



Spectra Verde Array Family

Site Preparation Guide



SPECTRALOGIC.COM

Copyright

Copyright © 2013-2016 Spectra Logic Corporation. All rights reserved. This item and the information contained herein are the property of Spectra Logic Corporation.

Notices

Except as expressly stated herein, Spectra Logic Corporation makes its products and associated documentation on an “AS IS” BASIS, WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, BOTH OF WHICH ARE EXPRESSLY DISCLAIMED. In no event shall Spectra Logic be liable for any loss of profits, loss of business, loss of use or data, interruption of business, or for indirect, special, incidental or consequential damages of any kind, even if Spectra Logic has been advised of the possibility of such damages arising from any defect or error.

Information furnished in this manual is believed to be accurate and reliable. However, no responsibility is assumed by Spectra Logic for its use. Due to continuing research and development, Spectra Logic may revise this publication from time to time without notice, and reserves the right to change any product specification at any time without notice.

Trademarks

BlackPearl, BlueScale, CC, Spectra, SpectraGuard, Spectra Logic, TeraPack, TFinity, TranScale, and Verde are registered trademarks of Spectra Logic Corporation. ArchiveGrade, ArcticBlue, Verde DP, and Verde DPE are trademarks of Spectra Logic Corporation. All rights reserved worldwide. All other trademarks and registered trademarks are the property of their respective owners.

Part Number

90990080 Revision J

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 3.1.1 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/.

To make sure you have the release notes for the most current version of the Verde Release Notes, check the Spectra Logic Technical Support portal at support.spectralogic.com/documentation/release-notes/. You must sign into the portal before viewing Release Notes. The release notes contain updates to the *User Guide* since the last time it was revised.

End User License Agreement

You have acquired a Spectra product that includes software owned or licensed by Spectra Logic from one or more software licensors (“Software Suppliers”). Such software products, as well as associated media, printed materials and “online” or electronic documentation (“SOFTWARE”) are protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties.

If you do not agree to this end user license agreement (EULA), do not use the Spectra Product; instead, promptly contact Spectra Logic for instructions on return of the Spectra Product for a refund. Any use of the Software, including but not limited to use on the Spectra Product, will constitute your agreement to this EULA (or ratification of any previous consent).

Grant of License. The Software is licensed on a non-exclusive basis, not sold. This EULA grants you the following rights to the Software:

- You may use the Software only on the Spectra Product.
- **Not Fault Tolerant.** The Software is not fault tolerant. Spectra Logic has independently determined how to use the Software in the Spectra Product, and suppliers have relied upon Spectra Logic to conduct sufficient testing to determine that the Software is suitable for such use.
- **No Warranties for the SOFTWARE.** The Software is provided “AS IS” and with all faults. The entire risk as to satisfactory quality, performance, accuracy, and effort (including lack of negligence) is with you. Also, there is no warranty against interference with your enjoyment of the Software or against infringement. If you have received any warranties regarding the SOFTWARE, those warranties do not originate from, and are not binding on Software suppliers.
- **Note on Java Support.** The Software may contain support for programs written in Java. Java technology is not fault tolerant and is not designed, manufactured, or intended for use of resale as online control equipment in hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communications systems, air traffic control, direct life support machines, or weapons systems, in which the failure of Java technology could lead directly to death, personal injury, or severe physical or environmental damage.
- **No Liability for Certain Damages.** Except as prohibited by law, Software suppliers shall have no liability for any indirect, special, consequential or incidental damages arising from or in connection with the use or performance of the Software. This limitation shall apply even if any remedy fails of its essential purpose. In no event shall Software suppliers, individually, be liable for any amount in excess of U.S. two hundred fifty dollars (U.S. \$250.00).
- **Limitations on Reverse Engineering, Decompilation, and Disassembly.** You may not reverse engineer, decompile, or disassemble the Software, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding this limitation.
- **Software Transfer Allowed with Restrictions.** You may permanently transfer rights under this EULA only as part of a permanent sale or transfer of the Spectra array and only if the recipient agrees to this EULA. If the Software is an upgrade, any transfer must also include all prior versions of the Software.
- **Export Restrictions.** Export of the Software from the United States is regulated by the Export Administration Regulations (EAR, 15 CFR 730-744) of the U.S. Commerce Department, Bureau of Export Administration. You agree to comply with the EAR in the export or re-export of the Software: (i) to any country to which the U.S. has embargoed or restricted the export of goods or services, which as May 1999 include, but are not necessarily limited to Cuba, Iran, Iraq, Libya, North Korea, Sudan, Syria, and the Federal Republic of Yugoslavia (including Serbia, but not Montenegro), or to any national or any such country, wherever located, who intends to transit or transport the Software back to such country; (ii) to any person or entity who you know or have reason to know will utilize the Software or portion thereof in the design, development or production of nuclear, chemical, or biological weapons; or (iii) to any person or entity who has been prohibited from participating in U.S. export transactions by any federal agency of the U.S. government. You warrant and represent that neither the BXA nor any other U.S. federal agency has suspended, revoked or denied your export privileges.

Contacting Spectra Logic

To Obtain General Information

Spectra Logic Website: www.spectralogic.com

United States Headquarters

Spectra Logic Corporation
6285 Lookout Road
Boulder, CO 80301
USA
Phone: 1.800.833.1132 or 1.303.449.6400
International: 1.303.449.6400
Fax: 1.303.939.8844

European Office

Spectra Logic Europe Ltd.
329 Doncastle Road
Bracknell
Berks, RG12 8PE
United Kingdom
Phone: 44 (0) 870.112.2150
Fax: 44 (0) 870.112.2175

Spectra Logic Technical Support

Technical Support Portal: support.spectralogic.com

United States and Canada

Phone:
Toll free US and Canada: 1.800.227.4637
International: 1.303.449.0160

Europe, Middle East, Africa

Phone: 44 (0) 870.112.2185
Deutsch Sprechende Kunden
Phone: 49 (0) 6028.9796.507
Email: spectralogic@stortrec.de

Mexico, Central and South America, Asia, Australia, and New Zealand

Phone: 1.303.449.0160

Spectra Logic Sales

Website: www.spectralogic.com/shop

United States and Canada

Phone: 1.800.833.1132 or 1.303.449.6400
Fax: 1.303.939.8844
Email: sales@spectralogic.com

Europe

Phone: 44 (0) 870.112.2150
Fax: 44 (0) 870.112.2175
Email: eurosales@spectralogic.com

To Obtain Documentation

Spectra Logic Website: support.spectralogic.com/documentation

CHAPTER 1

About This Guide

This guide describes site preparation requirements for the Spectra[®] Verde[®] master node, the Verde DPE[™] master node, and the Verde DP master node, which are referred to as the *master node* or the *array* in these instructions. When the three products are referred to together, they are called *the master nodes* or *the arrays*. Unless otherwise noted, the instructions in this guide apply to the Verde, Verde DPE, and Verde DP arrays.

This guide also describes the site preparation requirements for the Spectra Verde expansion node, and the Verde DPE expansion node. The expansion nodes are used in conjunction with their respective master node and cannot be used as a stand-alone product. When instructions in this guide apply to both the Verde master node and expansion nodes, *Verde array*, *the array*, or *the arrays* are 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 array.

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 arrays provide 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 arrays have 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 arrays are available on the Support Portal website at support.spectrallogic.com, and from the Documentation screen on the Verde web interface.

- The *Spectra Verde Array Family User Guide* provides information about configuring, using and maintaining your Verde array.
- The *Spectra Verde Array Family Network Setup Tips* provide helpful instructions for troubleshooting common connectivity problems.
- The *Spectra Verde Array Family Quick Start Guide* provides basic instructions for the essential installation and configuration steps.
- The *Spectra Verde Array Family Command Line Interface Guide* describes how to configure, monitor, and maintain the Spectra Verde arrays through the command line interface.
- The *Spectra Verde Array Family Installation Guide* provides instructions for installing a Verde, Verde DPE, or Verde DP array.

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

- The *Spectra Verde Family Release Notes and Documentation Updates* provide the most up-to-date information about the Verde arrays, 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 array.
- The *Spectra 12-, 36- & 45-Drive Chassis Drive Replacement Guide* provides instructions for replacing a failed data drive after the array is installed.
- The *Spectra 12-, 36- & 45-Drive Chassis Fan Replacement Guide* provides instructions for replacing a failed fan in the array.

- The *Spectra 12-, 36- & 45-Drive Chassis Power Supply Replacement Guide* provides instructions for replacing a failed power supply after the array 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 array.
- The *Spectra 96-Drive Chassis Drive Replacement Guide* provides instructions for replacing a failed data drive in the Verde DPE expansion node.
- The *Spectra 96-Drive Chassis Fan Replacement Guide* provides instructions for replacing a failed fan in the Verde DPE expansion node.
- The *Spectra 96-Drive Chassis Power Supply Replacement Guide* provides instructions for replacing a failed power supply in the Verde DPE expansion node.
- The *Spectra 96-Drive Chassis I/O Module Replacement Guide* provides instructions for replacing a failed I/O module in the Verde DPE expansion node.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following conventions to highlight important information:

Note: Read text marked by “Note” for additional information or suggestions about the current topic.



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



Read text marked by the “Caution” icon for information you must know to avoid damaging the array, or the installed drives, or losing data.



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


WARNUNG Lesen Sie markierten Text durch die “Warnung”-Symbol für die Informationen, die Sie kennen müssen, um Personenschäden zu vermeiden.

CHAPTER 2

Site Preparation Checklist

Use this checklist to ensure that all of the installation requirements are met prior to delivery of your Verde, Verde DPE, or Verde DP array.

Status	Description
<input type="checkbox"/>	<p>Physical requirements are met (see Physical Requirements on page 11).</p> <ul style="list-style-type: none">▪ Access to the array is restricted to authorized personnel.▪ There is room for unpacking and moving the array.▪ The installation location has a level, hard-surfaced floor that can support the weight of the rack and array. <p>Verde, Verde DPE, and Verde DP master nodes, Verde expansion nodes</p> <ul style="list-style-type: none">▪ There is at least 36 inches (91.4 cm) of clearance in front and behind the array.▪ Recommended - A fire suppression system is in place.▪ Optional - a stability kit is installed. <p>Verde DPE expansion nodes</p> <ul style="list-style-type: none">▪ There is at least 48 inches (122 cm) of clearance in front and behind the array.▪ Required - a bolt down kit is installed.▪ Recommended - A fire suppression system is in place.
<input type="checkbox"/>	<p>Environmental requirements are met (see Environmental Requirements on page 15).</p> <ul style="list-style-type: none">▪ The temperature, humidity, and altitude are within the array's specifications.▪ The location is as free of airborne particulates as possible.
<input type="checkbox"/>	<p>Power requirements are met (see Power Requirements on page 17).</p> <ul style="list-style-type: none">▪ A sufficient number of power outlets are installed near the back of the array, and are accessible when the array is fully inserted into the rack.▪ Power cords meet country and local electrical codes.
<input type="checkbox"/>	<p>Network cable requirements are addressed (see Network Cable Requirements on page 19).</p> <ul style="list-style-type: none">▪ The correct number and types of network cables are available.

<input type="checkbox"/>	<p>Rack-mount requirements are met (see Rack-Mount Requirements on page 21).</p> <p>Verde, Verde DPE, and Verde DP master nodes, Verde expansion nodes</p> <ul style="list-style-type: none">▪ The rack is of a sufficient size to hold the array 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 array.▪ The rack is assembled. <p>Verde DPE expansion nodes</p> <ul style="list-style-type: none">▪ The rack is of a sufficient size to hold the array 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 array.▪ The rack is assembled and affixed to the floor to eliminate the risk of tipping when a fully loaded Verde DPE expansion node is extended from the rack. <p> Warning: Failure to anchor the rack to the floor could allow the rack to tip over which could cause personal injury.</p>
--------------------------	---

CHAPTER 3

Site Preparation

This chapter describes the site requirements for the Verde, Verde DPE, and Verde DP arrays. Make sure that the location where the array is used meets these requirements before installing the array.

Topic	
Physical Requirements	page 11
Environmental Requirements	page 15
Verde, Verde DPE, and Verde DP Master Node, and Verde Expansion Node	page 15
Verde DPE Expansion Node	page 16
Power Requirements	page 17
Power Outlet Quantity and Location	page 18
Power Cord Specifications	page 18
Network Cable Requirements	page 19
Rack-Mount Requirements	page 21
Verde, Verde DPE, and Verde DP Master Nodes and Verde Expansion Node	page 21
Verde DPE Expansion Node	page 22

PHYSICAL REQUIREMENTS

The following physical requirements apply to the operating location of the Verde, Verde DPE, or Verde DP array. Meeting these requirements is necessary for successfully operating the array.

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 arrays.

Note: All dimensions and weights are approximate.

Array	Height	Width	Depth	Weights ^{a, b, c}
Verde 2U master node and Verde DP 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 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) 35-drive configuration: 154 lb (69.8 kg) 44-drive configuration: 170.2 lb (77.2 kg) ^d 45-drive configuration: 172 lb (78 kg) ^e
Verde DPE master node	17.5 in. (44.5 cm)	27 in. (68.6 cm)	39 in. (99.0 cm)	25-drive configuration: 136.3 lb (61.8 kg) 25-drive & 4 SSD drive configuration: 139.1 (63.1 kg) 25-drive & 6 SSD drive configuration: 140.5 (63.8 kg)
Verde DPE expansion node	14 in. (35.6 cm)	24.5 in. (62.2 cm)	43.5 in. (110.5 cm)	25-drive configuration: 153 lb (69.4 kg) 50-drive configuration: 198 lb (89.8 kg) 75-drive configuration: 243 lb (110.2 kg) 96-drive configuration: 280.8 lb (127.4 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 and Verde DP master node, and 25 drives are installed in the Verde DPE master node. Install additional drives after the array is installed in a rack. The Verde expansion node, and Verde DPE expansion node ship without drives installed.

c. Install drives shipped separately after the array is installed in a rack.

d. Only available in the Verde expansion node with an active bezel.

e. Only available in the Verde 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 Hebetchnik mit Unterstützung beim Umgang mit schwerem Gerät.

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

Note: All dimensions and weights are approximate.

Array	Height	Width	Depth ^a	Weights
Verde 2U master node and Verde DP 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 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
Verde DPE master node	4U—7 in. (17.8 cm)	19 in. (48.3 cm)	29 in. (73.7 cm)	Empty chassis: 57 lb (25.8 kg) 25-drive configuration: 102 lb (46.3 kg) 25-drive & 4 SSD drive configuration: 104.8 lb (47.5 kg) 25-drive & 6 SSD drive configuration: 106.2 lb (48.2 kg)
Verde DPE expansion node ^d	4U—7 in. (17.8 cm)	19 in. (48.3 cm)	40 in. (101.6 cm)	Empty chassis: 76 lb (34.5 kg) 25-drive configuration: 121 lb (54.9 kg) 50-drive configuration: 166 lb (75.3kg) 75-drive configuration: 211 lb (95.7 kg) 96-drive configuration: 248.8 lb (112.9 kg)

a. Includes the front bezel.

b. Only available in the Verde expansion node with an active bezel.

c. Only available in the Verde expansion node with a passive bezel.

d. Weights for the Verde DPE expansion node do not include the weight of the rack mount kit. The rack kit weighs 21 lb (9.5 kg)



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 Hebetchnik mit Unterstützung beim Umgang mit schwerem Gerät.

Maximum Configuration Size and Weight The maximum configuration for the Verde 4U and DPE arrays are one master node and eight expansion nodes all fully loaded with drives. The maximum configuration for the Verde 2U array 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.

Array	Height	Width	Depth ^a	Weight
One Verde 2U master node and two expansion nodes	17.5 in. (44.5 cm)	19 in. (48.3 cm)	29 in. (73.7 cm)	337 lb (152.9 kg) ^b
One Verde 4U master node and eight expansion nodes	63 in. (160 cm)	19 in. (48.3 cm)	29 in. (73.7 cm)	1225.8 lb (556 kg) ^c
One Verde DPE master node and eight Verde DPE expansion nodes	63 in. (160 cm)	19 in. (48.3 cm)	40 in. (101.6 cm)	2264.6 lb (1027.2 kg) ^d

a. Includes the front bezel.

b. Does not include the weight of rack mount kits.

c. Does not include the weight of rack mount kits.

d. Weight includes the weight of 8 rack kits used for the Verde DPE expansion nodes. Each rack kit weights 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 nine units, and the rack for a Verde DPE array with an 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 array** configuration weighs 337 lb (152.9 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**



WARNING

A fully loaded **Verde 4U array** configuration weighs 1225.8 lb (556 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**

A fully loaded **Verde DPE array** configuration weighs 2264.6 lb (1027.2 kg). **Serious damage and personal injury could occur if the floor collapses or if the rack tips over.**



WARNING

WARNUNG Ein voll beladener **Verde 2U Array**-Konfiguration wiegt £ 337 (152,9 kg). **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

WARNUNG Ein voll beladener **Verde 4U Array**-Konfiguration wiegt £ 1.225,8 (556 kg). **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

WARNUNG Ein voll beladener **Verde DPE Array**-Konfiguration wiegt £ 2.264,6 (1.027,2 kg). **Schwere Schäden und Verletzungen könnten auftreten, wenn der Boden zusammenbricht oder wenn die Rack umkippt.**

Working Area - Verde, Verde DPE, and Verde DP Master Nodes, and Verde Expansion Nodes Spectra Logic requires a minimum of 36 inches of clearance both in front and in back of the array for ventilation and access during installation, operation, and service.

Working Area - Verde DPE Expansion Nodes Spectra Logic requires a minimum of 48 inches of clearance both in front and in back of the array 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 array or its drives.

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

Stability Kit - Verde, Verde DPE, and Verde DP Master Nodes, and Verde 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 - Verde DPE Expansion Nodes A bolt down kit, such as the one shipped with the rack available from Spectra Logic, is required when installing one or more Verde DPE expansion nodes to prevent personal injury and limit potential damage to system components.

**WARNING**

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

WARNUNG Das Rack muss am Boden verankert werden, bevor das Verde DPE Erweiterungsknoten installiert ist, um die Kippgefahr zu beseitigen, wenn ein voll beladener Verde DPE 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 arrays.



Caution

When the array 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, Verde DPE, and Verde DP Master Node, and Verde 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 array is in its original packaging. The packaging is designed to protect the Verde array from condensation caused by extreme temperature variations (27° F per hour or 15° C per hour, or more).

Verde DPE 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 Verde DPE array is in its original packaging. The packaging is designed to protect the Verde DPE array 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 array near a copier or printer that may emit toner and paper dust.

POWER REQUIREMENTS

The Verde arrays have the following power requirements.



Caution

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

Verde 2U Master Node and Verde DP Master Node

Parameter	Requirements
Input Voltage	100–240 VAC, 11–4.5 A, 920 watts maximum
Input Frequency	50–60 Hz
Current	4 A

Verde 4U and Verde DPE Master Nodes

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
Current	4.2 A

Verde 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
Current	4.5 A

Verde DPE Expansion Node

Parameter	Requirements
Input Voltage	90–264 VAC, 1100 watts maximum
Input Frequency	47–63 Hz
Current	14.5 A RMS @ 90 VAC

Power Outlet Quantity and Location

The array 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 array before installing the array.

Power Cord Specifications

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

Cables provided by Spectra Logic are 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.

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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Male: Connector must be of the proper type, rating, and safety approval. ▪ Female: IEC 60320 C13

International 220 Volt-AC Power Cord The criteria for an international 220-volt AC power cord are as follows:

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	<ul style="list-style-type: none"> ▪ Male: Connector must be of the proper type, rating, and safety approval for the intended country. ▪ Female: IEC 60320 C13

NETWORK CABLE REQUIREMENTS

Provide the following network connectivity for the array installation:

Connection Type	Purpose
Ethernet (1000Base-T, 10GBase-T, or 10 Gigabit)	<ul style="list-style-type: none"> ▪ One 1000Base-T or 10GBase-T Ethernet connection to the Verde management port is required for accessing the Verde array to configure and manage it remotely. ▪ A minimum of one 10 GigE network connection is required to connect hosts to the Verde array. Only one data connection can be configured, however, the two 10 GigE ports can be configured to use link aggregation. <p>Note: The extra 10GBase-T port can be used for data transfer, but unless the array does not include a 10 GigE card, Spectra Logic recommends using the 10 GigE ports configured with link aggregation for best performance.</p>
SAS	SAS cables are required to allow communication between the Verde and Verde DPE master nodes and Verde expansion node and Verde DPE expansion node, respectively. SAS cable(s) are included with each expansion node.
Serial	One null modem cable is required to allow communication between two Verde master nodes in a HotPair configuration. One null modem cable is included with a HotPair configuration.

Network Interface Cables

The type of cables required to connect the Verde master node to the network and the array components to each other, depend on the implementation.

Interface Type	Cable Requirements
Ethernet (1000Base-T), Verde Management Port	Shielded Category 5 data-grade cable or a similar Category 5 cable with RJ-45 connectors <ul style="list-style-type: none"> ▪ Cable to be provided by the customer.
Ethernet (10GBase-T)	Shielded Category 6A data-grade cable with RJ-45 connectors <ul style="list-style-type: none"> ▪ Cables are to be provided by the customer.
Ethernet (10 GigE)	Multimode optical cable with duplex LC connectors <ul style="list-style-type: none"> ▪ Cables are to be provided by the customer.
SAS - Verde arrays	6Gbps 4 lane cable with SFF-8644 and SFF-8088 connectors <ul style="list-style-type: none"> ▪ Two SAS cables are included with each expansion node.
SAS - Verde DPE arrays	12Gbps 4 lane cable with SFF-8644 connectors <ul style="list-style-type: none"> ▪ One SAS cable is included with each Verde DPE expansion node.
Serial	Female to female null modem cable with DB9 connectors <ul style="list-style-type: none"> ▪ One null modem cable is included with a HotPair configuration.

RACK-MOUNT REQUIREMENTS

Assemble and place an appropriate rack near the AC power outlets and network connections.



Caution

The rack must be located 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 array or its drives.

Verde, Verde DPE, and Verde DP Master Nodes and Verde Expansion Node

Note: If the array configuration includes a Verde DPE master node with a Verde DPE expansion node, you must use the rack requirements for the Verde DPE expansion node. See [Verde DPE Expansion Node on page 22](#) for more information. Otherwise, use the instructions below.

The Verde 4U and Verde DPE chassis are 7 inches (18 cm) tall and occupy 4U of rack space. The Verde 2U and Verde DP chassis is 3.5 inches (8.9 cm) tall and occupies 2U of rack space. Both arrays fit in a standard 19-inch, 4-post rack. Keep the following in mind when selecting a rack:

- Spectra Logic recommends that you use a 4-post rack that is at least 36 inches (91 cm) deep.
- Make sure that the distance between the mounting surfaces on the front and rear posts is at least 30 inches (76 cm).

Note: If you are installing the rack kit in a circular cutout rack using the adaptors, the distance between the front and rear posts must be at least 31.5 inches (80 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 will accommodate the weight and depth of the Verde array.

Notes: ▪ Using a two-post rack is not supported.

- An enclosed 19-inch, four-post rack is available for purchase from Spectra Logic. The rack has two doors and removable side panels.
- In earthquake-prone areas, provide restraints as necessary. See [Stability Kit - Verde, Verde DPE, and Verde DP Master Nodes, and Verde Expansion Nodes on page 14](#).

Verde DPE Expansion Node

The Verde DPE expansion node chassis is 7 inches (17.8 cm) tall and occupies 4U of rack space, and 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 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 will accommodate the weight and depth of the Verde DPE expansion node. See [Physical Requirements on page 11](#) for more information.

**WARNING**

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

**WARNING**

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

- Notes:**
- Using a two-post rack is not supported.
 - 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.
 - If you are using a rack from Spectra Logic, see the *“Bolt Down Bracket Installation”* guide for instructions for anchoring the rack to the floor.