

# SC9000 Storage System

## Owner's Manual

## Notes, Cautions, and Warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

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## About this Guide

This guide describes how to perform service and maintenance on the SC9000 storage system.

### Revision History

Document Number: 680–101–001

Revision	Date	Description
A	October 2015	Initial release
B	May 2016	Made editorial changes
C	May 2017	Added instructions for powering on hardware
D	January 2019	Update product branding, incorporate enhancement requests

### Audience

The information provided in this guide is intended for use by Dell EMC end users.

### Contacting Dell

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services might not be available in your area.

To contact Dell for sales, technical support, or customer service issues, go to [Dell.com/support](http://Dell.com/support).

- For customized support, type your system service tag on the support page and click **Submit**.
- For general support, browse the product list on the support page and select your product.

# About the SC9000

The SC9000 is an enterprise-class storage system that provides performance, scalability and high availability.

Topics:

- [Storage System Overview](#)
- [SC9000 Monitoring and Diagnostics](#)
- [LCD Panel Features](#)

## Storage System Overview

The storage system described in this document consists of two storage controllers, enterprise-class switches, and one or more expansion enclosures.

## SC9000 Hardware

The storage controllers provide the central processing capability for the Storage Center Operating System, application software (Dell Storage Manager Client), and management of RAID storage.

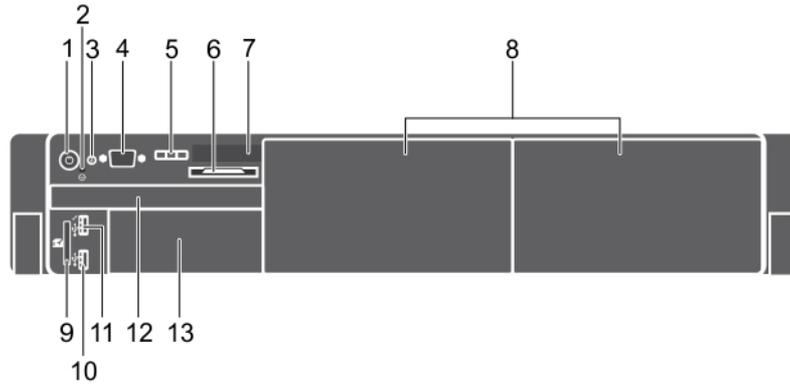
Each storage controller includes two Intel Xeon CPUs, a cache card, an Integrated Dell Remote Access Controller 8 (iDRAC8), a four-port Intel network daughter card, and up to six IO cards installed in three full-height slots and three low-profile slots. The Storage Center Operating System is installed on an embedded SSD within each storage controller.

The IO cards in the storage controller are designated as front-end ports or back-end ports.

- **Front-end ports:** Hosts, servers, or Network Attached Storage (NAS) appliances access storage by connecting to the storage controller iSCSI, Fibre Channel, or FCoE IO cards through one or more network switches. The ports for these connections are located on the back of the storage controller, but are designated as front-end ports.
- **Back-end ports:** Expansion enclosures, which hold the physical disks that provide back-end storage, connect directly to the SAS ports on the storage controllers. The SAS ports are designated as back-end ports, which are part of a private network between the storage controllers and expansion enclosures.

# Front Panel Features and Indicators

The front panel of the storage controller contains power and reset switches, and an LCD panel that shows system ID, status and error information.



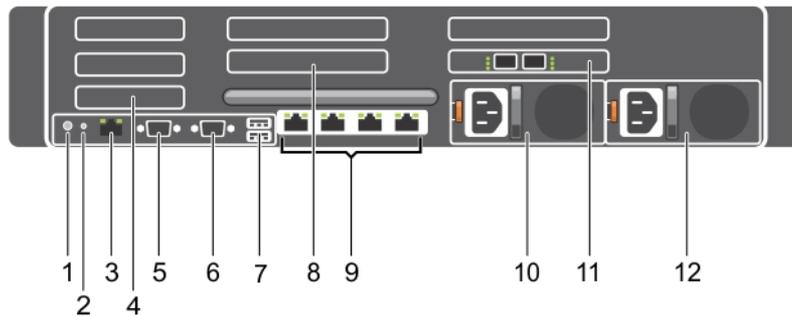
**Figure 1. Front Panel Features and Indicators**

Item	Indicator, Button, or Connector	Icon	Description
1	Power-on indicator, power button		The power-on indicator lights when the system power is on. The power button controls the power supply output to the system.
2	NMI button		Not used for the SC9000.
3	System identification button		<p>The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pressed, the front LCD panel and the back system status indicator flash until one of the buttons is pressed again. Press to toggle the system ID on and off.</p> <p>If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.</p> <p>To reset the iDRAC (if not disabled in F2 iDRAC setup) press and hold the button for more than 15 seconds.</p>
4	Video connector		Allows you to connect a display to the system.
5	LCD menu buttons	—	Allows you to navigate the control panel LCD menu.
6	Information tag	—	A slide-out label panel that records system information such as the Service Tag.
7	LCD panel	—	<p>Displays system ID, status information, and system error messages.</p> <ul style="list-style-type: none"> <li>The LCD lights blue during normal storage controller operation.</li> <li>The LCD lights amber when the storage controller needs attention, and the LCD panel displays an error code followed by descriptive text.</li> </ul>

Item	Indicator, Button, or Connector	Icon	Description
			<p><b>NOTE:</b> If the storage controller is connected to a power source and an error is detected, the LCD lights amber regardless of whether the storage controller is turned on or off.</p>
8	Filler plate	—	Covers empty bay.
9	vFlash media card slot	—	Not used for the SC9000.
10	iDRAC USB		Connects USB devices to the system or provides access to the iDRAC Direct features. The USB management port is USB 2.0-compliant.
11	Management USB		Connects USB devices to the system. The USB management port is USB 2.0-compliant.
12	Storage Center OS drive		An internal SSD drive that holds the Storage Center OS.
13	Filler plate	—	Covers empty bay.

## Back Panel Features and Indicators

The back panel of the storage controller contains IO card slots, a system identification button, connectors, and power supplies.



**Figure 2. Back Panel Features and Indicators**

Item	Indicator, button, or connector	Icon	Description
1	System identification button		<p>Used to locate a particular system within a rack. When a System ID button on the front or back panel is pressed, the front LCD panel and the back system status indicator flash until one of the buttons is pressed again.</p> <ul style="list-style-type: none"> <li>Press to toggle the system ID on and off.</li> <li>If the system stops responding during POST, press and hold the system ID button for more than five seconds to enter BIOS progress mode.</li> </ul>
2	System identification connector		Connects the optional system status indicator assembly through the optional cable management arm.

Item	Indicator, button, or connector	Icon	Description
3	iDRAC8 Enterprise port		Dedicated management port.
4	Low-profile IO card slots (3)	—	Ports are numbered from left to right.
5	Serial connector		Connects a serial device to the system.
6	Video connector		Connects a VGA display to the system.
7	USB connector (2)		Connects USB devices to the system. The ports are USB 3.0-compliant.
8	Full-height IO card slots (3)	—	Ports are numbered from right to left.
9	Ethernet connectors		Connects the storage controller to the Ethernet switch and to other storage controllers in the rack. The ports function as follows: <ul style="list-style-type: none"> <li>• IPC 1: 10Gb (Connect to second storage controller for IPC).</li> <li>• MGMT 0: 1GbE (Connects to the Ethernet switch for system login, email, alerts, SNMP traps, diagnostic data, and access for software).</li> </ul> <p><b>NOTE: IPC 3 and MGMT 2 are not used.</b></p>
10	Power supply unit (PSU1)	—	1100 W, 100–240 V AC, autoranging, 50/60 Hz
11	Cache card	—	Improves the performance of the storage system by temporarily storing data before it is written to disk.
12	Power supply unit (PSU2)	—	1100 W, 100–240 V AC, autoranging, 50/60 Hz

## SC9000 Monitoring and Diagnostics

The Storage Center Operating System generates alert messages for temperature, IO card, fan, and power conditions for Storage Center components.

Use the Dell Storage Manager Client to view these alerts. The SC9000 storage controller generates system messages that notify you of a possible problem with the storage controller. System messages are recorded in the System Event Log (SEL) and they may also appear in an abbreviated form on the LCD panel.

## LCD Panel Features

The LCD panel provides storage controller information, status messages, and error messages to indicate when the storage controller is operating correctly or when it needs attention.

- The LCD backlight lights blue during normal operating conditions and lights amber to indicate an error condition.
- The LCD backlight is off when the system is in standby mode and can be turned on by pressing either the Select, Left, or Right button on the LCD panel.
- The LCD backlight remains off if LCD messaging is turned off through the iDRAC utility, the LCD panel, or other tools.

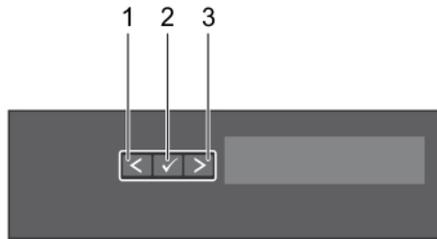


Figure 3. LCD Panel Features

Item	Button	Description
1	Left	Moves the cursor back in one-step increments.
2	Select	Selects the menu item highlighted by the cursor.
3	Right	Moves the cursor forward in one-step increments. During message scrolling: <ul style="list-style-type: none"> <li>• Press once to increase scrolling speed</li> <li>• Press again to stop</li> <li>• Press again to return to default scrolling speed</li> <li>• Press again to repeat the cycle</li> </ul>

## Home Screen

The Home screen displays user-configurable information about the system. This screen is displayed during normal system operation when there are no status messages or errors. When the system is in standby mode, the LCD backlight turns off after five minutes of inactivity if there are no error messages. Press one of the three navigation buttons (Select, Left, or Right) to view the Home screen.

To navigate to the Home screen from another menu, continue to select the up arrow  until the Home icon  is displayed, and then select the Home icon.

From the Home screen, press the Select button to enter the main menu.

## Setup Menu

 **NOTE:** When you select an option in the Setup menu, you must confirm the option before proceeding to the next action.

Option	Description
iDRAC	Select <b>DHCP</b> or <b>Static IP</b> to configure the network mode. If <b>Static IP</b> is selected, the available fields are <b>IP</b> , <b>Subnet (Sub)</b> , and <b>Gateway (Gtw)</b> . Select <b>Setup DNS</b> to enable DNS and to view domain addresses. Two separate DNS entries are available.
Set error	Select <b>SEL</b> to display LCD error messages in a format that matches the IPMI description in the System Event Log (SEL). This is useful when trying to match an LCD message with an SEL entry. Select <b>Simple</b> to display LCD error messages in a simplified user-friendly description.
Set home	Select the default information to be displayed on the LCD Home screen. See View menu for a description of the options that can be set as the default on the Home screen.

## View Menu

The View menu displays iDRAC, asset, power, and temperature information

 **NOTE:** When you select an option in the View menu, you must confirm the option before proceeding to the next action.

Option	Description
iDRAC IP	Displays the <b>IPv4</b> or <b>IPv6</b> addresses for the iDRAC8. Addresses include <b>DNS (Primary and Secondary)</b> , <b>Gateway</b> , <b>IP</b> , and <b>Subnet</b> (IPv6 does not have Subnet).
MAC	Displays the MAC addresses for <b>iDRAC</b> , <b>iSCSI</b> , or <b>Network</b> devices.
Name	Displays the name of the <b>Host</b> , <b>Model</b> , or <b>User String</b> for the system
Number	Displays the <b>Asset tag</b> or the <b>Service tag</b> for the system.
Power	Displays the power output of the system in BTU/hr or Watts. The display format can be configured in the <b>Set home</b> submenu of the <b>Setup</b> menu.
Temperature	Displays the temperature of the system in Celsius or Fahrenheit. The display format can be configured in the <b>Set home</b> submenu of the <b>Setup</b> menu.

# Replacing Storage System Components

This chapter describes how to remove and install components of the SC9000 storage system. This information assumes that you have received the replacement component and are ready to install it.

## Safety Precautions

Always follow these safety precautions to avoid injury and damage to Storage Center equipment.

If equipment described in this guide is used in a manner not specified by Dell EMC, the protection provided by the equipment could be impaired. For your safety and protection, observe the rules described in the following sections.

**NOTE:** See the safety and regulatory information that shipped with each Storage Center component. Warranty information is included as a separate document.

## Installation Safety Precautions

Follow these safety precautions when installing an SC9000 storage system:

- Dell EMC recommends that only individuals with rack-mounting experience install an SC9000 storage system in a rack.
- The rack construction must support the total weight of the installed expansion enclosures. The design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.
- To prevent the rack from tipping, slide only one storage system out of the rack at a time.
- Make sure that the storage system is always fully grounded to prevent damage from electrostatic discharge.
- When handling the storage system components, use an electrostatic wrist guard or a similar form of protection.

## Electrical Safety Precautions

Always follow electrical safety precautions to avoid injury and damage to Storage Center equipment.

**WARNING:** Disconnect power from the storage controllers when removing or installing components that are not hot-swappable. When disconnecting power, first power down the storage controllers using the Dell Storage Manager Client and then unplug the power cords from all the power supplies in the storage controllers.

- Provide a suitable power source with electrical overload protection. All Storage Center components must be grounded before applying power. Make sure that there is a safe electrical earth connection to power supply cords. Check the grounding before applying power.
- The plugs on the power supply cords are used as the main disconnect device. Make sure that the socket outlets are located near the equipment and are easily accessible.
- Know the locations of the equipment power switches and the room's emergency power-off switch, disconnection switch, or electrical outlet.
- Do not work alone when working with high-voltage components.
- Unplug the chassis before you move it or if you think it has become damaged in any way. When powered by multiple AC sources, disconnect all supply power for complete isolation.

# Electrostatic Discharge Precautions

Always follow electrostatic discharge (ESD) precautions to avoid injury and damage to Storage Center equipment.

Electrostatic discharge (ESD) is generated by two objects with different electrical charges coming into contact with each other. The resulting electrical discharge can damage electronic components and printed circuit boards. Follow these guidelines to protect your equipment from ESD:

- Dell EMC recommends that you always use a static mat and static strap while working on the storage controller.
- Use a suitable ESD wrist or ankle strap.

# General Safety Precautions

Always follow general safety precautions to avoid injury and damage to Storage Center equipment.

- Keep the area around the storage system chassis clean and free of clutter.
- Place any system components that have been removed away from the storage system chassis or on a table so that they are not in the way of foot traffic.
- While working on the storage system chassis, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.
- Remove any jewelry or metal objects from your body because they are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.
- Do not lift a storage controller by the handles of the power supply units (PSUs). They are not designed to hold the weight of the entire chassis, and the chassis cover may become bent.
- Before moving a storage controller, remove the PSUs to minimize weight.

# Replacing the Front Bezel

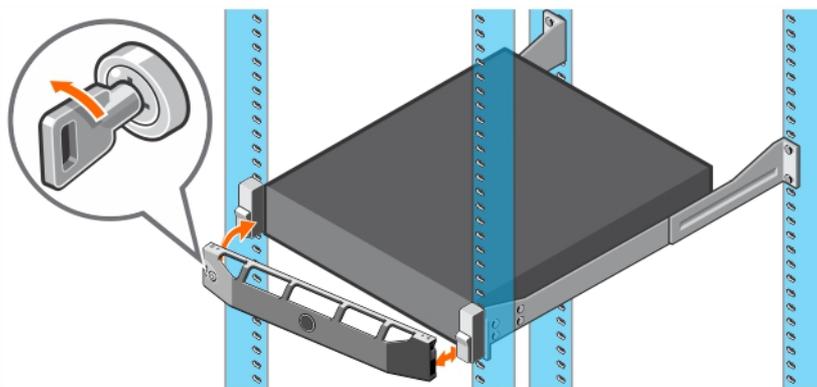
The front bezel is a cover for the front panel of the storage system.

## About this task

The front bezel must be removed from the front panel when replacing hard drives.

## Steps

- 1 Use the system key to unlock the keylock at the left end of the bezel.
- 2 Lift the release latch next to the keylock.
- 3 Rotate the left end of the bezel away from the front panel.
- 4 Unhook the right end of the bezel and pull the bezel away from the storage system.



**Figure 4. Replacing the Front Bezel**

- 5 Hook the right end of the replacement bezel onto the front panel of the storage system.
- 6 Insert the left end of the bezel into the securing slot until the release latch locks into place.
- 7 Secure the bezel with the keylock.

## Pre-Replacement Procedures

Perform the procedures described in this chapter before replacing the rack rails.

## Send Diagnostic Data Using SupportAssist

After replacing components, use SupportAssist to send diagnostic data to technical support.

- 1 Use Dell Storage Manager Client to connect to the Storage Center.
- 2 In the **Summary** tab, click **Send SupportAssist Information Now**, which is located under **SupportAssist Actions** in the **Status** pane. The **Send SupportAssist Information Now** dialog box opens.
- 3 Select **Storage Center Configuration** and **Detailed Logs**.
- 4 Click **OK**.

## Shut Down a Storage Controller

Use the Dell Storage Manager Client to shut down a storage controller.

### About this task

Shutting down one storage controller causes the Storage Center to fail over to the other storage controller, which continues to process I/O.

### Steps

- 1 Use the Dell Storage Manager Client to connect to the Storage Center.
- 2 Click the **Hardware** tab.
- 3 In the **Hardware** tab navigation pane, select the storage controller to shut down.
- 4 In the right pane, click **Shut Down/Restart Controller**. The **Shut Down/Restart Controller** dialog box opens.
- 5 Select **Shut Down Controller** from the drop-down menu.
- 6 Click **OK**.

The selected storage controller is shut down.

# Replacing Rack Rails

Rack rails are used to install the storage controller into a rack.

## Prerequisites

- 1 Use SupportAssist to send diagnostic data to technical support.
- 2 Shut down the storage controller using the Dell Storage Manager Client.

## About this task

Use this procedure to replace rack rails.

**NOTE:** Replacing rack rails must be performed during a scheduled maintenance window when the Storage Center system is unavailable to the network.

## Steps

- 1 Make sure all the cables are labeled.
- 2 Disconnect all of the cables from the storage controller.
- 3 Remove the screws that secure the chassis to the rack.
- 4 Remove the storage controller from the rack rails.
- 5 Remove the rack rails from the rack.
- 6 Install the replacement rack rails in the rack.
- 7 Install the storage controller in the rack rails.
- 8 Reconnect the cables to the storage controller.
- 9 Start up the storage controller.

## Next step

Use SupportAssist to send diagnostic data to technical support.

# Post-Replacement Procedures

Start up the storage controller (if it was previously shut down) and use SupportAssist to send diagnostic data to technical support.

## Start Up the Storage Controller

If the storage controller was previously shut down, perform this procedure to start it up.

- 1 Plug the power cables into the PSUs of the storage controller.
- 2 Turn on the storage controller by pressing the power switch on the storage controller
- 3 Use the Dell Storage Manager Client to make sure that the replacement part is recognized and shown as up and running.

## Send Diagnostic Data Using SupportAssist

After replacing components, use SupportAssist to send diagnostic data to technical support.

- 1 Use Dell Storage Manager Client to connect to the Storage Center.
- 2 In the **Summary** tab, click **Send SupportAssist Information Now**, which is located under **SupportAssist Actions** in the **Status** pane. The **Send SupportAssist Information Now** dialog box opens.
- 3 Select **Storage Center Configuration** and **Detailed Logs**.
- 4 Click **OK**.

# Power Up Storage Center Hardware

If you need to power up all Storage Center hardware, turn on the expansion enclosures first, then turn on the storage controllers.

- 1 Connect the expansion enclosures and storage controllers to a power source.
- 2 Turn on each expansion enclosure attached to the Storage Center.
  - a Simultaneously press both power switches on the rear of the expansion enclosure to turn on the expansion enclosure. The status indicator on the front of the expansion enclosure turns blue when the expansion enclosure is powered up and operational.

**NOTE:** After an expansion enclosure is powered on, its ID number is displayed by LEDs on the back panel. If you want the IDs for all the expansion enclosures to appear in sequential order, turn on each expansion enclosure, one after the other, in the order you want the ID to appear.
  - b Repeat with each expansion enclosure attached to the Storage Center, waiting for each to become operational before turning on the next expansion enclosure.

**NOTE:** Make sure that all disks are up and running before turning on any storage controllers.
- 3 After all expansion enclosures are powered on, turn on each storage controller by pressing and holding the power button on the front of the storage controller. The fans turn on as an indication that the storage controller is starting to come up.

# Technical Specifications

## Processor

Processor type	Two Intel Xeon 3.2 GHz 8 core processors
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## Power

AC power supply unit (PSU) per power supply

Wattage	1100 W
Heat dissipation	4100 BTU/hr maximum (1100 W PSU)

**i** **NOTE:** Heat dissipation is calculated using the power supply unit wattage rating.

Voltage	100–240 V AC, autoranging, 50/60 Hz
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## Expansion Bus

Bus type	PCI Express Generation 3
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Expansion slots using riser card:

Riser 1	(Slot 1) One half-height, low-profile x8 link (Slot 2) One half-height, low-profile x8 link (Slot 3) One half-height, low-profile x8 link
Riser 2	(Slot 4) One full-height, full-length x16 link (Slot 5) One full-height, full-length x8 link
Riser 3	(Slot 6) One full-height, full-length x8 link (Slot 7) One full-height, full-length x8 link

## Memory

Architecture	2133 MT/s DDR4 registered, load-reduced Error Correcting Code (ECC) DIMMs
Minimum RAM	128 GB with a single processor
Maximum RAM	256 GB with dual processors

## Connectors

### Back

NIC	Two 1 Gbps plus two 10 Gbps
Serial	9-pin, DTE, 16550-compatible
USB	Two 4-pin, USB 3.0-compliant

## Connectors

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Video 15-pin VGA

### Front

USB One 4-pin, USB 2.0-compliant  
One USB management port/iDRAC Direct

Video 15-pin VGA

External vFlash card One flash memory card slot with iDRAC8 Enterprise card

### Internal

USB One 4-pin, USB 3.0-compliant

## Physical

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Height 8.73 cm (3.44 inch)

Width 48.2 cm (18.98 inch)

Depth 75.58 cm (29.75 inch)

Maximum configuration weight 44 lb

## Environmental

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For additional information about environmental measurements for specific storage system configurations, see [dell.com/environmental\\_datasheets](http://dell.com/environmental_datasheets).

### Temperature

Storage –40° to 65°C (–40° to 149°F)

Continuous operation (for altitude less than 950 m or 3117 ft) 10°C to 35°C with no direct sunlight on the equipment.

Fresh air For information about fresh air, see Expanded Operating Temperature.

Maximum temperature gradient (operating and storage) 20°C/h (36°F/h)

### Relative humidity

Storage 5% to 95% with 33°C (91°F) maximum dew point. Atmosphere must be non-condensing at all times.

Operating 10% to 80% with 29°C (84.2°F) maximum dew point

### Maximum vibration

Operating 0.26 G<sub>rms</sub> at 5 Hz to 350 Hz (all operation orientations).

Storage 1.88 G<sub>rms</sub> at 10Hz to 500 Hz for 15 min (all six sides tested).

### Maximum shock

Operating Six consecutively executed shock pulses in the positive and negative x, y, and z axes of 40 G for up to 2.3 ms.

Storage Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71 G for up to 2 ms.

### Maximum altitude

Operating 3,048 m (10,000 ft)

## Environmental

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Storage 12,000 m (39,370 ft)

### Operating temperature de-rating

Up to 35 °C (95 °F) Maximum temperature is reduced by 1°C/300 m (1°F/547 ft) above 950 m (3,117 ft).

35 °C to 40 °C (95 °F to 104 °F) Maximum temperature is reduced by 1°C/175 m (1°F/319 ft) above 950 m (3,117 ft).

40 °C to 45 °C (104 °F to 113 °F) Maximum temperature is reduced by 1°C/125 m (1°F/228 ft) above 950 m (3,117 ft).

### Particulate contamination

**NOTE:** This section defines the limits to help avoid IT equipment damage and/or failure from particulates and gaseous contamination. If it is determined that levels of particulates or gaseous pollution are beyond the limits specified below and are the reason for the damage or failures to your equipment, it may be necessary for you to re-mediate the environmental conditions that are causing the damage or failures. Re-mediation of environmental conditions will be the responsibility of the customer.

Air filtration Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit.

**NOTE:** Applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor.

Conductive dust Air must be free of conductive dust, zinc whiskers, or other conductive particles.

**NOTE:** Applies to data center and non-data center environments.

Corrosive dust

- Air must be free of corrosive dust.
- Residual dust present in the air must have a deliquescent point less than 60% relative humidity.

**NOTE:** Applies to data center and non-data center environments.

Gaseous contamination

**NOTE:** Maximum corrosive contaminant levels measured at ≤50% relative humidity.

Copper coupon corrosion rate <300 Å/month per ClassG1 as defined by ANSI/ISA71.04-1985.

Silver coupon corrosion rate <200 Å/month as defined by AHSRAE TC9.9.

### Expanded operating temperature

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**NOTE:** When operating in the expanded temperature range, system performance may be impacted.

**NOTE:** When operating in the expanded temperature range, ambient temperature warnings may be reported on the LCD and in the system event log.

Continuous operation

5°C to 40°C at 5% to 85% RH with 29°C dew point.

**NOTE:** Outside the standard operating temperature (10°C to 35°C), the system can operate continuously down to 5°C or as high as 40°C.

For temperatures between 35°C and 40°C, de-rate maximum allowable temperature by 1°C per 175m above 950 m (1°F per 319 ft).

## Expanded operating temperature

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≤ 1% of annual operating hours

–5°C to 45°C at 5% to 90% RH with 29°C dew point.

**NOTE:** Outside the standard operating temperature (10°C to 35°C), the system can operate down to –5°C or up to 45°C for a maximum of 1% of its annual operating hours.

For temperatures between 40°C and 45°C, de-rate maximum allowable temperature by 1°C per 125 m above 950 m (1°F per 228 ft).

Expanded operating temperature restrictions

- Do not perform a cold startup below 5°C.
- The operating temperature specified is for a maximum altitude of 3050 m (10,000 ft).
- Redundant power supplies are required.
- Peripheral cards that are not Dell-qualified are not supported.
- Peripheral cards greater than 25 W are not supported.