

# SC4020 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.

<b>About This Manual</b> .....	<b>5</b>
Revision History.....	5
Audience.....	5
Contacting Dell.....	5
Related Publications.....	5
<b>1 About the SC4020 Storage System</b> .....	<b>7</b>
Storage Center Hardware Components.....	7
SC4020 Storage System.....	7
Switches.....	7
Expansion Enclosures.....	7
Storage Center Architecture Options.....	8
Storage Center Communication.....	9
Front-End Connectivity.....	9
Back-End Connectivity.....	10
System Administration.....	10
SC4020 Storage System Hardware.....	10
SC4020 Storage System Front-Panel Features and Indicators.....	10
SC4020 Storage System Back-Panel Features and Indicators.....	11
SC4020 Storage System Storage Controller Features and Indicators .....	12
SC4020 Storage System Drives.....	17
SC4020 Storage System Drive Numbering.....	17
<b>2 Replacing SC4020 Storage System Components</b> .....	<b>18</b>
Safety Precautions.....	18
Electrical Safety Precautions.....	18
Electrostatic Discharge Precautions.....	18
General Safety Precautions.....	19
Pre-Replacement Procedures.....	19
Send Diagnostic Data Using Dell SupportAssist.....	19
Contacting Dell Technical Support.....	19
Shut Down the Storage System.....	19
Replacing the Front Bezel.....	20
Replacing Hard Drives.....	20
Hard Drive Numbering.....	20
Identify the Failed Hard Drive.....	21
Replace a Hard Drive.....	22
Replacing Rack Rails.....	23
Post-Replacement Procedures.....	23
Start Up the Storage Controller.....	23
Send Diagnostic Data Using Dell SupportAssist.....	23
Contact Dell Technical Support.....	24
Power Up the Storage Center Hardware.....	24

**3 SC4020 Storage System Technical Specifications.....25**  
Technical Specifications..... 25

## About This Manual

This manual describes the features and technical specifications of an SC4020 storage system.

## Revision History

Document Number: 680-100-001

Revision	Date	Description
A	May 2014	Initial release
B	June 2014	Removed a reference to an internal document and added additional information about the BMC
C	August 2014	Added information about iSCSI front-end connectivity support
D	October 2014	Added information about SFP+ transceiver modules and contacting Dell technical support
E	November 2014	Corrected errors found during validation
F	June 2015	Added information about new features for SC4020 storage systems running Storage Center 6.6.4 or later
G	December 2015	Added information about 16 Gb Fibre Channel front-end connectivity
H	August 2016	Added information about 12 Gb front-end SAS connectivity
I	July 2017	Removed the front-end connection instructions and added instructions for replacing storage system components

## Audience

The information provided in this manual is intended for use by Dell 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 [www.dell.com/support](http://www.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.

## Related Publications

The following documentation is available for the SC4020 Storage System.

- *Dell Storage Center SC4020 Storage System Getting Started Guide*  
Provides information about an SC4020 storage system, such as installation instructions and technical specifications.
- *Dell Storage Center Release Notes*  
Provides information about new features and known and resolved issues for the Storage Center software.
- *Dell Storage Manager Installation Guide*  
Provides installation and setup instructions.

- *Dell Storage Manager Administrator's Guide*  
Provides instructions for using the Data Collector Manager and the Dell Storage Manager Client.
- *Dell Storage Manager Release Notes*  
Provides information about Dell Storage Manager releases, including new features, enhancements, fixed issues, and open issues.
- *Dell TechCenter*  
Provides technical white papers, best practice guides, and frequently asked questions about Dell Storage products. Go to <http://en.community.dell.com/techcenter/storage/>.

# About the SC4020 Storage System

The SC4020 storage system provides the central processing capabilities for the Storage Center Operating System and management of RAID storage.

## Topics:

- [Storage Center Hardware Components](#)
- [Storage Center Architecture Options](#)
- [Storage Center Communication](#)
- [SC4020 Storage System Hardware](#)

## Storage Center Hardware Components

The Storage Center described in this document consists of an SC4020 storage system, enterprise-class switches, and expansion enclosures.

To allow for storage expansion, the SC4020 storage system supports multiple SC200/SC220 expansion enclosures and up to two SC280 expansion enclosures.

**i NOTE: The cabling between the storage system, switches, and host servers is referred to as front-end connectivity. The SAS cabling between the storage system and expansion enclosures is referred to as back-end connectivity. If expansion enclosures are not used, the SAS cabling between the storage controllers is referred to as back-end connectivity.**

## SC4020 Storage System

The SC4020 is a 2U storage system that supports a minimum of 7 and a maximum of 24 internal 2.5-inch hot-swappable SAS hard drives installed horizontally side-by-side.

The SC4020 storage system contains two redundant power supply/cooling fan modules and two storage controllers with multiple I/O ports that provide communication with servers and expansion enclosures.

## Switches

Dell offers enterprise-class switches as part of the total Storage Center solution.

The SC4020 storage system supports Fibre Channel (FC) and Ethernet switches, which provide robust connectivity to servers and allow for the use of redundant transport paths. Fibre Channel (FC) or Ethernet switches can provide connectivity to a remote Storage Center to allow for replication of data. In addition, Ethernet switches provide connectivity to a management network to allow configuration, administration, and management of the Storage Center.

## Expansion Enclosures

Expansion enclosures allow the data storage capabilities of the SC4020 storage system to be expanded beyond the 24 internal disks in the storage system chassis.

An SC4020 a total of 192 disks per Storage Center system. This total includes the disks in the storage system chassis and the disks in the SC200/SC220 expansion enclosures or SC280 expansion enclosures.

An SC4020 can support:

- Up to fourteen SC200 expansion enclosures
- Up to seven SC220 expansion enclosures
- Any combination of SC200/SC220 expansion enclosures, as long as the total disk count of the system does not exceed 192
- Up to two SC280 expansion enclosures

**NOTE:** An SC4020 storage system cannot be connected to both SC200/SC220 expansion enclosures and SC280 expansion enclosures at the same time. The SC4020 supports only a single chain of SC200/SC220 expansion enclosures or a single chain of SC280 expansion enclosures.

## Storage Center Architecture Options

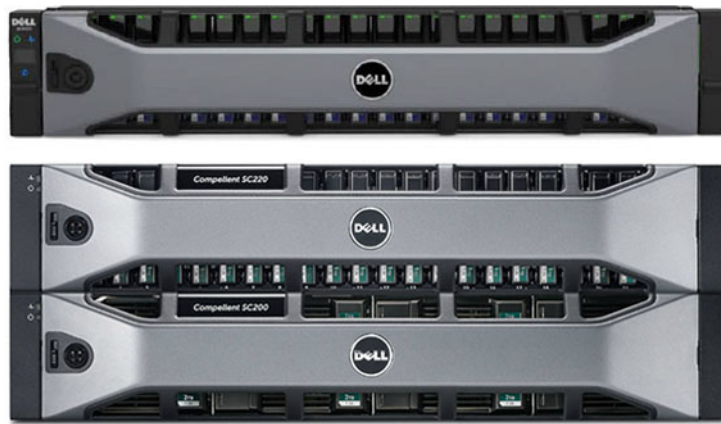
A Storage Center with an SC4020 storage system can be deployed in the following configurations:

- An SC4020 storage system deployed without SC200/SC220 expansion enclosures.



**Figure 1. SC4020 Storage System without Expansion Enclosures**

- An SC4020 storage system deployed with one or more SC200/SC220 expansion enclosures.



**Figure 2. SC4020 Storage System with Two SC200/SC220 Expansion Enclosures**

- An SC4020 storage system deployed with up to two SC280 expansion enclosures.



Figure 3. SC4020 Storage System with Two SC280 Expansion Enclosures

## Storage Center Communication

A Storage Center uses multiple types of communication for both data transfer and administrative functions. Storage Center communication is classified into three types: front end, back end, and system administration.

### Front-End Connectivity

Front-end connectivity provides I/O paths from servers to a storage system and replication paths from one Storage Center to another Storage Center. The SC4020 storage system provides the following types of front-end connectivity:

- **Fibre Channel:** Hosts, servers, or Network Attached Storage (NAS) appliances access storage by connecting to the storage system Fibre Channel ports through one or more Fibre Channel switches. Connecting host servers directly to the storage system, without using Fibre Channel switches, is not supported.

When replication is licensed, the SC4020 can use the front-end Fibre Channel ports to replicate data to another Storage Center.

- **iSCSI:** Hosts, servers, or Network Attached Storage (NAS) appliances access storage by connecting to the storage system iSCSI ports through one or more Ethernet switches. Connecting host servers directly to the storage system, without using Ethernet switches, is not supported.

When replication is licensed, the SC4020 can use the front-end iSCSI ports to replicate data to another Storage Center.

- **SAS:** Hosts or servers access storage by connecting directly to the storage system SAS ports.

**NOTE:** When replication is licensed, the SC4020 can use the embedded MGMT and REPL ports to perform iSCSI replication to another Storage Center. In addition, the SC4020 can use the embedded MGMT and REPL ports as front-end iSCSI ports for connectivity to host servers.

# Back-End Connectivity

Back-end connectivity refers to the SAS cabling between the storage system and expansion enclosures. If expansion enclosures are not used, back-end connectivity refers to the SAS cabling between the storage controllers.

An SC4020 storage system supports back-end connectivity to multiple expansion enclosures.

# System Administration

To perform system administration, the Storage Center communicates with computers using the Ethernet management (MGMT) port and serial port on the storage controllers.

- **Ethernet port:** Used for configuration, administration, and management of Storage Center.
  - **NOTE:** The baseboard management controller (BMC) does not have a separate physical port on the SC4020. The BMC is accessed through the same Ethernet port that is used for Storage Center configuration, administration, and management.
- **Serial port:** Used for initial configuration of the storage controllers. In addition, it is used to perform support only functions when instructed by Dell Technical Support.
  - **NOTE:** Do not throw away the serial cables that come with the SC4020. Keep the serial cables with the SC4020 for troubleshooting purposes.

# SC4020 Storage System Hardware

The SC4020 storage system ships with Dell Enterprise Plus drives, two redundant power supply/cooling fan modules, and two redundant storage controllers.

Each storage controller contains the front-end, back-end, and management communication ports of the storage system.

# SC4020 Storage System Front-Panel Features and Indicators

The front panel of the SC4020 contains power and status indicators, a system identification button, and a unit ID display.

In addition, the hard drives are installed and removed through the front of the storage system chassis.

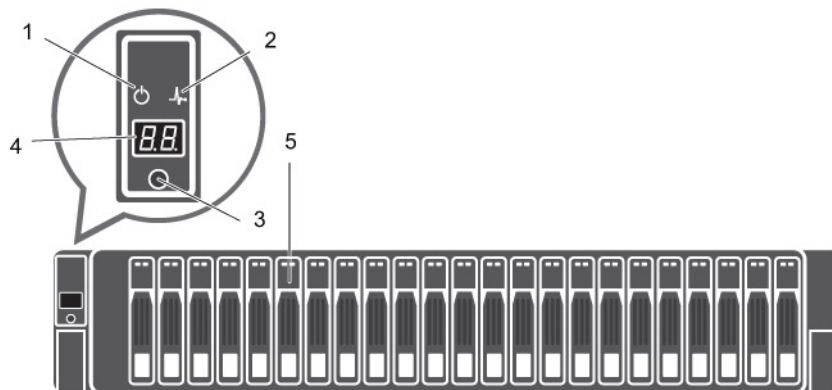


Figure 4. SC4020 Storage System Front-Panel View

Item	Name	Icon	Description
1	Power indicator		Lights when the storage system power is on. <ul style="list-style-type: none"> <li>• Off – No power</li> <li>• On steady green – At least one power supply is providing power to the storage system</li> </ul>
2	Status indicator		Lights when at least one power supply is supplying power to the storage system.

Item	Name	Icon	Description
			<ul style="list-style-type: none"> <li>Off – No power</li> <li>On steady blue – Power is on and firmware is running</li> <li>Blinking blue – Storage system is busy booting or updating</li> <li>On steady amber – Hardware detected fault</li> <li>Blinking amber – Software detected fault</li> </ul>
3	Identification button	ⓘ	Lights when the storage system identification is enabled. <ul style="list-style-type: none"> <li>Off – Normal status</li> <li>Blinking blue – Storage system identification enabled</li> </ul>
4	Unit ID display	—	Displays the storage system identification number. The default value for a new storage system is 01.
5	Hard drives	—	Can have up to 24 2.5-inch SAS hard drives.

## SC4020 Storage System Back-Panel Features and Indicators

The back panel of the SC4020 contains the storage controller indicators and power supply indicators.

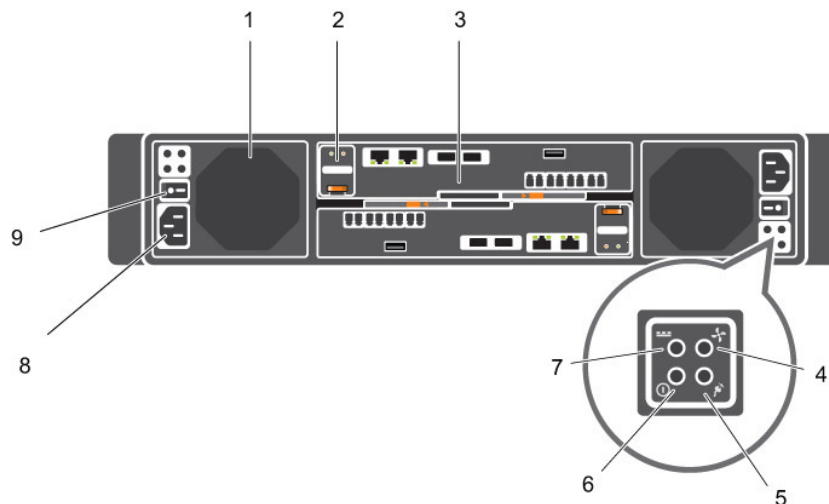


Figure 5. SC4020 Storage System Back-Panel View

Item	Name	Icon	Description
1	Power supply/cooling fan module (PSU) (2)	—	Contains a 580 W power supply and fans that provide cooling for the storage system.
2	Battery backup unit (BBU) (2)	—	Allows the storage controller to shut down smoothly when a loss of AC power is detected.
3	Storage controller (2)	—	Each storage controller contains: <ul style="list-style-type: none"> <li>Back-end ports – Two 6 Gbps SAS ports</li> <li>Front-end ports – Fibre Channel ports, iSCSI ports, or SAS ports</li> <li>MGMT port – Embedded Ethernet/iSCSI port that is typically used for system management</li> <li>REPL port – Embedded iSCSI port that is typically used for replication to another Storage Center</li> <li>Serial port – Used for initial configuration and support functions</li> </ul>
4	Cooling fan fault indicator (2)	✦	<ul style="list-style-type: none"> <li>Off – Normal operation</li> </ul>

Item	Name	Icon	Description
			<ul style="list-style-type: none"> <li>Steady amber – Fan fault or the storage system is having a problem communicating with the PSU</li> <li>Blinking amber – PSU is in programming mode</li> </ul>
5	AC power fault indicator (2)		<ul style="list-style-type: none"> <li>Off – Normal operation</li> <li>Steady Amber – PSU has been removed or the storage system is having a problem communicating with the PSU</li> <li>Blinking amber – PSU is in programming mode</li> </ul>
6	AC power status indicator (2)		<ul style="list-style-type: none"> <li>Off – AC power is off, the power is on but the PSU is not in the storage system, or a hardware fault is possible</li> <li>Steady green – AC power is on</li> <li>Blinking green – AC power is on and the PSU is in standby mode</li> </ul>
7	DC power fault indicator (2)		<ul style="list-style-type: none"> <li>Off – Normal operation</li> <li>Steady amber – PSU has been removed, a DC or other hardware fault has occurred, or the storage system is having a problem communicating with the PSU</li> <li>Blinking amber – PSU is in programming mode</li> </ul>
8	Power socket (2)	—	Accepts a standard computer power cord.
9	Power switch (2)	—	Controls power for the storage system. Each PSU has one switch.

## SC4020 Storage System Storage Controller Features and Indicators

The SC4020 storage system includes two storage controllers in two interface slots.

### SC4020 Storage System Storage Controller with Fibre Channel Front-End Ports

The following figures show the features and indicators on a storage controller with Fibre Channel front-end ports.

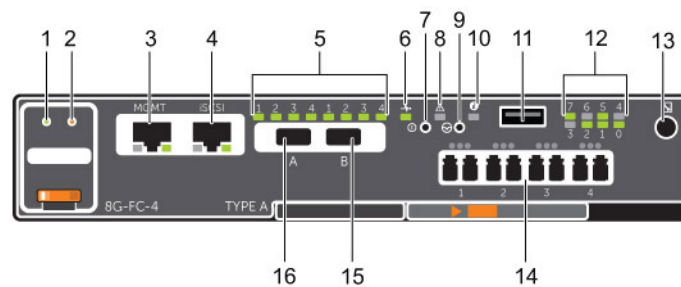


Figure 6. SC4020 Storage System Storage Controller with Four 8 Gb Fibre Channel Front-End Ports

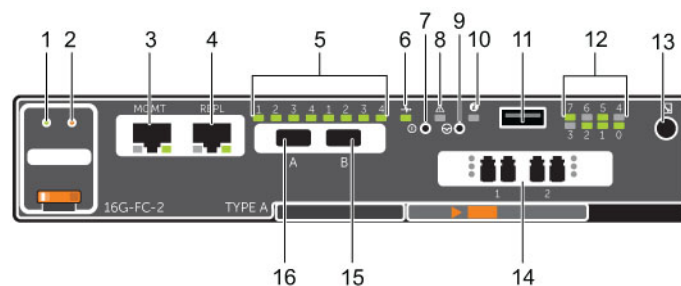













Figure 7. SC4020 Storage System Storage Controller with Two 16 Gb Fibre Channel Front-End Ports

Item	Control/Feature	Icon	Description
1	Battery status indicator		<ul style="list-style-type: none"> <li>Blinking green (on 0.5 sec. / off 1.5 sec.) – Battery heartbeat</li> <li>Fast blinking green (on 0.5 sec. / off 0.5 sec.) – Battery is charging</li> <li>Steady green – Battery is ready</li> </ul>
2	Battery fault indicator		<ul style="list-style-type: none"> <li>Off – No faults</li> <li>Blinking amber – Correctable fault detected</li> <li>Steady amber – Uncorrectable fault detected; replace battery</li> </ul>
3	MGMT port (Slot 3/Port 1)	—	<p>Ethernet/iSCSI port that is typically used for storage system management and access to the BMC</p> <p><b>NOTE:</b> The MGMT port can be used as an iSCSI port for replication to another Storage Center or as a front-end iSCSI port for connections to host servers.</p>
4	iSCSI port (Slot 3/Port 2)	—	<p>Ethernet/iSCSI port that is typically used for replication to another Storage Center (requires a replication license)</p> <p><b>NOTE:</b> The iSCSI port can be used as a front-end port for connections to host servers.</p>
5	SAS activity indicators	—	<p>There are four SAS PHYs per SAS port.</p> <ul style="list-style-type: none"> <li>Off – SAS PHY is not connected</li> <li>Steady green – SAS PHY is connected, but not active</li> <li>Blinking green – SAS PHY is not connected nor active</li> </ul>
6	Storage controller status		On – Storage controller completed a power-on self-test (POST)
7	Recessed power off button		Not currently used
8	Storage controller fault		<ul style="list-style-type: none"> <li>Off – No faults</li> <li>Steady amber – Firmware has detected an error</li> <li>Blinking amber – Storage controller is performing a POST</li> </ul>
9	Recessed reset button		Not currently used
10	Identification LED		<ul style="list-style-type: none"> <li>Off – Identification disabled</li> <li>Blinking blue (for 15 sec.) – Identification is enabled</li> <li>Blinking blue (continuously) – Storage controller shut down to the Advanced Configuration and Power Interface (ACPI) S5 state</li> </ul>
11	USB port		<p>One USB 3.0 connector</p> <p><b>NOTE:</b> For engineering use only.</p>
12	Diagnostic LEDs (8)	—	<ul style="list-style-type: none"> <li>Green LEDs 0–3 – Low byte hex POST code</li> <li>Green LEDs 4–7 – High byte hex POST code</li> </ul>
13	Serial port (3.5 mm mini jack)		Used to perform initial storage controller configurations. In addition, it is used to perform support only functions when instructed by Dell Technical Support.
14	Two options: <ul style="list-style-type: none"> <li>Four Fibre Channel ports (Slot 1/Port 1, Slot 1/Port 2, Slot 1/Port 3, and Slot 1/Port 4) with three LEDs per port</li> <li>Two Fibre Channel ports (Slot 1/Port 1 and Slot 1/Port 2) with three LEDs per port</li> </ul>	—	<p>LEDs for the four 8 Gb Fibre Channel ports:</p> <ul style="list-style-type: none"> <li>All off – No power</li> <li>All on – Booting up</li> <li>Blinking amber – 2 Gbps activity</li> <li>Blinking green – 4 Gbps activity</li> <li>Blinking yellow – 8 Gbps activity</li> <li>Blinking amber and yellow – Beacon</li> <li>All blinking (simultaneous) – Firmware initialized</li> <li>All blinking (alternating) – Firmware fault</li> </ul>

Item	Control/Feature	Icon	Description
			LEDs for the two 16 Gb Fibre Channel ports: <ul style="list-style-type: none"> <li>· All off – No power</li> <li>· All on – Booting up</li> <li>· Blinking amber – 4 Gbps activity</li> <li>· Blinking green – 8 Gbps activity</li> <li>· Blinking yellow – 16 Gbps activity</li> <li>· Blinking amber and yellow – Beacon</li> <li>· All blinking (simultaneous) – Firmware initialized</li> <li>· All blinking (alternating) – Firmware fault</li> </ul>
15	Mini-SAS port B (Slot 2/Port 2)		Back-end expansion port B
16	Mini-SAS port A (Slot 2/Port 1)		Back-end expansion port A

## SC4020 Storage System Storage Controller with iSCSI Front-End Ports

The following figure shows the features and indicators on a storage controller with iSCSI front-end ports.

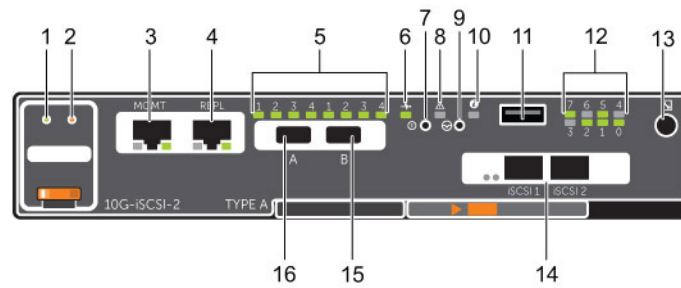





Figure 8. SC4020 Storage System Storage Controller with Two 10 GbE iSCSI Front-End Ports

Item	Control/Feature	Icon	Description
1	Battery status indicator		<ul style="list-style-type: none"> <li>· Blinking green (on 0.5 sec. / off 1.5 sec.) – Battery heartbeat</li> <li>· Fast blinking green (on 0.5 sec. / off 0.5 sec.) – Battery is charging</li> <li>· Steady green – Battery is ready</li> </ul>
2	Battery fault indicator		<ul style="list-style-type: none"> <li>· Off – No faults</li> <li>· Blinking amber – Correctable fault detected</li> <li>· Steady amber – Uncorrectable fault detected; replace battery</li> </ul>
3	MGMT port (Slot 3/Port 1)	—	Ethernet/iSCSI port that is typically used for storage system management and access to the BMC <b>NOTE:</b> The MGMT port can be used as an iSCSI port for replication to another Storage Center or as a front-end iSCSI port for connections to host servers.
4	REPL port (Slot 3/Port 2)	—	Ethernet/iSCSI port that is typically used for replication to another Storage Center <b>NOTE:</b> The REPL port can be used as a front-end iSCSI port for connections to host servers.
5	SAS activity indicators	—	There are four SAS PHYs per SAS port. <ul style="list-style-type: none"> <li>· Off – SAS PHY is not connected</li> <li>· Steady green – SAS PHY is connected, but not active</li> <li>· Blinking green – SAS PHY is not connected nor active</li> </ul>
6	Storage controller status		On – Storage controller completed a power-on self-test (POST)

Item	Control/Feature	Icon	Description
7	Recessed power off button	⏻	Not currently used
8	Storage controller fault	⚠	<ul style="list-style-type: none"> <li>Off – No faults</li> <li>Steady amber – Firmware has detected an error</li> <li>Blinking amber – Storage controller is performing a POST</li> </ul>
9	Recessed reset button	↺	Not currently used
10	Identification LED	ℹ	<ul style="list-style-type: none"> <li>Off – Identification disabled</li> <li>Blinking blue (for 15 sec.) – Identification is enabled</li> <li>Blinking blue (continuously) – Storage controller shut down to the Advanced Configuration and Power Interface (ACPI) S5 state</li> </ul>
11	USB port	🔌	One USB 3.0 connector <b>NOTE: For engineering use only.</b>
12	Diagnostic LEDs (8)	—	<ul style="list-style-type: none"> <li>Green LEDs 0–3 – Low byte hex POST code</li> <li>Green LEDs 4–7 – High byte hex POST code</li> </ul>
13	Serial port (3.5 mm mini jack)	🔊	Used to perform initial storage controller configurations. In addition, it is used to perform support only functions when instructed by Dell Technical Support.
14	Two iSCSI ports (Slot 1/Port 1 and Slot 1/Port 2) with one LED per port	—	<ul style="list-style-type: none"> <li>Off – power</li> <li>Steady Amber – Link</li> <li>Blinking Green – Activity</li> </ul>
15	Mini-SAS port B (Slot 2/Port 2)	🔌	Back-end expansion port B
16	Mini-SAS port A (Slot 2/Port 1)	🔌	Back-end expansion port A

## SC4020 Storage System Storage Controller with Front-End SAS Ports

The following figure shows the features and indicators on a storage controller with front-end SAS ports.

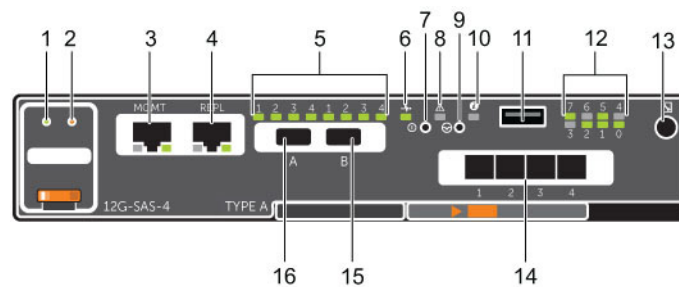











Figure 9. SC4020 Storage System Storage Controller with Four 12 Gb Front-End SAS Ports

Item	Control/Feature	Icon	Description
1	Battery status indicator	🔌	<ul style="list-style-type: none"> <li>Blinking green (on 0.5 sec. / off 1.5 sec.) – Battery heartbeat</li> <li>Fast blinking green (on 0.5 sec. / off 0.5 sec.) – Battery is charging</li> <li>Steady green – Battery is ready</li> </ul>
2	Battery fault indicator	⚠	<ul style="list-style-type: none"> <li>Off – No faults</li> <li>Blinking amber – Correctable fault detected</li> <li>Steady amber – Uncorrectable fault detected; replace battery</li> </ul>

Item	Control/Feature	Icon	Description
3	MGMT port (Slot 3/Port 1)	—	Ethernet/iSCSI port that is typically used for storage system management and access to the BMC <b>(i) NOTE: To use the MGMT port as an iSCSI port for replication to another Storage Center, a Flex Port license and replication license are required. To use the MGMT port as a front-end connection to host servers, a Flex Port license is required.</b>
4	REPL port (Slot 3/Port 2)	—	Ethernet/iSCSI port that is typically used for replication to another Storage Center <b>(i) NOTE: To use the RELP port as a front-end connection to host servers, a Flex Port license is required.</b>
5	SAS activity indicators	—	There are four SAS PHYs per SAS port. <ul style="list-style-type: none"> <li>Off – SAS PHY is not connected</li> <li>Steady green – SAS PHY is connected, but not active</li> <li>Blinking green – SAS PHY is not connected nor active</li> </ul>
6	Storage controller module status		On – Storage controller completed a power-on self-test (POST)
7	Recessed power off button		Not currently used
8	Storage controller module fault		<ul style="list-style-type: none"> <li>Off – No faults</li> <li>Steady amber – Firmware has detected an error</li> <li>Blinking amber – Storage controller is performing a POST</li> </ul>
9	Recessed reset button		Not currently used
10	Identification LED		<ul style="list-style-type: none"> <li>Off – Identification disabled</li> <li>Blinking blue (for 15 sec.) – Identification is enabled</li> <li>Blinking blue (continuously) – Storage controller shut down to the Advanced Configuration and Power Interface (ACPI) S5 state</li> </ul>
11	USB port		One USB 3.0 connector
12	Diagnostic LEDs (8)	—	<ul style="list-style-type: none"> <li>Green LEDs 0–3 – Low byte hex POST code</li> <li>Green LEDs 4–7 – High byte hex POST code</li> </ul>
13	Serial port (3.5 mm mini jack)		Not for customer use
14	Four Mini-SAS High Density (HD) ports (Slot 1/Port 1, Slot 1/Port 2, Slot 1/Port 3, and Slot 1/Port 4)	—	Front-end connectivity ports <b>(i) NOTE: The mini-SAS HD ports are used for front-end connectivity only and cannot be used for back-end expansion.</b>
15	Mini-SAS port B (Slot 2/Port 2)		Back-end expansion port B
16	Mini-SAS port A (Slot 2/Port 1)		Back-end expansion port A

# SC4020 Storage System Drives

The SC4020 storage system supports only Dell Enterprise Plus hard disk drives (HDDs) and Dell Enterprise solid-state drives (eSSDs).



Figure 10. SC4020 Storage System Drive Indicators

Item	Control/Feature	Indicator Code
1	Drive activity indicator	<ul style="list-style-type: none"> <li>Blinking green – Drive activity</li> <li>Steady green – Drive is detected and has no faults</li> </ul>
2	Drive status indicator	<ul style="list-style-type: none"> <li>Off – Normal operation</li> <li>Blinking amber (on 1 sec. / off 1 sec.) – Drive identification is enabled</li> <li>Blinking amber (on 2 sec. / off 1 sec.) – Hardware/firmware fault</li> <li>Steady amber – Drive is safe to remove</li> </ul>

# SC4020 Storage System Drive Numbering

Drives are numbered from left to right in the SC4020 storage system.

The Storage Center identifies drives as *xx-yy*, where *xx* is the unit ID of the storage system, and *yy* is the drive position inside the storage system.

The SC4020 holds up to 24 drives, which are numbered from left to right starting from 0.



Figure 11. SC4020 Storage Systems Drive Numbering

# Replacing SC4020 Storage System Components

This chapter describes how to remove and install components of the SC4020 storage system.

This information assumes that you have received the replacement component and are ready to install it.

## Topics:

- [Safety Precautions](#)
- [Pre-Replacement Procedures](#)
- [Replacing the Front Bezel](#)
- [Replacing Hard Drives](#)
- [Replacing Rack Rails](#)
- [Post-Replacement Procedures](#)
- [Power Up the Storage Center Hardware](#)

## Safety Precautions

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

If equipment described in this section is used in a manner not specified by Dell, 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 within this document or as a separate document.**

Follow these safety precautions:

- Make sure the storage system is always fully grounded to prevent damage from electrostatic discharge.
- When handling the storage system hardware, use an electrostatic wrist guard (not included) or a similar form of protection.
- To avoid danger of the rack toppling over, slide only one chassis out of the rack at a time.

## Electrical Safety Precautions

Always follow electrical safety precautions to avoid personal injury and damage to the storage system.

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

- 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.
- Do not use mats designed to decrease electrostatic discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.
- Each power supply power cord must include a grounding prong and must be plugged into a grounded electrical outlet.

## 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 recommends that you always use a static mat and static strap while working on components in the interior of the storage system chassis.
- Observe all conventional ESD precautions when handling plug-in modules and components.
- Use a suitable ESD wrist or ankle strap.
- Avoid contact with backplane components and module connectors.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.

## 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 other people.
- While working on the storage system chassis, do not wear loose clothing such as neckties and unbuttoned shirt sleeves. These items can come into contact with electrical circuits or be pulled into a cooling fan.
- Remove any jewelry or metal objects from your body. These items 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 the storage system chassis 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 could become bent.
- Before moving the storage system chassis, remove the PSUs to minimize weight.
- Do not remove drives until you are ready to replace them.

 **NOTE: To ensure proper storage system cooling, hard drive blanks must be installed in any hard drive slot that is not occupied.**

## Pre-Replacement Procedures

Perform the procedures described in this section before replacing a component of the SC4020 storage system.

## Send Diagnostic Data Using Dell SupportAssist

Use Dell SupportAssist to send diagnostic data to Dell Technical Support.

### Steps

1. Use the 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 the **Storage Center Configuration** and **Detailed Logs** checkboxes.
4. Click **OK**.

## Contacting Dell Technical Support

Contact Dell Technical Support to let them know that you are performing a repair.

Request that Dell Technical Support suspend alerts for the storage system and ask for a pre-installation system check.

## Shut Down the Storage System

If you are replacing the storage system chassis or rack rails, use the Dell Storage Manager Client to shut down the storage system.

### Steps

1. Use the Dell Storage Manager Client to connect to the Storage Center.
2. Select **Actions > System > Shut Down/Restart**.  
The **Shut Down/Restart** dialog box opens.
3. Select **Shutdown** from the first drop-down menu.

**CAUTION:** Shutting down the storage system results in a system outage.

4. Click **OK**.  
After the storage system shuts down, unplug the power cables from the power supply/cooling fan modules.

## 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.

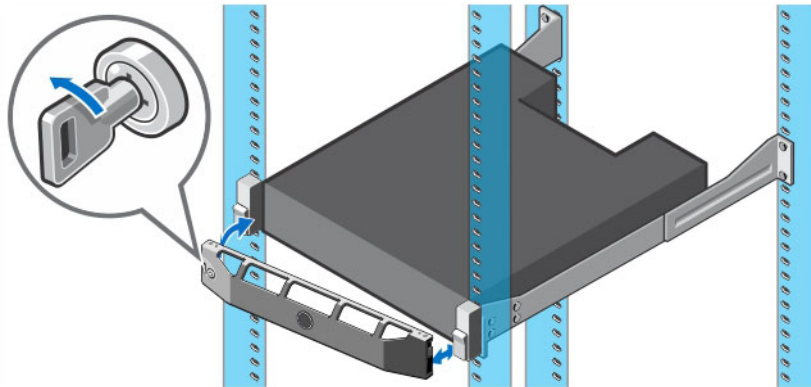


Figure 12. Replacing the Front Bezel

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.

## Replacing Hard Drives

The SC4020 storage systems support hot-swappable hard drives.

The SC4020 storage system supports up to 24 2.5-inch hard drives installed vertically side by side. Hard drive blanks are installed in the hard drive slots that do not have drives.

**CAUTION:** To prevent a storage system reset, at least one powered drive must remain installed in the primary chassis when multiple drives are replaced.

## Hard Drive Numbering

The hard drives in the SC4020 storage system are numbered from left to right (0 to 23).



Figure 13. Hard Drive Numbering

# Identify the Failed Hard Drive

To determine which hard drive failed, use the Dell Storage Manager Client.

## 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 Center.
4. In the **Hardware Alerts** area, find the hardware alert that identifies the expansion enclosure with the failed hard drive.

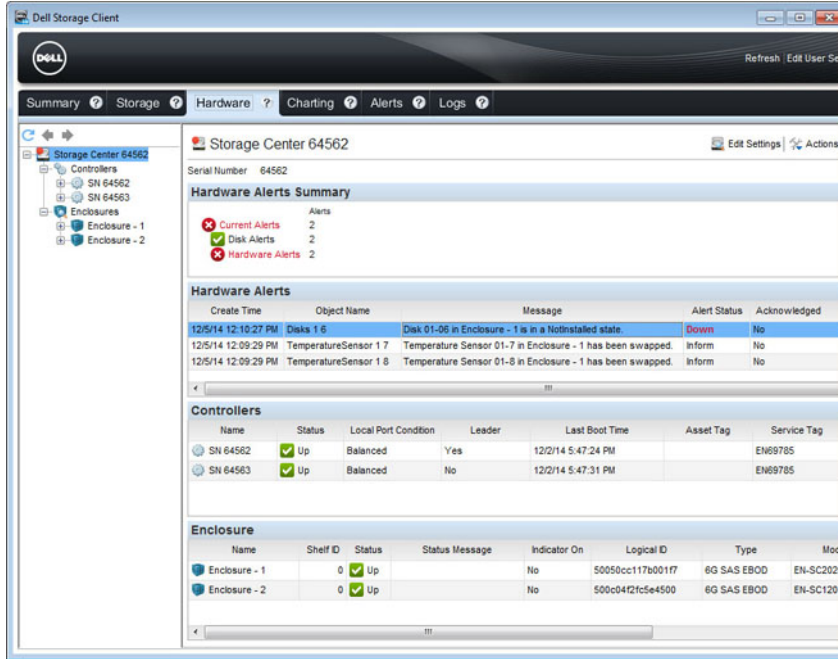


Figure 14. Hardware Alert Identifying the Expansion Enclosure with the Failed Hard Drive

5. In the **Hardware** tab navigation pane, expand the expansion enclosure identified in the previous step.
6. Select **Disks**. The status of each hard drive is displayed in the **Disks** tab.
7. Select the failed hard drive. The location of the failed hard drive is displayed in the **Disk View** tab.

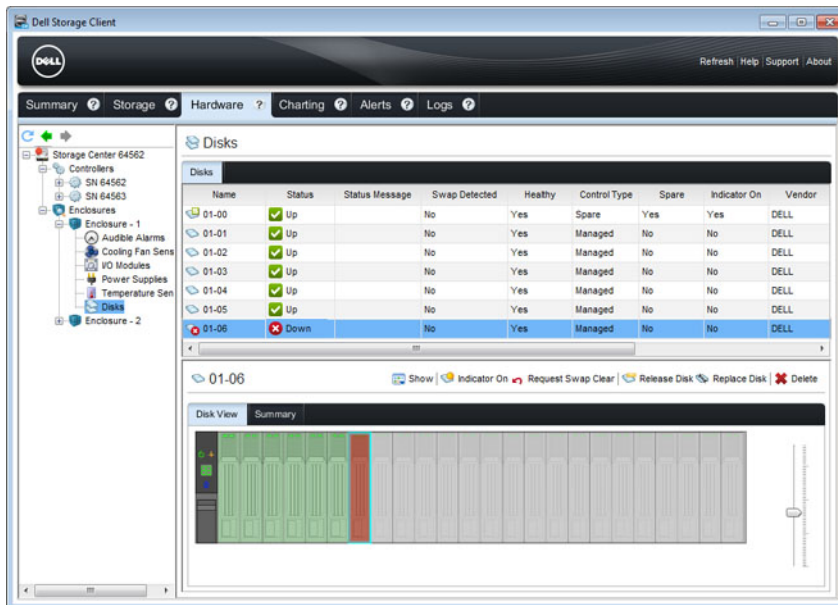


Figure 15. Front View of the Expansion Enclosure Showing the Failed Hard Drive

# Replace a Hard Drive

Use this procedure to replace a failed hard drive.

## Prerequisites

Use SupportAssist to send diagnostic data to Dell Technical Support.

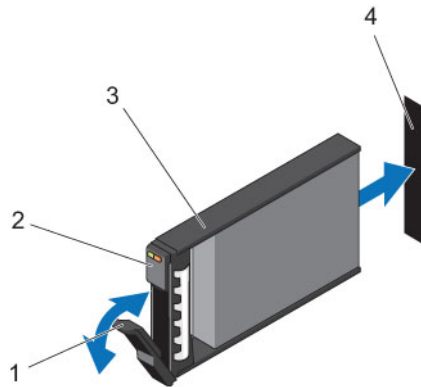
## About this task

Hard drives can be replaced one at a time without shutting down the storage system.

**CAUTION:** To prevent a storage system reset, at least one powered drive must remain installed in the primary chassis when multiple drives are replaced.

## Steps

1. Remove the front bezel.  
A solid amber LED is lit on the failed hard drive.
2. Press the release button to open the hard drive carrier release handle.
3. Slide the hard drive out until it is free of the hard drive slot.



**Figure 16. Replacing a Hard Drive**

1. Hard drive carrier release handle
  2. Hard drive indicators
  3. Hard drive carrier
  4. Hard drive slot
4. Press the release button on the replacement hard drive to open the hard drive carrier release handle.  
**NOTE:** Hold the hard drive by the plastic part of the hard drive carrier or the handle.
  5. Insert the hard drive carrier into the hard drive slot until the carrier make contact with the backplane.  
**CAUTION:** Do not remove the hard drive blanks that are installed in hard drive slots that are not occupied. The hard drive blanks ensure proper cooling of the storage system.
  6. Close the hard drive carrier handle to lock the hard drive in place.  
**NOTE:** Allow several seconds for the storage system to recognize the hard drive and determine its status.
  7. Replace the front bezel.
  8. In the Dell Storage Manager Client, make sure that the replacement hard drive is recognized and shown as up and healthy.

## Next steps

Use SupportAssist to send diagnostic data to Dell Technical Support.

# Replacing Rack Rails

Rack rails are used to install the SC4020 storage system into a rack.

## Prerequisites

1. Use SupportAssist to send diagnostic data to Dell Technical Support.
2. Shut down the storage system 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 the cables from the storage system.
3. Remove the screws that secure the chassis to the rack.
4. Remove the storage system 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 system in the rack rails.
8. Reconnect the cables to the storage system.
9. Start up the storage system.

## Next steps

Use SupportAssist to send diagnostic data to Dell Technical Support.

# Post-Replacement Procedures

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

## Start Up the Storage Controller

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

## Steps

1. Plug the power cables into the power supply/cooling fan modules of the storage system.
2. Turn on the storage system by pressing the power switches on the power supply/cooling fan modules.  
**NOTE:** When the storage system is powered on, a one-minute delay occurs while the SC4020 prepares to boot. During this time, the only indication that the SC4020 is powered on are the LEDs on the storage controllers. After the one-minute delay, the SC4020 fans and LEDs turn on to indicate that the storage system is starting to come up.
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 Dell SupportAssist

Use Dell SupportAssist to send diagnostic data to Dell Technical Support.

## Steps

1. Use the 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**.
5. Change the Storage Center mode from maintenance mode to normal operation.

## Contact Dell Technical Support

Contact Dell Technical Support to inform them that you completed a repair.

Request that Dell Technical Support re-enable alerts for the storage system and ask for a post-installation system check.

## Power Up the Storage Center Hardware

Perform these steps to power up the Storage Center hardware after powering off the hardware or after a power outage.

### About this task

If the Storage Center hardware includes expansion enclosures, turn on the expansion enclosures first, then turn on the storage system.

### Steps

1. Connect the storage system and any expansion enclosures to a power source.
2. Turn on any expansion enclosures attached to the Storage Center.

**NOTE:** After an expansion enclosure is powered on, its ID number is displayed on the back panel. If you want the expansion enclosures IDs to appear in sequential order, turn on each expansion enclosure one at a time, in the order that you want the IDs to appear.

- a. Press both power switches on the back of the expansion enclosure at the same time 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.
  - b. Power on any additional expansion enclosures attached to the Storage Center, waiting for each expansion enclosure to become operational before turning on the next expansion enclosure.
3. After all the expansion enclosures are powered on, turn on the storage system by pressing both power switches on the back of the chassis.

# SC4020 Storage System Technical Specifications

## Technical Specifications

The technical specifications of the SC4020 storage system are displayed in the following tables.

**Table 1. Hard Drives**

Drives	
SAS hard drives	Up to 24 2.5-inch SAS hot-swappable hard drives (6.0 Gbps)

**Table 2. Storage Controllers**

Storage Controllers	
Configurations	Two hot-swappable storage controllers with the following IO options: <ul style="list-style-type: none"> <li>Two 16 Gbps Fibre Channel ports</li> <li>Four 8 Gbps Fibre Channel ports</li> <li>Two 10 Gbps iSCSI ports</li> <li>Four 12 Gbps SAS ports</li> </ul>



**Table 3. Storage Connectivity**

Storage Connectivity	
Configurations	Supports up to 192 drives in one redundant-path SAS chain Supports up to 14 SC200 expansion enclosures and up to 7 SC220 expansion enclosures

**Table 4. RAID**

Redundant Array of Independent Disks (RAID)	
Controller	Two hot-swappable storage controllers
Management	RAID management using the Dell Storage Manager Client

**Table 5. Back Panel Ports**

Back-Panel Ports Connectors (per Storage Controllers)	
Fibre Channel, iSCSI, or SAS connectors	Connection to a Fibre Channel fabric, iSCSI network, or a direct connection to servers with SAS HBAs
Ethernet connectors	<b>MGMT:</b> 1 Gbps or 10 Gbps embedded Ethernet/iSCSI port that is typically used for system management <b>REPL:</b> 1 Gbps or 10 Gbps embedded iSCSI port that is typically used for replication to another Storage Center
SAS connectors	6 Gbps SAS connectors for SAS port redundancy and additional expansion enclosures  <b>NOTE: SAS connectors are SFF-8086/SFF-8088 compliant</b>
USB Connector	One USB 3.0 connector  <b>NOTE: For engineering use only</b>

**Table 5. Back Panel Ports(continued)**

<b>Back-Panel Ports Connectors (per Storage Controllers)</b>	
Serial connector	Used for initial configuration and support only functions

**Table 6. LEDs**

<b>LED Indicators</b>	
Front panel	<ul style="list-style-type: none"> <li>· One two-color LED indicator for system status.</li> <li>· One single-color LED indicator for power status.</li> <li>· Two-digit, seven-segment display indicating the storage system ID number</li> <li>· ID button with a single-color LED indicating startup and pressed states</li> </ul>
Hard drive carrier	<ul style="list-style-type: none"> <li>· One single-color activity LED</li> <li>· One single-color LED status indicator per drive</li> </ul>
Storage controller module	<ul style="list-style-type: none"> <li>· Two single-color LEDs per Ethernet port indicating activity and link speed</li> <li>· Four dual-color LEDs per SAS connector indicating port activity and status</li> <li>· One single-color LED indicating status</li> <li>· One single-color LED indicating fault</li> <li>· One single-color LED for identification</li> <li>· Eight single-color LED for diagnostics</li> </ul>
Power supply/cooling fan	Four LED status indicators for Power Supply Status, AC Fail status, DC Fail status, and Fan Fail status

**Table 7. Power Supplies**

<b>Power Supplies</b>	
AC power supply (per power supply)	
Wattage	580 W (maximum wattage: 584 W)
Voltage	100–240 VAC (7.6 A–3.0 A)
Heat dissipation	65 W at 230 VAC and 99 W at 115 VAC
Maximum inrush current	Under typical line conditions and over the entire system ambient operating range, the inrush current may reach 45 A per power supply for 40 ms or less

**Table 8. Hard Drive Power**

<b>Available Hard Drive Power (per Slot)</b>	
Supported hard drive power consumption (continuous)	Up to 1.2 A at +5 V Up to 0.5 A at +12 V

**Table 9. Physical Dimensions**

<b>Physical</b>	
Height	8.79 cm (3.46 in.)
Width	48.2 cm (18.98 in.)
Depth	54.68 cm (21.53 in.)
Weight (maximum configuration)	24 kg (53 lb)
Weight without drives	19 kg (41 lb)

**Table 10. Environmental**

<b>Environmental</b>	
For additional information about environmental measurements for specific storage system configurations, see <a href="https://dell.com/environmental_datasheets">dell.com/environmental_datasheets</a> .	
<b>Temperature</b>	
Operating	10°C to 35°C (40°F to 95°F) with a maximum temperature gradation of 20°C per hour
Storage	–40° to 65°C (–40° to 149°F) at a maximum altitude of 12,000 m (39,370 ft)
<b>Relative humidity</b>	
Operating	10% to 80% (noncondensing) with 29°C (84.2°F) maximum dew point
Storage	5% to 95% (noncondensing) with 33°C (91°F) maximum dew point
<b>Maximum vibration</b>	
Operating	0.21 G at 5–500 Hz for 15 min
Storage	1.04 G at 2–200 Hz for 15 min
<b>Maximum shock</b>	
Operating	Half-sine shock 5 G +/- 5% with a pulse duration of 10 ms +/- 10% in operational orientations only
Storage	Half-sine shock 30 G +/- 5% with a pulse duration of 10 ms +/- 10% (all sides)
<b>Altitude</b>	
Operating	0 m to 3,048 m (0 ft to 10,000 ft) For altitudes above 915 m (3,000 ft), the maximum operating temperature is derated 1°C per 300 m (1°F per 547 ft)
Storage	–300 m to 12,192 m (–1000 ft to 40,000 ft)
<b>Airborne Contaminant Level</b>	
Class	G1 or lower as defined by ISA-S71.04-1985