



Western Digital

Installation Guide

Ultrastar® Data60

Regulatory Model H4060-J
Document D018-000237-000
Revision 03
September 2022

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Revision History

Date	Revision	Comment
November 2017	1.0	Initial release
November 2017	1.1	<ul style="list-style-type: none"> The crossbar on the CMA was changed. See the installation instructions for details. Changed required rack depth, see Required Rack Depth (page 5). Changed typical power consumption, see Typical Power Consumption (page 4).
December 2017	1.2	<ul style="list-style-type: none"> Added active cable support Added a note regarding single IOMs in SATA TLAs. See Ultrastar Data60 Description (page 2) Updated the Non-Op altitude specification. See Non-Operational Altitude (page 4). Correct the packaging images to show the two CMA boxes that come in the accessory tray. See Packaging Layout (page 21).
January 2018	1.2.1	Updated the product name
January 2018	1.2.2	Added an image for cage nut positioning in the installation procedure.
January 2018	1.3	<ul style="list-style-type: none"> Updated information on the 2.5" drive carrier option. (topic removed) Added torque requirements for all screws used in the enclosure. Updated the IOM replacement section to account for the possibility of a firmware mismatch. (topic removed) Updated the drive assembly installation instructions to clarify the orientation of the drive assemblies. See Installation (page 27).
April 2018	1.4	<ul style="list-style-type: none"> Updated Compatible Drives List. See Compatible Drives (page 9). Updated the Rack Requirements. See Ultrastar Data60 Rack Requirements (page 6).
June 2018	1.5	<ul style="list-style-type: none"> Updated the Compatible Drives List. See Compatible Drives (page 9)
December 2018	1.6	<ul style="list-style-type: none"> Updated Compatible Drives List. See Compatible Drives (page 9)
March 2019	1.7	Updated Installation (page 27)
May 2019	1.8	Updated Installation (page 27)

Date	Revision	Comment
July 2019	1.9	<ul style="list-style-type: none"> Updated servicing image to correct length values and rail servicing extension in UltraStar Data60 Rack Requirements (page 6) section. Updated revision history to remove broken links to topics no longer in this document.
November 2019	1.10	<ul style="list-style-type: none"> Replaced references to He12 drives with UltraStar DC HC520 in Compatible Drives (page 9) Corrected layout image annotations to match table numbering in UltraStar Data60 Layout (page 2) Updated images of chassis cover screws throughout
December 2019	1.11	<ul style="list-style-type: none"> Rebranded document to WD design Updated the Compatible Drives (page 9)
April 2020	1.12	<ul style="list-style-type: none"> Updated drive installation order in the Installation (page 27) Added SAS Cabling (page 52) Added note about minimum time between removing and reapplying power in Power Connections (page 17)
August 2020	1.13	Updated SAS Cabling (page 52)
October 2020	1.14	<ul style="list-style-type: none"> Updated images and text in UltraStar Data60 Packaging Overview (page 21) and UltraStar Data60 Unpacking Procedure (page 24) Added the following to Installation (page 27): <ul style="list-style-type: none"> Note about input voltage at plug-in step Reference to User Guide after installation instructions Note about installation of 2.5in SSD Assembly Added Operating the 2.5" Drive Carrier Updated table of approved SAS cables in SAS Cabling (page 52) Reordered cabling topics in Installation (page 27) section
December 2020	1.15	<ul style="list-style-type: none"> Added UK Import Representation Contact Removed Formerica cables from SAS Cabling (page 52)
February 2021	1.16	<ul style="list-style-type: none"> Added UltraStar DC HC650 drives to Compatible Drives (page 9) Updated Installation (page 27) to include instructions for screw plate
August 2021	1.17	<ul style="list-style-type: none"> Removed Mexico from Country Certifications (page 14) Separated installation procedure into individual tasks by component in Installation (page 27)

Date	Revision	Comment
September 2021	01	Changed document number from 1ET1105 to D018-000237-000
March 2022	02	<ul style="list-style-type: none">Added drive model numbers to Compatible Drives (page 9)Reorganized SAS Cabling (page 52) section, added note about compatibility between AOCs and 9300-, 9302-, and 9305-series HBAs, and removed Amphenol ICC (FCI) passive cables 10112041-2010LF, -2020LF, and -2030LFUpdated logo for detachable power cord in Safety Warnings and Cautions (page 19)Updated drive installation instructions in Drive Installation (page 61)
September 2022	03	Updated document branding

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Email:

support@wdc.com

Website:

<https://portal.wdc.com/Support/s/>

UK Import Representation Contact

Western Digital UK Limited

PO Box 471
Leatherhead KT22 2LU
UK

Telephone: +44 1372 366000

EU Import Representation Contact

Western Digital EU Limited

PO Box 13379
Swords, Co
Dublin, Ireland

1.1 Product Label Information

The following product information is required for technical support requests:

- Part Number (P/N)
- Serial Number (S/N)
- Product Name and/or Model Number (MODEL)

This information may be found on the product label, which is affixed to an exterior, non-removable surface of the chassis. The following is an example label with the applicable information fields highlighted:

P/N: 1ESXXXX REV: XX

 S/N: CCMMMOWWYYPXXXX

 ###-##v~ ##A ##/## Hz (2x)
 MODEL: XXXXX-X

Nemko US 
Electrical Safety - UL60950-1

NOM NYCE  **IEEx**
INMETRO OCP 0064  1003

MANUFACTURED BY: **Western Digital.**

EAC **CE**  H005 15
   

IS 13252 (PART1)/
IEC 60950-1



R-41042056

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAN ICES-3 (A)/NMB-3(A)
この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

警告使用者: 此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會 被要求採取某些適當的對策。

Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan
 Apparatet må tilkoples jordat stikkontakt
 Apparaten skall anslutas till jordat uttag

 Electric shock hazard! Disconnect (2) power supply cords before servicing.

DATE CODE: MMDDYYYY
COO



Overview

This section provides a high level overview of the features of the Ultrastar Data60 .

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1.1 Ultrastar Data60 Description

Figure 2: Ultrastar Data60



The Ultrastar Data60 is a 4U form factor, high availability, high density, rack-mounted storage enclosure. It is capable of hosting up to 60 HDD drives (SAS or SATA). The maximum data storage capacity of the Ultrastar Data60 is 1.3PB using 22TB Ultrastar HC570 drives. (For a full list of compatible drives, see [Compatible Drives \(page 9\)](#).) The enclosure runs on an input voltage of 200-240 VAC and consumes ~1000W of power under typical conditions. It requires a maximum of 1250W at full load.

It is designed to fit within a 4U rack space and requires 900mm (35.43in.) usable rack space, frame to frame. A fully loaded system will add 79.4 kg. / 175 lbs. of static load when fully loaded with drives.

- 4U Storage Enclosure
- Supports up to 60 Drives
- Supports 3.5" drives in the 60 available drive bays.
- Up to 12W per drive slot for the 60 data storage drives (Cannot exceed 85A on the 5V rail)
- House and control four (4) N+1 redundant 80mm rear fans
- House and control a dual rotor 40mm internal IOM Fan
- Controlled by two (2) redundant I/O Modules¹
- Powered by two (2) redundant 1600W or 1800W PSUs
- Supports High Line (220-240 VAC) Input Power
- Full high availability with independent dual paths to all HDDs
- Toolless replacement of all Customer Replaceable Units (CRUs)
- Fits within a standard EIA-310 rack including all necessary cable management (see [Compatible Rack Hardware Configuration \(page 7\)](#))
- Supports up to 3m passive SAS cables (limited to 3m or less) or active cables (any length) (see [SAS Cabling \(page 52\)](#))

1. SATA based models will only include 1 IOM

1.2 Ultrastar Data60 Layout

Figure 3: Front and Rear Product Layout

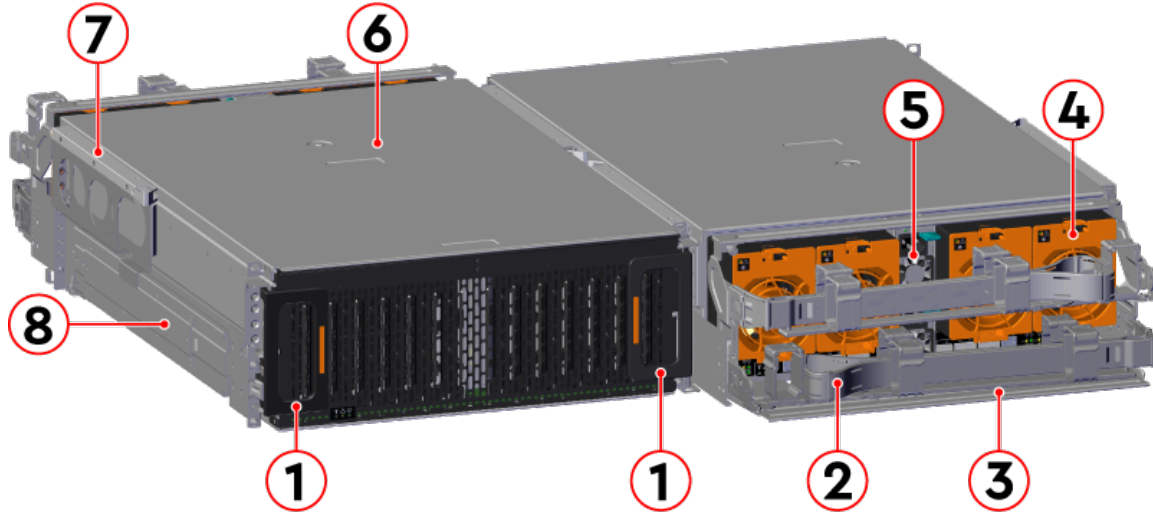
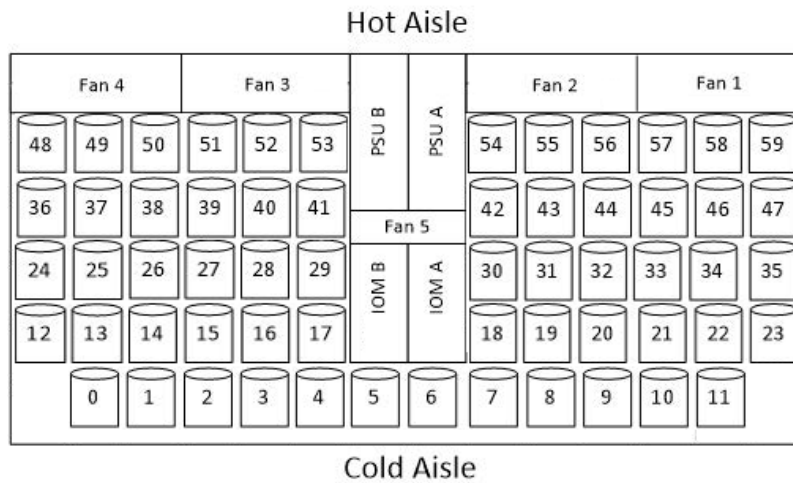


Table 1: Front and Rear Component Identification

Number	Component
1	Enclosure Handles
2	CMAs
3	CMA Tray
4	Rear Fans
5	PSUs (Delta PSUs shown)
6	Chassis Cover
7	Rear Cover Alignment Brackets
8	Rails

The following is an image of the layout of the major system components inside the Ultrastar Data60 .

Figure 4: Component Layout



1.3 Environmental Specifications

Table 2: Environmental Specification

Specification	Non-Operational	Operational
Temperature	-40°C to 70°C	5°C to 35°C
Temperature Gradient	30°C per hour max	20°C per hour max
Temperature De-rating	1°C per 300m above 3000m	1°C per 300m above 900m
Relative Humidity	8-90% Non-Condensing	8-90% Non-Condensing
Relative Humidity Gradient	30% per hour maximum	30% per hour maximum
Altitude	-300m to 12,000m / -984 ft. to 39,370 ft	-300m to 3048m / -984 ft. to 10,000 ft.

1.4 Electrical Specifications

Table 3: Electrical Specifications

Specification	Value
Max Power Consumption	1250W
Typical Power Consumption ²	~1000W
Input Voltage	200-240 VAC
PSU Connector Type	C14

2. Max and typical power consumption values represent the output power to the system. Input power will vary depending on the PSU efficiency and load sharing between PSUs.

Specification	Value
PSU Efficiency	80 PLUS Platinum
Inrush Current Maximum (per PSU)	AC line inrush current shall not exceed 40A peak, for up to one-quarter of the AC cycle after which, the input current should be no more than the specified maximum input current.



Caution: The Ultrastar Data60 can only be plugged into high line (200-240 VAC) power. If the unit is plugged into low line (110-127 VAC), the PSU will report a "Critical" state when status pages are queried using SES. In this case, the enclosure will power up, but the drives will not. The enclosure will remain in low-power mode.

1.5 Mechanical Specifications

Table 4: Mechanical Specifications

Specification	Non-Operational	Operational
Shock	10G, 0 - peak, 11ms half sine; 3 positive and 3 negative pulses in each axis Shock	5G, 0 - peak, 11ms half sine; 3 positive and 3 negative pulses in each axis- minimum 6 seconds between shocks to allow for write/read recovery
Vibration	0.75G, 0 - peak swept sine; 5 -500Hz; 1 complete sweep @ 1/2 octave per minute	0.10G, 0 - peak swept sine; 5 -500Hz; 1 complete sweep @ 1/2 octave per minute
Weight	79.4 kg. / 175 lbs. ³	
Enclosure Dimensions	W: 447 mm x L: 890 mm x H: 175 mm / W: 17.67 in. x L: 35.04 in. x H: 6.89 in.	
Length of Enclosure w/o CMA	712 mm / 28.03in.	
Required Rack Width	450 mm (17.72 in.) minimum width, with 465 mm (18.31 in.) ± 1.5 mm nominal hole spacing. See EIA-310 Rack Standard.	
Required Rack Depth	900mm (35.43in.) usable rack space, frame to frame	
Rack Units (U)	4U	
Vertical Rack Rail Spacing	609.6 - 812.8 mm / 24 - 32 in.	

1.6 Performance Specifications

- Listed weight is for a dual-IOM enclosure, fully populated with 60 drives. It does not include the CMA, cable tray, accessories, or packaging/shipping materials.

Table 5: Performance Specifications

Specification	Value
Number of Drive Slots	60
Data Transfer Rates	12Gbps SAS / 6Gbps SATA
Max Raw Data Storage Capacity	1.3PB using 22TB Ultrastar HC570 drives
SAS Ports	12 x Mini-SAS HD (6 per IOM)
Management Ports	2 x 10/100/1G Ethernet

1.7 Ultrastar Data60 Rack Requirements

The Ultrastar Data60 is designed to be installed into a rack that meets the EIA-310 standard at a minimum 900mm (35.43in.) usable rack space, frame to frame. The vertical rack rails must be set between 609.6 - 812.8 mm / 24 - 32 in. to support the enclosure. It requires 4U of rack space, and it should be installed into the rack at the lowest possible U height to keep the load on the rack balanced.

Table 6: Required Rack Specifications

Parameter	Requirement
Rack Depth	900mm (35.43in.) usable rack space, frame to frame
Rack Width	450 mm (17.72 in.) minimum width, with 465 mm (18.31 in.) ± 1.5 mm nominal hole spacing. See EIA-310 Rack Standard.
Rack Units (U)	4U
Vertical Rack Rail Spacing	609.6 - 812.8 mm / 24 - 32 in.
Static Load Rating	1360.7 kg. / 3000 lbs.
Dynamic Load Rating	1020.5 kg. / 2250 lbs.



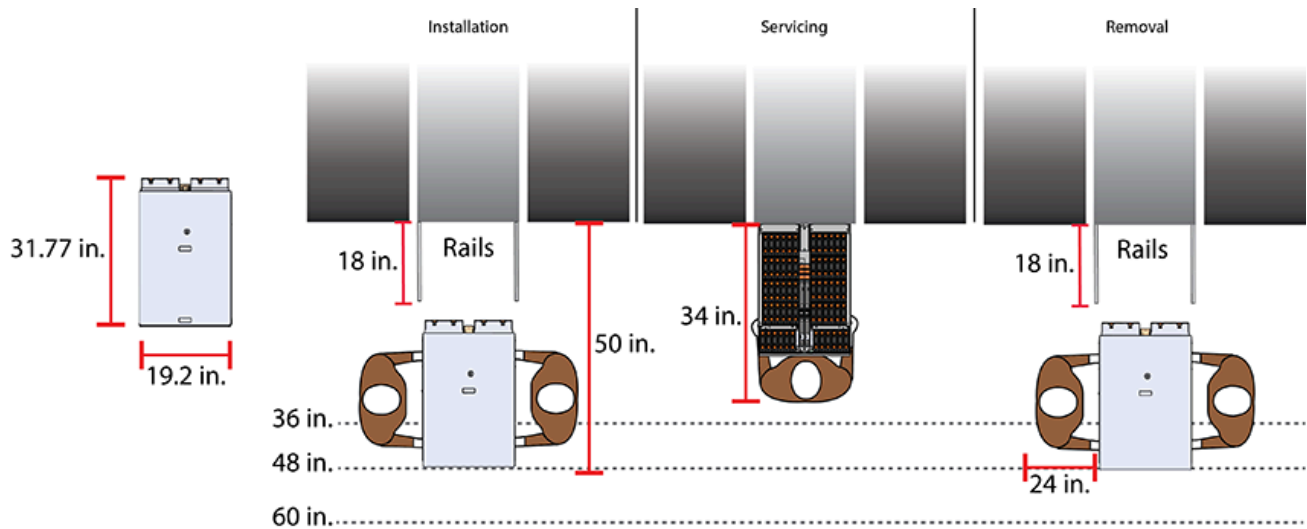
Warning: When extended out of the rack on the rail system, the Ultrastar Data60 will be ~630mm / 24.8in. extended outward. This may be a potential tipping hazard depending on the configuration of the rack. Ensure that leveling feet, anti-tilt, and any other safety features recommended by the specific rack manufacturers have been deployed before servicing.

The following section provides specific information necessary to install, service, and remove the Ultrastar Data60. The installation of the Ultrastar Data60 requires two people and a space of 1270mm / 50in. in front of the installation space. The servicing of the enclosure requires one person and a minimum of 863.6mm / 34in. of space in front of the installation space. The removal of the enclosure requires two people, 914.4mm / 36in. of space in front of the installation space, and 24in. on either side of the enclosure for two people to remove the enclosure.



Warning: The handles on the front of the chassis are not intended to be used to support the weight of the Ultrastar Data60. Lifting the unit by the chassis handles or trying to support the unit on the handles can cause them to fail. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

Figure 5: Installation, Servicing, and Removal



Attention: Do not install or remove the enclosure while it is populated with drives. The fully populated enclosure exceeds the amount of weight that a team of two should lift.

1.7.1 Compatible Rack Hardware Configuration

The following table(s) list the approved rack hardware configurations for the Ultrastar Data60 :

Table 7: Compatible Hardware Configuration 1

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	CRENLO/ EMCOR	Server Technology	Server Technology	Various
Part Number	AS-160099-03 (Drawing Number EMCOR 526121 Rev 5)	412-0761-11_STV-4501 412-0761-20_STV-4502 412-0761-23_STV-4503	KIT-MBVPT-1B (one kit per PDU)	4 x M6 x 16 Hex Cap Screws 8 x M6 Fender Washers 4 x M6 Hex Nut with Nylon Lock
Quantity	1	2	2	Varies

Table 8: Compatible Hardware Configuration 2

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	AFCO/Legrand	Server Technology	Server Technology	Various

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Part Number	Options:	412-0761-11_STV-4501	KIT-MB-40	None
	42RU – WEDIT605	412-0761-20_STV-4502		
	45RU – WEDIT604	412-0761-23_STV-4503		
	48RU – WEDIT603			
	51RU – WEDIT606			
Quantity	1 rack	2	1	N/A

Table 9: Compatible Hardware Configuration 3

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	TRIPP LITE	Server Technology	Server Technology	Various
Part Number	Options:	412-0761-11_STV-4501	KIT-MBVPT-1B	None
	SR42UBDP (Rack)	412-0761-20_STV-4502		
	SREXTENDER 25U (Rack Extension)	412-0761-23_STV-4503		
	SREXTENDER 42U (Rack Extension)			
	SREXTENDER 48U (Rack Extension)			
Quantity	1 rack	2	1	N/A

Table 10: Compatible Hardware Configuration 4

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	APC/Schneider	Server Technology	Server Technology	Various

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Part Number	AR3300W	412-0761-11_STV-4501	KIT-MBVPT-1B (one kit per PDU)	4 x M6 x 16 Hex Cap Screws
		412-0761-20_STV-4502		8 x M6 Fender Washers
		412-0761-23_STV-4503		4 x M6 Hex Nut with Nylon Lock
Quantity	1 rack	2	2	Varies

1.8 Compatible Drives

Ultrastar DC HC310, 6TB HDD with 3.5" Drive Carrier

Table 11: DC HC310 Part / Model Numbers

Sector Size	SATA		SAS		
	SE	TCG	SE	TCG	TCG-FIPS
512e	1EX1189 / HUS726T6TAL-E604	1EX1188 / HUS726T6TAL-E601	1EX1185 / HUS726T6TAL-5204	1EX1184 / HUS726T6TAL-5201	1EX1853 / HUS726T6TAL-5205
4Kn	1EX1187 / HUS726T6TAL-N604	1EX1186 / HUS726T6TAL-N601	1EX1183 / HUS726T6TAL-4204	1EX1182 / HUS726T6TAL-4201	1EX1852 / HUS726T6TAL-4205

Ultrastar DC HC320, 8TB HDD with 3.5" Drive Carrier

Table 12: DC HC320 Part / Model Numbers

Sector Size	SATA			SAS		
	SE	SED	TCG	SE	TCG	TCG-FIPS
512e	1EX1227 / HUS728T8TAL-E604	1EX1226 / HUS728T8TAL-E601		1EX1223 / HUS728T8TAL-5204	1EX1222 / HUS728T8TAL-5201	1EX1343 / HUS728T8TAL-5205
4Kn	1EX1225 / HUS728T8TAL-N604		1EX1224 / HUS728T8TAL-N601	1EX1221 / HUS728T8TAL-4204	1EX1220 / HUS728T8TAL-4201	1EX1342 / HUS728T8TAL-4205

Ultrastar DC HC330, 10TB HDD with 3.5" Drive Carrier

Table 13: DC HC330 Part / Model Numbers

Sector Size	SATA		SAS		
	SE	SED	SE	TCG	TCG-FIPS
512e	1EX2440 / WUS721010AL- E604	1EX2441 / WUS721010AL- E601	1EX2435 / WUS721010AL- 5204	1EX2436 / WUS721010AL- 5201	1EX2437 / WUS721010AL- 5205
4Kn	1EX2438 / WUS721010AL- N604	1EX2439 / WUS721010AL- N601		1EX2433 / WUS721010AL- 4201	1EX2434 / WUS721010AL- 4205

Ultrastar DC HC510, 10TB HDD with 3.5" Drive Carrier

Table 14: DC HC510 Part / Model Numbers

Sector Size	SATA			SAS			
	SE	ISE	SED	SE	ISE	TCG	TCG-FIPS
512e	1EX0499 / HUH721010AL- E604	1EX0497 / HUH721010AL- E600	1EX0498 / HUH721010AL- E601	1EX0487 / HUH721010AL- 5204	1EX0485 / HUH721010AL- 5200	1EX0486 / HUH721010AL- 5201	1EX1341 / HUH721010AL- 5205
4Kn	1EX0496 / HUH721010AL- N604	1EX0494 / HUH721010AL- N600	1EX0495 / HUH721010AL- N601	1EX0484 / HUH721010AL- 4204	1EX0482 / HUH721010AL- 4200	1EX0483 / HUH721010AL- 4201	1EX1340 / HUH721010AL- 4205

Ultrastar DC HC520, 12TB HDD with 3.5" Drive Carrier

Table 15: DC HC520 Part / Model Numbers

Sector Size	SATA			SAS			
	SE	ISE	SED	SE	ISE	TCG	TCG-FIPS
512e	1EX1015 / HUH721212AL- E604	1EX1013 / HUH721212AL- E600	1EX1014 / HUH721212AL- E601	1EX1009 / HUH721212AL- 5204	1EX1007 / HUH721212AL- 5200	1EX1008 / HUH721212AL- 5201	1EX1338 / HUH721212AL- 5205
4Kn	1EX1012 / HUH721212AL- N604	1EX1010 / HUH721212AL- N600	1EX1011 / HUH721212AL- N601	1EX1006 / HUH721212AL- 4204	1EX1004 / HUH721212AL- 4200	1EX1005 / HUH721212AL- 4201	1EX1339 / HUH721212AL- 4205

Ultrastar DC HC530, 14TB HDD with 3.5" Drive Carrier

Table 16: DC HC530 Part / Model Numbers

Sector Size	SATA		SAS			
	SE	SED	SE	ISE	TCG	TCG-FIPS
512e	1EX1793 / WUH721414AL- E604	1EX1794 / WUH721414AL- E6L1	1EX1791 / WUH721414AL- 5204	1EX1583 / WUH721414AL- 5200	1EX1792 / WUH721414AL- 5201	1EX1855 / WUH721414AL- 5205
4Kn	1EX1790 / WUH721414AL- N604		1EX1788 / WUH721414AL- 4204		1EX1789 / WUH721414AL- 4201	1EX1854 / WUH721414AL- 4205

Ultrastar DC HC550, 16TB HDD with 3.5" Drive Carrier

Table 17: DC HC550 Part / Model Numbers

Sector Size	SATA		SAS		
	SE	SED	SE	TCG	TCG-FIPS
512e	1EX2476 / WUH721816AL- E604	1EX2477 / WUH721816AL- E601	1EX2473 / WUH721816AL- 5204	1EX2474 / WUH721816AL- 5201	1EX2475 / WUH721816AL- 5205

Ultrastar DC HC550, 18TB HDD with 3.5" Drive Carrier

Table 18: DC HC550 Part / Model Numbers

Sector Size	SATA		SAS		
	SE	SED	SE	TCG	TCG-FIPS
512e	1EX2481 / WUH721818AL- E604	1EX2482 / WUH721818AL- E601	1EX2478 / WUH721818AL- 5204	1EX2479 / WUH721818AL- 5201	1EX2480 / WUH721818AL- 5205

Ultrastar DC HC560, 20TB HDD with 3.5" Drive Carrier

Table 19: DC HC560 Part / Model Numbers

Sector Size	SATA		SAS	
	SE	SED	SE	TCG
512e	1EX2909 / WUH722020BL- E604	1EX2910 / WUH722020BL- E601	1EX2906 / WUH722020BL- 5204	1EX2907 / WUH722020BL- 5201

Ultrastar DC HC570, 22TB HDD with 3.5" Drive Carrier

Table 20: DC HC570 Part / Model Numbers

Sector Size	SATA		SAS	
	SE	SED	SE	TCG
512e	1EX2966/ WUH722222AL- E604	1EX2967/ WUH722222AL- E601	1EX2963/ WUH722222AL- 5204	1EX2964/ WUH722222AL- 5201

Ultrastar DC HC650, 20TB HDD with 3.5" Drive Carrier

Table 21: DC HC650 Part / Model Numbers

Sector Size	SATA		SAS	
	SE	SED	SE	TCG
4Kn	1EX2719 / WSH722020AL- N604	1EX2720 / WSH722020AL- N601	1EX2716 / WSH722020AL- 4204	1EX2717 / WSH722020AL- 4201



Caution: Ultrastar DC HC650 drives are only compatible with the OSs and HBAs listed in the following table:

OS	Kernel	HBA	HBA FW	HBA Driver
Ubuntu 18.04	4.15.0-76-generic	9400-8e	15.00.01.00	34.00.00.00
		9405-16e		
Ubuntu 20.04	5.4.0-47-generic	9400-8e		
		9405-16e		



Disclaimers

The following chapter describes the Regulatory Statement of Compliance, Safety Compliance, Electromagnetic Compatibility Agency Requirements, and country certifications for the Ultrastar Data60 .

In This Chapter:

- Country Certifications.....14
- Electromagnetic Compatibility (EMC) Class A Compliance.....14
- Restricted Access Location.....15
- Safety Compliance.....15

2.1 Country Certifications

Table 22: Country Certifications

Country/Region	Authority or Mark
Australia/New Zealand	RCM
European Union	CE
India	BIS
Israel	SII
Japan	VCCI
Korea	MSIP
North America (Canada, USA)	Nemko
Russia, Kazakhstan, Belarus, Armenia	CU EAC
South Africa	SABS
Taiwan	BSMI
Ukraine	Ukrsepro

2.2 Electromagnetic Compatibility (EMC) Class A Compliance

The H4060-J complies with and conforms to the latest international standards as applicable:

Emissions

- AS/NZS CISPR 32
- BSMI CNS14338
- CE – EMC Directive 2014/30/EU
- CISPR 32 Edition 6
- FCC CFR 47 Part 15, Subpart B
- ICES-003, Issue 7
- IEC 55032
- KN32
- TR CU 020/2011
- VCCI V-3

Immunity

- IEC 55024
- IEC 61000-3-2 Harmonic Current Emissions
- IEC 61000-3-3 Voltage Fluctuations and Flicker
- IEC 61000-4-2 ESD
- IEC 61000-4-3 Radiated Immunity
- IEC 61000-4-4 EFT

- IEC 61000-4-5 Surge
- IEC 61000-4-6 RF Common Mode
- IEC 61000-4-8 Power Frequency Magnetic Field
- IEC 61000-4-11 Voltage Dips and Interruptions
- KN35

2.3 Restricted Access Location

The Ultrastar Data60 is intended for installation in a server room or computer room where at least one of the following conditions apply:

- Access can only be gained by **service persons** or by **users** who have been instructed about the restrictions applied to the location and about any precautions that shall be taken, and/or
- Access is through the use of a **tool** or lock and key, or other means of security, and is controlled by the authority responsible for the location

2.4 Safety Compliance

Product Name: **Ultrastar Data60**
System Regulatory Model: **H4060-J**

Electromagnetic Compatibility Emissions: **Class A**

This product has been tested and evaluated as Information Technology Equipment (ITE) at accredited third-party laboratories for all safety, emissions and immunity testing required for the countries and regions where the product is marketed and sold. The product has been verified as compliant with the latest applicable standards, regulations and directives for those regions/countries. The suitability of this product for other product categories other than ITE may require further evaluation.

The product is labeled with a unique regulatory model that is printed on the label and affixed to every unit. The label will provide traceability to the regulatory approvals listed in this document. The document applies to any product that bears the regulatory model and type names including marketing names other than those listed in this document.

- CE – Low Voltage Directive
- CNS 14336-1
- CSA 60950-1-03, Second Edition
- IEC 60950-1, Second Edition
- IEC 62368-1, Second Edition Am1, Am2
- TR CU 004/2011



Safety

The following chapter provides safety information for the Ultrastar Data60 .

In This Chapter:

- Electrostatic Discharge.....	17
- Optimizing Location.....	17
- Power Connections.....	17
- Power Cords.....	17
- Rack-Mountable Systems.....	18
- Safety and Service.....	18
- Safety Warnings and Cautions.....	19

3.1 Electrostatic Discharge



Electrostatic discharge can harm delicate components inside Western Digital products.

Electrostatic discharge (ESD) is a discharge of stored static electricity that can damage equipment and impair electrical circuitry. It occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Wear an ESD wrist strap for installation, service and maintenance to prevent damage to components in the product. Ensure the antistatic wrist strap is attached to a chassis ground (any unpainted metal surface). If possible, keep one hand on the frame when you install or remove an ESD-sensitive part.

Before moving ESD-sensitive parts, place them in ESD static-protective bags until you are ready to install the part.

3.2 Optimizing Location

- Failure to recognize the importance of optimally locating your product and failure to protect against electrostatic discharge (ESD) when handling your product can result in lowered system performance or system failure.
- Do not position the unit in an environment that has extreme high temperatures or extreme low temperatures. Be aware of the proximity of the unit to heaters, radiators, and air conditioners.
- Position the unit so that there is adequate space around it for proper cooling and ventilation.
- Keep the unit away from direct strong magnetic fields, excessive dust, and electronic/electrical equipment that generate electrical noise.

3.3 Power Connections

Be aware of the ampere limit on any power supply or extension cables being used. The total ampere rating being pulled on a circuit by all devices combined should not exceed 80% of the maximum limit for the circuit.

CAUTION The power outlet must be easily accessible close to the unit.



Always use properly grounded, unmodified electrical outlets and cables. Ensure all outlets and cables are rated to supply the proper voltage and current.

When power cycling the unit, wait 10 seconds before re-applying power. Failure to do so may cause the enclosure to boot up in an inaccessible state. If this is encountered, remove power, wait 10 seconds, and then reapply power.

3.4 Power Cords



Use only tested and approved power cords to connect to properly grounded power outlets or insulated sockets of the rack's internal power supply.

If an AC power cord was not provided with your product, purchase one that is approved for use in your country or region.

CAUTION To avoid electrical shock or fire, check the power cord(s) that will be used with the product as follows:

- The power cord must have an electrical rating that is greater than that of the electrical current rating marked on the product.
- Do not attempt to modify or use the AC power cord(s) if they are not the exact type required to fit into the grounded electrical outlets.
- The power supply cord(s) must be plugged into socket-outlet(s) that is / are provided with a suitable earth ground.
- The power supply cord(s) is / are the main disconnect device to AC power. The socket outlet(s) must be near the equipment and readily accessible for disconnection.

3.5 Rack-Mountable Systems

CAUTION: Always install rack rails and storage enclosure according to Ultrastar Data60 product documentation. Follow all cautions, warnings, labels, and instructions provided within the rackmount instructions.

Reliable grounding of rack-mounted equipment should be maintained.

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.

Observe the maximum rated ambient temperature, which is specified in the product documentation.

For safe operation of the equipment, installation of the equipment in a rack should be such that the amount of air flow is not impeded so that the safe operation of the equipment is not compromised.

3.6 Safety and Service



All maintenance and service actions appropriate to the end-users are described in the product documentation. All other servicing should be referred to a Western Digital-authorized service technician.



To avoid shock hazard, turn off power to the unit by unplugging both power cords before servicing the unit. Use extreme caution around the chassis because potentially harmful voltages are present.



When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing it from the Ultrastar Data60 .



The power supply in this product contains no user-serviceable parts. Do not open the power supply. Hazardous voltage, current and energy levels are present inside the power supply. Return to manufacturer for servicing.



Use caution when accessing part of the product that are labeled as potential shock hazards, hazardous access to moving parts such as fan blades.

3.7 Safety Warnings and Cautions

To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following safety instructions and information. The following safety symbols may be used throughout the documentation and may be marked on the product and/or the product packaging.

CAUTION Indicates the presence of a hazard that may cause minor personal injury or property damage if the CAUTION is ignored.

WARNING Indicates the presence of a hazard that may result in serious personal injury if the WARNING is ignored.



Indicates potential hazard if indicated information is ignored.



Indicates shock hazards that result in serious injury or death if safety instructions are not followed.



Indicates do not touch fan blades, may result in injury.



Indicates disconnect all power sources before servicing.



Packaging

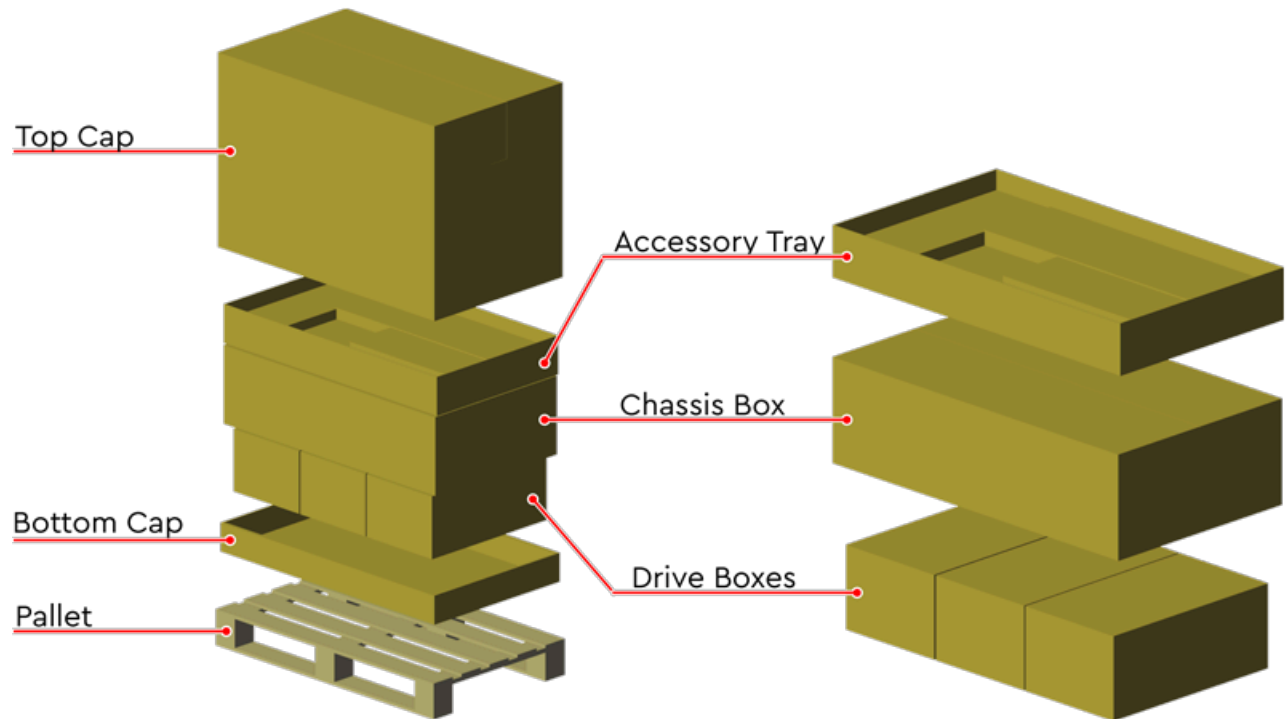
The following chapter provides information about how the Ultrastar Data60 is packaged and instructions for unpacking it.

In This Chapter:

- Ultrastar Data60 Packaging Overview..... 21
- Ultrastar Data60 Unpacking Procedure..... 24

4.1 Ultrastar Data60 Packaging Overview

Figure 6: Outer Packaging



The Ultrastar Data60 is shipped in protective outer packaging that consists of cardboard caps on the top and bottom and an outer sleeve surrounding the sides. Plastic banding surrounds the packaging and secures it all to the shipping pallet.

The inner contents of the Ultrastar Data60 packaging consists of three layers: the accessory tray (top), the chassis box (middle), and the drive boxes (bottom). The contents of each layer are detailed in the following sections.

Accessory Tray

The accessory tray contains boxes for the CMA arms, the Rails, and the Top Cover Alignment Brackets, as well as plastic bags containing the cables and necessary hardware.

Figure 7: Accessory Tray Contents

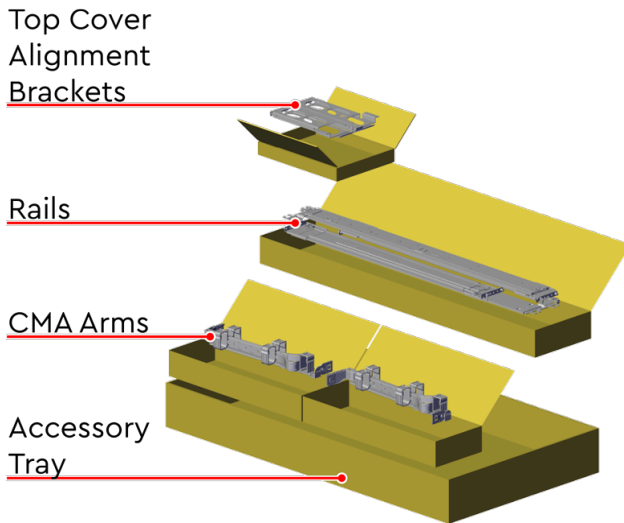


Table 23: Accessory Tray Contents

Container	Contents
CMA Box	2 CMA arms (1 upper, 1 lower)
Rails Box	<ul style="list-style-type: none"> • 2 Rails (each containing 1 inner-rail & 1 outer-rail) • Cross-bar
Brackets Box	2 Top Cover Alignment Brackets
Accessory Tray	<ul style="list-style-type: none"> • 2 Rack Latch Brackets (1 left, 1 right) • Screws & Nuts <ul style="list-style-type: none"> ◦ 10 M5 cagenuts ◦ 30 M5 x 12, T15 Torx screws ◦ 2 M5 x 12 Philips panhead screws (for cover retention) ◦ 16 custom round washers ◦ 4 Custom Low-Profile M4 Screws (packaged with the rail kit) • Cables <ul style="list-style-type: none"> ◦ 2 C13 to C14 power cables (3m) ◦ 2 MiniSAS HD cables (3m)

Chassis Box

The Chassis is boxed in the middle layer and protected by foam padding. It comes with pre-installed Rear Fans, PSUs, IOM Fan, and IOMs.

Figure 8: Chassis Box Contents

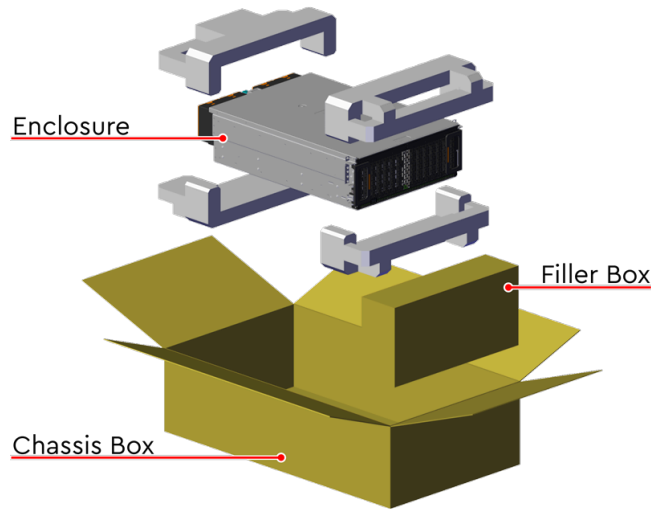


Table 24: Chassis Box Contents

Container	Contents
Chassis box	1 Chassis w/ all internal components pre-installed (except HDDs): <ul style="list-style-type: none"> • 2 PSUs • 2 IOM s • 1 IOM Fan • 4 Rear Fans

Drive Boxes

On the bottom layer are three boxes holding twenty HDD assemblies each.

Figure 9: Drive Box Contents

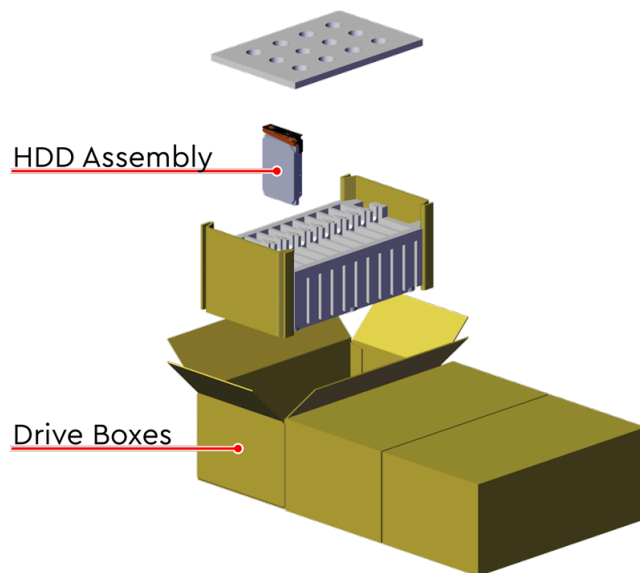


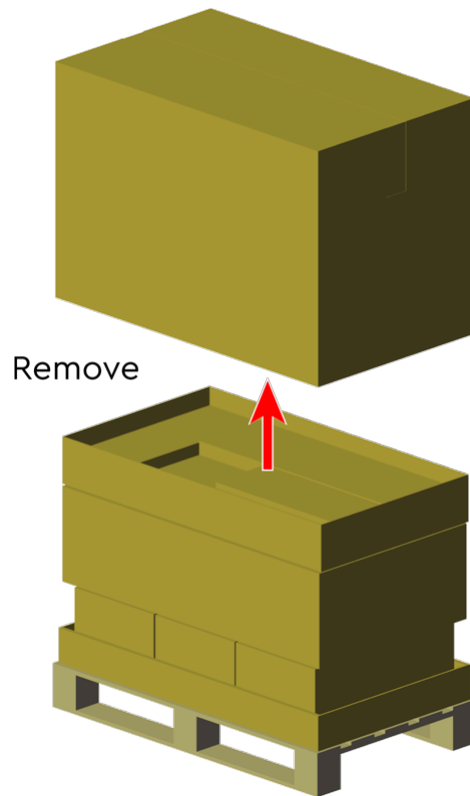
Table 25: Drive Box Contents

Container	Contents
3 boxes:	20 HDD assemblies each (total of 60 HDD assemblies)

4.2 Ultrastar Data60 Unpacking Procedure

- Step 1:** Make sure that all of the necessary parts and equipment are available, including any equipment necessary to support the enclosure during installation. To verify the list of necessary parts, see [Ultrastar Data60 Packaging Overview \(page 21\)](#).
- Step 2:** Using a box cutter, cut the straps that secure the packaging to the pallet.
- Step 3:** Remove and discard the top cap.

Figure 10: Top Cap and Sleeve Removal



Step 4: From the accessory tray, open the boxes for the rails, CMA arms, and top cover alignment brackets. Remove these parts and set them aside.

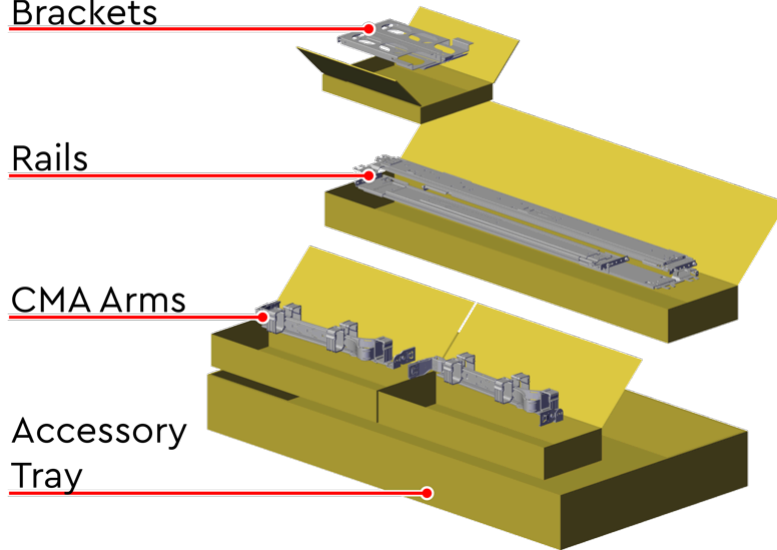
Figure 11: Unpack Accessory Tray Contents

Top Cover
Alignment
Brackets

Rails

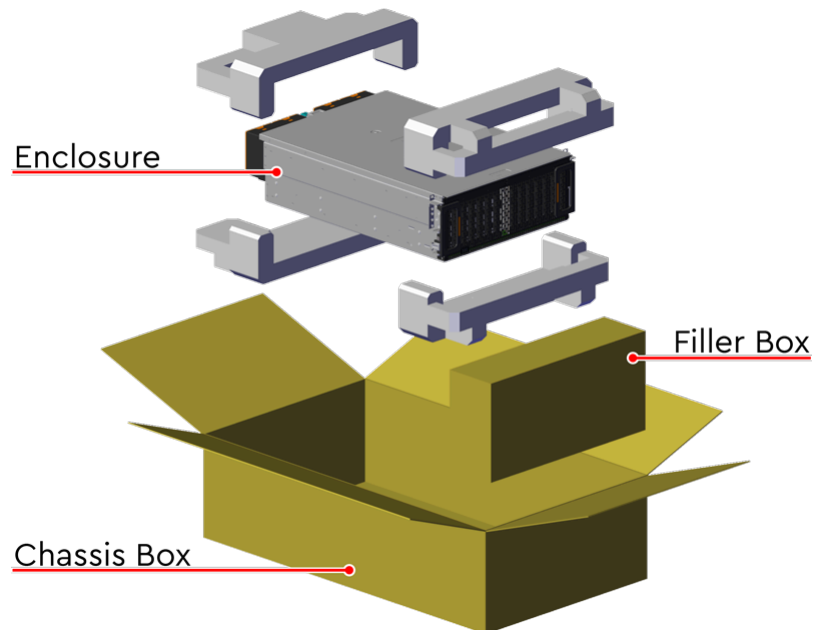
CMA Arms

Accessory
Tray



Step 5: Open the chassis box and remove the top cushions from the front and rear of the chassis.

Figure 12: Unpack Chassis Box Contents



Step 6: With assistance, and without using the system handles, remove the chassis from the chassis box and set it aside.



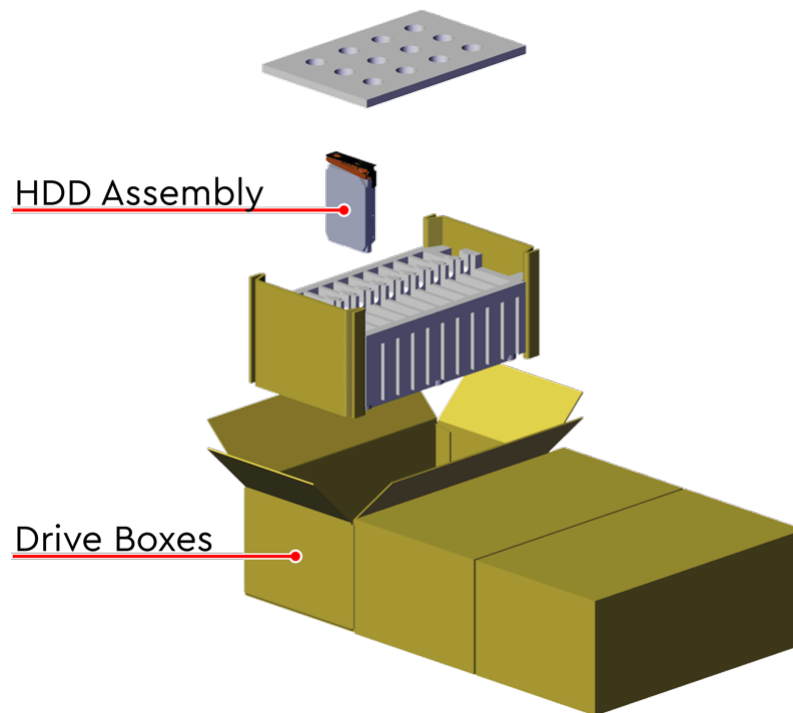
Warning: The chassis weight without drives is 20 kg / 44 lbs . To avoid injury, the chassis should be team lifted.



Caution: Do not lift the chassis by the system handles. The handles are designed only for sliding the enclosure out of the rack on its rails.

Step 7: Open the drive boxes and verify their contents. Depending on the version of the Ultrastar Data60 being unpacked, the boxes should contain twenty drive assemblies each (in the form of HDDs, SSDs, or blanks). Once the contents are verified, leave them in the boxes. This will protect them from damage until they are installed in the enclosure.

Figure 13: Verify Drives and Drive Blanks





Installation

In This Chapter:

- Installation Overview.....	28
- Cable Tray Installation (Optional).....	29
- Rails Installation.....	31
- Chassis Installation.....	40
- CMA Installation.....	44
- Cable Installation.....	47
- Top Cover Installation and Extension Test.....	59
- Drive Installation.....	61
- Shipping Screws Installation.....	68
- Enclosure Power On.....	69

5.1 Installation Overview

Procedure Info

Required Tools	Required Parts	# of People Required	Time Required
<ul style="list-style-type: none"> • Long T15 Torx Screwdriver • # 2 Philips Screwdriver • Long T10 Torx Screwdriver • Cable Ties (for configurations with greater than 10 total cables) • Tape Measure • Level 	<ul style="list-style-type: none"> • Option 1: M5 x 12mm T15 Flat Head Torx screws and included washers • Option 2: Screw plate • M5 x 12mm Phillips Pan Head screws (to secure top cover) • Low-Profile M4 x 3.2mm Phillips screws (included with rail assembly) • M3 x 8mm T10 Torx screws • 10 M5 cage nuts • CMA Crossbar • Cable Tray (optional) • Optional (if using CMA Tray): M3 x 8mm T10 Torx screws • Zip Tie (from CMA box) 	3 Total (2 for Team Lifting Purposes and 1 to Guide and Spot)	45 min.

Torque Specifications for Screws

Screw Type	Torque Value
M5 x 12mm T15 Flat Head Torx screws or screw plate	3.38-3.61 Nm / 30-32 in-lbf
M5 x 12mm Phillips Pan Head screws	3.38-3.61 Nm / 30-32 in-lbf
Low-Profile M4 x 3.2mm Philips screws	.90-1.12 Nm / 8-10 in-lbf
M3 x 8mm T10 Torx screws	.33-.56 Nm / 3-5 in-lbf
Captive M5 Torx chassis cover thumb screws	3.38-3.61 Nm / 30-32 in-lbf

5.2 Cable Tray Installation (Optional)

This procedure provides instructions for installing the cabling tray of an Ultrastar Data60 .

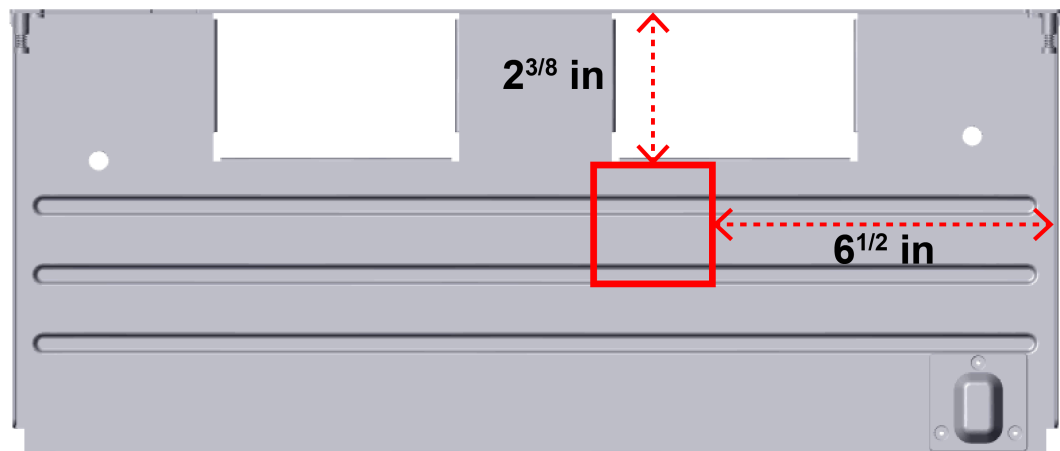
Table 26: Installation Requirements

Tool(s):	Long T10 Torx Screwdriver with torque measurement capability
Part(s):	Cable tie mount CMA Standard cable tray 1EX1119 M3 x 8mm T10 Torx screws
Person(s):	1
Time:	15 minutes

Step 1: Attach a cable tie mount to the cable tray.

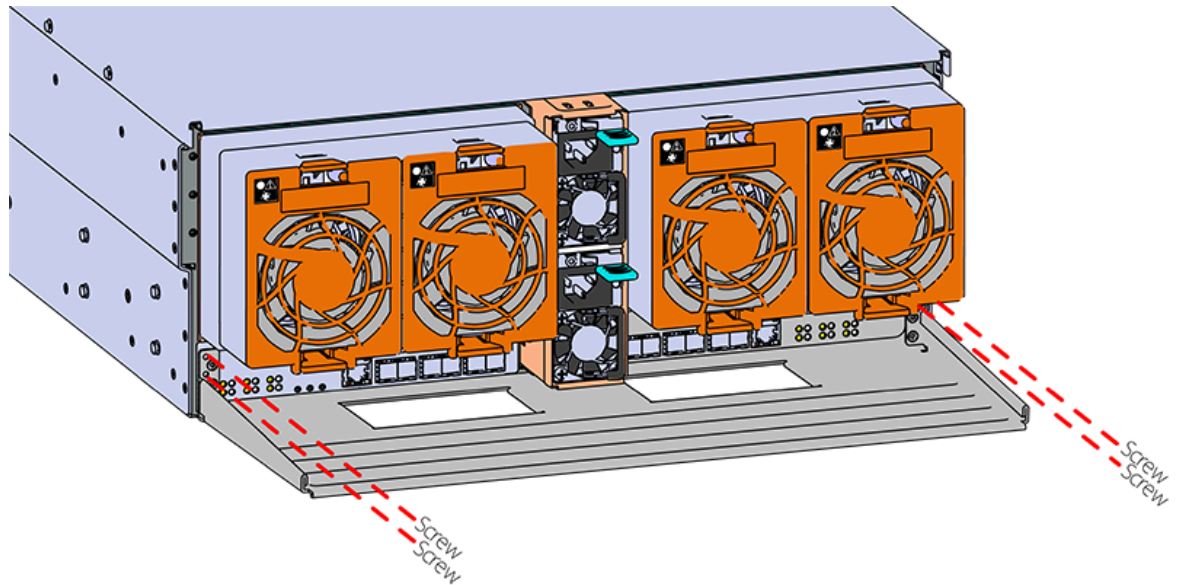
- Clean the surface of the cable tray, under the mounting area, with isopropyl alcohol and allow to dry.
- Adhere a cable tie mount in the approximate location shown in the following diagram:

Figure 14: Cable Tie Mount Location



Step 2: Secure the cable tray onto the enclosure using the included M3 x 8mm T10 Torx screws and the Long T10 Torx Screwdriver. These screws should be tightened to .33-.56 Nm / 3-5 in-lbf.

Figure 15: Installing the Cable Tray



What to do next: The cable tray is now installed. Proceed to [Rails Installation \(page 31\)](#).

5.3 Rails Installation

This procedure provides instructions for installing the rails for an Ultrastar Data60 .

Before you begin: Complete the instructions in [Cable Tray Installation \(Optional\)](#) (page 29).



Note: For CMA Lite only: Ensure that the rack has about 2.5in. of extra space in front of the vertical rack rails. The intent of CMA Lite is to reposition the enclosure closer to the front of the rack to create a more centered enclosure.

Table 27: Installation Requirements

Tool(s): # 2 Philips Screwdriver with torque measurement capability

Long T15 Torx Screwdriver

Part(s): Rails Kit 1EX0436 (CMA Standard)

Low-Profile M4 x 3.2mm Philips screws

M5 x 12mm T15 Flat Head Torx screws

Screw plate (optional)

Person(s): 1

Time: 30 minutes

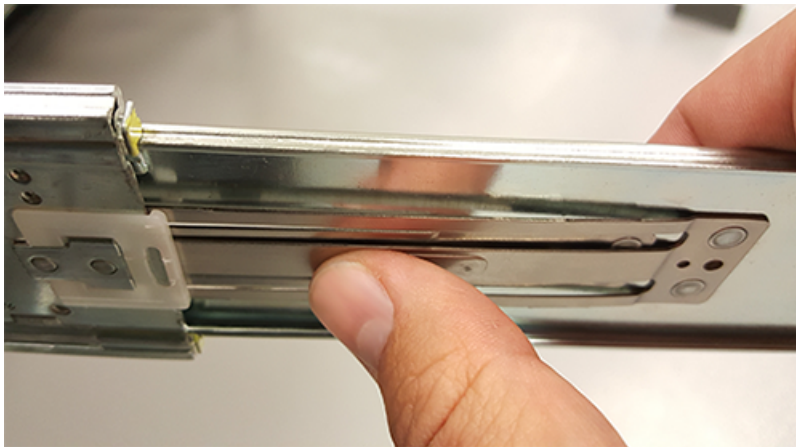
Step 1: Remove the inner rail that is nested inside the rack rails.



Note: There are Right and Left rails and they must be installed as a set. Each inner rail will read "R" for the right or "L" for the left embossed on the inside. Each outer rail will read "R-Front" for the right or "L-Front" for the left. Right and Left refer to when you are facing the front of the rack.

- a. Start by sliding the inner rail out of the outer/rack rail until the safety latch engages and the inner rail will not extend further. It will only slide one way.
- b. Press on the safety latch release spring located on the side of the rail and slide the inner rail out the rest of the way.

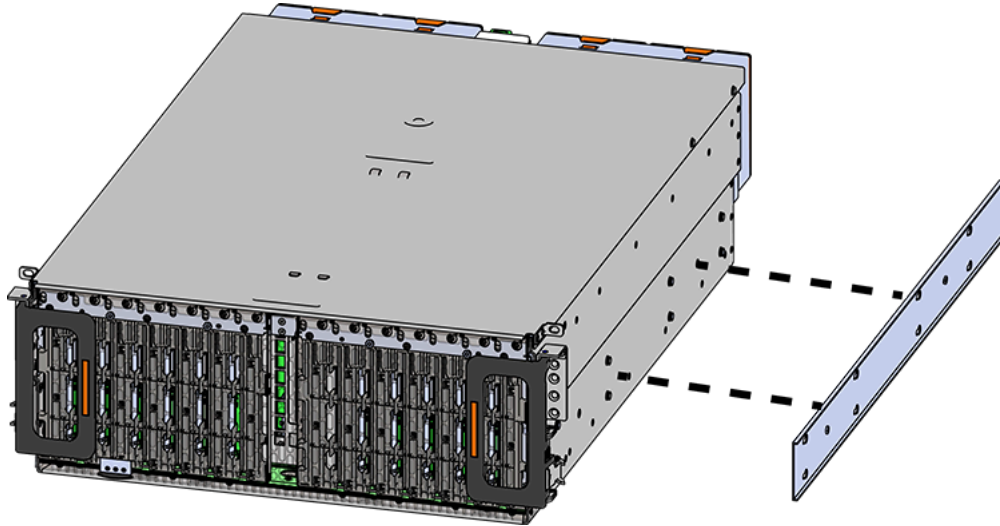
Figure 16: Rail Safety Latch



- Step 2:** Install the inner rail onto the chassis making sure they are installed on the correct side. Each inner rail will read "R" for the right or "L" for the left embossed on the side that faces away from the chassis. Right and Left are with reference to looking at the front of the enclosure.
- a. Orient the inner rails so that the flat side is facing the enclosure and the side with the grooves is facing away from the enclosure.

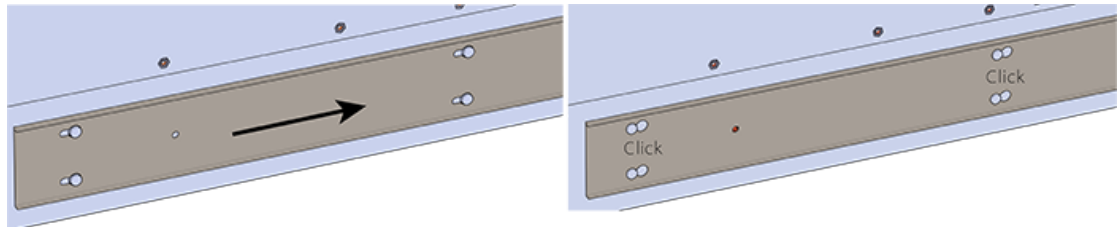
- b. Align the keyholes on the inner rail to the mounting pegs on the side of the enclosure and press the inner rail flush against the chassis. If the keyholes don't line up with the pegs, flip the rail length-wise to see if this will align them.


Figure 17: Inner Rail Attachment



- c. Slide the inner rail toward the rear of the chassis to lock it in place. There will be an audible click and the mounting pegs will cover the front part of the keyhole.

Figure 18: Slide Inner Rail



- d.  **Caution:** When installing the inner rail onto the chassis, make sure to only use the special Low-Profile M4 x 3.2mm Philips screws provided in the accessory kit with the CMA. These screws should be tightened to .90-1.12 Nm / 8-10 in-lbf using a # 2 Philips Screwdriver. These screws are specially designed for this purpose. Using unapproved screws could cause damage to the slides inside the rail.

Install the two special low-profile M4 x 3.2mm Philips screws provided to secure the inner rail to the chassis.

- e. Follow these steps for the second inner rail on the opposite side of the enclosure.

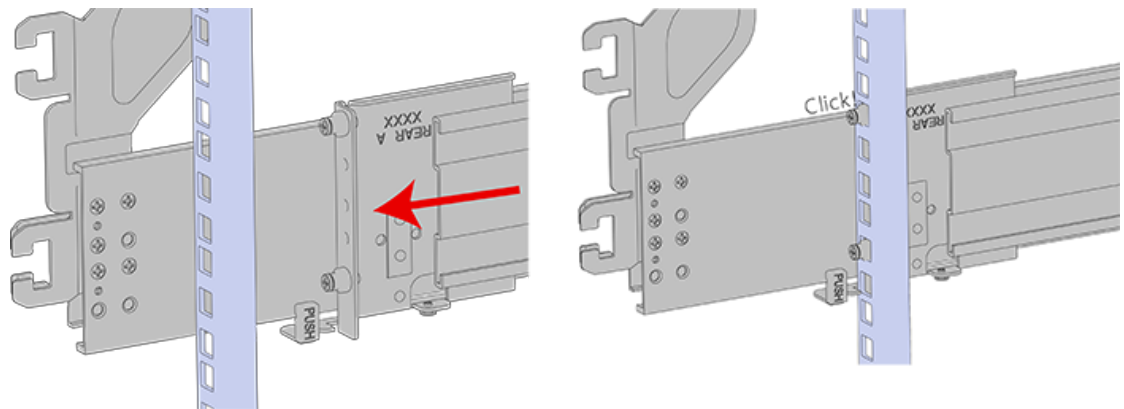
Step 3: Set the vertical rack rail depth to between 24" and 32".



Note: Ensure that all of the vertical rails are set to the same depth using a tape measure.

- Step 4:** Install the outer rails into the rack. Pay special attention to which side is being installed. The embossed R is for the right side and L is for the left side. Right and Left refer to when you are facing the front of the rack.
- Move to the rear of the rack.
 - Orient the rail so that the word "REAR" that is embossed into the metal of the rail is at the rear end of the rack, and the release latch is facing the inside of the rack posts as shown in the following image.

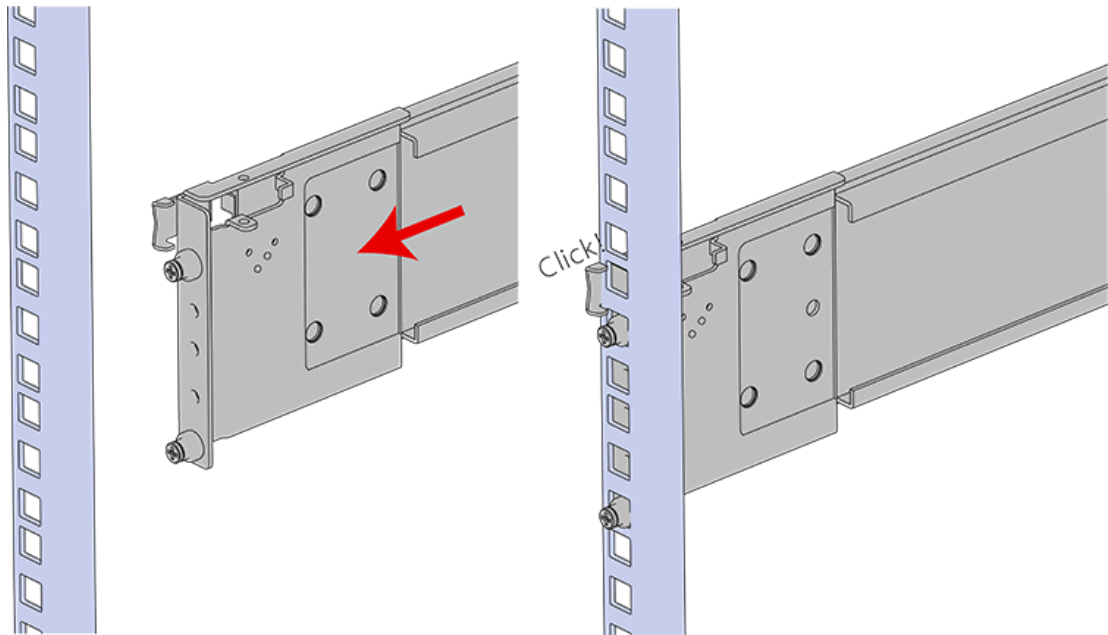
Figure 19: Rear Rail Latch Release Latch



- Align the rail on the rack posts at the U-height desired for installation. The bottom of the rail will be the lower most U of the total 4U height.
- Pull the rail toward the rack post until the toolless latching mechanism engages the rack. The latching mechanism may need to be pulled open to get around the rack post.
- Move to the front of the rack.

- f. Align the front of the rail with the holes on the rack posts that will receive the rails and pull the rail toward the holes until the toolless latching mechanism engages the rack.

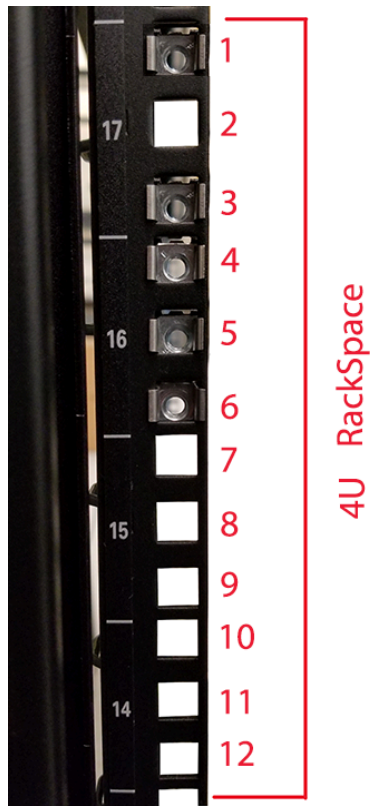
Figure 20: Front Rail Release Clip Operation



- g. Use a level to make sure that the rails are aligned properly.
 - h. Follow these steps for the other outer rail.
- Step 5:** Install the rail mounting hardware, starting with the uppermost rack mounting hole of the 4U space on the front of the rack.
- a. Install one cagenut at the uppermost mounting hole of the 4U space that the enclosure will occupy.

- b. If the Ultrastar Data60 will be installed in a rack for shipping purposes, install four more M5 cage nuts in the holes 3-6 of the 4U space. These will receive the M5 x 12mm T15 Flat Head Torx screws that secure the enclosure to the rack with the shipping bracket.

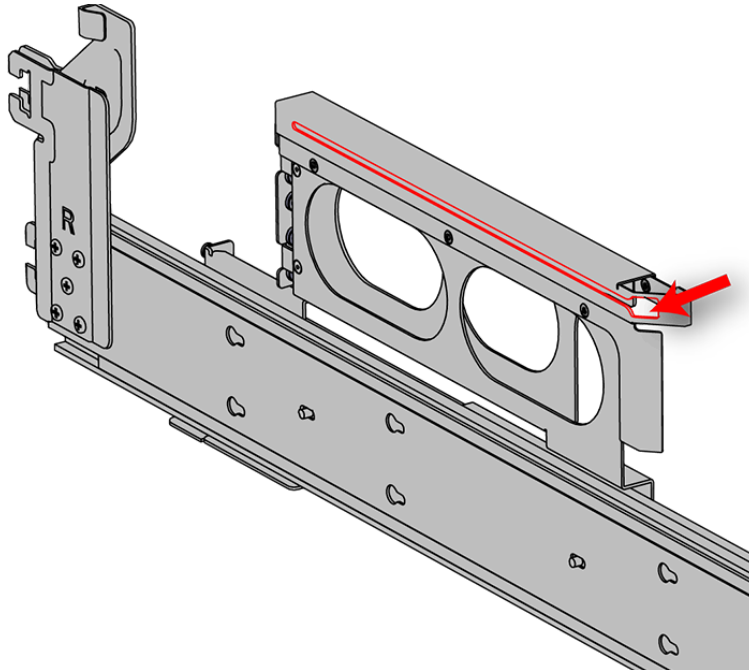
Figure 21: Cage Nut Spacing



Step 6: Install the rear cover alignment brackets and secure the rear rails.

- a. From the rear of the rack, orient the alignment brackets so that the groove that will catch the cover is facing the inside of the rack.

Figure 22: Alignment Bracket Groove (highlighted in red)



- b. Attach the rear cover alignment bracket and rear rail to the vertical rack rail. The following examples show two methods for securing the bracket and rail to the rack: individual screws (with washers) or a screw plate.

Option 1: Using a Long T15 Torx Screwdriver, install M5 x 12mm T15 Flat Head Torx screws (with washers) to attach the rear cover alignment bracket. The number of required screws will vary depending on the bracket type. Install additional M5 x 12mm T15 Flat Head Torx screws (with washers) to attach the rear rail to the rack posts. Screw locations are shown in the following image. Tighten the rails screws to 3.38-3.61 Nm / 30-32 in-lbf.

Option2: Using a Long T15 Torx Screwdriver, install the screw plate to attach the rear cover alignment bracket and the rear rail to the rack posts. The screw locations are shown in the following image. Tighten the rail screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 23: Rear Screws Installation

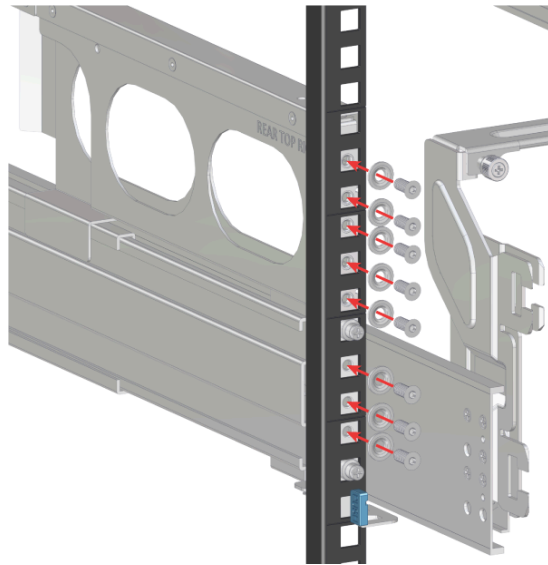
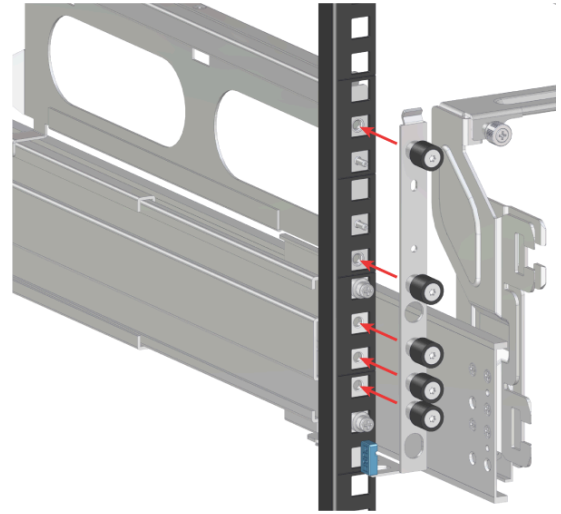


Figure 24: Screw Plate Installation



Caution: Be careful to set the screws properly in the cover alignment bracket and rail to prevent crossthreading.

Step 7: Install the two rack latch brackets at the front of the rack.

- a. Orient the brackets so that the screw holes are between the two pins supporting the outer rails as shown in the following image. There is a left and a right. Use the image below as a guide for how to orient this bracket and mirror it for the other side. Notice the increased distance between the top two screw holes and the lower screwholes and the flange being oriented on the outside.

Figure 25: Rack Latch Bracket Installed



- b. Use 6 of the included M5 x 12mm screws and the T15 Torx screwdriver to install each bracket, 3 screws per bracket.

What to do next: The rails are now installed. Proceed to [Chassis Installation \(page 40\)](#).

5.4 Chassis Installation

This procedure provides instructions for installing the chassis of an Ultrastar Data60 .

Before you begin: Complete the instructions in [Rails Installation \(page 31\)](#).

Table 28: Installation Requirements

Tool(s): N/A

Part(s): N/A

Person(s): 2 for team-lifting, plus 1 to guide and spot (total of 3)

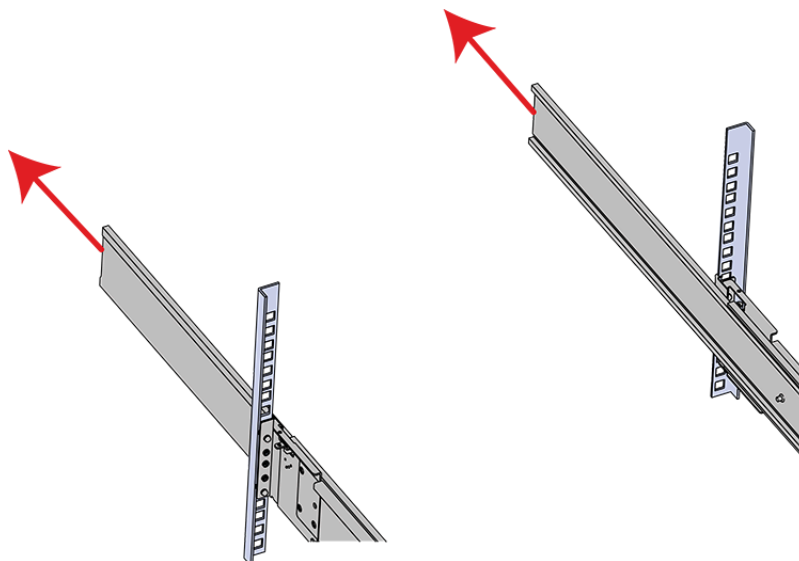
Time: 10 minutes



Caution: Always install the top cover onto the enclosure before installing the chassis into a rack. Not having the top cover installed may damage the alignment brackets.

Step 1: Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

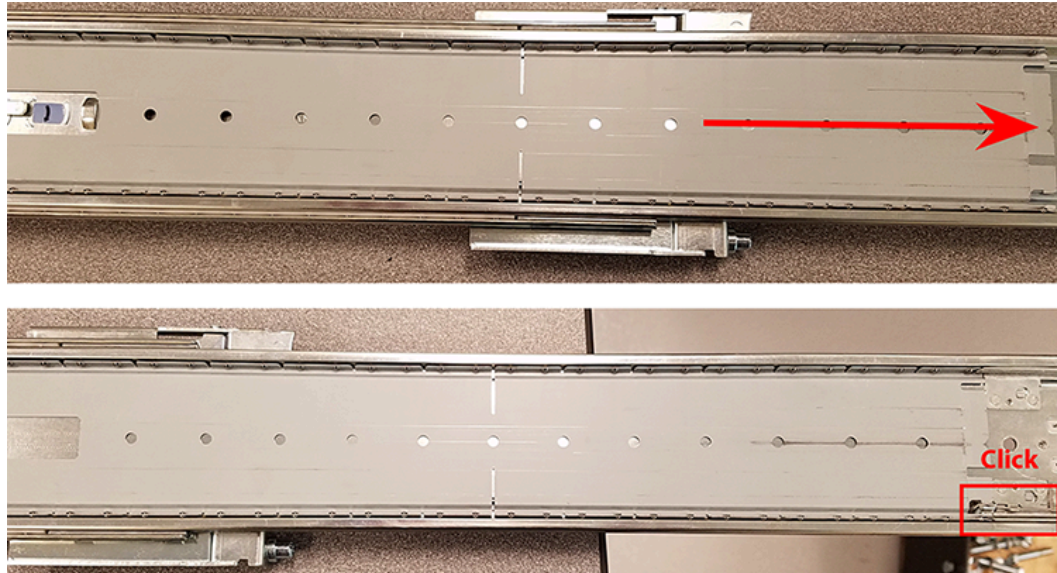
Figure 26: Extend Mid-Rails






Step 2: Install the chassis into the rails.

- a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 27: Bearing Plate

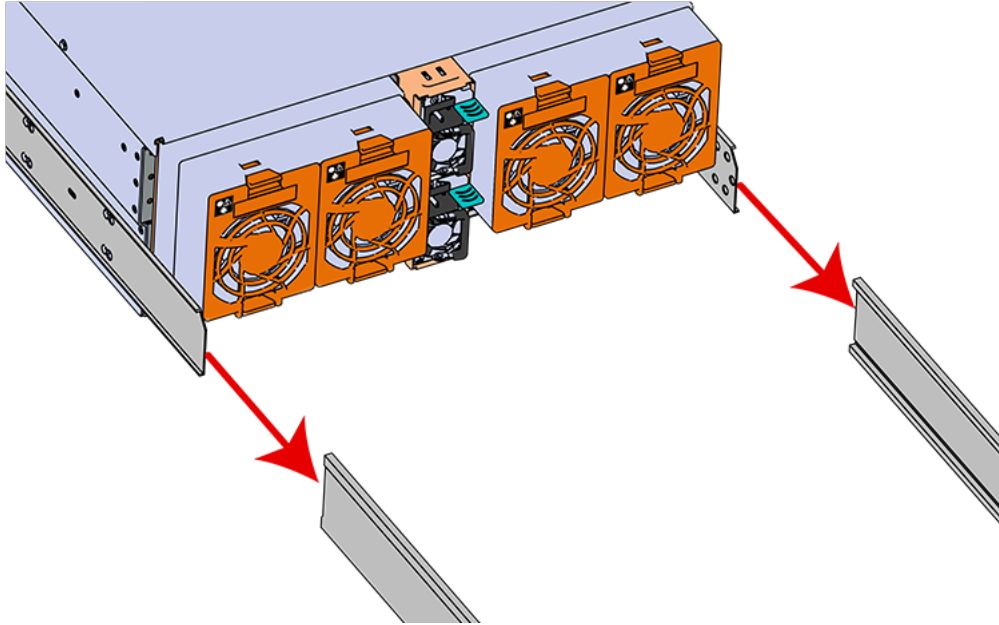


- b.  **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure **MUST** have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.
-  **Warning:** The handles on the front of the chassis are not intended to be used to support the weight of the Ultrastar Data60 . Lifting the unit by the chassis handles or trying to support the unit on the handles can cause them to fail. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.
-  **Warning:** Do not lift the chassis by the Cable Tray while removing the chassis from the rack OR while installing it into a rack. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

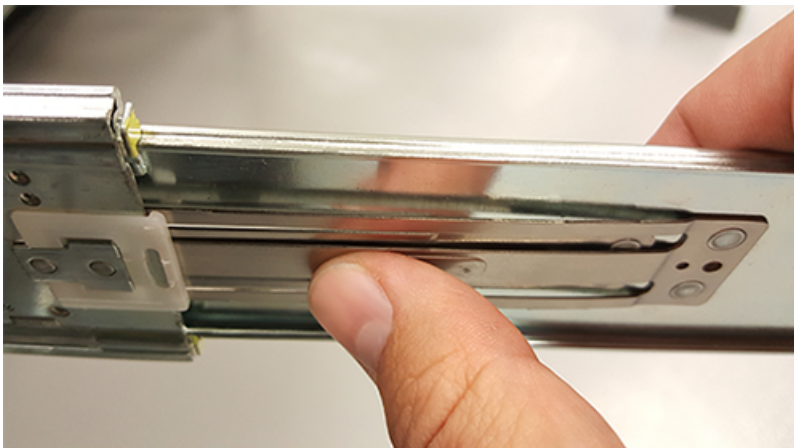
- c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 28: Installing the Chassis



- d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 29: Safety Latch Release



- e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

What to do next: The chassis is now installed. Proceed to [CMA Installation \(page 44\)](#).

5.5 CMA Installation

This procedure provides instructions for installing the cable management assembly for an Ultrastar Data60 .

Before you begin: Complete the instructions in [Chassis Installation \(page 40\)](#).

Table 29: Installation Requirements

Tool(s): N/A

Part(s): CMA Standard Arm 1EX1174 (single) or 1EX0437 (dual)

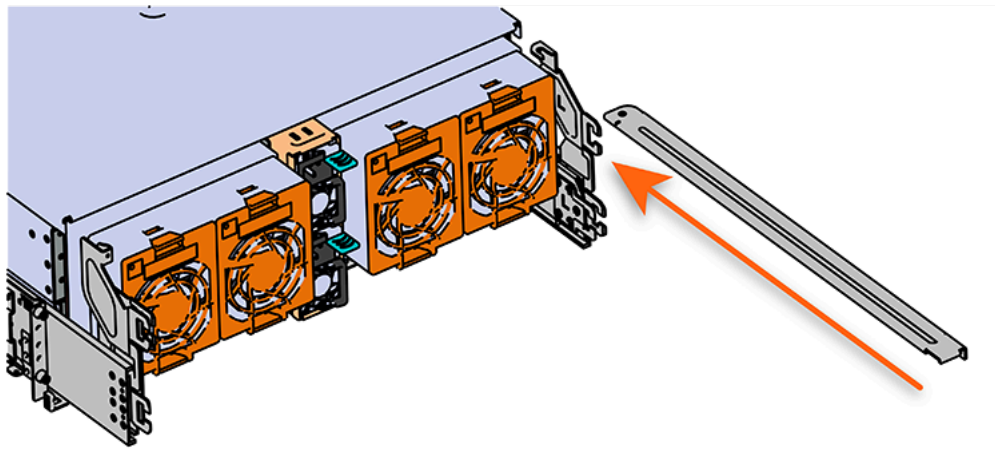
Person(s): 1

Time: 10 minutes

Step 1: Install the crossbar onto the CMA mounting bracket.

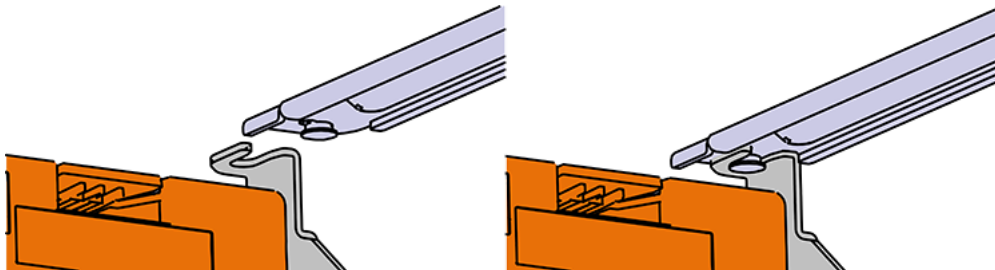
- a. Align the crossbar with the mounting peg facing down and pointing toward the CMA mounting bracket.

Figure 30: Initial Alignment



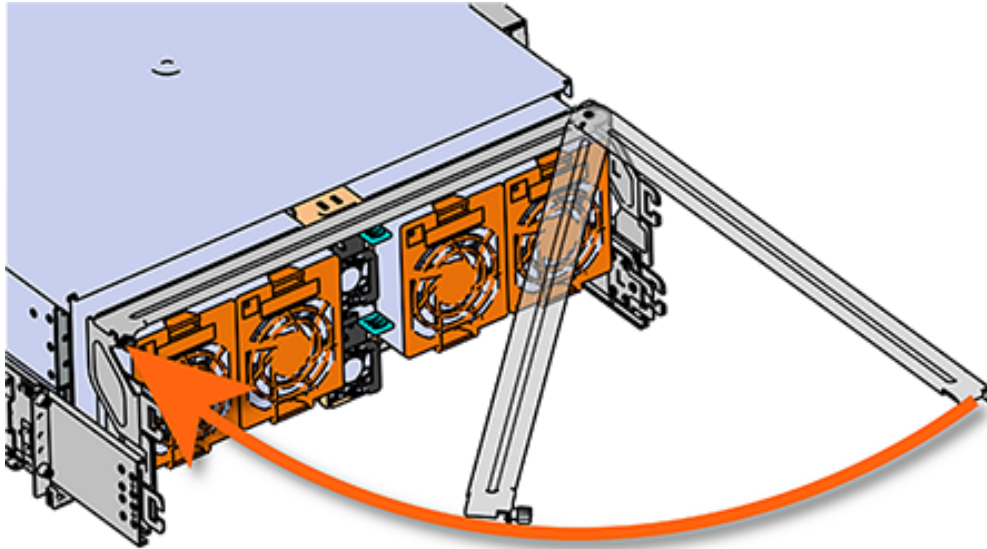
- b. Insert the peg on the underside of the crossbar into the slot on the CMA mounting bracket.

Figure 31: Crossbar Underside Peg



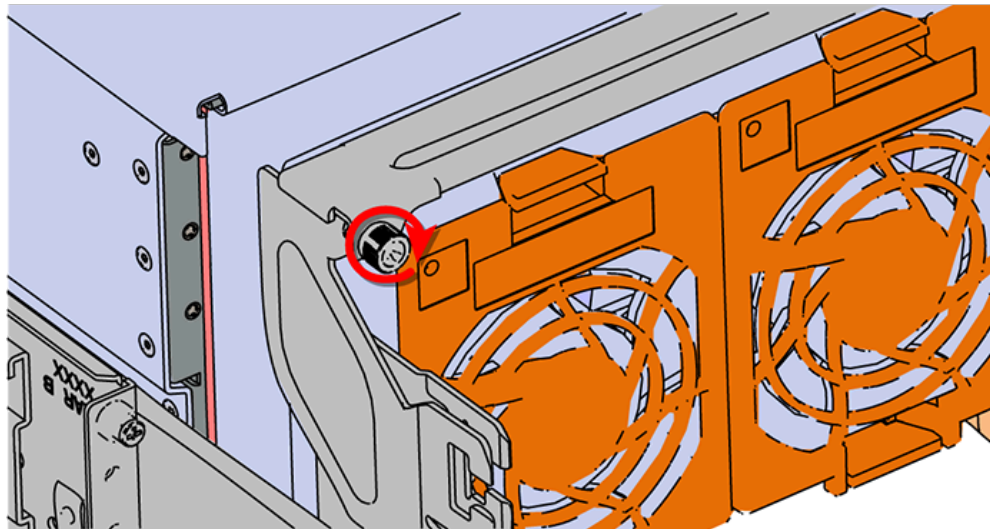
- c. Swing the crossbar so that the thumbscrew lines up with the mounting hole on the opposite side of the enclosure.

Figure 32: Swinging Motion of Crossbar to Locking Position



- d. Press the crossbar against the CMA mounting bracket and secure the crossbar in place by pressing and turning the thumbscrew clockwise until snug.

Figure 33: Tightening the Thumbscrew



- e. Check that the crossbar is fully secured to the CMA mounting bracket by pulling on the bar to ensure it does not move.

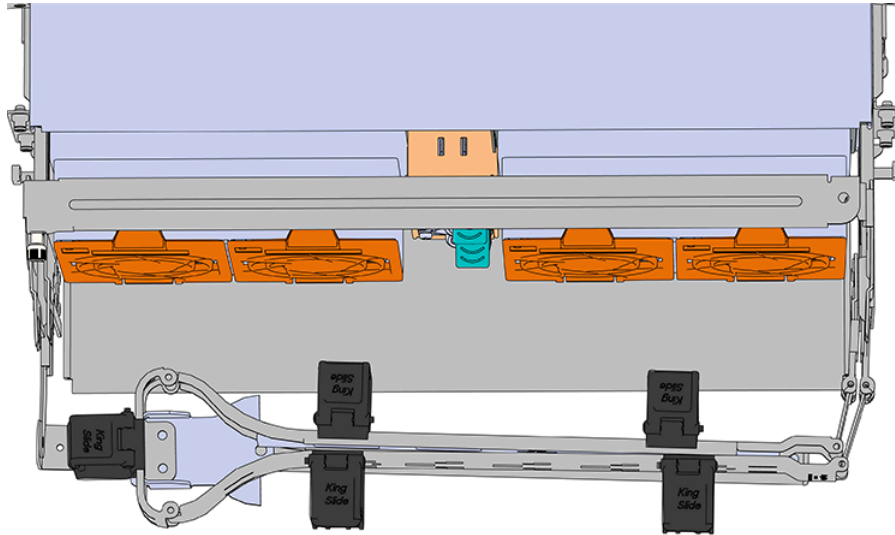
Step 2: Install the CMA(s).



Note: The CMA has two arms, labeled "upper" and "lower." The lower arm should have the elbow on the left side and be installed first; the upper arm should have the elbow on the right side and be installed last.

- a. Orient the CMA so that the elbow is on the left hand side.
- b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 34: Lower CMA Orientation



- c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.
- d. **CMA Standard:** Repeat these steps to install the upper arm with the elbow facing to the right.

What to do next: The cable management assembly is now installed. Proceed to [Cable Installation \(page 47\)](#).

5.6 Cable Installation

This procedure provides instructions for installing the data and power cables for an Ultrastar Data60 .

Before you begin: Complete the instructions in [CMA Installation \(page 44\)](#).

Table 30: Installation Requirements

Tool(s):	N/A
Part(s):	Power cable(s) 1EX1158 Data cable(s) - quantity and type will vary by configuration
Person(s):	1
Time:	30 minutes

Step 1: Cable the CMA(s).

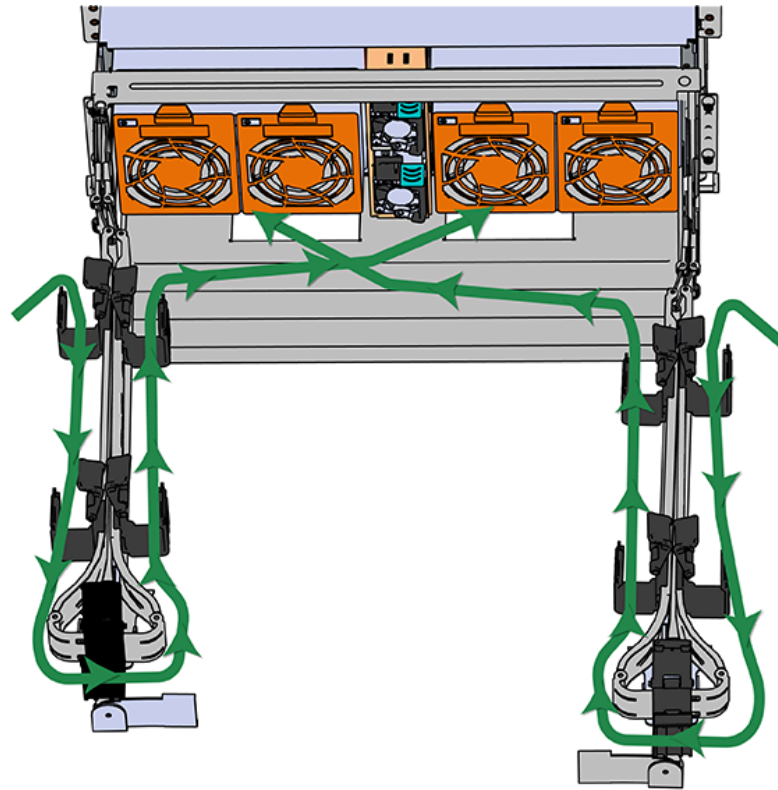
- a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled “push,” and then swing the arm(s) open.

- b. Gather the SAS, power, and Ethernet cables for installation. Before cabling, note the following routing patterns for best results:



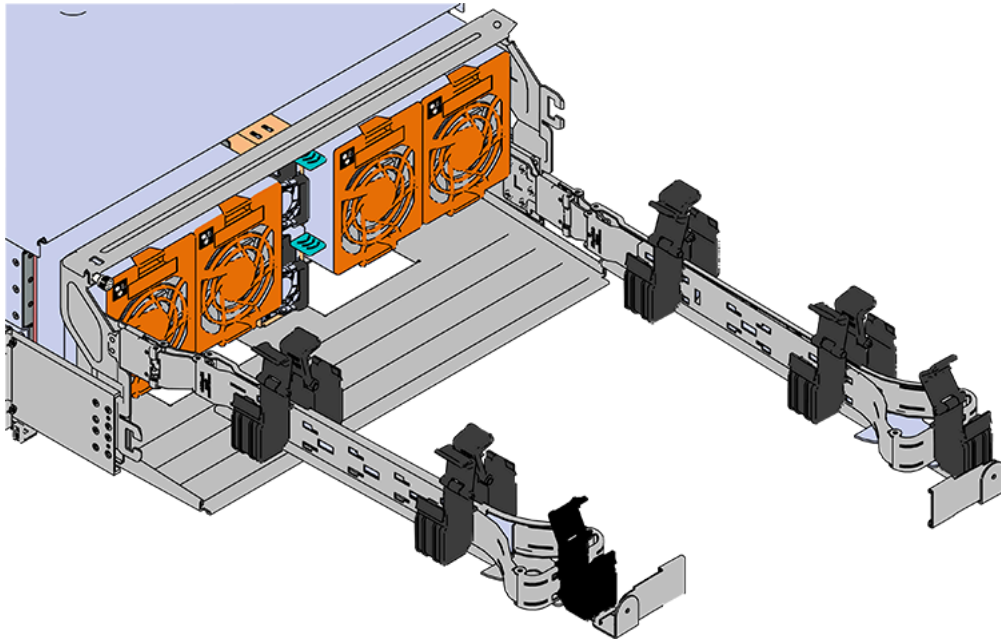
Note: Route the cables supported by the lower arm to IOM A (left hand side looking at the rear). Second, route the cables supported by the upper arm to IOM B (right hand side looking at the rear) in a "criss-cross" pattern. See the [Special Considerations for Cable Routing \(page 54\)](#) for more information.

Figure 35: CMA Cable Routing



- c. Open all of the baskets.

Figure 36: Open Baskets



- d. Connect the Ethernet cable to the Ethernet port, and route the cable through each of the baskets on the arm.
- e. Connect the SAS cables to the SAS ports, and route them through the baskets one at a time. Make sure to follow the labels to ensure they are connected to the proper ports.
- f. Connect the power cable to the PSU.

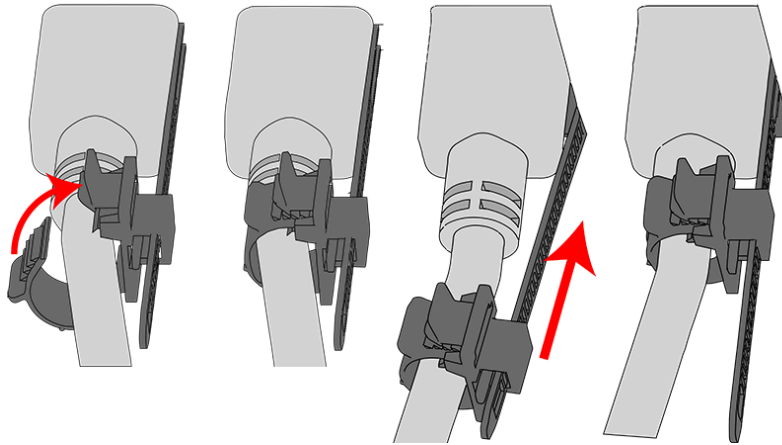


Attention: Make sure the power cable is not connected to a PDU. If it is, the system will power up when the cable is connected to a PSU. This is not intended at this stage of installation.

g. Attach the cable retention mechanism.

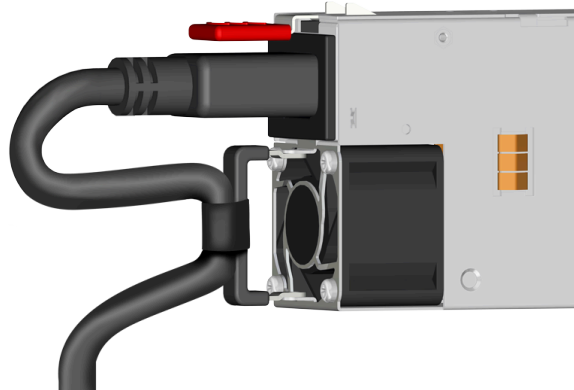
For PSUs with the clip-style retention mechanism, loop the clip around the power cable and pinch it until the clip catches and locks in place. Then slide the clip forward until it stops near the cable connector.

Figure 37: Clip-Style Cable Retention



For PSUs with the strap-style retention mechanism, secure the power cable to the PSU handle with the hook-and-loop strap as shown in the following image.

Figure 38: Strap-Style Cable Retention

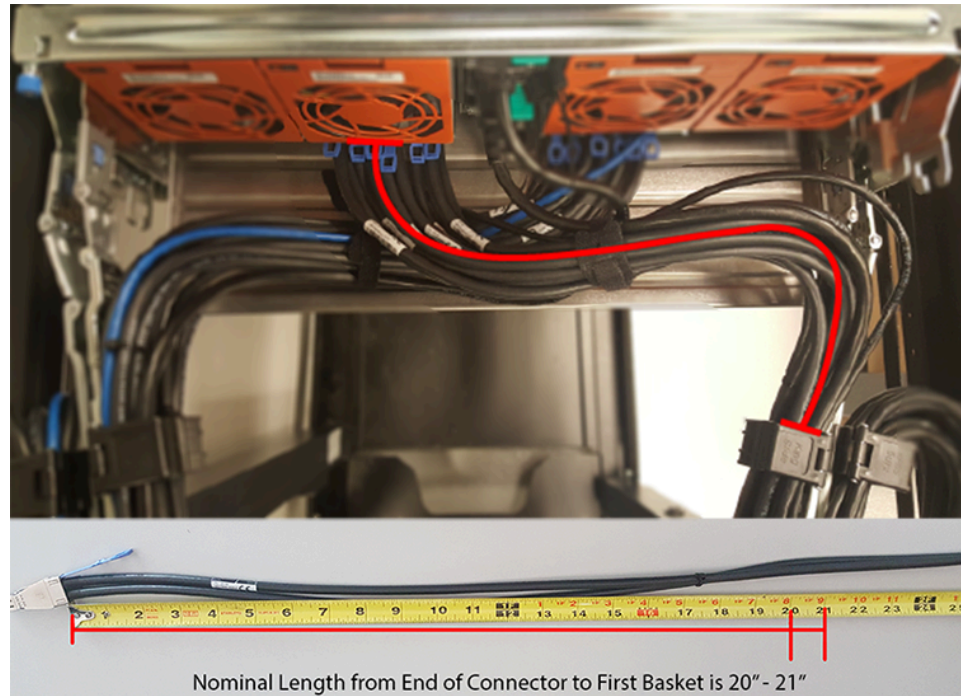


- h.** Route the power cable through each basket.
- i.** If the installation includes more than 10 total cables, follow the recommendations in [Special Considerations for Cable Routing \(page 54\)](#), before proceeding.



Note: Each cable must be given enough slack at the connector end to operate smoothly. Allow 20 - 21 in. (508 – 533.4 mm) between the connector and the first basket.

Figure 39: Nominal Cable Length at Connectors



- j. Close all of the baskets.
 - k. If the Ultrastar Data60 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Data60 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
 - l. Reconnect the arm at the elbow to the connectors on the rail.
- Step 2:** Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.
- Step 3:** Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

What to do next: The data and power cables are now installed. Proceed to [Top Cover Installation and Extension Test \(page 59\)](#).

5.6.1 SAS Cabling

The Ultrastar Data60 can use passive cables up to 3m in length, or active cables up to 10m, for SAS connections to the host. All approved passive and active SAS cables are listed in the following tables.

Active Cabling

Active cables can be used for both direct (host-to-enclosure) and daisy-chain (enclosure-to-enclosure) connections. When daisy-chaining multiple Ultrastar Data60 enclosures together, active cables must be used between enclosures for improved signal integrity.



Important: Active Optical SAS cable support is limited to Broadcom 9300-, 9302-, and 9305-series HBAs.



Note: MegaRAID adapters do not support the use of active SAS cables. If your configuration requires the use of MegaRAID adapters, passive cables must be used.

Table 31: Approved Active Optical HD Mini-SAS to HD Mini-SAS Cables

Length	Manufacturer	Vendor Part Number
3m	Amphenol ICC (FCI)	FOHHB23P00003 ⁴
	Molex	106415-2103
4m	Amphenol ICC (FCI)	FOHHB23P00004
5m	Amphenol ICC (FCI)	FOHHB23P00005
	Molex	106415-2105
6m	Amphenol ICC (FCI)	FOHHB23P00006
10m	Molex	106415-2110

Passive Cabling

Passive cables should only be used for direct (host-to-enclosure) connections.

Table 32: Approved Passive HD Mini-SAS to HD Mini-SAS Cables

Length	Manufacturer	Vendor Part Number
2m	Amphenol ICC (FCI)	601760006
		10117949-2020LF
	CS Electronics	12G-HD-4444/2M
	Data Storage Cables (DSC)	C5555-2M
	Molex	1110751002

4. Listed FOHHB23P00xxx cables are compatible, beginning with FW 2052-003.

Length	Manufacturer	Vendor Part Number
	The Mate Company (TMC)	C5555-2M
3m	Amphenol ICC (FCI)	601760008
		10117949-4030LF
	CS Electronics	12G-HD-4444/3M
	Molex	1110751003

As a best practice, Western Digital requires connecting the cables to every other SAS connector port when connecting more than one host per IOM. Please refer to [Table 33: Recommended IOM Port Connection Order \(page 53\)](#) for port connection ordering required for IOMA and IOMB:

Table 33: Recommended IOM Port Connection Order

IOM	1st Host Ports	2nd Host Ports	3rd Host Ports	4th Host Ports	5th Host Ports	6th Host Ports
A	A6	A4	A2	A5	A3	A1
B	B1	B3	B5	B2	B4	B6

Edge Buffering

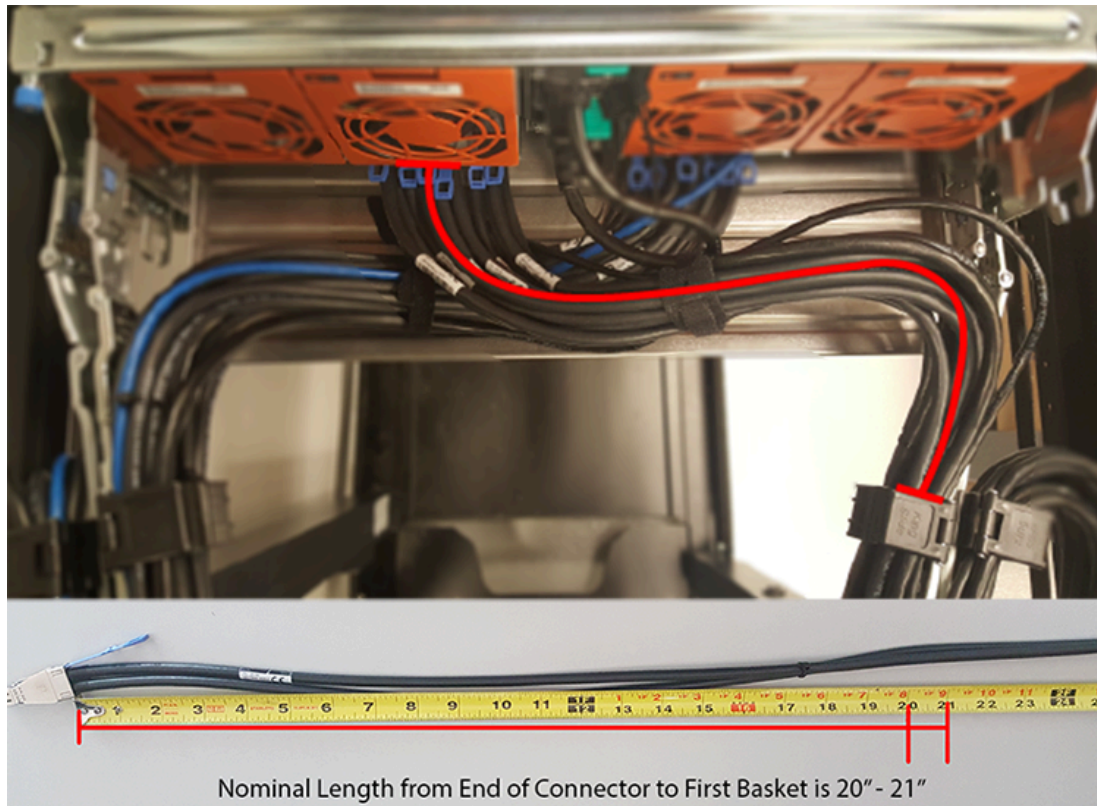
Edge buffering is an enclosure feature that increases the overall performance when a 6Gb/s target is connected. With edge buffering disabled, primitives that can be deleted from the initiator are added to slow the effective logical rate to the slowest target device connected between the initiator and the target device. With edge buffering enabled, the expanders buffer data from slower 6Gb/s targets to utilize the 12Gb/s link from the expander to the initiator in a more efficient manner.

5.6.2 Special Considerations for Cable Routing

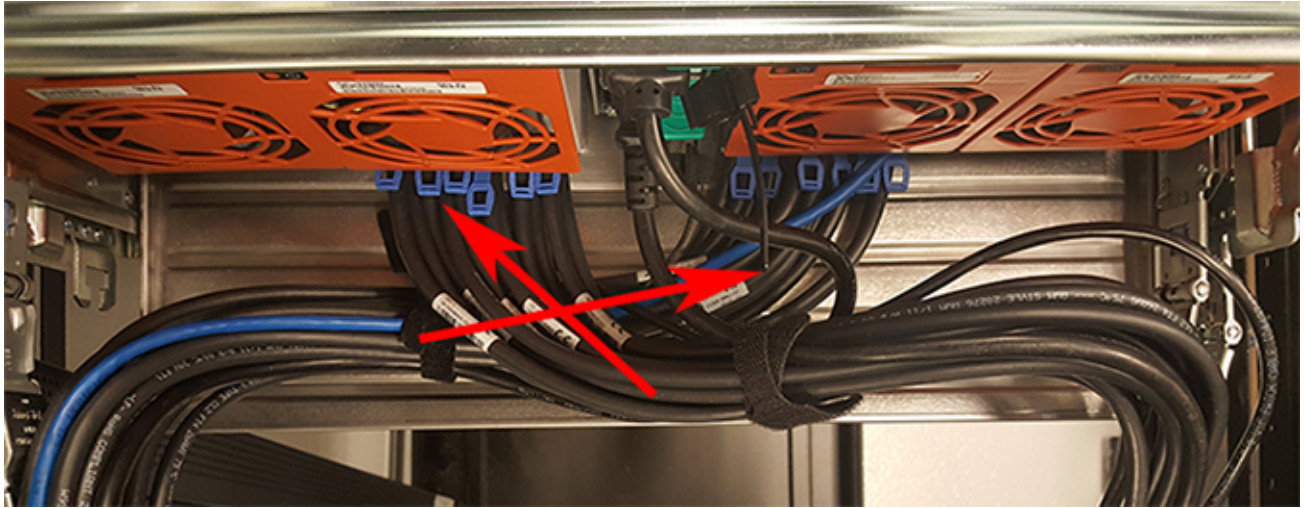
There are a number of special considerations installers should take when routing cables through the CMA. This section outlines those considerations.

The distance from the end of the connector at the port to the first basket on the CMA should be 20" – 21" long. This will give the cables enough slack at this end to prevent stress on the port and binding during operation cycles.

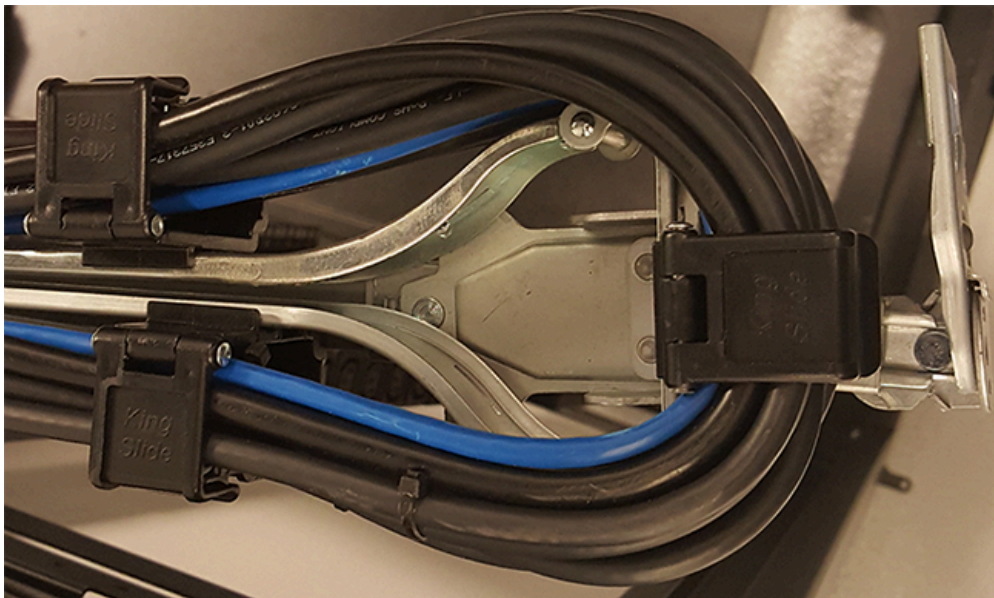
Figure 40: Nominal Cable Length at Connectors



The cables at the port side of the CMA should crisscross in front of the IOMs. To accomplish this, the cables connected to the ports for IOM B (right hand side when facing the rear) should be connected to the upper CMA, and the cables connected to the ports for IOM A (left hand side when facing the rear) should be connected to the lower CMA.

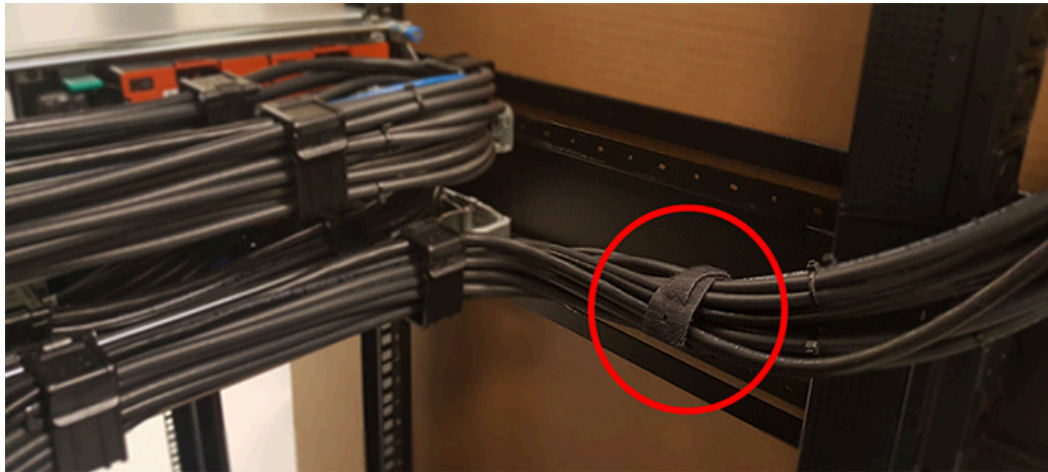
Figure 41: Crisscross Cables

When the cables are routed into the CMA, make sure there is some slack given to the elbow joint of the CMA. It is recommended not to wrap the cables tightly around this joint because this can cause binding and prevent smooth operation. To ensure there is enough slack at the elbow, pull the enclosure in and out of the rack and have another installer check for binding in the elbow joint. Make sure the cables are bending and not twisting.

Figure 42: CMA Elbow with Full Cable Bundle

At the end of the CMA where the cables exit, use a cable tie to bundle the cables together. Make sure the cables are bending and not twisting.

Figure 43: Cable Tie at Exit of CMA



5.6.3 Cabling for CMA

5.6.3.1 Before You Begin

The cable configurations detailed in this section are intended to provide the optimal setup for your specific configuration. During the cabling of the CMA, the HD Mini-SAS and SFP+ cables should be installed into the CMA first, followed by Ethernet cables, and finally the power cables on top.

How to Use the Service Loop Dimension Figure and Table

This section uses the concept of service loops to inform the user on how to prepare HD mini-SAS cables for installation into the CMA. The power and Ethernet cables do not need to be added to the Service Loop bundle. This concept utilizes measurements that begin at the connector end of the cable and along the cable itself. The Service Loop Dimensions figure and the Service Loop Dimensions table are paired together to communicate the length in which connectors, velcro, and the CMA cage must be set at to avoid binding or snagging.



Note: The measurement provided in this section are only suggested values based on product testing. Your specific situation may vary. Adjust the measurement as necessary to avoid cable binding or sagging below the rear of the enclosure.

1. Identify the configuration that is needed for the particular setup and locate the Service Loop Dimension table related to that configuration.
2. Take the first measurement (letter A) and measure that length from the connector on the cable to the edge of where the first velcro strip will go. Apply the velcro strip.
3. Repeat this action for the B and C values until the table has been completed.

Here is an example of the Service Loop Dimension Figure and Table:

Figure 44: Service Loop Dimension Figure

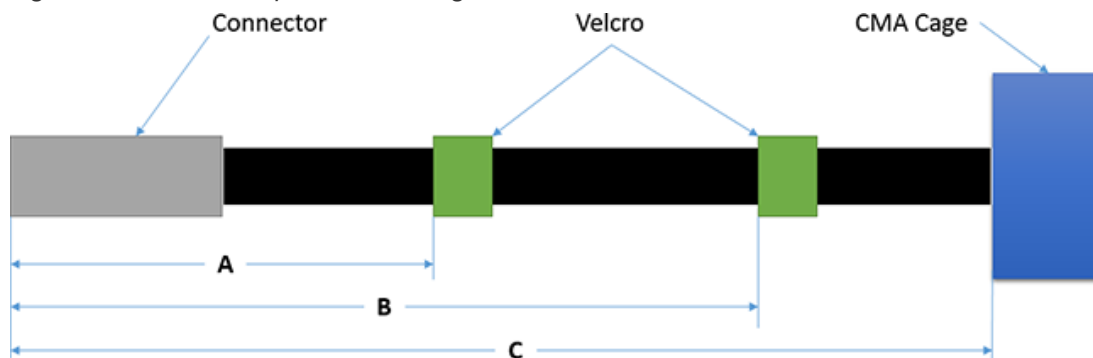


Table 34: Example Service Loop Dimension Table

A	B	C
6in.	N/A	12in.

In this case, the first measurement from the tip of the cable to the first velcro strip is 6in. Followed by a 12in. measurement to the CMA cage. There is no need for a B value due how short this configuration is.

5.6.3.2 Cabling CMA

5.6.3.2.1 SFP+ and HD Mini-SAS Cable Configuration

This configuration includes the use of up to **four** SFP+ and **two** HD Mini-SAS cables installed into a CMA arm.

Figure 45: Service Loop Dimension Figure

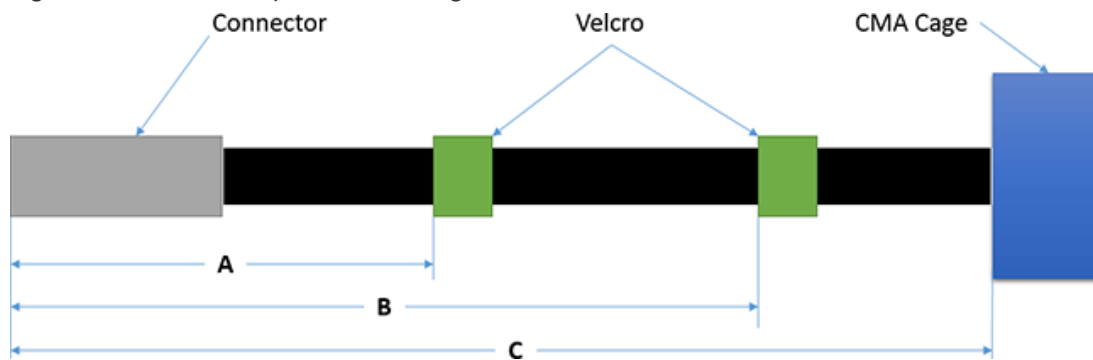


Table 35: Service Loop Dimension Table

A	B	C
6in.	12in.	16in.

5.7 Top Cover Installation and Extension Test

This procedure provides instructions for installing the top cover and performing an enclosure extension test for an Ultrastar Data60 .

Before you begin: Complete the instructions in [Cable Installation \(page 47\)](#).

Table 36: Installation Requirements

Tool(s): Long T15 Torx Screwdriver

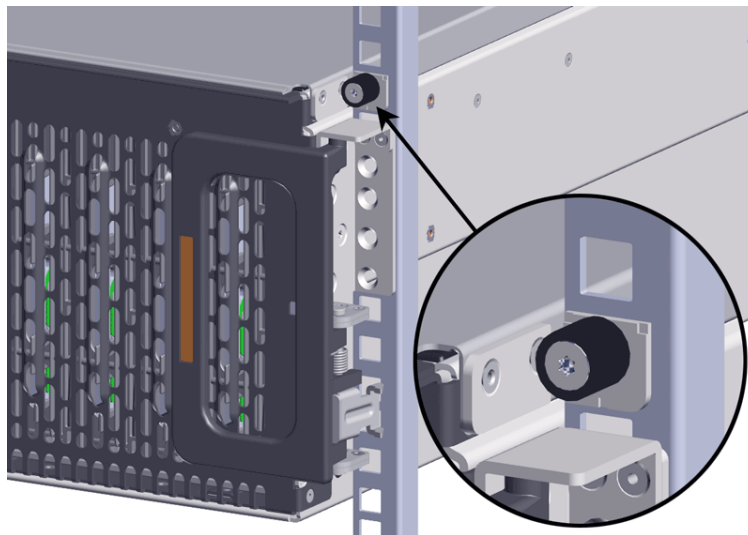
Part(s): N/A

Person(s): 1

Time: 5 minutes

Step 1: Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 46: Cover Retention Screws



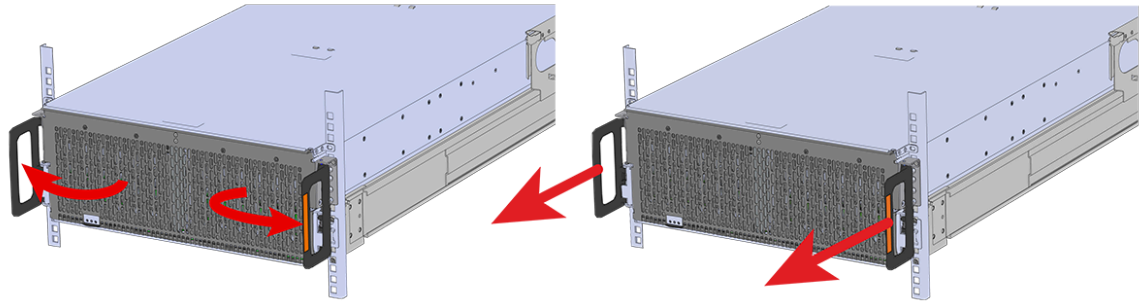
Step 2: Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.



Note: Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 3: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 47: Chassis Handle Operation



Step 4: Perform this same action two more times without the drives loaded to make sure the rail kits are installed properly.

What to do next: The top cover is now installed, and extension of the enclosure for servicing has been tested. Proceed to [Drive Installation \(page 61\)](#).

5.8 Drive Installation

This procedure provides instructions for installing drives in an Ultrastar Data60 .

Before you begin: Complete the instructions in [Top Cover Installation and Extension Test \(page 59\)](#).

Table 37: Installation Requirements

Tool(s):	N/A
Part(s):	3.5in HDD Assembly and/or 2.5in SSD Assembly
Person(s):	1
Time:	30 minutes

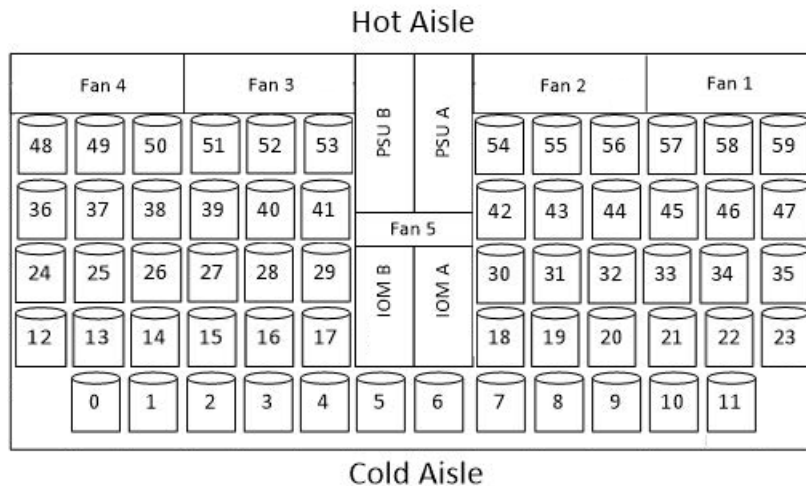


Note: The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see [Operating the 2.5" Drive Carrier \(page 66\)](#).



Note: When installing drives, populate the enclosure from left-to-right, rear-to-front. For example, begin with slot 48 (as shown in the following diagram), continue through 59, then proceed with 36 through 47, and so on:

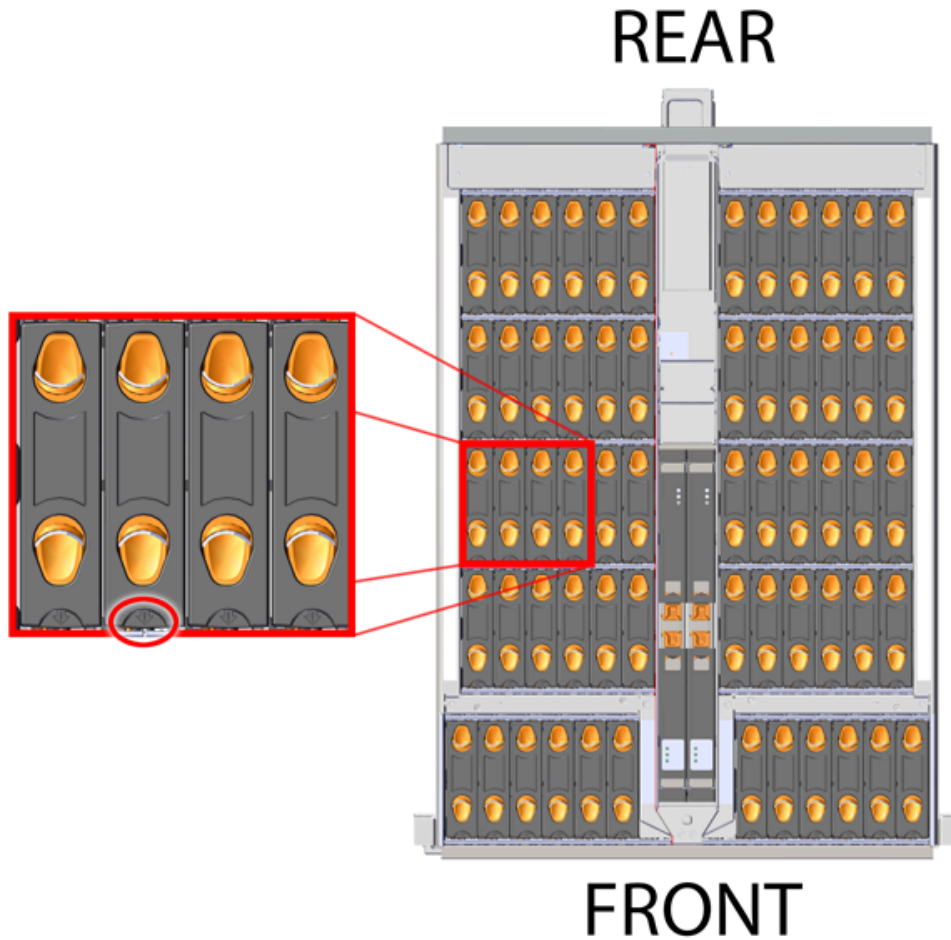
Figure 48: Drive Layout





Note: When installing drives, ensure that the LED pointer on the top of the drive carrier points toward the front of the enclosure, as shown in the following image:

Figure 49: LED Pointer Orientation

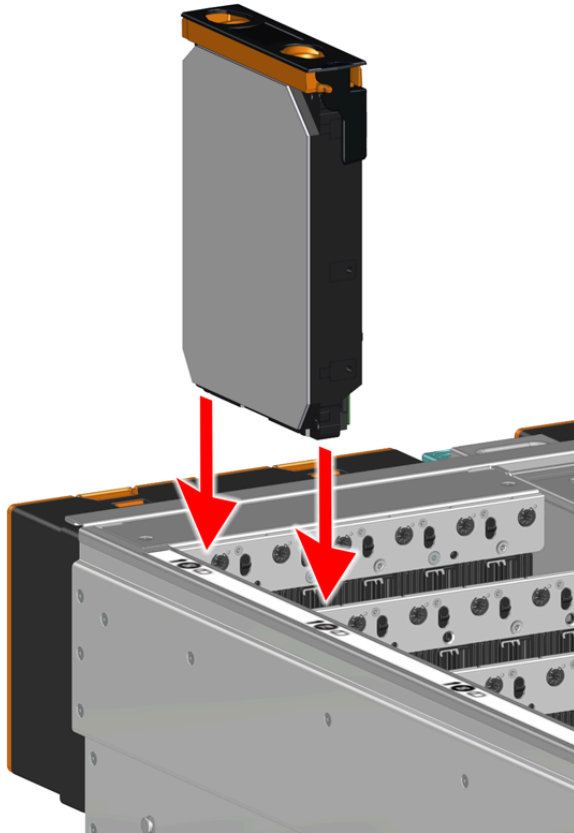


Caution: To ensure proper airflow for enclosure cooling, all drive slots must be populated with either drives or drive blanks.

Step 1: Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

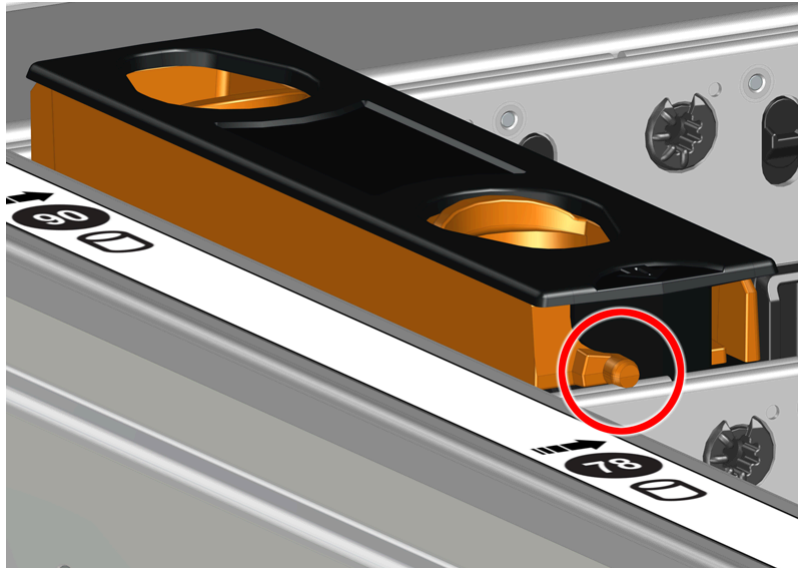
Step 2: Align the drive with the empty slot that will receive it. Lower it into the slot, ensuring that it stays level and does not bind.

Figure 50: Inserting a 3.5in HDD Assembly



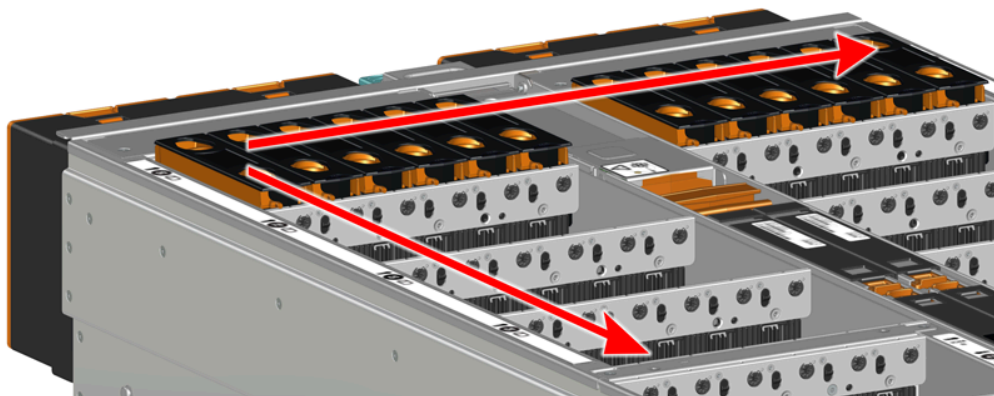
- Step 3:** Lower the drive until the spring-loaded posts on the carrier contact the top edges of the drive slot. This is an intermediate position; the drive assembly will be fully seated later on.

Figure 51: Intermediate Install Position



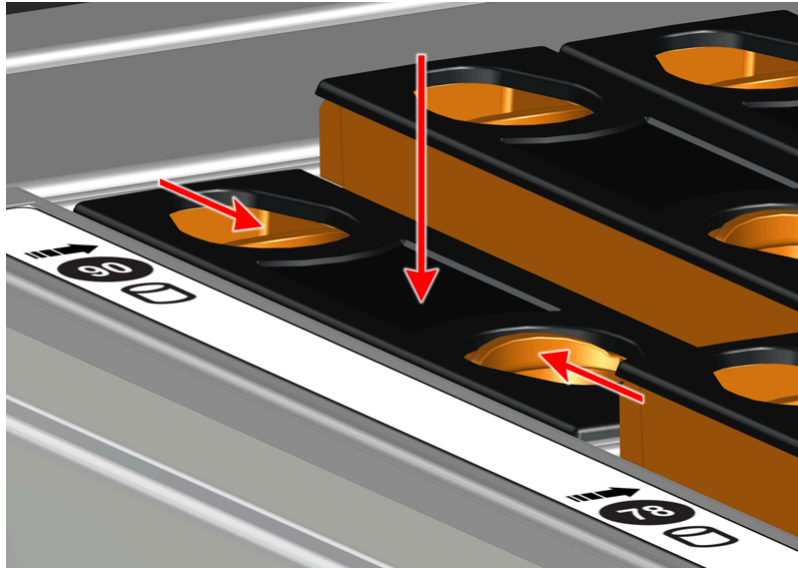
- Step 4:** Repeat this intermediate installation for the remaining drive assemblies, populating the enclosure from left-to-right, rear-to-front.

Figure 52: Populating the Enclosure



- Step 5:** Returning to the first drive assembly, pinch the latch release and carefully press downward to fully seat the 3.5in HDD Assembly into the drive slot.

Figure 53: Seating the 3.5in HDD Assembly



- Step 6:** Repeat this action to fully install the remaining drive assemblies in the same order, from left-to-right, rear-to-front.
- Step 7:** Now that the drives are installed into the chassis, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation of the drives and chassis.

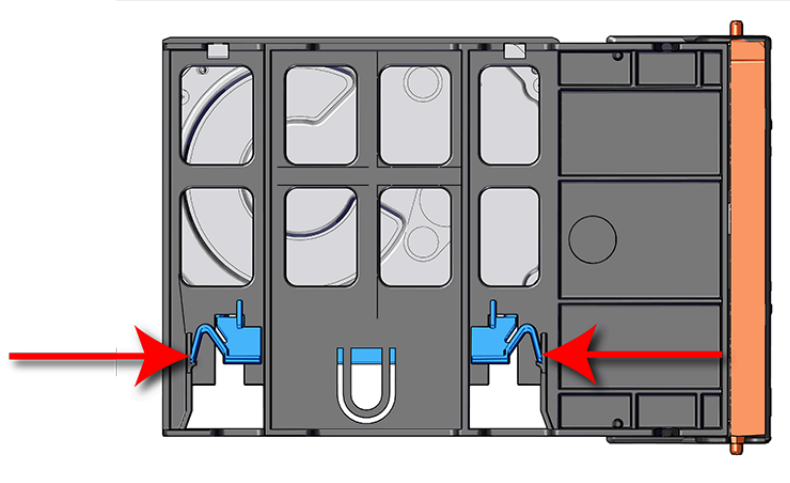
What to do next: The drives are now installed. Proceed to [Shipping Screws Installation \(page 68\)](#).

5.8.1 Operating the 2.5" Drive Carrier

Follow these steps to operate the clamping mechanism and install a 2.5" drive in the carrier.

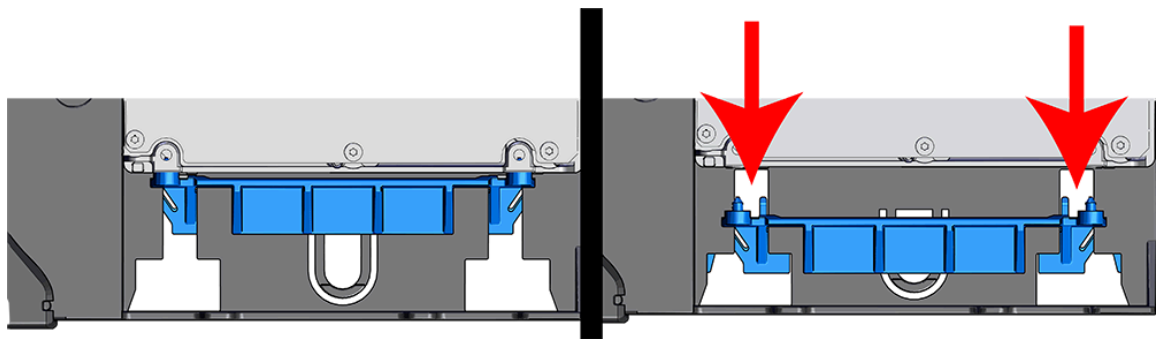
Step 1: Locate the release clips on the rear and press them inward to release the clamp.

Figure 54: Clamp Release (clamp shown in blue for visual clarity)



Step 2: Slide the clamp in the direction shown in the following image to loosen it from the drive. Be sure not to slide too far as this will allow the clamp to fall from the carrier body and it will have to be reinstalled.

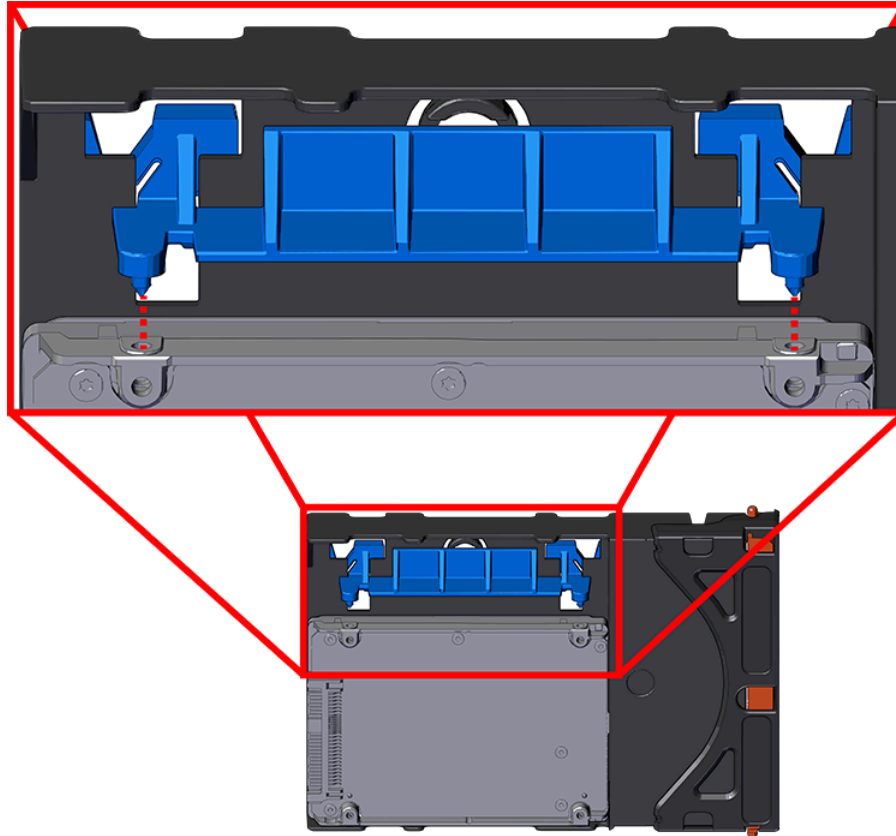
Figure 55: Clamp Slide (clamp shown in blue for visual clarity)



Step 3: Insert the 2.5" drive into the drive slot so that it is snug into the corner.

- Step 4:** Slide the clamp back toward the drive making sure that the two plastic pins on the side of the drive properly install into the drive screwholes. If these pins are not seated properly, unlatch the clamp and retry.

Figure 56: Clamp Pins (clamp shown in blue for visual clarity)



5.9 Shipping Screws Installation

This procedure provides instructions for securing an Ultrastar Data60 to the rack for shipping.

Before you begin: Complete the instructions in [Drive Installation \(page 61\)](#).

Table 38: Installation Requirements

Tool(s): Long T15 Torx Screwdriver

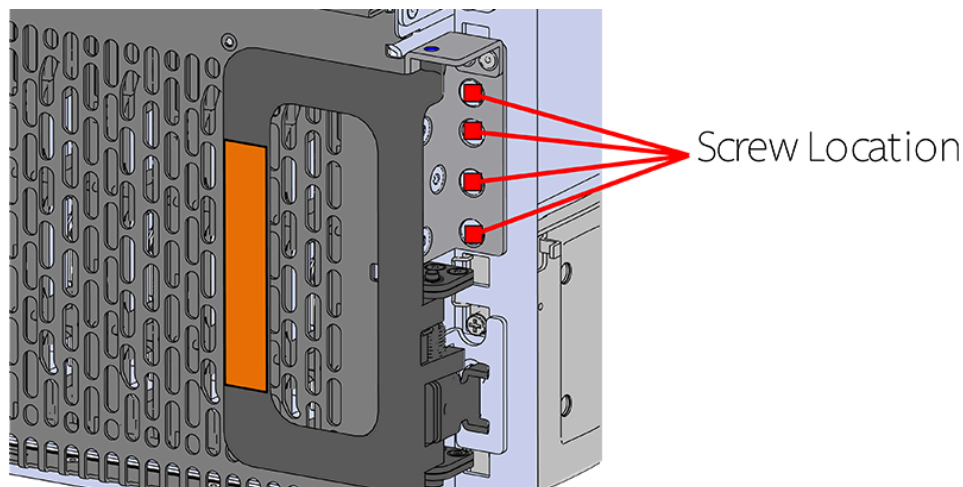
Part(s): M5 x 12mm T15 Flat Head Torx screws

Person(s): 1

Time: 5 minutes

Step 1: If the chassis is being installed into a rack that will be shipped fully assembled, you **must** install eight (four per side) of the included M5 x 12mm T15 Flat Head Torx screws into the two brackets at the front of the chassis in the following locations. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long T15 Torx Screwdriver. If this chassis will not be installed into a rack for shipping purposes, skip this step and move on to the next one.

Figure 57: Shipping Bracket Screw Locations



What to do next: The shipping screws are now installed. Proceed to [Enclosure Power On \(page 69\)](#).

5.10 Enclosure Power On

This procedure provides instructions for powering on an Ultrastar Data60 .

Before you begin: Complete the instructions in [Shipping Screws Installation \(page 68\)](#).

Table 39: Installation Requirements

Tool(s):	N/A
Part(s):	N/A
Person(s):	1
Time:	5 minutes

Step 1: Plug the enclosure power cords into a PDU to power the enclosure.



Caution: The Ultrastar Data60 can only be plugged into high line (200-240 VAC) power. If the unit is plugged into low line (110-127 VAC), the PSU will report a "Critical" state when status pages are queried using SES. In this case, the enclosure will power up, but the drives will not. The enclosure will remain in low-power mode.

Step 2: Double check the power indicators and other LEDs to ensure that the system is booting. See the following table for details on LED status during power-up:

Table 40: LED Status During Power-Up

LED	At Power-Up	After Primary Expander Booted (1-3 min.)
Identify	On	Off
Fault	On	Off
Power	On	On

What to do next: The enclosure is now installed and ready for operation. For instructions on how to operate the enclosure, please refer to the Ultrastar Data60 User Guide.