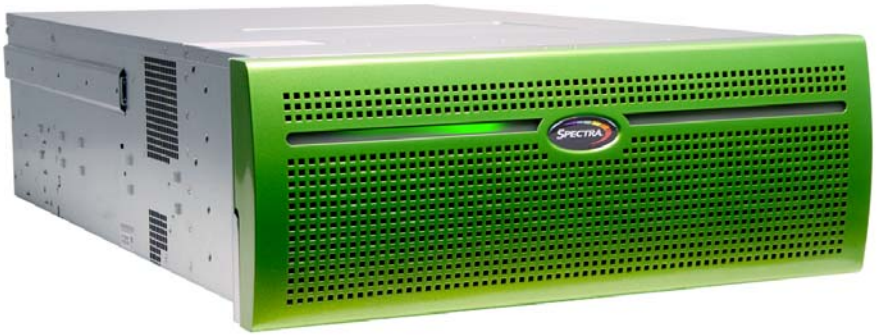
Spectra Verde NAS Solution

Site Preparation Guide



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Part Number

90990080 Revision L

Revision History

Revision	Date	Description
A	April 2013	Initial release.
B	July 2013	Update for Verde 1.1 release.
C	August 2013	Update for Verde 1.2 release.
D	October 2013	Update for Verde 1.3 release.
E	December 2014	Split previous guide into separate Site Prep and Installation guides.
F	March 2015	Updated for Verde 2.1 release.
G	October 2015	Updated for Verde 2.2 release and Verde DPE array.
H	November 2015	Additional updates for Verde 2.2 release.
I	March 2016	Updated for the Verde DP release.
J	April 2016	Updated for the Verde 3.1.1 release.
K	July 2018	Updated for the Verde 5.0 release.
L	March 2020	Updated for the Verde 5.1.5 release.

Note: To make sure you have the most current version of this guide check the Spectra Logic Technical Support portal at support.spectralogic.com/documentation/user-guides/.

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CHAPTER 1

About This Guide

This guide describes site preparation requirements for the Spectra® Verde® NAS Solution master node, which is referred to as the *master node* in these instructions.

This guide also describes the site preparation requirements for the Spectra 44-bay, 96-bay, and 107-bay expansion nodes. The expansion nodes are used in conjunction with the Verde NAS Solution system and cannot be used as stand-alone products.

When instructions in this guide apply to both the Verde NAS Solution master node and expansion nodes, *the system* is used to refer to both.

Use the information in this guide to prepare for the installation or if you need to move and reinstall the system.

INTENDED AUDIENCE

This guide is intended for data center administrators and operators who maintain and operate file storage systems. The information in this guide assumes a familiarity with computing terminology, RAID technology, SAS connectivity, and Ethernet networking. You also need to be familiar with installing, configuring, and using data file storage and archival software.

OVERVIEW

The Verde NAS solution provides high-density, network-attached storage for most major operating environments, including Microsoft® Windows®operating system, Apple® OS X® operating system, UNIX®, and Linux®. Optimized for secondary storage, the highly versatile Verde NAS solution has many applications, including use as:

- Network-Attached Storage (NAS) for sharing file-based information over an IP network.
- Bulk file storage for both general and digital preservation usage.
- Disk-to-disk data file storage, either alone or as part of a tiered storage solution.

ADDITIONAL PUBLICATIONS

The following documents related to the Spectra Verde NAS solution are available on the Support Portal website at support.spectralogic.com, and from the Documentation screen on the Verde user interface.

- The *Spectra Verde NAS Solution Network Setup Tips* provide helpful instructions for troubleshooting common connectivity problems.
- The *Spectra Verde NAS Solution Quick Start Guide* provides basic instructions for the essential installation and configuration steps.
- The *Spectra Verde NAS Solution Command Line Interface Guide* describes how to configure, monitor, and maintain the Spectra Verde NAS solution through the command line interface.
- The *Spectra Verde NAS Solution Site Preparation Guide* provides important information that you should know before installing a Verde NAS solution in your storage environment.
- The *Spectra Verde NAS Solution Installation Guide* provides instructions for installing a Verde NAS solution.
- The *Spectra BlackPearl & Verde NAS Solution HotPair Installation & Configuration Guide* provides detailed information on installing and using a the Verde NAS solution in a HotPair configuration.

The following documents are available after logging into your Support portal account at: support.spectralogic.com.

- The *Spectra Verde Release Notes and Documentation Updates* provide the most up-to-date information about the Verde NAS solution, including information about the latest software releases and documentation updates.
- The *Spectra 12- & 36-Drive Chassis Boot Drive Replacement Guide* provides instructions for replacing a failed boot drive in the system.
- The *Spectra 12-, 36- & 45-Drive Chassis Drive Replacement Guide* provides instructions for replacing a failed data drive after the system is installed.
- The *Spectra 12-, 36- & 45-Drive Chassis Fan Replacement Guide* provides instructions for replacing a failed fan in the system.
- The *Spectra 12-, 36- & 45-Drive Chassis Power Supply Replacement Guide* provides instructions for replacing a failed power supply after the system is installed.
- The *Spectra 12-Drive Chassis HBA Replacement Guide* and *Spectra 36-Drive Chassis HBA Replacement Guide* provide instructions for replacing a failed HBA in the system.
- The *Spectra 96-Drive Chassis Drive Replacement Guide* provides instructions for replacing a failed data drive in the 96-bay expansion node.

- The *Spectra 96-Drive Chassis Fan Replacement Guide* provides instructions for replacing a failed fan in the 96-bay expansion node.
- The *Spectra 96-Drive Chassis Power Supply Replacement Guide* provides instructions for replacing a failed power supply in the 96-bay expansion node.
- The *Spectra 96-Drive Chassis I/O Module Replacement Guide* provides instructions for replacing a failed I/O module in the 96-bay expansion node.

TYPOGRAPHICAL CONVENTIONS

This document uses the following conventions to highlight important information:

WARNING Read text marked by the "Warning" icon for information you must know to avoid personal injury.

Caution Read text marked by the "Caution" icon for information you must know to avoid damaging the NAS solution, the drives, or losing data.

Important Read text marked by the "Important" icon for information that helps you complete a procedure or avoid extra steps.

Note: Read text marked with "Note" for additional information or suggestions about the current topic.

CHAPTER 2

Site Preparation Checklist

Use this checklist to ensure that all of the installation requirements are met prior to delivery of your Verde NAS solution.

Status	Description
☐	Physical requirements are met (see Physical Requirements on page 14). ▪ Access to the system is restricted to authorized personnel. ▪ There is room for unpacking and moving the system. ▪ The installation location has a level, hard-surfaced floor that can support the weight of the rack and system. **Verde master node and 44-bay expansion nodes** ▪ There is at least 36 inches (91.4 cm) of clearance in front and behind the system. ▪ **Recommended** - A fire suppression system is in place. ▪ **Optional** - A rack stability kit is installed. **96-bay expansion nodes** ▪ There is at least 48 inches (122 cm) of clearance in front and behind the system. ▪ **Recommended** - A fire suppression system is in place. ▪ **Required** - A rack bolt down kit is installed. **107-bay expansion nodes** ▪ There is at least 48 inches (122 cm) of clearance in front and behind the system. ▪ **Recommended** - A fire suppression system is in place. ▪ **Required** - A rack bolt down kit is installed. ▪ **Required** - A server lift.
☐	Environmental requirements are met (see Environmental Requirements on page 19). ▪ The temperature, humidity, and altitude are within the system's specifications. ▪ The location is as free of airborne particulates as possible.
☐	Power requirements are met (see Power Requirements on page 21). ▪ A sufficient number of power outlets are installed near the back of the system, and are accessible when the system is fully inserted into the rack. ▪ Power cords meet country and local electrical codes.
☐	Network cable requirements are addressed (see Interface Specifications on page 25). ▪ The correct number and types of network cables are available.

☐	Rack-mount requirements are met (see Rack Requirements on page 30). **Verde master nodes and 44-bay expansion nodes** ▪ The rack is of a sufficient size to hold the system including cable clearance in back and clearance between the front door frame and the front mounting posts of the rack to allow the door to close over the front bezel. ▪ The rack can safely handle the weight of the system. ▪ The rack is assembled. **96-bay expansion nodes** ▪ The rack is of a sufficient size to hold the system including cable clearance in back and clearance between the front door frame and the front mounting posts of the rack to allow the door to close over the front bezel. ▪ The rack can safely handle the weight of the system. ▪ The rack is assembled and affixed to the floor to eliminate the risk of tipping when a fully loaded 96-bay expansion node is extended from the rack.  **Warning:** Failure to anchor the rack to the floor could allow the rack to tip over which could cause personal injury. **WARNUNG** Wenn das Rack nicht am Boden verankert wird, kann das Rack umkippen, was zu Verletzungen führen kann. **107-bay expansion nodes** ▪ The rack is of a sufficient size to hold the system including cable clearance in back and clearance between the front door frame and the front mounting posts of the rack to allow the door to close over the front bezel. ▪ The rack can safely handle the weight of the system. ▪ The rack is assembled and affixed to the floor to eliminate the risk of tipping when a fully loaded 107-bay expansion node is extended from the rack.  **Warning:** Failure to anchor the rack to the floor could allow the rack to tip over which could cause personal injury. **WARNUNG** Wenn das Rack nicht am Boden verankert wird, kann das Rack umkippen, was zu Verletzungen führen kann.

CHAPTER 3

Site Preparation

This chapter describes the site requirements for the Verde NAS solution master nodes and 44-bay, 96-bay, and 107-bay expansion nodes. Make sure that the location where the system is used meets these requirements before installing the system.

PHYSICAL REQUIREMENTS

The following physical requirements apply to the operating location of the Verde NAS solution. Meeting these requirements is necessary for successfully operating the system.

Restricted Access Ensure that your installation location is only accessible to authorized personnel.

Shipping Size and Weight The following table provides the shipping size and weight specifications for the systems.

Note: All dimensions and weights are approximate.

Chassis	Height	Width	Depth	Weights [a, b, c]
Verde 2U master node	13.25 in. (33.6 cm)	26 in. (66 cm)	34.25 in. (87.0 cm)	12-drive configuration: 80.5 lb (36.5 kg)
Verde 4U master node or **44-bay expansion node**	17.5 in. (44.5 cm)	27 in. (68.6 cm)	39 in. (99.0 cm)	20-drive configuration: 127.4 lb (57.8 kg) Additional for each disk drive: 1.8 lb (0.8 kg)
96-bay expansion node	14 in. (35.6 cm)	24.5 in. (62.2 cm)	43.5 in. (110.5 cm)	Empty chassis: 108 lb (48.9 kg) Additional for each disk drive: 1.8 lb (0.8 kg) Additional for rack mounting kit: 21 lb (9.5 kg)
107-bay expansion node	18.4 in. (46.7 cm)	24.3 in. (61.7 cm)	52.3 in. (132.8 cm)	Empty chassis: 154.5 lb (70.1 kg) Each additional drive: 1.5 lb (0.67 kg) Rack mounting kit: 21 lb (9.5 kg)

a. Includes chassis, drives, and packaging.

b. Twenty drives are installed in the Verde 4U master node for shipping, 12 drives are installed in the Verde 2U master node. Install additional drives after the system is installed in a rack.

c. The 44-bay expansion node, and 96-bay expansion node ship without drives installed. Install drives shipped after the system is installed in a rack.

WARNING Lifting hazard. Use lifting aids and proper lifting techniques with assistance when handling heavy equipment.

WARNUNG Gefahren beim Heben. Verwenden Sie Hebehilfen und richtige Hebetechnik mit Unterstützung beim Umgang mit schwerem Gerät.

Unpacked Size and Weight The following table provides the unpacked size and weight specifications for the systems.

Note: All dimensions and weights are approximate.

Chassis	Height	Width	Depth [a]	Weights
Verde 2U master node	2U—3.5 in. (8.9 cm)	19 in. (48.3 cm)	27.5 in. (69.9 cm)	Empty chassis: 39 lb (17.7 kg) 12-drive configuration: 60.6 lb (27.5 kg)
Verde 4U master node or **44-bay expansion node**	4U—7 in. (17.8 cm)	19 in. (48.3 cm)	29 in. (73.7 cm)	Empty chassis: 57 lb (25.8 kg) 20-drive configuration: 93.2 lb (42.3 kg) 35-drive configuration: 120.2 lb (54.5 kg) 44-drive configuration: 136.4 lb (61.9 kg) [b] 45-drive configuration: 138.2 lb (62.7 kg) [c]
96-bay expansion node	4U—7 in. (17.8 cm)	19 in. (48.3 cm)	40 in. (101.6 cm)	Empty chassis: 97 lb (44 kg) With 25 HDDs: 142 lb (64.4 kg) With 50 HDDs: 187 lb (85 kg) With 75 HDDs: 232 lb (105.2 kg) With 96 HDDs: 270 lb (122.5 kg)
107-bay expansion node	4U—7 in. (17.8 cm)	17 in. (43.2 cm)	41 in. (104.1 cm)	Empty chassis: 109.4 lb (49.6 kg) With 107 SDDs: 195 lb (88.5 kg) With 107 HDDs: 270 lb (122.5 kg)

a. Includes the front bezel.
b. Only available in the 44-bay expansion node with an active bezel.
c. Only available in the 44-bay expansion node with a passive bezel.

WARNING Lifting hazard. Use lifting aids and proper lifting techniques with assistance when handling heavy equipment.

WARNUNG Gefahren beim Heben. Verwenden Sie Hebehilfen und richtige Hebetechnik mit Unterstützung beim Umgang mit schwerem Gerät.

Maximum Configuration Size and Weight The maximum configuration for the Verde 4U NAS solution is one master node and nine expansion nodes all fully loaded with drives. The maximum configuration for the Verde 2U NAS solution is one master node and two expansion nodes fully loaded with drives. The following table shows the size and weight of the combined units.

Note: All dimensions and weights are approximate.

Chassis	Height	Width	Depth [a]	Weight
One Verde 2U master node and two 44-bay expansion nodes	17.5 in. (44.5 cm)	19 in. (48.3 cm)	29 in. (73.7 cm)	337 lb (152.9 kg)
One Verde 2U master node and two 96-bay expansion nodes	17.5 in. (44.5 cm)	19 in. (48.3 cm)	40 in. (101.6 cm)	597.1 lb (270.8 kg) [b]
One Verde 2U master node and two 107-bay expansion nodes	17.5 in. (44.5 cm)	19 in. (48.3 cm)	41 in. (104.1 cm)	597.5 lb (271 kg) [b]
One Verde 4U master node and nine 44-bay expansion nodes	63 in. (160 cm)	19 in. (48.3 cm)	29 in. (73.7 cm)	1364 lb (618.7 kg)
One Verde 4U master node and nine 96-bay expansion nodes	63 in. (160 cm)	19 in. (48.3 cm)	40 in. (101.6 cm)	2534.4 lb (1149.6 kg) [c]
One Verde 4U master node and nine 107-bay expansion nodes	63 in. (160 cm)	19 in. (48.3 cm)	41 in. (104.1 cm)	2527.8 lb (1146.6 kg) [c]

a. Includes the front bezel.
b. Weight includes the weight of 2 rack kits used for the expansion nodes. Each rack kit weighs 21 lb (9.5 kg).
c. Weight includes the weight of 9 rack kits used for the expansion nodes. Each rack kit weighs 21 lb (9.5 kg).

Floor Load / Tipping Hazard The data center flooring must be able to support the weight of a fully loaded rack with 10 units. Additionally, any rack containing a 96-bay expansion node must be anchored to the floor to prevent the rack from tipping over, which could cause personal injury.

A fully loaded **Verde 2U system with 44-bay expansion nodes** weighs 330.3 lb (149.8 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**

WARNING A fully loaded **Verde 2U system with 96-bay expansion nodes** weighs 597.1 lb (270.8 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**

A fully loaded **Verde 2U system with 107-bay expansion nodes** weighs 597.5 lb (271 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**

WARNING A fully loaded **Verde 4U system with 44-bay expansion nodes** weighs 1325.4 lb (601.2 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**

A fully loaded **Verde 4U system with 96-bay expansion nodes** weighs 2526 lb (1145.8 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**

A fully loaded **Verde 4U system with 107-bay expansion nodes** weighs 2527.8 lb (1146.6 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**

WARNUNG Ein voll beladener **Verde 2U System mit 44-bay Expansion Knoten** wiegt 149,8 kg. **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

WARNUNG Ein voll beladener **Verde 2U System mit 96-bay Expansion Knoten** wiegt 270,8 kg. **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

WARNUNG Ein voll beladener **Verde 2U System mit 107-bay Expansion Knoten** wiegt 271 kg. **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

WARNUNG Ein voll beladener **Verde 4U System mit 44-bay Expansion Knoten** 601,2 kg. **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

WARNUNG Ein voll beladener **Verde 4U System mit 96-bay Expansion Knoten** 1145,8 kg. **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

WARNUNG Ein voll beladener **Verde 4U System mit 107-bay Expansion Knoten** 1146,6 kg. **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

Working Area - Verde NAS Solution and 44-Bay Expansion Nodes Spectra Logic requires a minimum of 36 inches of clearance both in front and in back of the system for ventilation and access during installation, operation, and service.

Working Area - 96-Bay Expansion Nodes Spectra Logic requires a minimum of 48 inches of clearance both in front and in back of the system for ventilation and access during installation, operation, and service.

Working Area - 107-Bay Expansion Nodes Spectra Logic requires a minimum of 48 inches (122 cm) of clearance, both in front and in back of the expansion node, for ventilation and access during installation, operation, and service.

Flooring Place the rack on a level, hard-surfaced floor such as cement or tile. Do not place the rack on a carpeted floor or anywhere else that poses risk for static discharge that could damage your system or its drives.

Fire Protection If possible, install the Verde NAS solution close to your data center's fire suppression equipment.

Stability Kit - Verde NAS Solution and 44-Bay Expansion Nodes In earthquake-prone areas, it is important to adequately restrain file storage systems to prevent personal injury and limit potential damage to system components.

WARNING In earthquake- prone areas, the rack must have stabilizing equipment or be anchored to the floor to eliminate the risk of tipping, which could lead to personal injury.

WARNUNG In erdbebengefährdeten Gebieten muss das Rack stabilisierende Ausrüstung oder am Boden verankert, um die Kippgefahr, die zu Verletzungen führen können beseitigt werden.

Bolt Down Kit - 96-Bay and 107-Bay Expansion Nodes When installing one or more 96-bay or 107-bay expansion nodes, use a bolt down kit, such as the one shipped with the rack available from Spectra Logic, to prevent personal injury and limit potential damage to system components.

WARNING The rack must be anchored to the floor before the 96-bay or 107-bay expansion node is installed to eliminate the risk of tipping when a fully loaded 96-bay or 107-bay expansion node is extended from the rack, which could lead to personal injury.

WARNUNG Das Rack muss am Boden verankert werden, bevor das 96-bay oder 107-bay Erweiterungsknoten installiert ist, um die Kippgefahr zu beseitigen, wenn ein voll beladener 96-bay oder 107-bay Erweiterungsknoten aus dem Rack, die zu Personenschäden führen könnte erweitert.

Environmental Requirements

The table below shows the temperature, humidity, and altitude requirements for the Verde NAS solution.

Caution When the system is moved from a cold storage environment to a warm operating environment or vice versa, it must be acclimated in its packaging for at least 24 hours before opening to prevent serious condensation damage from occurring.

Verde NAS Master Nodes and 44-Bay Expansion Node

Parameter	Operating Environment	Non-Operating Environment (Storing and Shipping)[a]
Humidity	8% to 90% (non-condensing)	5% to 95% (non-condensing)
Temperature	50° F to 95° F (10° C to 35° C)	–40° F to 158° F (–40° C to 70° C)
Altitude	Sea level to 10,000 feet (3,048 meters)	Sea level to 39,370 feet (12,000 meters)
Maximum wet bulb temperature	84° F (29° C)	95° F (35° C)

a. The system is in its original packaging. The packaging is designed to protect the Verde NAS solution from condensation caused by extreme temperature variations (27° F per hour or 15° C per hour, or more).

96-bay Expansion Node

Parameter	Operating Environment	Storing and Shipping (Non-Operating) Environment [a]
Humidity	20% to 80% (non-condensing)	10% to 90% (non-condensing)
Temperature	41° F to 95° F (5° C to 35° C)	–40° F to 140° F (–40° C to 60° C)
Altitude	-200 feet to 10,000 feet (-61 meters to 3,048 meters)	-200 feet to 40,000 feet (-61 meters to 12,192 meters)

a. The 96-bay expansion node is in its original packaging. The packaging is designed to protect the expansion node from condensation caused by extreme temperature variations (27° F per hour or 15° C per hour, or more).

107-Bay Expansion Node

Parameter	Operating Environment [a]	Storing and Shipping (Non-Operating) Environment [b]
Humidity	20% to 80% (non-condensing)	10% to 90% (non-condensing)
Temperature	32° F to 95° F (0° C to 35° C)	–4° F to 140° F (–20° C to 60° C)
Altitude	-200 feet to 10,000 feet (-61 meters to 3,048 meters)	-200 feet to 40,000 feet (-61 meters to 12,192 meters)

a. When moving the 107-bay expansion node from a cold storage environment to a warm operating environment, it must acclimate in its packaging for at least 12 hours before opening to prevent serious condensation damage.

b. Specifications are for the 107-bay expansion node is in its original packaging. The packaging is designed to protect the 107-bay expansion node from condensation caused by extreme temperature variations (27° F per hour or 15° C per hour, or more).

Air Quality

Keep the location as free of airborne particulates as possible. To eliminate obvious sources of particulates, do not permit anyone to smoke, eat, or drink near the storage area, and do not place the system near a copier or printer that may emit toner and paper dust.

Heat Generation

The following table shows the heat generation of each Verde chassis.

Chassis	Heat Generation at Maximum Wattage
Verde 2U master node	3138 BTUs/hour
Verde 4U master node	3410 - 4365 BTUs/hour
44-bay expansion node	3751 - 4775 BTUs/hour
96-bay expansion node	3751 BTUs/hour
107-bay expansion node	6820 BTUs/hour

POWER REQUIREMENTS

The Verde NAS solution master nodes, 44-bay, 96-bay, and 107-bay expansion nodes have the following power requirement.

Caution Failure to meet the cabling and power specifications could damage your system, result in data loss, or both.

Verde 2U Master Node

Parameter	Requirements
Input Voltage	100–240 VAC, 11–4.5 A, 920 watts maximum
Input Frequency	50–60 Hz

Verde 4U Master Node

Parameter	Requirements
Input Voltage	100–140 VAC, 12–8 A, 1000 watts maximum 180–240 VAC, 8–6 A, 1280 watts maximum
Input Frequency	50–60 Hz

44-Bay Expansion Node

Parameter	Requirements
Input Voltage	100–140 VAC, 13.5–9.5 A, 1100 watts maximum 180–240 VAC, 9.5–7 A, 1400 watts maximum
Input Frequency	50–60 Hz

96-Bay Expansion Node

Parameter	Requirements
Input Voltage	90-264 VAC, 1100 watts maximum
Input Frequency	47–63 Hz

107-Bay Expansion Node

Parameter	Requirements
Input Voltage	200–240 VAC, 15 A, 2000 watts maximum
Input Frequency	50–60 Hz

Power Outlet Quantity and Location

The system requires two easily accessible power outlets near the rear of each node.

Notes:
- It is helpful to have an additional outlet available for a monitor.
- Complete adequate electrical cabling for the system before installing the system.

Power Cord Specifications

The power cords included with the Verde NAS solutions are part of the unit and not intended for use with any other equipment.

Important Confirm the PDU used with the Verde NAS solution has enough amperage for the power supply in each chassis included in your installation.

Cables provided by Spectra Logic are between 6 ft (1.8m) to 6.5 ft (2m) in length. If you need to use a longer cord, make sure it conforms to the specifications listed below.

Power cords must comply with local electrical codes.

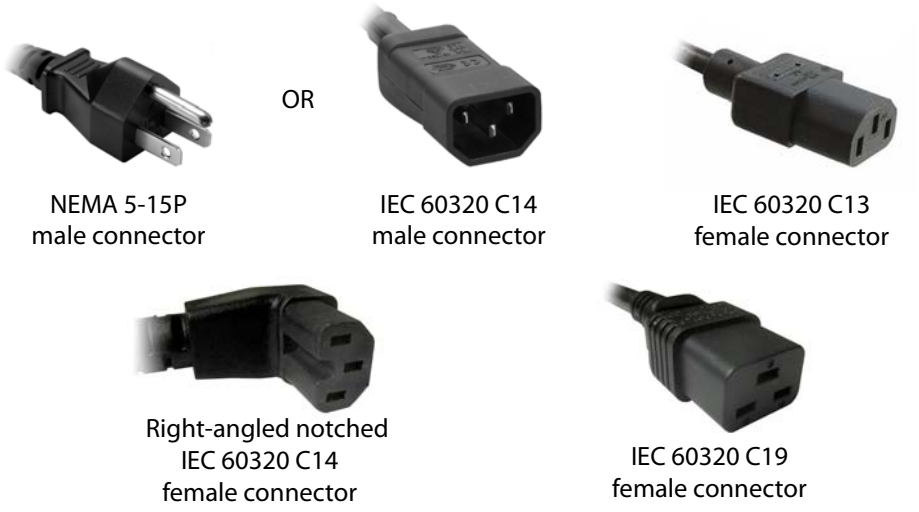
Note: The 96-bay expansion nodes ship with cables for use with the chassis. These power cables have a right-angled C14 connector, which is required for the 96-bay expansion node. Only use the cords provided by Spectra Logic with the 96-bay expansion node.

WARNING Using extension cords in conjunction with the cords provided with a 96-bay expansion node, may cause serious damage.

WARNUNG Die Verwendung von Verlängerungskabeln in Verbindung mit den mit einem 96-bay Erweiterungsknoten versehenen Kabeln kann schwere Schäden verursachen.

North American 120 Volt-AC Power Cord The criteria for a 120-volt power cord for use in the United States and Canada are as follows:

Parameter	Specification
Power cordage	Three-conductor, 14 AWG
Power input connectors	▪ **Male:** NEMA 5-15P or IEC-60320 C14 ▪ **Female:** IEC 60320 C13



North American 220 Volt-AC Power Cord The criteria for a 220-volt power cord for use in the United States and Canada are as follows:

Parameter	Specification
Power cordage	SJT type, three-conductor, 14 AWG minimum
Power input connectors	**Verde 2U and 4U Master Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** IEC 60320 C13 **44-Bay Expansion Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** IEC 60320 C13 **96-Bay Expansion Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** Right-angled notched IEC 60320 C14 **107-Bay Chassis Expansion Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** IEC 60320 C19

International 220 Volt-AC Power Cord The table below shows the criteria for an international 220-volt AC power cord:

Parameter	Specification
Power cordage	Flexible, HAR (harmonized) type H05VV-F, three conductor cord with minimum conductor size of 1.7 square millimeters (0.0026350 square inches).
Power input connectors	**Verde 2U and 4U Master Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** IEC 60320 C13 **44-Bay Expansion Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** IEC 60320 C13 **96-Bay Expansion Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** Right-angled notched IEC 60320 C14 **107-Bay Chassis Expansion Node:** ▪ **Male:** Connector must be of the proper type, rating, and safety approval. ▪ **Female:** IEC 60320 C19

INTERFACE SPECIFICATIONS

This section provides information about the interfaces used to connect a Verde system to expansion nodes and host systems.

Interface Connectivity Types

Connection Type	Purpose
Ethernet ▪ 1000Base-T ▪ 10GBase-T ▪ 10 GigE ▪ 40 GigE	▪ Access to the Verde user interface to configure and manage the system remotely requires one 1000Base-T or 10GBase-T Ethernet connection to the Verde management port. ▪ A data connection using one 10 GigE or 40 GigE port is required to connect hosts to the Verde system. Although only one data connection can be configured, the two 10 GigE or 40 GigE ports can be configured to use link aggregation. **Notes:** ▪ Spectra Logic recommends using the ports on the 10 GigE or 40 GigE network card with link aggregation for best performance. ▪ If the system does not include a 10 GigE or 40 GigE network interface card, the extra 10GBase-T port can be used for data transfer.
SAS ▪ 6 Gbps ▪ 12 Gbps	SAS cables are required to allow communication between the Verde master node and 44-bay, 96-bay, or 107-bay expansion nodes.

System Interface Connectors

Interface Type	Number of Ports and Connector Type
Ethernet (1000BaseT, or 10GBase-T)	Two RJ-45 sockets.
Ethernet (10 GigE)	Two SFP+ optical modules with a duplex LC connector per optional 10 GigE NIC.
Ethernet (40 GigE)	Two QSFP+ optical modules with a duplex LC connector per optional 40 GigE NIC.
SAS (6 Gbps)	Four SFF-8644 sockets per optional 6 Gbps SAS card provide connections to two 44-bay expansion nodes, using two ports for each expansion node.
SAS (12 Gbps)	Two or four SFF-8644 sockets per optional 12 Gbps SAS card provide connections to two or four 96-bay expansion nodes, or two or four 107-bay expansion nodes, using one port per expansion node.

Expansion Node Interface Connectors

Interface Type	Number of Ports and Connector Type
44-Bay Expansion Node	Two SFF-8088 ports per 44-bay expansion node. Both ports are required to connect the expansion node to a Verde master node.
96-Bay Expansion Node	Two SFF-8644 ports per 96-bay expansion node. Only a single port is required to connect the expansion node to a Verde master node.
107-Bay Expansion Node	▪ Four SFF-8644 ports per expander in the 107-bay expansion node. Maximum of two expanders. ▪ One 1_GigE Ethernet port per expander in the 107-bay expansion node. Maximum of two expanders.

Interface Cables

The type of cables required to connect the Verde system to an Ethernet network, or a 44-bay, 96-bay, or 107-bay expansion node depend on the type of interface.

Interface Type	Cable Requirements
Ethernet (10GBase-T or 10/100/1000Base-T)	**10GBase-T** - Shielded Category 6A data-grade cable with an RJ-45 connector. **10/100/1000Base-T** - Shielded Category 5 data-grade cable with an RJ-45 connector. **Note:** Cables may be provided by the customer.
Ethernet (10 GigE)	SFP+ transceiver multimode optical cable with duplex LC connectors. **Note:** Cables may be provided by the customer.
Ethernet (40 GigE)	QSFP+ transceiver MPT optical cables with duplex LC connectors, or copper cables with QSFP+ connector. **Note:** Cables may be provided by the customer.

Interface Type	Cable Requirements
SAS	**44-bay expansion node:** 6 Gbps 4 lane cable with SFF-8644 and SFF-8088 connectors. Two SAS cables are required for each 44-bay expansion node. **Note:** Two SAS cables are included with each 44-bay expansion node. Cables may be provided by the customer. **96-bay expansion node:** 12 Gbps cable with SFF-8644 connectors. One SAS cable is required for each 96-bay expansion node. **107-bay expansion node:** 12 Gbps cable with SFF-8644 connectors. One SAS cable is required for each 107-bay expansion node. **Note:** One SAS cable is included with each 96-bay expansion node or 107-bay expansion node. Cables may be provided by the customer.
Serial	Female to female null modem cable with DB9 connectors. **Note:** One null modem cable is included with a HotPair configuration.

RACK-MOUNT REQUIREMENTS

Ensure that an appropriate rack is assembled and placed near the AC power outlets and network connections.

Caution You must locate the rack on a level, hard-surfaced floor, such as cement or tile. Do not place the rack on a carpeted floor or anywhere else that poses risk for static discharge that could damage your system or its drives.

Verde NAS Solution and 44-Bay Expansion Node

Note: When installing a Verde system with a 96-bay or 107-bay expansion node, you must use the rack requirements for the appropriate expansion node:

- See 96-Bay Expansion Node on page 29.

  -OR-

- See 107-Bay Expansion Node on page 30

Otherwise, use the instructions on this page.

The Verde 4U master node and 44-bay expansion node are 7 inches (17.8 cm) tall and occupies 4U of rack space. The Verde 2U master node is 3.5 inches (8.9 cm) tall and occupies 2U of rack space. All are designed to fit in a standard 19-inch, 4-post rack. Keep the following in mind when selecting a rack:

- Make sure that the distance between the mounting surfaces on the front and rear posts is between 27 inches (68.6 cm) and 36 inches (91 cm).

  Note: If you are using the adaptors to install the rack-mount kit in a rack with circular mounting cutouts, the distance between the front and rear posts must be at least 28.5 inches (72.4 cm), and not more than 37.5 inches (95.25 cm).

- Allow approximately 3 inches (8 cm) of additional depth at the back of the rack for cable clearance.
- If the rack has a door, allow at least 2 inches (5 cm) of clearance between the front door frame and the front mounting posts of the rack to allow the door to close over the front bezel.
- Check your rack's specifications to make sure it accommodates the weight and depth of the Verde system.

  Notes:
  - Spectra Logic does not support the use of a two-post rack with a Verde master node or expansion node.
  - An enclosed 19-inch, four-post rack is available for purchase from Spectra Logic. The rack has two doors and removable side panels. Contact Spectra Logic Sales for more information (see Contacting Spectra Logic on page 7).

- In earthquake prone areas, provide restraints as necessary. See Stability Kit - Verde NAS Solution and 44-Bay Expansion Nodes on page 18.

96-Bay Expansion Node

The 96-bay expansion node chassis is 6.9 inches (17.5 cm) tall and occupies 4U of rack space; it fits in a standard 19-inch, 4-post rack. Keep the following in mind when selecting a rack:

- Make sure that the distance between the mounting surfaces on the front and rear posts is between 19 inches (48.3 cm) and 30 inches (76.2 cm).
- Allow approximately 3 inches (8 cm) of additional depth at the back of the rack for cable clearance.
- If the rack has a door, allow at least 2 inches (5 cm) of clearance between the front door frame and the front mounting posts of the rack to allow the door to close over the front bezel.
- Check your rack's specifications to make sure it accommodates the weight and depth of the 96-bay expansion node. See Physical Requirements on page 14 for more information.

WARNING The rack must be anchored to the floor before the 96-bay expansion node is installed to eliminate the risk of tipping when a fully loaded 96-bay expansion node is extended from the rack, which could lead to personal injury.

WARNING **WARNUNG** Das Rack muss am Boden verankert werden, bevor das 96-bay Erweiterungsknoten installiert ist, um die Kippgefahr zu beseitigen, wenn ein voll beladener 96-bay Erweiterungsknoten aus dem Rack, die zu Personenschäden führen könnte erweitert.

Notes:
- Spectra Logic does not support the use of a two-post rack with an 96-bay expansion node.
- An enclosed 19-inch, four-post rack and suitable bolt down kit is available for purchase from Spectra Logic. The rack has two doors and removable side panels.

107-Bay Expansion Node

The 107-bay expansion node chassis is 6.9 inches (17.5 cm) tall and occupies 4U of rack space; it fits in a standard 19-inch, 4-post rack. Keep the following in mind when selecting a rack:

- Make sure that the distance between the mounting surfaces on the front and rear posts is between 31 inches (78.6 cm) and 36.4 inches (92.4 cm).
- Allow approximately 3 inches (8 cm) of additional depth at the back of the rack for cable clearance.
- If the rack has a door, allow at least 2 inches (5 cm) of clearance between the front door frame and the front mounting posts of the rack to allow the door to close over the front bezel.
- Check your rack's specifications to make sure it accommodates the weight and depth of the 107-bay expansion node. See Physical Requirements on page 14 for more information.

WARNING The rack must be anchored to the floor before the 107-bay expansion node is installed to eliminate the risk of tipping when a fully loaded 107-bay expansion node is extended from the rack, which could lead to personal injury.

WARNUNG Das Rack muss am Boden verankert werden, bevor das 107-bay Erweiterungsknoten installiert ist, um die Kippgefahr zu beseitigen, wenn ein voll beladener 107-bay Erweiterungsknoten aus dem Rack, die zu Personenschäden führen könnte erweitert.

Notes:
- Spectra Logic does not support the use of a two-post rack with an 107-bay expansion node.
- An enclosed 19-inch, four-post rack and suitable bolt down kit is available for purchase from Spectra Logic. The rack has two doors and removable side panels.