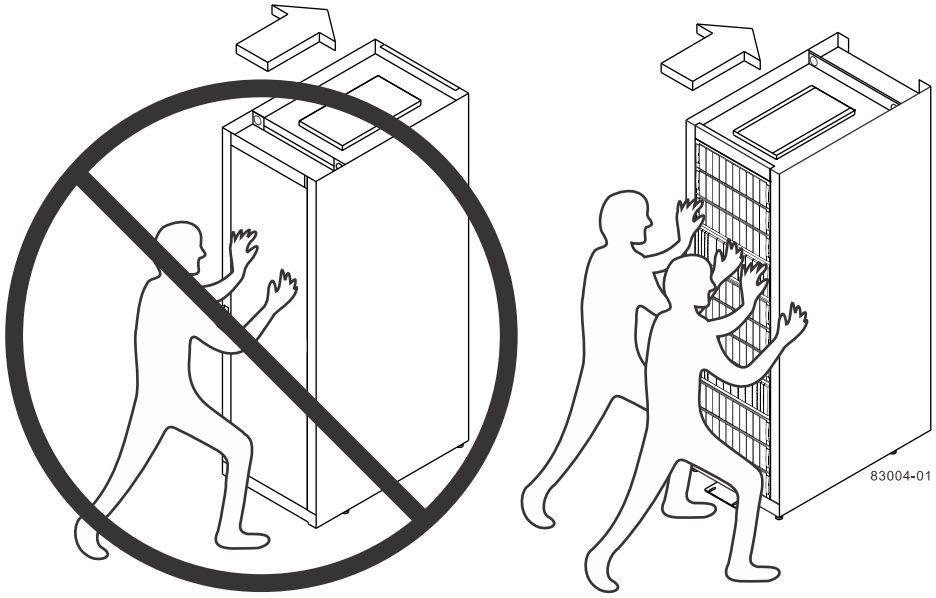
Shipping crates provide built-in ramps and instructions for rolling the cabinet off the pallet without the use of a forklift. Refer to the unpacking instructions included on the front of the shipping crate.

When you move a cabinet, you must be aware of all of the ramps between the loading dock and the destination. You must evaluate all ramps to make sure that the cabinet's center of gravity (when the cabinet is on a ramp and sitting at an angle) does not extend beyond the cabinet's footprint.

Remove the top-most devices in your cabinet to make sure that the cabinet is safely transported to its final location. This is especially important if any ramp has an incline or a decline greater than 10 degrees.

Note: Many of the cabinets are populated with drive trays. This situation results in most of the weight in the front portion of the cabinet, making the center of gravity closer to the front.

Move the cabinet to its permanent location using the correct method shown in the following figure. Make sure that you push on the front of the cabinet, not the rear.



Rear of Cabinet

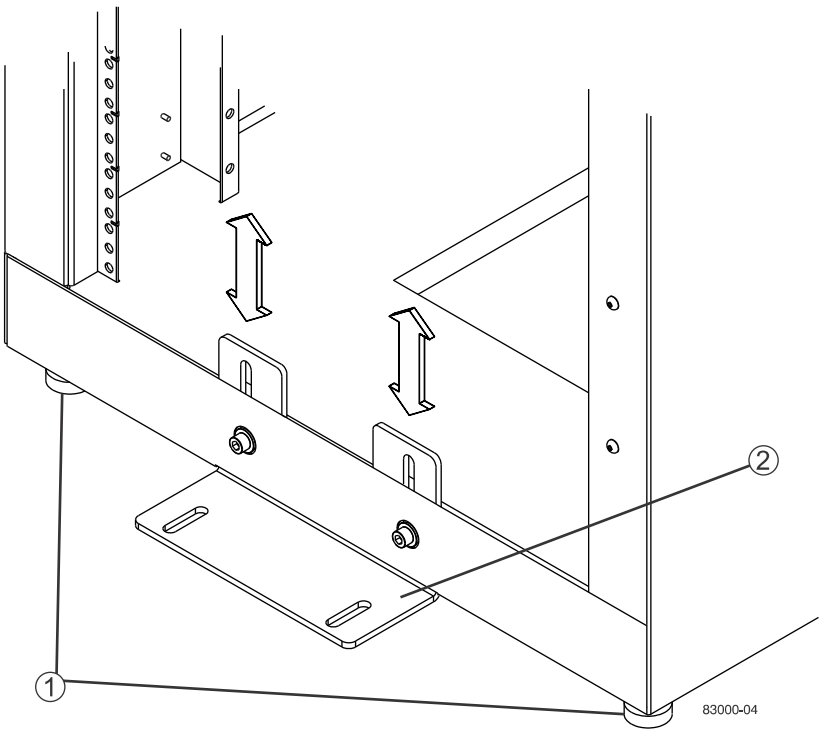
Front of Cabinet

Completing the installation

After you move the cabinet, you lower the leveling feet and the stability foot, reinstall the components you removed, and install other required components.

Lowering the leveling feet and the stability foot

The stability foot prevents the cabinet from falling over after it is placed in its permanent location. After you move the 3040 40U cabinet to its permanent location, lower the leveling feet to support the cabinet off of the casters. Make sure that the cabinet is a level as possible. The leveling feet are located near each bottom corner of the cabinet. The following figure provides a close-up view of the stability foot and the leveling feet.



1.	Leveling feet

2.	Stability foot

Reinstalling the trays

After you move the cabinet, you can reinstall the trays in their original locations.

About this task

Attention: Possible equipment damage – Do not install a DE6600 drive tray, an E2660 controller-drive tray, an E2760 controller-drive tray, an E5460 controller-drive tray, E5560 controller-drive tray, or an E5660 controller-drive tray in the top of the cabinet over your head. When fully-populated, each of these trays weighs over 100 kg (220 lb). If installed in the top of the cabinet, the trays will create a top-heavy cabinet that can become easily unbalanced.

Warning: (W15) **Risk of bodily injury** – An empty tray weighs approximately 56.7 kg (125 lb). Three persons are required to safely move an empty tray. If the tray is populated with components, a mechanized lift is required to safely move the tray.

Attention: Possible address conflict or loss of data access – To prevent address conflicts and loss of data access, replace all components in the same tray and in the same location in the tray. Reinstall all trays in their original locations in the cabinet. Reinstall all cables in their original locations in the cabinet.

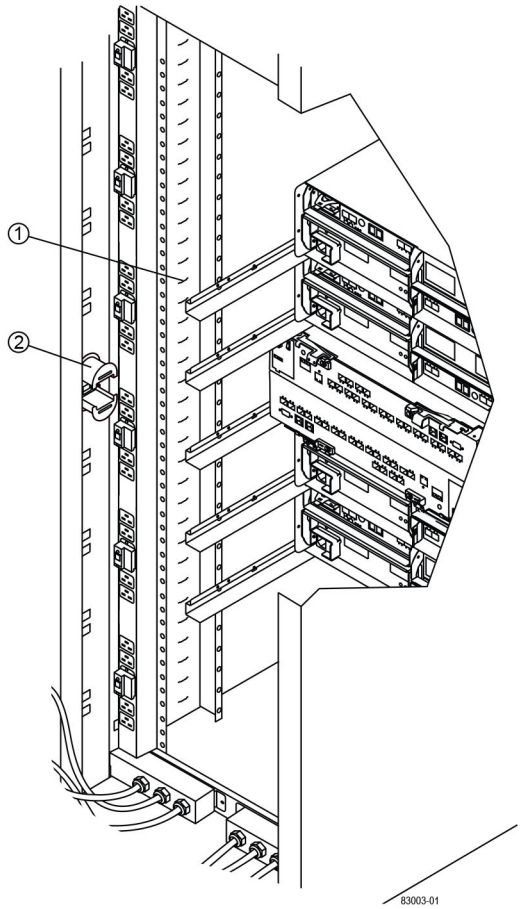
Steps

1. Reinstall all of the trays in their original locations in the cabinet.
2. Reinstall all of the components in their original locations in the trays.
3. Reinstall all cables to their original locations in the trays.
4. Route the interface cables to the cabinet.
5. Route the main power cords from the cabinet to the two external power sources. *Do not* plug in the power cords at this time.

Installing the cable spools and the tie wraps

After you reinstall the trays, you install the cable spools and the tie wraps along both sides of the vertical power distribution outlets. The cable spools and the tie wraps accommodate excess cable length and cable routing for the controllers and the trays.

About this task



1.	Tie wrap location
2.	Cable spool

Installing other components

You can install additional trays. You must cover unused positions for trays to assure correct air flow.

Steps

1. If you have additional trays that must be installed, install the mounting hardware for these trays.
2. If the front of the cabinet is not completely filled with trays, use front panel kits to cover the empty spaces above or below the installed trays.

   Covering the empty spaces is necessary so that the correct airflow through the cabinet is maintained.

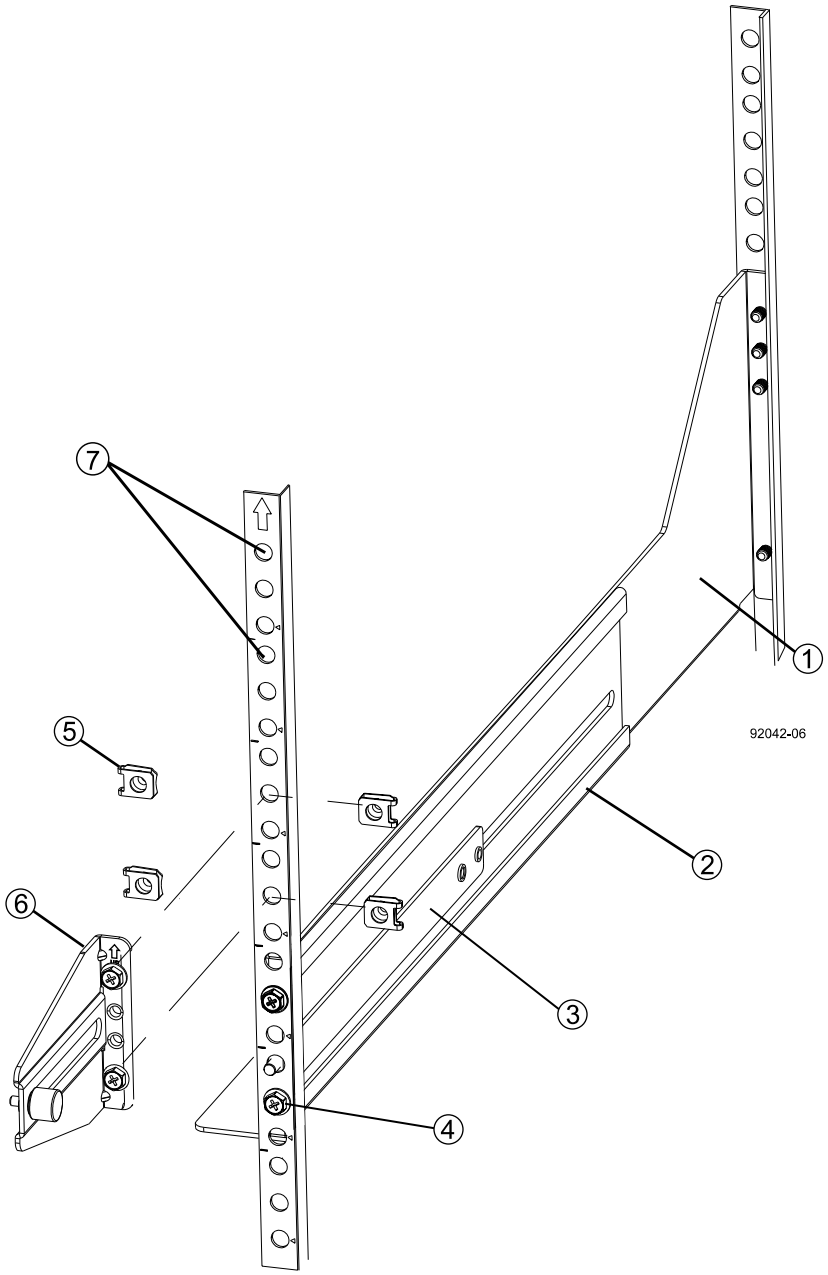
3. Refer to the controller-drive tray installation guides for the trays that are contained in the cabinet, and complete the power-on procedures described in the guides.

Installing additional mounting rails

If you are installing controller-drive trays, or drive trays that were shipped separately (not already installed in the cabinet), you might need to install additional mounting rails in the cabinet.

Steps

1. Determine the location for the mounting rails.
   - **Above an existing tray** – Position the mounting rails immediately above the top tray in the cabinet.
   - **Beneath an existing tray** – Position the mounting rails with enough clearance to hold the tray being installed:
     - 8.9 cm (3.5 in.) for 2U controller-drive trays or drive trays
     - 17.8 cm (7 in.) for 4U controller-drive trays or drive trays
2. Use the measurement markers on the right-front and left-front vertical supports to attach the mounting rails to the same position on each side of the cabinet.



1.	Front adjustable rail
2.	Rear adjustable rail
3.	Adjustment plate and screws
4.	Rail mounting M5×10mm screws
5.	Clip nuts
6.	Rear hold down bracket
7.	Vertical support

Note: The clip nuts and the rear hold down bracket are not used when the rails are installed in a 3040 cabinet.

3. Place the rear adjustable rail on the vertical support.
4. On the rear adjustable rail, align the adjustable rail holes in front of the holes in the vertical support.
5. Attach two M5×10mm screws.
    a. Attach the screws through the vertical support rail and the rear adjustable rail.
    b. Tighten the screws.
6. Place the front adjustable rail on the vertical support.
7. On the front adjustable rail, align the adjustable rail holes in front of the holes in the vertical support.
8. Attach two M5×10mm screws.
    a. Attach one screw through the vertical support rail and the bottom hole of the front adjustable rail.
    b. Attach one screw through the vertical support rail and the middle of the top three holes in the front adjustable rail.
    c. Tighten the screws.

    Note: The remaining two screw holes are used to mount the tray.
9. Repeat step *3* through step *8* to attach the second rail on the other side of the cabinet.
10. Install each tray using the applicable tray installation instructions.
11. Choose one of the following options:
    - If all positions for trays are full, refer to the controller-drive tray installation guide for each tray that is contained in the cabinet, and complete the power-on procedures described in the guides.
    - If not all positions for trays are full, use front panel kits to cover the empty spaces above or below the installed trays.

Turning on the power with 72A PDUs

Power to trays is provided by a standard AC power source. This topic describes how to connect the cabinet to power.

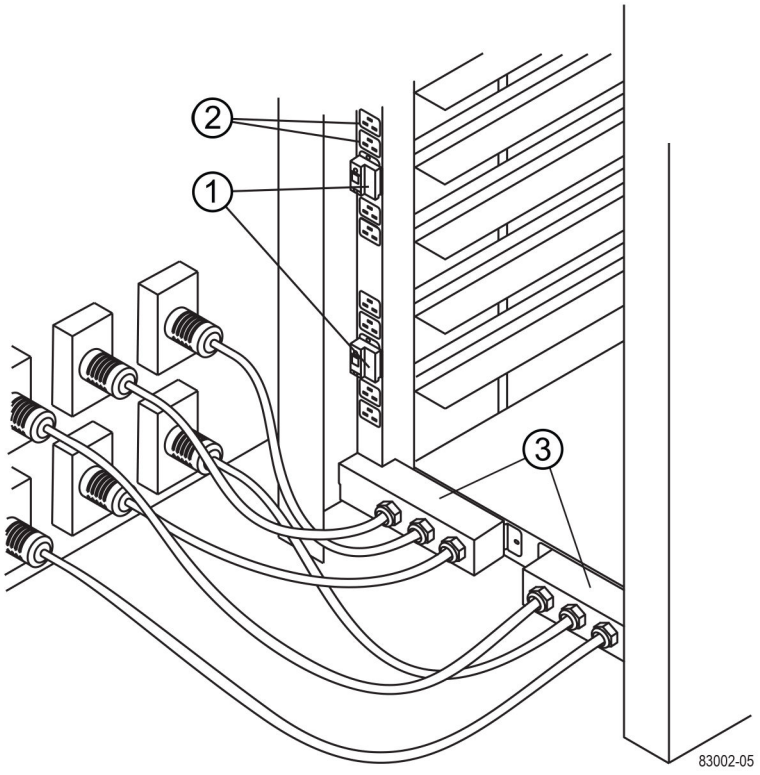
About this task

While the trays perform the power-on procedure, the LEDs on the front and the rear of the trays blink. Depending on your configuration, it can take several minutes to complete the power-on procedure.

Steps

1. Turn off the power to all of the components in the cabinet.
2. Turn all 12 circuit breakers to their off (down) position.
3. Plug each of the six NEMA L6-30 connectors (USA and Canada) or the six IEC 60309 connectors (worldwide, except for USA and Canada) into an available electrical outlet.

   Note: You must connect each PDU to an independent power source outside of the cabinet.
4. Turn all 12 circuit breakers to their on (up) position.



1.	Circuit breakers
2.	Electrical outlets
3.	Power entry boxes

5. Turn on the power to all of the drive trays in the cabinet (refer to the appropriate controller-drive tray installation guide for assistance).

Important: Wait 30 seconds after turning on the drive trays before you turn on the power to the controller-drive trays.

6. Turn on the power to all of the controller-drive trays in the cabinet (refer to the appropriate controller-drive tray installation guide for assistance).

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