



VIKINGTM
Enterprise Solutions

ONYX Series

Hardware Guide

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About the User Guide & Helpful Resources

This hardware guide includes detailed product information and guidance designed to help the system administrator and technicians responsible for installation, configuration, maintenance, and observation of the ONYX Series system.



WARNING: Only skilled persons having the relevant education or experience, or instructed persons who are instructed or supervised by a skilled person who has experience in various energies and energy magnitudes used in this equipment should operate, install, or handle the ONYX Series system or any system components.

About the Guide

The ONYX Series Hardware Guide ensures the user has the information necessary to successfully install and maintain the system.

GUIDE ORGANIZATION

The guide begins with an overview of the ONYX Series system layout and design, and explores the configuration options available to the ONYX Series user. Comprehensive instructions guide users through system installation, power functionality, and system monitoring tools. Should any of the field replaceable units (FRUs) require servicing or replacement, the chapter on system maintenance offers solutions.

HELPFUL INFORMATION

Colored “call-outs” provide the user with important safety alerts and usage tips in the form of critical warnings (red), safety cautions (yellow), informational notes (green), and reference icons (open book). Hot links provide instant access to related topics of discussion. These supportive tools ensure each user has the information necessary to install and maintain the ONYX Series system successfully.

Warnings, Cautions, Notes, & References

A number of icons display throughout the guide to alert the user to take precautions against the possible loss of data, warn of the potential risk of electrical or other hazards, and offer additional helpful information. Always follow all warnings and cautions provided throughout this documentation.

	WARNING: “ELECTRICAL HAZARD” symbols warn the user of the potential for property damage, personal injury, or death due to electric shock or other hazards.
	HEAVY OBJECT: “HEAVY OBJECT” warnings advise the user to take special precautions and obtain help during receiving and installation as the system can weigh hundreds of pounds fully loaded.
	ESD-DEVICE: Electrostatic discharge (ESD) device warnings remind the user to take protective measures to avoid damage to system components due to electrostatic discharge.
	CAUTION: The “CAUTION” symbol instructs the user to take precautions to prevent damage to the product, loss of data, or personal injury.
	SHARP: Use care when handling the product to avoid injury due to sharp pins or edges that can puncture or cut the skin. Always exercise caution when handling boards and components.
	HOT SURFACE: The “HOT SURFACE” symbol reminds the user that integrated circuits and heat sinks might become hot if the system has been running for any length of time. Always use care when handling the board and components.
	NOTE: Pencil notes give the user information that will help them make the best use of the product.

Revision History

CTC-DOC-003005

Rev.	Date	Source	Revision Description
1	05/20/2023	HH	Initial release.

Helpful Resources

This section provides additional system documentation for the ONYX Series system, and includes instructions for obtaining the latest firmware updates.

PRODUCT DOCUMENTATION

Whether using the documentation available in the VES Online Document Library, or visiting other product-specific industry resources, the information provided will assist the user in gaining a better understanding of the product design and application.

VES Online Document Library

Viking Enterprise Solutions™ product documentation is available via the VES Online Document Library, which is maintained on a secure site. To access the library, email customersupport@vikingenterprise.com and request the secure login and password for the ONYX Series system document library. The following additional documentation is available for download:

- ONYX Series VESq Software Guide

FIRMWARE UPDATES

Viking Enterprise periodically releases firmware updates for the ONYX Series system. Check the VES Online Document Library frequently to ensure the storage enclosure is running the latest firmware. The accompanying release notes include the update installation instructions. To access the library, email customersupport@vikingenterprise.com and request the secure login and password for the ONYX Series system document library.



For firmware installation instructions, refer to the release notes PDF included with the firmware files.

Supplement **Product Safety & Handling**

This product supplement includes important safety and handling information for users to consider prior to system installation. Read all safety warnings, cautions, and notes thoroughly and contact a sales representative with any questions.

	WARNING: Only skilled persons having the relevant education or experience, or instructed persons who are instructed or supervised by a skilled person who has experience in various energies and energy magnitudes used in this equipment should operate, install, or handle the VDS41022 EXPANSION Enclosure or any system components.
	WARNING: This product is designed to be installed in a Restricted Access area accessible only to skilled persons and instructed persons with the proper authorization
	WARNING: This equipment is not suitable for use in locations where children are likely to be present.
	WARNING: Each storage subsystem must have a good electrical ground connection through each power cord and through the building power grid to the point of origin at the building's power source.
	WARNING: There is no power switch on this unit. Once the power cord is connected to an active power distribution unit (PDU), the system starts. Two power cords must be unplugged from the PDU receptacle to properly shut down the chassis.
	WARNING: While some factory-approved maintenance on FRUs (e.g. hot-swapping a power supply, disk drive, or I/O module (IOM)) does not require the user to disconnect power to the system, performing other types of maintenance on systems connected to an electrical power supply may result in serious injury or death. Only individuals with knowledge and training working with devices containing live circuits should operate the system. Take precautions when performing all other types of maintenance. Disconnect 2 power supply cords before servicing.
	WARNING: The power cords included with the system extend 1.4 meters (4.6 feet) beyond the chassis. If an extension is necessary, the extension cord must not exceed 1 meter (3.3 feet), so that the power cord plus extension cord does not exceed 2.4 meters (7.9 feet). It must be: <ul style="list-style-type: none"> ▪ Certified ▪ Rated minimum 300V, 15A
	WARNING: Do not connect or disconnect any cables to this device during an electrical storm.
	WARNING: This EXPANSION enclosure operates between 5°C (41°F) and 35°C (95°F); however, enclosure temperatures during transit could reach 70°C (158°F). Use care when touching machinery as the surface may be hot.
	WARNING: This EXPANSION enclosure operates between 5°C (41°F) and 35°C (95°F); however, temperatures of interior components during normal operation could be much higher. Use care when touching components as they may be hot.

	<p>ESD-SENSITIVE DEVICE: Only install the device on a properly grounded electrostatic discharge (ESD) protection surface to avoid damage to the components. Always utilize a properly grounded ESD wrist strap or mat during operation or installation of the device, or when connecting the cables.</p>
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	<p>HEAVY OBJECT: This system weighs 116.1 kilograms (~256.0 pounds) when drives, PSUs and IOMs are installed (does not include the CMA or chassis member rails). Prevent personal injury and equipment damage; obtain assistance during rack installation and when sliding the unit in or out of a rack. If necessary, reduce the weight of the enclosure by removing the disk drives, PSUs, and IOMs prior to installation. Use a lift table or forklift as a safe alternative to physically lifting the system.</p>
	<p>WARNING: The handles mounted on the front of the enclosure are designed only for the purpose of extending the enclosure from the rack into the serviceable position. They will not support the entire weight of the enclosure. Do not attempt to lift the enclosure by the handles, They will break and damage to the enclosure and/or personal injury may occur.</p>
	<p>CAUTION: Take precautions before connecting the enclosure to a power source to ensure that the equipment does not overload circuits, or negatively impact over-current protection and supply wiring. Check the equipment nameplate ratings when addressing power concerns.</p>
	<p>CAUTION: Hot-swapping FRUs must be completed within five minutes to ensure proper system cooling or thermal damage to drives may result.</p>
	<p>CAUTION: Mechanical Loading—Prevent instability and hazardous conditions due to uneven loading by installing heavier items into the bottom of the equipment rack and lighter items on top.</p>
	<p>CAUTION: Place the equipment rack in a dust-free, well-ventilated area close to either a single power source protected by a universal power supply (UPS), or two separate power sources; one for each power supply. Leave enough room behind the rack for servicing and to allow sufficient airflow from front to back.</p>
	<p>CAUTION: Install the IOM in the proper “release tabs up” orientation. Ensure the edge fingers on the IOM properly mate with the connectors in the IOM option slot inside the storage enclosure. Never force the module into the enclosure. Take care not to bend or twist the IOM during installation. If a connector is damaged or bent, or a data connector is broken, return the module for servicing.</p>
	<p>NOTE: For equipment racks with single or multiple storage subsystems installed, the typical TMRA (manufacturer’s maximum recommended ambient) is 35°C (95°F). (Refer to the product user guide to obtain the actual TMRA for the product.) When installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient; therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer’s maximum recommended ambient temperature.</p>
	<p>NOTE: To obtain a copy of the product documentation, email customersupport@vikingenterprise.com.</p>



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

About the ONYX Series System

Product Highlights & Features

Each of the special features of the ONYX Series system are presented in this section, including mechanical, storage, electrical, and behavioral system aspects. The ONYX Series system is shown in Figure 1.1.

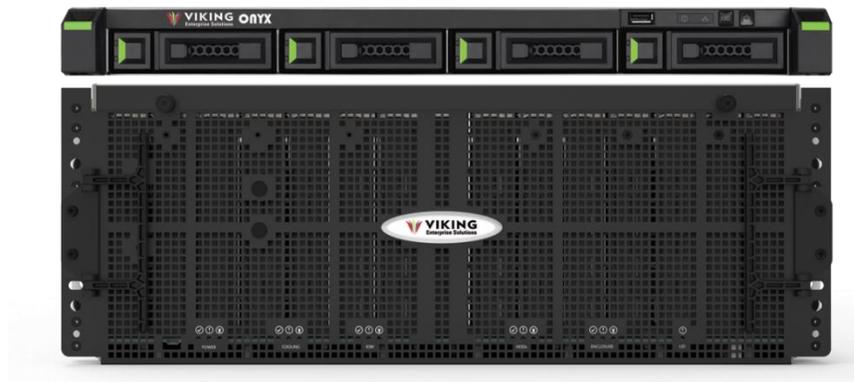


Figure 1.1 ONYX Series System

SYSTEM OVERVIEW

The Viking Enterprise Solutions (VES) ONYX Series dense network attached storage solution is designed for high capacity and storage demanding environments. The turnkey ONYX 10400S small 5U footprint saves on deployment costs while providing seamless multi petabytes scaling capability via multiple EXPANSION enclosures. This model is optimized for versatile I/O expansion and reliable multi-layer security that ensures bulletproof data protection.

ONYX SERIES 1U CONTROLLER

The ONYX series features a unique design: the system controls and indicators are located on the right ear. The system controls and indicators module integrate functional buttons and system state indicators, which can be easily operated and read by user.

Figure 1.2 shows the system controls and indicators of the ONYX Series 1U controller.

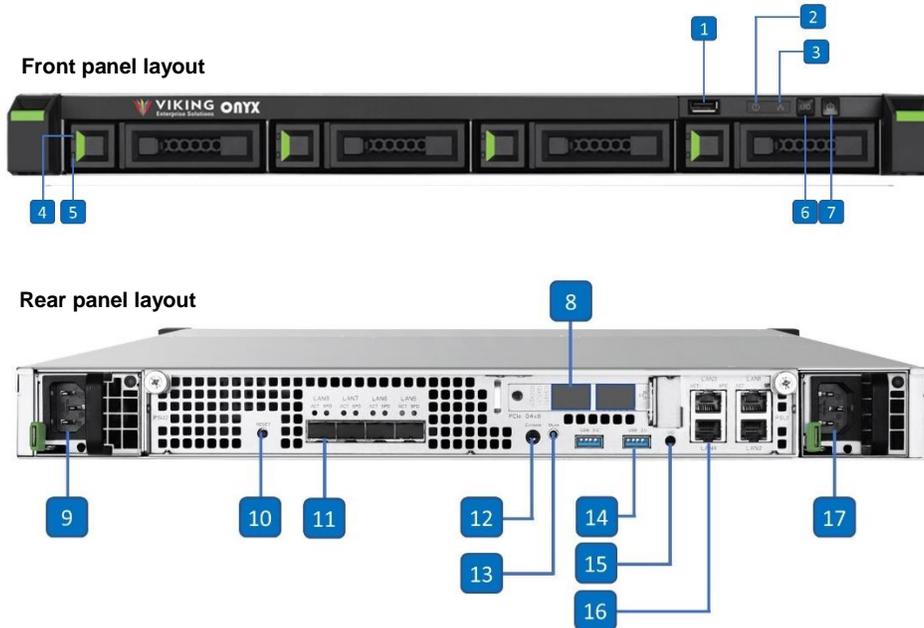


Figure 1.2 system controls and indicators of the ONYX Series Controller

Descriptions of the system controls and indicators

1. USB Port
2. Enclosure Status LED
3. Enclosure Access LED
4. Disk Drive Status LED
5. Disk Drive Power LED
6. UID (Unique Identifier) Button / LED
7. Enclosure Power Button / LED
8. Host SAS Ports
9. Power Supply Unit 1
10. Reset to Factory Default Button
11. 10 GbE (SFP+) LAN Ports
12. Console Port
13. Buzzer Mute Button
14. USB Port
15. UID (Unique Identifier) LED
16. 2.5 GbE (RJ45) LAN Port
17. Power Supply Unit 2

The figure below illustrates the ONYX Series 1U controller disk drive numbering. The disk drive numbering starts from left column.



Figure 1.3 ONYX Series Controller disk drive numbering

STORAGE EXPANSION ENCLOSURE

This section includes a summary of many of the VDS41022 Expansion Enclosure features and benefits. For assistance or questions with any of these features, contact a Viking Enterprise Solutions™ sales representative.

The enclosure front contains a customizable badge that is available to accommodate customer-specific branding requirements. System status LEDs display from the front of the enclosure as shown in Figure 1.4.

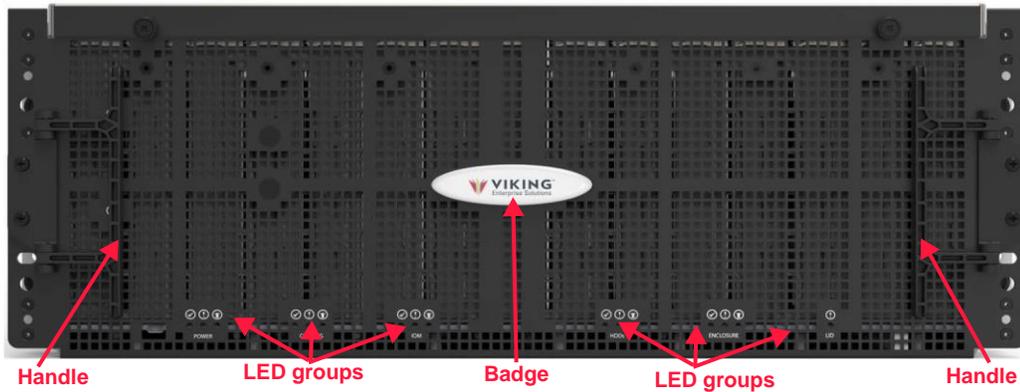


Figure 1.4 Enclosure front plate and badge area indicators

Figure 1.4.1 shows the contents of the expansion storage enclosure.

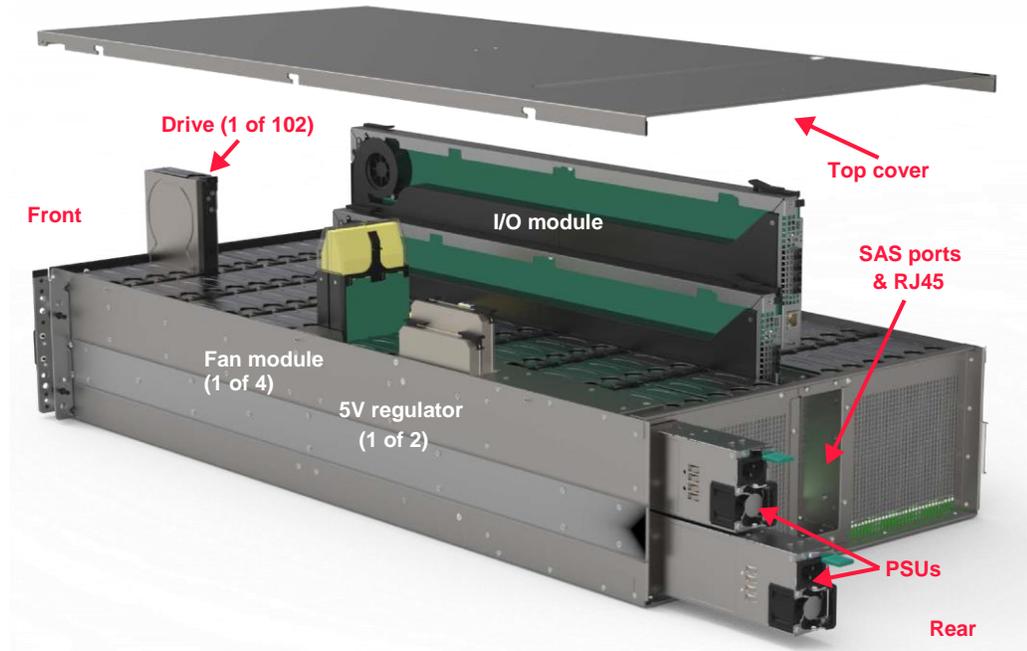


Figure 1.4.1 Storage enclosure—cover removed

Four fan modules, each containing two dual impeller 40 mm fans—eight individual fans per enclosure—provide system cooling. Two hot-swappable and fully redundant power supply units (PSUs) and two 5V DC regulators power the system. In addition, the enclosure supports one or two I/O modules (IOMs). If one IOM is used, the other IOM slot must be filled with an IOM blank. A dual IOM configuration provides redundancy and enhanced performance.

Rack

- Standard 19-inch rack with cable management
- 4U high
- 92.7-centimeter (36.5-inch) enclosure depth
- 100-centimeter (39.4-inch) enclosure depth with cable management assembly (CMA) installed
- Rail kit supports 68.6-centimeter (27-inch) to 81.3-centimeter (32-inch) rack depth
- 94-centimeter (37.0-inch) minimum travel to serviceable position
- Conforms to EIA-310-D Specifications

Storage Expansion Enclosure

- Under top enclosure cover:
 - 102 3.5-inch drive bays
 - Two I/O option slots

- Two 5V regulator slots
- Four fan module slots
- Conforms to Small Computer System Interface (SCSI) enclosure services (SES) 3.0 T10/2149-D Specifications
- In-band (SES)
- Drive zoning support

Fan Modules

- Four fan modules, each with two dual impeller 40 mm fans
- Hot-swappable
- Bi-color LED indicator
- N+1 redundant

I/O Modules

- One EXPANSION IOMs
 - Support up to a total of four enclosures

Power Supply Units

- Two PSUs
- 200–240V (±10%) ~9.48A max @ 200V AC
- Hot-swappable and fully redundant

Regulators

- Two 5V DC regulators
- Hot-swappable and fully redundant

LEDs

- 5V DC regulators
- Enclosure status
 - Fan modules
 - Drives
 - IOMs and SAS ports
 - PSUs

System Layout & Design

This section provides an overview of the enclosure layout and design, and discusses field-replaceable unit (FRU) vital product data (VPD) identification,

system power, system cooling, and the drive carrier assemblies. The CMA—integral to the enclosure and varying rack configurations—is discussed as well.

ENCLOSURE OVERVIEW

Each enclosure provides a multitude of features designed to provide high-powered, customizable performance. This section provides the enclosure dimensions and weight, and discusses the front, rear, and top features.

Dimensions

ONYX Series 1U controller dimensions

Parameter	Measurement
Overall length	51.0 cm (20.0 in.)
Width	43.8 cm (17.2 in.)
Height	4.4 cm (1.7 in.)

VDS41022 Storage Expansion Enclosure dimensions

Parameter	Measurement
Overall length	98.0 cm (38.6 in.)
Chassis length - Rack mounting surface to rear connectors' surface.	92.7 cm (36.5 in.)
Depth - Front surface of enclosure to end of CMA arms.	100.0 cm (39.4 in.)
Width	43.8 cm (17.2 in.)
Front width w/ rack ears	48.3 cm (19.0 in.)
Height	17.5 cm (6.9 in.)

Weights

ONYX 1U Controller Weights

Component	System Total	Weight	Extended Weight
1U Appliance Chassis - including baseboard and PSU riser	1	13.2 kg (29.1 lbs)	13.2 kg (29.1 lbs)

VDS41022 Expansion Enclosure Weights

Component	System Total	Weight	Extended Weight
Chassis - including baseboard and PSU riser	1	36.8 kg (81.2 lbs)	36.8 kg (81.2 lbs)
5V DC regulators	2	0.2 kg (0.4 lbs)	0.4 kg (0.8 lbs)
Drives and carriers	102	0.7 kg (1.6 lbs)	74.0 kg (163.2 lbs)
Fan modules	4	0.3 kg (0.6 lbs)	1.1 kg (2.4 lbs)
IOMs	2	0.9 kg (2.0 lbs)	1.8 kg (4.0 lbs)
PSUs	2	1.0 kg (2.2 lbs)	2.0 kg (4.4 lbs)
System Weight			116.1 kg (256.0 lbs)
CMA w/ cables	1	3.2 kg (7.0 lbs)	3.2 kg (7.0 lbs)
Rail Kit	1	5.4 kg (12.0 lbs)	5.4 kg (12.0 lbs)
Total Weight	--	--	275.0 lbs (124.7 kg)

Top

The top enclosure cover must be removed to service the 5V regulators, drives, fan modules, or IOMs. The main drive cavity contains 102 drive bays that support 3.5-inch HDDs or 2.5-inch SFF HDDs or SSDs (SFF drives require adapters).

Figure 1.5 shows the components inside the system with the top cover removed, including two 5V regulators, 102 drive bays fully populated with 102 drive carrier assemblies (drive carriers containing drives or drive blanks), four fan modules— each containing two dual impeller 40 mm fans—and two IOMs.

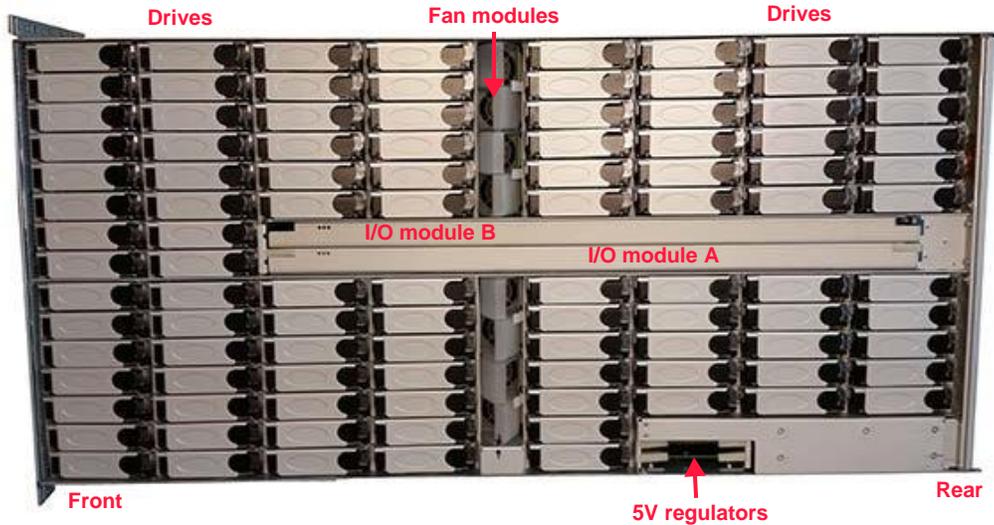


Figure 1.5 Inside top cover

Rear

The rear of the enclosure houses the two PSUs and provides access to the four 4-wide 24 Gbps SAS ports and RJ45 connector on each IOM operator panel.

Figure 1.6 identifies the components in the rear of the VDS41022 EXPANSION Enclosure.

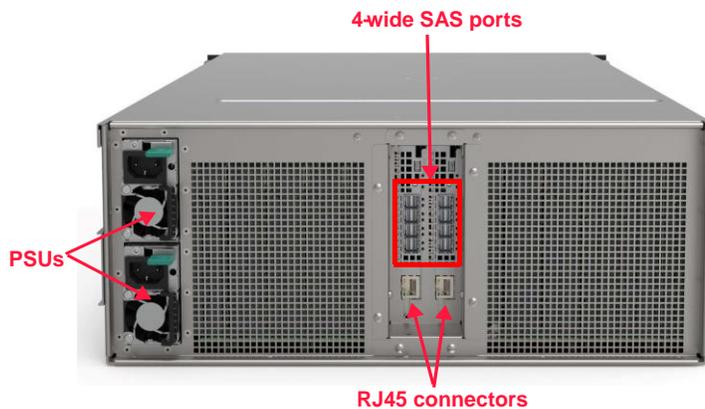


Figure 1.6 Enclosure rear

FIELD-REPLACEABLE UNITS

The VDS41022 EXPANSION Enclosure includes the following hot-swappable field-replaceable units (FRUs):

- 5V DC Regulators (P/N NDS41020-FRU-004)
- Drive Carrier Assemblies (P/N NDS41020-FRU-014)
- Fan Modules (P/N NDS41020-FRU-008)
- IOM(s) (P/N VDS41022-FRU-002)
- IOM blanks (P/N NDS41020-FRU-009)
- PSUs (P/N NDS41020-FRU-005)

The vital product data (VPD) EEPROM, located on the enclosure's baseboard, stores VPD data regarding each FRU, such as the FRU version and serial number. Additional fields may be included in a customer-definable section of the VPD data. Each FRU includes a visible label that displays the part and serial numbers in bar code-readable format. (It may be necessary to remove the FRU from the chassis to read the label.)



WARNING: While some factory-approved maintenance on FRUs (e.g. hot-swapping a power supply, disk drive, or IOM) does not require the user to disconnect power to the system, performing other types of maintenance on systems connected to an electrical power supply may result in serious injury or death. Only individuals with knowledge and training working with devices containing live circuits should operate the system. Take precautions when performing all other types of maintenance. **Disconnect 2 power supply cords before servicing.**

5V DC Regulators

Two, hot-swappable, fully redundant 5V DC regulator cards are located on the rear baseboard of the enclosure. Each regulator card provides 5.2V from the 12V DC provided by the PSUs. The system can run off of one of the 5V regulators indefinitely. The second 5V regulator is provided for redundancy only. The 5V DC regulator card is shown in Figure 1.7.



Figure 1.7 5V DC regulator card

Drive Carrier Assemblies

The 102 drive carrier assemblies consist of a drive (or drive blank) and drive carrier. Each drive carrier provides for controlled insertion and extraction of the drives, and ensures complete seating of the drive through typical operational shock and vibration. Drives are hot-swappable. Every row containing one or more drives must be completely filled with drive carriers containing either drives or drive blanks.

Supported drives include SAS or SATA, 3.5-inch HDDs or 2.5-inch SFF HDDs or SSDs. (2.5-inch drives require adapters.) All drive capacities and spindle speeds are supported. SAS drives are dual-ported and the enclosure provides drive on/off power control for SAS-4 devices. SATA drives are single-ported; SATA drive power control is not available.

Drive status is controlled by an enclosure management processor (EMP) that communicates via an I2C interface to each IOM. Disk drive firmware download is supported in-band for SAS enterprise drives. Figure 1.8 provides a close-up view of a drive carrier assembly.

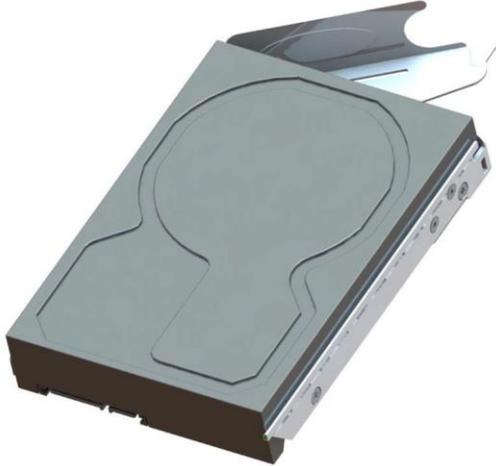


Figure 1.8 Drive carrier assembly

Drive Mapping & Zoning

Drives are mapped according to their location within the enclosure. Groups of drives are further divided into zones, which enable the user to control data access based on user, location, or a number of other criteria. The VDS41022 EXPANSION Enclosure supports multiple zoning configurations for the IOM architectures; however, SATA drives only report to IOM A.

VDS41022 I/O Module(s)

Up to two hot-swappable SAS-4 VDS41022 I/O Modules (IOMs) are installed via the top of the storage enclosure. Each IOM provides four 4-wide SAS data-links (mini-SAS HD), any of which can be used as host or expansion ports to additional VDS41022 EXPANSION Enclosures. The IOM is shown in Figure 1.9



Figure 1.9 VDS41022 I/O Module

Configurations

The storage enclosure supports IOMs in single or dual configurations.

- **Single configuration:** One IOM is installed on the right side of the enclosure (as viewed from the enclosure front) in slot A. One blank filler canister is installed in slot B (on the left). Figure 1.9.1 shows the IOM slot locations.

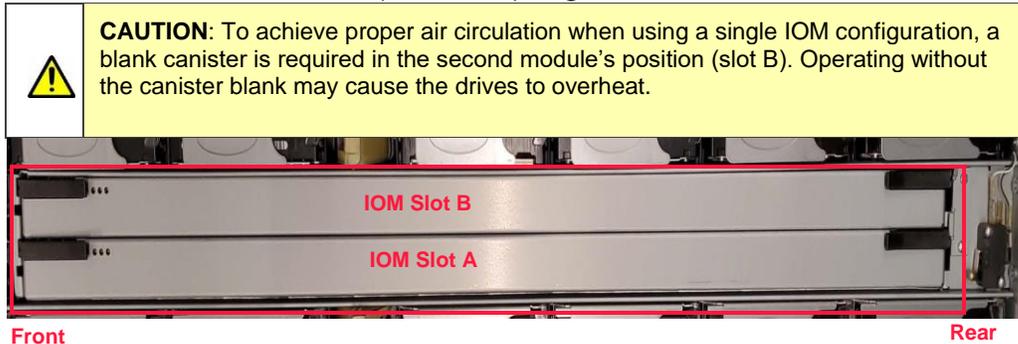


Figure 1.9.1 IOM slot locations

- **Dual configuration:** Two IOMs are installed side-by-side in the slots shown in Figure 1.9.

PSUs

The VDS41022 EXPANSION Enclosure is powered by dual N+1 redundant PSUs, an example of which is shown in Figure 1.10. Each PSU is high-efficiency, hot-swappable, and has active current sharing so long as both are of the same model and wattage. A single PSU can power the storage enclosure indefinitely; however, both supplies are required to ensure N+1 redundancy. Each PSU includes an independent fan for self-cooling and airflow over the 5V regulators.

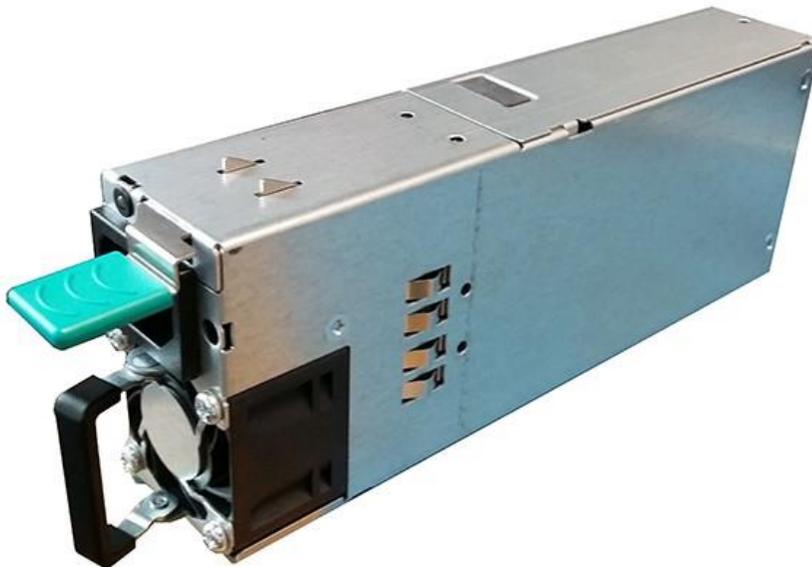


Figure 1.10 PSU

Fan Modules

The enclosure's cooling system is designed to support N+1 redundancy. Four hot-swappable fan modules are used to cool the system. Each fan module contains two 40 mm dual impeller fans for a total of eight fans per enclosure. The fan modules are mounted vertically to ensure optimal efficiency. A fan module is shown in Figure 1.11



Figure 1.11 Fan module

The Storage Enclosure Processor (SEP), located on the IOM, controls fan speed; fan speeds are reported by SES. Should a fan fail, the remaining fans will increase their speed to maximum until the defective fan is replaced.

LEDS

The system status LEDs are visible through the enclosure's front panel, as shown previously in Figure 1.4, and identify the operational status of the various FRUs within the enclosure. When a fault condition occurs, the associated FRU group status LED illuminates, e.g. drives, fan modules, IOMs, or power. Once directed to the group containing the failed FRU, check the individual FRU LEDs to identify the specific component that has failed.

Environmental Specifications

The following section provides information on the system’s environmental specifications, including system temperature and humidity, and shock and vibration.

TEMPERATURE & HUMIDITY

- Maximum Ambient Air Temperature
 - 35°C (95°F) to inlet of storage enclosure

Climate specifications for system temperature, relative humidity (RH), and altitude during operation, non-operation, and transit are shown in Table 1.12 on page 15.

Parameter	Operating	Non-Operating	Transit
Temperature	5°C to 35°C (41°F to 95°F)	5°C to 45°C (41°F to 113°F)	-40°C to 70°C (-40°F to 158°F)
Relative Humidity	20% to 80% noncondensing	10% to 90% noncondensing	10% to 90% noncondensing
Altitude	-61 to 3,048 m (-200 to 10,000 ft)	-61 to 3,048 m (-200 to 10,000 ft)	-61 to 12,192 m (- 200 to 40,000 ft)

Table 1.12 Environmental specifications

*. Maximum operating temperature is specified at sea level and is derated 2 percent per 305 m (1,000 ft) of increased altitude.

SHOCK & VIBRATION

Shock and vibration levels are tested in a simulated rack condition. The results are shown in Table 1.13.

Test Parameter	Level	Frequency Range	Duration (Sweep Rate / # of Shocks)
Operating Vibration	0.10 G, 0-peak swept sine	5-500 Hz	1 complete sweep 1/2 octave/min
Operating Random Vibration	0.15 Grms	5-500 Hz	10 minutes
Operating Shock	3.5 G, 0-peak 11 ms half sine		3 positive shocks 3 negative shocks
Non-operational Vibration	0.3 G, 0-peak swept sine	5-500 Hz	1 complete sweep 1/2 octave/min
Non-operational Random Vibration	0.5 Grms	5-500 Hz	10 minutes

Non-operational Shock	7 G, 0-peak 11 ms half sine		3 positive shocks 3 negative shocks
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Table 1.13 Shock and vibration levels

Additional Safety Precautions

The following additional safety precautions help to ensure safe and proper installation and operation of the VDS41022 EXPANSION Enclosure.



Refer to the supplement titled “Product Safety & Handling” that begins on page xvii for more information on system-specific safety warnings and special handling notes, as well as those provided elsewhere throughout this guide.

	CAUTION: Hot-swapping FRUs must be completed within five minutes to ensure proper system cooling or thermal damage to drives may result.
	NOTE: The maximum current draw is listed on each PSU label. For example, if the maximum input for one PSU is 200–240V (±10%) ~9.48A max, this rating is for one PSU and there are two PSUs per enclosure sharing the load.

Certifications

The VDS41022 Expansion Enclosure is designed to meet the following requirements.

- RoHS and WEEE compliant
- Safety
- CE
- Federal Communications Commission (FCC) Federal Code of Regulation, Title 47, Part 15 for Class A devices
 - Electromagnetic Interference (EMI)/Electromagnetic Compatibility (EMC) for FCC Part 15A
 - CISPR 22:2008 emissions



NOTE: The enclosure also meets other countries’ regulatory requirements as defined by the country marks on the regulatory label at the rear of the product. Additional certifications may be added without notice.

Chapter 2 **Connection & Configuration Options**

Chapter 2 provides an overview of the connection and configuration option for the ONYX series system. The following subjects are discussed:

- Connecting the System
- System Configuration Options
- Zoned Configurations

Connecting the System

This section includes a description of each of the recommended cables necessary to get up and running on the system, and an overview of the available ports on the ONYX series controller and expansion enclosure I/O Module (IOM) operator panel.

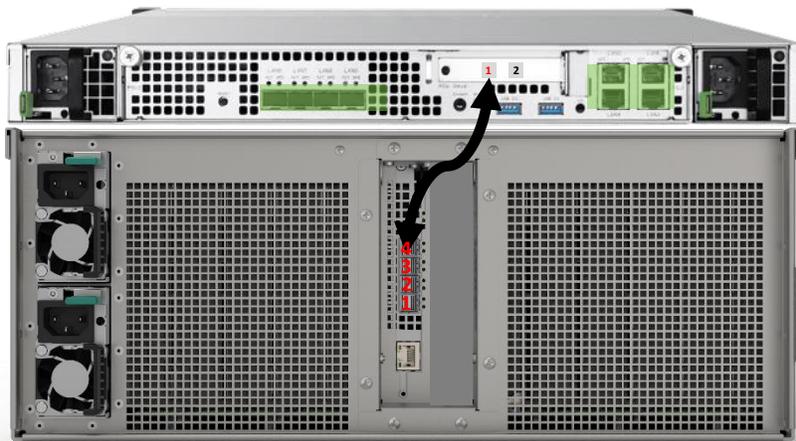


Figure 2.1 ONYX Series SAS Connectivity

SYSTEM CABLING & MANAGEMENT

Ensure the appropriate cabling and cable management are available prior to installing the ONYX series system into the rack.

ONYX Series SAS Connectivity

Connect the provided HD mini-SAS cable from port #1 of the ONYX Series controller to port #4 of IOM A on the VDS41022 Expansion enclosure as shown on Figure 2.1.

Power Cords

Total of four power cords supplied with the ONYX series, two power cords for the ONYX series controller and two power cords for the VDS41022 expansion enclosure. To order additional power cords, please contact a Viking Enterprise Solutions™ support representative. Do not use extension cords or other third-party power cords with this enclosure. Additionally, VES recommends the use of an uninterruptible power supply (UPS).



WARNING: While some factory-approved maintenance on FRUs (e.g. hot-swapping a PSU, fan, IOM, regulator, or drive) does not require the user to disconnect power to the system, performing other types of maintenance on systems connected to an electrical power supply may result in serious injury or death. Only individuals with knowledge and training in working with devices containing live circuits should operate the system. Take precautions when performing all other types of maintenance.
Disconnect power supply cords before servicing.

SAS Cables

One high quality mini-SAS HD (SFF-8644) cables are provided.

If longer cable is needed, it should meet the following requirements:

- Maximum Length: 6.0 meters (19.7 feet) for passive copper cables. Active optical cables can also be used if longer lengths are needed.
- There is no maximum length for active cables.



Ethernet Cables

Only high-quality Ethernet cables are recommended as follows:

- RJ45 Ethernet cables that support 10/100/1000 Mb/s



Cable Management

Cable management aids in better routing and securing of the system's cabling. The CMA hardware simplifies cable organization in a rack configuration and enables the enclosure to slide easily into and out of the rack without cable interference.

I/O MODULE OPERATOR PANEL

The ONYX expansion enclosure, VDS41022, I/O Module operator panel is pictured in Figure 2.3. The operator panel enables the following tasks to be completed:

- Monitor I/O status via the LEDs
- Connect to the following ports:
 - Four 4-wide 24Gbps SAS ports
 - 1 gigabit Ethernet (GbE) RJ45
 - USB Mini-B (for Viking technician use only)

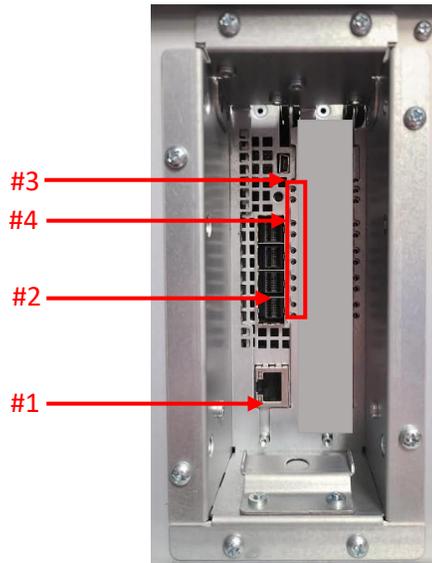


Figure 2.3 IOM operator panel

Each of the operator panel connectors and indicators shown in Figure 2.3 is identified in Table 2.1 on page 20. Details include information on the Ethernet, USB Mini-B, four SAS host ports (numbered as shown), and I/O status LEDs.

Item#	Feature	Description
1	1 GbE RJ45	Provides a 1 GbE port for connection to a network.
2	12 or 24 Gb/s SAS Host Ports 1-4	Four 4-wide SAS ports provide expansion capabilities to additional enclosures, or may be used as input ports.
3	USB Mini-B Connector	Provides a serial connection to an input device such as a laptop computer or KVM. For use by Viking technicians only.
4	Status LEDs	Indicate system conditions.

Table 2.1 Operator panel connectors and indicators

System Configuration Options

I/O MODULE CONFIGURATIONS

The ONYX Series VDS41022 expansion enclosure comes with a single and IOM configuration. Single IOM configurations include one IOM installed through the top of the enclosure into slot A (on the right as viewed overhead from the enclosure front), and a module blank must be installed into slot B (on the left). Module blanks help to ensure proper system cooling and are required when using single configurations.



Figure 2.4 Single IOM configuration



CAUTION: To achieve proper air circulation when using a single IOM, a blank canister is required in IOM slot B. Operating without the blank canister may cause the drives to overheat.

EXPANSION

Single Host Configuration

When using a single host configuration, the I/O controller module must be installed in I/O slot A, which is the slot on the left side of the enclosure as viewed facing the enclosure rear. One IOM blank is installed in I/O slot B (on the right as viewed facing the enclosure rear) to maintain proper airflow and system cooling. In the following example, all 102 drives are viewable by Host 1. The mini-SAS HD cable may be installed in any of the four available SAS ports shown in

Figure 2.5. Cables may be installed into all four ports to enhance performance.

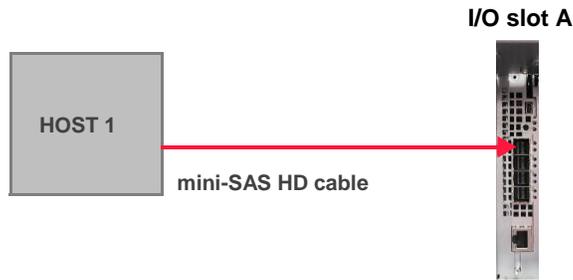


Figure 2.5 Single host configuration

Zoned Configurations

Zoning enables drives within a group, or zone, to be assigned to specific SAS ports on an IOM. Four possible drive zoning configurations are available to choose from when purchasing an IOM architecture. The customer's preselected zoning configuration is preset at the factory prior to delivery. Zoning can be changed using SES commands as outlined in the SES Specification document located on the VES Online Document Library.

DRIVE MAPPING

Drives are first mapped according to their location within the enclosure. Each drive is numbered from 1 through 102. While viewing overhead from the enclosure's front, drive numbering begins in the bottom left corner and increases incrementally left to right, and then from front to back. Table 2.2 illustrates the drive mapping.

Front of Enclosure														
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
43	42	41	40	39	38	37	I/O Module A	I/O Module B	36	35	34	33	32	31
56	55	54	53	52	51	50			49	48	47	46	45	44
Fan Modules							Fan Modules							
69	68	67	66	65	64	63			62	61	60	59	58	57
5V Regs		80	79	78	77	76			75	74	73	72	71	70
PSUs		91	90	89	88	87			86	85	84	83	82	81
		102	101	100	99	98	Host Ports		97	96	95	94	93	92
Rear of Enclosure														

Table 2.2 Drive mapping

Chapter 3 Installing the VDS41022 Expansion Enclosure Into a Rack

The following chapter describes the procedures for installing the VDS41022 Expansion Enclosure into a standard 19-inch rack. Instructions are provided for:

- Installation Safety & Handling
- Planning & Preparation
- Installing the Enclosure into the Rack

Preliminary information about installing the Cable Management Assembly is also provided.

Installation Safety & Handling

Prior to installation of the VDS41022 Expansion Enclosure, read the following safety warnings, cautions, and notes, as well as those detailed in “Product Safety & Handling” on page xvii and elsewhere throughout this documentation. Observing all recommendations will help to ensure user safety, as well as system longevity and proper functionality.

	WARNING: This EXPANSION enclosure operates between 5°C (41°F) and 35°C (95°F); however, enclosure temperatures during transit could reach 70°C (158°F). Use care when touching machinery as the surface may be hot.
	WARNING: This EXPANSION enclosure operates between 5°C (41°F) and 35°C (95°F); however, temperatures of interior components during normal operation could be much higher. Use care when touching components as they may be hot enough to cause serious injury.
	CAUTION: The storage enclosure is designed to remain operational during a service action, such as replacing a drive, I/O module (IOM), fan, or power supply unit (PSU). All service actions performed while the system is operational must be completed within five (5) minutes to ensure proper system cooling.
	NOTE: The maximum current draw is listed on the label on each PSU. If the recommended amounts are 200–240V (±10%) AC ~9.48A max, this is for one PSU and there are two PSUs per storage enclosure sharing the load.

Planning & Preparation

Planning ensures the installation process goes smoothly. The recommendations provided help the user properly plan for installation, and includes the steps necessary to install the VDS41022 Expansion Enclosure.

INSTALLATION CHECKLIST

	<p>HEAVY OBJECT: This system weighs approximately 116.1 kilograms (256.0 pounds) when all 102 drives, two PSUs, and two IOMs are preinstalled at the factory. (This weight does not include the container weight.) A fully loaded system weighs 124.7 kilograms (275.0 pounds) with the rails and CMA installed. Prevent personal injury and equipment damage. Obtain assistance during rack installation and when sliding the system in or out of the rack.</p>
	<p>NOTE: The enclosure depth is 92.7 centimeters (36.5 inches) without the CMA, and 39.4 (100.0 centimeters) with the CMA installed.</p>

1. The rail kit supports a 68.6-centimeter (27-inch) to 81.3-centimeter (32-inch) rack depth.
2. Plan the system environment beforehand to ensure that the following conditions are met:
 - a. There is access to 200–240V (±10%) AC.
 - b. There is enough room around the rack to allow for future servicing.
 - c. There is sufficient air flow around the system.
 - d. The space is dust-free and well-ventilated.
 - e. The space is close to an uninterruptible power supply (UPS) and that appropriate power is available. The maximum wall current for each power supply is ~9.48A.
4. Lifting the system into and out of the rack requires at least two people (A forklift or lift table is recommended). Always obtain help when lifting the system, or when negotiating the system into and out of the rack.

	<p>WARNING: The handles mounted on the front of the enclosure are designed only for the purpose of extending the enclosure from the rack into the serviceable position. They will not support the entire weight of the enclosure. Do not attempt to lift the enclosure by the handles, they will break and damage to the enclosure and/or personal injury may occur.</p>
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REQUIRED HARDWARE

Verify that all necessary installation hardware is available.

- All necessary cables (e.g. Mini-SAS HD, Ethernet, USB, etc.)
- Phillips® #2 screwdriver
- Level

RECEIVING & INSPECTION

Once the checklist items are completed and the shipment is received, the next steps are to unpack the system from the shipping container, inspect the packaging and contents for any damage, and verify that all necessary components are included in the shipment.

Shipping Container Contents

The shipping container contents may vary in both quantity and components, based on individual customer needs. The system typically arrives with each component preinstalled, but components may occasionally require installation. The shipping container may include any or all of the following contents:

- VDS41022 Expansion Enclosure, including the following:
 - One VDS41022 I/O Module (IOM)
 - Four fan modules, each with two dual impeller fans
 - Two Power Supply Units (PSU)s
 - Two 5V DC regulators
 - Up to 102 drives

	NOTE: VES recommends that disk drives acclimate to room temperature for two hours prior to installation.
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- Accessories:
 - Two power cords
 - CMA hardware (if supplied)

Unpacking the Shipping Container

1. Visually inspect the packaging exterior for any signs of damage before opening.
 - a. If the container has sustained any damage, obtain an RMA.
 - b. If the container is not damaged, continue to the next step.

Figure 3.1 shows the contents of the shipping container when it is first opened.



Figure 3.1 Open shipping container contents

2. Open the top of the box and remove the smaller box that contains the Accessory Kit. Inspect the Accessory Kit box for shipping damage.
3. Remove the foam tray from the carton and inspect the enclosure for shipping damage. Figure 3.2 on page 31 shows the enclosure ready to be removed from the packaging.



HEAVY OBJECT: This system weighs approximately **116.1 kilograms (256.0 pounds)** when all 102 drives, two PSUs, and two IOMs are preinstalled at the factory. (This weight does not include the container weight.) A fully loaded system weighs **124.7 kilograms (275.0 pounds)** with the rails and CMA installed. Prevent personal injury and equipment damage. Obtain assistance during rack installation and when sliding the system in or out of the rack.



Figure 3.2 Enclosure ready for removal

- Remove the protective foam sheet and lift the enclosure from the packaging using the lift straps shown in Figure 3.3. Use of a forklift or lift table is recommended. Always obtain assistance lifting the enclosure from the container.



WARNING: The handles mounted on the front of the enclosure are designed only for the purpose of extending the enclosure from the rack into the serviceable position. They will not support the entire weight of the enclosure. Do not attempt to lift the enclosure by the handles, they will break and damage to the enclosure and/or personal injury may occur.

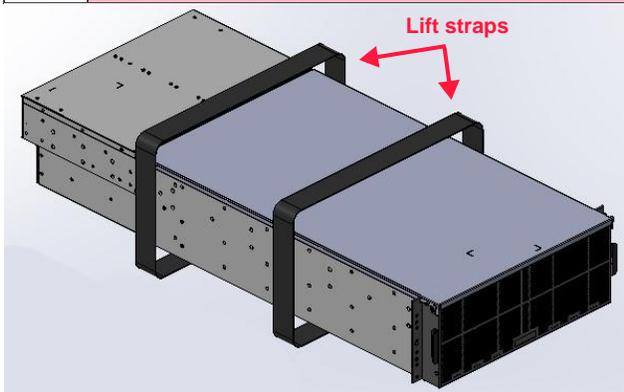


Figure 3.3 Removing the enclosure

- If installed, remove the enclosure's components to minimize enclosure weight during rack installation.

Place all components on an anti-static surface until the enclosure is installed in the rack and ready to have the components reinstalled.

REDUCING SYSTEM WEIGHT

Removal of any preinstalled drive carrier assemblies, IOMs, and PSUs to reduce system weight may be necessary before installing the system into a rack. Removing these FRUs can reduce the total weight by as much as 77.8 kilograms (171.6 pounds).

Removing the Enclosure's Top Cover

Removing the top cover from the enclosure is necessary to access and remove the drives and IOMs; the PSUs are accessed at the rear of the enclosure.



CAUTION: At this point in installation, it is assumed the system has not yet been connected to a power source. Once the system is running, when servicing any device, the replacement must be completed within **five (5) minutes** to maintain proper system cooling. Leaving the enclosure's top cover open for an extended period of time while the system is running may result in thermal damage.

- Loosen the left and right enclosure cover thumbscrews, which are located at the front edge of the chassis cover. The thumbscrews are identified in Figure 3.4.

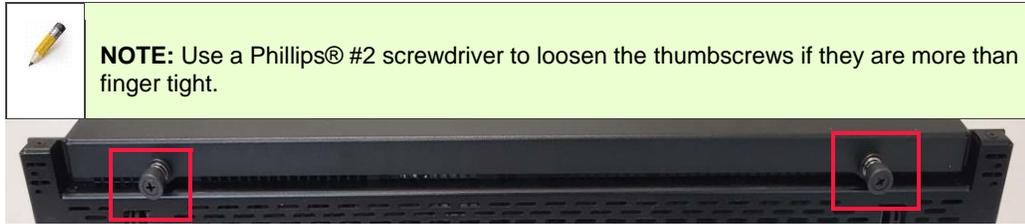


Figure 3.4 Top cover thumbscrews

2. Use both hands to apply a gentle downward pressure on the top cover. Slide the cover forward enough to clear the flange at the rear of the enclosure, aligning the six guide pins (three on each side of the chassis) with the six guide pin openings (three each on each side of the cover). Refer to Figure 3.5 to view the guide pins and openings.

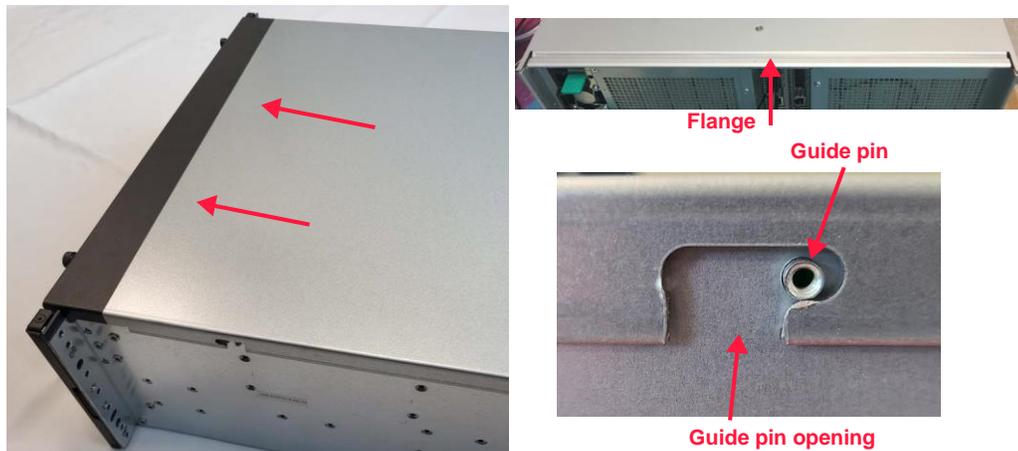


Figure 3.5 Top cover removal

3. Lift the top cover up and away from the enclosure.

Removing the Drive Carrier Assemblies

Removing the drive carrier assemblies from the enclosure can reduce the enclosure weight by as much as 74.0 kilograms (163.2 pounds).

	<p>CAUTION: At this point in installation, it is assumed the system is being installed for the first time and has not yet been connected to a power source. If the system has been running, ensure there are no data transactions taking place.</p> <p> If replacing a drive, follow the drive replacement instructions provided in the section titled “Drives” on page 78 of Chapter 6.</p>
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Drives are numbered from 1 through 102. When viewed overhead from the front of the enclosure, drive numbering begins in the front left corner and increases incrementally left to right, and then from front to back.

Drive Carrier Assemblies

A drive carrier assembly is comprised of the drive (or drive blank) and drive carrier and is used to provide for controlled drive installation into (and removal from) the VDS41022 Expansion Enclosure. Closing the handle ensures complete seating of the connectors through typical operational shock and vibration.

Each partially filled row of drives must be completely filled with either drives or drive blanks to ensure proper system airflow and cooling. Any remaining empty rows may be left unfilled. For example: If row 1 (supporting 15 drives) is filled with just 11 drives, the remaining four drive bays in row 1 must be filled with drives or drive blanks. The remaining empty rows do not require a drive or drive blank.

	<p>ESD-DEVICE: Users should take anti-static precautions before touching any of the interior components of the enclosure. Use an anti-static wrist strap and grounding wire as a minimum precaution.</p>
	<p>CAUTION: VES recommends that the drives have a minimum of two hours to acclimate to room temperature prior to enclosure installation.</p>

	<p>NOTE: The VDS41022 EXPANSION Enclosure is designed to remain operational during a service action, such as replacing a drive, IOM, fan, or PSU. During drive replacement, the enclosure management firmware detects the opened cover and turns on a yellow status LED on the front of the enclosure. This LED will go dark once the cover is properly installed.</p>
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Removing Drive Carrier Assemblies

To remove a drive carrier assembly from the enclosure, follow these steps. (When removing a drive carrier, it is not necessary to remove any drive carrier containing a drive blank, or to remove a drive from the carrier.)

	<p>NOTE: In a remove/replace action, make note of the location of each drive prior to removal and ensure each drive is returned to its original location. This is especially important if the drives contain data and the system has a zoned configuration.</p>
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1. Press the release catch (see Figure 3.6) on the drive carrier in the direction of the imprinted arrows—pointing to the rear of the enclosure—to release the handle into the open position.

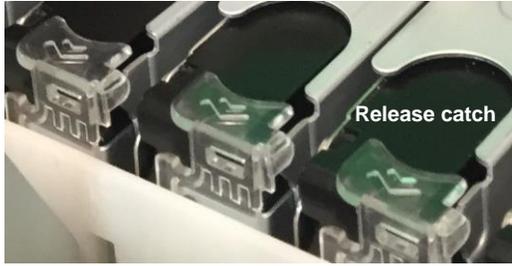


Figure 3.6 Carrier release catch

- Carefully lift the drive carrier assembly out of the slot as demonstrated in Figure 3.7.

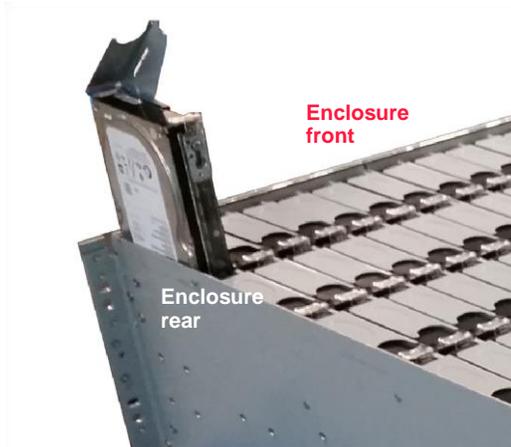


Figure 3.7 Drive removal

- Repeat steps 1 and 2 for the remaining drives.

Drive removal is complete. Remove the IOM(s).

Removing the I/O Module(s)

Removing preinstalled IOM(s) from the enclosure during rack installation further reduces the enclosure weight by an additional four pounds (1.8 kilograms).

	ESD-DEVICE: Follow proper anti-static guidelines when handling I/O or server modules, e.g. wrist strap, ESD mat, etc.
	CAUTION: In single IOM configurations, a blank canister is required in the unoccupied slot (B) to maintain proper system cooling. Contact a Viking Enterprise Solutions™ sales representative for more information on ordering a blank canister for a single IOM configuration.
	CAUTION: At this point in installation, it is assumed the system is being installed for the first time and has not yet been connected to a power source. If the system has been running, ensure there are no data transactions taking place and that the internal components have had time to cool in order to avoid injury.

1. Because this is a new system installation, no cables should be connected to the IOM(s) at this time. If there are cables attached, label all cables prior to removal to ensure they are installed into the same ports during reinstallation. This is particularly important if the VDS41022 Expansion Enclosure has a zoned configuration.
2. The enclosure's top cover should still be removed.
3. Lift up on the release tabs on both sides of the IOM in slot A. When viewed overhead from the front of the enclosure, slot A is on the right. Figure 3.8 shows the locations of the release tabs.



Figure 3.8 IOM release tabs

4. Carefully lift up on the IOM and slowly remove it from the enclosure. Take care not to bend the IOM during removal.
5. If this is a dual IOM configuration, repeat steps 3 and 4 to remove the second IOM from slot B. For single IOM configurations, it is not necessary to remove the module blank.

IOM removal is complete. Remove the PSUs from the enclosure.

Removing the PSUs

Removing the PSUs further reduces the enclosure weight during rack installation.



To skip the PSU removal instructions, proceed to “Enclosure Rack Installation”.

	ESD-DEVICE: Follow proper anti-static guidelines when handling I/O or server modules, e.g. wrist strap, ESD mat, proper grounding, etc.
	CAUTION: Verify both power cords are unplugged from the jacks on the enclosure rear.
	CAUTION: At this point in installation, it is assumed the system is being installed for the first time and has not yet been connected to a power source. If the system has been running, ensure there are no data transactions taking place and that the system has been properly shut down. Refer to Chapter 4 titled “Powering the VDS41022 EXPANSION Enclosure” that begins on page 51 for more information on proper shutdown procedures.

To remove the PSUs from the enclosure, follow these steps.

1. Ensure the power cords are unplugged from both PSUs on the rear of the enclosure.

2. Press down on the release tab on the first PSU to release the cam from the locked position. The release tab cannot be pressed if the power cord is still plugged into the PSU jack. Figure 3.9 shows the location of the release tab.

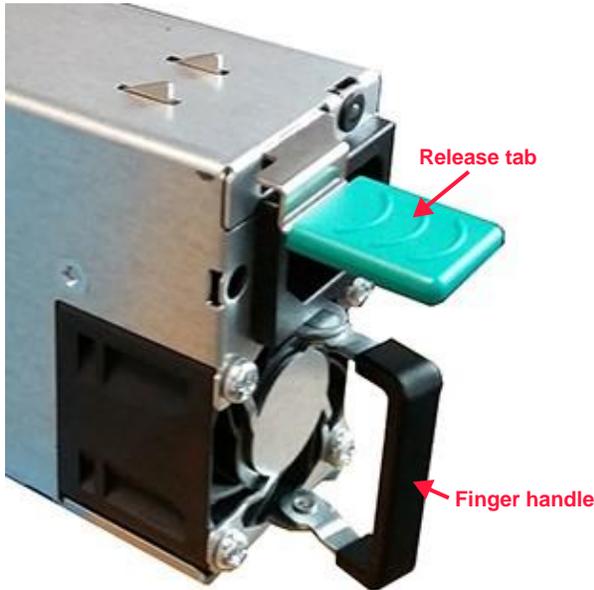


Figure 3.9 PSU removal

3. Pull the PSU out of the enclosure using the black finger handle, which is also shown in Figure 3.9.
 4. Repeat steps 2 and 3 for the second PSU.
- PSU removal is complete.

Weight reduction is complete. Install the enclosure into the rack.

Enclosure Rack Installation

This section reviews the procedures for installing the 4U high enclosure into a 19-inch rack. Provisions are made to accommodate the installation of multiple systems into a standard 19-inch wide, one-meter long rack with power management for redundant power and sufficient clearance for cable management. The front and rear doors of the rack can be closed with all systems installed and cabled, without binding or compressing any of the cables in the rack. The side rack panels do not interfere with any of the equipment or cables that are installed into the rack.

	<p>TIPPING HAZARD: Only extend one enclosure from the rack at a time. Ensure that each of the remaining enclosures in the rack are secured to the front rack posts. Enclosures should be installed into the rack according to their weight, with the heaviest systems on the bottom and lightest systems on top.</p>
	<p>NOTE: The rail kit supports a 68.6-centimeter (27-inch) to 81.3-centimeter (32-inch) rack depth. The enclosure depth is 92.7 centimeters (36.5 inches) without the CMA, and 100.0 centimeters (39.4 inches) with the CMA installed.</p>

INSTALLING THE VDS41022 EXPANSION ENCLOSURE RAIL KIT

Each rail kit has two components: one left rail and one right rail. When properly installed, the rail kit's chassis member (bolted to the sides of the enclosure) slides inside the rail kit's cabinet member (bolted to the rack).

The rail kit includes:

- One left adjustable rack mounting rail, engraved "L".
- One right adjustable rack mounting rail, engraved "R".
- Two mounting plates
- 22 Phillips® M5 X 10 flat head screws
- 12 ø5.1 washers
- Four M5 cage nuts
- Four M5 X 13 screws

Installing the Cabinet Members into the Rack

Install the cabinet members into the standard 19-inch (48.3-centimeter) rack as follows.

1. Adjust the length of the left cabinet member rail to match the depth of the rack.

	NOTE: R (right) and L (left) are marked on the outside of the adjustable rack mounting rails to indicate the appropriate placement.
--	--

2. Align the rail to the desired position on the front and rear left rack post.
3. Secure the left rear cabinet member rail to the rear left rack post by inserting the stag (prongs) into the post.
4. Secure it in place using four M5 X 10 screws and four M5 conical washers.
5. Place the mounting plate onto the left front rack post, aligning the top screw hole with the rail.
6. Verify the rail is level.
7. Insert one of the M5 cage nuts into the square rack hole immediately above the rail as shown in Figure 3.10.

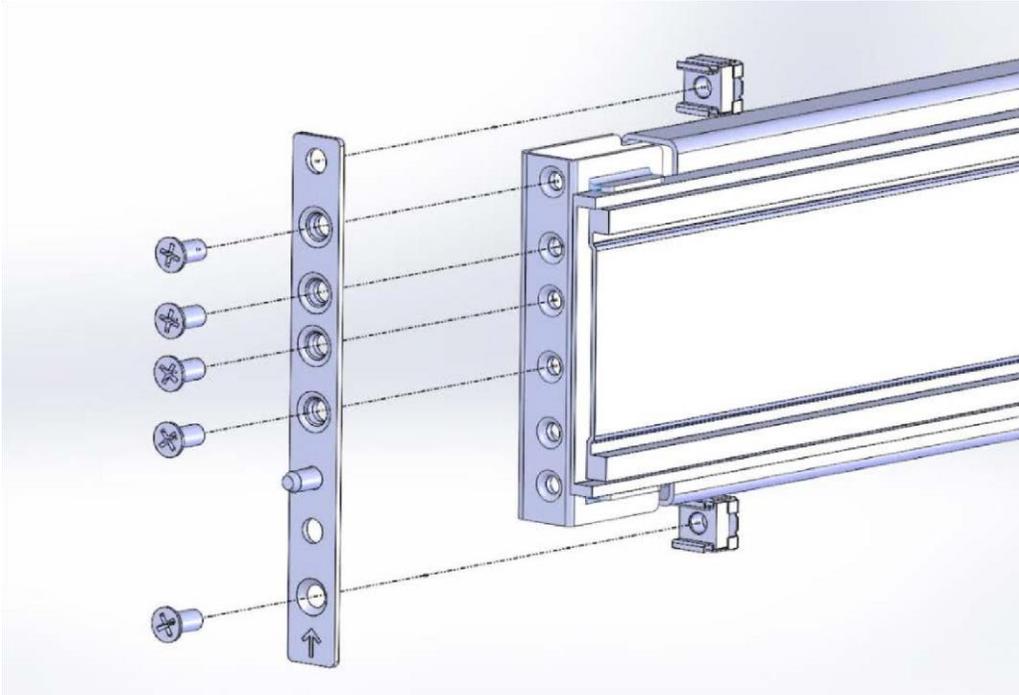


Figure 3.10 Right front mounting plate and rail

8. Insert a second M5 cage nut into the square rack hole immediately below the rail, also shown in Figure 3.10.
9. Secure the mounting plate and left cabinet member rail onto the front left rack post using five of the M5 X 10 flat head screws. Figure 3.10 on page 39 demonstrates a properly installed right front mounting plate and rail.
10. Repeat steps 1 through 9 to secure the right cabinet member rail to the front and rear right rack posts.

Rail kit installation is complete. Install the enclosure into the rack.

INSTALLING THE EXPANSION ENCLOSURE INTO THE RACK

To install the VDS41022 Expansion Enclosure into the rack, follow these steps:



NOTE: The rail kit supports a 68.6-centimeter (27-inch) to 81.3-centimeter (32-inch) rack depth. The enclosure depth is 92.7 centimeters (36.5 inches) without the CMA, and 100.0 centimeters (39.4 inches) with the CMA installed.

1. Fully extend the cabinet member rails.



HEAVY OBJECT: This system weighs approximately **116.1 kilograms (256.0 pounds)** when all 102 drives, two PSUs, and two IOMs are preinstalled at the factory. (This weight does not include the container weight.) A fully loaded system weighs **124.7 kilograms (275.0 pounds)** with the rails and CMA installed. Prevent personal injury and equipment damage. Obtain assistance during rack installation and when sliding the system in or out of the rack.



WARNING: The handles mounted on the front of the enclosure are designed only for the purpose of extending the enclosure from the rack into the serviceable position. They will not support the entire weight of the enclosure. Do not attempt to lift the enclosure by the handles, they will break and damage to the enclosure and/or personal injury may occur.

2. With a second person or lift table to assist in supporting the enclosure, align the inner chassis member rails (attached to the enclosure) with the extended cabinet member rails.
3. Insert the inner chassis member rails into the extended cabinet member rails.
4. Push the enclosure into the rack until the rails lock in the serviceable position, indicated by an audible click.
5. With the enclosure installed in the serviceable position, reinstall the enclosure components.

REINSTALLING ENCLOSURE FRUS

Once the enclosure is installed into the rack, reinstall the drive carrier assemblies, IOM(s), and PSUs into the enclosure.

Reinstalling the Drive Carrier Assemblies

Once the enclosure is installed onto the rails, reinstall the drive carrier assemblies into the enclosure. At this point in the installation, it is assumed the system has not yet been connected to a power source.

	ESD-DEVICE: Follow proper anti-static guidelines when handling the drives, e.g. wrist strap, ESD mat, proper grounding, etc.
	CAUTION: Filling all rows in the enclosure with drives is not necessary; however, each partially filled row of drives must be completely filled with drive carriers containing drives or drive blanks to ensure proper system cooling. Contact a Viking Enterprise Solutions™ sales representative for assistance in obtaining the appropriate drive blank(s) for the system.
	CAUTION: VES recommends that drives have a minimum of two hours to acclimate to room temperature before installation in the enclosure.
	NOTE: The VDS41022 EXPANSION Enclosure is designed to remain operational during a service action, such as replacing a drive, IOM, fan, or PSU. During drive replacement, the enclosure management firmware detects the opened cover and turns on a yellow status LED on the front of the enclosure.

1. The rails should still be extended into the serviceable position and the enclosure's top cover should still be removed.
2. Ensure the drive carrier release handle is in the open position as shown in Figure 3.11. If the release handle is closed, press the release catch in the

direction of the arrows (shown in Figure 3.6) and lift the handle into the open position.

 **NOTE:** If the system has a zoned configuration, drive placement should follow the company's preset zoning configuration. SATA drives only report to IOM A.

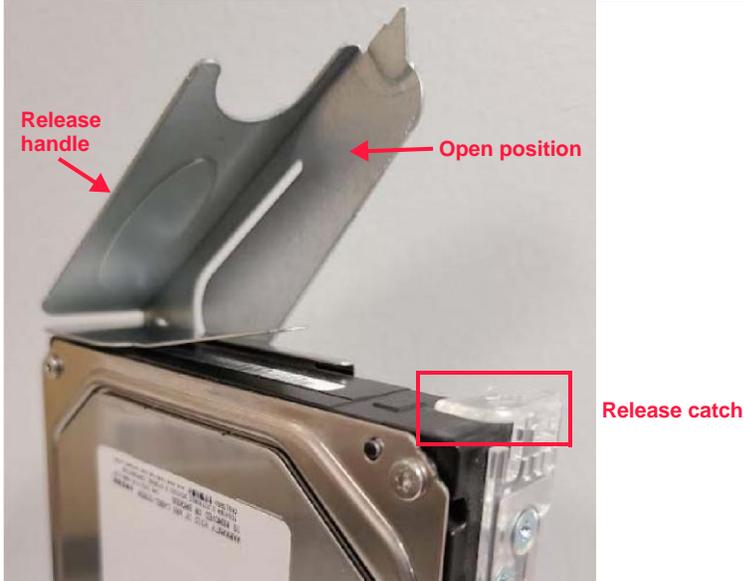


Figure 3.11 Drive carrier release

3. Ensure the imprinted arrows on top of the release catch are pointing toward the rear of the enclosure, and then carefully slide the drive carrier assembly into the slot until it contacts the baseboard. The release handle begins to engage. (Refer to Figure 3.7 for an illustration of the correct drive carrier orientation.)

 **CAUTION:** There should be no resistance when installing the hard drive. If resistance is encountered both carrier rails are not aligned correctly.

When installing a hard drive ensure that both sides of the drive carrier are aligned properly in the drive dividers as shown in Figure 3.12.

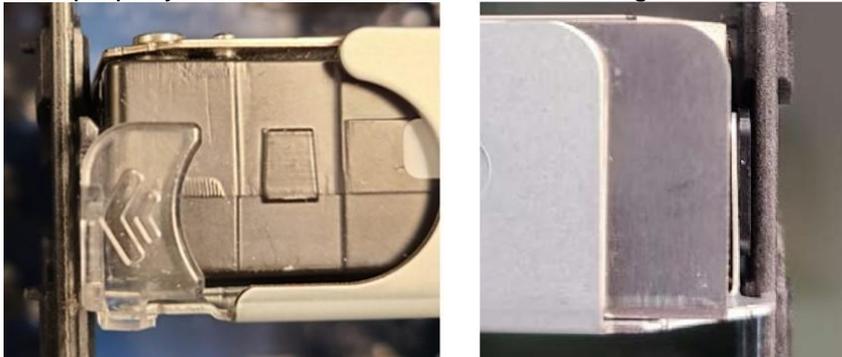


Figure 3.12 Drive carrier rails aligned correctly

If the drive carrier rails are not aligned correctly, there is a gap between the drive carrier rail and the drive divider, as shown on the left in Figure 3.13 on page 43.

The drive divider also bows slightly if the drive carrier rails are not aligned correctly as shown on the right in Figure 3.13.

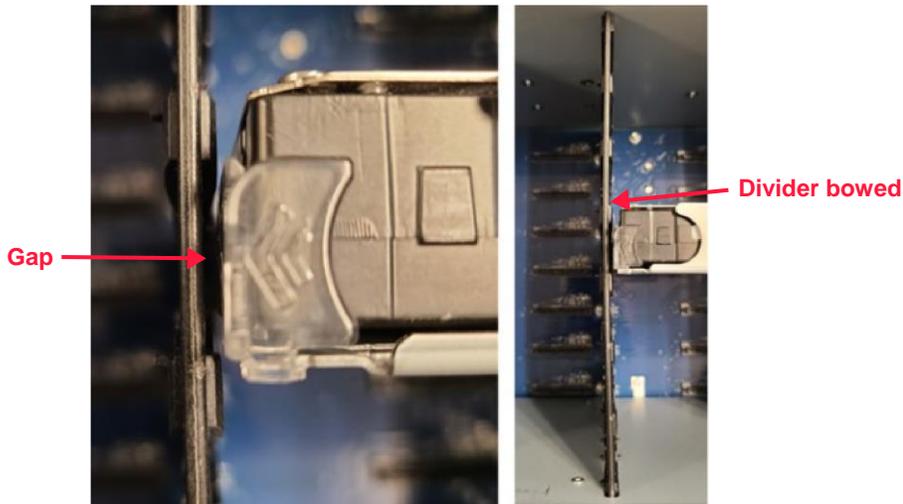


Figure 3.13 Drive carrier rails not aligned correctly

4. Press down on the release handle until it latches closed and the drive cams into place.

When installing a full system of hard drives, install the first hard drive at or near the center of the divider in each row. This helps to maintain the proper drive divider spacing. Install the remaining drives from the center drive outwards, as shown by the arrows in Figure 3.14.



Figure 3.14 Example of drive installation sequence

In a half-populated configuration, full rows of hard drives and/or blanks must be installed in order to maintain proper airflow and cooling. An example of a half-populated configuration is shown in Figure 3.15.



Figure 3.15 Example of half-populated configuration

5. Repeat steps 2 through 4 for all remaining drives.
- Drive installation is complete. Reinstall the IOM(s).

Reinstalling the I/O Module(s)

Once rack installation is complete, the user may reinstall the IOM(s) into the VDS41022 expansion enclosure.

	ESD-DEVICE: Follow proper anti-static guidelines when handling the modules, e.g. wrist strap, ESD mat, etc.
	CAUTION: In single IOM configurations, a blank canister is required in the unoccupied I/O option slot B to maintain proper system cooling. Contact a Viking Enterprise Solutions™ sales representative for more information on ordering a blank canister for a single IOM configuration.
	CAUTION: To avoid damage to components inside the IOM or damage to the connectors, install the module in the correct orientation (with the release tabs at the top of the I/O option slot). Ensure the edge fingers properly align with the baseboard connectors before installing the IOM. Never force a module into the slot.

1. The rails should still be extended in the serviceable position and the enclosure's top cover still removed.
2. Identify the edge fingers on the bottom of the IOM and the connectors inside I/O option slot A. (Slot A is on the right when viewed overhead from the front of the enclosure.) The edge fingers on the IOM must properly mate with the connectors in the I/O option slot. The RJ45 port should be at the bottom upon installation and the release tabs should be at the top as shown in Figure 3.16.

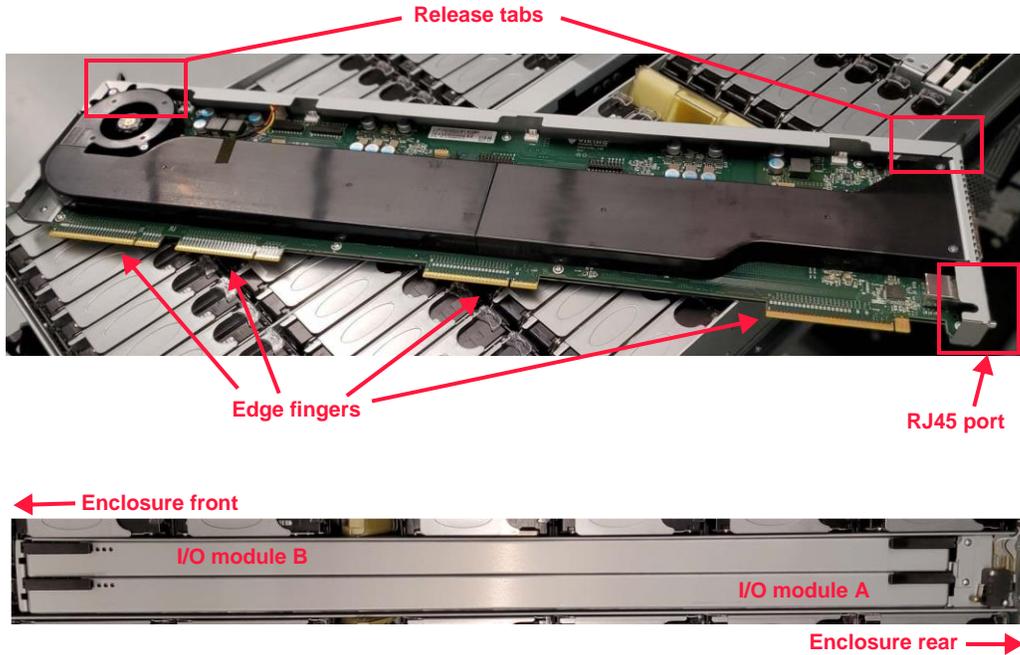


Figure 3.16 IOM orientation

3. If necessary, lift up on the release tabs on both sides of the IOM to ensure they are in the upward (open) position.
4. Carefully slide IOM A into I/O option slot A in the enclosure. Take care not to bend the IOM during installation.
5. Gently push the module into place until the top edge is flush with the top of the option slot. Never force the module into place as damage to the connectors might occur.
6. Press the release tabs on both sides of the IOM down to engage the cam and secure the IOM to the enclosure. The correct orientation of the IOM for installation is shown in Figure 3.17



Figure 3.17 Correctly installing the IOM

7. If this is a dual I/O configuration, repeat steps 2 through 6 to reinstall IOM B into IOM option slot B. (An IOM blank used in a single configuration would not have been removed earlier.)

IOM reinstallation is complete. Return the enclosure's top cover to the chassis.

Returning the Top Cover to the Enclosure

1. Align the top cover with the chassis. Ensure the six guide pins (three on each side of the chassis) are aligned with the six guide pin openings (three on each side of the cover), and that the flange on the enclosure rear is properly aligned to the rear edge of the cover. See Figure 3.18.

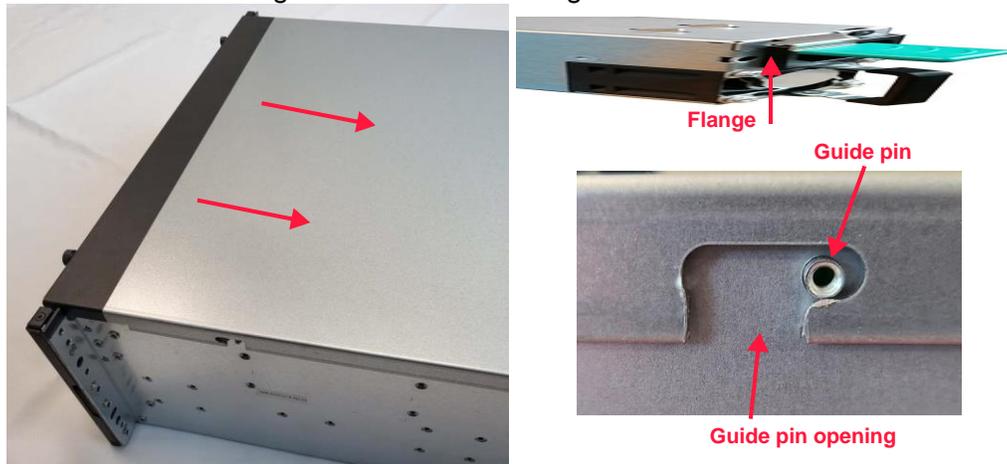


Figure 3.18 Top cover reinstallation

2. Use both hands to apply mild downward pressure and slide the top cover in place.
3. Finger tighten the left and right enclosure top cover thumbscrews located at the front edge of the chassis cover (see Figure 3.19).

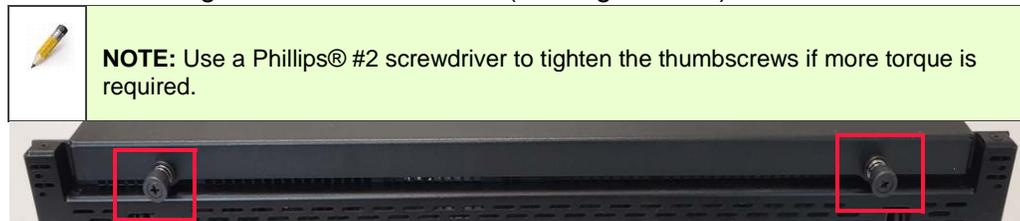


Figure 3.19 Top cover thumbscrews

Cover reinstallation is complete. Insert the enclosure into the rack.

Returning the Enclosure to the Rack

1. With the enclosure in the serviceable position, press and hold the release tab on each inner chassis member rail (shown in Figure 3.20) to release the rail from the serviceable position and push the enclosure into the rack.

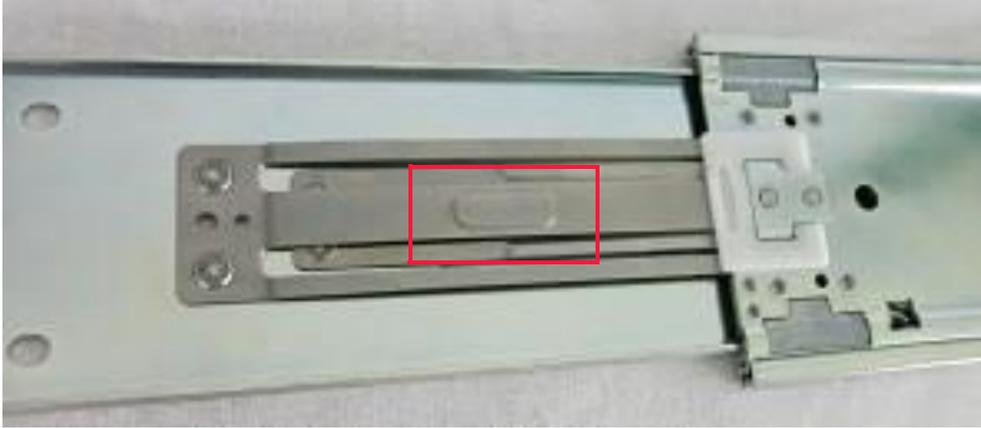


Figure 3.20 Release tab

2. The two left and two right thumbscrews on each side of the enclosure must align with the two screw holes on each rack post as shown in Figure 3.21.

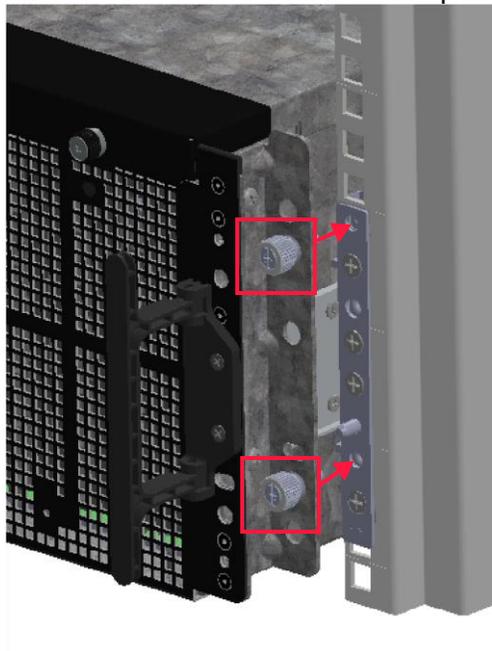


Figure 3.21 Rack thumbscrews

3. Finger tighten the two thumbscrews on each side of the enclosure to secure the enclosure to the rack posts.

 **NOTE:** Use a Phillips® #2 screwdriver to tighten the thumbscrews if more torque is required.

The enclosure is secured to the rack posts. Reinstall the PSUs.

Reinstalling the PSUs

To reinstall the PSUs into the storage enclosure, follow these steps:

	ESD-DEVICE: Follow proper anti-static guidelines when handling PM modules, e.g. wrist strap, ESD mat, proper grounding, etc.
	CAUTION: Verify the power cords are not plugged into the jacks on the rear of the enclosure.

1. Slide the first PSU into one of the vacant PSU slots on the rear of the enclosure. Ensure the PSU is in the same orientation as it was on removal. The finger pull should be on the bottom and the release tab on top as shown in Figure 3.22.

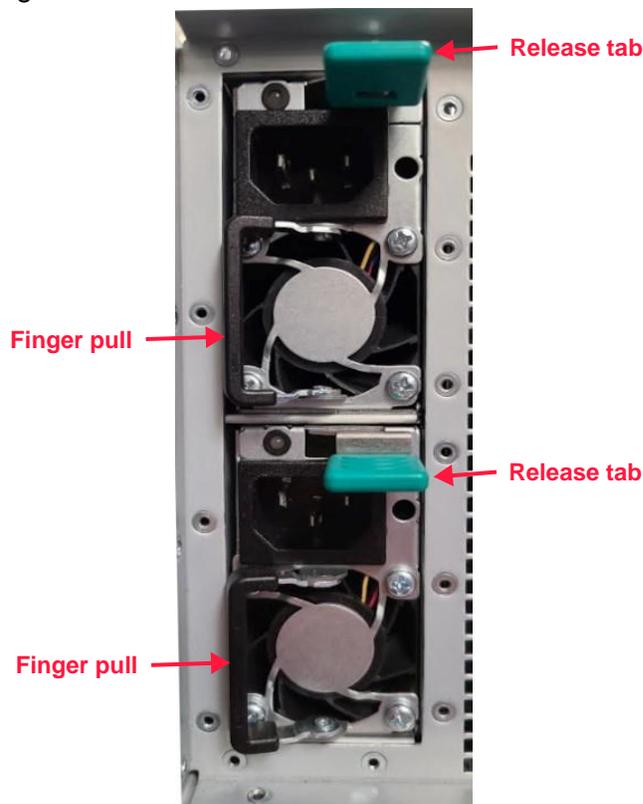


Figure 3.22 Correctly installed PSUs

2. Continue pushing the PSU into the enclosure until the release tab engages and the PSU is cammed into place. If the PSU slides out of the enclosure easily without pressing the release tab, check the orientation and reinsert the PSU into the slot.
3. Repeat steps 1 and 2 for the second PSU.

PSU reinstallation is complete. Install the cable management hardware.

Installing the Cable Management Assembly

The CMA aids in better routing and securing of the system's cabling, and enables the storage enclosure to be easily slid into and out of the rack for drive installation or replacement without having to disconnect cables. A properly installed CMA prevents cable tangling and interference with other components in the rack. See Appendix A, "Cable Management Assembly Installation" for instructions on how to install the CMA if one is supplied with the enclosure.

Chapter 4 **Powering the ONYX Series System**

Chapter 4 includes an overview of the ONYX Series power configuration and instructions for controlling power to the enclosure.

Enclosure Power Overview

This section discusses the power supply units (PSUs) and 5V regulators, which provide power to the ONYX Series system. Input and output specifications are also provided.

ABOUT THE POWER SUPPLY UNITS

Two hot-swappable and N+1 redundant PSUs are installed at the rear of both enclosures. The PSUs supplied may be rated at 1600W. Each PSU is load sharing and contains a built-in cooling fan for self-cooling. A single PSU can power the enclosure indefinitely; however, both PSUs are required for full redundancy.

Figure 4.1 shows a typical PSU.

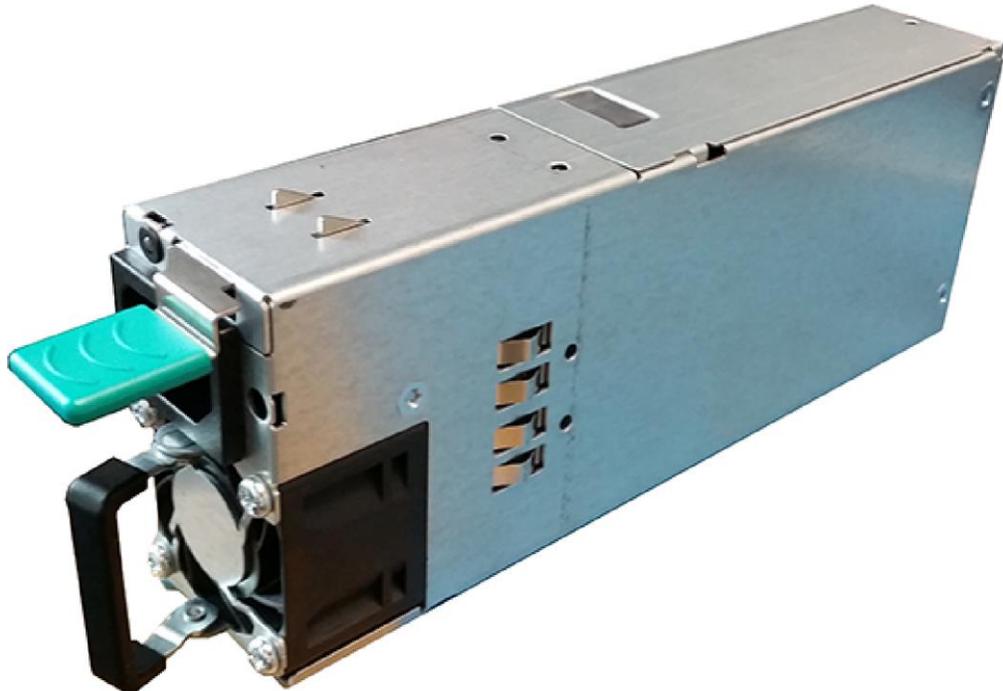


Figure 4.1 PSU

VDS41022 Expansion Enclosure PSU Input Specifications

Each PSU meets the following input specifications.

Input	1600W Value	2000W Value
Input Voltage	200–240V (±10%) AC	200–240V (±10%) AC
Input Frequency	50–60 Hz	50–60 Hz
Maximum Input Current	9.48A RMS @ 200V AC	12A RMS @ 200V AC
Peak Inrush Current	40A @ 230VAC, 25oC, 4.167 msec max (based on 60 Hz cycle)	30A @ 230VAC, 25oC, 10 msec max (based on 60 Hz cycle)
Power Maximum	1600W	2000W
Minimum Efficiency (Platinum Rating)	208V AC, 91% efficiency at 100% load, 94% at 50% load.	208V AC, 91% efficiency at 100% load, 94% at 50% load.

Table 4.1 PSU AC input characteristics

VDS41022 Expansion Enclosure PSU Output Specifications

Each PSU meets the following output specifications.

Output Parameter	1600W Value	2000W Value
Main DC Voltage	+12V DC @ 132A, peak 50ms 145A	+12V DC @ 148A, peak 10ms 192A
Minimum Current	0.1A main	0.1A main

Table 4.2 PSU DC output characteristics

ABOUT THE VDS41022 EXPANSION ENCLOSURE 5V REGULATORS

The Expansion enclosure houses two hot-swappable, N+1 redundant 5V DC regulators that are installed under the enclosure’s top cover. The regulators supply 5V power to the drives. A single regulator can provide drive power indefinitely; however, both regulators are required for full redundancy. Figure 4.2 provides a close-up of the regulator board.



Figure 4.2 5V DC regulator board

5v Regulator Output Specifications

Each regulator meets the following output specifications.

Output Parameter	438W Value
Main DC Voltage	5V @ 85A Max

Table 4.3 5V DC regulator output characteristics

Controlling Enclosures Power

This section provides general instructions on controlling systems power. General instructions are also provided for controlling power when multiple expansion enclosures are in use. Individual system configurations may differ based on customer needs and customization. Contact an IT manager for additional information on powering the system configuration in use.

NOTE: N+1 redundancy is not supported if only one PSU is installed.

POWERING UP THE ONYX SERIES 1U CONTROLLER

Power on the ONYX Series chassis by pressing the power button on the front of the system.

POWERING UP THE EXPANSION ENCLOSURE

The storage enclosure does not contain a power button. Power is controlled by the two power cords that plug into a power distribution unit (PDU). Fans, drives, IOMs, PSUs, and 5V regulators are hot-swappable and do not require the system power to be shut down during replacement.

	<p>WARNING: While some factory-approved maintenance on FRUs (e.g. hot-swapping a PSU, fan, IOM, regulator, or drive) does not require the user to disconnect power to the system, performing other types of maintenance on systems connected to an electrical power supply may result in serious injury or death. Only individuals with knowledge and training in working with devices containing live circuits should operate the system. Take precautions when performing all other types of maintenance. Disconnect 2 power supply cords before servicing.</p>
	<p>NOTE: The VDS41022 EXPANSION Enclosure sequences the power supplied to the disk drives on start-up to prevent an overcurrent condition. Different disk drive manufacturers, types, and capacities used will result in varying waits, and differences in the amount of time that the drives take to become ready. In most cases, waiting approximately one minute from power-on will ensure that all drives are ready and available to the host operating system.</p>

Powering On the ONYX Series System Sequence

To turn ON power to an ONYX series system, follow these steps:

1. Connect the provided HD mini-SAS cable as shown in Figure 4.3.
2. Connect the applicable network cables.
3. Power on any network switches, routers, or other standalone components
4. Verify that the power cords are plugged into their respective jacks on the enclosures rear. The locations of the jacks are shown in Figure 4.3.

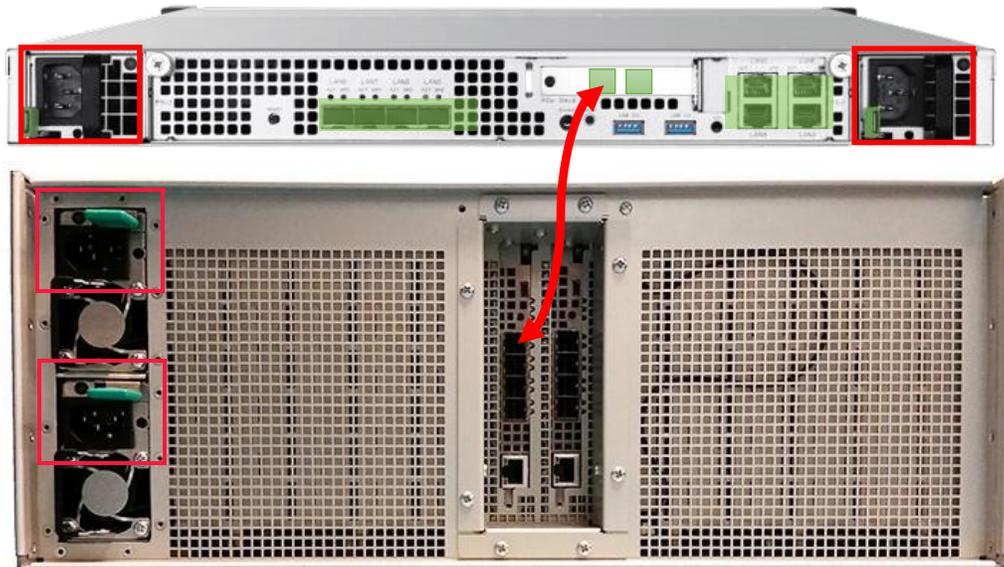


Figure 4.3 Mini-SAS ports and PSU jacks

5. Connect the opposite end of each power cord directly into an active PDU.
6. The expansion enclosure's power turns on immediately and allow are couple minutes for the system and drives to power up.

7. Turn on the 1U controller by pressing the power button in the front of the system
ONYX Series system powering on sequence is completed

POWERING DOWN EXPANSION ENCLOSURE

Because the expansion enclosure does not contain a power button, powering down the system is accomplished by disconnecting the power cords



CAUTION: Before performing an immediate system shutdown, ensure ONYX Series 1U controller is shut down and there are no data transactions taking place.

Powering Down a Single Expansion Enclosure

To perform an immediate shutdown of a single EXPANSION enclosure, follow these steps:

1. Perform an orderly shutdown on the host computer.
2. Ensure ONYX Series 1U controller is shut down and no data transactions are taking place.
3. Unplug the two power cords from the PDU, or from the two PSU jacks on the rear of the VDS41022 expansion enclosure.
4. Enclosure power shuts down immediately.
5. Wait a minimum of 15 seconds before powering the enclosure back on.

Chapter 5 **Monitoring the VDS41022 EXPANSION Enclosure**

The VDS41022 EXPANSION Enclosure provides FRU and system status via LEDs. Chapter 5 describes each of these LEDs to assist the user in effectively monitoring the system.

Operational status LEDs are located in three areas of the enclosure.

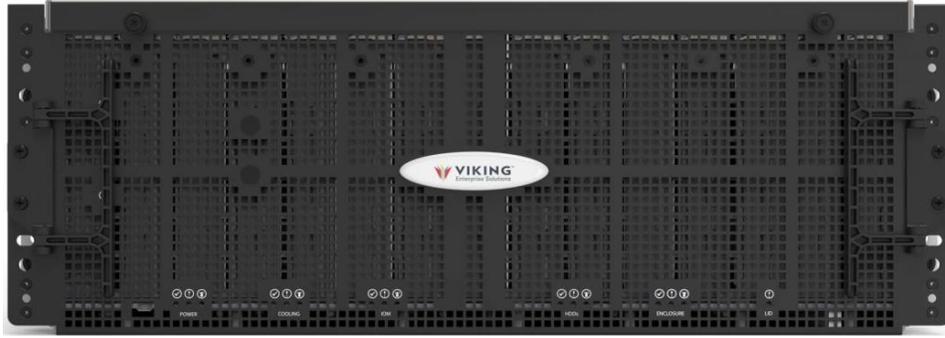
- Front Operator Panel LEDs
- LED Groups
- Optional LCD Module
- LEDs Under the Top Cover
 - 5V DC Regulators
 - Drives
 - Fan Modules
 - I/O Module (IOM)
- Enclosure Rear LEDs
 - IOM(s)
 - PSUs

Front Operator Panel LEDs

The front operator panel on the VDS41022 EXPANSION Enclosure displays system status LEDs that are divided into groups to simplify status identification.

LED GROUPS

There are six groups of LEDs that display on the front operator panel. The first four groups identify the status of specific FRU components. The fifth group identifies the enclosure status, and the final LED alerts the user when the enclosure's top cover is open—proper cover installation is necessary to ensure proper system cooling. Figure 5.1 on page 58 identifies each LED group located on the front of the enclosure.



Power Cooling IOMs HDDs Enclosure Cover

Figure 5.1 Front panel LEDs

Each LED group displays a green, yellow, or blue LED. Group LED behavior is presented in Table 5.1.

LED	Color	Behavior
Power OK	Green	ON indicates all PSUs and 5V DC regulators are OK and operating normally.
Power Fault	Yellow	ON indicates one or more PSUs or 5V DC regulators have failed. Refer to the PSU or regulator LEDs to identify the failed component.
Power Identify	Blue	ON indicates the power system LED is being sent an identify command via SES.
Cooling OK	Green	ON indicates all fans are OK and operating normally.
Cooling Fault	Yellow	ON indicates one or more fan modules within the enclosure have failed. Refer to the fan LEDs to identify the failed fan module.
Cooling Identify	Blue	ON indicates the fan system identify LED is being sent an identify command via SES.
IOMs OK	Green	ON indicates all installed IOMs are OK and operating normally.
IOM Fault	Yellow	ON indicates one or more IOMs have detected a fault. Refer to the IOM LEDs to identify the failed IOM.
IOM Identify	Blue	ON indicates that one or more IOM identify LEDs are being sent an identify command via SES.
HDDs OK	Green	ON indicates all HDDs within the enclosure are OK and functioning normally.
HDD Fault	Yellow	ON indicates one or more HDDs within the enclosure have failed. Refer to the drive LEDs to identify the failed drive.
HDD Identify	Blue	ON indicates the HDD system identify LED is being sent an identify command via SES.

Table 5.1 Front panel LEDs

LED	Color	Behavior
Enclosure OK	Green	ON indicates the entire enclosure is OK and operating normally.
Enclosure Fault	Yellow	ON indicates one or more components within the enclosure have failed. Refer to the first four group LEDs to identify the group experiencing the failure. Blinking indicates a predicted fail of one or more components within the enclosure. Refer to the first four group LEDs to identify the group experiencing the predicted fail.
Enclosure Identify	Blue	ON indicates this enclosure is being sent an identify command via SES.
Enclosure Cover Open	Yellow	ON indicates the enclosure top cover is not properly closed and secured. OFF indicates the cover is properly installed.

Table 5.1 Front panel LEDs (cont.)

LEDs Under the Top Cover of the Expansion Enclosure

Two 5V DC regulators, up to 102 drive carrier assemblies, four fan modules, and one or two IOMs (single configurations require an IOM module blank in the unoccupied slot) are housed under the enclosure's top cover. Viewing these LEDs requires the extension of the enclosure from the rack, and the removal of the enclosure's top cover.

EXTENDING THE ENCLOSURE FROM THE RACK

Removing the enclosure's top cover requires that the enclosure is extended from the rack into the serviceable position.



TIPPING HAZARD: Only extend one enclosure from the rack at a time. Ensure that each of the remaining enclosures in the rack are secured to the front rack posts. Enclosures should be installed into the rack according to their weight, with the heaviest systems on the bottom and lightest systems on top.

Extending the Enclosure

Perform the following steps to extend the enclosure from the rack.



HEAVY OBJECT: A fully loaded system weighs **275.0 pounds (124.7 kilograms)** with the rails and CMA installed. Prevent personal injury and equipment damage. Obtain assistance during rack installation and when sliding the system in or out of the rack.

1. Loosen the two left and two right thumbscrews that secure the enclosure to the rack. The right two thumbscrews are shown in Figure 5.3 on page 61.

 **NOTE:** Use a Phillips® #2 screwdriver to loosen the thumbscrews if they are more than finger tight.

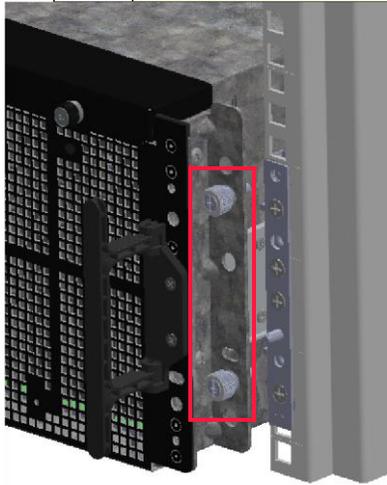


Figure 5.3 Rack thumbscrews

2. Using care to avoid a tipping hazard, extend the enclosure into the serviceable position by unfolding and grasping the left and right enclosure handles (see Figure 5.4), and then pulling the enclosure out of the rack until the rails lock in the serviceable position. This process is accompanied by an audible click.



Figure 5.4 Enclosure handles

The enclosure is extended into the serviceable position. Remove the enclosure's top cover.

REMOVING THE ENCLOSURE'S TOP COVER

To remove the top cover from the enclosure in order to view the FRU component LEDs, follow these steps:



CAUTION: When servicing any device, the replacement must be completed within **five (5) minutes** to maintain proper system cooling. Leaving the enclosure's top cover open for an extended period of time while the system is running may result in thermal damage.

1. Follow each step in the instructions provided for “Extending the Enclosure from the Rack” on page 60 to extend the enclosure into the serviceable position.
2. Loosen the left and right enclosure cover thumbscrews located at the top front edge of the chassis cover. The thumbscrews are shown in Figure 5.5.



NOTE: Use a Phillips® #2 screwdriver to loosen the thumbscrews if they are more than finger tight.



Figure 5.5 Top cover thumbscrews

3. Use both hands to apply a gentle downward pressure on the top cover, and then slide the cover forward enough to clear the flange at the rear of the enclosure. Align the six guide pins (three on each side of the chassis) with the guide pin openings (three on each side of the cover). Refer to Figure 5.6.

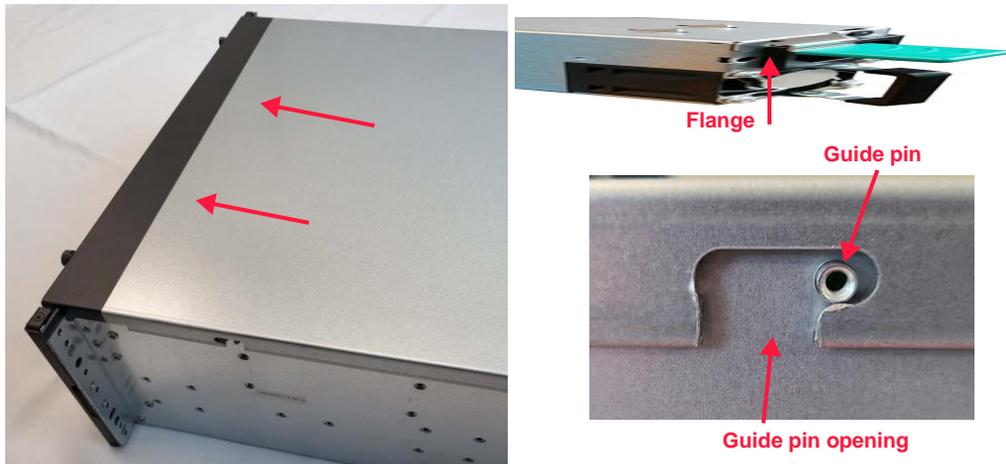


Figure 5.6 Top cover removal

4. Lift the top cover up and away from the enclosure.
5. Proceed to the appropriate instruction set to identify the LEDs requiring attention.

FRU STATUS LEDs

Each FRU component provides status LEDs as shown in Figure 5.7.

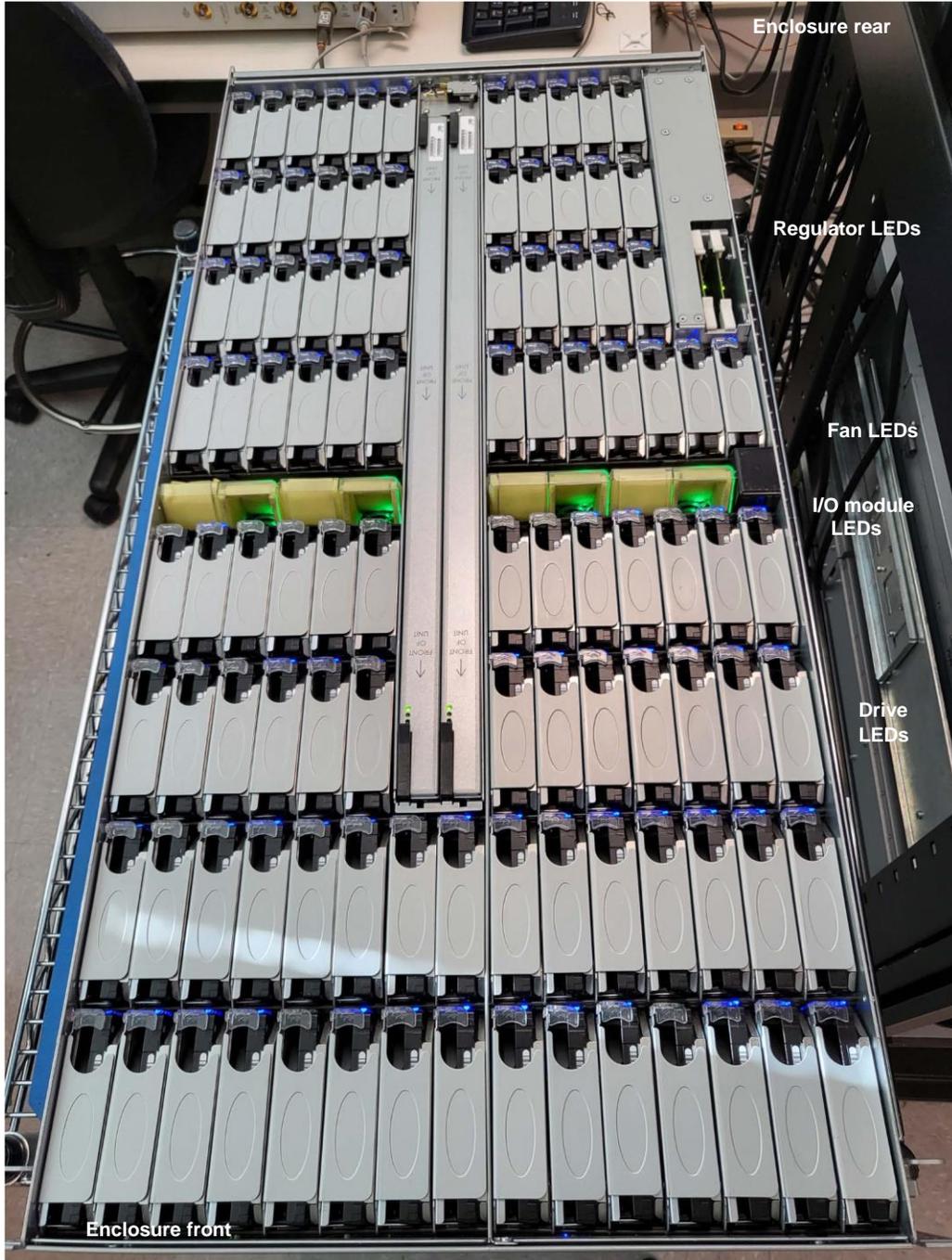


Figure 5.7 LEDs under top cover

5V DC Regulators

The two 5V DC regulator status LEDs display in the top enclosure cavity as shown in the previous image. These LEDs are located at the top of the 5V regulator card. Figure 5.8 provides a close-up of this LED.

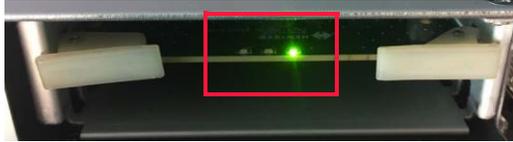


Figure 5.8 5V regulator LEDs

Each 5V DC regulator provides the LED indications outlined in Table 5.3.

LED	Color	Status
5V DC Regulator OK	Green	ON indicates that the DC output of the 5V regulator is within tolerances.
5V Regulator Fault	Yellow	ON indicates that a 5V regulator fault has been detected.
5V Regulator Identify	Blue	ON Indicates that this 5V regulator is being sent an identify command through SES.

Table 5.3 5V DC regulator LEDs

Drives

The VDS41022 EXPANSION Enclosure also includes an internal drive identify LED located inside each drive bay. When the LED illuminates, the light travels up through the light pipe on the drive carrier and is visible from the top of the drive carrier as shown in Figure 5.7 on page 63. Figure 5.9 provides a close-up view of the blue drive identify LED illuminating within the light pipe on the drive carrier.



Figure 5.9 Drive identify LED

The LED behavior is identified in the following table:

Description	LED Color	Behavior
Drive Identify	Blue	ON indicates this drive is being sent an identify command via SES. OFF indicates no identify command has been received.

Table 5.4 Drive Identify LEDs

Fan Modules

Four N+1 redundant, hot-swappable fan modules (each containing two dual impeller, 40mm fans) cool the system. Figure 5.10 shows the illuminated LEDs, which are located on the right side of each fan module when viewed from the front of the enclosure.

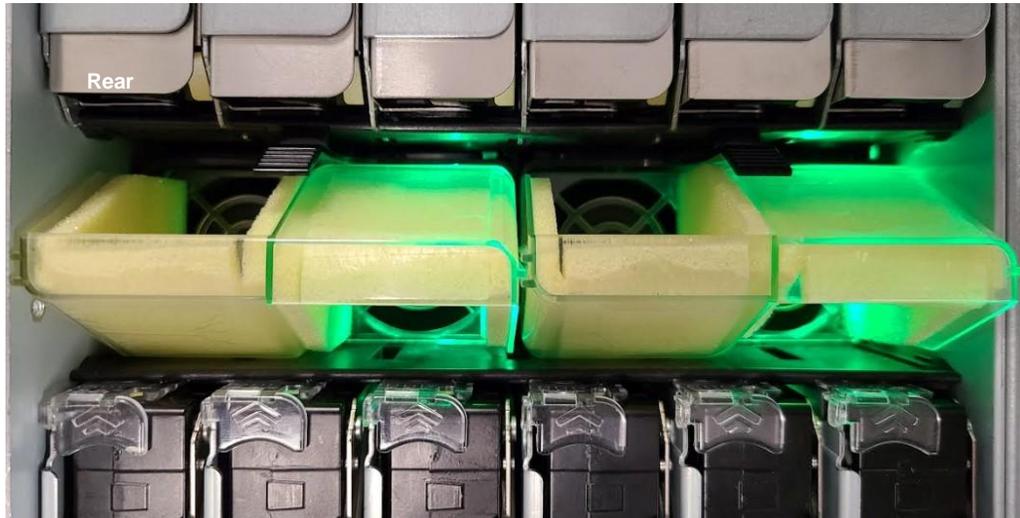


Figure 5.10 Fan module status LEDs

Each fan module provides the LED colors and indications outlined in Table 5.5.

LED	Color	Status
Fan Module OK	Green	ON indicates the fan module is OK and operating normally.
Fan Module Fault	Yellow	ON indicates the fan module has detected a fault.
Fan Module Identify	Blue	ON indicates this fan module is being sent an identify command via SES.

Table 5.5 Fan module status LEDs

I/O Module(s)

The IOMs have three system status LEDs that are visible from the top of the enclosure. The location of these LEDs is shown in Figure 5.7 on page 63 and a close-up is shown in Figure 5.11.



Figure 5.11 IOM LEDs under top cover

LED indications are identified in Table 5.6.

LED	Color	Description
IOM OK	Green	ON indicates the IOM is on, properly configured, and functioning normally. OFF indicates no faults are present.
IOM Fault	Yellow	ON indicates the IOM has experienced a fault. Blinking indicates a predicted fail of the IOM. OFF no connection is identified.
IOM Identify	Blue	ON indicates the IOM has received an identify command through SES. OFF indicates no identify command has been received.

Table 5.6 IOM LEDs under top cover

REINSTALLING THE ENCLOSURE TOP COVER

Return the top cover to the enclosure once the component's LED indication is identified (see Figure 5.6 on page 62).

1. Align the top cover with the chassis, ensuring the rear edge of the cover is properly aligned with the flange on the rear of the enclosure, and that the six guide pins (three on each side of the chassis) are aligned with the six guide pin openings (three on each side of the cover).
2. Use both hands to apply mild pressure and slide the top cover in place.
3. Tighten the left and right thumbscrews located at the top front corners of the enclosure's cover to secure the cover in place. See Figure 5.5 on page 62 for the locations of the top cover thumbscrew.



NOTE: Use a Phillips® #2 screwdriver to tighten the thumbscrews if more torque is required.

The enclosure's top cover is reinstalled. Return the enclosure to the rack.

RETURNING THE ENCLOSURE TO THE RACK

These instructions guide the user in returning the enclosure to the rack.



HEAVY OBJECT: A fully loaded system weighs **124.7 kilograms (275.0 pounds)** with the rails and CMA installed. Prevent personal injury and equipment damage. Obtain assistance during rack installation and when sliding the system in or out of the rack.

1. With the enclosure in the serviceable position, press and hold the release tab on each inner chassis member rail (shown in Figure 5.12) to release the rail from the serviceable position, and push the enclosure into the rack.



Figure 5.12 Release tab

2. Tighten the two left and two right thumbscrews on the enclosure. The right thumbscrews are shown in Figure 5.13.



NOTE: Use a Phillips® #2 screwdriver to tighten the thumbscrews if more torque is required.

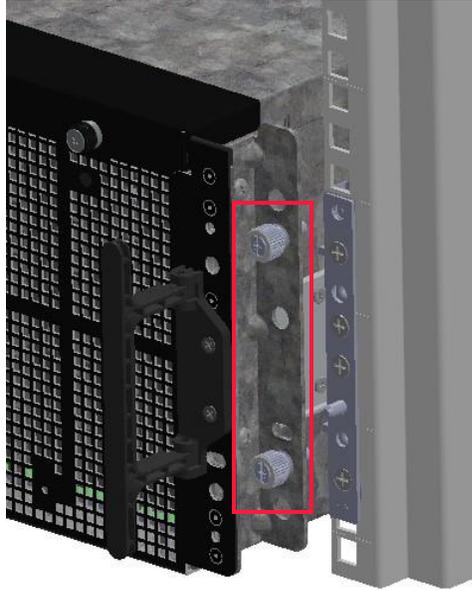


Figure 5.13 Rack thumbscrews

3. Tighten all four thumbscrews to secure the enclosure to the rack posts. The enclosure is secured to the rack posts.

Enclosure Rear LEDs

The IOM and PSU status LEDs are visible from the rear of the enclosure.

I/O MODULE(S)



The 24 Gb/s IOM has 11 LEDs: three system status LEDs and eight host connector LEDs (two per host connection). Each LED is identified in Figure 5.14 on page 68.

IOM Status

SAS Link

10/100/1000 BASE-T Link

Figure 5.14 IOM LEDs

Table 5.7 identifies each IOM LED function, color, and behavior.

LED	Color	Description
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IOM OK	Green	ON indicates the IOM is on, properly configured, and functioning normally. OFF indicates no faults are present.
IOM Fault	Yellow	ON indicates the IOM has experienced a fault. Blinking indicates a predicted fail of the IOM. OFF no connection is identified.
IOM Identify	Blue	ON indicates the IOM has received an identify command through SES. OFF indicates no identify command has been received.
IOM SAS Link 1-4 Established	Green	ON indicates 12V power is good and IOM has powered up. Blinking indicates the IOM start-up is in progress. OFF indicates the IOM is powered off.
IOM SAS Link 1-4 Fault	Yellow	ON indicates a system fault has been identified. Blinking indicates reset is in progress. OFF indicates no system faults have been identified.
IOM 100BASE-T Link/Activity	Green	ON Indicates a link. Blinking indicates 100BASE-T link activity.
IOM 10BASE-T Link/Activity	Yellow	ON Indicates a link. Blinking indicates 10BASE-T link activity.

Table 5.7 IOM LEDs rear of enclosure

PSUs

The VDS41022 Expansion Enclosure includes two PSUs that are installed in the rear of the enclosure, each containing a single bi-color yellow and green status LED. Figure 5.15 shows the locations of the PSU LEDs.

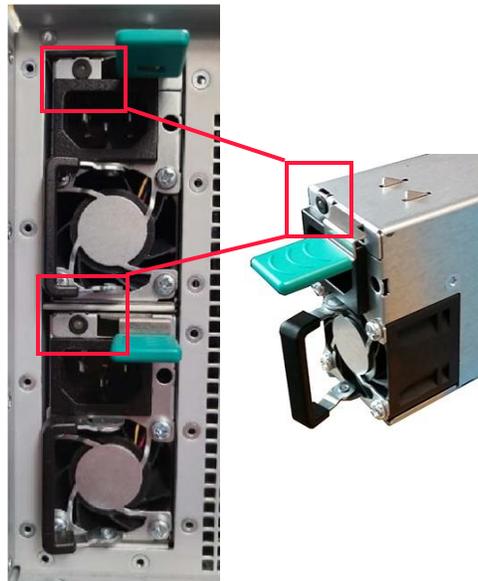


Figure 5.15 PSU LEDs

Each PSU includes the LED colors and indications outlined in Table 5.8.

LED	Color	Status
PSU Fault	Yellow	<p>ON indicates the PSU has failed and requires a service action.</p> <p>Blinking: Indicates a high temperature or overcurrent condition, or PSU fan failure. Service action is required.</p> <p>OFF indicates that no detectable faults are present.</p>
PSU Power	Green	<p>ON indicates the PSU is on and the power is good.</p> <p>OFF indicates the PSU is not receiving power. Verify the PSU is correctly installed, and that the power cord is properly plugged into the PSU jack and PDU.</p>

Table 5.8 PSU LED status descriptions

Chapter 6 System Maintenance

System maintenance typically includes the upgrade or replacement of hot-swappable FRU components installed in the VDS41022 EXPANSION Enclosure. This chapter provides the necessary steps to prepare for a service action, and includes instructions for the replacement of the following components:

- 5V DC Regulator Cards
- Drives
- Fan Modules
- I/O Modules (IOMs)
- Power Supply Units

The chapter concludes with instructions on the steps necessary to complete the service action, which typically include returning the enclosure’s top cover and returning the enclosure to the rack.

Preparing for a Service Action

Read all of the instructions provided in this chapter prior to commencing with any service action. Contact support with questions on replacing or upgrading a component—including verification that a replacement component is compatible with the system—and for assistance in purchasing the necessary replacement components and accessories.

	<p>CAUTION: When servicing the VDS41022 EXPANSION Enclosure, replacements must be completed within five (5) minutes to maintain proper system cooling. Leaving the enclosure’s top cover open for an extended period of time while the system is running may result in thermal damage.</p>
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SERVICE ACTION PREPARATION

These instructions guide the user through the steps necessary to prepare for a service action, which may include locating service labels, extending the enclosure from the rack, and removing the enclosure's top cover.

Locating the Service Labels

This section identifies the purpose and location of each of the following labels:

Dual Cord Warning Label

This dual cord warning ensures user safety by reminding the user to remove both power cords prior to commencing with services actions that require system power to be shut down.



Figure 6.1 Dual cord warning

Regulatory Label

The regulatory label identifies system compliance with different regulatory agencies (such as ROHS, WEEE, and UL), and may also contain various country marks as well. Additional certifications may be added without notice. The regulatory label is located on the enclosure top cover above the PSUs.

Serial Number & Product Number Label

Serial and product numbers are required to obtain an RMA from the Viking Enterprise Solutions™ support department. The serial number and product number label is located on the rear of the enclosure top cover, above the PSUs. A second label is located on the front of the enclosure.

Required Hardware

- None.

Enclosure Extension

Replacing or upgrading the FRU components located under the enclosure's top cover requires extending the enclosure into the serviceable position.

The hot-swappable PSUs are a hot aisle service item and do not require the enclosure to be extended from the rack for service.

Extending the Enclosure

Extending the enclosure from the rack into the serviceable position is necessary to replace the FRUs located under the enclosure's top cover including:

- 5V DC Regulator Cards
- Drives
- Fan Modules
- IOMs
- IOM blanks

	HEAVY OBJECT: A fully loaded system weighs 124.7 kilograms (275.0 pounds) with the rails and CMA installed. Prevent personal injury and equipment damage. Obtain assistance during rack installation and when sliding the system in or out of the rack.
	TIPPING HAZARD: Only extend one enclosure from the rack at a time. Ensure that each of the remaining enclosures in the rack are secured to the front rack posts. Enclosures should be installed into the rack according to their weight, with the heaviest systems on the bottom and lightest systems on top.

To extend the enclosure from the rack into the serviceable position follow these steps:

1. Loosen the two left and two right thumbscrews that secure the enclosure to each of the front rack posts. The thumbscrews are shown in Figure 6.2 on page 74.

	NOTE: Use a Phillips® #2 screwdriver to loosen the thumbscrews if they are more than finger tight.
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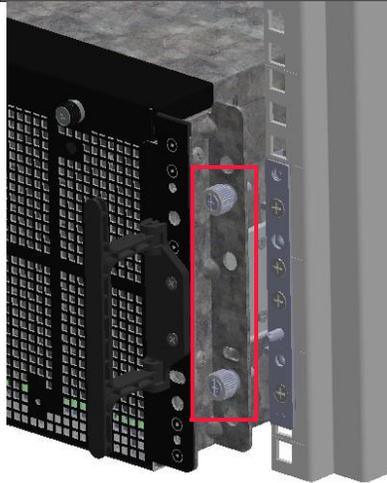


Figure 6.2 Two right side rack thumbscrews

- b. Fold out and grasp the two enclosure handles (see Figure 6.3), one on each side of the front of the enclosure.

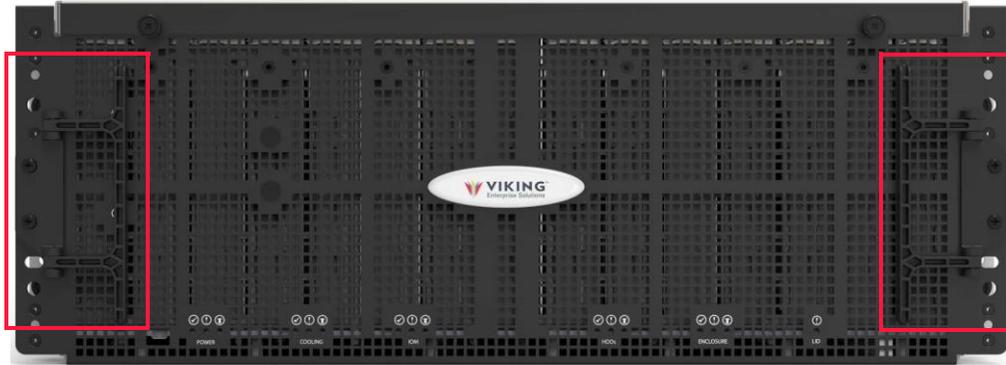


Figure 6.3 Enclosure handles

3. Slowly pull the enclosure completely forward until it locks into the serviceable position (accompanied by an audible click), while simultaneously observing the power and SAS cables on the rear of the enclosure and on the CMA to ensure the cables have enough slack to allow full extension of the enclosure on the rails.
4. The enclosure is extended into the serviceable position. Proceed to the next section to remove the enclosure’s top cover.

Removing the Enclosure’s Top Cover

The enclosure’s top cover must be removed to replace drives, IOMs, or 5V regulators. The PSUs are accessed through the enclosure rear and do not require top cover removal.



CAUTION: When servicing any device, the replacement must be completed within **five (5) minutes** to maintain proper system cooling. Leaving the enclosure’s top cover open for an extended period of time while the system is running may result in thermal damage.

1. Loosen the left and right enclosure cover thumbscrews located at the front edge of the chassis cover. The thumbscrews are shown in Figure 6.4.



NOTE: Use a Phillips® #2 screwdriver to loosen the thumbscrews if they are more than finger tight.



Figure 6.4 Top cover thumbscrews

2. Use both hands to apply a gentle downward pressure on the top cover, and then slide the cover forward enough to clear the flange at the rear of the enclosure. Aligning the six guide pins (three on each side of the chassis) with the six guide pin openings (three on each side of the cover). Refer to the examples presented in Figure 6.5.

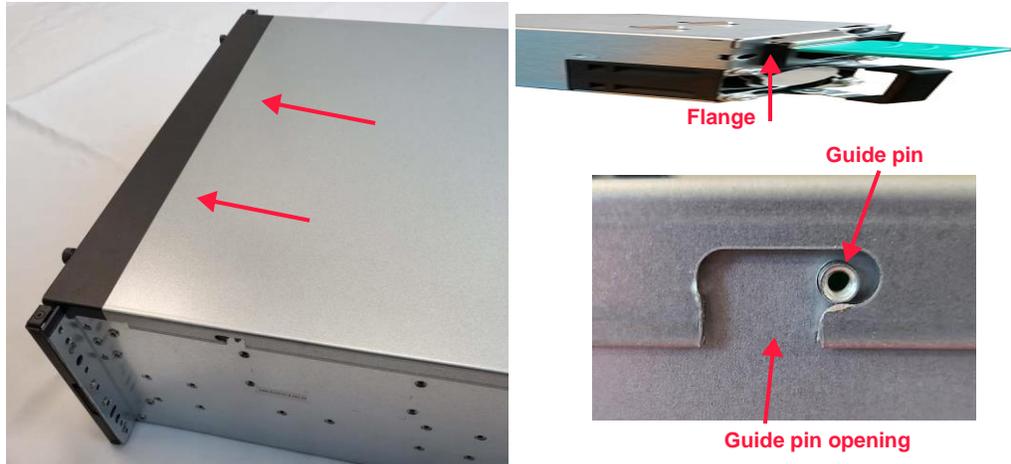


Figure 6.5 Top cover removal

3. Lift the top cover up and away from the enclosure.
4. Proceed to the appropriate FRU replacement topic.

Replacing FRUs

Replacing a system FRU component may require a Phillips® No. 2 screwdriver. Contact a Viking Enterprise Solutions™ support representative to obtain the replacement components or to verify a specific replacement component's compatibility with the system.



WARNING: While some factory-approved maintenance on FRUs (e.g. hot-swapping a PSU, fan, IOM, regulator, or drive) does not require the user to disconnect power to the system, performing other types of maintenance on systems connected to an electrical power supply may result in serious injury or death. Only individuals with knowledge and training in working with devices containing live circuits should operate the system. Take precautions when performing all other types of maintenance.
Disconnect 2 power supply cords before servicing.

5V DC REGULATOR CARDS

The enclosure houses two hot-swappable, fully redundant 5V DC regulator cards on the rear baseboard of the enclosure. Each 5V DC regulator card provides 5.2V from the 12V DC provided by the PSUs. The system is able to run off of one of the 5V DC regulators indefinitely, with the second 5V DC regulator provided for redundancy only. The following procedures guide the user in regulator card replacement.



ESD-DEVICE: Take anti-static precautions and use the appropriate equipment to ground yourself, e.g. wrist straps, grounded ESD mat, etc. when working with any system component.



CAUTION: During regulator card replacement, VES recommends the process be completed within **five (5) minutes** to ensure proper system cooling.

Removing a 5V DC Regulator Card

1. Identify the regulator card to be removed.
2. Ensure the necessary service action preparation was performed as required to remove a 5V regulator board, which includes:
 - a. “Extending the Enclosure” that begins on page 73.
 - b. “Removing the Enclosure’s Top Cover” that begins on page 74.

	ESD-SENSITIVE DEVICE. Always utilize a properly grounded ESD wrist strap or mat during operation or installation of the device, or when connecting the cables.
	WARNING: While some factory-approved maintenance on FRUs (e.g. hot-swapping a PSU, fan, IOM, regulator, or drive) does not require the user to disconnect power to the system, performing other types of maintenance on systems connected to an electrical power supply may result in serious injury or death. Only individuals with knowledge and training in working with devices containing live circuits should operate the system. Take precautions when performing all other types of maintenance. Disconnect 2 power supply cords before servicing.

3. Push up on the release tabs on both sides of the regulator card as shown in Figure 6.6.

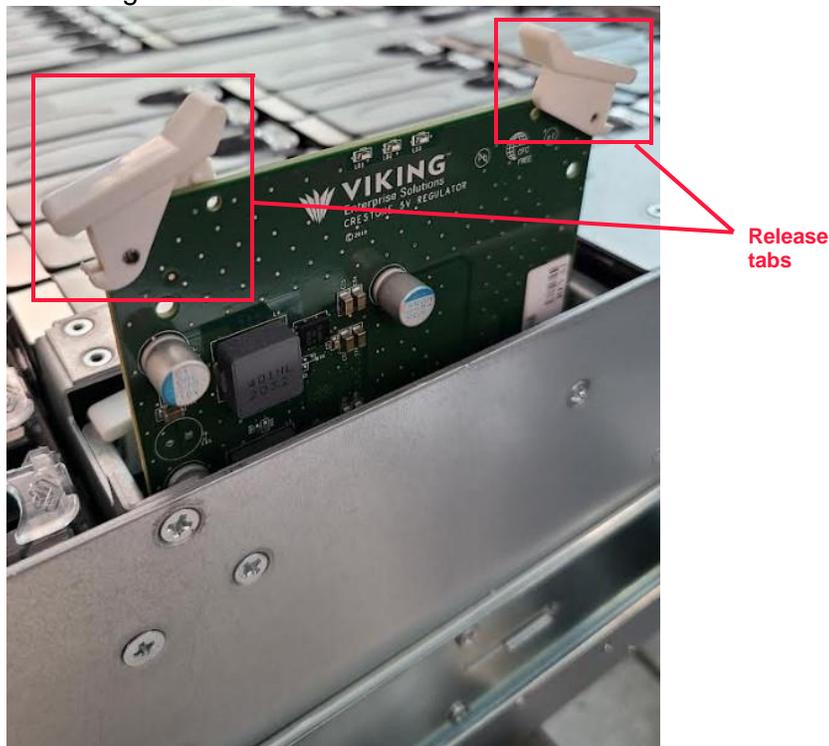


Figure 6.6 5V DC regulator card release tabs

4. Lift the regulator card up and out of the enclosure.
5. Install the replacement regulator card.

Installing a 5V DC Regulator Card

1. Ensure the necessary service action preparation was performed as required to install a 5V DC regulator card, which includes:
 - a. “Enclosure Extension” that begins on page 73.
 - b. “Removing the Enclosure’s Top Cover” section.
2. Locate the edge fingers on the regulator card and the connector in the regulator slot in the enclosure.
3. Insert the new regulator card into the guide rails (see Figure 6.7) using the same orientation as the removed card. The LEDs at the top of the card (shown in Figure 6.8) should face the right side of the enclosure as viewed from the enclosure front.

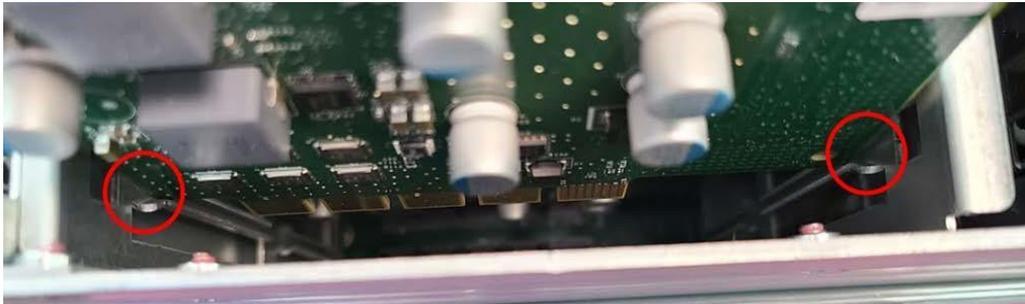


Figure 6.7 5V DC regulator card guide rails



Figure 6.8 5V DC regulator card LEDs

4. Press down on the release tabs on both sides of the regulator card to cam the regulator into place.
5. Follow the instructions provided to complete a service action, which include:
 - a. “Returning the Top Cover to the Enclosure” section.
 - b. “Returning the Enclosure to the Rack” section.

5V regulator replacement is complete. The regulator’s LEDs and the power fault warning LED on the front of the enclosure return to normal status.

DRIVES

The VDS41022 Expansion Enclosure supports SAS or SATA, 3.5-inch HDDs or 2.5-inch SFF HDDs or SSDs (2.5-inch drives require adapters). All drive capacities and spindle speeds are supported. SAS drives are dual ported and the enclosure provides drive on/off power control for SAS-4 devices. SATA drives are single ported and SATA drive power control is not available—the use of Interposers is not supported. Hard drives are hot-swappable FRUs. Shutting down the system to

replace a drive is unnecessary; however, verify no data transactions are taking place before hot-swapping a drive.

Drive Mapping and Zoning

Drives are mapped according to their location within the enclosure. Groups of drives are further divided into zones, which enable the user to control data access based on user, location, or a number of other criteria. The VDS41022 Expansion Enclosure supports multiple zoning configurations for the IOM architectures; however, SATA drives only report to IOM A.

Drive Carrier Assemblies

Drive carriers are used to facilitate controlled installation and removal of drives into and from the storage enclosure. Closing the drive carrier handle ensures complete seating of the connectors through typical operational shock and vibration. A drive carrier assembly includes the drive (or drive blank) installed in the drive carrier. Figure 6.9 provides a close-up view of a drive carrier with a preinstalled 3.5-inch HDD.

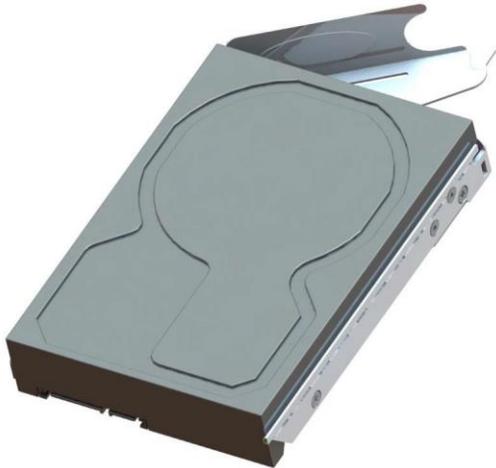


Figure 6.9 Drive carrier assembly

Drive Carrier Assembly Configurations

Two drive carrier assembly configurations are possible. Interposers are not supported.

- 3.5-inch SAS or SATA LFF HDD or SSD
- 2.5-inch SAS or SATA SSD or SFF HDD (requires a custom spacer)



NOTE: Before switching from a 3.5-inch drive to a 2.5-inch drive, ensure the appropriate supplies are on hand and the selected drive is supported. 2.5-inch drives require an adapter. Contact a Viking Enterprise Solutions™ support representative for more information on the chosen drive.

Drive Replacement

When replacement is necessary, the instructions that follow guide the user in removing the drive carrier from the enclosure, removing a defective drive from the carrier, installing a new drive, and returning the drive carrier assembly to the drive bay.

	<p>CAUTION: Ensure that disk drives are at room temperature before installing and powering up a storage enclosure. Drives should acclimate to room temperature for at least two hours prior to use.</p>
	<p>CAUTION: When hot-swapping any device, the replacement must be completed within five (5) minutes to maintain proper system cooling. Leaving the top cover open for an extended period of time will cause the drives to overheat.</p>
	<p>NOTE: The VDS41022 EXPANSION Enclosure is designed to remain operational during a service action, such as replacing a drive, IOM, fan, or PSU. During drive replacement, the enclosure management firmware detects the opened cover and turns on an Yellow status LED on the front of the enclosure. This LED will go dark once the cover is properly installed.</p>

Removing a Drive Carrier Assembly

1. Ensure no data transactions are occurring prior to drive removal.
2. Identify the drive to be removed.
3. Verify that the necessary service action preparation was performed as required to remove a drive, which includes:
 - a. “Enclosure Extension” section.
 - b. “Removing the Enclosure’s Top Cover” section.

	<p>ESD-SENSITIVE DEVICE. Always utilize a properly grounded ESD wrist strap or mat during operation or installation of the device, or when connecting the cables.</p>
	<p>NOTE: In a remove/replace action, make note of the location of each drive prior to removal. This is especially important if the drives contain data and the system has a zoned configuration.</p>

4. Push the drive carrier release catch away from the drive, in the direction of the imprinted arrows on top of the release catch as shown in Figure 6.10. This releases the cam securing the drive to the baseboard.

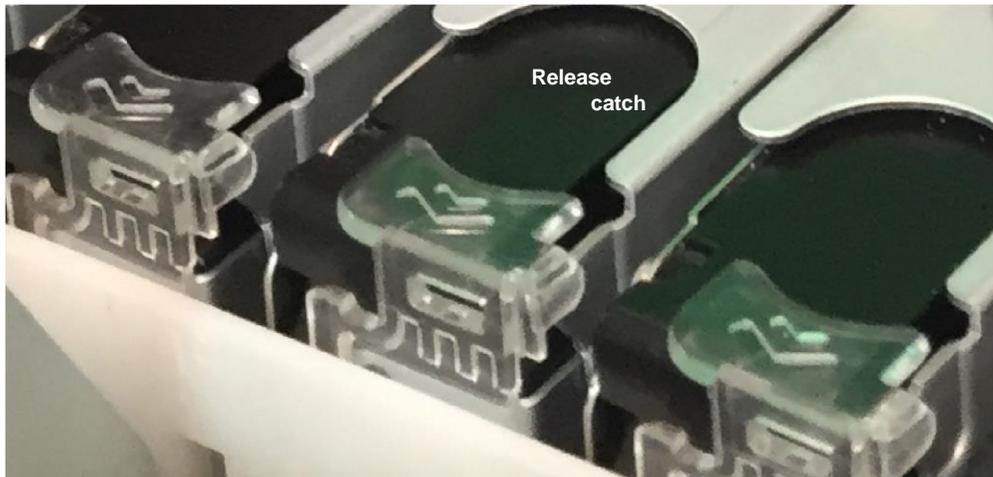


Figure 6.10 Drive release catch

5. Lift the drive up and out of the enclosure.
6. Repeat steps 1 through 4 to remove each drive requiring replacement, making note of the location of each drive.



NOTE: The enclosure remains operational while the rails are extended forward. The enclosure components do not exceed the maximum operational shock and vibration specifications while being pulled out of, or pushed into, the rack.

Replacing a Drive In a Carrier

1. Using a Phillips screwdriver, remove the two drive pins or Phillips screws that secure the side rail to the drive. The drive pins are shown in Figure 6.11.

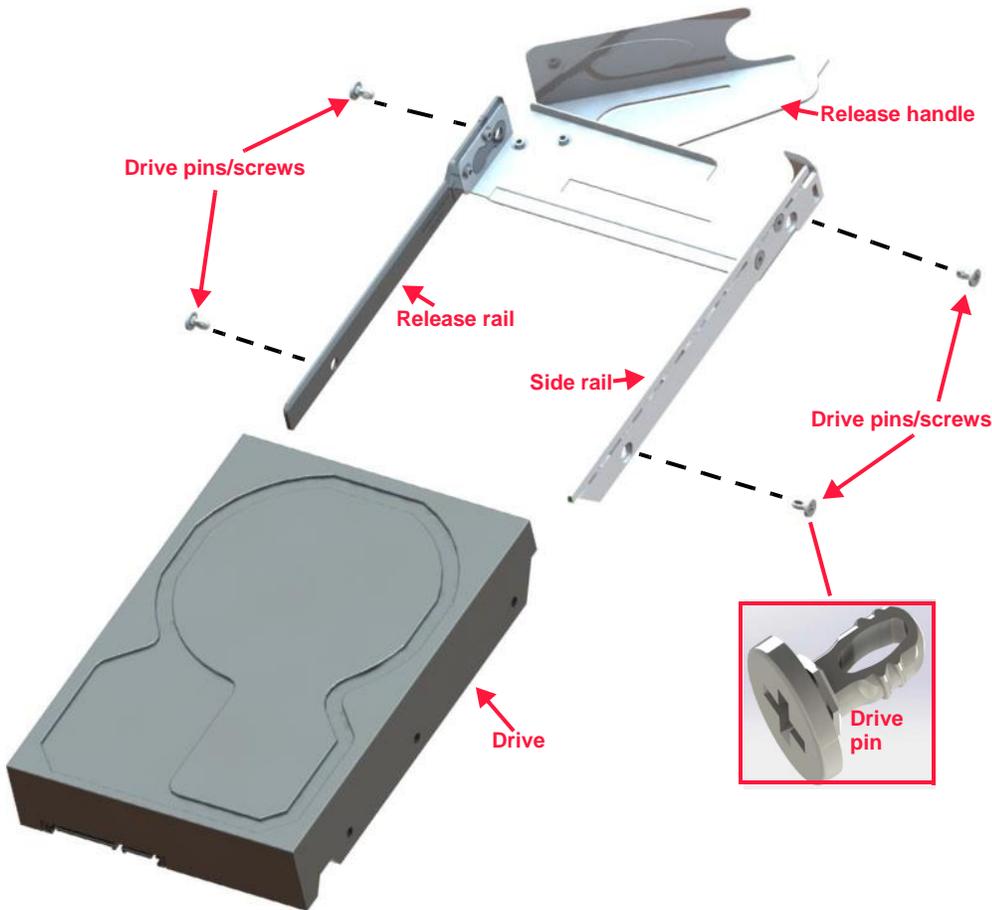


Figure 6.11 Drive carrier assembly components

2. Use the screwdriver to remove the two drive pins or Phillips screws that secure the release rail to the drive.
3. Carefully slide the drive out and away from the carrier rails.
4. Insert the replacement drive in between the two rails in the same orientation as the removed drive.
5. Adjust the drive as necessary so that the screw holes on the sides of the drive properly align with the screw holes on the rails.
6. Push the drive pins or use the No.2 Phillips screwdriver to screw the Phillips screws into each of the four screw holes (two on the side rail and two on the release rail) to secure the drive to the drive carrier.
7. Repeat steps 1 through 7 for each drive requiring replacement.

Installing a Drive Carrier Assembly

	<p>ESD-DEVICE: Follow proper anti-static guidelines when handling the drives, e.g. wrist strap, ESD mat, proper grounding, etc.</p>
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	<p>CAUTION: Filling all rows in the enclosure with drives is not necessary; however, each partially filled row must be completely filled with drive carriers containing either drives or drive blanks. Completely filling a row is required to ensure proper system cooling. Contact a Viking Enterprise Solutions™ sales representative for assistance in obtaining the appropriate drive blank(s) for the system.</p>
	<p>CAUTION: VES recommends that drives have a minimum of two hours to acclimate to room temperature before installing them in the enclosure.</p>

1. Verify the drive carrier's release handle is in the open position. See Figure 6.12 for a close-up view of the release handle.

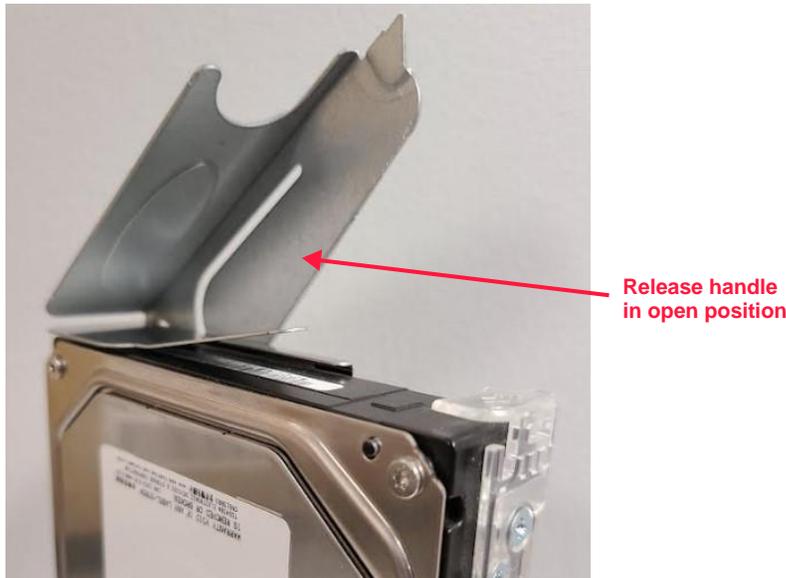


Figure 6.12 Drive carrier release handle open

2. Carefully slide the drive carrier assembly into the drive bay until the carrier contacts the baseboard and the handle begins to engage. The arrows on the release catch will point towards the rear of the enclosure when the drive is inserted in the correct orientation as shown in Figure 6.13.

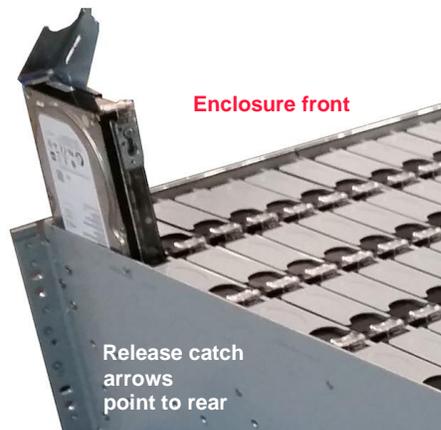


Figure 6.13 Drive insertion

	CAUTION: Do not drop the drive into the drive bay as damage to the drive, connectors, or baseboard may result. Gently guide the drive carrier assembly into the drive bay.
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3. Press the release handle down until the release catch engages. The drive cams into place.
4. Repeat steps 1 through 3 for any remaining drives requiring replacement.
5. Ensure the following steps are performed to complete the service action, including:
 - a. “Returning the Top Cover to the Enclosure” section.
 - b. “Returning the Enclosure to the Rack” section.

Drive replacement is complete. The drive LED and the drive group LEDs on the front of the enclosure return to normal status.

FAN MODULES

Four fan modules are included in the enclosure, each containing two fans— eight individual fans per enclosure—that provide system cooling. These fan modules are hot-swappable. Fan module replacement should be made within five minutes of removal to ensure proper system airflow and cooling.

The following procedures guide the user in fan module replacement.

	ESD-DEVICE: Take anti-static precautions and use the appropriate equipment to ground yourself, e.g. wrist straps, grounded ESD mat, etc. when working with any system component.
	CAUTION: During fan module replacement, VES recommends the process be completed within five (5) minutes to ensure proper system cooling.

Removing a Fan Module

1. Identify the fan module to be removed.

	ESD-SENSITIVE DEVICE. Always utilize a properly grounded ESD wrist strap or mat during operation or installation of the device, or when connecting the cables.
---	---

2. Ensure the necessary service action preparation was performed as required to remove a fan module, which includes:
 - a. “Extending the Enclosure” section.
 - b. “Removing the Enclosure’s Top Cover” section.
3. Push in on the release tab on the fan module identified in Figure 6.14.

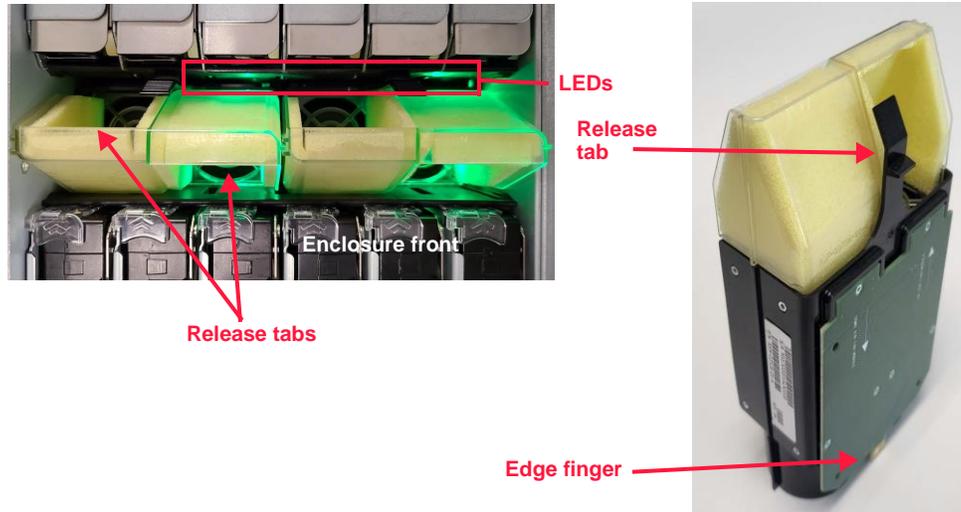


Figure 6.14 Fan module

4. Make note of the fan module’s orientation and lift the fan module up and out of the enclosure.

Fan module removal is complete. Install the replacement fan module.

Installing a Fan Module

1. Ensure the necessary service action preparation was performed as required to install a fan module, which includes:
 - a. “Enclosure Extension” section.
 - b. “Removing the Enclosure’s Top Cover” section.
2. Become familiar with the edge fingers on the bottom of the fan module and the connector in the fan module slot of the enclosure.
3. Insert the new fan module in the same orientation as the removed fan module, with the fan module board facing the rear of the enclosure.
4. Press down on the fan module firmly to secure it in place. The fan module is not fully seated until the release tabs audibly click into place.
5. Follow the instructions provided to complete a service action, which include:
 - a. “Returning the Top Cover to the Enclosure” section.
 - b. “Returning the Enclosure to the Rack” section.

Fan module replacement is complete. The fan module LED and the cooling group LEDs on the front operator panel return to normal status.

I/O MODULES

IOMs are hot-swappable and may be replaced while the system is in operation. Replacement should be made within five (5) minutes to ensure proper system cooling. To remove and install an IOM, use the following procedures.

	ESD-DEVICE: Take anti-static precautions and use the appropriate equipment to ground yourself, e.g. wrist straps, grounded ESD mat, etc. when working with any system component.
	CAUTION: In single IOM configurations, a blank canister is required in the unoccupied slot (B) to maintain proper system cooling. Contact a Viking Enterprise Solutions™ sales representative for more information on ordering a blank canister for the single IOM configuration.
	CAUTION: When replacing any component in the VDS41022 EXPANSION Enclosure, VES recommends that the replacement is made within five (5) minutes to maintain proper cooling.
	HOT SURFACE: Take care when handling the IOM if it has been running for any length of time as the surface may be hot.

Removing an I/O Module

	ESD-DEVICE: Follow proper anti-static guidelines when handling I/O or server modules, e.g. wrist strap, ESD mat, etc.
	CAUTION: Ensure there are no data transactions taking place prior to IOM removal.  Refer to the section titled “I/O Modules” that begins on page 86 for more information on hot-swapping the IOM(s).

1. Identify the IOM to be removed.
2. Ensure that no data transactions are occurring on the IOM being removed.
3. Verify that the necessary service action preparation was performed as required to remove an IOM, which includes:
 - a. “Enclosure Extension” section.
 - b. “Removing the Enclosure’s Top Cover” section.
4. The IOM ports are accessed from the rear of the enclosure. Label each cable to ensure it is reinstalled into the same port after IOM replacement. This is particularly important if the VDS41022 Expansion Enclosure has a zoned configuration.
5. Remove each cable from the IOM being replaced.
6. Lift up on the release tabs on both sides of the IOM being replaced. The IOM on the right (as viewed from the enclosure front) is installed into I/O slot A and the IOM or blank on the left is installed into I/O slot B. See Figure 6.15. (The correct IOM slot is especially important if this is a zoned configuration and the drives contain data. SATA HDDs are only accessible from IOM A.)



Figure 6.15 IOM release tabs

7. Carefully lift up on the IOM to remove it from the enclosure. Take care not to bend the IOM during removal.
8. Repeat steps 2 through 7 to remove the second IOM ONLY if both IOMs have failed and the system is shut down. Otherwise, complete all steps to remove and install the first IOM, and then repeat all steps to remove and install the second IOM. If replacing only one IOM, skip this step.
9. Proceed to install the replacement IOM.

Installing an I/O Module

	ESD-DEVICE: Follow proper anti-static guidelines when handling the modules, e.g. wrist strap, ESD mat, etc.
	CAUTION: In single IOM configurations, a blank canister is required in the unoccupied I/O option slot (B) to maintain proper system cooling. Contact a Viking Enterprise Solutions™ sales representative for more information on ordering a blank canister for a single IOM configuration.
	CAUTION: To avoid damage to components inside the IOM or damage to the connectors, install the module in the correct orientation (with the release tabs at the top of the I/O option slot). Ensure the edge fingers properly align with the baseboard connectors before installing the IOM. Never force the module into the slot.

1. Ensure that the necessary service action preparation was performed as required to install an IOM, which includes:
 - a. “Enclosure Extension” section.
 - b. “Removing the Enclosure’s Top Cover” section.
2. Identify the connectors on the bottom of the IOM and inside the I/O option slot(s) in the enclosure. The edge fingers on the IOM must properly mate with the connectors in the I/O option slot. The RJ45 port should be at the bottom and the release tabs should be at the top (see Figure 6.16).

Release tabs

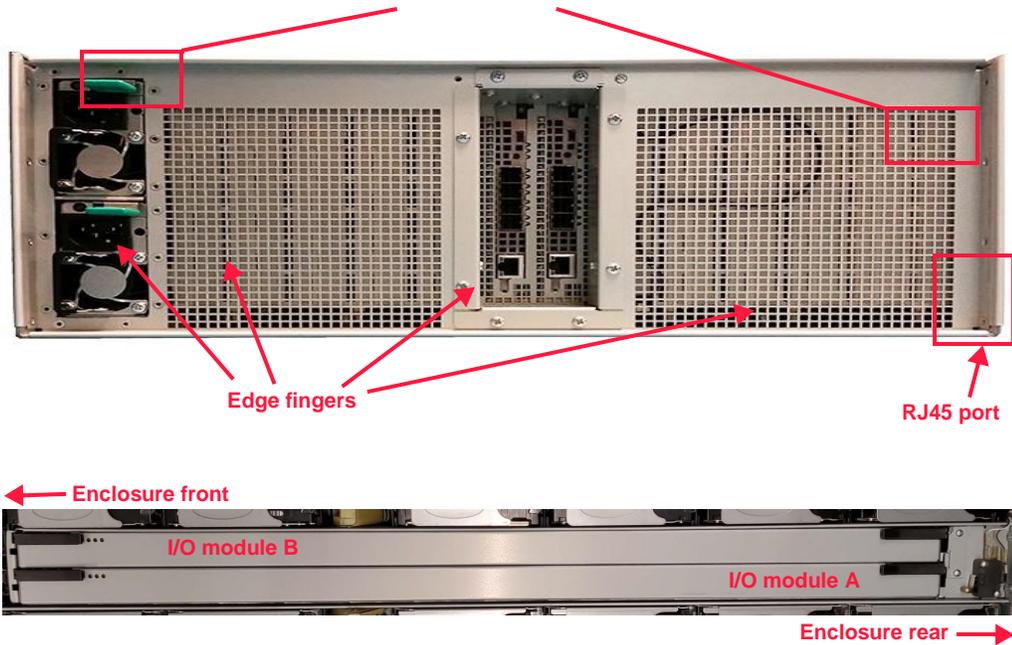


Figure 6.16 IOM correct orientation

3. If necessary, lift up on the release tabs on both sides of the IOM to ensure they are in the open position.
4. Carefully slide the IOM down into the appropriate slot in the enclosure (see Figure 6.17). Take care not to bend the IOM during installation or damage to the connectors may result.
5. Gently push the module into place until the top edge is flush with the top of the option slot. Never force the module into place as damage to the connectors may occur.
6. Press the release tabs on both sides of the IOM down to engage the cam and secure the IOM to the enclosure.



Figure 6.17 Installing the IOM

7. Return the cables labeled and removed earlier to the appropriate ports on the IOM operator panel at the rear of the enclosure.
8. If necessary, repeat steps 2 through 7 to install a second IOM or module blank.
9. Follow the instructions provided to complete a service action, which include:
 - a. “Returning the Top Cover to the Enclosure” section.
 - b. “Returning the Enclosure to the Rack” section.

IOM replacement is complete. The IOM LEDs and the IOM group LEDs on the front operator panel return to normal status.

POWER SUPPLY UNITS

The PSU(s) supplied with the VDS41022 Expansion Enclosure may be from different manufacturers and are rated at either 1600W or 2000W. PSUs are designed to work in pairs of the same model and wattage. Two PSUs of the same model and wattage can communicate with each other to balance the power provided; when two PSUs of different models and wattage are installed in a single enclosure, they are unable to communicate with each other. Therefore, to assure N+1 redundancy both PSUs in a single enclosure must be of the same model and wattage.

The FRU contains two identical PSUs. If the enclosure you are servicing contains the same PSU as those in the FRU you receive, you only need to replace the single defective PSU, which can be hot-swapped. If the enclosure you are servicing contains a different PSU from those in the FRU, you must replace both PSUs. Replacing both PSUs requires that the system first be shut down. When replacing both PSUs, first replace the defective PSU with one of the PSUs from the FRU, then replace the other PSU in the system with the second PSU from the FRU. The second PSU you replace is still fully functional and can be used in the event that a replacement PSU of that model and wattage is required.

PSUs are accessed the hot aisle; therefore, removing the enclosure’s top cover or extending the enclosure from the rack into a serviceable position is not required.

	NOTE: The maximum current draw is listed on each PSU label. The maximum input for one PSU is 200–240V (±10%) ~ 9.48A max. This rating is for one PSU and there are two PSUs per storage enclosure sharing the load.
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Removing a PSU

To remove a PSU from the storage enclosure, follow these steps.

	ESD-DEVICE: Follow proper anti-static guidelines when handling PSUs, e.g. wrist strap, ESD mat, proper grounding, etc.
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1. Identify the PSU to be removed.
2. Disconnect the CMA and swing it into the hot aisle far enough to access the PSU (See Appendix D).

- Unplug the power cord from the jack in the PSU requiring replacement.

	<p>WARNING: While some factory-approved maintenance on FRUs (e.g. hot-swapping a PSU, fan, IOM, regulator, or drive) does not require the user to disconnect power to the system, performing other types of maintenance on systems connected to an electrical power supply may result in serious injury or death. Only individuals with knowledge and training in working with devices containing live circuits should operate the system. Take precautions when performing all other types of maintenance. Disconnect 2 power supply cords before servicing.</p>
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- Press down on the release tab to release the cam. The release tab cannot be pressed if the power cord is still plugged into the PSU jack. The release tab is shown in Figure 6.18.

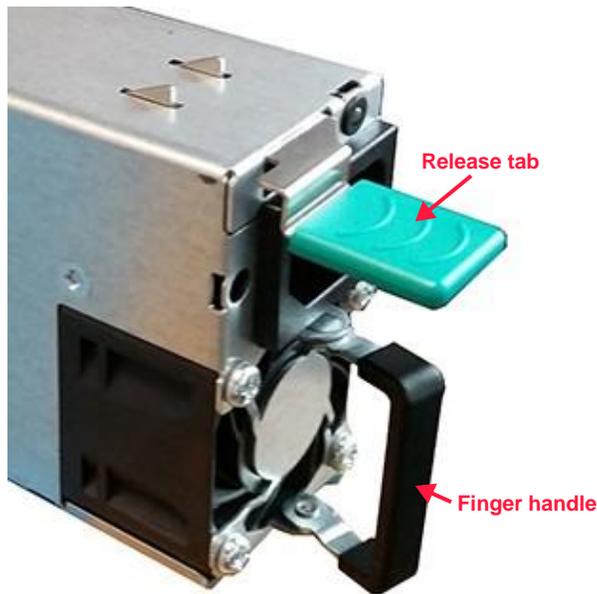


Figure 6.18 PSU removal

- Pull the PSU out of the enclosure by the finger handle. The finger handle is also shown in Figure 6.18.

<p>CAUTION: If both PSUs require replacement and the second PSU is operational, complete all steps to replace the first PSU, and then follow the same steps to replace the second PSU.</p>

- Repeat steps 4 through 6 to remove the second PSU ONLY if both PSUs have failed and the system is shut down. Otherwise, complete all steps to remove and install the first PSU, and then repeat all steps to remove and install the second PSU. If replacing one PSU, skip this step.

PSU removal is complete. Install the replacement PSU.

Installing a PSU

To install a PSU into the storage enclosure, follow these steps.



ESD-DEVICE: Follow proper anti-static guidelines when handling PSUs, e.g. wrist strap, ESD mat, proper grounding, etc.

1. Slide the replacement PSU into the vacant PSU slot on the rear of the enclosure. Ensure the PSU is in the same orientation as the PSU you removed in step 6 of the previous procedure. The finger pull should be on the bottom and the release tab on top as shown in Figure 6.19.



Figure 6.19 Correctly oriented PSUs

2. Continue pushing the PSU into the enclosure until the release tab engages and the PSU is cammed into place.



NOTE: The proper orientation allows the PSU to cam into place once it is fully inserted into the enclosure. If the PSU slides out of the enclosure easily without pressing the release tab, check the orientation and reinsert the PSU into the slot.

3. Repeat steps 1 and 2 for the second PSU if replacing both PSUs during the same service action. This procedure requires the system to be shut down prior to PSU removal as instructed in step 7 in the section titled “Removing a PSU”.
4. Reconnect the CMA (see Appendix D).

PSU replacement is complete. The PSU LED and the power group LED on the front of the enclosure return to normal status.

Completing the Service Action

Follow these instructions to complete a service action, to include returning the top cover to the enclosure, and returning and securing the enclosure to the rack.

These steps are not necessary when replacing a PSU.

RETURNING THE TOP COVER TO THE ENCLOSURE

1. Align the top cover with the chassis. Ensure that the six guide pins (three on each side of the chassis) are aligned with the guide pin openings (three on each side of the cover), and that the flange on the enclosure rear is properly aligned to the rear edge of the cover. See Figure 6.20.

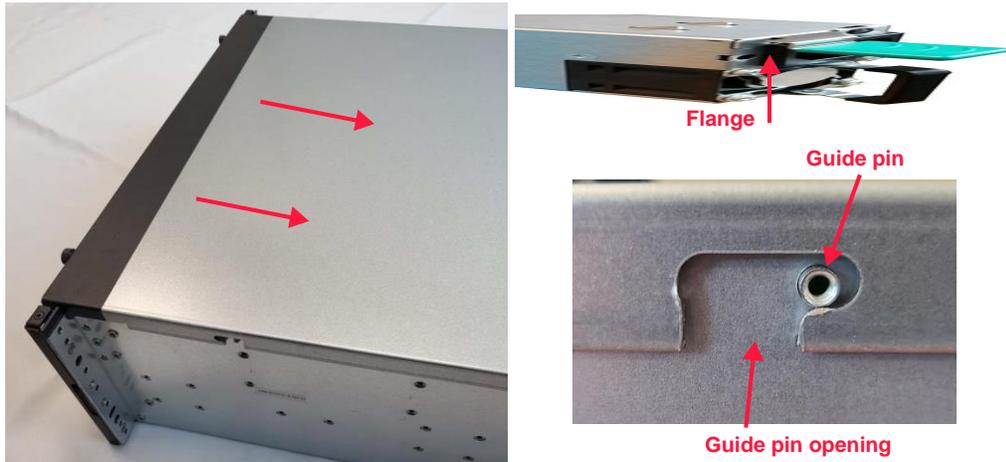


Figure 6.20 Top cover reinstallation

2. Use both hands to apply mild downward pressure and slide the top cover into place.
3. Tighten the left and right enclosure cover thumbscrews located at the front edge of the chassis cover. The thumbscrews are identified in Figure 6.21.

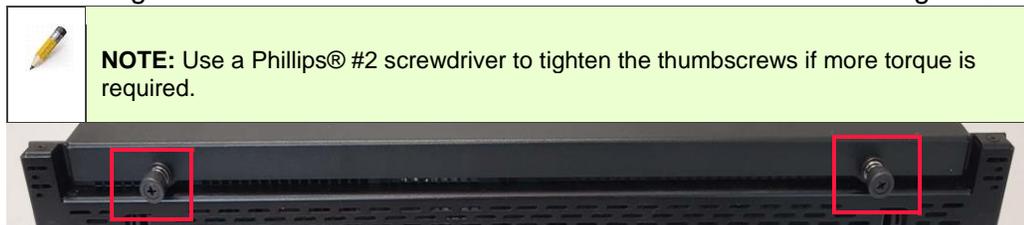


Figure 6.21 Top cover thumbscrews

Cover reinstallation is complete. Return the enclosure to the rack.

RETURNING THE ENCLOSURE TO THE RACK

1. With the enclosure in the serviceable position, press and hold the release tab on each inner chassis member rail (shown in Figure 6.22) to release the rail from the serviceable position, and push the enclosure into the rack.



Figure 6.22 Release tab

- The two left and two right thumbscrews on each side of the enclosure should align with the two screw holes on each rack post. Correct alignment of the right thumbscrews is shown in Figure 6.23.

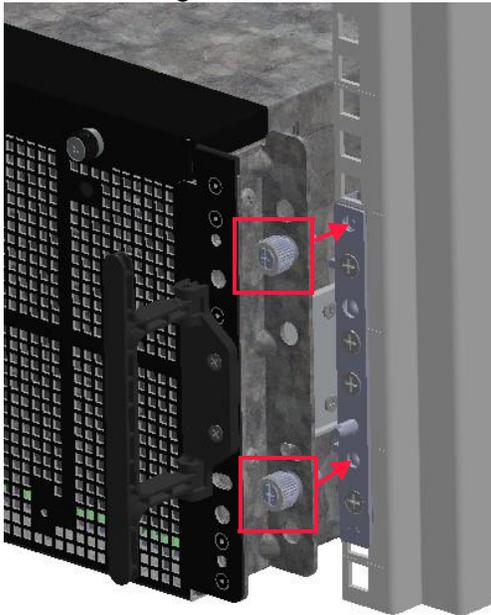


Figure 6.23 Rack thumbscrews

- Finger tighten the two thumbscrews on each side of the enclosure to secure the enclosure to the rack posts.

	<p>NOTE: Use a Phillips® #2 screwdriver to tighten the thumbscrews if more torque is required.</p>
---	---

Service actions are complete. The enclosure is now returned to the rack and secured to the front rack posts.

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Appendix A **Expansion Enclosure Cable Management Assembly Installation**

This appendix provides instructions for installing the Cable Management Assembly (CMA) supplied with the enclosure.

CMA INSTALLATION

Figure D.1 shows the Cobra CMA as it appears when removed from the packaging.



Figure D.1 Cobra CMA

To install the Cobra CMA, follow these steps:

1. Remove the two Phillips® M5 X 10 flat head screws from the second and fourth position from the right rear rack post. The screws to be removed are shown in Figure D.2.

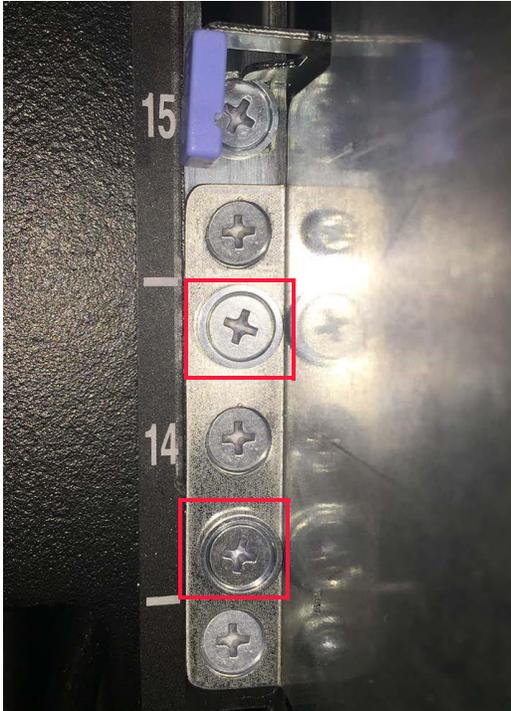


Figure D.2 Rear rack post screws

2. Align the flange on the right CMA bracket with the screw holes on the rack post and install the two M5 flat head screws that were removed in step 1. The cutout on the CMA bracket (shown in Figure D.3) should be aligned at the top.
3. If necessary, loosen the nuts on the CMA bracket to adjust the bracket to the appropriate depth. Re-tighten the nuts when finished.
4. Repeat steps 1 through 3 to install the left CMA bracket onto the left rear rack post. Ensure the cutout is aligned at the top of the CMA bracket and any necessary depth adjustment is made.
5. Route the cables around the CMA loop and secure the cables to the CMA using the hook and loop fasteners. Ensure there is enough slack provided for the power and SAS cables to allow for the bend radius and rack extension. Wrapping the cables around the CMA loop too tightly can result in damage to the cables. Figure D.3 on page 111 shows a correctly wrapped Cobra CMA.



Figure D.3 Correctly wrapped Cobra CMA

6. Install the CMA onto the CMA brackets.
 - a. Squeeze the two knurled knobs on the spring-loaded quick release hinge on the right side of the CMA together as shown in Figure D.4.



Figure D.4 Spring-loaded quick release hinge

- b. Align the quick release hinge with the top and bottom openings on the right CMA bracket that was secured earlier to the rear right rack post.
 - c. Pivot the hinge to lock it into place.
7. Secure the CMA to the rear of the enclosure.
 - a. Disengage the spring-loaded CMA attachment pin located on the rear of the enclosure. Lift up on the pin and turn it counter-clockwise for 1/2 turn. The pin is shown in Figure D.5.

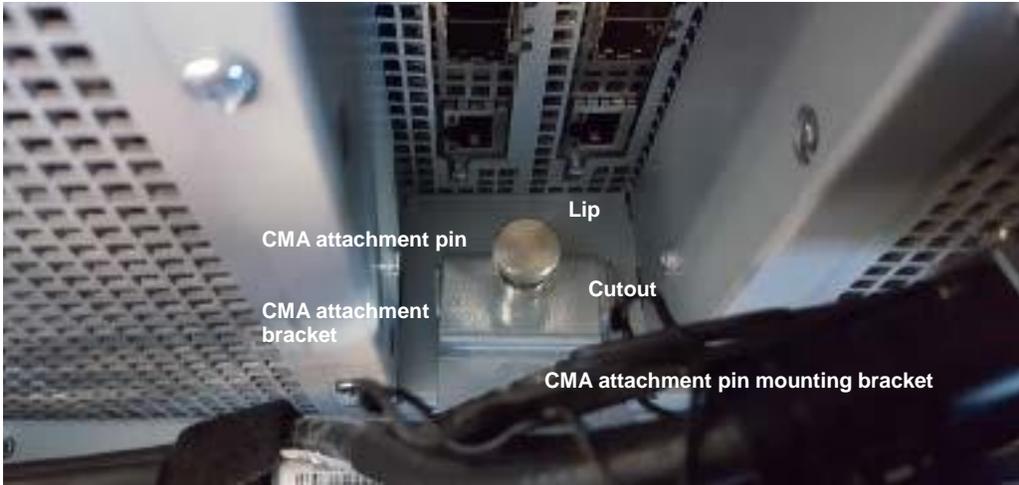


Figure D.5 Cobra CMA attachment pin

- b. Align the CMA attachment bracket so that the cutout slides fully forward, under the head of the CMA attachment pin, and the lip on the CMA attachment bracket hangs over the edge of the pin's mounting bracket as demonstrated in Figure D.5.
 - c. Pull back on the CMA attachment bracket until the lip is flush against the edge of the pin's mounting bracket.
 - d. Lift up on the CMA attachment pin and turn it clockwise 1/2 turn, and then release the pin to lock it into place.
8. Plug the power cables into their respective PSU jacks. An example is shown in Figure D.6 on page 113. Note that the plugs may be oriented differently on the supplied power cables.

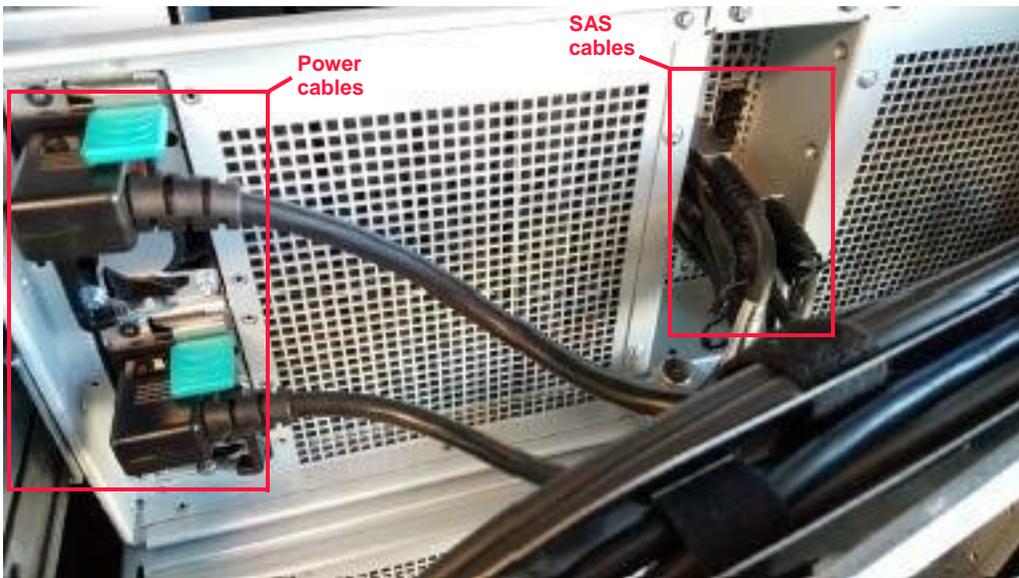


Figure D.6 Example of power and SAS cables installed

9. Plug the SAS cables into the appropriate ports on each I/O module, also shown in Figure D.6.
10. Repeat steps 6a through 6c to secure the left side of the CMA to the left CMA bracket.
11. Test the CMA installation.
 - a. Loosen the two left and two right thumbscrews that secure the enclosure to each of the front rack posts. The thumbscrews are shown in Figure D.7.

 **NOTE:** Use a Phillips® #2 screwdriver to loosen the thumbscrews if they are more than finger tight.

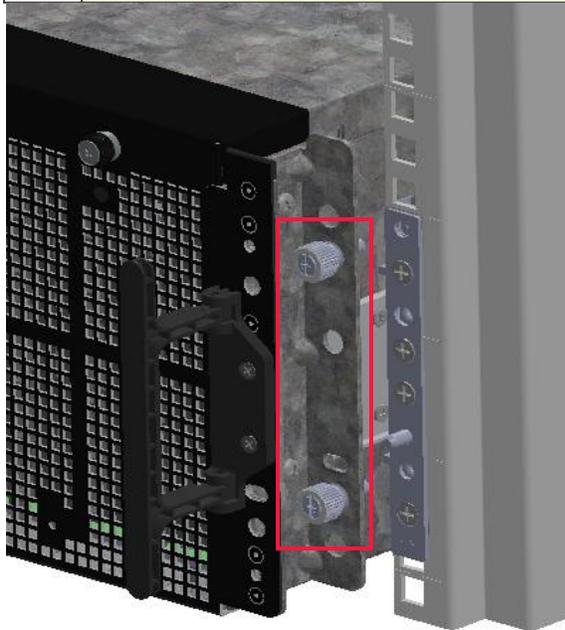


Figure D.7 Rack thumbscrews

 **HEAVY OBJECT:** A fully loaded system weighs **124.7 kilograms (275.0 pounds)** with the rails and CMA installed. Prevent personal injury and equipment damage. Obtain assistance during rack installation and when sliding the system in or out of the rack.

 **TIPPING HAZARD:** Only extend one enclosure from the rack at a time. Ensure that each of the remaining enclosures in the rack is secured to the front rack posts. Enclosures should be installed into the rack according to their weight, with the heaviest systems on the bottom and lightest systems on top.

- b. Fold out and grasp the two enclosure handles (see Figure D.8), one on each side of the front of the enclosure.

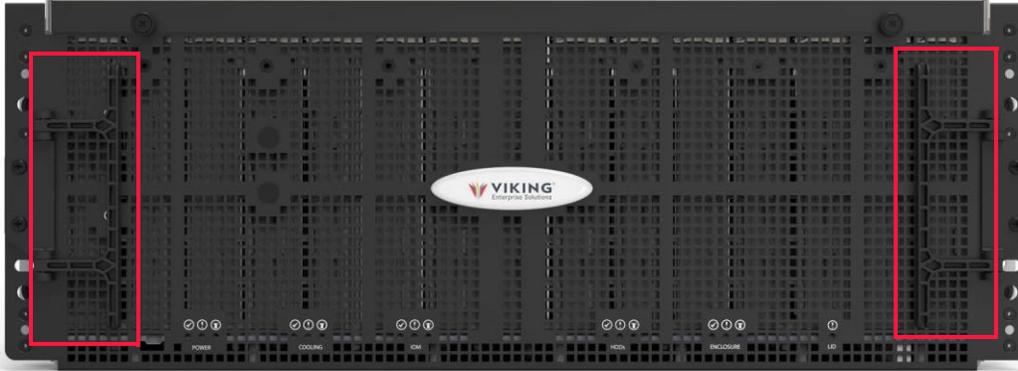


Figure D.8 Enclosure handles

- c. Slowly pull the enclosure completely forward until it locks into the serviceable position (accompanied by an audible click), while simultaneously observing the power and SAS cables on the rear of the enclosure and on the CMA to ensure the cables have enough slack to allow full extension of the enclosure on the rails.
- d. Follow the instructions provided in the section titled “Returning the Enclosure to the Rack” on page 47 to return the enclosure and secure it to the front rack posts. No pinching or binding of the cables should occur.

Cobra CMA installation is complete.

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Appendix C Acronyms & Abbreviations

A	Amps	Mb/s	Megabits per second
AC	Alternating current	PDU	Power distribution unit
ATA	Advanced Technology Attachment	PSU	Power supply unit
CAT5e	Category 5 enhanced	RH	Relative humidity
CE	Conformance European Union	RJ45	Registered jack, form factor for Ethernet
CMA	Cable management arm	RMA	Return merchandise authorization
DC	Direct current	RMS	Root mean square (VA-power consumption)
EEPROM	Electrically Erasable Programmable Read-Only Memory	RoHS	Restriction of Hazardous Substances
EMC	Electromagnetic Compatibility	SAS	Serial-Attached SCSI
EMI	Electromagnetic Interference	SATA	Serial Advanced Technology Attachment
ESD	Electrostatic discharge	SCSI	Small Computer System Interface
FCC	Federal Communications Commission	SEP	Storage Enclosure Processor
FRU	Field-replaceable unit	SES	SCSI enclosure services
GbE	Gigabit Ethernet	SFF	Small form factor
Gb/s	Gigabits per second	SSD	Solid-state drive
HD	Hard drive, or hard disk	TMRA	Temperature, Maximum Recommended Ambient
HDD	Hard disk drive	UL®	Underwriter's Laboratories, Inc.
Hz	Hertz	UPS	Universal power supply, uninterruptible power supply
I/O	Input/output	USB	Universal Serial Bus
IOM	Input/output module	V	Volts
ISO	International Organization for Standardization	VPD	Vital product data
IT	Information technology	WEEE	Waste Electrical and Electronic Equipment Directive
EXPANSION	Just a bunch of drives		
kg	Kilogram, rounded		
LED	Light-emitting diode		
LFF	Large form factor		

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Contact Information

Key Business & Technology Development Locations

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Servicing Instructions

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The server module's serial and product number label is located on the top of the server module's CPU fan. These numbers are required for servicing.

Warranty Information

Check the sales agreement for details. Contact a Viking Enterprise Solutions sales representative for assistance.



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