Installation Guide

Ultrastar Data102
Regulatory Model: H4102-J
December 2020
Rev. 1.15
1ET1098

Western Digital

Table of Contents

Revision History

Date	Revision	Comment
November 2017	1.0	Initial release
November 2017	1.1	• 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	• Added active cable support • Added a note regarding single IOMs in SATA TLAs. See Ultrastar Data102 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 29)*.
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	• 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 Ultrastar Data102 Installation Procedure *(page 37)*.
April 2018	1.4	• Updated Compatible Drives List. See List of Compatible Drives *(page 9)*. • Updated the Rack Requirements. See Ultrastar Data102 Rack Requirements *(page 6)*.
June 2018	1.5	• Updated the Compatible Drives List. See List of Compatible Drives *(page 9)*
December 2018	1.6	• Updated Compatible Drives List. See List of Compatible Drives *(page 9)*
March 2019	1.7	Updated the Ultrastar Data102 Installation Procedure *(page 37)*
May 2019	1.8	Updated the Ultrastar Data102 Installation Procedure *(page 37)*

Date	Revision	Comment
July 2019	1.9	• Updated servicing image to correct length values and rail servicing extension in Ultrastar Data102 Rack Requirements *(page 6)* section. • Updated Ultrastar Data102 Installation Overview *(page 36)* section to include options for cable management. • Updated Ultrastar Data102 Installation Procedure *(page 37)* section to combine CMA Standard and CMA Lite instructions where applicable. • Updated Cable Configuration for CMA Lite *(page 71)*section to correct instructions. • Updated revision history to remove broken links to topics no longer in this document.
November 2019	1.10	• Replaced references to He12 drives with Ultrastrar DC HC520 in List of Compatible Drives *(page 9)* • Updated images of chassis cover screws throughout
December 2019	1.11	• Rebranded document to WD design • Updated the List of Compatible Drives *(page 9)*
April 2020	1.12	• Updated drive installation order in the Ultrastar Data102 Installation Procedure *(page 37)* • Added SAS Cabling *(page 66)* • Added note about minimum time between removing and reapplying power in Power Connections *(page 26)*
August 2020	1.13	Updated SAS Cabling *(page 66)*
October 2020	1.14	• Updated images and text in Ultrastar Data102 Packaging Overview *(page 29)* and Ultrastar Data102 Unpacking Procedure *(page 32)* • Added the following to Ultrastar Data102 Installation Procedure *(page 37)*: ◦ 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 *(page 65)* • Updated table of approved SAS cables in SAS Cabling *(page 66)* • Reordered cabling topics in Installation *(page 35)* section
December 2020	1.15	• Added UK Import Representation Contact • Removed Formerica cables from SAS Cabling *(page 66)*

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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:

Overview

This section provides a high level overview of the features of the Ultrastar Data102 .

In This Chapter:

1.1 Ultrastar Data102 Description

Figure 2: Ultrastar Data102

The Ultrastar Data102 is a 4U form factor, high availability, high density, rack-mounted storage enclosure that is capable of hosting up to 102 SAS or SATA drives. The maximum data storage capacity of the Ultrastar Data102 is 1.428 PB using 14TB HGST Ultrastar® HC530 drives . (For a full list of compatible drives and total storage capacities, see the List of Compatible Drives *(page 9)*.) The enclosure runs on an input voltage of 200 - 240 VAC and consumes ~1300W of power under typical conditions. It requires a maximum of ~1600W at full load.

It is designed to fit within a 4U rack space and requires 1181-1197 mm (46.5in. - 47.13in.) of usable rack space, frame to frame. A fully loaded system will add 118.8 kg / 262 lbs. of static load when fully loaded with drives.

- 4U Storage Enclosure
- Supports up to 102 Drives
- Can support 3.5″ drives and 2.5″ SSD drives (2.5″ requires an adapter) in the 102 available drive bays.
- Up to 12W per drive slot for the 102 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 Modules[1]
- Powered by two (2) redundant 1600W 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 66)*)

1.2 Ultrastar Data102 Layout

1.   SATA based models will only include 1 IOM

Figure 3: Front and Rear Product Layout
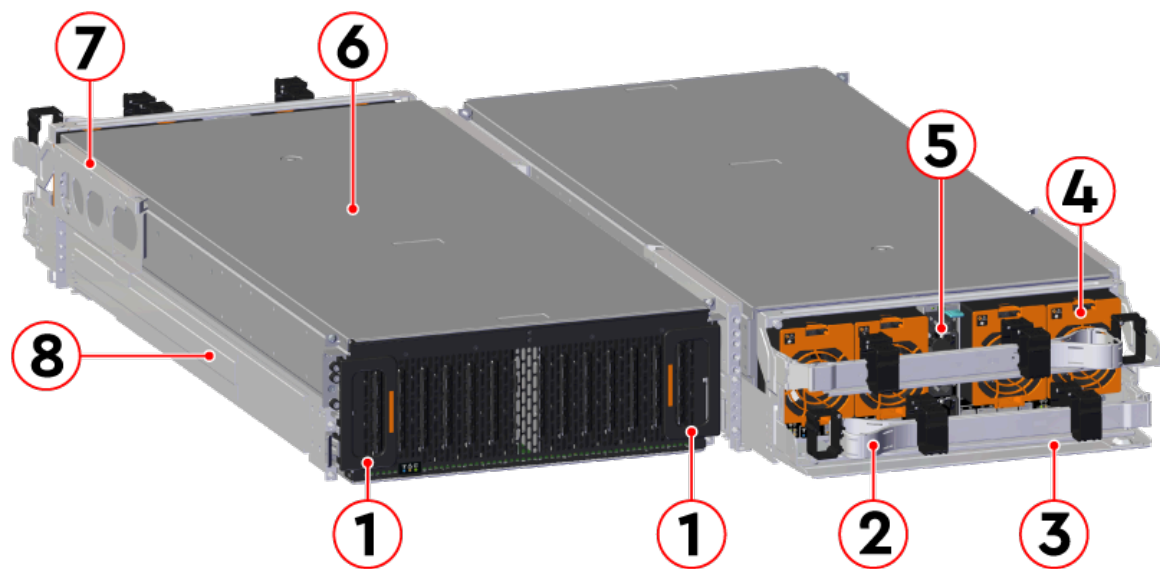
Table 1: Front and Rear Component Identification

Number	Component
1	Enclosure Handles
2	CMAs
3	CMA Tray
4	Rear Fans
5	PSUs
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 Data102 .

Figure 4: Component Layout
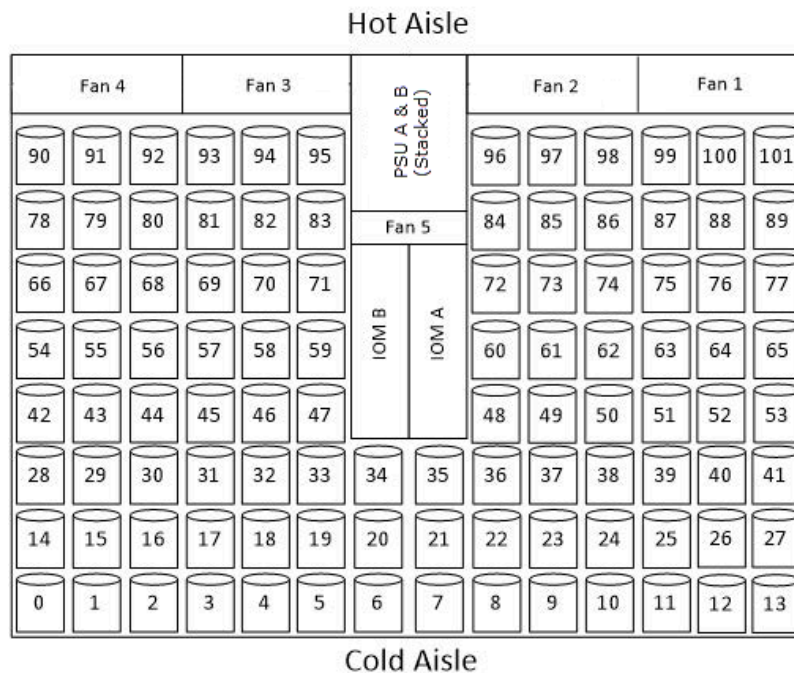
1.3 Environmental Specifications

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	~1600W

Specification	Value
Typical Power Consumption[2]	~1300W
Input Voltage	200 - 240 VAC
PSU Connector Type	C14
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 Data102 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 @ 1/2octave per minute
Weight	118.8 kg / 262 lbs.	
Enclosure Dimensions	**W:** 447mm x **L:** 1048.5 mm x **H:** 175mm / **W:** 17.6in. x **L:** 41.28in. x **H:** 6.89in.	
Length of Enclosure w/ CMA	**CMA Standard:** 1183mm / 46.57in.	
	CMA Lite: 1148mm / 45.19in.	
Required Rack Width	450mm with (17.72in.) with 465mm (18.31in.) ± 1.5mm nominal hole spacing. See EIA-310 Rack Standard	
Required Rack Depth	1181-1197 mm (46.5in. - 47.13in.) of usable rack space, frame to frame	
Rack Units (U)	4U	
Vertical Rack Rail Spacing	812.8mm - 914.4mm / 32 in. - 36 in.	

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.

1.6 Performance Specifications

Table 5: Performance Specifications

Specification	Value
Number of Drive Slots	102
Data Transfer Rates	12GBps SAS / 6Gbps SATA
Max Raw Data Storage Capacity	1.428 PB using 14TB HGST Ultrastar® HC530 drives
SAS Ports	12 **x** Mini-SAS HD (6 per IOM) 2 **x** 10/100/1G Ethernet

1.7 Ultrastar Data102 Rack Requirements

The Ultrastar Data102 is designed to be installed into a rack that meets the EIA-310 standard at a minimum 1181-1197 mm (46.5in. - 47.13in.) of usable rack space, frame to frame. The vertical rack rails must be set between 812.8mm - 914.4mm / 32 in. - 36 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	1181-1197 mm (46.5in. - 47.13in.) of usable rack space, frame to frame
Rack Width	450mm with (17.72in.) with 465mm (18.31in.) ± 1.5mm nominal hole spacing. See EIA-310 Rack Standard
Rack Units (U)	4U
Vertical Rack Rail Spacing	812.8mm - 914.4mm / 32 in. - 36 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 Data102 will be ~950 mm / 37.4in. 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 Data102 . The installation of the Ultrastar Data102 requires two people and a space of 1524mm / 60in. in front of the installation space. The servicing of the enclosure requires one person and a minimum of 1219.2mm / 48in. of space in front of the installation space. The removal of the enclosure requires two people, 1371mm / 54in. 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 Data102 . 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
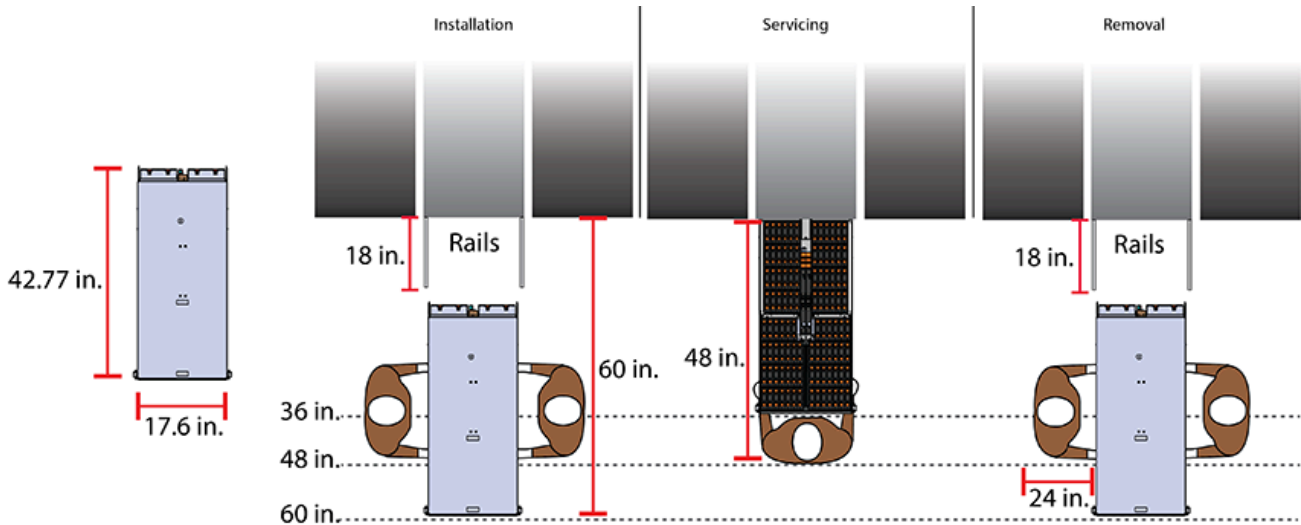
ⓘ **Attention: Do not** install or remove the enclosure while it is populated with drives. The fully populated enclosure exceeds the amount of weight that a team of two should lift.

1.7.1 Compatible Rack Hardware Configuration

The following table(s) list the approved rack hardware configurations for the Ultrastar Data102 :

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
Part Number	**Options:** 42RU – WEDIT605 45RU – WEDIT604 48RU – WEDIT603 51RU – WEDIT606	412-0761-11_STV-4501 412-0761-20_STV-4502 412-0761-23_STV-4503	KIT-MB-40	None
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:** SR42UBDP (Rack) SREXTENDER 25U (Rack Extension) SREXTENDER 42U (Rack Extension) SREXTENDER 48U (Rack Extension)	412-0761-11_STV-4501 412-0761-20_STV-4502 412-0761-23_STV-4503	KIT-MBVPT-1B	None
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
Part Number	AR3300W	412-0761-11_STV-4501 412-0761-20_STV-4502	KIT-MBVPT-1B (one kit per PDU)	4 x M6 x 16 Hex Cap Screws

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
		412-0761-23_STV-4503		8 x M6 Fender Washers
				4 x M6 Hex Nut with Nylon Lock
Quantity	1 rack	2	2	Varies

1.8 List of Compatible Drives

HDD with 3.5-inch Drive Carrier

Table 11: Western Digital Ultrastar DC HC310

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	6TB	1EX1189
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	TCG	6TB	1EX1188
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	6TB	1EX1187
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	TCG	6TB	1EX1186
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	6TB	1EX1185
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	6TB	1EX1184
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	6TB	1EX1853
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	6TB	1EX1183
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	6TB	1EX1182
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	6TB	1EX1852

Table 12: Western Digital Ultrastar DC HC320

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	8TB	1EX1227

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	8TB	1EX1226
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	8TB	1EX1225
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	TCG	8TB	1EX1224
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	8TB	1EX1223
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	8TB	1EX1222
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	8TB	1EX1343
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	8TB	1EX1221
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	8TB	1EX1220
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	8TB	1EX1342

Table 13: Western Digital Ultrastar DC HC330

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	10TB	1EX2440
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	10TB	1EX2441
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	10TB	1EX2438
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	10TB	1EX2439
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	10TB	1EX2435
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	10TB	1EX2436
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	10TB	1EX2437
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	10TB	1EX2433
Ultrastar DC HC330 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	10TB	1EX2434

Table 14: Western Digital Ultrastar DC HC510

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	10TB	1EX0499
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	ISE	10TB	1EX0497
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	10TB	1EX0498
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	10TB	1EX0496
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	ISE	10TB	1EX0494
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	10TB	1EX0495
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	10TB	1EX0487
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	10TB	1EX0485
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	10TB	1EX0486
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	10TB	1EX1341
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	10TB	1EX0484
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	ISE	10TB	1EX0482
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	10TB	1EX0483
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	10TB	1EX1340

Table 15: Western Digital Ultrastar DC HC520

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	12TB	1EX1015
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	ISE	12TB	1EX1013
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	12TB	1EX1014
Ultrastar DC HC520	HDD	SATA 6Gb/s	4Kn	SE	12TB	1EX1012

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
w/ 3.5 in. drive carrier						
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	ISE	12TB	1EX1010
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	12TB	1EX1011
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	12TB	1EX1009
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	12TB	1EX1007
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	12TB	1EX1008
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	12TB	1EX1338
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	12TB	1EX1006
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	ISE	12TB	1EX1004
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	12TB	1EX1005
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	12TB	1EX1339

Table 16: Western Digital Ultrastar DC HC530

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	14TB	1EX1793
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	14TB	1EX1794
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	14TB	1EX1790
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	14TB	1EX1791
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	14TB	1EX1583
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	14TB	1EX1792
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	14TB	1EX1855
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	14TB	1EX1788

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	14TB	1EX1789
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	14TB	1EX1854

Table 17: Western Digital Ultrastar DC HC550

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	16TB	1EX2476
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	16TB	1EX2477
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	16TB	1EX2473
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	16TB	1EX2474
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	16TB	1EX2475
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	18TB	1EX2481
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	18TB	1EX2482
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	18TB	1EX2478
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	18TB	1EX2479
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	18TB	1EX2480

SSD with 2.5-inch Drive Carrier

Table 18: Western Digital Ultrastar SS300

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	1.6TB	No longer available

SSD with 3.5-inch to 2.5-inch Drive Carrier

Table 19: Western Digital Ultrastar SS200

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	480GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	7.68TB	No longer available

Table 20: Western Digital Ultrastar SS300

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	SE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	ISE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	TCG	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	1.6TB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	No longer available

Table 21: Western Digital Ultrastar SS530

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	1EX2020
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	1EX2021
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	1EX2087
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	1EX2012
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	1EX2013
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	1EX2083
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	480GB	1EX2030
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	480GB	1EX2031
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	480GB	1EX2092
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX2022
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX2023
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX2088
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	1EX2014
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	1EX2015
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	1EX2084
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	960GB	1EX2032
Ultrastar SS530	SSD	SAS 12Gb/s	RI-1DW/D	ISE	960GB	1EX2033

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
w/ 3.5 in. to 2.5 in. drive carrier						
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	1EX2093
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX2024
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX2025
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX2089
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	1.6TB	1EX2016
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	1.6TB	1EX2017
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	1.6TB	1EX2085
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	1.92TB	1EX2034
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	1.92TB	1EX2035
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	1EX2094
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	1EX2026
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	1EX2027
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	3.2TB	1EX2090
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	3.2TB	1EX2018
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	3.2TB	1EX2019
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	3.2TB	1EX2086
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	3.84TB	1EX2036
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	1EX2037
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	3.84TB	1EX2095
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	6.4TB	1EX2028

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	6.4TB	1EX2029
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	6.4TB	1EX2091
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	7.68TB	1EX2038
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	7.68TB	1EX2039
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	7.68TB	1EX2096
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	15.36TB	1EX2040
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	15.36TB	1EX2041
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	15.36TB	1EX2097

Table 22: Western Digital Ultrastar SA620

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	400GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	400GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	480GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	480GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	800GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	800GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	960GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	960GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	1.6TB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	1.6TB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	1.92TB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	1.92TB	No longer available

Disclaimers

Learn about the Regulatory, Safety, and Electromagnetic standards for which this product is compliant.

The following chapter describes the Regulatory Statement of Compliance, Safety Compliance, and Electromagnetic Compatibility Agency Requirements for the Ultrastar Data102 .

In This Chapter:

2.1 Restricted Access Location

The Ultrastar Data102 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.

2.2 Safety Compliance

Product Name: **Ultrastar Data102**
Regulatory Model: **H4102-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.

2.3 Electromagnetic Compatibility (EMC) Class A Compliance

The **H4102-J** complies with and conforms to the latest international standards as applicable:

Emissions

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

Immunity

- EN 61000-3-2 Harmonic Current Emissions
- EN 61000-3-3 Voltage Fluctuations and Flicker
- EN 55024
- KN35
- EN 61000-4-2 ESD

- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 RF Common Mode
- EN 61000-4-8 Power Frequency Magnetic Field
- EN 61000-4-11 Voltage Dips and Interruptions

2.4 Country Certifications

Table 23: Country Certifications

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

Safety

The following chapter provides safety and regulatory information for the Ultrastar Data102 .

In This Chapter:

3.1 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.

3.2 Electrostatic Discharge

CAUTION

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.

3.3 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. Consult the product documentation for spacing information.

Keep the unit away from direct strong magnetic fields, excessive dust, and electronic/electrical equipment that generate electrical noise.

3.4 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.

⚡ This unit has more than one power supply connection; both power cords must be removed from the power supplies to completely remove power from the unit. There is no switch or other disconnect device.

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.

3.5 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.

3.6 Rackmountable Systems

CAUTION

Always install rack rails and storage enclosure according to Ultrastar Data102 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 (Tma) 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.

3.7   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.
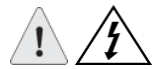
To avoid shock hazard, turn off power to the unit by unplugging both power cords before servicing the unit. Use extreme caution around the chassis because potentially harmful voltages are present.

When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing it from the Ultrastar Data102 .

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.

Packaging

The following chapter provides information about how the Ultrastar Data102 is packaged and instructions for unpacking it.

In This Chapter:

4.1 Ultrastar Data102 Packaging Overview

Figure 6: Outer Packaging
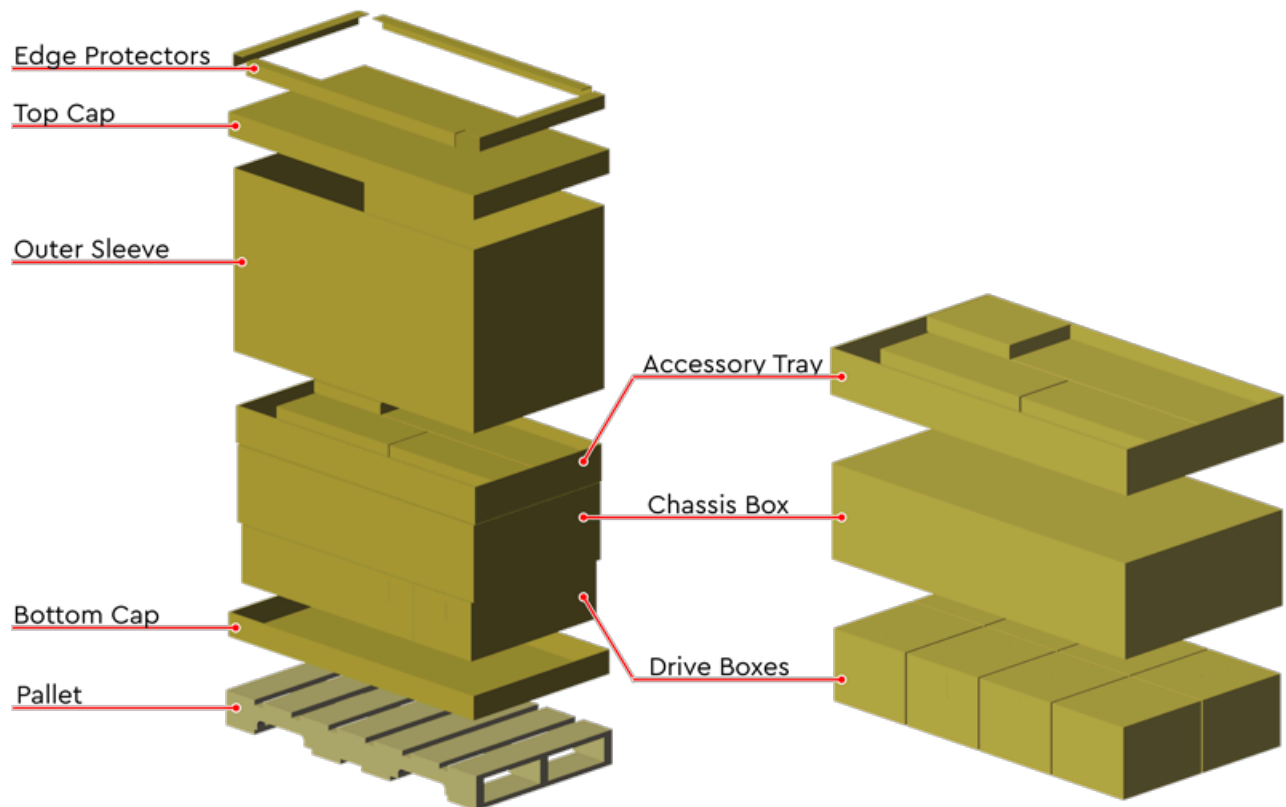
The Ultrastar Data102 is shipped in protective outer packaging that consists of cardboard caps on the top and bottom and an outer sleeve surrounding the sides. Edge protectors reinforce the top cap, while plastic banding surrounds the packaging and secures it all to the shipping pallet.

The inner contents of the Ultrastar Data102 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
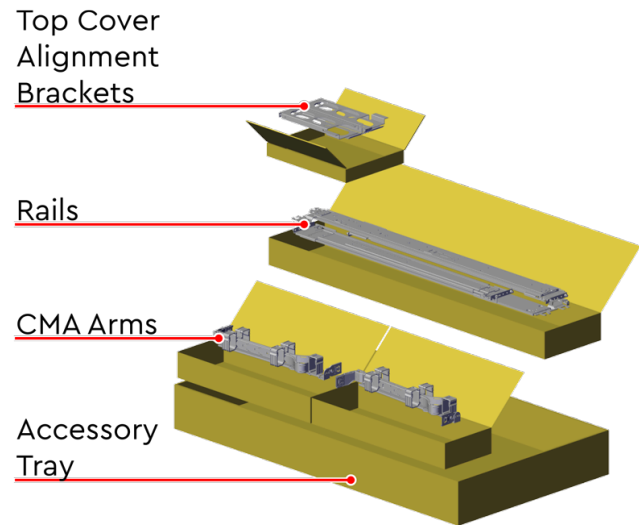
Table 24: Accessory Tray Contents

Container	Contents
CMA Box	2 CMA arms (1 upper, 1 lower)
Rails Box	• 2 Rails (each containing 1 inner-rail & 1 outer-rail) • Cross-bar
Brackets Box	2 Top Cover Alignment Brackets

Accessory Tray	• 2 Rack Latch Brackets (1 left, 1 right)
	• Screws & Nuts
	  ◦ 10 M5 cagenuts
	  ◦ 30 M5 x 12, T15 Torx screws
	  ◦ 2 M5 x 12 Philips panhead screws (for cover retention)
	  ◦ 16 custom round washers
	  ◦ 6 custom low-profile M4 xcrews (packaged with the rail kit)
	• Cables
	  ◦ 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
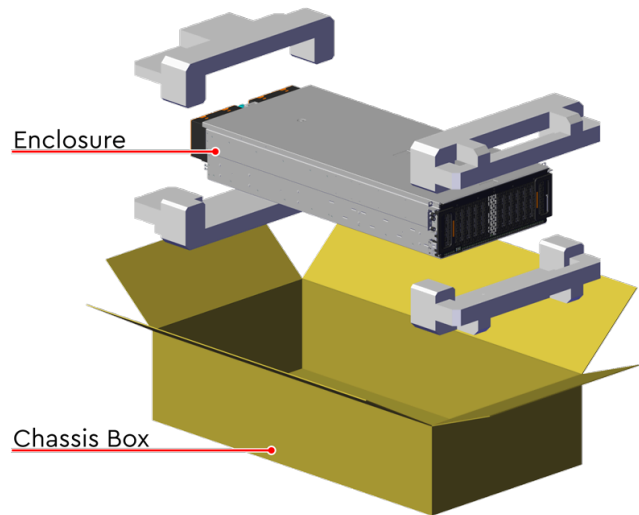
Table 25: Chassis Box Contents

Container	Contents
Chassis box	1 Chassis w/ all internal components pre-installed (except HDDs): • 2 PSUs • 2 IOM s • 1 IOM Fan • 4 Rear Fans

Drive Boxes

On the bottom layer are seven drive boxes holding fourteen HDD assemblies each, and one box holding four HDD assemblies.

Figure 9: Drive Box Contents
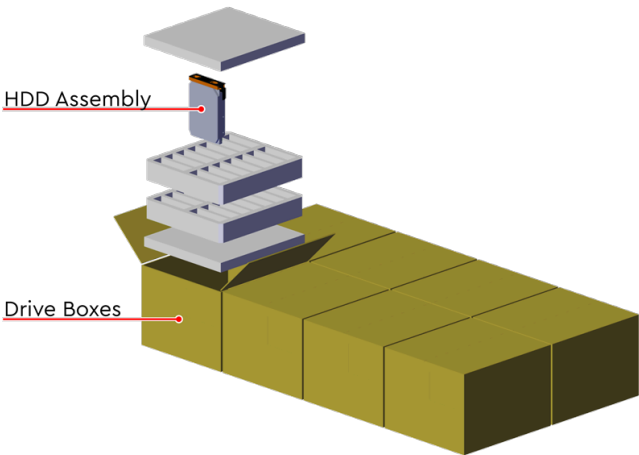
Table 26: Drive Box Contents

Container	Contents
7 boxes:	14 HDD assemblies each
1 box:	4 HDD assemblies
(total of 8 boxes)	(total of 102 HDD assemblies)

4.2 Ultrastar Data102 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 Data102 Packaging Overview *(page 29)*.

Step 2: Using a box cutter, cut the straps that secure the packaging to the pallet.

Step 3: Remove and discard the top cap and the outer sleeve.

Figure 10: Top Cap and Sleeve Removal
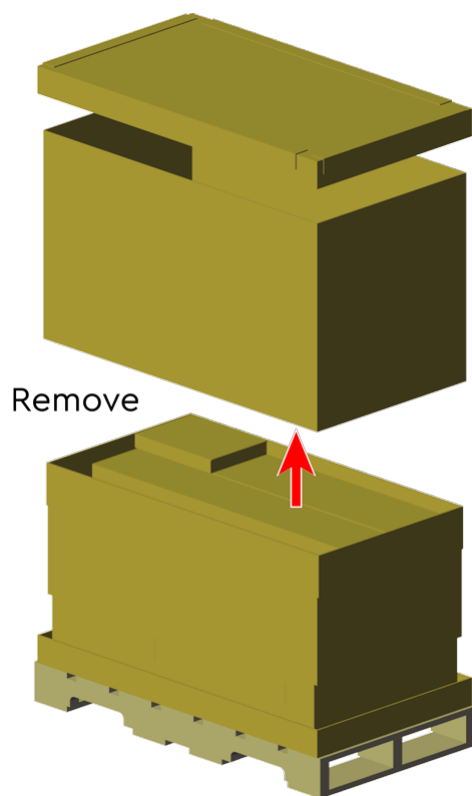
Step 4: From the accessory tray, open the boxes for the rails, CMA arms, and top cover alignment brackets. Remove these parts and set them aside.

Figure 11: Unpack Accessory Tray Contents

Top Cover
Alignment
Brackets

Rails

CMA Arms

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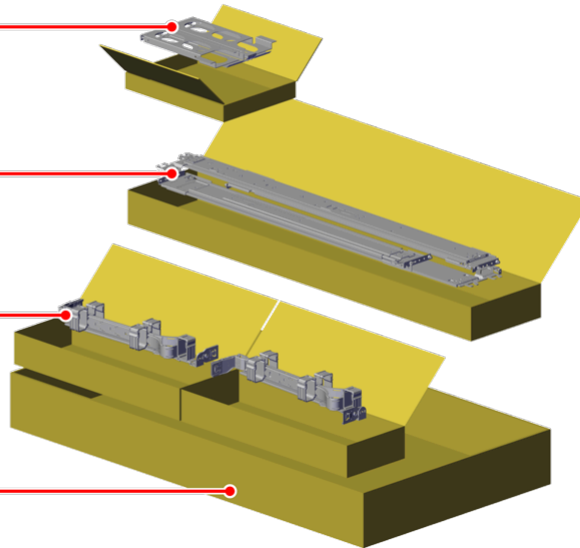
Step 5 : Open the chassis box and remove the top cushions from the front and rear of the chassis.

Figure 12: Unpack Chassis Box Contents

Enclosure

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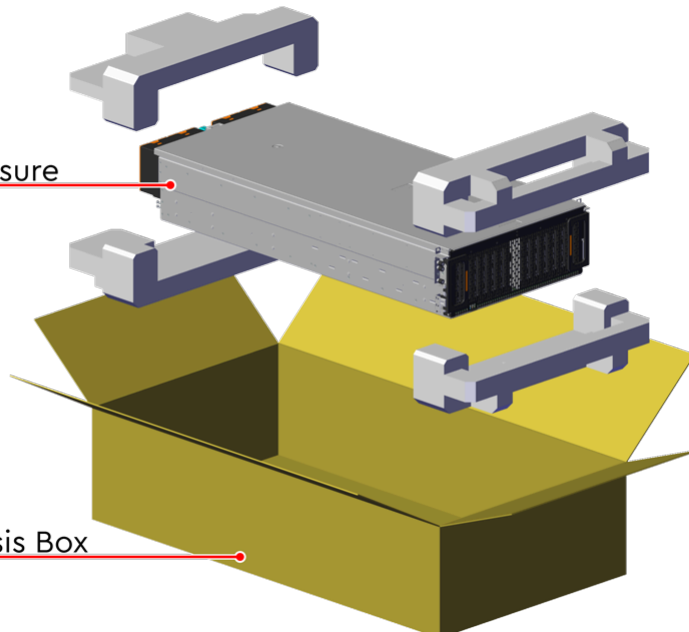
Step 6 : With assistance, and without using the system handles, remove the chassis from the chassis box and set it aside.

⚠ **Warning:** The chassis weight without drives is 32.34 kg / 71.3 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 Data102 being unpacked, seven boxes should contain fourteen drive assemblies (in the form of HDDs, SSDs, or blanks), and one box should contain four drive assemblies. 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

HDD Assembly

Drive Boxes
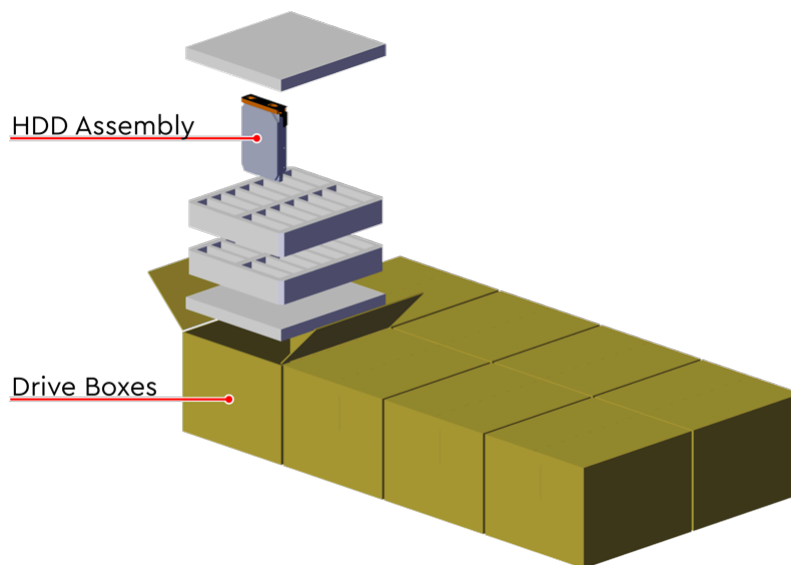
Installation

In This Chapter:

5.1 Ultrastar Data102 Installation Overview

Procedure Info

Required Tools	Required Parts	# of People Required	Time Required
• Long T15 Torx Screwdriver • # 2 Philips Screwdriver • Long T10 Torx Screwdriver • Cable Ties (for configurations with greater than 10 total cables) • Tape Measure • Level	• M5 x 12mm T15 Flat Head Torx screws • M5 x 12mm Phillips Pan Head screws (to secure top cover) • Included Washers • Low-Profile M4 x 3.2mm Philips 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	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

Cable Management

There are two different options for cable management in Ultrastar Data102 : CMA Standard and CMA Lite. Each of these options has a different installation, configuration, and purpose. The standard CMA configuration manages and protects the full cable load during normal operation of the Ultrastar Data102 . If a fully-configured Ultrastar Data102 is not necessary, CMA Lite provides a better management and protection solution for a lighter cable load, with a more compact hardware footprint. Utilizing front spacer brackets that shift the enclosure forward, and narrower basket clips for tighter cable management, CMA Lite allows the enclosure to fit within shallower racks and/or those with front and rear doors. The following information provides a list of the features of each cable management option:

CMA Standard:

- Enables use of all I/O connections
- Manages and protects full set of cables during installation, operation, and servicing
- Easy cable routing with the open-top cable baskets
- Toolless installation

CMA Lite:

- Smaller rack footprint for shallower racks and/or racks with doors
- Manages and protects a lighter cable load (with only one CMA arm) during installation, operation, and servicing
- Easy cable routing with the open-top cable baskets
- Toolless installation

CMA and CMA Lite in the Installation Procedure

The installation procedure for the Ultrastar Data102 includes instructions for both CMA Standard and CMA Lite. These instructions are labeled, in-line, to notify the user when a step or part of a step is used for one option or the other. These options occur during the steps for **rail installation**, **CMA installation**, **cabling**, and **securing the enclosure to the rack**.

> (i) **Attention:** The CMA Lite replacement package includes a CMA arm and spacer brackets. Replacing the CMA arm can be done with the enclosure in place in the rack. To replace the spacer brackets, the enclosure must be removed from the rack.

5.2 Ultrastar Data102 Installation Procedure

> ⚠ **Warning:** The handles on the front of the chassis are not intended to be used to support the weight of the Ultrastar Data102 . 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.

> (i) **Attention:** This procedure utilizes "Right" and "Left" as to inform the user on actions related to the installation. "Right" and "Left" will be in reference to where the user is positioned, whether at the front or the rear of the installation space.

📄 **Note:** **For CMA Lite Installation only**: Ensure that the chosen 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.

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 14: Rail Safety Latch
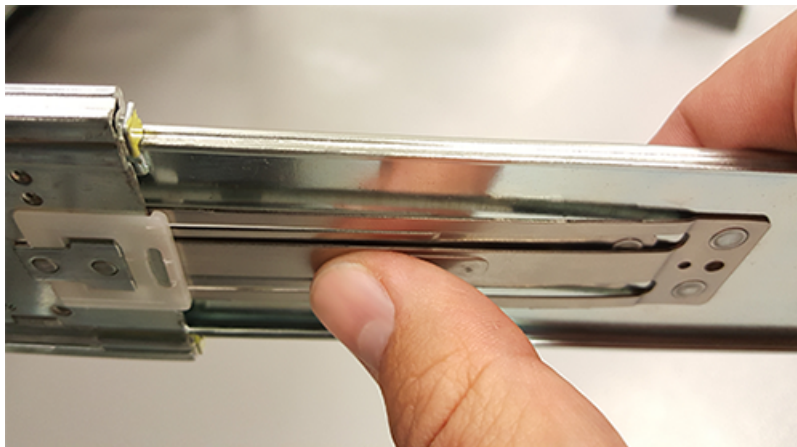
Step 2: Install the inner rail onto the chassis making sure they are installed on the correct side. Each inner rail will read "R" for the right or "L" for the left embossed on the side that faces away from the chassis. Right and Left are with reference to looking at the front of the enclosure.

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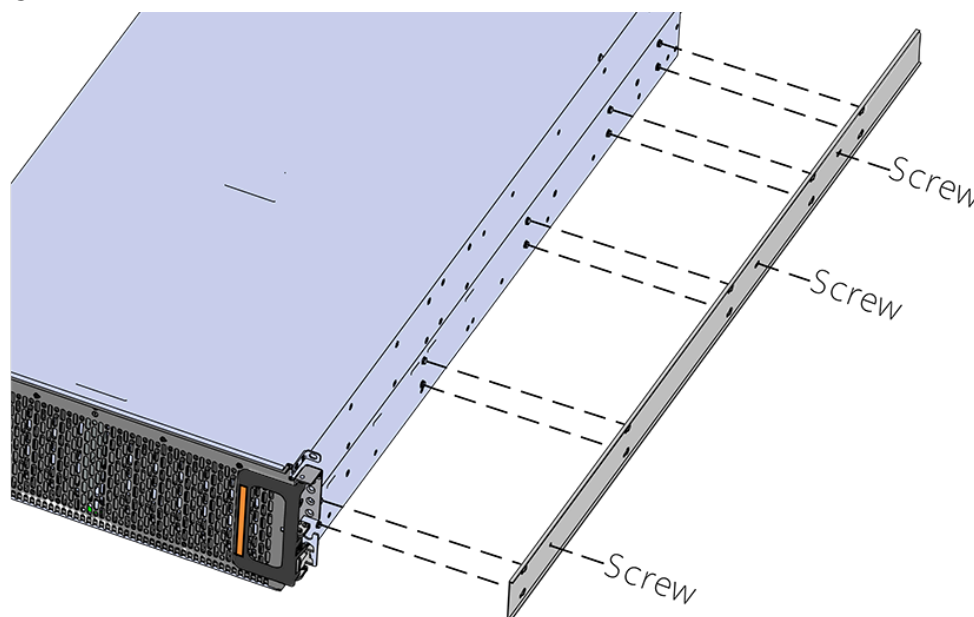
c. Slide the inner rail toward the rear of the chassis to lock it in place. There will be an audible click and the mounting pegs will cover the front part of the keyhole.

Figure 16: Slide Inner Rail
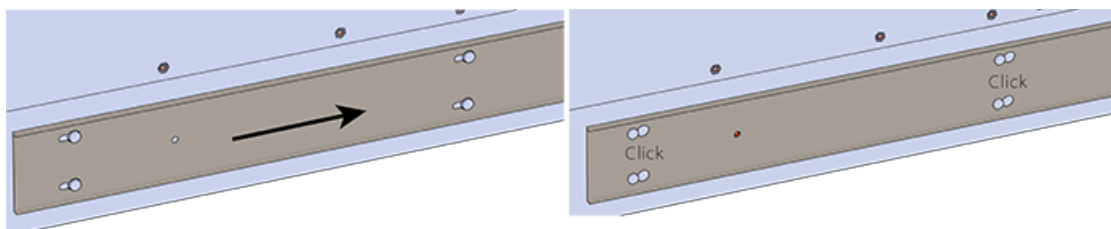
d. ⚠ **Caution:** When installing the inner rail onto the chassis, make sure to only use the special Low-Profile M4 x 3.2mm Philips screws provided in the accessory kit with the CMA. These screws should be tightened to .90-1.12 Nm / 8-10 in-lbf using a # 2 Philips Screwdriver. These screws are specially designed for this purpose. Using unapproved screws could cause damage to the slides inside the rail.

Install the three 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: Attach a cable tie mount to the cable tray.

a. Clean the surface of the cable tray, under the mounting area, with isopropyl alcohol and allow to dry.

b. Adhere a cable tie mount in the approximate location shown in the following diagram:

Figure 17: Cable Tie Mount Location
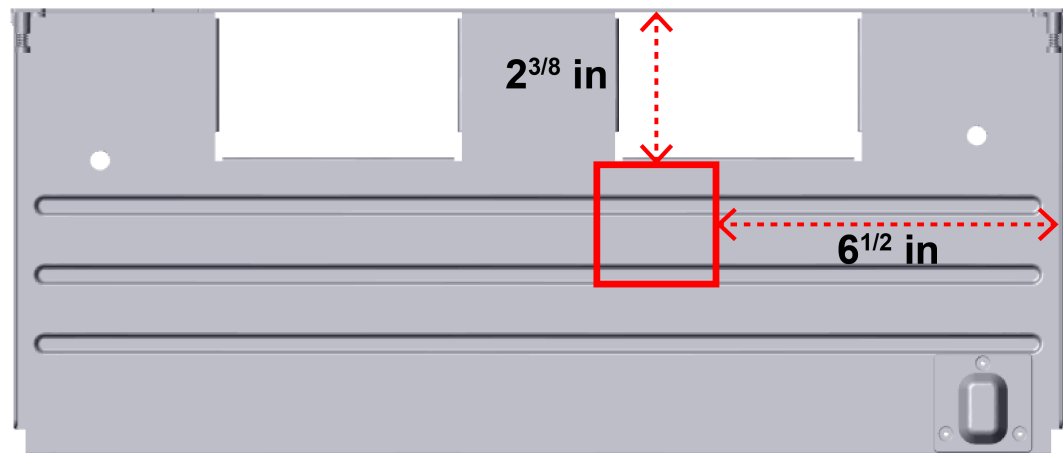
Step 4: Secure the Cable Tray onto the enclosure using the included M3 x 8mm T10 Torx screws and the Long T10 Torx Screwdriver. These screws should be tightened to .33-.56 Nm / 3-5 in-lbf using a Long T10 Torx Screwdriver.

Figure 18: Installing the Cable Tray
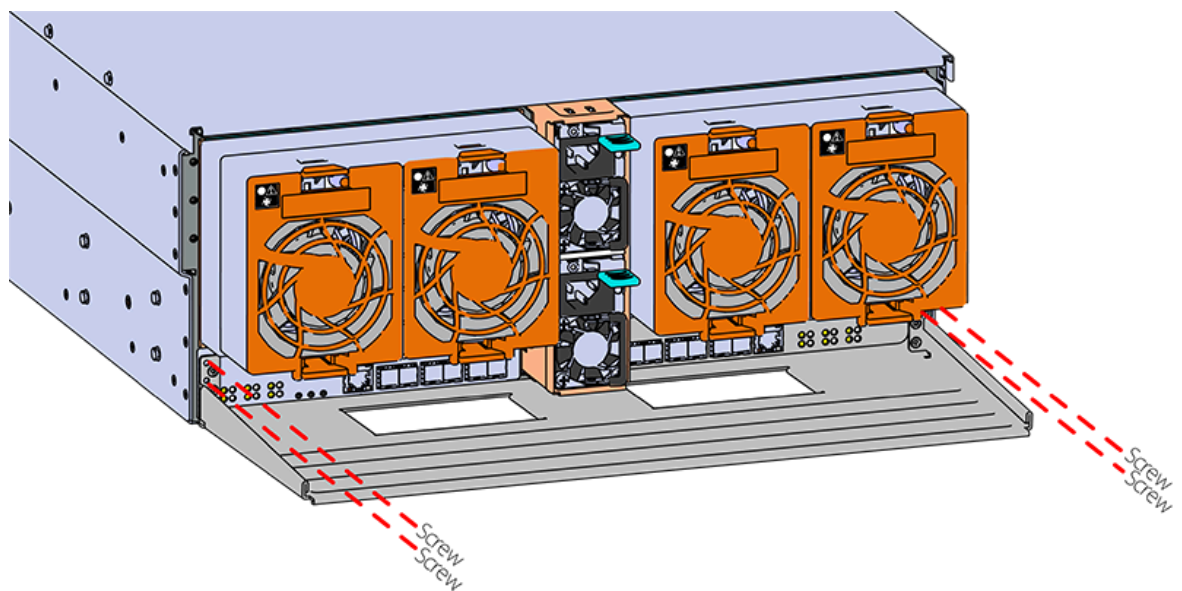
Step 5: Set the vertical rack rail depth to between 32" and 36".

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

Step 6: 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.

    a. Move to the rear of the rack.

    b. 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
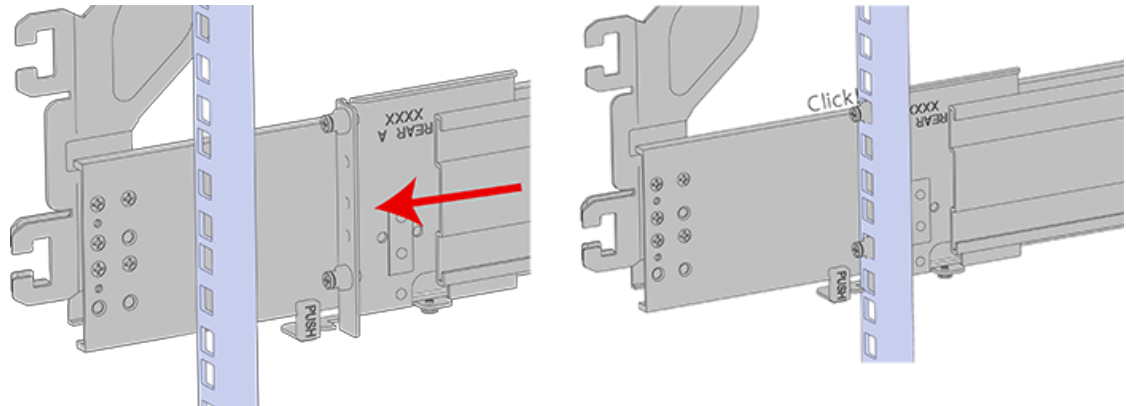
    c. Align the rail on the rack posts at the U-height desired for installation. The bottom of the rail will be the lower most U of the total 4U height.

    d. 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.

    e. 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
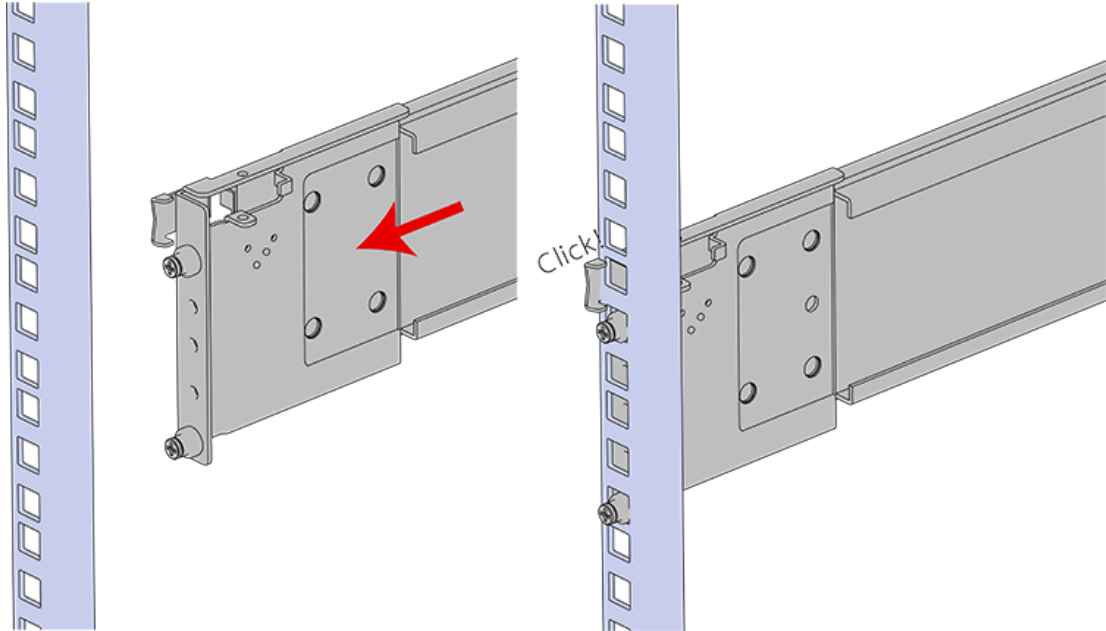
g. Use a level to make sure that the rails are aligned properly.

h. Follow these steps for the other outer rail.

Step 7: Install the rail mounting hardware, starting with the uppermost rack mounting hole of the 4U space on the front of the rack.

CMA Standard:

a. Install one cagenut at the uppermost mounting hole of the 4U space that the enclosure will occupy.

b. If the Ultrastar Data102 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
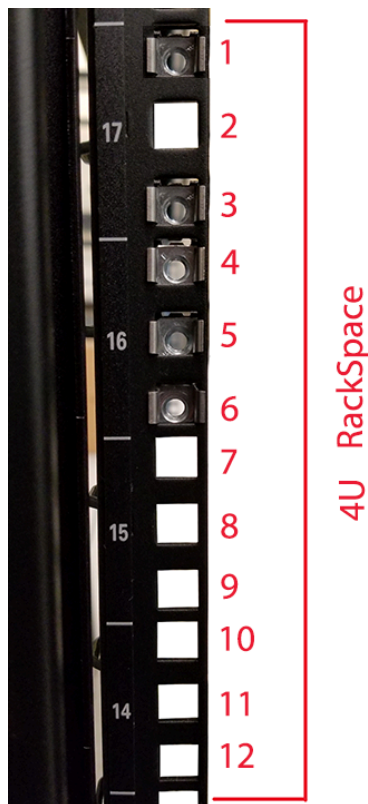
CMA Lite:

a. Line the spacer bracket up with the bottom of rack unit location of the installed outer rails. The bottom of the spacer bracket will rest on top of the bottom outer rail pin.

Figure 22: Spacer Bracket Orientation
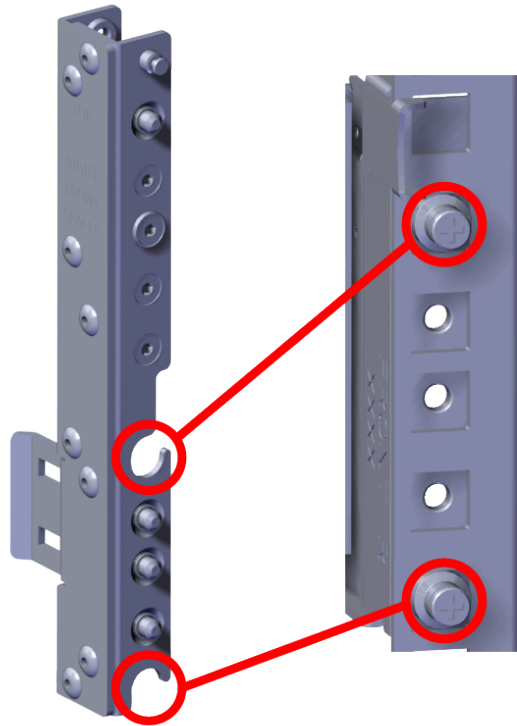
Figure 23: Spacer Bracket Placement
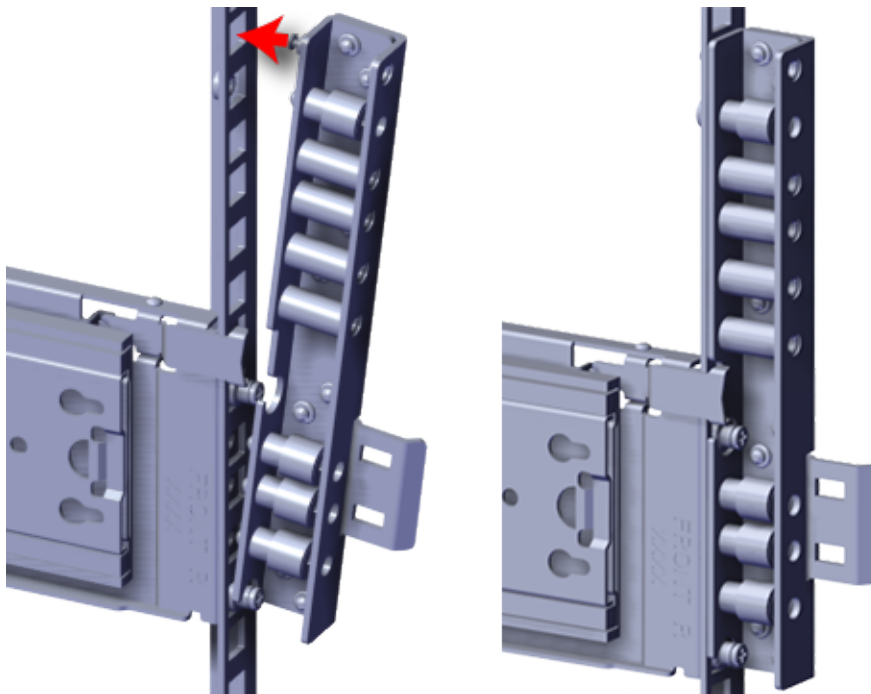
b. Slide the nut plate down over the mounting pin on the back of the spacer bracket.

Figure 24: Rack Spacer Nut Plate Installation
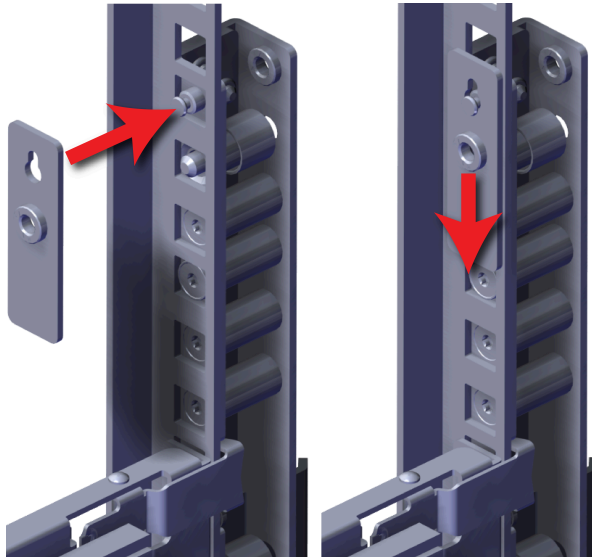
c. Using a T15 Torx screwdriver, tighten the top captive screw to secure the mounting plate in place. Tighten the remaining captive screws at the bottom of the spacer bracket, and torque all four of the captive screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 25: Captive Screws
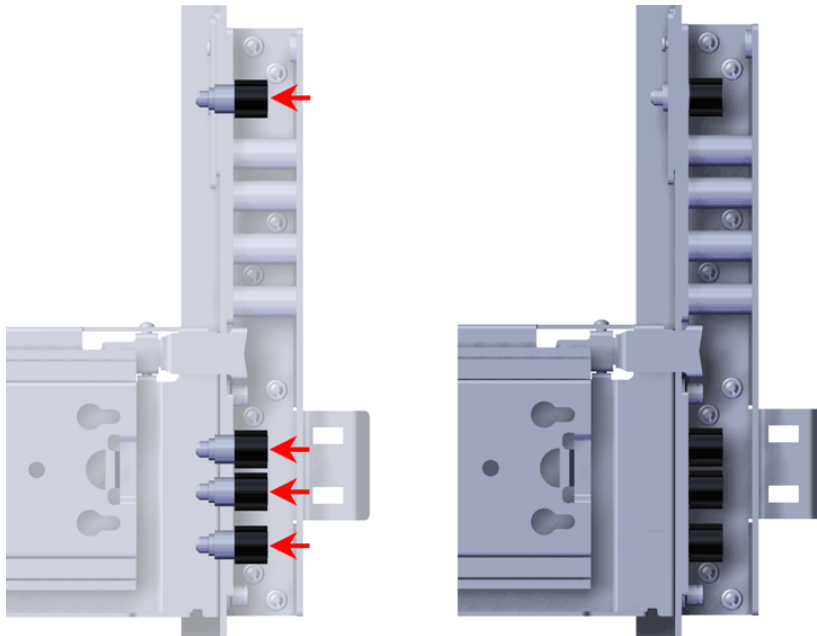
d. Repeat these steps to install the remaining rack spacer.

Step 8 : Install the rear cover alignment brackets.

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 26: Alignment Bracket Groove (highlighted in red)
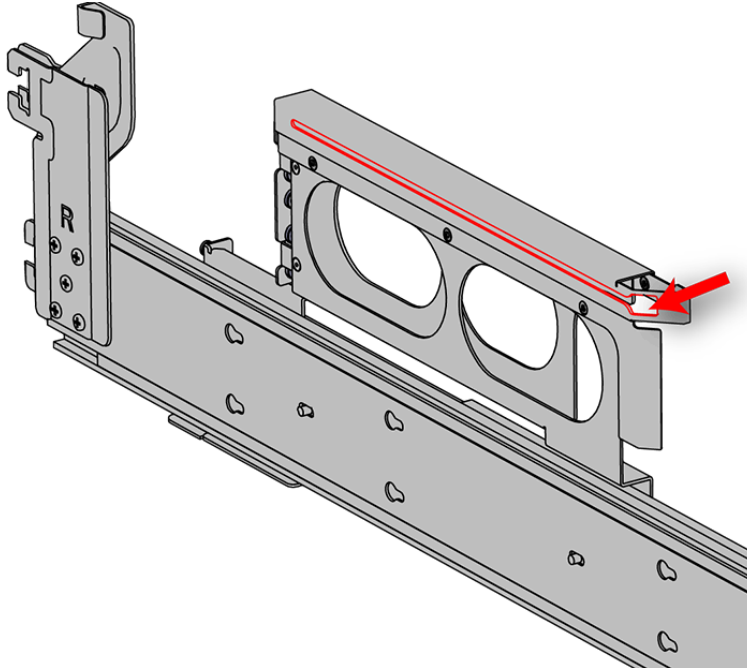
b. Use five of the M5 x 12mm T15 Flat Head Torx screws and five of the included washers and attach the rear cover alignment bracket to the vertical rail with the Long T15 Torx Screwdriver. Add three M5 x 12mm T15 Flat Head Torx screws and three included washers to attach the rear rail (the three lower holes) to the rack posts as shown in the following image. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long T15 Torx Screwdriver.

Figure 27: Screw and Washer Order
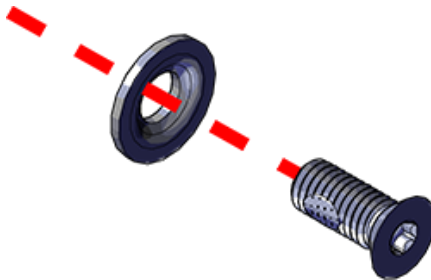
⚠ **Caution:** Be careful to set the screws properly cover alignment bracket and rail to prevent crossthreading.

Figure 28: Screw Installation Location
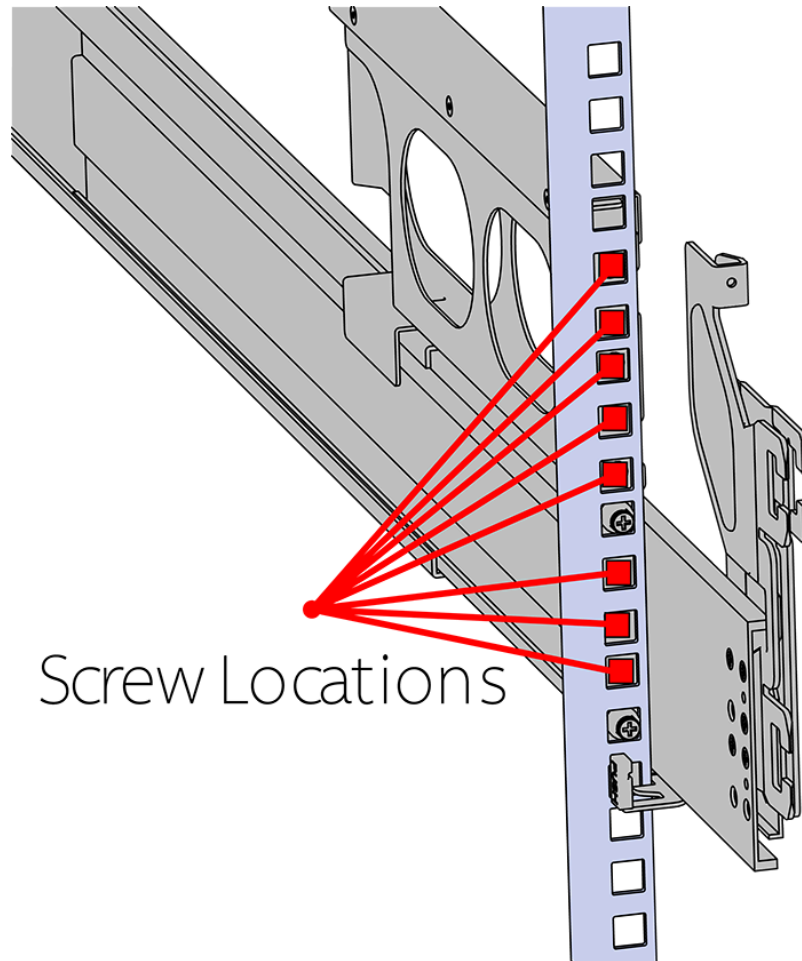
Step 9: **CMA Standard:** Install the two rack latch brackets at the front of the rack.

    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 29: 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.

⚠ **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 10 : 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 30: Extend Mid-Rails
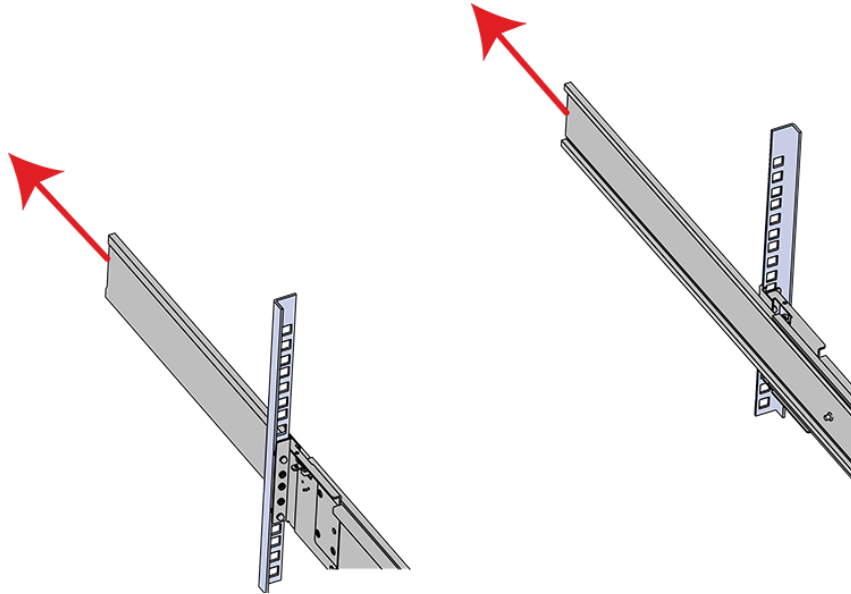
Step 11: Install the chassis into the rails.

    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 31: Bearing Plate
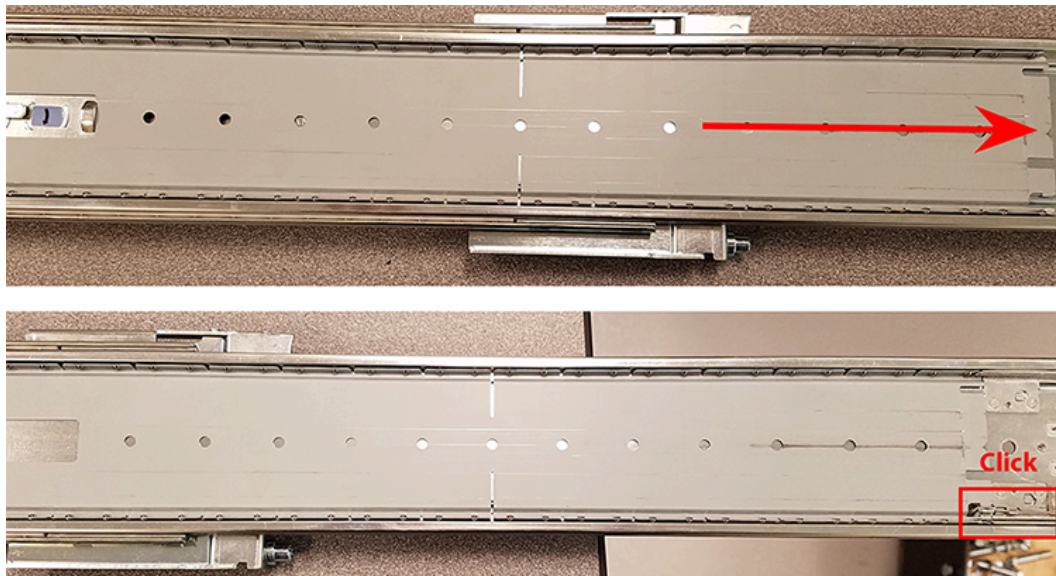
b. ⚠ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. 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 Data102 . 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 32: Installing the Chassis
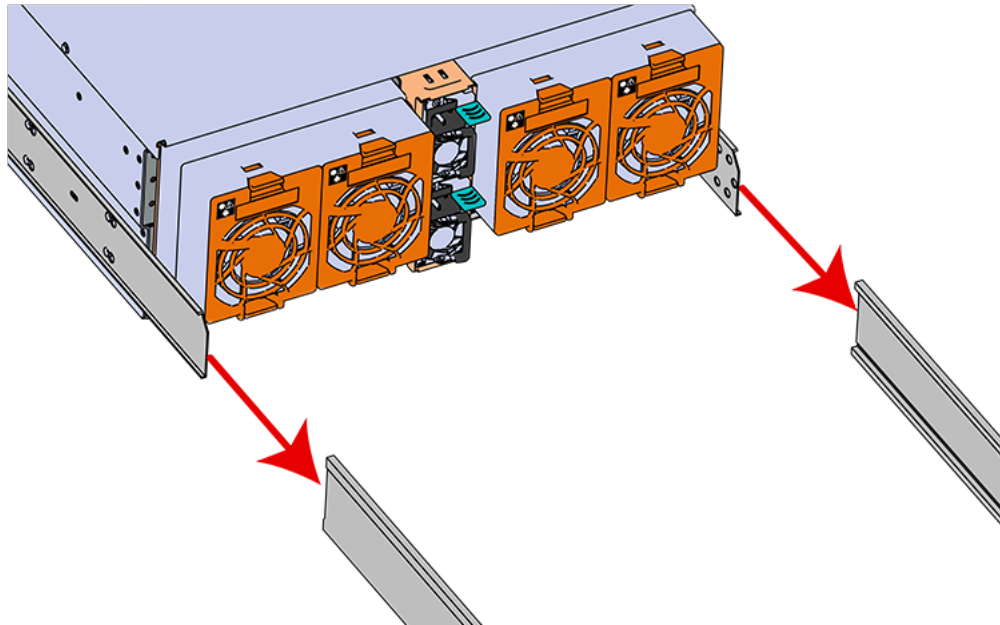
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 33: Safety Latch Release
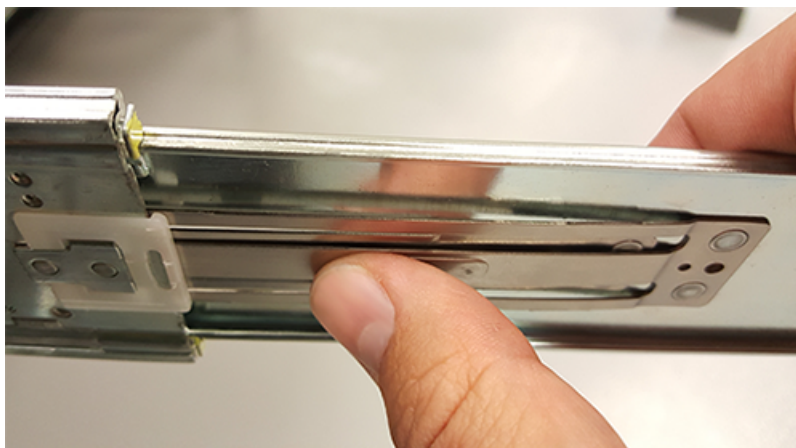
e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 12 : 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 34: Initial Alignment
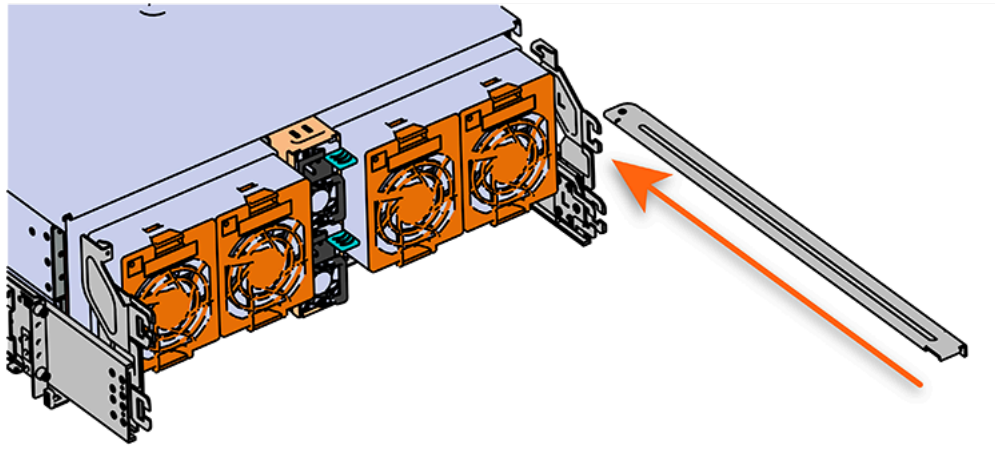
b. Insert the peg on the underside of the crossbar into the slot on the CMA mounting bracket.

Figure 35: Crossbar Underside Peg
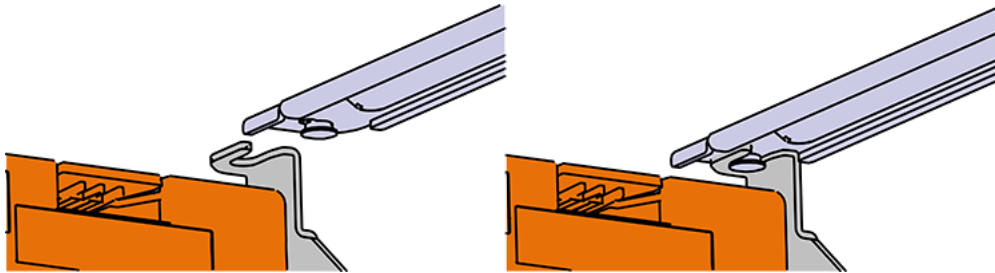
c. Swing the crossbar so that the thumbscrew lines up with the mounting hole on the opposite side of the enclosure.

Figure 36: Swinging Motion of Crossbar to Locking Position
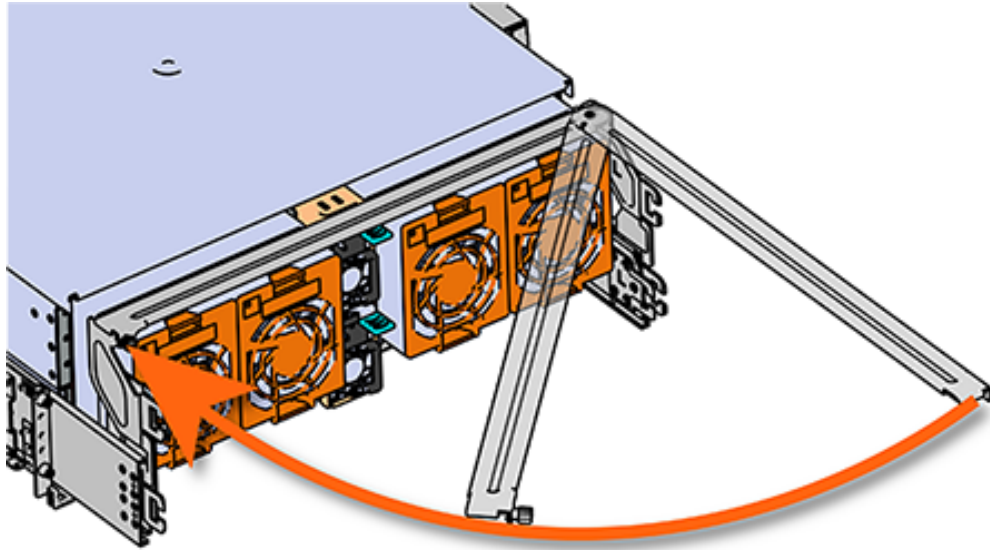
d. Press the crossbar against the CMA mounting bracket and secure the crossbar in place by pressing and turning the thumbscrew clockwise until snug.

Figure 37: Tightening the Thumbscrew
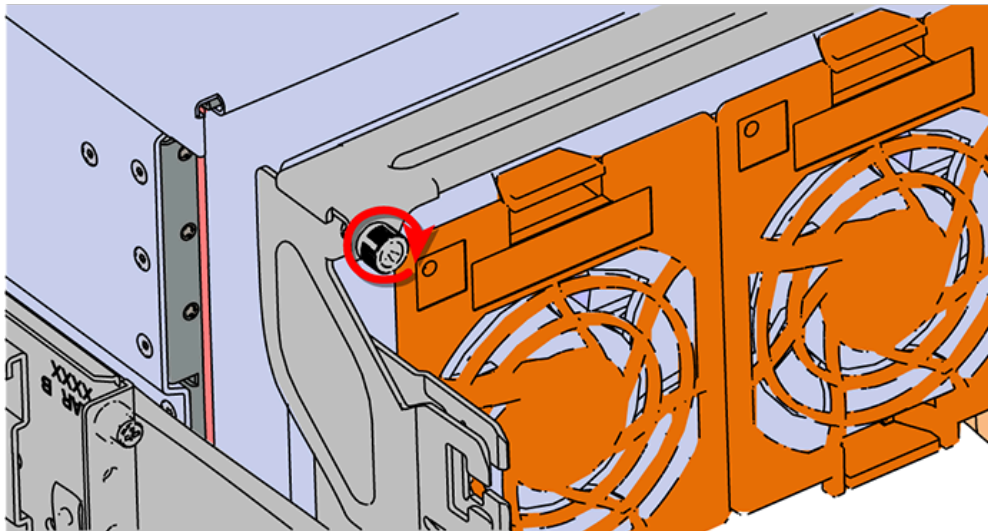
a. Check that the crossbar is fully secured to the CMA mounting bracket by pulling on the bar to ensure it does not move.
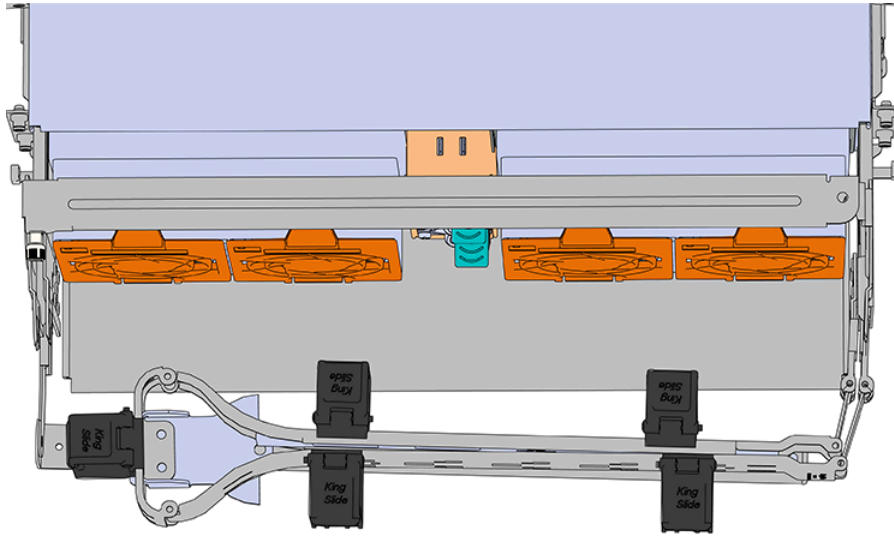
Step 13: Install the CMA(s).

> **Note:** The standard 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.

> 📄 **Note:** CMA Lite has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

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 38: Lower CMA Orientation

c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

**a.** **CMA Standard:** Repeat these steps to install the upper arm with the elbow facing to the right.

Step 14: Cable the CMA(s).

CMA Standard:

**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 68)* for more information.

Figure 39: CMA Cable Routing
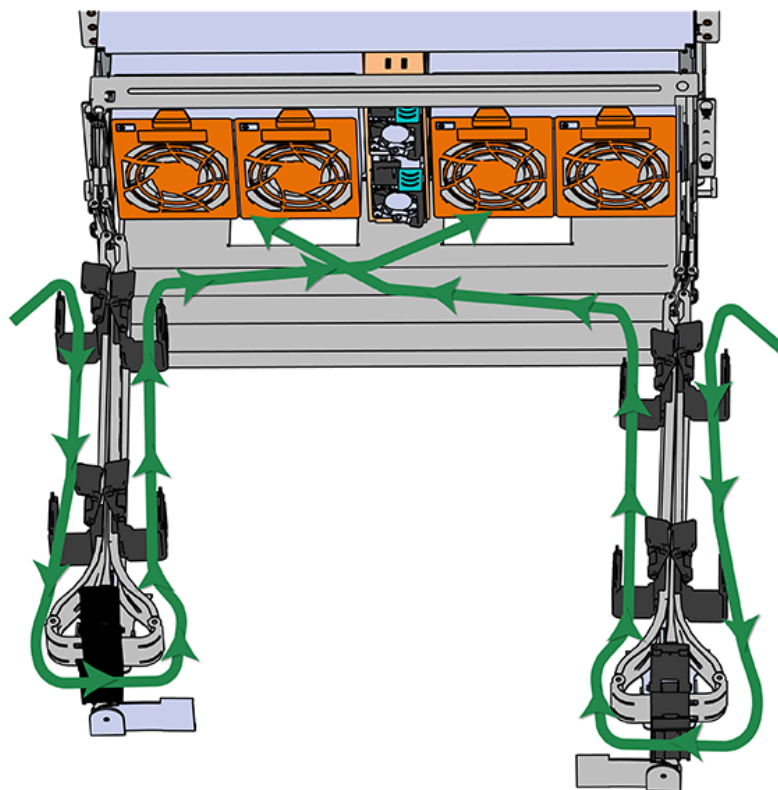
c. Open all of the baskets.

Figure 40: Open Baskets
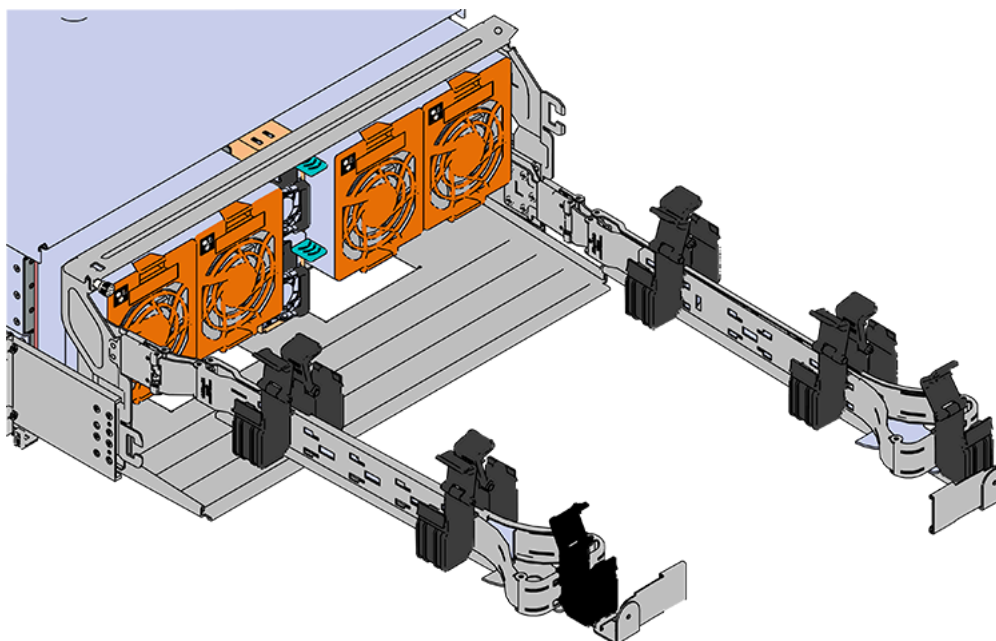
d. Connect the Ethernet cable to the Ethernet port, and route the cable through each of the baskets on the arm.

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 and route it through each basket.

> (i) **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. If the installation includes more than 10 total cables, follow the recommendations in Special Considerations for Cable Routing *(page 68)*, 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 41: Nominal Cable Length at Connectors

Nominal Length from End of Connector to First Basket is 20" - 21"
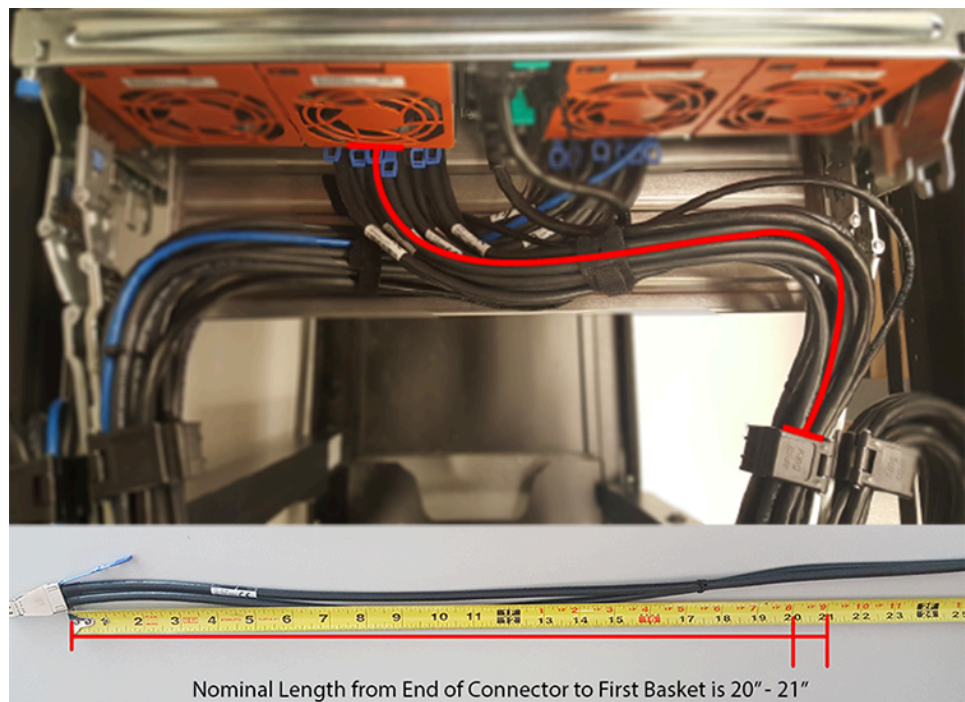
h. Close all of the baskets.

i. If the Ultrastar Data102 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 Data102 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.

j. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 42: Open Baskets
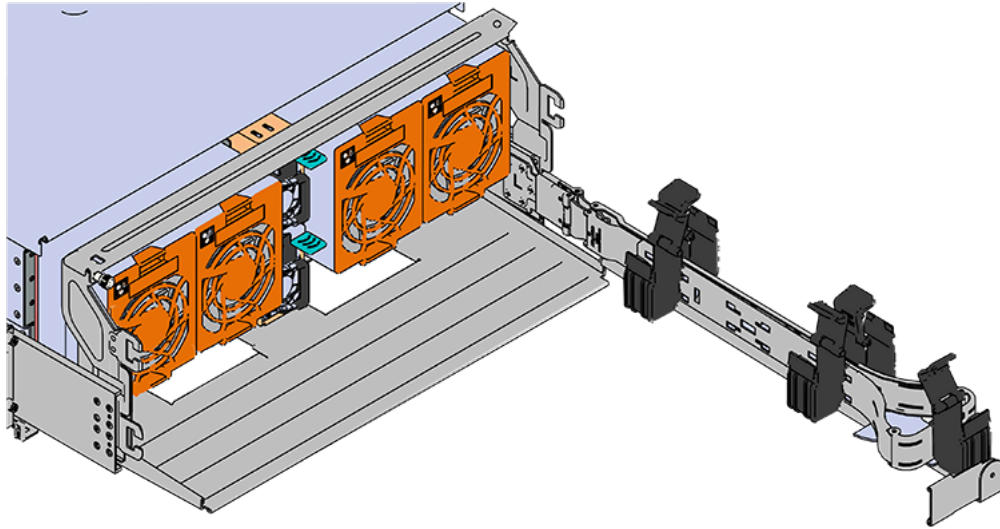
c. Gather the SAS, power, and Ethernet cables for installation.

> **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Connect the Ethernet cables to the Ethernet ports on the left hand side of the Ultrastar Data102 , and then route the cables through each of the baskets on the arm.

Figure 43: Connected Cable Routing
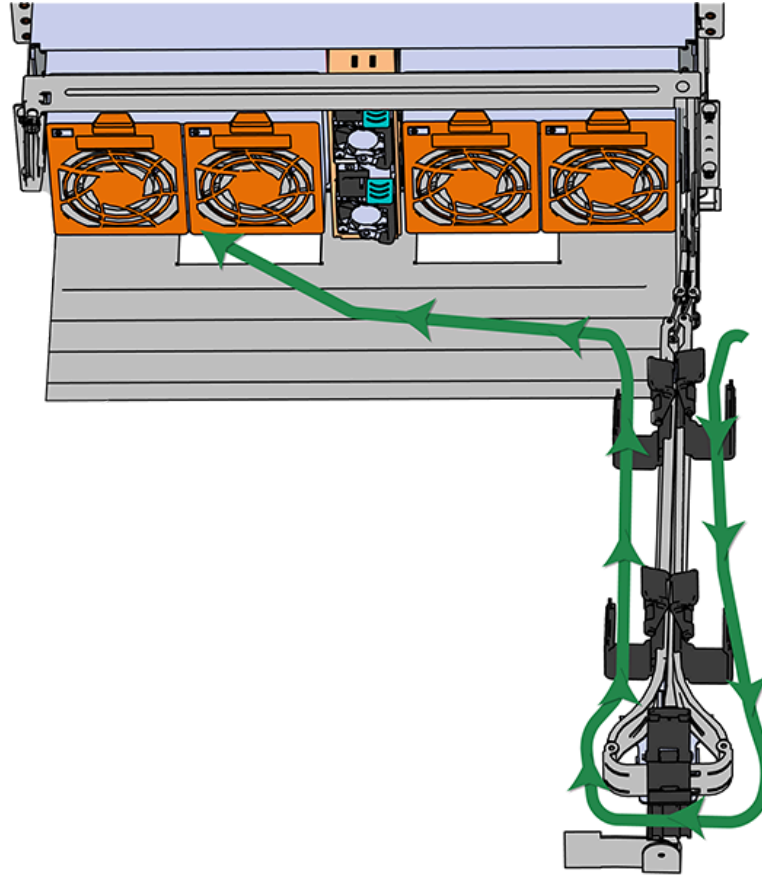
e. Connect the SAS cables and route them through the baskets one at a time. Follow the labels to ensure they are connected to the proper ports.

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

Connect the power cable to the lower PSU and route it through each basket.

g. Close all of the baskets.

h. If the Ultrastar Data102 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 Data102 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

i. Reconnect the arm to the rail by the connector at the elbow.

Step 15 : 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 16: 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.

Step 17: 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 44: Cover Retention Screws
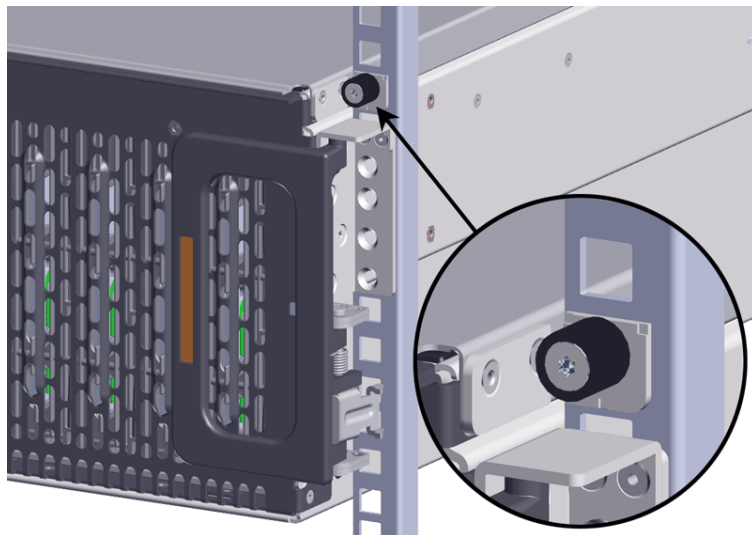
Step 18: Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

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

Step 19: 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 45: Chassis Handle Operation
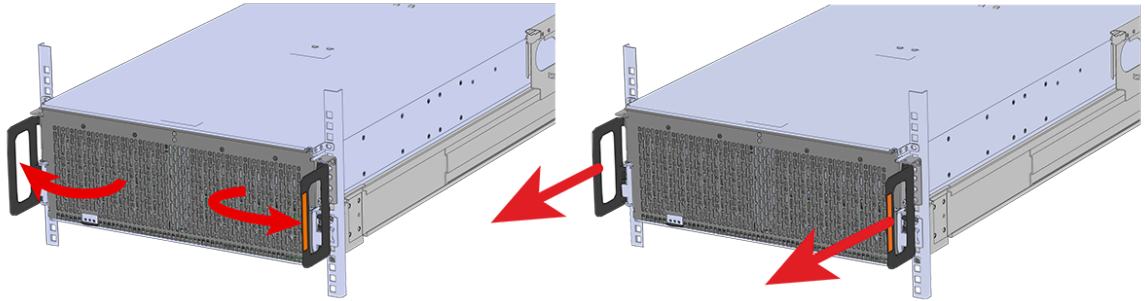
Step 20 : Perform this same action two more times without the drives loaded to make sure the rail kits are installed properly.
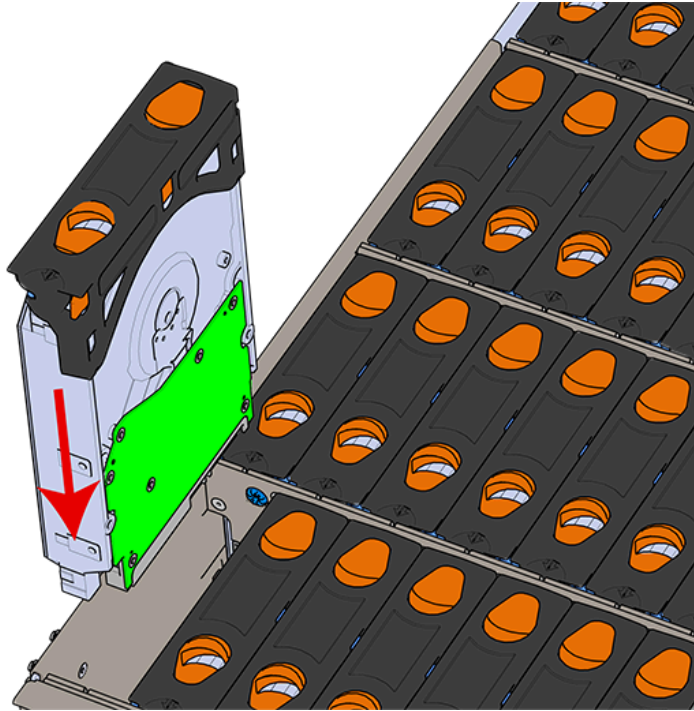
Step 21: Install the 3.5in HDD Assembly.

> **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 65)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.
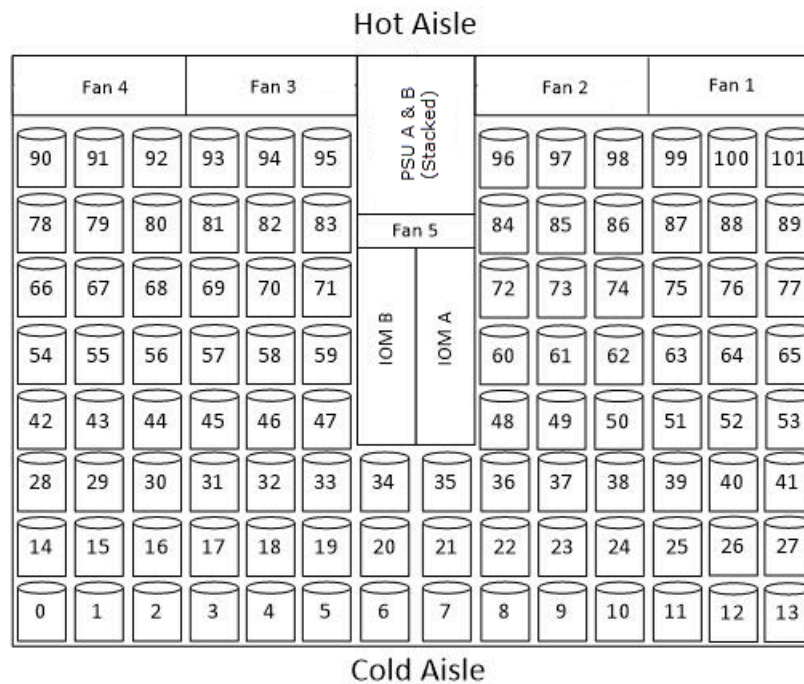
Figure 46: LED Pointer Orientation
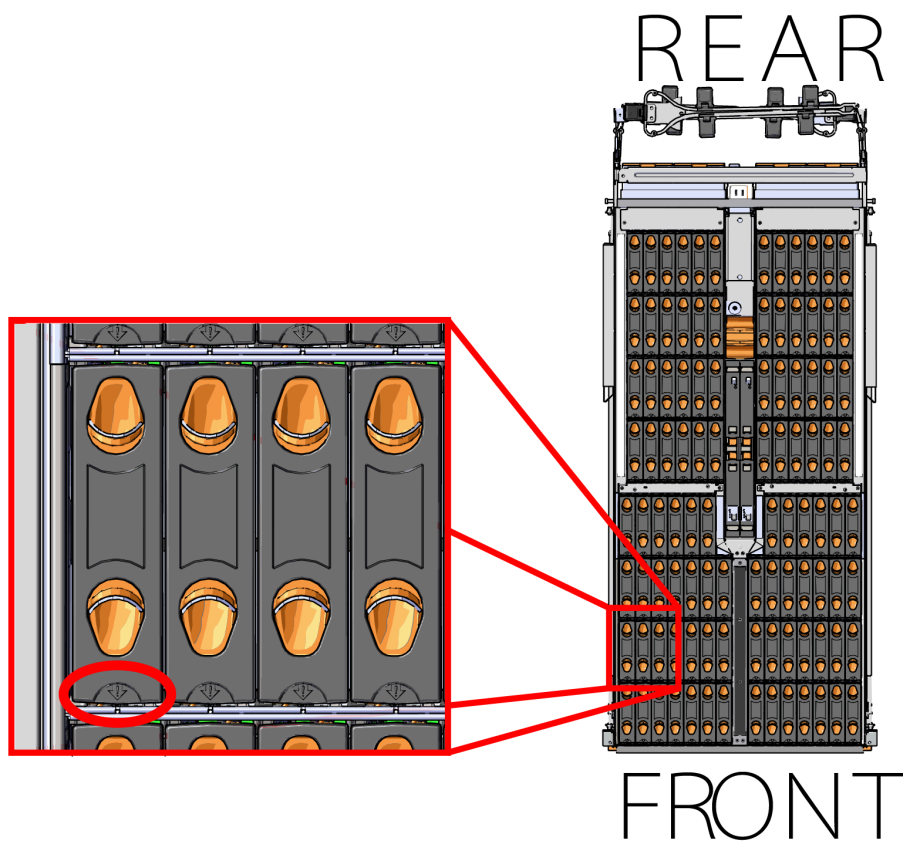
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 47: Installing a 3.5in HDD Assembly

    d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 22: Repeat the preceding steps to install each subsequent HDD using the same method as the first, populating the enclosure from left-to-right, rear-to-front.

For example, begin with slot 90 (as shown in the following diagram), continue through 101, then proceed with 78 through 89, and so on:

Figure 48: Drive Layout

Hot Aisle

Fan 4			Fan 3			PSU A & B (Stacked)		Fan 2			Fan 1		
90	91	92	93	94	95			96	97	98	99	100	101
78	79	80	81	82	83	Fan 5		84	85	86	87	88	89
66	67	68	69	70	71			72	73	74	75	76	77
54	55	56	57	58	59	IOM B	IOM A	60	61	62	63	64	65
42	43	44	45	46	47			48	49	50	51	52	53
28	29	30	31	32	33	34	35	36	37	38	39	40	41
14	15	16	17	18	19	20	21	22	23	24	25	26	27
0	1	2	3	4	5	6	7	8	9	10	11	12	13

Cold Aisle

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

Step 23: 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.

Step 24: 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 49: Shipping Bracket Screw Locations (CMA Standard)
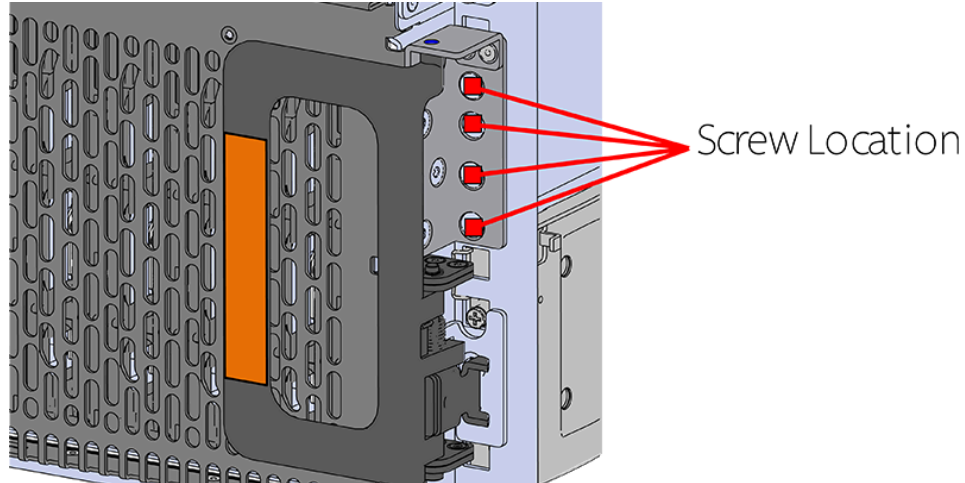
Figure 50: Shipping Bracket Screw Locations (CMA Lite)

Step 25: Plug the enclosure power cords into a PDU to power the enclosure.

⚠️ **Caution:** The Ultrastar Data102 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 26: Double check the power indicators and other LEDs to ensure that the system is booting.

**Result:** The enclosure is now installed.

What to do next: For instructions on how to operate the enclosure, please refer to the Ultrastar Data102 User Guide.

5.2.1 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 51: Clamp Release (clamp shown in blue for visual clarity)
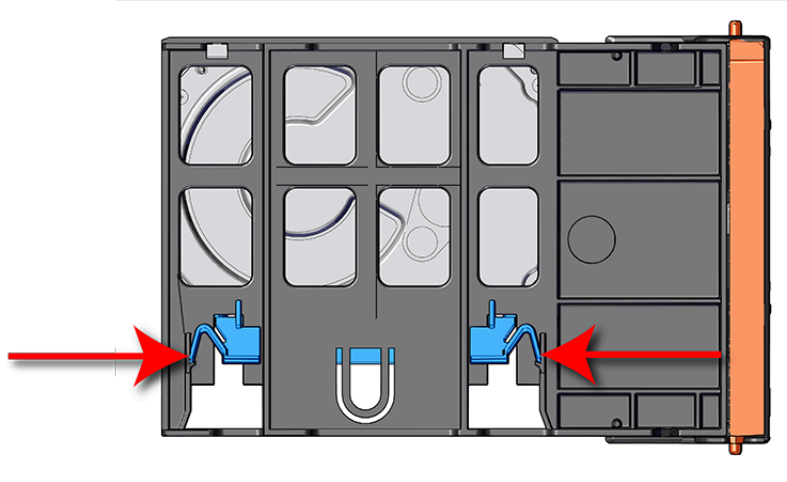
Step 2: Slide the clamp in the direction shown in the following image to loosen it from the drive. Be sure not to slide too far as this will allow the clamp to fall from the carrier body and it will have to be reinstalled.

Figure 52: Clamp Slide (clamp shown in blue for visual clarity)
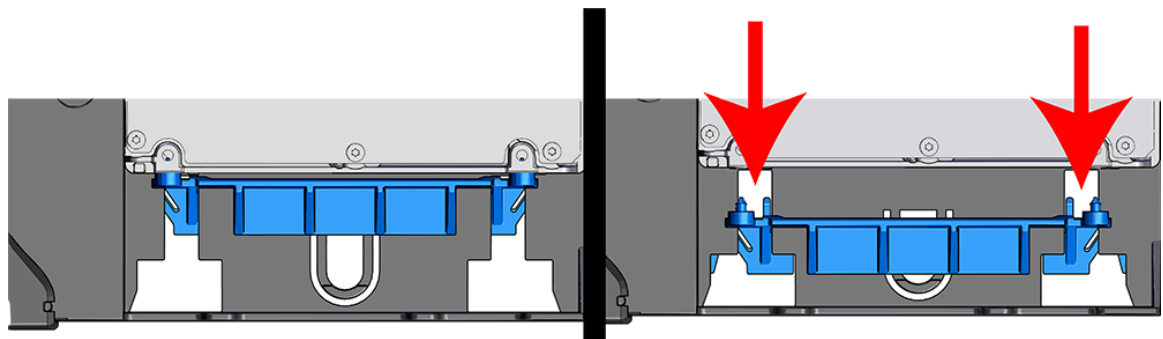
Step 3: Insert the 2.5" drive into the drive slot so that it is snug into the corner.

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 53: Clamp Pins (clamp shown in blue for visual clarity)
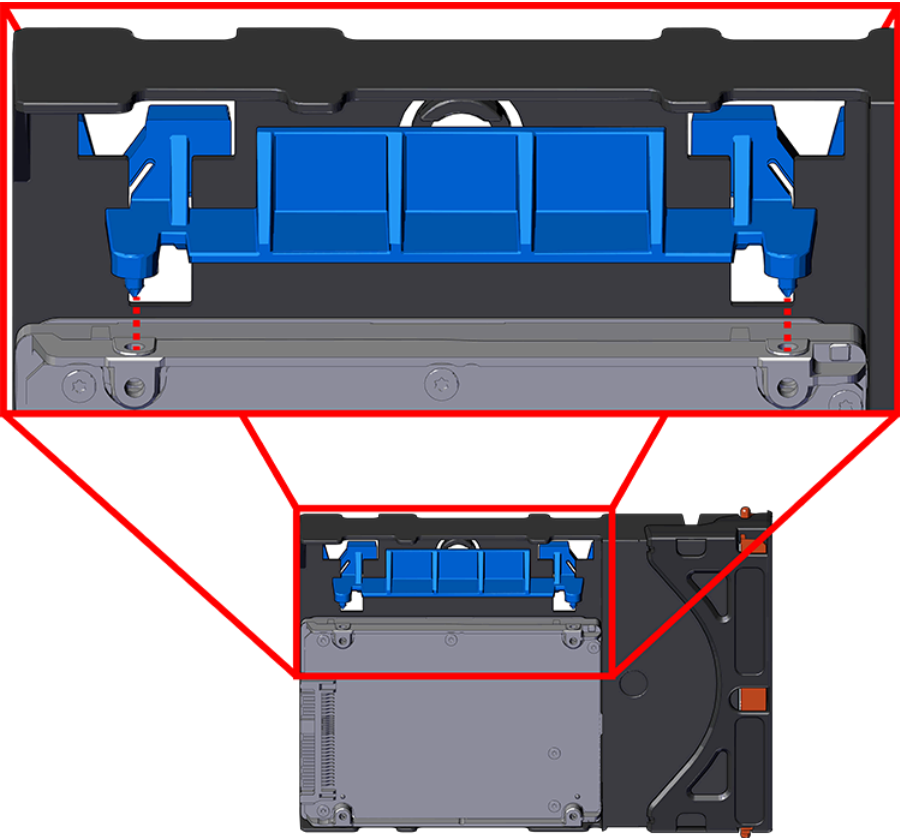
5.3 SAS Cabling

The Ultrastar Data102 can use passive cables up to 3m in length, or active cables up to 10m, for SAS connections to the host. Active cables must be used for Ultrastar Data102 to Ultrastar Data102 daisy-chaining connections. All approved passive and active SAS cables are listed in the following table.

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 27: Approved SAS Cables

Type	Length	Manufacturer	Vendor Part Number
Active Optical HD Mini-SAS to HD Mini-SAS[3]	3m	Amphenol ICC (FCI)	FOHHB23P00003[4]
		Molex	106415-2103
	4m	Amphenol ICC (FCI)	FOHHB23P00004

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

3.   Active cables can be used for both direct (host-to-enclosure) and daisy-chain (enclosure-to-enclosure) connections.

Type	Length	Manufacturer	Vendor Part Number
	5m	Amphenol ICC (FCI)	FOHHB23P00005
		Molex	106415-2105
	6m	Amphenol ICC (FCI)	FOHHB23P00006
	10m	Molex	106415-2110
Passive HD Mini-SAS to HD Mini-SAS[5]	1m	Amphenol ICC (FCI)	10112041-2010LF
	2m	Amphenol ICC (FCI)	601760006
		CS Electronics	12G-HD-4444/2M
		Data Storage Cables (DSC)	C5555-2M
		The Mate Company (TMC)	C5555-2M
		Amphenol ICC (FCI)	10112041-2020LF
			10117949-2020LF
		Molex	1110751002
	3m	Amphenol ICC (FCI)	601760008
		CS Electronics	12G-HD-4444/3M
		Amphenol ICC (FCI)	10112041-2030LF
			10117949-4030LF
		Molex	1110751003

Active Cables

When daisy-chaining multiple Ultrastar Data102 enclosures together, active cables must be used between enclosures for improved signal integrity.

Passive Cabling

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 for port connection ordering required for IOMA and IOMB:

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

Table 28: Recommended IOM Port Connection Order

| IOM	1st Host	2nd Host	3rd Host	4th Host	5th Host	6th Host
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.

## 5.4 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 54: Nominal Cable Length at Connectors

Nominal Length from End of Connector to First Basket is 20" - 21"
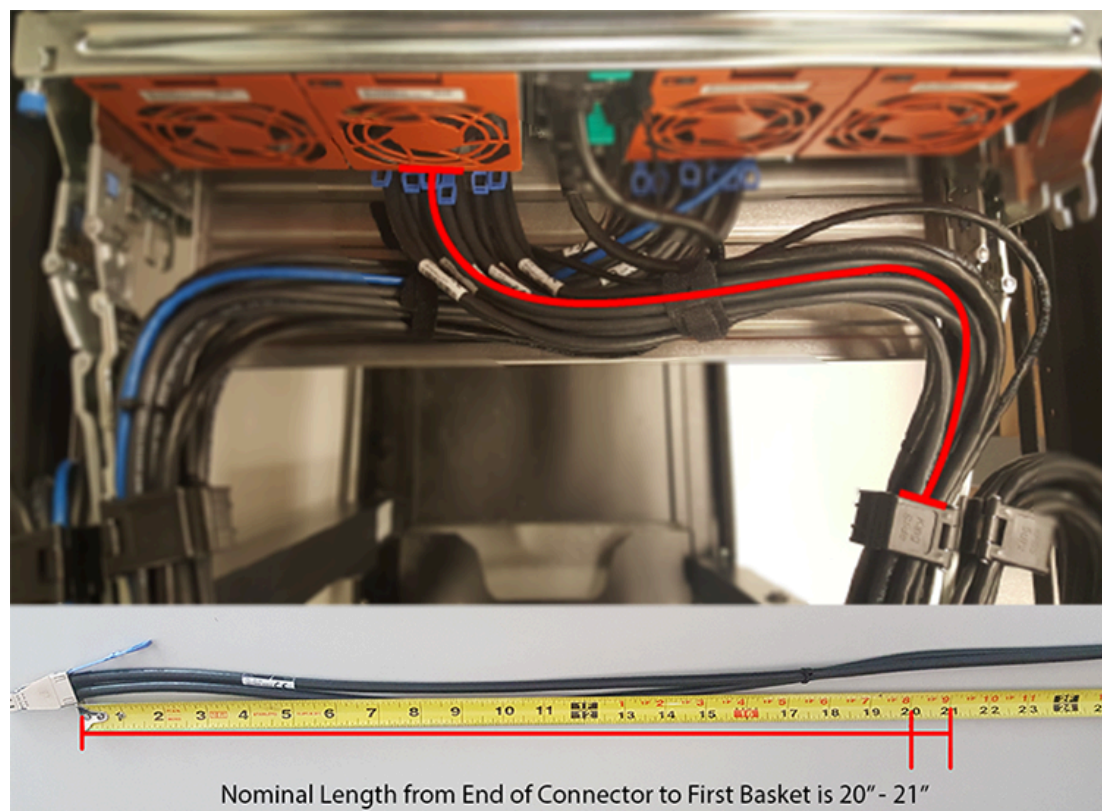
The cables at the port side of the CMA should crisscross in front of the IOMs. To accomplish this, the cables connected to the ports for IOM B (right hand side when facing the rear) should be connected to the upper CMA, and the cables connected to the ports for IOM A (left hand side when facing the rear) should be connected to the lower CMA.

**Figure 55:** Crisscross Cables
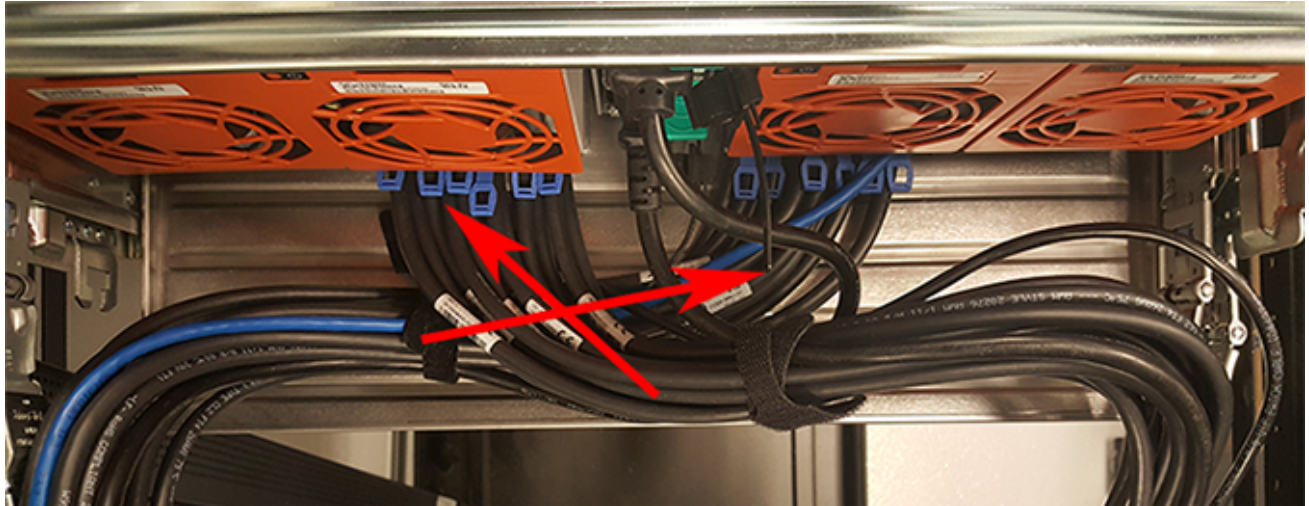
When the cables are routed into the CMA, make sure there is some slack given to the elbow joint of the CMA. It is recommended not to wrap the cables tightly around this joint because this can cause binding and prevent smooth operation. To ensure there is enough slack at the elbow, pull the enclosure 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 56: CMA Elbow with Full Cable Bundle
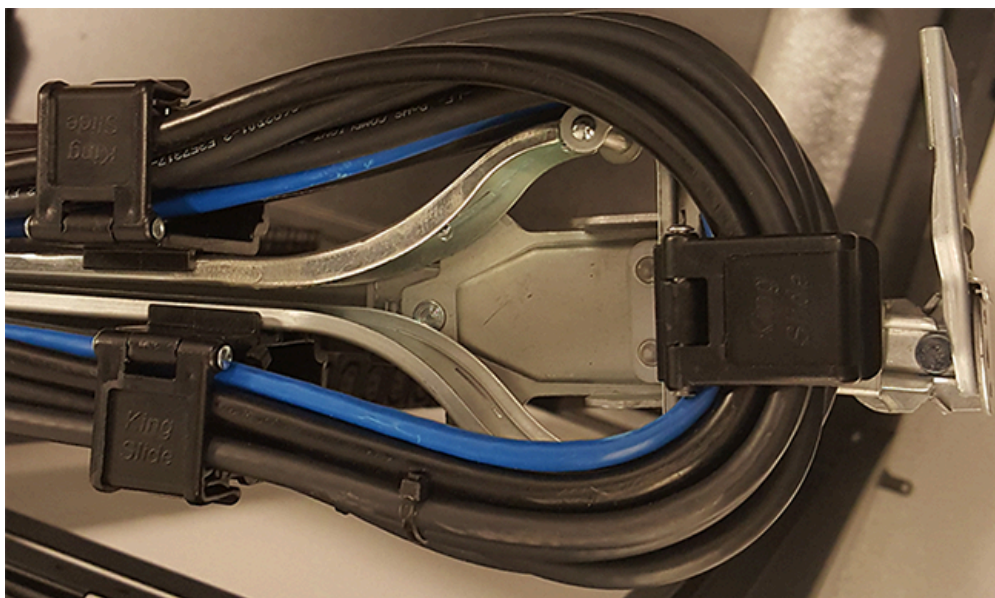
At the end of the CMA where the cables exit, use a cable tie to bundle the cables together. Make sure the cables are bending and not twisting.

Figure 57: Cable Tie at Exit of CMA
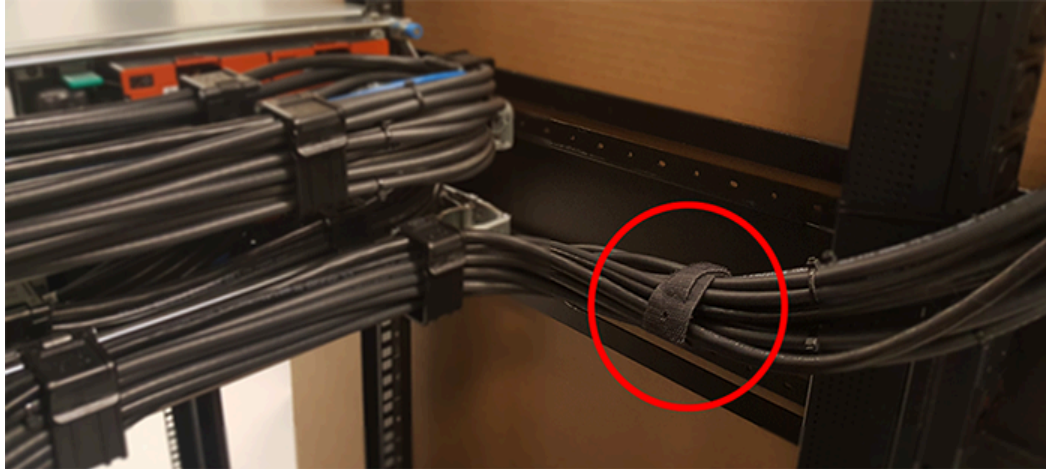
5.5 Cabling for CMA Standard and CMA Lite

5.5.1 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 either the CMA Standard or CMA Lite. 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 verco strip will go. Apply the velco 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:
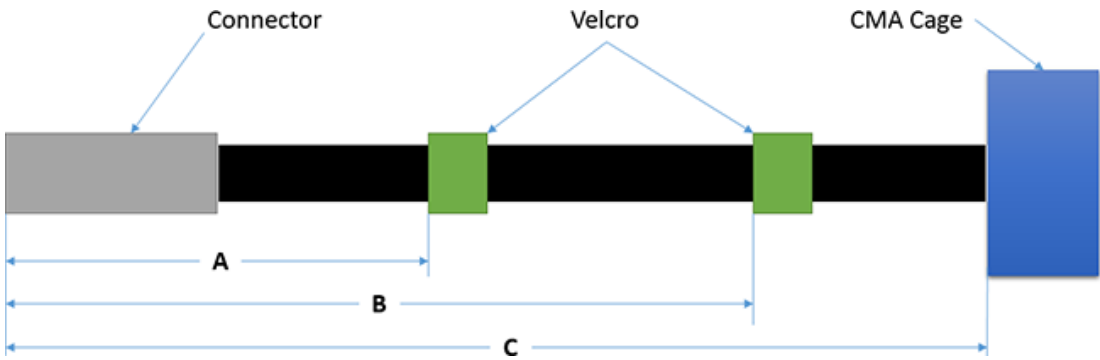
Figure 58: Service Loop Dimension Figure

Table 29: 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 velco 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.

5.5.2 Cabling CMA Standard

5.5.2.1 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.
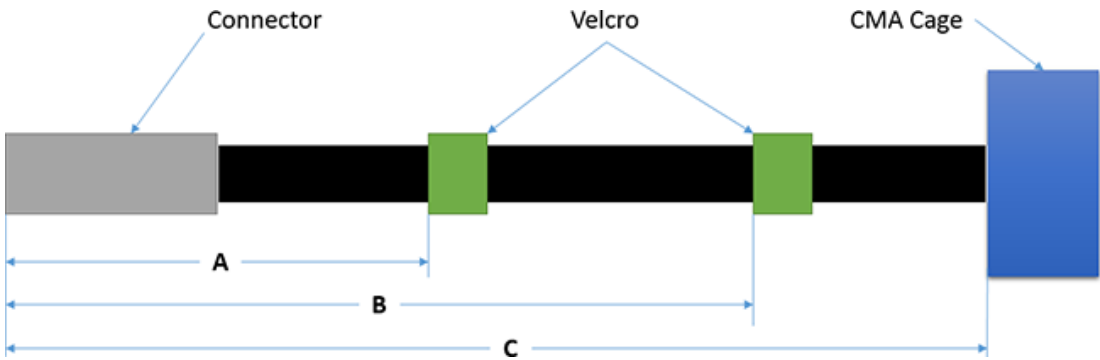
Figure 59: Service Loop Dimension Figure

Table 30: Service Loop Dimension Table

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

5.5.3 Cable Configuration for CMA Lite

5.5.3.1 Maximum HD Mini-SAS Configuration

This configuration includes the use of up to **two** HD Mini-SAS cables, **two** Ethernet cables, and **two** power cables installed into a CMA Lite arm.
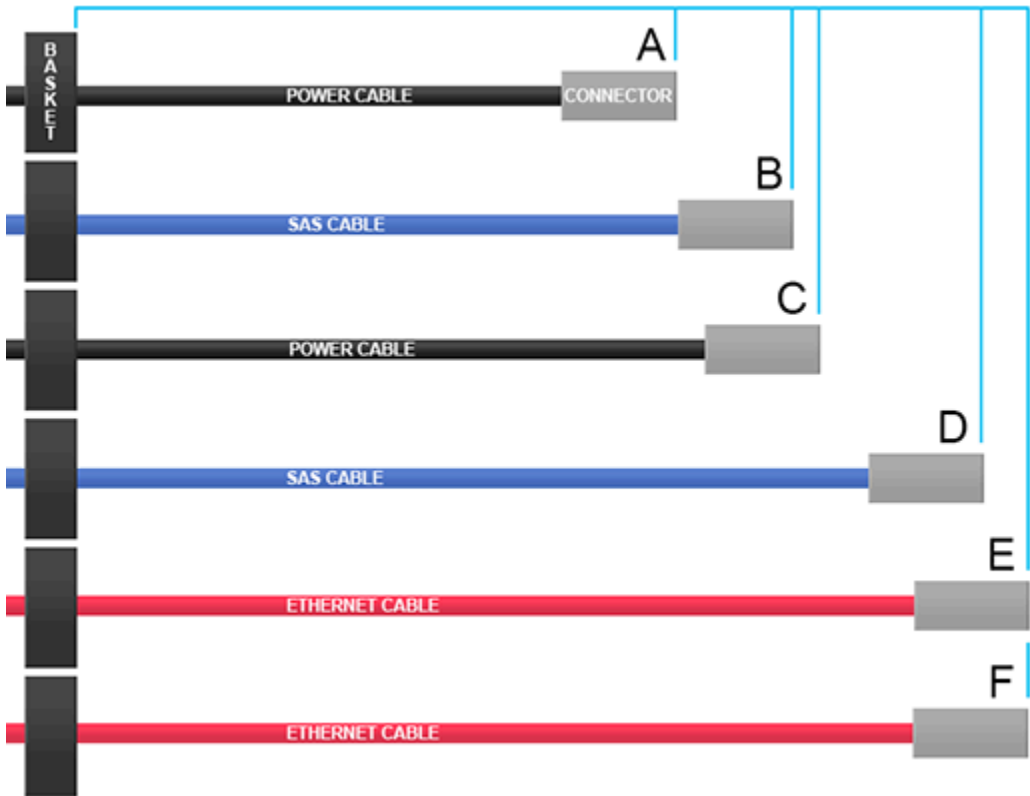
Figure 60: Service Loop Diagram

Table 31: Service Loop Lengths

Cable Identifier	Length to First Basket Clip
A	16 in / 406 mm
B	18 in / 457 mm
C	19 in / 483 mm
D	22 in / 559 mm
E	23 in / 584 mm
F	23 in / 584 mm