



# User Guide

*OpenFlex Data24™*

*Regulatory Model: DCS0010*

*1ET2228*

*Version 1.0*

*November 2020*

**Western Digital®**

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# Revision History

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Date	Revision	Comment
November 2020	1.0	Initial Release

## Notices

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## Points of Contact

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# Overview

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## 1.1 OpenFlex Data24 Overview

The OpenFlex Data24 is a 2U rack mounted data storage enclosure built on the OpenFlex platform. OpenFlex is Western Digital's architecture that supports Open Composable Infrastructure (OCI). The OpenFlex Data24 is a Just-a-Bunch-Of-Flash (JBOF) platform that leverages this OCI approach in the form of disaggregated data storage using NVMe-over-Fabrics (NVMe-oF™). NVMe-oF is a networked storage protocol that allows storage to be disaggregated from compute to make that storage widely available to multiple applications and

hosts. By enabling applications to share a common pool of storage capacity, data can be easily shared between applications, or needed capacity can be allocated to an application regardless of location. Utilizing NVMe™ device-level performance, NVMe-oF promises to deliver the lowest end-to-end latency from application to shared storage. NVMe-oF enables composable infrastructures to deliver the data locality benefits of NVMe (low latency, high performance) while providing the agility and flexibility of sharing storage and compute.



### Composable Infrastructure

An emerging category of datacenter infrastructure that seeks to disaggregate compute, storage, and networking fabric resources into shared resource pools that can be available for on-demand allocation (i.e., "composable"). Composability occurs at the software level, disaggregation occurs at the hardware level using NVMe-over-Fabric—will vastly improve compute and storage utilization, performance, and agility in the data center.

- 368TB<sup>1</sup> Max Storage Capacity
- 100Gbps NVMe-oF
- 29.7 kg / 65.5 lbs.

### OpenFlex

OpenFlex is Western Digital's architecture that supports Open Composable Infrastructure through storage disaggregation – both disk and flash natively attached to a scalable fabric. OpenFlex does not rule out multiple fabrics, but whenever possible, Ethernet will be used as a unifying connect for both flash and disk because of its broad applicability and availability.

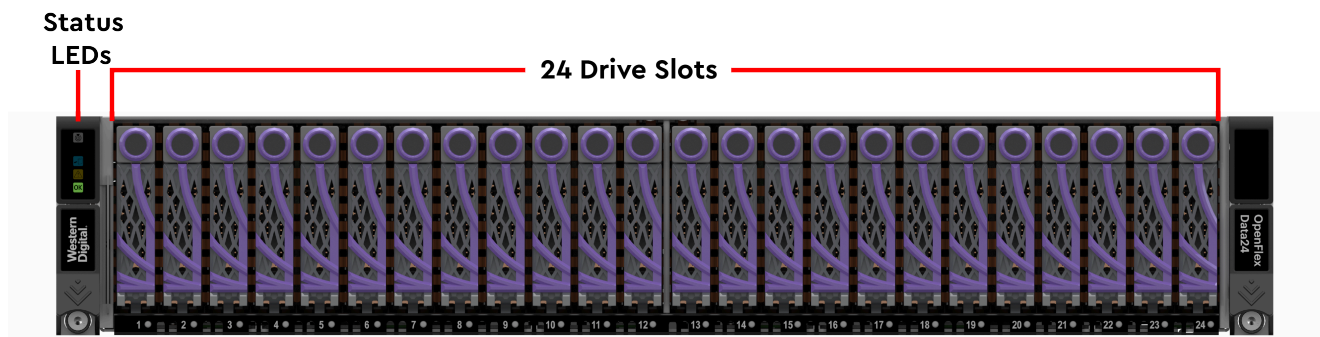
- 200V - 240V Input Voltages
- 2U Form Factor

### Open Composable API

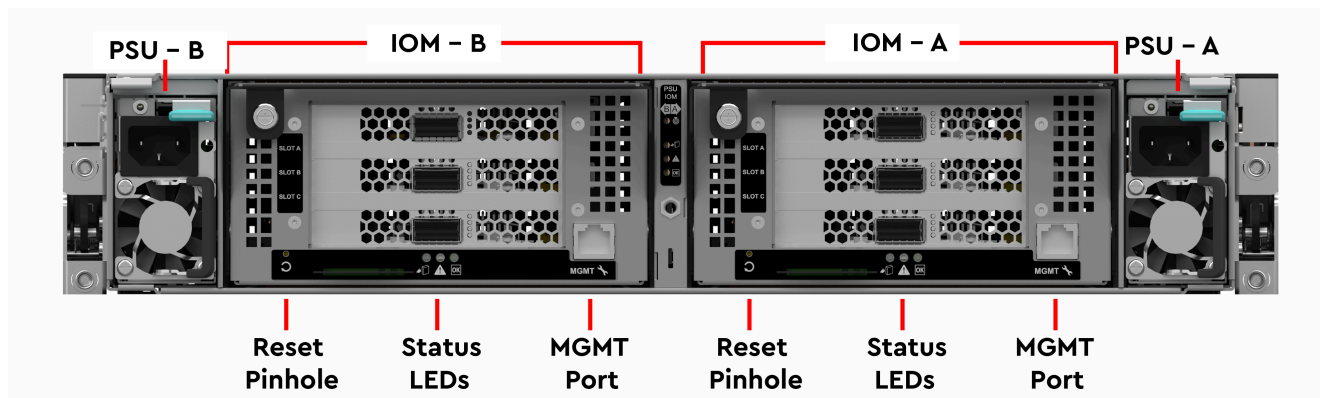
Western Digital's Open Composable API is a REST interface designed for data center composability. It builds upon existing industry standards utilizing the best features of those standards as well as practices from proprietary management protocols.

- Dual 2000W PSUs
- Operational Temperature: 10°C to 35°C

## 1.2 Design Details

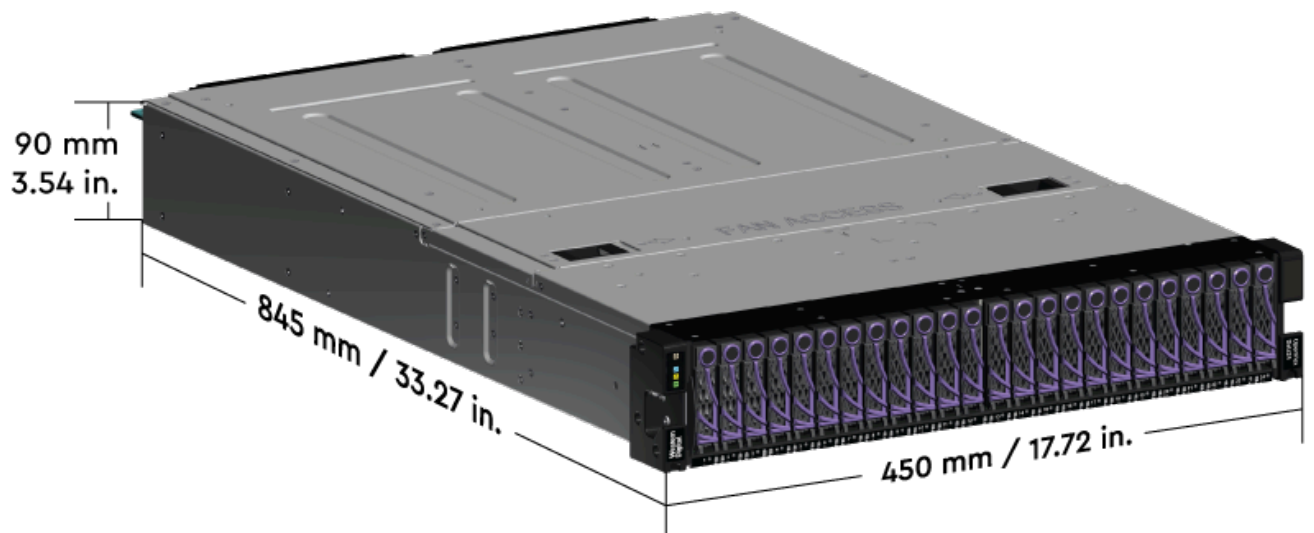


On the front of the OpenFlex Data24 there are the 24 Small Form Factor (SFF) drive slots, and the enclosure status LEDs. Each drive is individually removable/serviceable. Below each drive slot there are status and activity LEDs embedded in the chassis. For more details, review the [LEDs \(page 4\)](#) section.



The rear of the platform contains the Power Supply Units (PSUs), and IO Modules (IOMs). The System Fans are accessible from the top of the unit via a latch cover which can be accessed by extending the unit out of the rack. All of these components are hot-swappable and do not require tools to replace.

The enclosure measures 450 mm/17.72 in. wide by 711.2 mm/28 in. long. It's height is 90 mm/3.54 in. or 2U.



1.2.1 LEDs

Enclosure LEDs

Figure 2: Enclosure LEDs

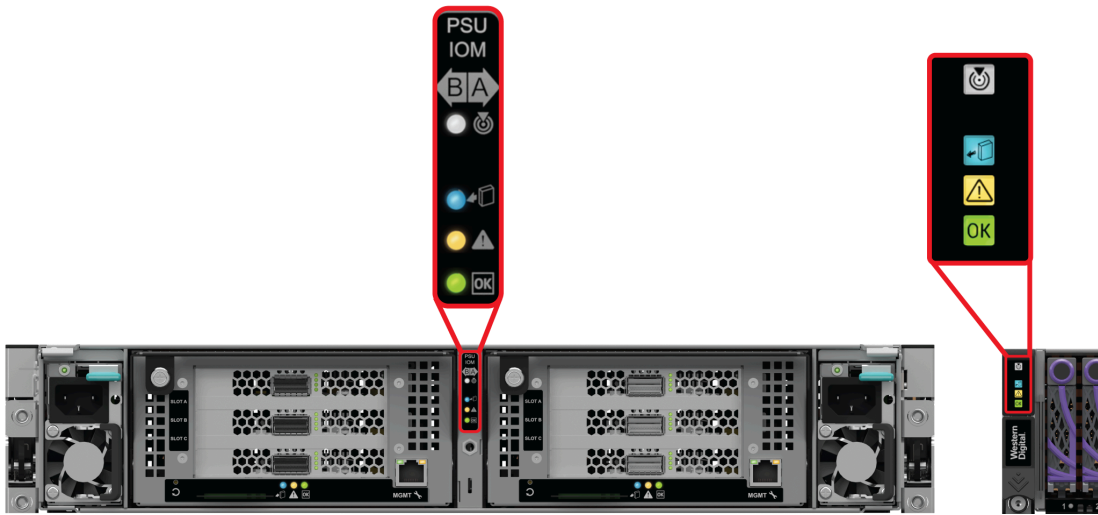


Table 1: Enclosure LED Flash Patterns

LED Name	Color	Behavior
Identification	White	<b>Blink @ 1 Hz:</b> Blinks only when Identification has been activated. Will blink when <b>any</b> component is identified, e.g. Fans, PSUs, etc. <b>Off:</b> Enclosure not being identified/located
Power	Green	<b>Blink @ 1Hz:</b> Enclosure is booting <b>3Hz Quick Flash:</b> Enclosure is in standby mode. <b>Solid:</b> Enclosure is powered on <b>Off:</b> Enclosure is powered off
Service State	Blue	<b>Solid:</b> Enclosure is serviceable <b>Off:</b> Enclosure is not serviceable
Fault	Amber	<b>Solid:</b> Enclosure has a fault <b>Off:</b> Enclosure has no fault

Power Supply Unit (PSU) LED

Figure 3: Power Supply Unit (PSU) LED

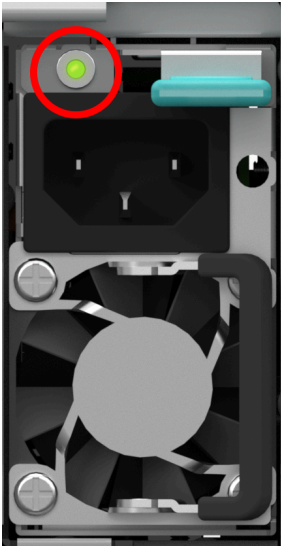


Table 2: Power Supply Unit (PSU) LED Flash Patterns

LED Name	Color	Behavior
Multi-function LED	Green	<b>Solid:</b> PSU is on and reporting no faults
		<b>Blinking @ 2Hz:</b> PSU in firmware update mode
		<b>Blinking @ 3Hz:</b> PSU is in Low Power Mode
		<b>Off:</b> PSU is disconnected from power
	Amber	<b>Solid:</b> PSU is disconnected from power or critical fault causing a shutdown failure
		<b>Blinking @ 0.5Hz:</b> PSU reporting warnings
		<b>Off:</b> PSU is reporting no faults

System Fan LED

Figure 4: System Fan LED

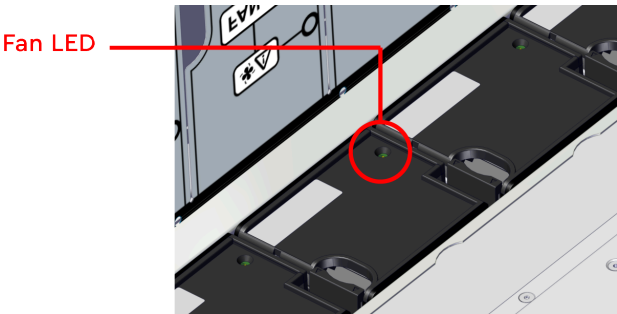


Table 3: System Fan LED Flash Patterns

LED Name	Color	Behavior
LED	Amber	<b>Solid:</b> Critical Failure
		<b>Blinking @ 2 Hz:</b> Fan is reporting a fault
		<b>Off:</b> Fan is on and reporting no faults

Drive Assembly LEDs

Figure 5: Drive Assembly LEDs

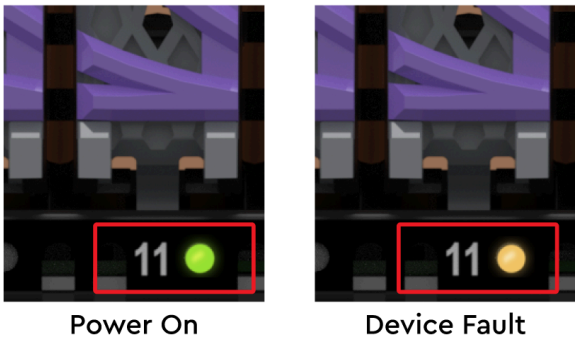


Table 4: Drive Assembly LED Flash Patterns

LED Name	Color	Behavior
Status	Green/Amber	<b>Green:</b> Device is Powered On <b>Flashing Green:</b> Activity <b>Amber:</b> Device has fault <b>Off:</b> Device is Powered Down

IO Module (IOM) LED

Figure 6: IO Module (IOM) LED

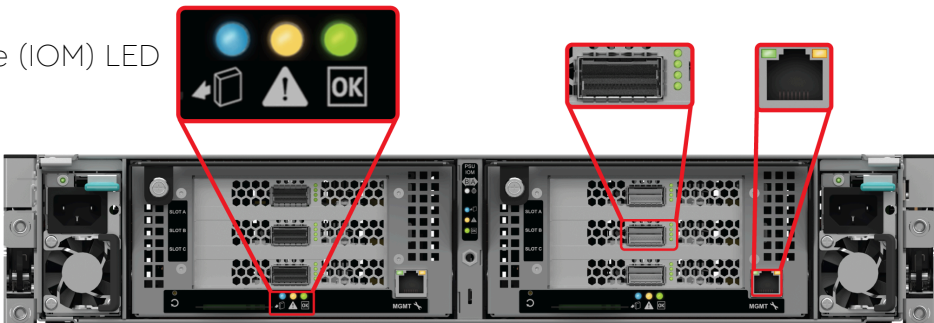



Table 5: IOM LED Flash Patterns

LED Name	Color/Number	Behavior
RJ45 Management Port Ethernet Link/Activity	Green	<b>Off:</b> No Connection <b>Solid:</b> Connected <b>Blink:</b> Activity
RJ45 Management Port Ethernet Speed	Green	<b>Off:</b> Operating at 10 Mbps <b>Solid:</b> Operating at 100 Mbps
 QSF28 LED 1 - Ethernet Port 1 2 - Ethernet Port 2 (Not Used) 3 - Firmware State 4 - Hardware and Management State	Amber	<b>Off:</b> Operating at 10 Mbps <b>Solid:</b> Operating at 1Gpbs
	1	<b>Green Blinking:</b> Activity <b>Off:</b> No Activity
	2 (not used)	
	3 - Firmware State	<b>Amber:</b> Boot Sequence Started or Action Required <b>Green:</b> Firmware Up with No Errors
	4 - Hardware and Management State	<b>Green:</b> Operational <b>Off:</b> Off

LED Name	Color/Number	Behavior
Power	Green	<b>Solid:</b> IOM is powered on <b>Off:</b> IOM is powered off
Service State	Blue	<b>Solid:</b> IOM is serviceable <b>Off:</b> IOM is not serviceable
Fault	Amber	<b>Solid:</b> Enclosure has a fault <b>Off:</b> IOM has no fault

## 1.2.2 Servicing Features

### Toolless Servicing

All internal system components can be serviced without any additional tools.

All **System Fans** can be removed via an access panel on the top of the system. Each fan has a housing that can be used to safely remove it during servicing.

**Power Supply Unit (PSU)** and **IO Module (IOM)** can be accessed from the rear, and have toolless latching mechanisms.

All **Drive Assembly** can all be hotswapped from the cold-aisle using built-in drive carrier latches.

## 1.3 List of Compatible Devices

**Table 6:** Devices

Device	Volume	Max Bandwidth <sup>2</sup>	Drive Writes	Encryption	Part Number
OpenFlex Data24 CRU Drive w/ Carrier SN840	1.6 TB	3.3GB/s	RI-3DW/D	SE	1EX2708
OpenFlex Data24 CRU Drive w/ Carrier SN840	1.92 TB	3.3GB/s	RI-1DW/D	SE	1EX2753
OpenFlex Data24 CRU Drive w/ Carrier SN840	3.2 TB	3.3GB/s	RI-3DW/D	SE	1EX2754
OpenFlex Data24 CRU Drive w/ Carrier SN840	3.84 TB	3.3GB/s	RI-1DW/D	SE	1EX2706
OpenFlex Data24 CRU Drive w/ Carrier SN840	7.68 TB	3.3 GB/s	RI-1DW/D	SE	1EX2707
OpenFlex Data24 CRU Drive w/ Carrier SN840	15.36 TB	3.3 GB/s	RI-1DW/D	SE	1EX2709

2. Sequential read bandwidth, 64KiB block size. Based on internal testing. Performance will vary by capacity point, or with changes in useable capacity. All measurements are in full sustained mode and are peak values. Subject to change.

Device	Volume	Max Bandwidth <sup>2</sup>	Drive Writes	Encryption	Part Number
OpenFlex Data24 CRU Drive w/ Carrier SN840	6.4TB	3.3GB/s	RI-3DW/D	SE	1EX2794

## 1.4 Electrical Specifications

**Table 7:** Electrical Specifications

Specification	Value
Max Power Consumption	2000W
Typical Power Consumption	~410 W
Input Voltage	200V - 240V
PSU Connector Type	C14
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.
PSU Efficiency	80 Plus Platinum

## 1.5 Environmental Specifications

**Table 8:** Environmental Specifications

Specification	Non-Operational	Operational
Temperature	5°C to 45°C	10°C to 35°C
Temperature Gradient	30°C/hr Maximum	5°C per 15 minutes
Temperature De-rating	1°C per 300m above 3000m	1°C per 300m above 900m
Relative Humidity	5-95% Non-Condensing	8-80% 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.
Cooling	N/A	5 Dual Rotor System Fans (N+1 Supported)

## 1.6 Mechanical Specifications

2. Sequential read bandwidth, 64KiB block size. Based on internal testing. Performance will vary by capacity point, or with changes in useable capacity. All measurements are in full sustained mode and are peak values. Subject to change.

**Table 9:** Mechanical Specifications

Specification	Non-Operational	Operational
Shock	10G, 11ms half sine; 3 positive and 3 negative pulses in X, Y, and Z axes.	5G, 11ms half sine; positive and 3 negative pulses in X, Y, and Z axes.
Vibration	<b>Linear Random:</b> 0.54 Grms; 5-500 Hz; 10 minutes each axis in X, Y, and Z <b>Linear Random:</b> 0.54 Grms; 1-200 Hz; 60 minutes in Z axis. <b>Linear Random:</b> 0.80 Grms; 2 - 200Hz; 15 minutes in Z axis <b>Swept Sine:</b> 0.75 Grms, 0 - peak swept sine; 5 - 500Hz; 1 complete sweep @ 1/2 octave per minute	<b>Linear Random:</b> 0.15 Grms 5-500 Hz 10 minutes each axis in X, Y and Z <b>Swept Sine:</b> 0.10 G, 0 - peak, 5-500 Hz 0.5 octaves/min, approx. 13 minutes each axis
Weight	29.7 kg / 65.5 lbs.	
Dimensions	<b>W:</b> 450 mm x <b>L:</b> 711.2 mm x <b>H:</b> 90 mm / <b>W:</b> 17.72 in. x <b>L:</b> 28 in. x <b>H:</b> 3.54 in.	
Required Rack Depth	1000 mm (39.4 in.) of usable rack space, door to door	
Required Rack Width	450mm (17.72in.) with 465mm (18.31in.) ± 1.5mm nominal hole spacing. See EIA-310 Rack Standard	
Rack Units (U)	2U	
Vertical Rack Rail Spacing	700 mm – 850 mm / 28.26 in. – 33.46 in.	

## 1.7 List of CRUs

**Table 10:** List of Replaceable Components

Component	Part Number	Package Dimensions	Weight
1EX2704	OpenFlex Data24 CRU Chassis	<b>W:</b> 927.1 mm x <b>L:</b> 609.6 mm x <b>H:</b> 254 mm <b>W:</b> 36.5 in x <b>L:</b> 24 in x <b>H:</b> 10 in	22.2 kg / 49 lbs
1EX1530	Platform CRU Power Cord 3m C13-C14 18AWG	<b>W:</b> 107.9 mm x <b>L:</b> 158.7 mm x <b>H:</b> 311.1 mm <b>W:</b> 4.25 in x <b>L:</b> 6.25 in x <b>H:</b> 12.25 in	0.81 kg / 1.8 lbs
1EX2698	OpenFlex Data24 CRU PSU 2000W	<b>W:</b> 107.9 mm x <b>L:</b> 158.7 mm x <b>H:</b> 311.1 mm <b>W:</b> 4.25 in x <b>L:</b> 6.25 in x <b>H:</b> 12.25 in	1.3 kg / 2.9 lbs
1EX2699	OpenFlex Data24 CRU System Fan	<b>W:</b> 177.8 mm x <b>L:</b> 184.1 mm x <b>H:</b> 133.3 mm <b>W:</b> 7 in x <b>L:</b> 7.25 in x <b>H:</b> 5.25 in	0.49 kg / 1.1 lbs

Component	Part Number	Package Dimensions	Weight
1EX2701	OpenFlex Data24 CRU IO Module w/3 Add-In Cards	<b>W:</b> 292.1 mm x <b>L:</b> 469.9 mm x <b>H:</b> 203.2 mm <b>W:</b> 11.5 in x <b>L:</b> 18.5 in x <b>H:</b> 8 in	3.6 kg / 8 lbs
1EX2702	OpenFlex Data24 CRU Rail Kit	<b>W:</b> 990.6 mm x <b>L:</b> 812.8 mm x <b>H:</b> 50.8 mm <b>W:</b> 9 in x <b>L:</b> 32 in x <b>H:</b> 2 in	5.4 kg / 12 lbs
1EX2705	Platform CRU Cable QSFP28 to QSFP28 3m	<b>W:</b> 261.6 mm x <b>L:</b> 373.8 mm x <b>H:</b> 116.8 mm <b>W:</b> 10.3 in x <b>L:</b> 13.3 in x <b>H:</b> 4.6 in	0.49 kg / 1.1 lbs
1EX2744	OpenFlex Data24 CRU Rack Ear Kit	<b>W:</b> 261.6 mm x <b>L:</b> 373.8 mm x <b>H:</b> 116.8 mm <b>W:</b> 10.3 in x <b>L:</b> 13.3 in x <b>H:</b> 4.6 in	0.49 kg / 1.1 lbs
1EX2745	OpenFlex Data24 CRU Drive Carrier w/o Interposer	<b>W:</b> 261.6 mm x <b>L:</b> 373.8 mm x <b>H:</b> 116.8 mm <b>W:</b> 10.3 in x <b>L:</b> 13.3 in x <b>H:</b> 4.6 in	0.22 kg / 0.5 lbs
1EX2703	OpenFlex Data24 CRU Drive Carrier Blank	<b>W:</b> 261.6 mm x <b>L:</b> 373.8 mm x <b>H:</b> 116.8 mm <b>W:</b> 10.3 in x <b>L:</b> 13.3 in x <b>H:</b> 4.6 in	0.72 kg / 1.1 lbs
1EX2708	OpenFlex Data24 CRU Drive w/Carrier SN840 1.6TB RI-3DW/D SE	<b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 6.7 in x <b>L:</b> 11.6 in x <b>H:</b> 3 in	0.49 kg / 1.1 lbs
1EX2753	OpenFlex Data24 CRU Drive w/Carrier SN840 1.92TB RI-1DW/D SE	<b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 6.7 in x <b>L:</b> 11.6 in x <b>H:</b> 3 in	0.49 kg / 1.1 lbs
1EX2754	OpenFlex Data24 CRU Drive w/Carrier SN840 3.2TB RI-3DW/D SE	<b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 6.7 in x <b>L:</b> 11.6 in x <b>H:</b> 3 in	0.49 kg / 1.1 lbs
1EX2706	OpenFlex Data24 CRU Drive w/Carrier SN840 3.84TB RI-1DW/D SE	<b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 6.7 in x <b>L:</b> 11.6 in x <b>H:</b> 3 in	0.49 kg / 1.1 lbs
1EX2707	OpenFlex Data24 CRU Drive w/Carrier SN840 7.68TB RI-1DW/D SE	<b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 6.7 in x <b>L:</b> 11.6 in x <b>H:</b> 3 in	0.49 kg / 1.1 lbs
1EX2709	OpenFlex Data24 CRU Drive w/Carrier SN840 15.36TB RI-1DW/D SE	<b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm <b>W:</b> 6.7 in x <b>L:</b> 11.6 in x <b>H:</b> 3 in	0.49 kg / 1.1 lbs
1EX2794	OpenFlex Data24 CRU Drive w/Carrier SN840 6.4TB RI-3DW/D SE	<b>W:</b> 170.1 mm x <b>L:</b> 294.6 mm x <b>H:</b> 76.2 mm	0.49 kg / 1.1 lbs

Component	Part Number	Package Dimensions	Weight
W: 6.7 in x L: 11.6 in x H: 3 in			

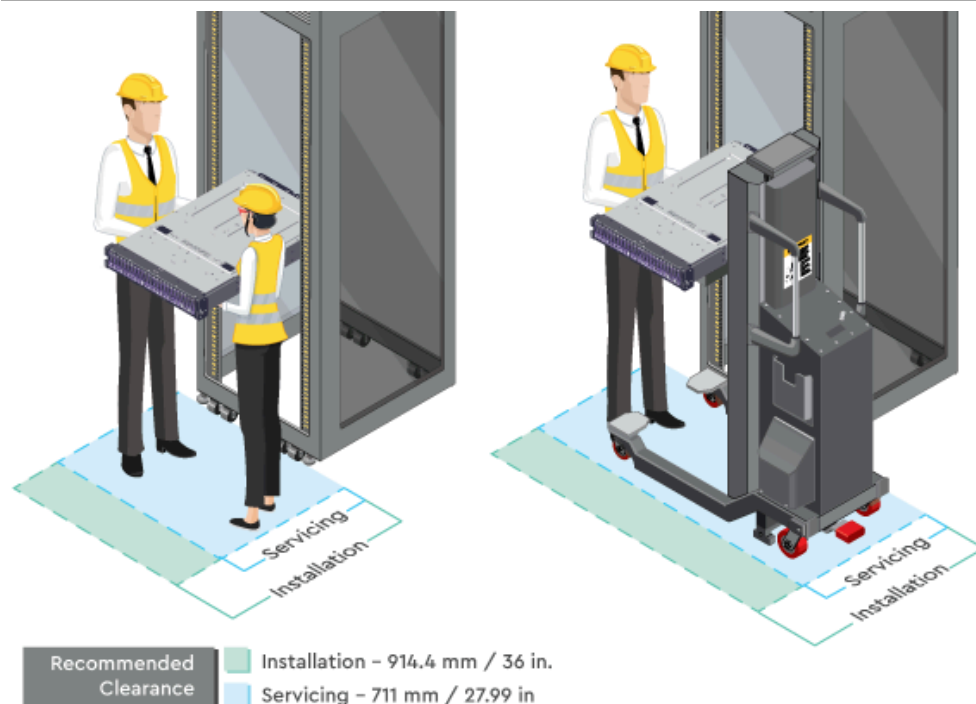
## 1.8 Rack Requirements

The OpenFlex Data24 is designed to be installed into a rack that meets the EIA-310 standard with a minimum of 1000 mm (39.4 in.) of usable rack space, door to door. The vertical rack rails must be set between 700 mm – 850 mm / 28.26 in. – 33.46 in. to support the enclosure. It requires 2U 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 11:** Required Rack Specifications

Parameter	Requirement
Rack Depth	1000 mm (39.4 in.) of usable rack space, door to door
Rack Width	450mm (17.72in.) with 465mm (18.31in.) ± 1.5mm nominal hole spacing. See EIA-310 Rack Standard
Rack Units (U)	2U
Vertical Rack Rail Spacing	700 mm – 850 mm / 28.26 in. – 33.46 in.
Static Load Rating	Rack meets ISTA 3E or 3B test requirements and regulations when mounted to the shipping pallet
Dynamic Load Rating	Rack meets ISTA 3E or 3B test requirements and regulations when mounted to the shipping pallet

## 1.9 Space Requirements



The installation of the OpenFlex Data24 will require enough space in front of the rack for two people to perform a safe installation. The recommended forward clearance is 914.4 mm / 36 in. from the front of the rack and 609.6 mm / 24 in. on both sides of the enclosure. It is also recommended to make considerations for any carts or lift equipment that might be used to perform the installation.<sup>3</sup> The servicing of the enclosure requires one person and a minimum of 711 mm / 27.99 in. of space in front of the rack to allow enough clearance to remove an enclosure. See the following diagram for details.

## 1.10 Supported SKUs

The following table lists the versions of this Western Digital product that are supported by this document.

**Table 12:** List of Supported SKUs

Component	Capacity	SKU
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	184.32TB	1ES2033
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-3DW/D SE	76.8TB	1ES1986
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-3DW/D SE	153.6TB	1ES2040
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	92.16TB	1ES1913
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	184.32TB	1ES1915
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	368.64TB	1ES1914

3. The weight of the enclosure during installation will vary, depending on the number of devices and blanks contained in the OpenFlex Data24. In some situations, carts or lift equipment may be required.

Component	Capacity	SKU
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	46.08TB	1ES2025
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	92.16TB	1ES2026
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	23.04 TB	1ES2027

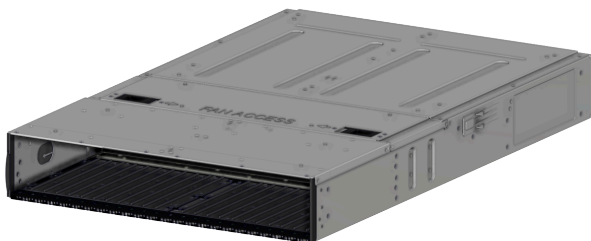


# Components

## In This Chapter:

- Chassis..... 15
- IO Module (IOM).....16
- Drive Assembly.....17
- System Fan..... 18
- Power Supply Unit (PSU).....19
- Rails..... 20

## 2.1 Chassis



The chassis is the primary housing that contains and connects all of the system components. All of the drives are located at the front in the drive bay, and the rear houses the IO Modules, PSUs, and cabling. There is a removable compartment cover on the top of the chassis that allows access to the system fans.

### 2.1.1 Chassis Specifications

**Table 13:** Chassis Specification Summary

Specification	Value
Part Number	1EX2704
Hot Swappable?	No
Dimensions	<b>W:</b> 450 mm x <b>L:</b> 845mm x <b>H:</b> 90 mm <b>W:</b> 17.72 in. x <b>L:</b> 33.27 in. x <b>H:</b> 3.54 in.
Weight	22.14 kg 48.81 lbs.

## 2.2 IO Module (IOM)



Each IOM provides system data connectivity through up to three QSFP28 cables per IOM, and supports cable lengths up to 5M. Out-of-Band Management (OOBM) features are accessed via an RJ45 port that supports a 10/100/1000 Ethernet connection. The IOM has three status LEDs that report OK status, Fault, and Service State. The IOM is hotswappable and easily removable by removing cables/connectors, loosening the single thumbscrew and pulling on the handle.



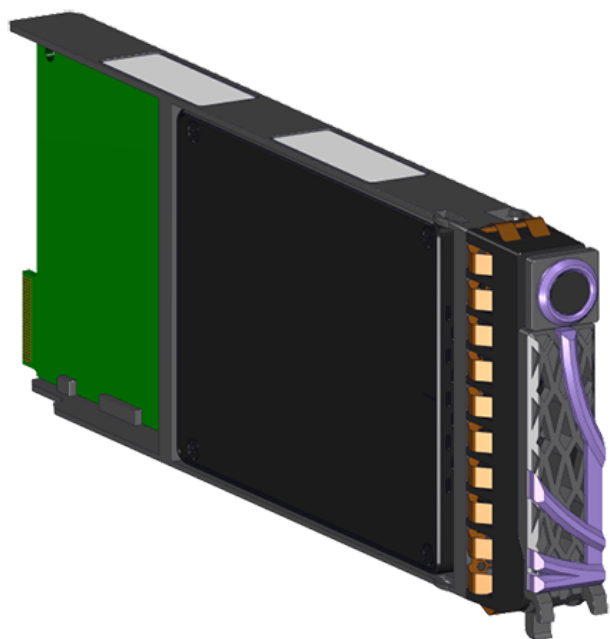
**Warning:** It is important to remove the QSFP28 connectors and cables before unscrewing and lowering the handle. Lowering the handle while the cables are still installed can damage the internal components and the connector itself.

### 2.2.1 IOM Specifications

**Table 14:** IO Module (IOM) Specification Summary

Specification	Value
Part Number	1EX2701
Number per Enclosure	2
Hot Swappable?	Yes
Service window	No Service Window
Dimensions	<b>W:</b> 169.69 mm x <b>L:</b> 392.77 mm x <b>H:</b> 83.41 mm <b>W:</b> 3.28 in. x <b>L:</b> 15.46 in. x <b>H:</b> 6.68 in.
Connector Type	3 QSFP28 connectors and 1 RJ45 Mgmt Port

## 2.3 Drive Assembly



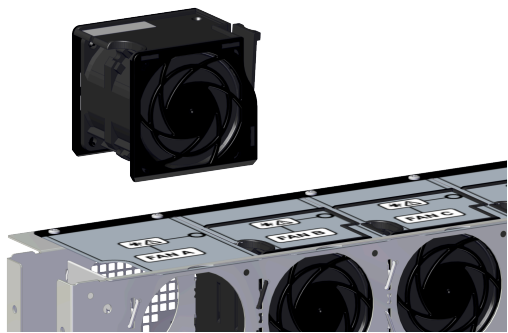
The drive assembly is comprised of 3 basic parts: the 2.5 in. SSD, the drive carrier, and the interposer card. The drive carrier houses the 2.5 in. drive and the interposer card and enables toolless installation and replacement. The drive assembly is available in many different volumes, encryption, and block sizes.

### 2.3.1 Drive Assembly Specifications

**Table 15:** Drive Assembly Specification Summary

Specification	Value
Part Number	Varies See list of compatible drives
Number per Enclosure	1-24
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	<b>W:</b> 20.46 mm x <b>L:</b> 211.80 mm x <b>H:</b> 80.38 mm <b>W:</b> 0.81 in. x <b>L:</b> 3.16 in. x <b>H:</b> 8.34 in.

## 2.4 System Fan



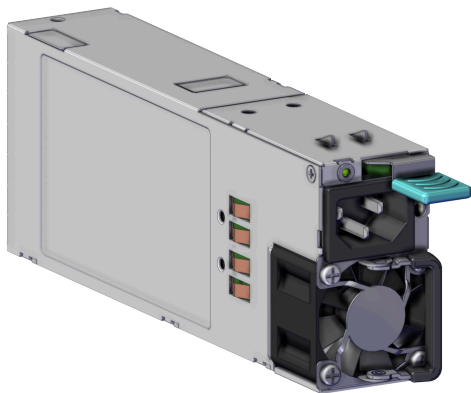
The system fans provide the primary system cooling for the OpenFlex Data24. There are five fans total, and they are accessible from a latch cover on the top of the chassis. The system fans are hotswappable CRU components, and do not require any wiring. The plastic fan covers also have labels identifying each fan.

### 2.4.1 System Fan Specifications

**Table 16:** System Fan Specification Summary

Specification	Value
Part Number	1EX2699
Number per Enclosure	5
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	<b>W:</b> 76.33 mm x <b>L:</b> 63.07 mm x <b>H:</b> 67.60 mm <b>W:</b> 3.01 in. x <b>L:</b> 2.48 in. x <b>H:</b> 2.66 in.

## 2.5 Power Supply Unit (PSU)



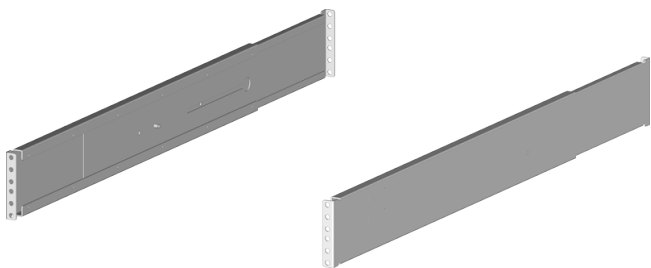
The Power Supply Units (PSUs) inside the OpenFlex Data24 are 2000W, 80 Plus Platinum efficiency rated, and operates within a 200 - 240 VAC voltage range. The PSUs are redundant and can be hotswapped one at a time. There must always be one PSU in operation for continuous usage during replacements of the PSUs.

### 2.5.1 PSU Specifications

**Table 17:** Power Supply Unit (PSU) Specification Summary

Specification	Value
Part Number	1EX2698
Number per Enclosure	2
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	<b>W:</b> 41 mm x <b>L:</b> 234.80 mm x <b>H:</b> 76.50 mm <b>W:</b> 1.61 in. x <b>L:</b> 9.24 in. x <b>H:</b> 3.01 in.
Current Output	16A
Power Output	2000W Maximum
Input Voltage	200V - 240V
80 PLUS Standard	Platinum
Connector Type	C14

## 2.6 Rails



The Rails included with the OpenFlex Data24 are 2U, shelf style rails with springloaded inner arms that enable easy installation.

### 2.6.1 Rails Specification

**Table 18:** Rails Specification Summary

Specification	Value
Part Number	1EX2702
Number per Enclosure	1 Pair
Hot Swappable?	No
Service window	N/A

# Support

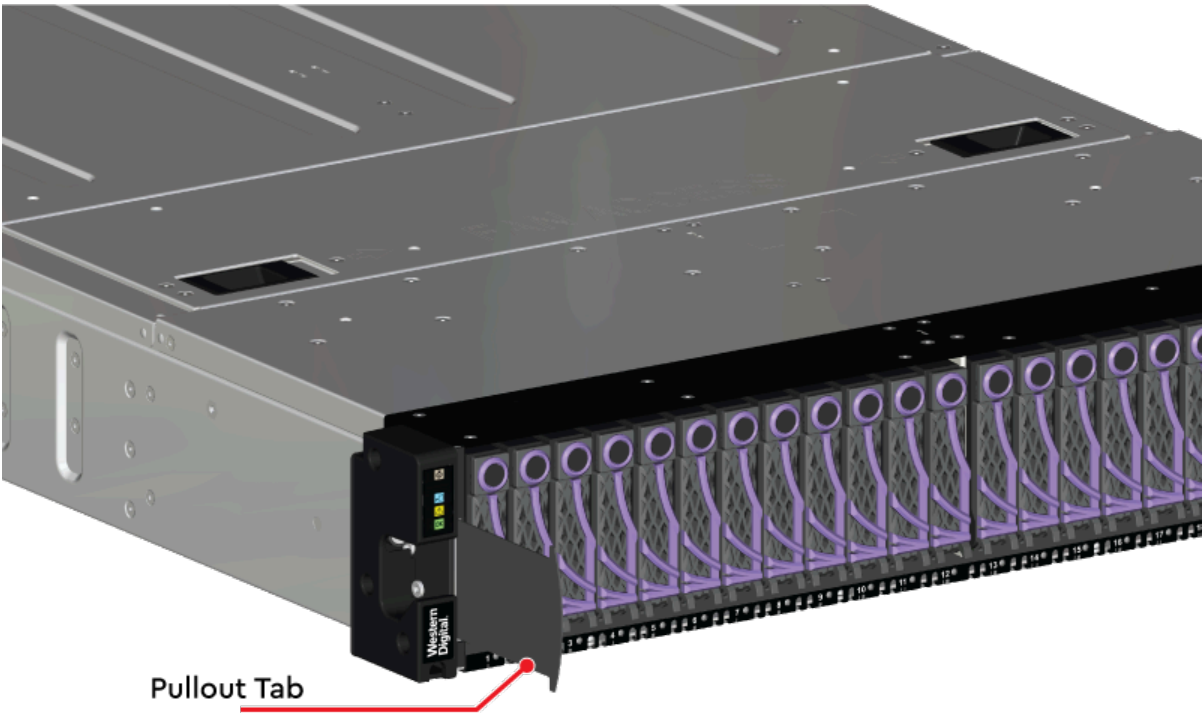
## In This Chapter:

- Platform Details Pullout Tab.....22
- Chassis Replacement..... 22
- Drive Assembly Replacement..... 38
- System Fan Replacement.....41
- IO Module (IOM) Replacement.....48
- Power Supply Unit (PSU) Replacement..... 53

### 3.1 Platform Details Pullout Tab

There is a small plastic tab that can be pulled out to show the vital system details such as the SKU number and serial numbers. The pullout tab is located on the front of the platform in the location shown in the following image.

**Figure 13:** Pullout Tab Location



### 3.2 Chassis Replacement

Replacement Requirements		
Personnel Required		2
Average Replacement Time		1 hour
Tool	# Needed	Required vs. Optional
T15 Torx Screwdriver	1	Required
Lift Equipment	1	Optional
ESD Mitigation Equipment (site specific)	1	Required

- ESD Sensitive
- Electric Shock
- Team Lift Required

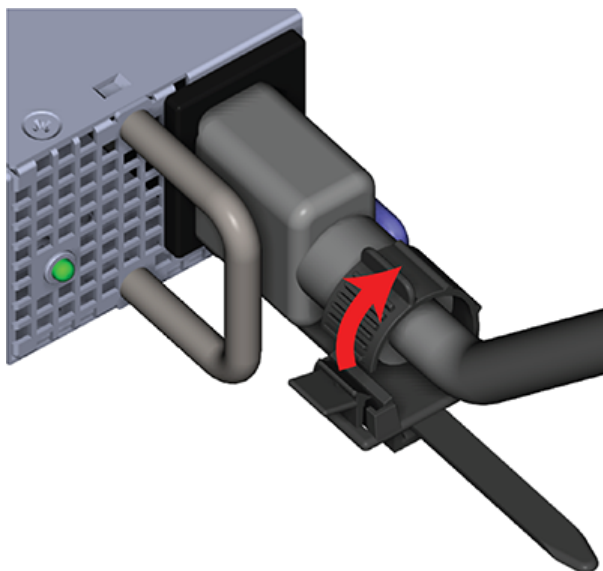
**Step 1:** Unpack and inspect the new Chassis for damage.

- a. Inspect the packaging that the Chassis replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b. Remove the Chassis from the packaging and verify that there is no damage to the Chassis. Dents, scratches, and broken parts should be reported. If major damage has occurred to the Chassis, DO NOT use the replacement part.
- c. Store in a safe location until the Chassis is needed for installation.

**Step 2:** Disconnect the power and data cables from the enclosure.

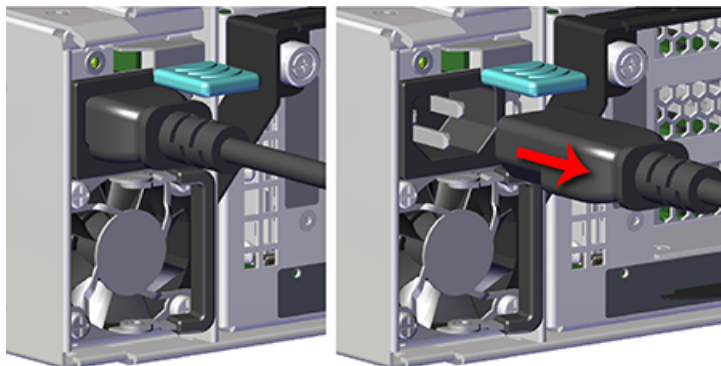
- a. Unclip the retention strap as shown in the following image.

**Figure 14:** Unclipping Cable Retention Strap (Generic PSU Shown)



- b. Move to the rear of the rack and disconnect the power cables from each of the two Power Supply Unit (PSU).

**Figure 15:** Disconnect Power Cables



- c. Disconnect the Ethernet Cable from the RJ45 Ethernet Management port.

**Figure 16:** Disconnect RJ45 Ethernet Cables

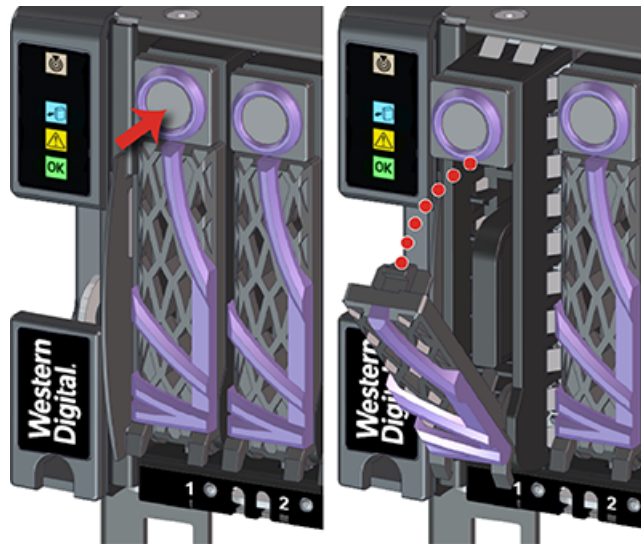
- d. Disconnect the QSFP28 cables from all of the IOM ports.

**Figure 17:** Disconnect QSFP28 Cables

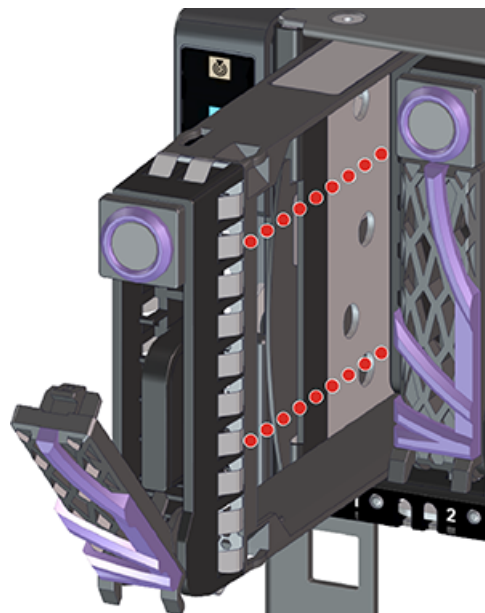
**Remember:** It's important to return drives to their proper slot when reinstalling. Use a tracking methodology such as marking drive assemblies to be certain that drive assemblies removed by this procedure make it back to their correct slot number.

**Step 3:** Uninstall the Drive Assembly from the enclosure.

- a. From the front of the rack, press the release button on the front of the Drive Assembly. The release handle will eject outward.

**Figure 18:** Drive Assembly Release Operation

- b. Use the release handle to pull the Drive Assembly out of the enclosure.

**Figure 19:** Uninstall Drive Assembly

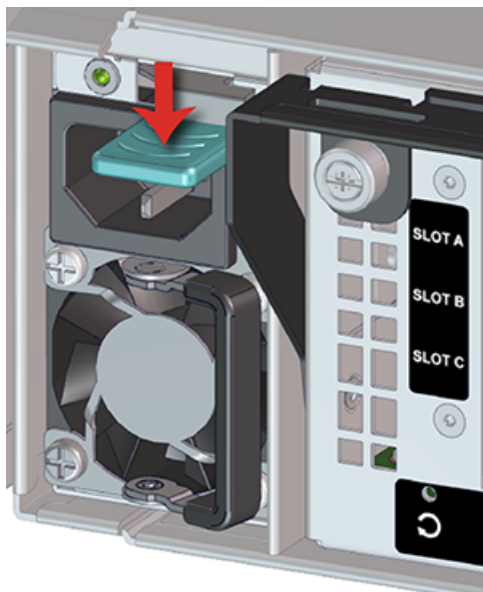
**Step 4:** Uninstall each Drive Assembly in the same way the first was uninstalled.



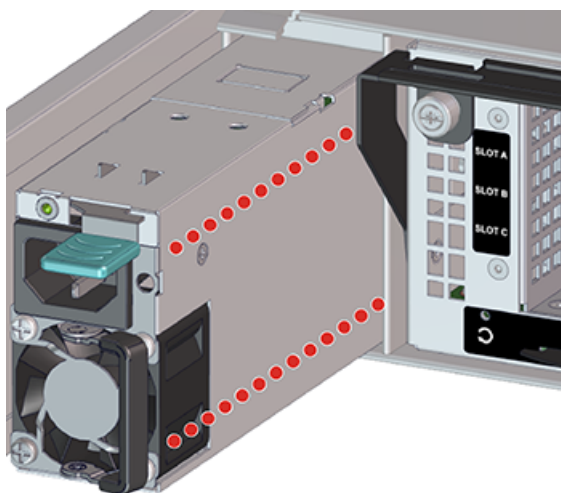
**Caution:** The PSU must be replaced within 5 minutes.

**Step 5:** Uninstall the Power Supply Unit (PSU) from the enclosure.

- a. From the rear of the rack, grasp the ring handle with your index finger and use your thumb to press the latch release using a pinching motion.

**Figure 20:** Power Supply Unit (PSU) Release Latch Operation

- b. Carefully pull the Power Supply Unit (PSU) out of the Power Supply Unit (PSU) slot.

**Figure 21:** Uninstall Power Supply Unit (PSU)

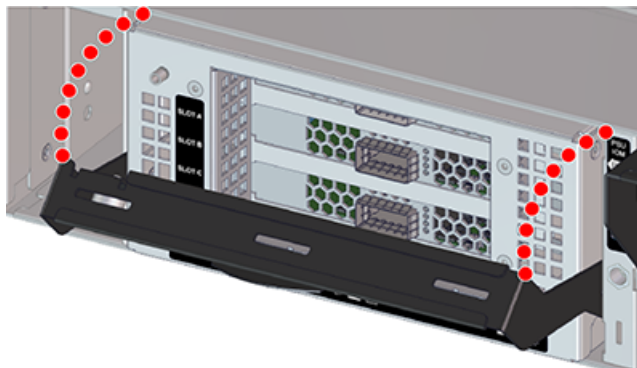
**Step 6:** Uninstall the remaining Power Supply Unit (PSU) in the same way the first was uninstalled.

**Step 7:** Uninstall the IO Module (IOM) from the enclosure.

- a. Unlock the IO Module (IOM) by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image. A screwdriver may be used if desired.

**Figure 22:** IO Module (IOM) Thumbscrew Operation

- b. Pull the release handle out until the IO Module (IOM) is unseated and can be removed from the IO Module (IOM) slot.

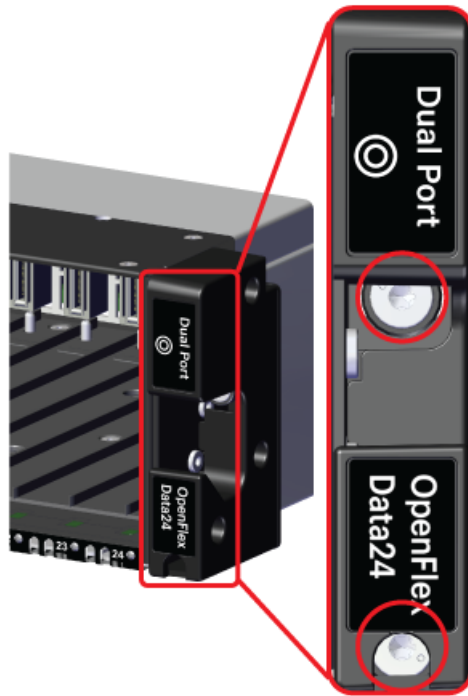
**Figure 23:** IO Module (IOM) Release Handle Operation**Figure 24:** Uninstall IO Module (IOM)

**Step 8:** Uninstall the remaining IO Module (IOM) in the same way the first was uninstalled.

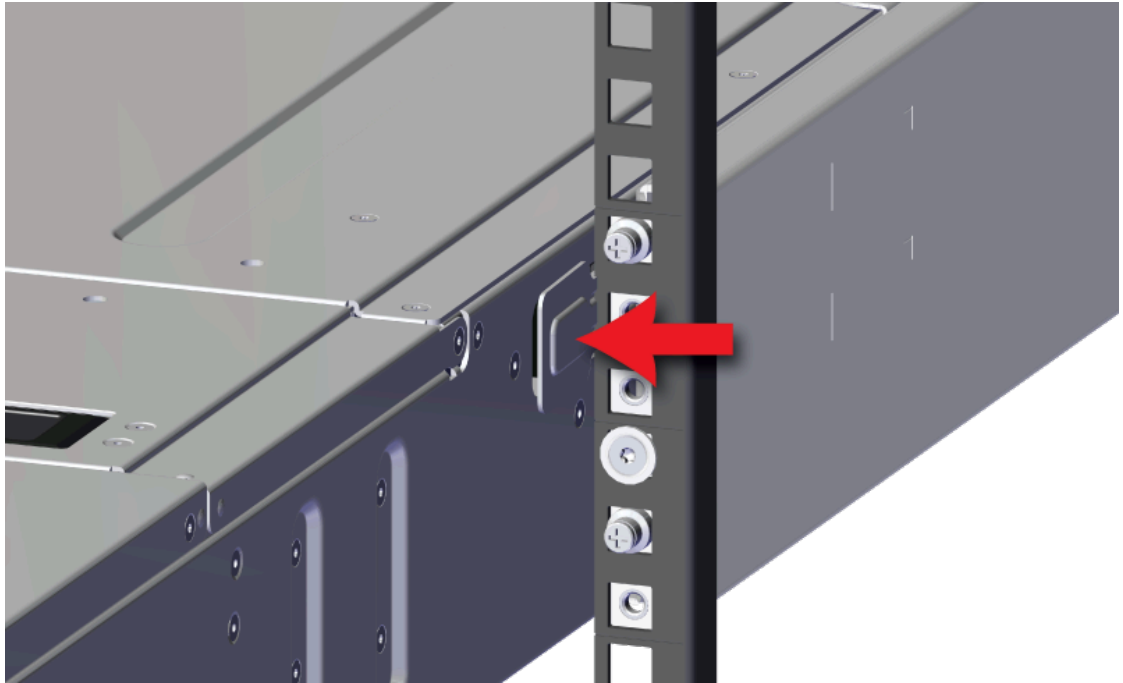
**Step 9:** Uninstall the Chassis from the rack mounted rails.

- a. From the front of the rack, using the T15 Torx screwdriver, loosen the two Torx captive screws that secure the Chassis to the rail. Repeat this step to loosen the two Torx captive screws that secure the Chassis to the remaining rail. The location of the captive screws are shown in the following image.

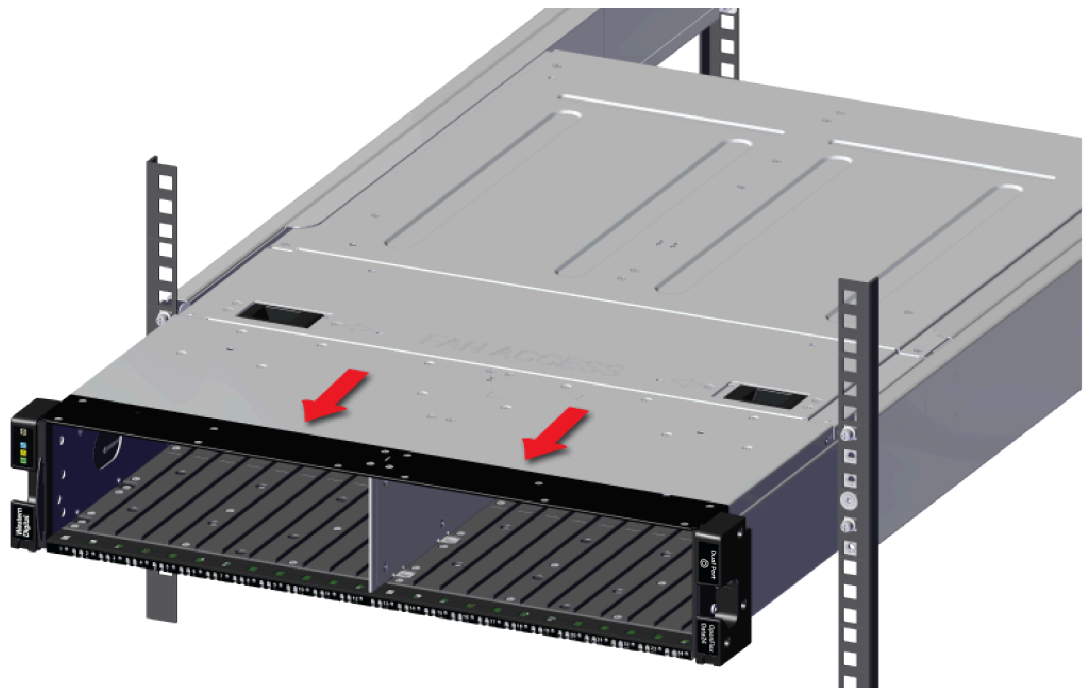
**Figure 25:** Rack Ear Captive Screw Location



- b. Carefully pull the Chassis out of the rack. The chassis will slide out of the rails until the locking tabs on the side of the chassis engage and stop the chassis from being pulled out further.
- c. Depress the locking tabs on the sides of the chassis to allow it to be removed from the rails.

**Figure 26:** Locking Tabs

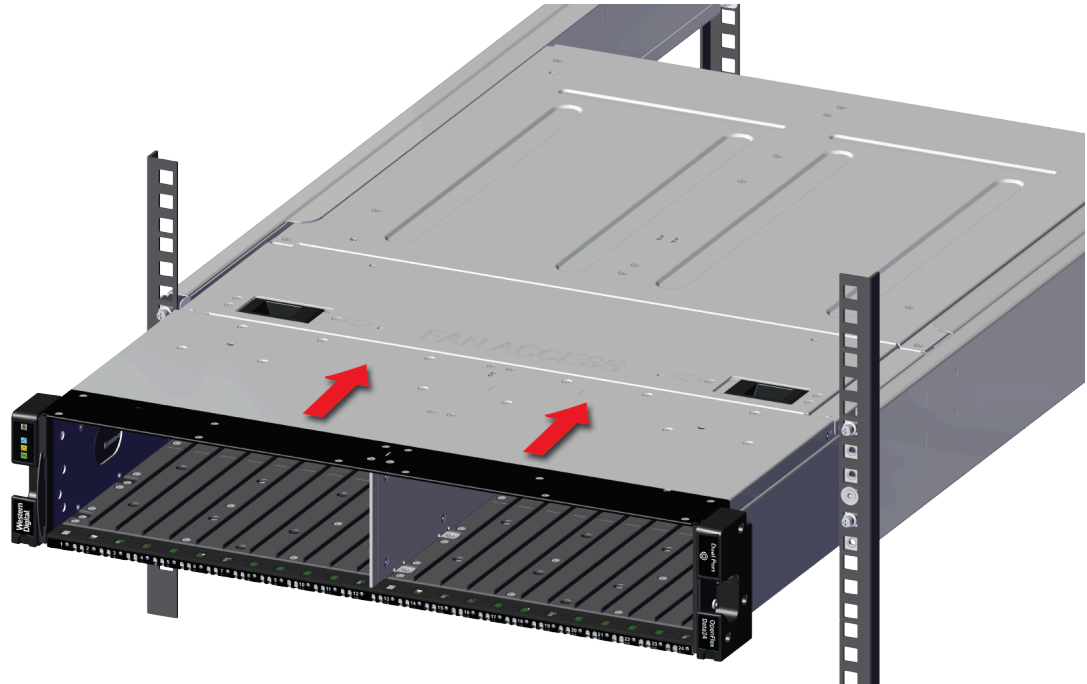
- d. Continue sliding the chassis out of the rack and ensure extra care is taken to support the weight of the Chassis when the Chassis is clear of the rack mount rails.

**Figure 27:** Uninstall Chassis

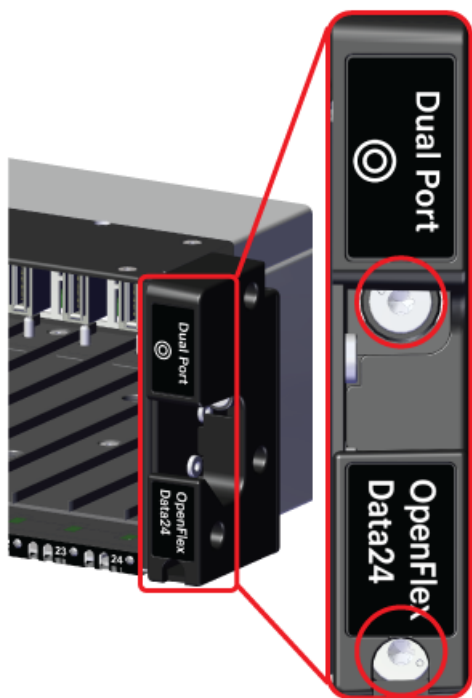
**Step 10:** Install the Chassis onto the rack mounted rails.

- a. Carefully slide the Chassis onto the rails until the rack ears are flush with the mounts on the rails.

**Figure 28:** Chassis Installation



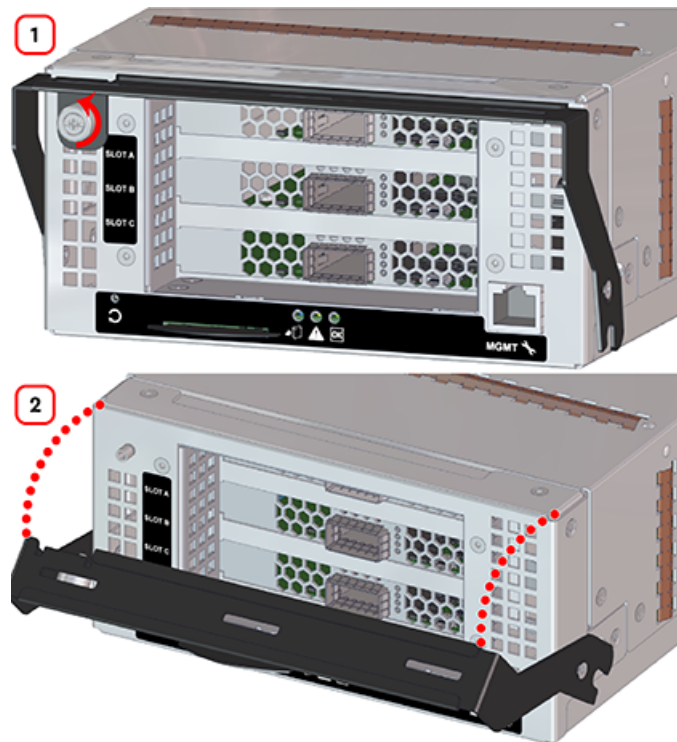
- b. Using the T15 Torx screwdriver, tighten the two Torx captive screws to secure the Chassis to the rail. Repeat this step to secure the remaining rack mount to the remaining rail.

**Figure 29:** Captive Screws

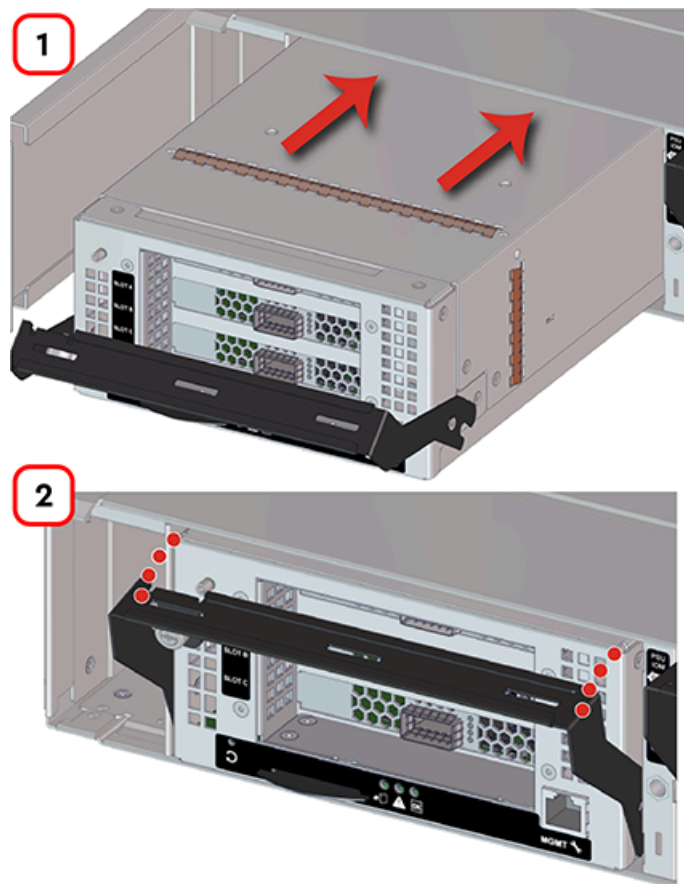
**Step 11:** Install the IO Module (IOM) into the enclosure.

- a. From the rear of the rack, unlock the IO Module (IOM) by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image.

**Figure 30:** Prepare IO Module (IOM)



- b.** Gently slide the IO Module (IOM) into the IO Module (IOM) slot until the release handle is engaged with the Chassis. When the handle lifts up slightly, it is an indicator that the release handle is engaged with the Chassis.

**Figure 31:** IO Module (IOM) Handle Engaged

- c. Press the release handle into the IO Module (IOM) and secure it in place by turning the thumbscrew clockwise until it is tight.

**Figure 32:** IO Module (IOM) Secure

- d. Verify that the IO Module (IOM) is securely latched into the Chassis by pulling on the release handle and ensuring the IO Module (IOM) does not move when pulled. Reinstall the IO Module (IOM) if it is not securely installed into the Chassis.

**Step 12:** Install the remaining IO Module (IOM) in the same way the first was installed.

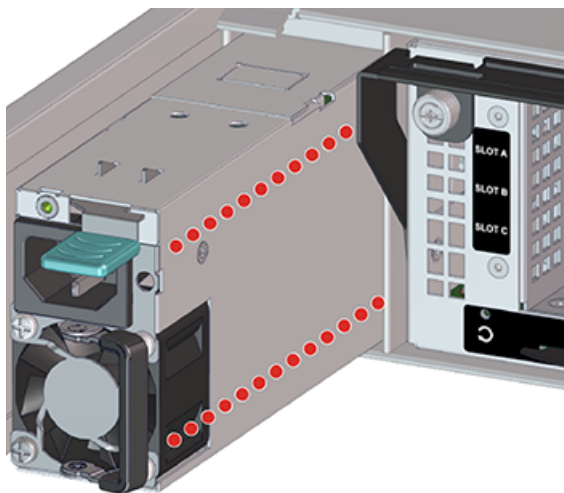
**Step 13:** Install the Power Supply Unit (PSU) into the enclosure.

- a. Orient the Power Supply Unit (PSU) with the power port located on the top and insert it into the Power Supply Unit (PSU) slot. The location of the power port is shown in the following image.

**Figure 33:** Port Location



**Figure 34:** Power Supply Unit (PSU) Installation

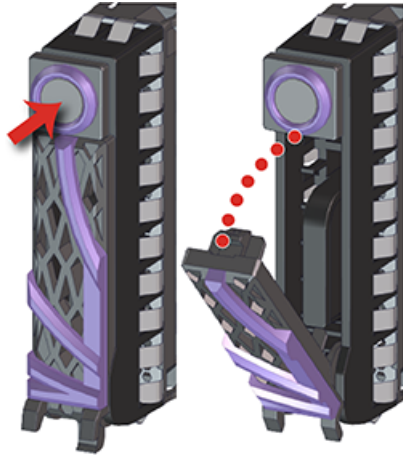


- b. Verify that the Power Supply Unit (PSU) is fully seated and latched into the Power Supply Unit (PSU) slot by gently pulling on the handle.

**Step 14:** Install the remaining Power Supply Unit (PSU) in the same way the first was installed.

**Step 15:** Install the Drive Assembly into the enclosure.

- a. Prepare the Drive Assembly for installation by pressing the release button on the front of the Drive Assembly. The release handle will eject outward.

**Figure 35:** Drive Assembly Release Operation

- b. From the front of the rack, gently slide the Drive Assembly into the Drive Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

**Figure 36:** Drive Assembly Latch Engaged

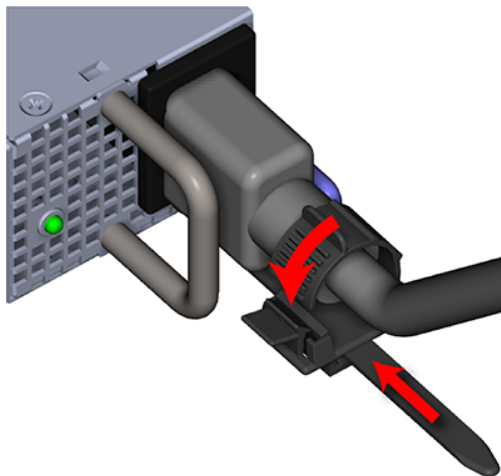
- c. Rotate the release handle up and press it into the Drive Assembly to secure it into the slot. When it is fully installed the user will feel the handle snap and lock into place.

**Figure 37:** Drive Assembly Installation

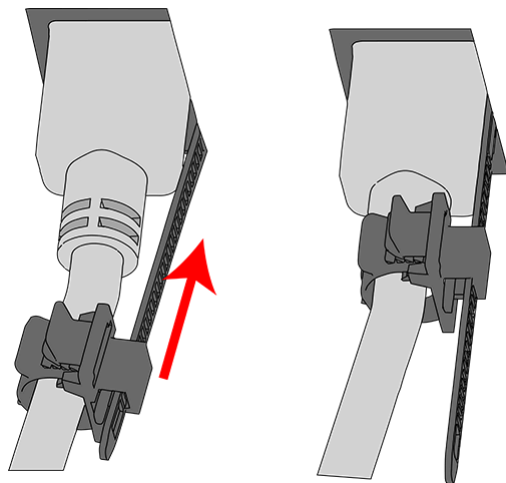
**Step 16:** Install the remaining Drive Assembly in the same way the first was installed.

**Step 17:** Connect the power and data cables to the enclosure.

- a. Loop the PSU's retention clip around the power cable and pinch it until the clip catches and locks in place.

**Figure 38:** Locking the Retention Clip

- b. Slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is accidentally pulled.

**Figure 39:** Sliding the Retention Clip Forward

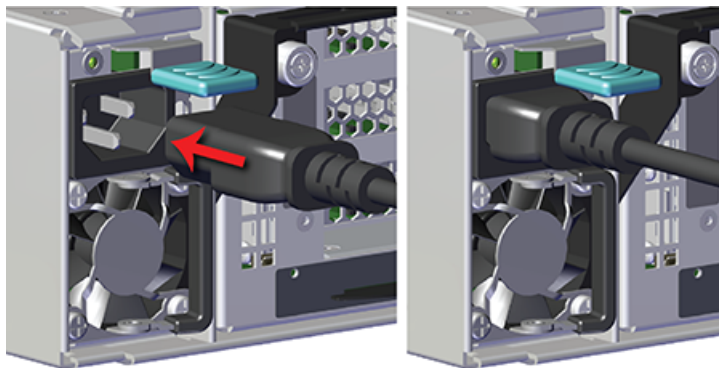
- c. Connect the Ethernet Cable into the Ethernet Management port.

**Figure 40:** Connecting RJ45 Ethernet Cable to Management Port

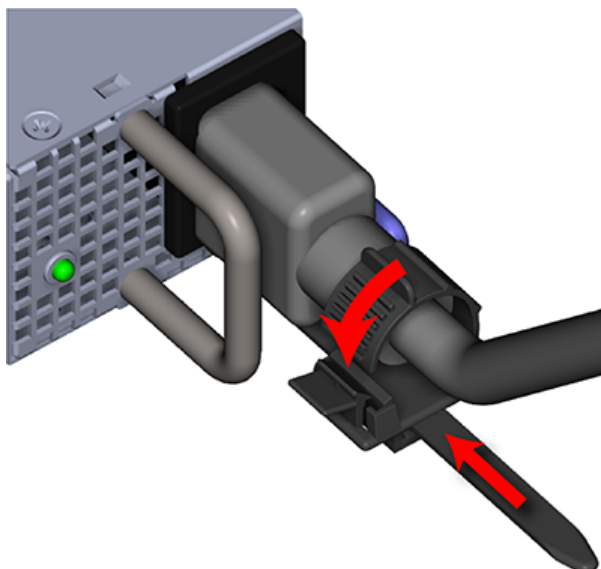
- d. Connect the QSFP28 cables into all of the IOM ports.

**Figure 41:** Connect QSFP28 Cables

- e. Move to the rear of the rack and connect the power cables into each of the two Power Supply Unit (PSU) power connectors.

**Figure 42:** Connect Power Cables

- f. Wrap the power cable in the cable retention clip and cinch it so it securely holds the power cable in place.

**Figure 43:** Cinching Retention Strap (Generic PSU Shown)

## 3.3 Drive Assembly Replacement

Replacement Requirements	
Personnel Required	1
Service Window	5 minutes

- ESD Sensitive

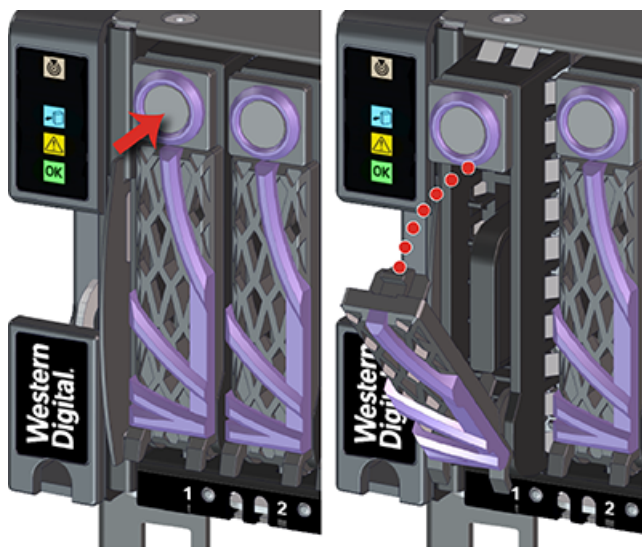
**Step 1:** Unpack and inspect the new Drive Assembly for damage.

- a. Inspect the packaging that the Drive Assembly replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b. Remove the Drive Assembly from the packaging and verify that there is no damage to the Drive Assembly. Dents, scratches, and broken parts should be reported. If major damage has occurred to the Drive Assembly, DO NOT use the replacement part.
- c. Store in a safe location until the Drive Assembly is needed for installation.

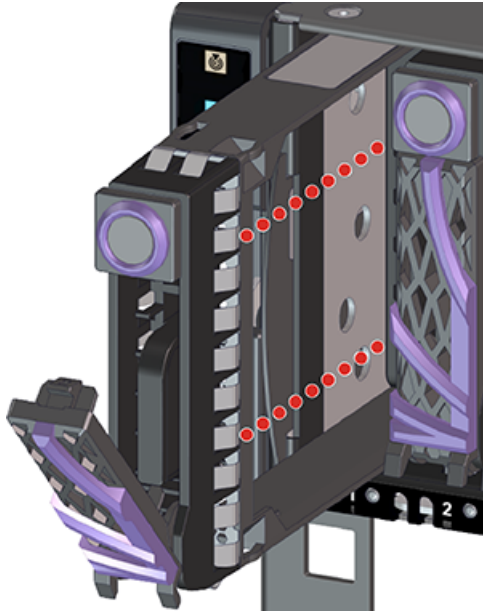
**Step 2:** Uninstall the Drive Assembly from the enclosure.

- a. From the front of the rack, press the release button on the front of the Drive Assembly. The release handle will eject outward.

**Figure 44:** Drive Assembly Release Operation

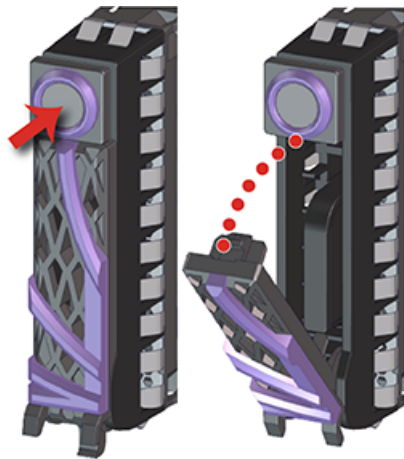


- b. Use the release handle to pull the Drive Assembly out of the enclosure.

**Figure 45:** Uninstall Drive Assembly

**Step 3:** Install the Drive Assembly into the enclosure.

- a. Prepare the Drive Assembly for installation by pressing the release button on the front of the Drive Assembly. The release handle will eject outward.

**Figure 46:** Drive Assembly Release Operation

- b. From the front of the rack, gently slide the Drive Assembly into the Drive Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

**Figure 47:** Drive Assembly Latch Engaged



- c. Rotate the release handle up and press it into the Drive Assembly to secure it into the slot. When it is fully installed the user will feel the handle snap and lock into place.

**Figure 48:** Drive Assembly Installation



### 3.4 System Fan Replacement

Replacement Requirements	
Personnel Required	1
Service Window	5 minutes

Tool	# Needed	Required vs. Recommended
T15 Torx Screwdriver	1	Required
ESD Mitigation Equipment (site specific)	1	Required

- ESD Sensitive
- Electric Shock
- Fan Blade Danger

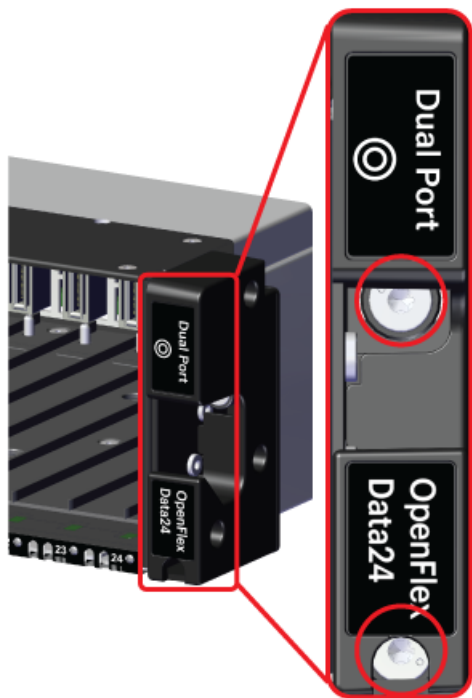
**Step 1:** Unpack and inspect the new System Fan for damage.

- Inspect the packaging that the System Fan replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- Remove the System Fan from the packaging and verify that there is no damage to the System Fan. Dents, scratches, and broken parts should be reported. If major damage has occurred to the System Fan, DO NOT use the replacement part.
- Store in a safe location until the System Fan is needed for installation.

**Step 2:** Extend the platform out of the rack to access the System Fan bay.

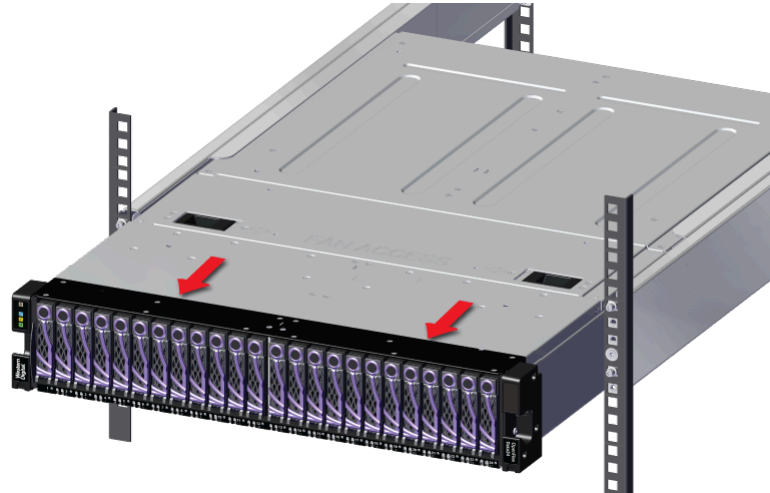
- From the front of the rack, using the T15 Torx screwdriver, loosen the two Torx captive screws that secure the Chassis to the rail. Repeat this step to loosen the two Torx captive screws that secure the Chassis to the remaining rail. The location of the captive screws are shown in the following image.

**Figure 49:** Rack Ear Captive Screw Location



- b.** Carefully slide the Chassis out of the rack until the System Fan bay is completely accessible and the locking tabs on the side of the chassis have stopped the OpenFlex Data24 and locked it in place. The System Fan bay accessibility is shown in the following image.

### Figure 50: System Fan Bay Access

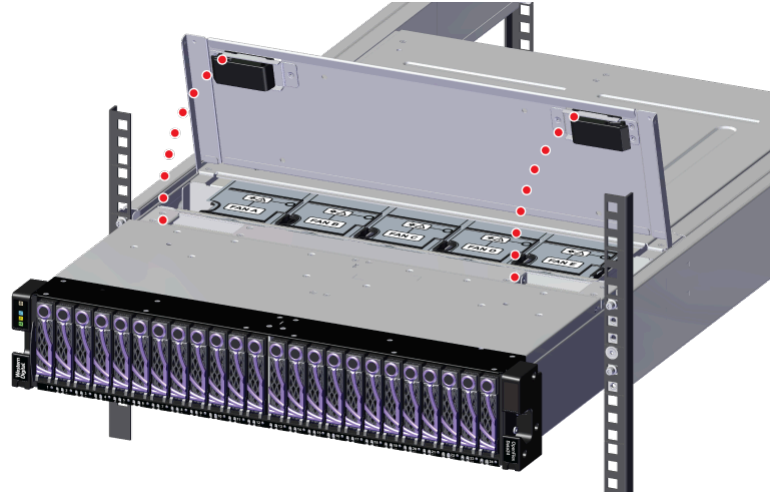


**Step 3:** Uninstall the System Fan from the enclosure.

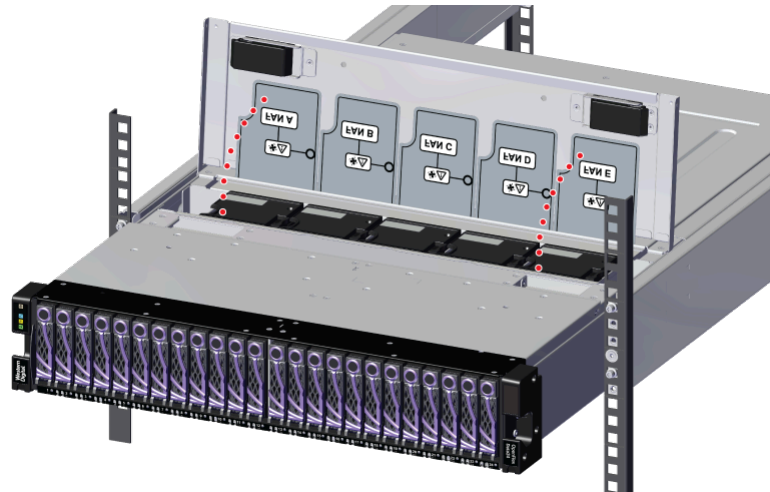
- a. Unlatch the System Fan bay cover by sliding both latches in towards the center of the Chassis until the cover is released and can be rotated open on its hinges. The latch operation is shown in the following image.

**Figure 51:** System Fan Bay Cover Latch Location




**Figure 52:** System Fan Bay Cover Operation

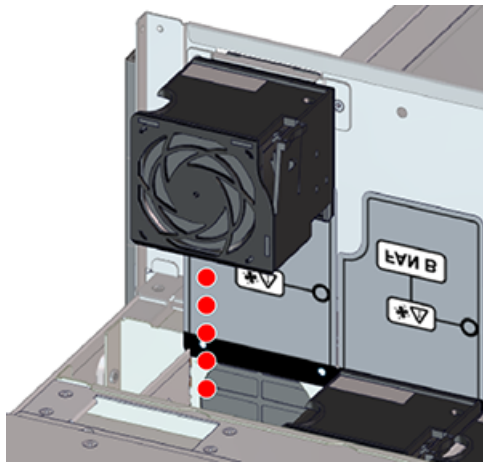
- b. Gain access to the System Fan bay by lifting the flexible label.

**Figure 53:** Flexible Label

- c. Grasp the System Fan firmly with your index finger and use your thumb to press the latch release using a pinching motion.

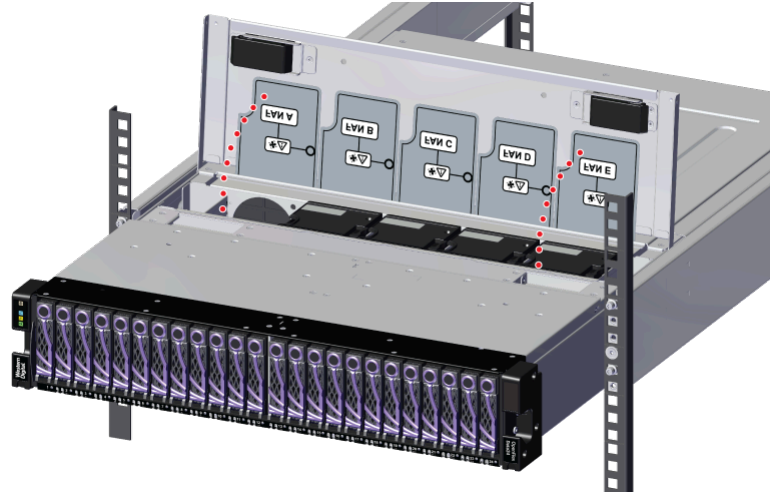
**Figure 54:** System Fan Latch Operation

- d.  **Caution:** The fan module must be replaced within 5 minutes.  
Carefully pull the System Fan out of the System Fan slot.

**Figure 55:** Uninstall System Fan

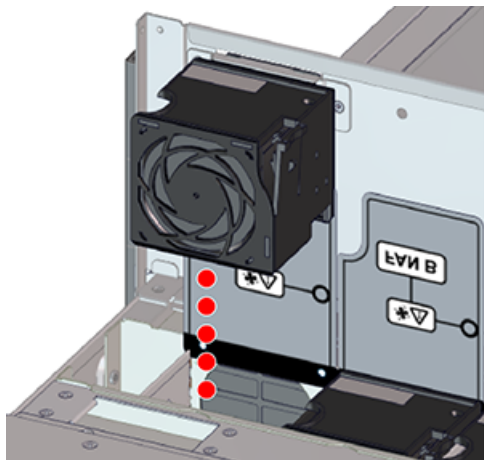
**Step 4:** Install the System Fan into the enclosure.

- a. Gain access to the System Fan bay by lifting the flexible Formex flap.

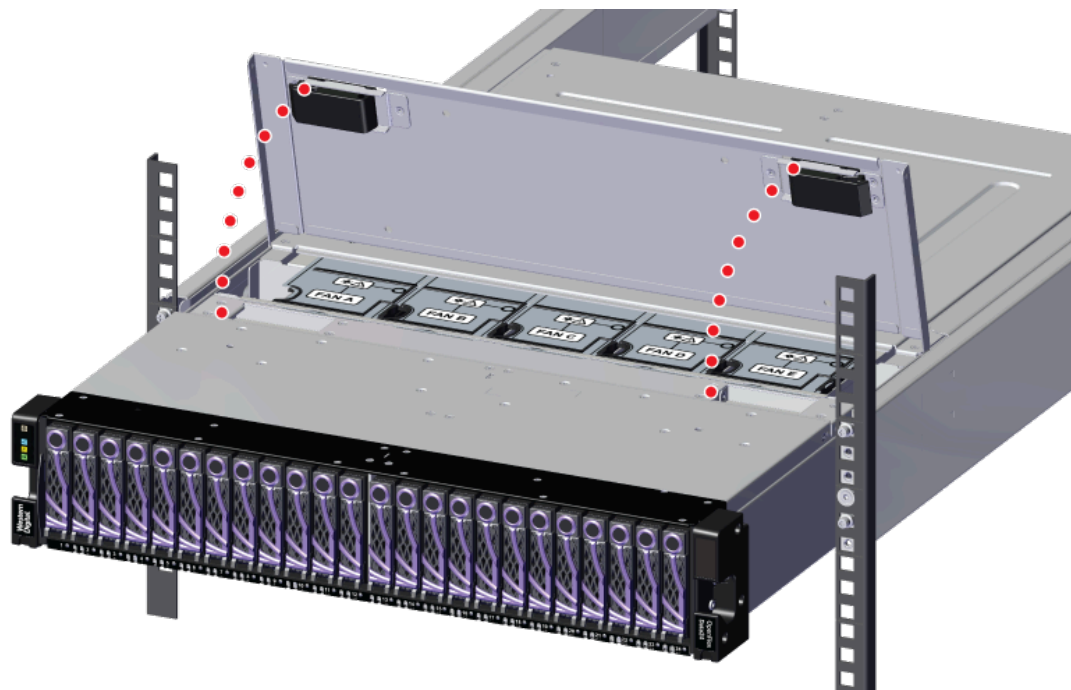
**Figure 56:** Flexible Label

- b. Orient the System Fan with the module latch (and connector) on the right-hand side and insert it into the System Fan slot.

**Figure 57:** System Fan Installation

**Figure 58:** System Fan Installation

- c. Verify that the System Fan is fully seated and latched into the System Fan slot by gently pulling on the module.
- d. Latch the System Fan bay cover by rotating the cover toward the Chassis and sliding both latches in towards the center of the Chassis until the cover engages with the Chassis.

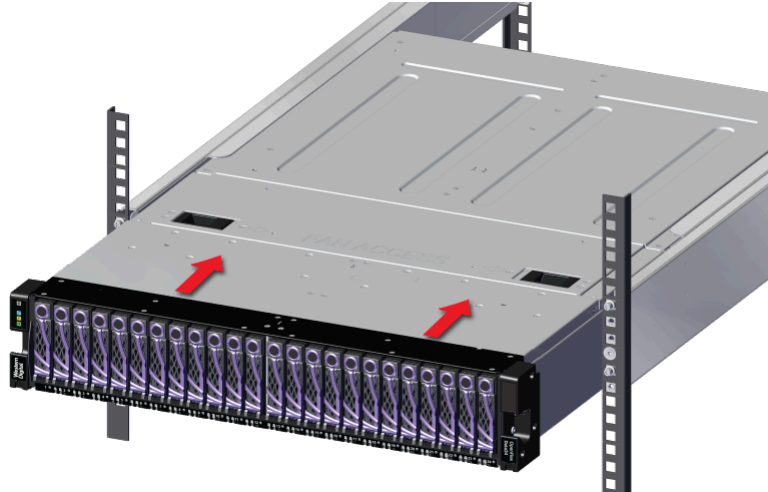
**Figure 59:** System Fan Bay Cover Operation

- e. Verify that the System Fan bay cover is securely latched into the Chassis by gently pulling up on the latches ensuring the System Fan bay cover does not move when pulled. Reinstall the System Fan bay cover if it is not securely installed onto the Chassis.

**Step 5:** Secure the Chassis to the rack rails.

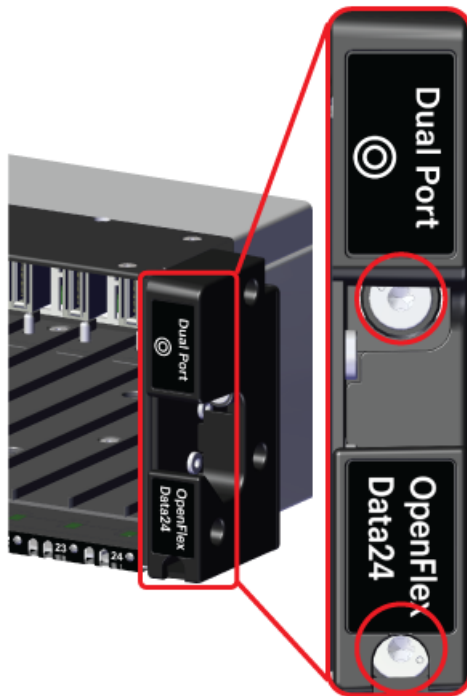
- a. Carefully slide the Chassis into the rack until the rack ears are flush with the mounts on the rails.

**Figure 60:** Seating the Chassis



- b. Using the T15 Torx screwdriver, tighten the two Torx captive screws to secure the Chassis to the rail. Repeat this step to secure the remaining rack mount to the remaining rail.

**Figure 61:** Chassis Captive Screws



### 3.5 IO Module (IOM) Replacement

Replacement Requirements			
Personnel Required		1	
Service Window		No Service Window	
Tool	# Needed	Required vs. Optional	
Philips head Screwdriver	1	Optional	

- ESD Sensitive
- Electric Shock

**Step 1:** Unpack and inspect the new IO Module (IOM) for damage.

- a. Inspect the packaging that the IO Module (IOM) replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b. Remove the IO Module (IOM) from the packaging and verify that there is no damage to the IO Module (IOM). Dents, scratches, and broken parts should be reported. If major damage has occurred to the IO Module (IOM), DO NOT use the replacement part.
- c. Store in a safe location until the IO Module (IOM) is needed for installation.

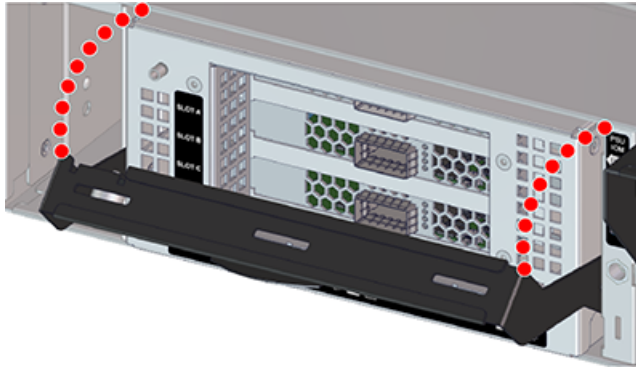
**Step 2:** Uninstall the IO Module (IOM) from the enclosure.

- a. Unlock the IO Module (IOM) by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image. A screwdriver may be used if desired.

**Figure 62:** IO Module (IOM) Thumbscrew Operation

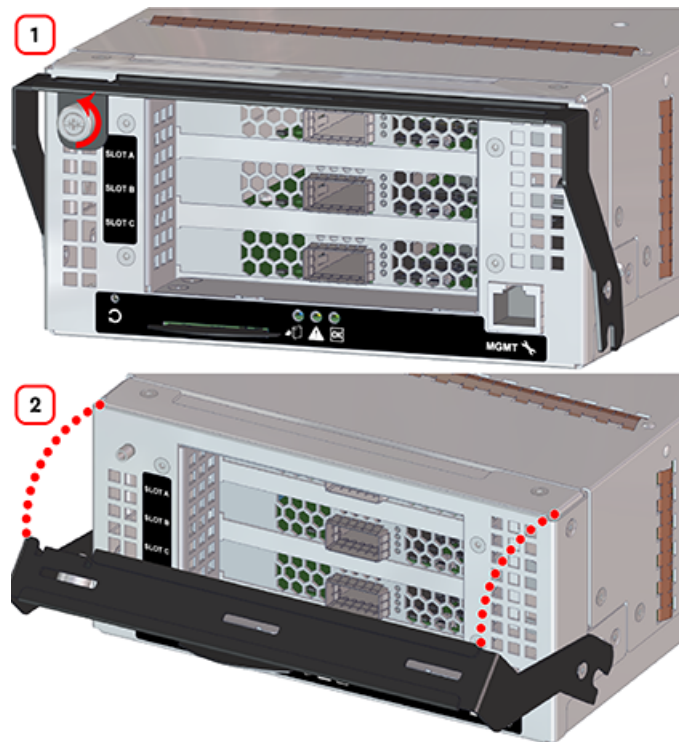


- b. Pull the release handle out until the IO Module (IOM) is unseated and can be removed from the IO Module (IOM) slot.

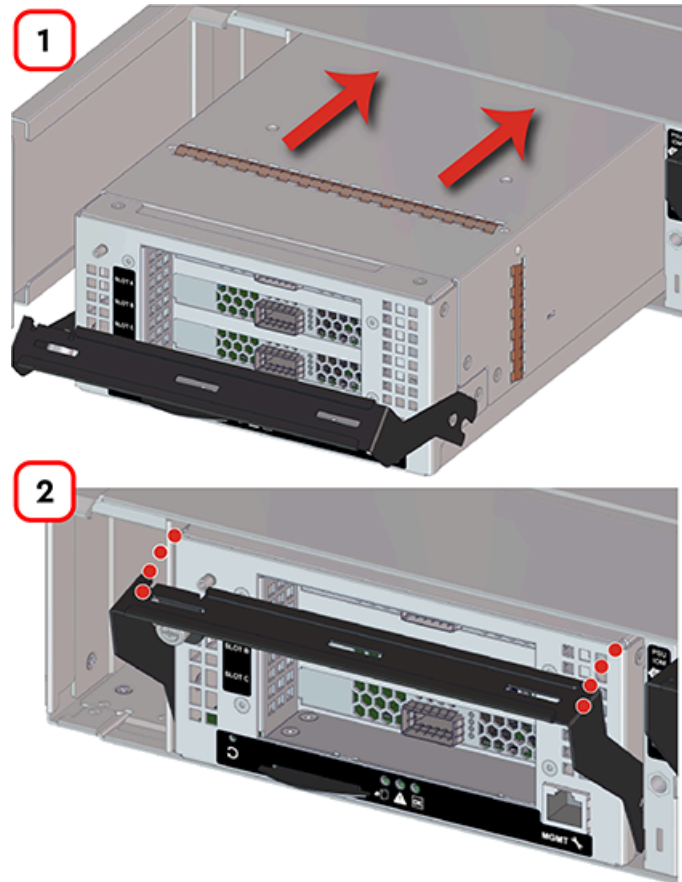
**Figure 63:** IO Module (IOM) Release Handle Operation**Figure 64:** Uninstall IO Module (IOM)

**Step 3:** Install the IO Module (IOM) into the enclosure.

- a. From the rear of the rack, unlock the IO Module (IOM) by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image.

**Figure 65:** Prepare IO Module (IOM)

- b. Gently slide the IO Module (IOM) into the IO Module (IOM) slot until the release handle is engaged with the Chassis. When the handle lifts up slightly, it is an indicator that the release handle is engaged with the Chassis.

**Figure 66:** IO Module (IOM) Handle Engaged

- c. Press the release handle into the IO Module (IOM) and secure it in place by turning the thumbscrew clockwise until it is tight.

**Figure 67:** IO Module (IOM) Secure

- d. Verify that the IO Module (IOM) is securely latched into the Chassis by pulling on the release handle and ensuring the IO Module (IOM) does not move when pulled. Reinstall the IO Module (IOM) if it is not securely installed into the Chassis.

**Step 4:** Connect the data cables to the IO Module (IOM).

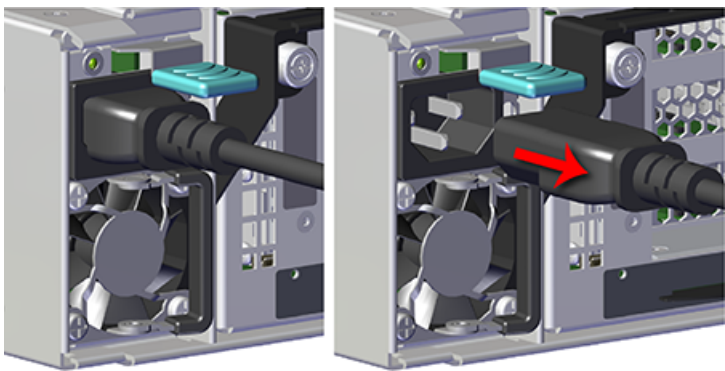
## 3.6 Power Supply Unit (PSU) Replacement

Replacement Requirements	
Personnel Required	1
Service Window	5 minutes

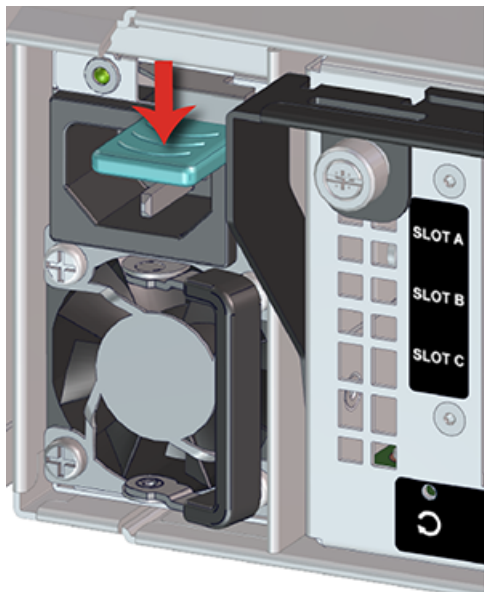
- ESD Sensitive
- Electric Shock
- Fan Blade Danger

- Step 1:** Unpack and inspect the new Power Supply Unit (PSU) for damage.
- a. Inspect the packaging that the Power Supply Unit (PSU) replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
  - b. Remove the Power Supply Unit (PSU) from the packaging and verify that there is no damage to the Power Supply Unit (PSU). Dents, scratches, and broken parts should be reported. If major damage has occurred to the Power Supply Unit (PSU), DO NOT use the replacement part.
  - c. Store in a safe location until the Power Supply Unit (PSU) is needed for installation.
- Step 2:** Move to the rear of the rack and disconnect the power cable from the Power Supply Unit (PSU).

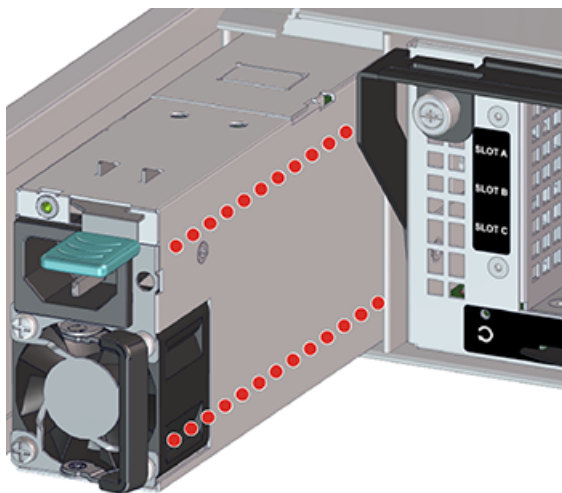
**Figure 68:** Disconnect Power Cable



- Step 3:** Uninstall the Power Supply Unit (PSU) from the enclosure.
- a. From the rear of the rack, grasp the ring handle with your index finger and use your thumb to press the latch release using a pinching motion.

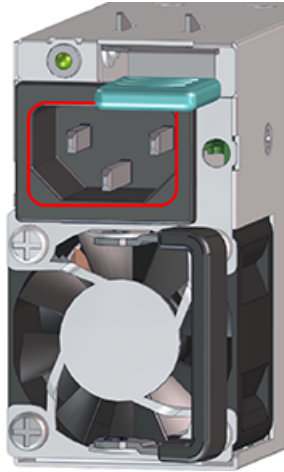
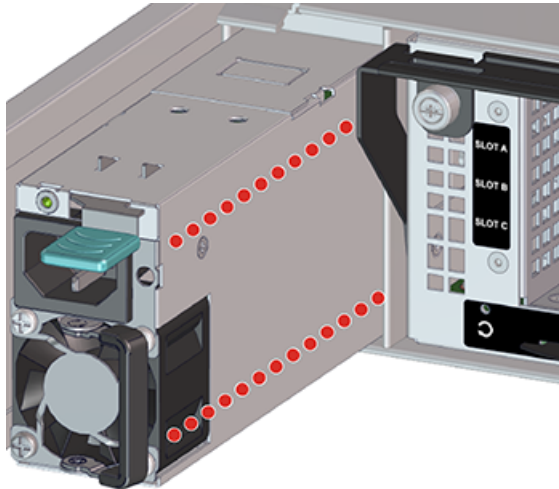
**Figure 69:** Power Supply Unit (PSU) Release Latch Operation

- b. Carefully pull the Power Supply Unit (PSU) out of the Power Supply Unit (PSU) slot.

**Figure 70:** Uninstall Power Supply Unit (PSU)

**Step 4:** Install the Power Supply Unit (PSU) into the enclosure.

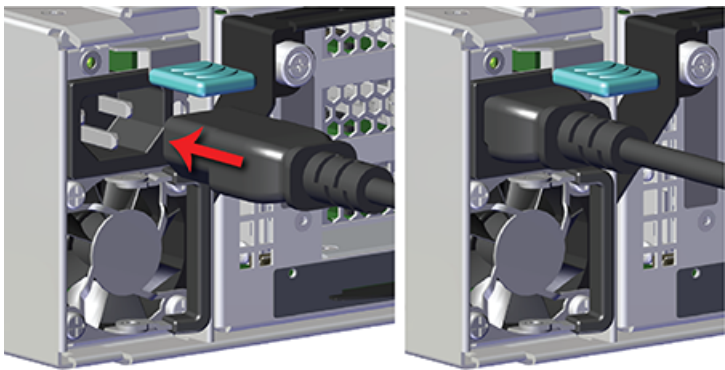
- a. Orient the Power Supply Unit (PSU) with the power port located on the top and insert it into the Power Supply Unit (PSU) slot. The location of the power port is shown in the following image.

**Figure 71:** Port Location**Figure 72:** Power Supply Unit (PSU) Installation

- b.** Verify that the Power Supply Unit (PSU) is fully seated and latched into the Power Supply Unit (PSU) slot by gently pulling on the handle.

**Step 5:** Connect the power cable to the Power Supply Unit (PSU).

**Figure 73:** Connect Power Cable



### 3.7 Rails Replacement

Replacement Requirements		
Personnel Required		1
Service Window		N/A
Tool	# Needed	Required vs. Optional
T15 Torx Screwdriver	1	Required
Level	1	Optional
Lift Equipment	1	Optional
ESD Mitigation Equipment (site specific)	1	Required

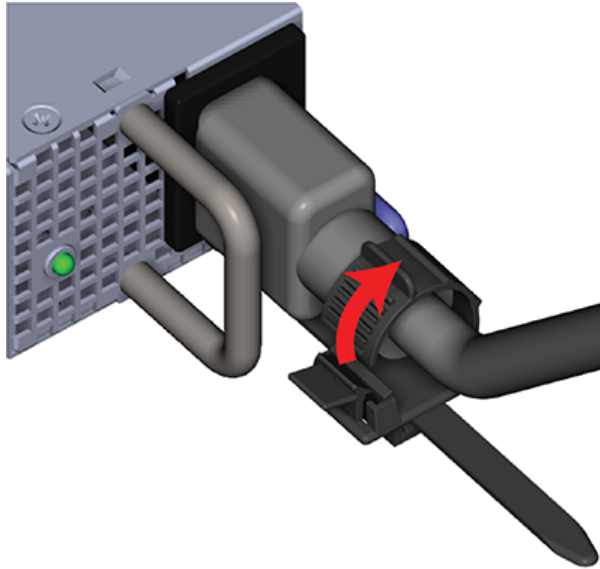
- ESD Sensitive
- Electric Shock
- Fan Blade Danger
- Safe Lift: Under 50 lbs.
- Safe Lift: Over 50lbs.

**Step 1:** Unpack and inspect the new Rails for damage.

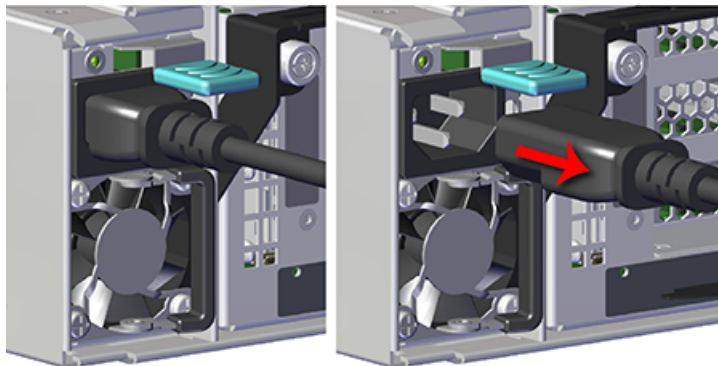
- a. Inspect the packaging that the Rails replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b. Remove the Rails from the packaging and verify that there is no damage to the Rails. Dents, scratches, and broken parts should be reported. If major damage has occurred to the Rails, DO NOT use the replacement part.
- c. Store in a safe location until the Rails is needed for installation.

**Step 2:** Disconnect the power and data cables from the enclosure.

- a. Unclip the retention strap as shown in the following image.

**Figure 74:** Unclipping Cable Retention Strap (Generic PSU Shown)

- b. Move to the rear of the rack and disconnect the power cables from each of the two Power Supply Unit (PSU).

**Figure 75:** Disconnect Power Cables

- c. Disconnect the Ethernet Cable from the RJ45 Ethernet Management port.

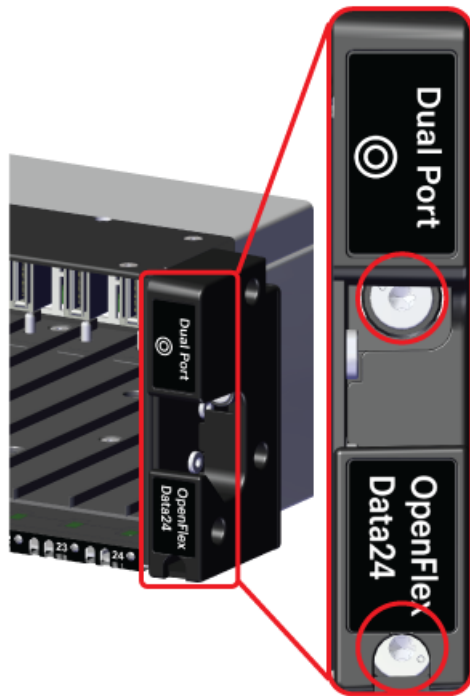
**Figure 76:** Disconnect RJ45 Ethernet Cables

- d. Disconnect the QSFP28 cables from all of the IOM ports.

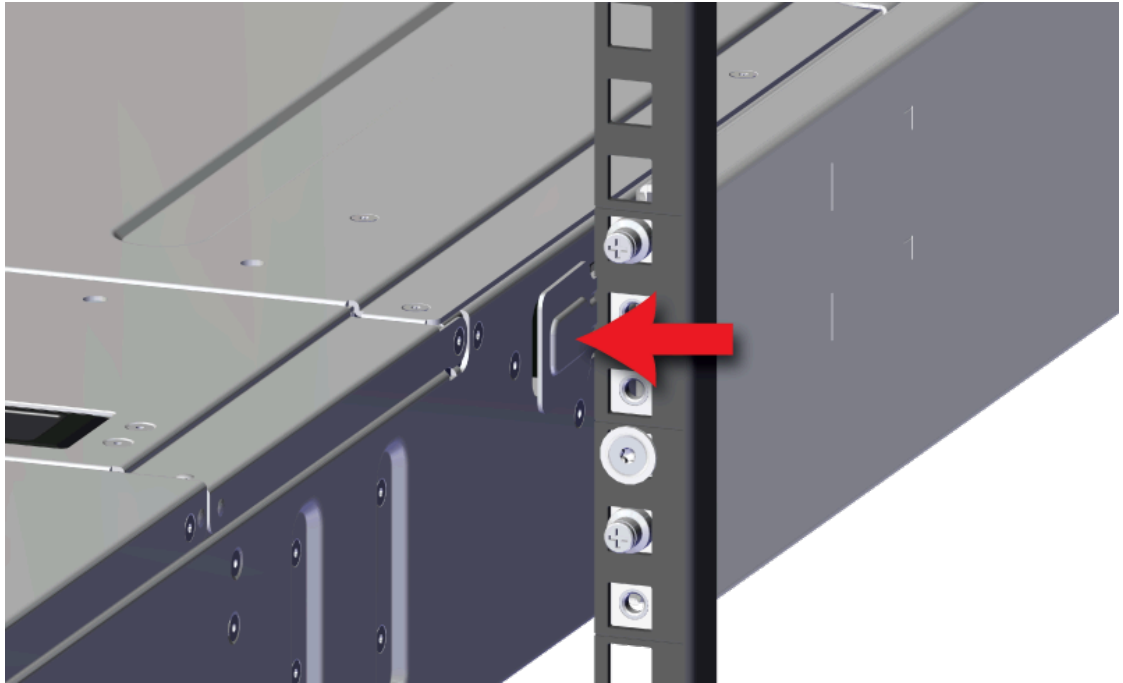
**Figure 77:** Disconnect QSFP28 Cables

**Step 3:** Uninstall the Chassis from the rack mounted rails.

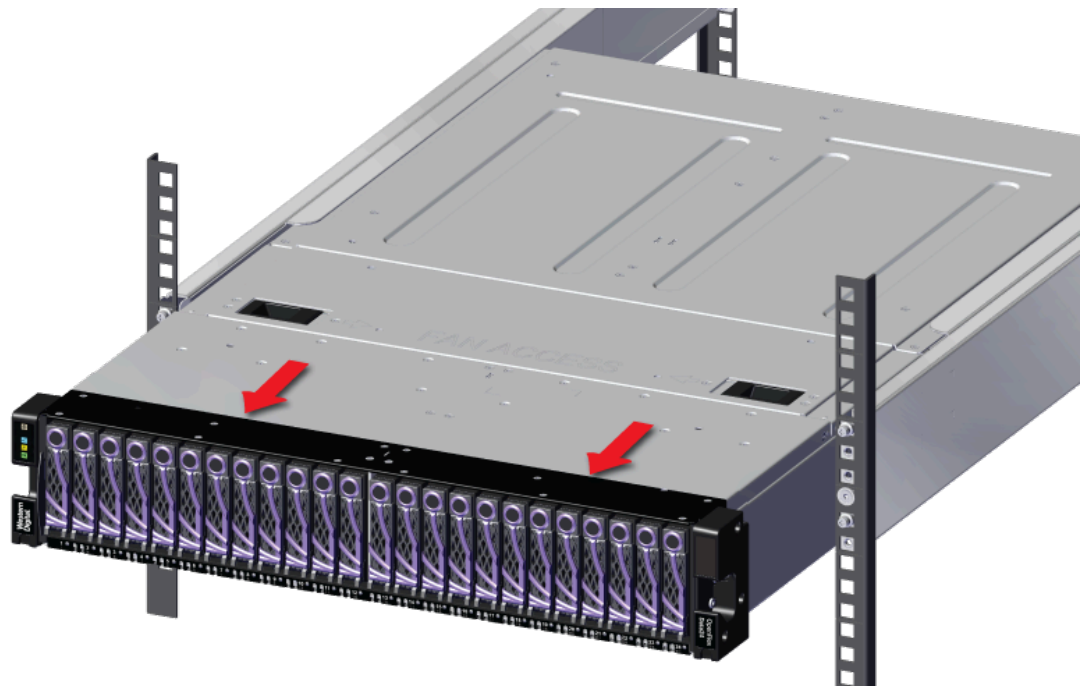
- a. From the front of the rack, using the T15 Torx screwdriver, loosen the two Torx captive screws that secure the Chassis to the rail. Repeat this step to loosen the two Torx captive screws that secure the Chassis to the remaining rail. The location of the captive screws are shown in the following image.

**Figure 78:** Rack Ear Captive Screw Location

- b. Carefully pull the Chassis out of the rack. The chassis will slide out of the rails until the locking tabs on the side of the chassis engage and stop the chassis from being pulled out further.
- c. Depress the locking tabs on the sides of the chassis to allow it to be removed from the rails.

**Figure 79:** Locking Tabs

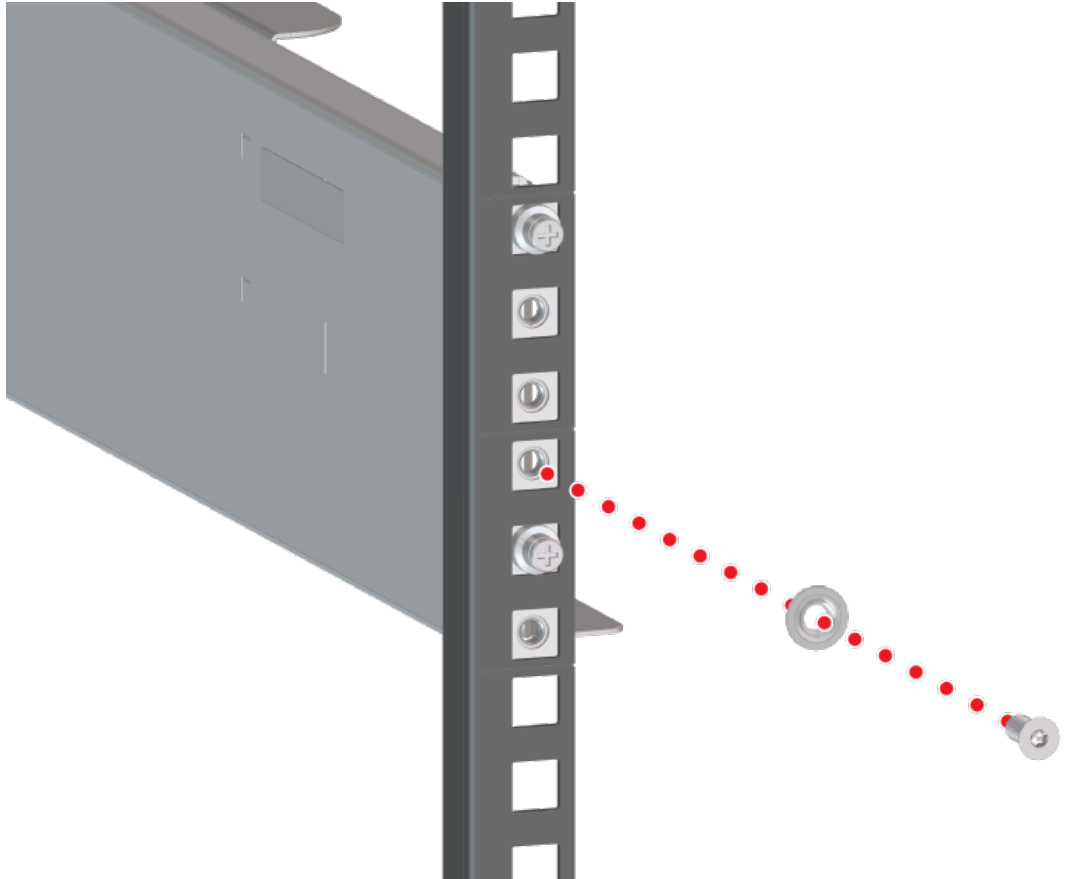
- d. Continue sliding the chassis out of the rack and ensure extra care is taken to support the weight of the Chassis when the Chassis is clear of the rack mount rails.

**Figure 80:** Uninstall Chassis

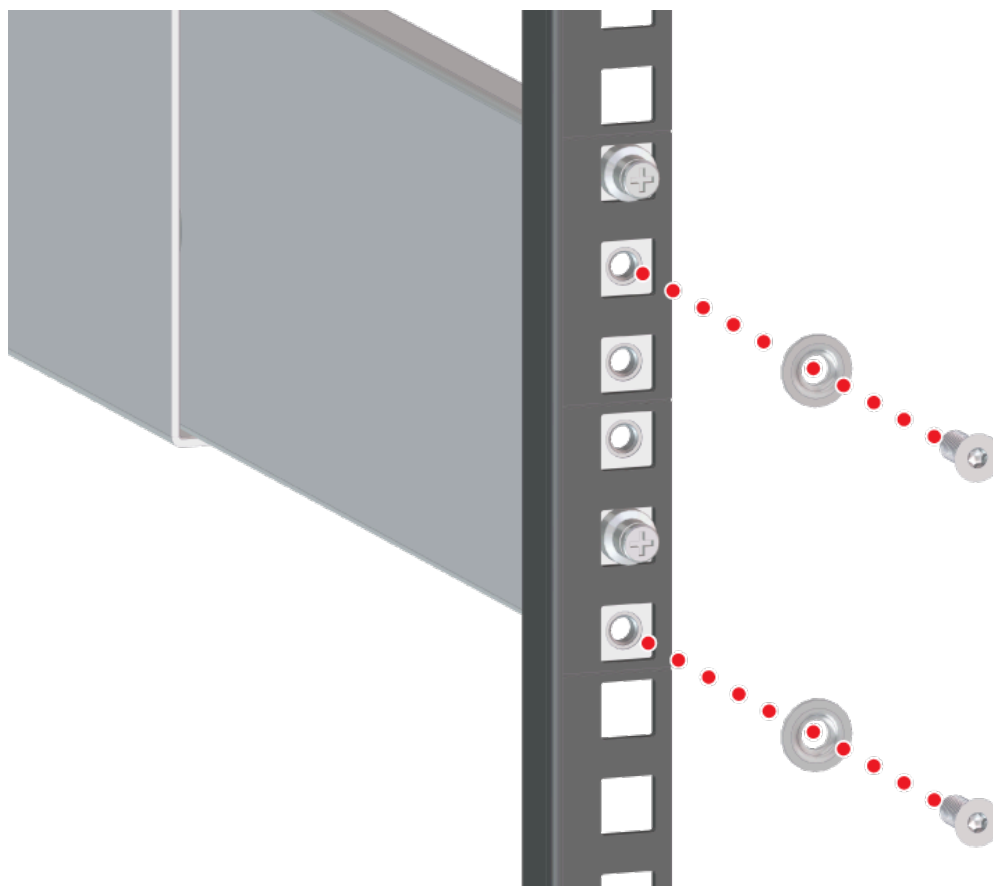
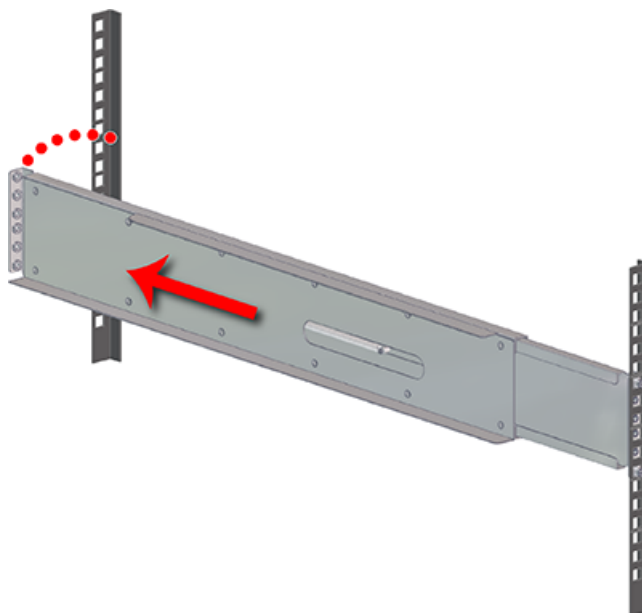
**Step 4:** Uninstall the rack mount Rails.

- a. From the front of the rack, using the T15 Torx screwdriver, uninstall the M5 Torx screw that secure the front of the rack mount Rails and bracket to the rack.

**Figure 81:** Uninstall Front Rack Mount



- b. From the rear of the rack, using the T15 Torx screwdriver, uninstall the two M5 Torx screws that secure the rear of the rack mount Rails to the rack. Remove the Rail from the rack by rotating the front mount out and pulling the rear mount out of the rack.

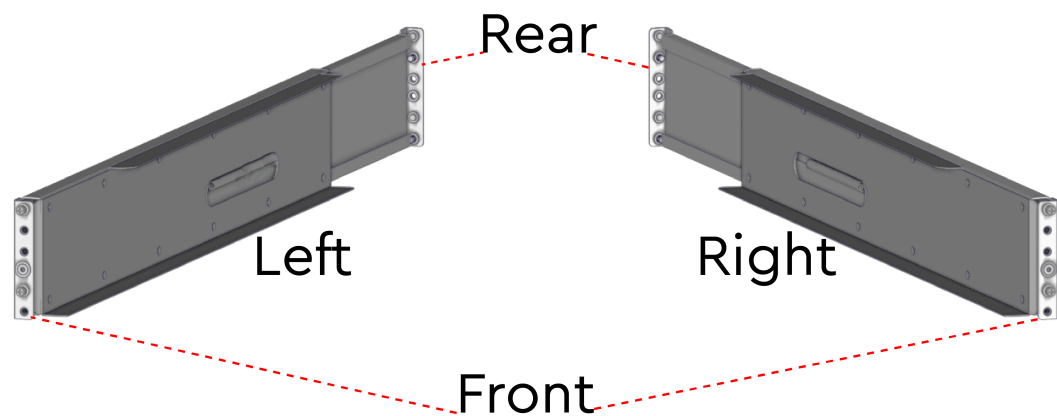
**Figure 82:** Uninstall Rear Rack Mount**Figure 83:** Remove Rail

**Step 5:** Uninstall the remaining Rails in the same way the first was uninstalled.

**Step 6:** Install the rack mount Rails.

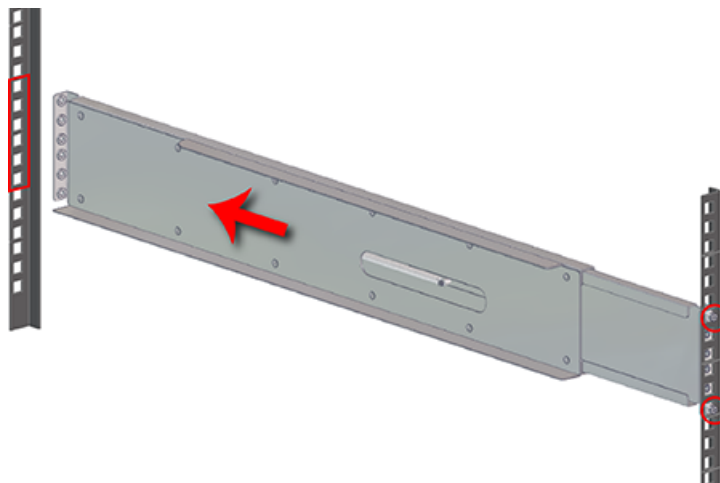
- a. Determine which of the rails is the right and which is the left as shown in the following image.

**Figure 84:** Rails Identification

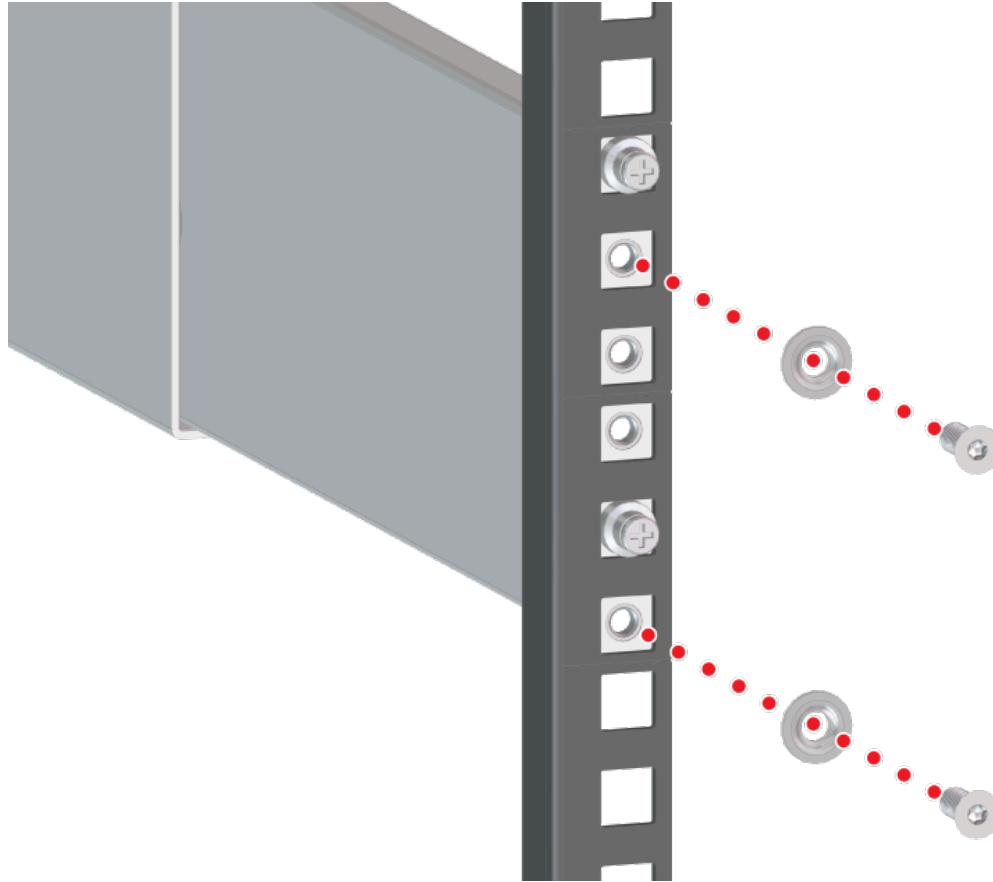


- b. From the rear of the rack, set the rear of the Rails in the same location as the damaged Rails and extend it so that the pins fit into the same U holes.

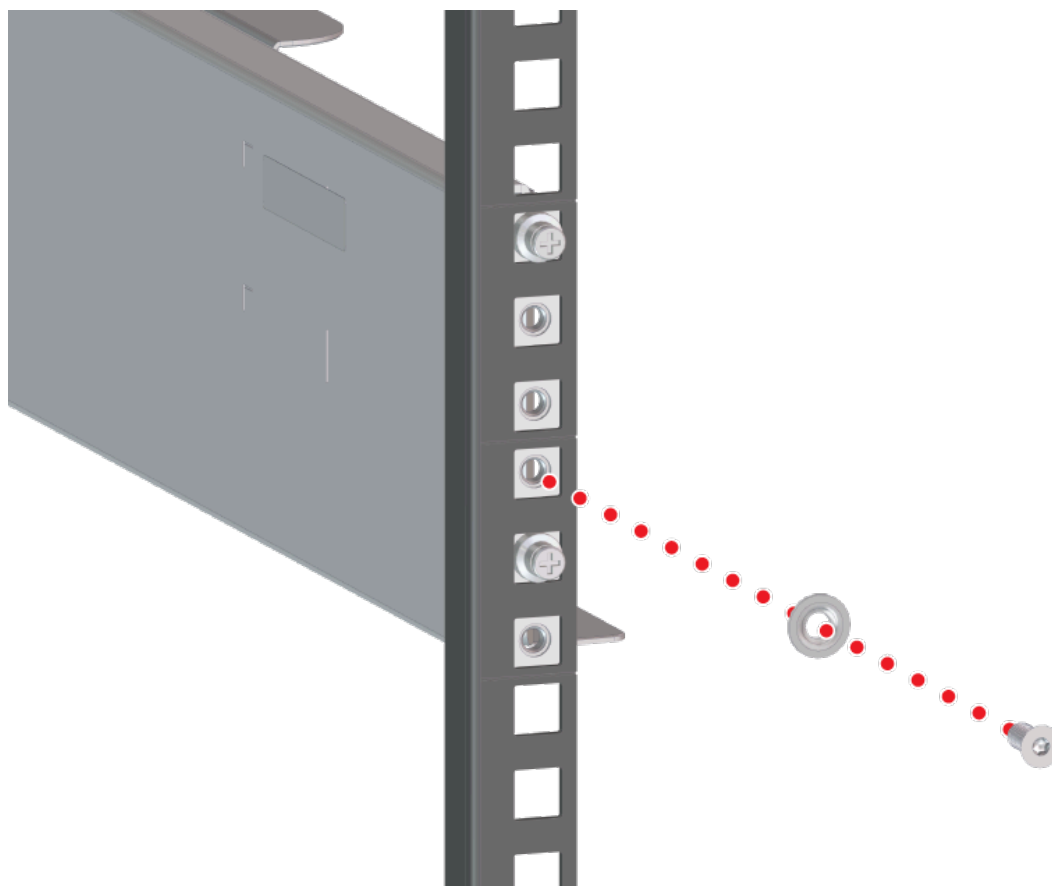
**Figure 85:** Rails Location



- c. Secure the rear of the rack mount Rails to the rack using the T15 Torx screwdriver, install the two M5 Torx screws that secure the rear of the rack mount Rails to the rack.

**Figure 86:** Install Rear Rack Mount

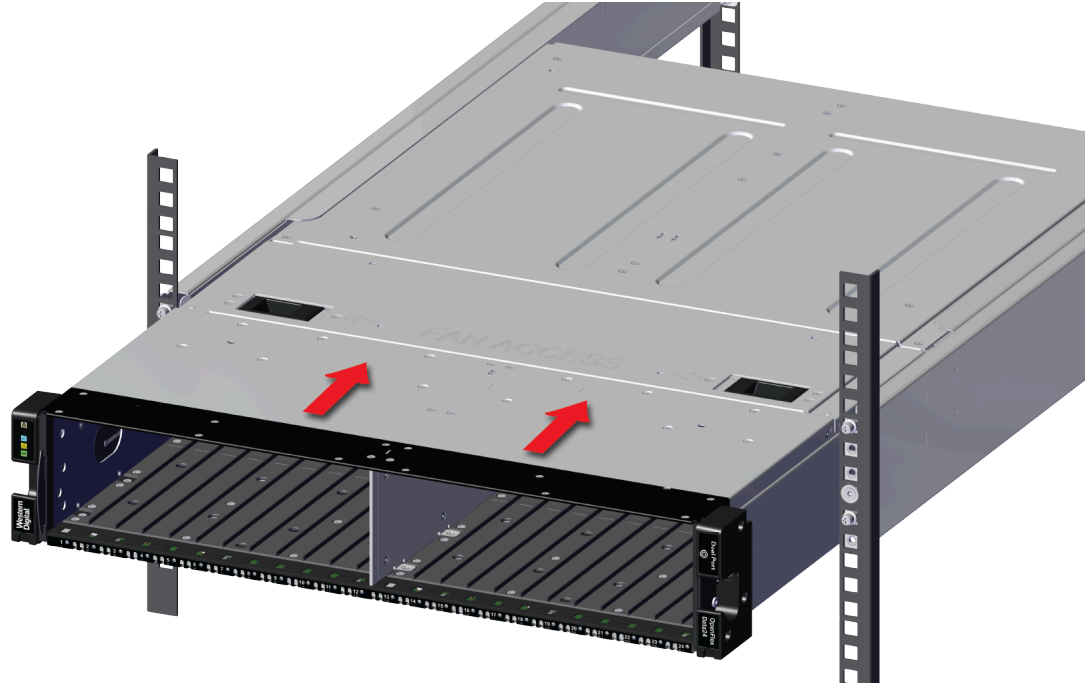
- d. From the front of the rack, using the T15 Torx screwdriver, install the M5 Torx screws that secure the front of the rack mount Rails and bracket to the rack.

**Figure 87:** Install Front Rack Mount

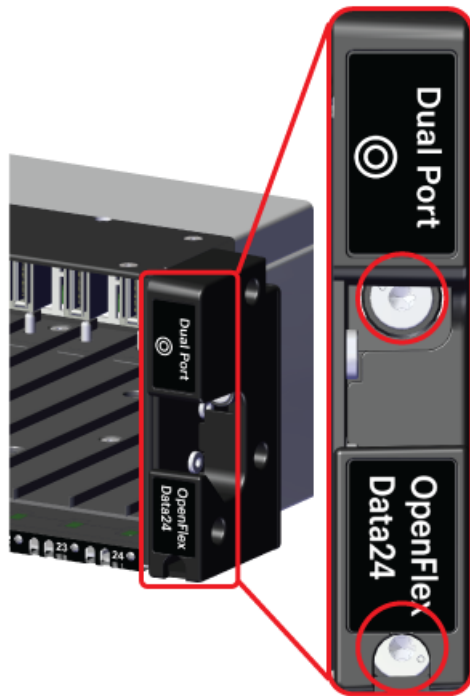
**Step 7:** Install the remaining Rails in the same way the first was installed.

**Step 8:** Install the Chassis onto the rack mounted rails.

- a. Carefully slide the Chassis onto the rails until the rack ears are flush with the mounts on the rails.

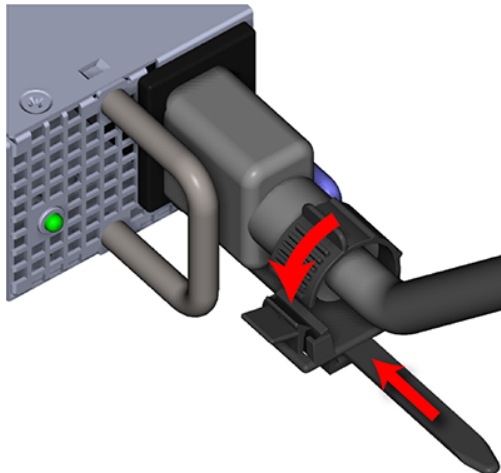
**Figure 88:** Chassis Installation

- b. Using the T15 Torx screwdriver, tighten the two Torx captive screws to secure the Chassis to the rail. Repeat this step to secure the remaining rack mount to the remaining rail.

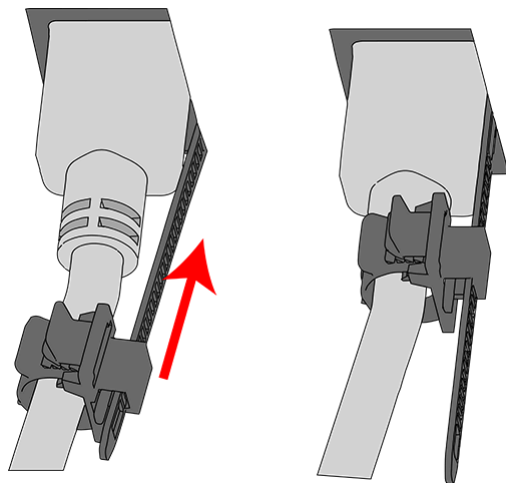
**Figure 89:** Captive Screws

**Step 9:** Connect the power and data cables to the enclosure.

- a. Loop the PSU's retention clip around the power cable and pinch it until the clip catches and locks in place.

**Figure 90:** Locking the Retention Clip

- b. Slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is accidentally pulled.

**Figure 91:** Sliding the Retention Clip Forward

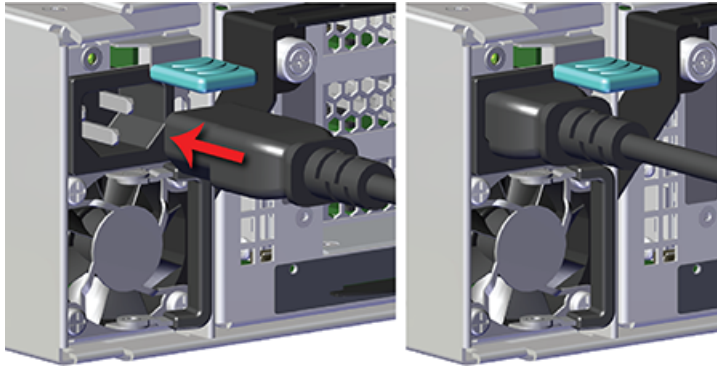
- c. Connect the Ethernet Cable into the Ethernet Management port.

**Figure 92:** Connecting RJ45 Ethernet Cable to Management Port

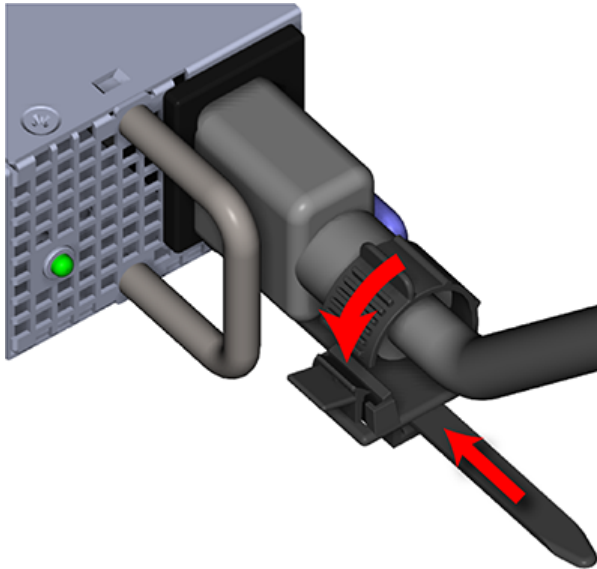
- d. Connect the QSFP28 cables into all of the IOM ports.

**Figure 93:** Connect QSFP28 Cables

- e. Move to the rear of the rack and connect the power cables into each of the two Power Supply Unit (PSU) power connectors.

**Figure 94:** Connect Power Cables

- f. Wrap the power cable in the cable retention clip and cinch it so it securely holds the power cable in place.

**Figure 95:** Cinching Retention Strap (Generic PSU Shown)



# Management

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- NVMe-CLI.....71
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- Enclosure Firmware Update..... 78
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## 4.1 Open Composable API

---

The Open Composable API is a RESTful interface for OpenFlex that enables a Unified Fabric Control Plane for Storage Fabric Devices. This allows for composing disaggregated storage resources—with compute, networking, and memory—into virtual systems in the future. These virtual systems will be dynamically provided to the right application at the right time, ensuring SLAs can be met automatically.

- Monitor hardware sensors (temperatures, voltages, fan speeds, hardware state)
- Configure hardware (update firmware, reboot individual components or systems, assert LEDs)
- Capture inventory data (serial number, part number, etc.)
- Capture log information
- Configure policies (user access lists, authentication, HTTPS/TLS encryption/security with certificate/key settings)
- Self-discovery of other locally-available resources configurable using the Open Composable API for OpenFlex

### 4.1.1 Accessing the API

The API is accessible on every fabric device connected to the fabric network. The simplest way to access the API is to find the IP address of the management port on the rear of the Chassis Device that contains all of the other devices. This is set to DHCP by default. Navigating to that IP address from a browser with `/query/` added to the end of the IP address will return top level status information.

The IP addresses/API targets listed in this response body will help in navigating the resources available on this device, as well as provide links and contextual information related to other devices connected on the fabric.

### 4.1.2 RESTful API

This API is based on the true REST architectural style meaning that all actions/verbs will be handled exclusively by the existing HTTP Methods (GET, POST, PUT, DELETE, HEAD, OPTIONS) along with all URI patterns containing only fully qualified collections of resources and resource instantiations (nouns only, no action verbs permitted in the URI).

## 4.2 In-band Enclosure Management

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The OpenFlex Data24 provides In-Band Enclosure Management functionality through the OCAPI. To leverage the In-Band Management features, users must install a standalone version of the OCAPI onto an initiator or host and connect a management device that is presented up to the fabric via the IOM enclosure manager(EM) and discoverable using `nvm discover`. For details on how to install the OCAPI on a host to perform in-band enclosure management, see [Installing Standalone OCAPI for In-Band Management \(page 86\)](#)

## 4.3 NVMe-CLI

---

NVMe-CLI is an open-source management tool for NVMe storage devices in Linux®. The tool allows users to manage device firmware, erase data securely, output error logs, and other similar management functions. It is a command-line utility and can be used to script management functions for large storage arrays.



**Note:** OpenFlex Data24 supports only version 1.12 of NVMe-CLI

To install NVMe-CLI on Ubuntu 18.04.4 LTS:

```
sudo apt-get install -y nvme-cli
```

To Install NVMe-CLI on CentOS 7.7, 8.1/RHEL 7.7, 8.2:

```
sudo yum install nvme-cli
```

For further details on NVMe-CLI see the following resources:

- [NVMe-CLI Debian Manpages](#)
- [General NVMe-CLI Information from nvmeexpress.org](#)

### 4.3.1 Discovering and Connecting to NVMe™ Devices on OpenFlex Data24

This process assumes the user knows the IP address of the IOM of the enclosure. The IOM MAC address is available on the pull-out tab at the front of the enclosure and can be used to determine the IP address. Examples where REST commands are required will display cURL commands.

**Step 1: Optional.** Utilize this step in cases where the network may not detect the IP addresses of the adapters that will be connected.

- To determine the Storage Device ID, issue a GET to `/Query/` to review a list of devices installed in the target enclosure.

```
curl -u username:password http://ip.of.target.iom:80/Query/
```

- Review the data returned to find the device ID of the target device. See the highlighted example below.

```
{
  "Self": "http://10.20.30.40:80/Query/",
  "SystemQuery": "http://10.20.30.40:80/System/Query/",
  "InformationStructure": {
    "Self": "http://10.20.30.40:80/Query/InformationStructure/",
    "AuthenticationType": {
      "ID": 0,
      "Name": "Basic"
    },
  },
  "HTTPPort": 80,
  "HTTPSPort": 443,
  "LogLevel": "debug",
  "MaximumThreads": 5,
  "Name": "OpenFlex API",
  "OwningOrganization": "WDC",
  "Status": "Released",
  "StructureDescription": "REST-based API for Device Management.
Use HTTP OPTIONS with header
                                {\"Documentation\": \"Schema\"} to get
resource schema information based on URI.
                                Use HTTP OPTIONS with header
                                {\"Documentation\": \"Info\"} to get general information
                                based on URI. ",
  "StructureDescription": "REST-based API for Device Management.
Use HTTP OPTIONS with header
                                {\"Documentation\": \"Schema\"} to get
resource schema information based on URI.
                                Use HTTP OPTIONS with header
                                {\"Documentation\": \"Info\"} to get general information
                                based on URI. "
```

```

    "URI": "/Query/",
    "TimeoutMultiplier": 1,
    "Version": "1.2.0-301"
  },
  "Devices": {
    "Self": "http://10.20.30.40:80/Devices/",
    "Members": [
      {
        "Self": "http://10.20.30.40:80/Storage/Devices/openflex-
data24-usalp00000aa000a/",
        "SystemType": {
          "ID": 2,
          "Name": "Storage"
        },
        "Name": "openflex-data24-usalp00000aa000a",
        "ID": "openflex-data24-usalp00000aa000a",
        "OperatingSystem": {
          "Self": "http://10.20.30.40:80/Storage/Devices/
openflex-data24-usalp00000aa000a/OperatingSystem/",
          "Name": "Vendor Firmware",
          "OSType": {
            "ID": 59,

```

**Truncated Example**

- c. Determine the Adapters in the system using the Storage Device. Send a GET to the device ID gathered in the previous step.

```
curl -u username:password http://ip.of.target.iom:80/Storage/Devices/
openflex-data24-usalp00000aa000a/Adapters/
```

- d. Review the output to locate the IP of the appropriate port.

```

{
  "Self": "http://10.20.30.40:80/Storage/Devices/openflex-data24-
usalp00000aa000a/Adapters/",
  "Members": [
    {
      "Self": "http://10.20.30.40:80/Storage/Devices/openflex-
data24-usalp00000aa000a/Adapters/1/",
      "ID": "1",
      "Name": "IOM-A-AIC-A",
      "Status": {
        "State": {
          "ID": 16,
          "Name": "In service"
        },
        "Health": [
          {
            "ID": 5,
            "Name": "OK"
          }
        ]
      },
      "HostName": "openflex-data24-usalp00000aa000a-iom-a-aic-a",
      "Ports": "http://10.20.30.40:80/Storage/Devices/openflex-
data24-usalp00000aa000a/Ports/?adapterid=1"
    },

```

**Truncated Example**

- e. Determine the IP address of the adapter that is attached to your host using the ports link. This will be the IP that is used to perform an `nvme discover` to find drives connected on the fabric. Send a GET to the Ports object associated with the adapter.

```
curl -u username:password http://10.20.30.40:80/Storage/Devices/openflex-  
data24-usalp00000aa000a/Ports/?adapterid=1
```

- f. Review the returned data to find the IP of the proper port.

```
{
  "Self": "http://10.20.30.40:80/Storage/Devices/openflex-data24-  
usalp00000aa000a/Ports/",
  "Members": [
    {
      "Self": "http://10.20.30.40:80/Storage/Devices/openflex-  
data24-usalp00000aa000a/Ports/70_b3_d5_76_8a_be_192_168_10_51_24/",
      "ID": "70_b3_d5_76_8a_be_192_168_10_51_24",
      "Status": {
        "State": {
          "ID": 16,
          "Name": "In service"
        },
        "Health": [
          {
            "ID": 5,
            "Name": "OK"
          }
        ]
      },
      "AddressOrigin": {
        "ID": 65536,
        "Name": "DHCPv4"
      },
      "IPv4Address": "192.168.10.51/24",
      "IPv4Gateway": "192.168.10.1",
      "MACAddress": "70:b3:d5:76:8a:be",
      "NetworkType": {
        "ID": 8,
        "Name": "IPv4 Network"
      },
      "MTUBytes": 5000,
      "Adapters": "http://10.20.30.40:80/Storage/  
Devices/openflex-data24-usalp00000aa000a/Adapters/?  
portid=70_b3_d5_76_8a_be_192_168_10_51_24"
    }
  ]
}
```

- Step 2:** Open a terminal and use the adapter's IPv4 address to discover all nvme devices installed on the fabric.

```
sudo nvme discover -t rdma -a 192.168.10.51
```

**Step 3:** Review the output to locate the subnqn number associated with the device that will be connected. The following example shows two devices, the In-Band management device, as well as the device intended for connection.

```
Discovery Log Number of Records 2, Generation counter 0
====Discovery Log Entry 0=====
trtype: rdma
adrfam: ipv4
subtype: nvme subsystem
treq: not specified
portid: 0
trsvcid: 4420
subnqn: nqn.1992-05.com.wdc.openflex-data24-usalp00000bb000b:MI.AA (In-Band
Management Device)
traddr: 192.168.10.51
rdma_prtype: roce-v2
rdma_qptype: connected
rdma_cms: rdma-cm
rdma_pkey: 0x0000
====Discovery Log Entry 1=====
trtype: rdma
adrfam: ipv4
subtype: nvme subsystem
treq: not specified
portid: 0
trsvcid: 4420
subnqn: nqn.1992-05.com.wdc.openflex-data24-usalp00000aa000a:nvme.1 (subnqn
for NVMe device)
traddr: 192.168.10.51
rdma_prtype: roce-v2
rdma_qptype: connected
rdma_cms: rdma-cm
rdma_pkey: 0x0000
```

**Step 4:** Connect to the device using the subnqn.

```
sudo nvme connect -t rdma -a 192.168.10.51 -n nqn.1992-05.com.wdc.openflex-
data24-usalp00000aa000a:nvme.1
```

**Step 5:** Verify the connection using `nvme list -v`.

```
root:~$ sudo nvme list -v
NVM Express Subsystems

Subsystem          Subsystem-NQN                      Controllers
-----
-----
nvme-subsys0       nqn.1992-05.com.wdc.openflex-data24-usalp00000aa000a:nvme.1
                                       nvme0

NVM Express Controllers

Device  SN          MN          FR
TxPort Address      Subsystem  Namespaces
-----
-----
```

nvme0	AXXXXXXX	WUSxxxxxxx	R2109003
rdma	traddr=192.168.10.51	trsvcid=4420	nvme-subsys0 nvme0n1
NVM Express Namespaces			
Device	NSID	Usage	Format
-----	-----	-----	-----
nvme0n1	1	3.84 TB / 3.84 TB	512 B + 0 B
			nvme0

## 4.4 Downloading Firmware from the Support Portal



**Note:** The product must be registered in order to download firmware updates.

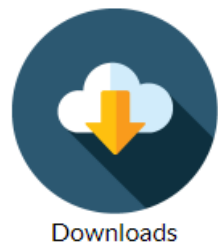
- Step 1:** Open a web browser and go to: <https://portal.wdc.com/Support/s/>.  
The **Western Digital Enterprise Support Center** will appear.
- Step 2:** Log in to the **Western Digital Enterprise Support Center** using a valid email address and password:

Sign in to  
SUPPORT PORTAL

LOGIN

Several support options will appear on the page.

- Step 3:** Click the **Downloads** option:



The Western Digital downloads page will appear.

- Step 4:** From the **Identify Product** section, select the **Product**, **OS / Type**, and **Release Version**:

1. Identify Product

2. Select Files for Download

3. Review & Download Files

Pick Product Options:

1

Select Product...

2

Select OS / Type

3

Release Version

Available Downloads:

Expand All

Please select your options on the left.

Custom Download List:

Files: 0    Total Size: 0b

The **Select Files for Download** section updates with the applicable options:

1. Identify Product

2. Select Files for Download

3. Review & Download Files

Pick Product Options:

1

Select Product...

2

Select OS / Type

3

Release Version

Available Downloads:

Expand All

☒ Documentation

☒ Firmware

Custom Download List:

Files: 0    Total Size: 0b

**Step 5:** From the **Select Files for Download** section, expand the **Firmware** option and select the checkbox for the appropriate firmware file(s):

2. Select Files for Download


Available Downloads:

Expand All

☒ Documentation

☒ Firmware

<input type="checkbox"/>	File Name	Size	Released	
<input checked="" type="checkbox"/>	Firmware_File	1.96MB	11 Oct 2018	⬇
<input checked="" type="checkbox"/>	Firmware_File	843.7KB	22 Oct 2018	⬇

 **Note:** Filenames will vary, depending on the options chosen in the **Identify Product** section.

**Step 6:** In the **Review & Download Files** section, review the selected files to ensure that all intended files are included in the list.

**3. Review & Download Files**

Custom Download List:

Firmware_File	1.96MB	X
Firmware_File	843.7KB	X

Files: 2 Total Size: 2.79MB

☒ Zip ☐ Tar

RESET DOWNLOAD FILES

**Step 7:** If needed, remove an unwanted file by clicking its red X.

**Step 8:** Select the appropriate archive file format by clicking either **Zip** or **Tar**.

**Step 9:** Click the **Download Files** button to download the selected files.

**Step 10:** If needed, unzip/extract the file to the desired location.

## 4.5 Enclosure Firmware Update

This section provides instructions for updating enclosure firmware on the OpenFlex Data24 using the OCAPI.

### Before you begin:

- The following cURL commands must be run from a Linux host.
- The variable portions of the commands are enclosed in angle-brackets (i.e. <filename>) and should be replaced by information specific to the user's system.
- The top level /Storage/Devices/{id}/ resource in this example is one of the two IOMs.

**Step 1:** Follow the instructions in [Downloading Firmware from the Support Portal \(page 76\)](#) to download the firmware file to an appropriate location on the host.

**Step 2:** From a command line, issue a POST request to the /Storage/Devices/{id}/OperatingSystem/ resource to upload the firmware file:

```
curl -v -i -X POST -u <username>:<password> -F FirmwareFile=@<filepath>/<filename> http://10.20.30.40/Storage/Devices/0123456789/OperatingSystem/
```

A successful upload will result in a 201 response.

**Step 3:** Issue a GET request to the top level /Storage/Devices/{id}/ resource and note the Etag returned in the header:

```
curl -v -i -X GET -u <username>:<password> http://10.20.30.40/Storage/Devices/0123456789/
```

```
HTTP/1.1 200 OK
Content-Type: application/json
Etag: 783e532540dc6b3e4978604a2f3e0353
Date: Thu, 24 Sep 2020 21:28:38 GMT
```

```
Transfer-Encoding: chunked
```

- Step 4:** Using the Etag from the GET request, issue a PUT request to the same resource, passing the key/value pair of "FirmwareUpdate":true to update the firmware:

```
curl -v -u <username>:<password> -X PUT -H "If-Match:783e532540dc6b3e4978604a2f3e0353" -H "Content-Type: application/json" -d '{"FirmwareUpdate":true}' http://10.20.30.40/Storage/Devices/0123456789/
```

A successful PUT request will result in a 202 response:

```
HTTP/1.1 202 Accepted
Content-Type: application/json
Location: http://10.20.30.40:80/Storage/Devices/0123456789/Jobs/FirmwareUpdate/
Date: Thu, 24 Sep 2020 21:53:41 GMT
Content-Length: 166
```

- Step 5:** To verify a successful update, issue a GET request to the listed **FirmwareUpdate** jobs resource:

```
curl -i -u admin:admin -X GET http://10.20.30.40:80/Storage/Devices/0123456789/Jobs/FirmwareUpdate/
```

If the update was successful, the GET response body will show a completed status:

```
{
  "Self": "http://10.20.30.40:80/Storage/Devices/0123456789/Jobs/FirmwareUpdate/",
  "ID": "FirmwareUpdate",
  "PercentComplete": 100,
  ...
}
```

- Step 6:** Using the Etag again, issue another PUT request, passing the key/value pair of "FirmwareActivate":true to activate the firmware:

```
curl -v -u <username>:<password> -X PUT -H "If-Match:783e532540dc6b3e4978604a2f3e0353" -H "Content-Type: application/json" -d '{"FirmwareActivate":true}' http://10.20.30.40/Storage/Devices/0123456789/
```

A successful PUT request will result in a 202 response:

```
HTTP/1.1 202 Accepted
Content-Type: application/json
Location: http://10.20.30.40:80/Storage/Devices/0123456789/Jobs/FirmwareActivate/
Date: Thu, 24 Sep 2020 22:04:07 GMT
Content-Length: 166
```

- Step 7:** To verify a successful activation, issue a GET request to the listed **FirmwareActivate** jobs resource:

```
curl -i -u admin:admin -X GET http://10.20.30.40:80/Storage/Devices/0123456789/Jobs/FirmwareActivate/
```

If the activation was successful, the GET response body will show a completed status:

```
{
```

```
"Self": "http://10.202.249.35:80/Storage/Devices/openflex-data24-
usalp03020qb0003-ioma/Jobs/FirmwareActivate/",
  "ID": "FirmwareActivate",
  "PercentComplete": 100,
  ...
}
```

**Step 8:** Repeat these steps to update firmware for the second IO Module (IOM).



**Note:** For high availability, it is recommended to update one IO Module (IOM) at a time. Verify host access before updating the second IO Module (IOM).

## 4.6 Drive Firmware Upgrade

This section provides instructions for updating drives firmware on the OpenFlex Data24 using NVMe-CLI.

### Before you begin:

#### Prerequisites

- NVMe-CLI
- Supported OS
- Device identifier(s) for drives that will be updated.
- This procedure assumes that the targeted NVMe device is has already been connected. For an example of how to connect a device see [Discovering and Connecting to NVMe™ Devices on OpenFlex Data24 \(page 72\)](#)

**Step 1:** Follow the instructions in [Downloading Firmware from the Support Portal \(page 76\)](#) to download the firmware file to an appropriate location on the host.

**Step 2:** Use `fw-download` to load the new drive firmware onto the target NVMe device.

```
nvme fw-download /dev/nvme3 -f /path-to-fw-file/malibux_GD_R2109003.vpkg
```

**Step 3:** Use `fw-activate` to activate firmware and commit to install the loaded firmware version.

```
nvme fw-activate /dev/nvme3 -s 3 -a 1
```

**Step 4:** Use `reset` to reset the drive so that the firmware activation can finalize.

```
nvme reset /dev/nvme3
```

**Step 5:** To optionally confirm the firmware version that is now loaded on the drive use `id-ctrl` and review the output.

```
nvme id-ctrl /dev/nvme3
```

# Configuration

## In This Chapter:

- Device Installation Order.....82
- Initial Network Configuration..... 83
- Setting Static IPs on Ports.....83
- Port Setup Using Bash Script.....86

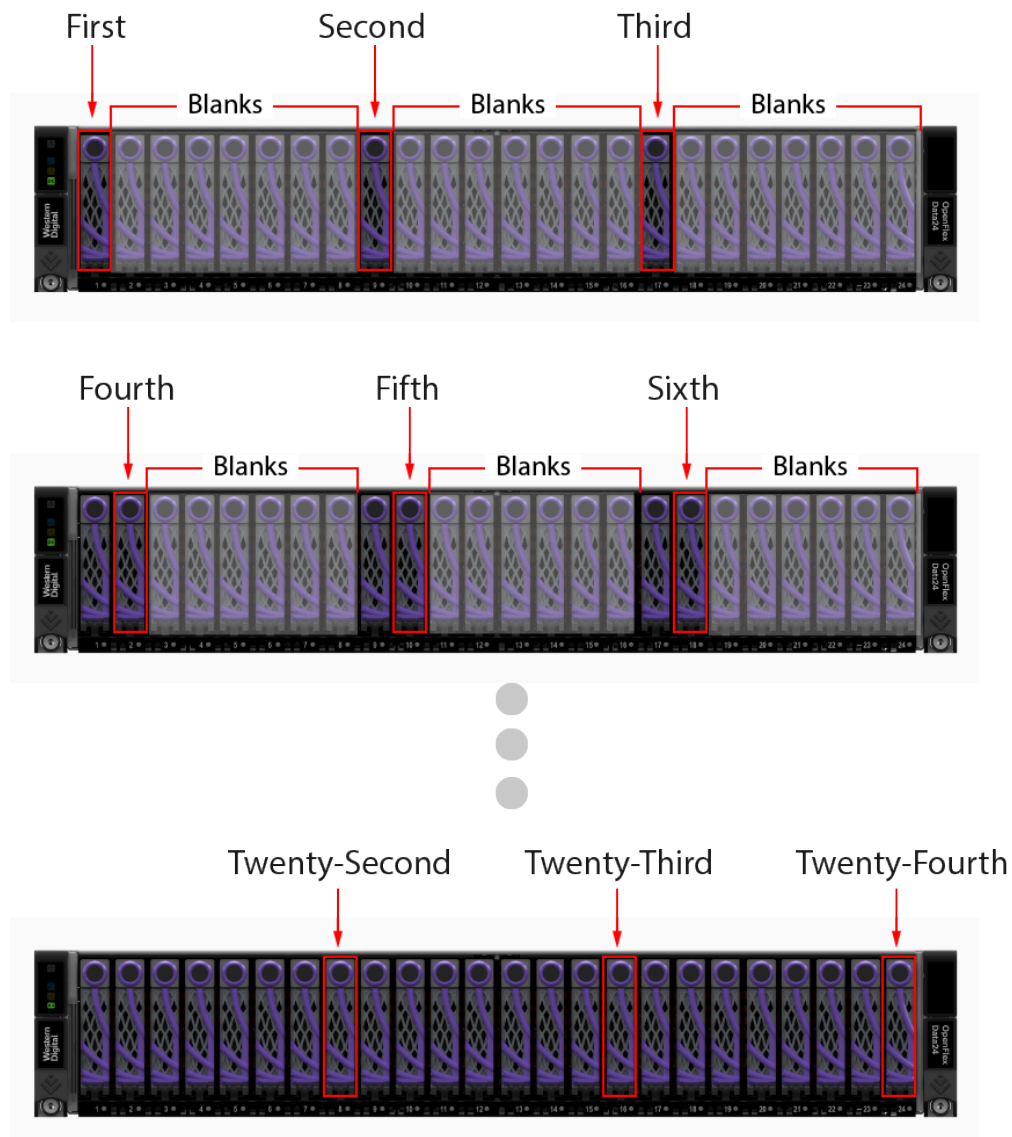


## 5.1 Device Installation Order

The OpenFlex Data24 holds 1-24 storage drive assemblies. The minimum number of drives required is 1, and drives can be installed in increments of 1 at a time. However, there is a specific installation order that is recommended in order to optimally balance data load distribution.

Each AIC controls 8 drives. The first AIC controls drives 1 - 8, the second controls drives 9 - 16, and the third controls drives 17-24. To balance the IO load optimally, install in the pattern shown in the following image.

**Figure 102:** Drive Installation Order



## 5.2 Initial Network Configuration

This section outlines the behavior of the OpenFlex Data24 when it is initially connected to a network. The default configuration for the RJ45 management ports and the QSFP28 data ports will be to initially attempt a network configuration using DHCP. If the network has been configured with a DHCP server to perform network discovery, the platform will be configured with the settings generated by the DHCP server.

If there is no DHCP server available on the network to configure the platform, the enclosure manager (EM) will fall back to an mDNS configuration and assign addresses to IOMs A and B, as well as to all 6 AICs, for a total of 8 link local addresses. The EM will also configure a name and ID for the platform itself. This base mDNS configuration will allow local access through the RJ45 management port to a direct-connect host or laptop. Connecting in this way will allow users to apply their own desired network settings.

### Enclosure ID and Link Local Address Patterns and Examples

The following table defines the design patterns that can be used to understand the addresses that are configured by mDNS.

**Table 19:** Address Design Patterns

Property	REST API URL	REST API Property	Format	Example
encId	/Storage/Devices/ <encId>	ID	<brand name>-<Serial Number>	openflex-data24- usalp04619xx0000
encName	/Storage/Devices/ <encId>	Name	<encId>	openflex-data24- usalp04619xx0000
IOM Hostname	/Storage/Devices/ <encId>/Controllers/ <controller-id>	Name	<encName>-iom< a   b>	openflex-data24- usalp04619xx0000-ioma
AIC Hostname	/Storage/Devices/ <encId>/Adapters/ <adapter-id>	Name	<encName>-ioma-aic< a   b   c>	openflex-data24- usalp04619xx0000- ioma-aicc

### Further resources

The following is a list of resources available to further assist in network configuration beyond this initial configuration.

- [Setting Static IPs on Ports \(page 83\)](#)
- [Port Setup Using Bash Script \(page 86\)](#)

## 5.3 Setting Static IPs on Ports

**Before you begin:** This procedure assumes the IOM IP addresses are known.

By default, the OpenFlex Data24 is set to use DHCP to assign IPv4 addresses to all of the adapter ports. This procedure shows how to use the OCAPI to set all of the adapter ports to static IP addresses. All examples will use cURL.

**Step 1:** Drill down into the OCAPI to access each Port object.

**Step 2:** Do a GET to the IOMs /query/ object to get the adapter addresses.

```
curl -i -u user:password http://10.20.30.40/query/
```

**Step 3:** Use the device URL obtained in the previous step to find the URLs for all of the Adapters in the IOM.

```
curl -i -u user:password http://10.20.30.40/Storage/Devices/openflex-data24-usalp03420xxxxxx/Adapters/
```

**Step 4:** The output will show all of the installed adapters, as well as their associated Ports at the bottom of each Adapter object that will lead to the associated Port object for that adapter for later reference.

```
{
  "Self": "http://10.202.249.56:80/Storage/Devices/openflex-data24-usalp03420xxxxxx/Adapters/1/",
  "ID": "1",
  "Name": "IOM-A-AIC-A",
  "Status": {
    "State": {
      "ID": 16,
      "Name": "In Service"
    },
    "Health": [
      {
        "ID": 5,
        "Name": "OK"
      }
    ]
  },
  "Ports": "http://10.202.249.56:80/Storage/Devices/openflex-data24-usalp03420xxxxxx/Ports/?adapterid=1"
},
```

**Step 5:** To find the Port object's specific device ID, query the Ports object associated with the device.

```
curl -i -u user:password http://10.20.30.40/Storage/Devices/openflex-data24-usalp03420xxxxxx/Ports/
```

**Step 6:** Find the desired Port ID in the output.

```
{
  "Self": "http://10.202.249.56:80/Storage/Devices/openflex-data24-usalp03420xxxxxx/Ports/00_0c_ca_11_00_40_10_202_249_56_24/",
  "ID": "00_0c_ca_11_00_40_10_202_249_56_24",
  "Status": {
    "State": {
      "ID": 16,
      "Name": "In service"
    },
    "Health": [
      {
        "ID": 5,
        "Name": "OK"
      }
    ]
  }
}
```

```

    ],
    "AddressOrigin": {
      "ID": 65536,
      "Name": "DHCPv4"
    },
    "IPv4Address": "10.202.249.56/24",
    "IPv4Gateway": "10.202.249.1",
    "MACAddress": "00:0c:ca:11:00:40",
    "NetworkType": {
      "ID": 8,
      "Name": "IPv4 Network"
    },
    "MTUBytes": 1500,
    "Controllers": "http://10.202.249.56:80/Storage/Devices/openflex-data24-
usalp03420xxxxxx/Controllers/?portid=00_0c_ca_11_00_40_10_202_249_56_24"
  }
}

```

**Step 7:** Send a HEAD to the Port object you wish to configure to secure the Etag for authorization purposes.

```
curl -i -u user:password -X HEAD http://10.20.30.40/Storage/Devices/openflex-
data24-usalp03420xxxxxx/Ports/00_0c_ca_11_00_40_10_202_249_56_24/
```

**Step 8:** Send a PUT to the Port object that contains the desired IPv4 address as well as the instruction to change the **AddressOrigin** parameter of that Port to **STATIC** instead of **DHCP** and the Etag collected from the previous step.

```
curl -i -u user:password -H "Content-Type: application/json" -H "If-
Match: 3677651d2011428f32120a029b015e80" -X PUT --data '{"AddressOrigin":
{"ID": 3}}{"IPv4Address": "10.50.50.50/24"}' http://10.20.30.40/Storage/
Devices/0123456789/Ports/00_0c_ca_11_00_40_10_202_249_56_24/
```

**Step 9:** Check the status of the Port by performing another GET to check the output.

```

{
  "Self": "http://10.202.249.56:80/Storage/Devices/openflex-data24-
usalp03420xxxxxx/Ports/00_0c_ca_11_00_40_10_202_249_56_24/",
  "ID": "00_0c_ca_11_00_40_10_202_249_56_24",
  "Status": {
    "State": {
      "ID": 16,
      "Name": "In service"
    },
    "Health": [
      {
        "ID": 5,
        "Name": "OK"
      }
    ]
  },
  "AddressOrigin": {
    "ID": 3,
    "Name": "STATIC"
  },
  "IPv4Address": "10.50.50.50/24",
  "IPv4Gateway": "10.50.50.1",
  "MACAddress": "00:0c:ca:11:00:40",
}

```

```

    "NetworkType": {
        "ID": 8,
        "Name": "IPv4 Network"
    },
    "MTUBytes": 1500,
    "Controllers": "http://10.202.249.56:80/Storage/Devices/openflex-data24-
usalp03420xxxxxx/Controllers/?portid=00_0c_ca_11_00_40_10_202_249_56_24"
}

```

## 5.4 Port Setup Using Bash Script

Users can leverage a Bash script available with the OpenFlex Data24 firmware package available at <https://portal.wdc.com/Support/s/>. The script will walk a user through the steps to configure a single port, and will have to be restarted for each Port.

The script will be named `init_iom_openflex-data24.sh`.

## 5.5 Installing Standalone OCAPI for In-Band Management

### Before you begin:

- a supported version of NVMe-CLI must be installed.
- The target OpenFlex Data24 must be either directly connected or visible on the network.

The OCAPI standalone distribution runs on an initiator or host, to which an NVMe device like OpenFlex Data24 is connected. The standalone OCAPI uses IOCTLs to send in-band commands to the in-band management interface on the NVMe devices in the OpenFlex Data24, and returns the data to the caller. This procedure provides instructions on how to install the OCAPI on a Linux initiator or host.

**Step 1:** Download the latest firmware bundle available at <http://westerndigital.com/support>. The bundle will contain a compressed archive called `openflex-api_matterhorn-master.0000.tgz` from the OpenFlex Data24.

**Step 2:** Untar the `openflex-api_matterhorn-master.0000.tgz` file to the desired directory on the Linux host, and into that directory.

**Step 3:** If `systemctl` will be used to manage the OCAPI service, use the following command to extract the binary:

```
sudo tar -xf openflex-api_matterhorn-master.0000.tgz -C
```

**Step 4:** If `systemctl` will not be used, remove the `-C` command modifier.

```
sudo tar -xf openflex-api_matterhorn-master.0000.tgz
```

**Step 5:** Run the binary using the desired system service and parameters.

**Step 6:** Discover and connect to the OpenFlex Data24 using NVMe-CLI `discover` and `connect`.

```

sudo nvme discover -t rdma -a <Data24_IPAddress>
sudo nvme connect -t rdma -a <Data24_IPAddress> -i 1 -n
nqn.1992-05.com.wdc.<Data24_Name>:nvme.2

```

**Step 7:** Use `id-ctrl` to verify the connection.

```
sudo nvme id-ctrl /dev/nvm#
```

A close-up photograph of a person's hand, wearing a silver ring, working on a server rack. The rack is filled with numerous blue LED lights, creating a vibrant blue glow. The hand is positioned near a vertical metal bar, possibly a latch or a connector. The background is dark, emphasizing the bright blue lights.

# Safety

## In This Chapter:

- Electrostatic Discharge..... 89
- Optimizing Location..... 89
- Power Connections.....89
- Power Cords..... 89
- Rackmountable Systems..... 90
- Restricted Access Location.....90
- Safety and Service..... 90
- Safety Warnings and Cautions..... 91

## 6.1 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.

## 6.2 Optimizing Location

---

Failure to recognize the importance of optimally locating your product, and failure to protect against electrostatic discharge (ESD) when handling your product, can result in lowered system performance or system failure.

Do not position the unit in an environment that has extreme high temperatures or extreme low temperatures. Be aware of the proximity of the unit to heaters, radiators, and air conditioners.

Position the unit so that there is adequate space around it for proper cooling and ventilation. 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.

## 6.3 Power Connections

---

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

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



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



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.

## 6.4 Power Cords

---



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

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

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

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

## 6.5 Rackmountable Systems

---

**CAUTION:** Always install rack rails and storage enclosure according to OpenFlex Data24 product documentation. Follow all cautions, warnings, labels, and instructions provided within the rackmount instructions.

Reliable grounding of rack-mounted equipment should be maintained.

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T<sub>ma</sub>) 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.**

## 6.6 Restricted Access Location

---

The OpenFlex Data24 are 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 **skilled** or **service persons** or by **instructed persons** 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.

## 6.7 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 an 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 OpenFlex Data24.



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.

## 6.8 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.

# Regulatory

## In This Chapter:

- Europe (CE Declaration of Conformity).....93
- FCC Class A Notice..... 93
- ICES-003 Class A Notice—Avis NMB-003, Classe A..... 93
- Japanese Compliance Statement, Class A ITE..... 93
- Taiwan Warning Label Statement, Class A ITE..... 94

## 7.1 Europe (CE Declaration of Conformity)

Marking by the symbol indicates compliance of this system to the applicable Council Directives of the European Union, including the Electromagnetic Compatibility Directive (2014/30/EU), the Low Voltage Directive (2014/30/EU), RoHS Directive (2011/65/EU) and EcoDesign Directive (2019/424/EU). A "Declaration of Conformity" in accordance with the applicable directives has been made and is on file at Western Digital Technologies, Inc. Europe.

### UK Import Representation Contact

**Western Digital UK Limited** Hamilton House, Regent Park, Kingston Road Leatherhead, Surrey KT22 7PL, GB, United Kingdom

**Telephone:** +44 1372 366000

## 7.2 FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.



**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Any modifications made to this device that are not approved by Western Digital may void the authority granted to the user by the FCC to operate equipment.

## 7.3 ICES-003 Class A Notice—Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## 7.4 Japanese Compliance Statement, Class A ITE

The following Japanese compliance statement pertains to VCCI EMI regulations:

この装置は、クラスA機器です。この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI — A

English translation:

This is a Class A product based on the Technical Requirement of the Voluntary Control Council for Interference by Information Technology (VCCI). In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective actions.

## 7.5 Taiwan Warning Label Statement, Class A ITE

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**警告使用者:**

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

**English translation:**

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.