



# 6180 Array Module Installation Guide

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## Revision History

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## Step 1 – Preparing for an Installation

This topic provides basic information for installing the 6180 array module and the CSM200 drive module in a storage array. After you have completed these tasks, you will continue onto the *Initial Configuration and Software Installation* electronic document topics or the PDF on the SANtricity ES Storage Manager Installation DVD.

The 6180 storage array consists of a 6180 array module and one or more CSM200 drive modules in a cabinet. This document includes instructions for installing the CSM200 drive modules.

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**ATTENTION Possible hardware damage** – To prevent electrostatic discharge damage to the module, use proper antistatic protection when handling module components.

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### Key Terms

#### storage array

A collection of both physical components and logical components for storing data. Physical components include drives, controllers, fans, and power supplies. Logical components include pools and volumes. These components are managed by the storage management software.

#### array module

One module with drives, one or two controllers, fans, and power supplies. The array module provides the interface between a host and a storage array.

#### controller

A circuit board and firmware that is located within a controller module or an array module. A controller manages the input/output (I/O) between the host system and data volumes.

#### drive module

One module with drives, one or two environmental services monitors (ESMs), power supplies, and fans. A drive module does not contain controllers.

#### environmental services monitor (ESM)

A CRU in the drive module that monitors the status of the components. An ESM also serves as the connection point to transfer data between the drive module and the controller.

#### Small Form-factor Pluggable (SFP) transceiver

A component that enables Fibre Channel duplex communication between storage array devices. SFP transceivers can be inserted into host bus adapters (HBAs), controllers, and environmental services monitors (ESMs). SFP transceivers can support either copper cables (the SFP transceiver is integrated with the cable) or fiber-optic cables (the SFP transceiver is a separate component from the fiber-optic cable).

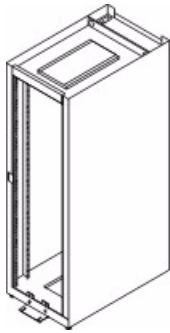
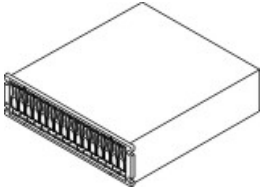

## Gathering Items

Before you start installing the array module, you must have installed the cabinet in which the array module will be mounted.

Use the tables in this section to verify that you have all of the necessary items to install the array module.

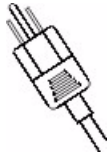
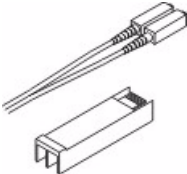
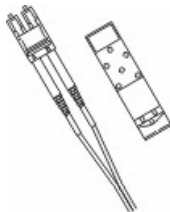
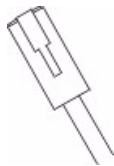
### Basic Hardware

**Table 1 Basic Hardware**

	Item	Included with the Array Module
	<p>Cabinet</p> <ul style="list-style-type: none"> <li>Make sure that your cabinet meets the installation site specifications of the various 6180 storage array components. Refer to the <i>Storage System Site Preparation Guide</i> on the SANtricity ES Storage Manager Installation DVD for more information.</li> <li>Depending on the power supply limitations of your cabinet, you might need to install more than one cabinet to accommodate the different components of the 6180 storage array. Refer to the installation guide for your cabinet for instructions on installing the cabinet.</li> </ul>	
	CSM200 drive module with end caps that are packaged separately.	✓
	Mounting rails and screws	✓
	Fibre Channel switch (optional)	
	iSCSI switch (optional)	
	Host with Fibre Channel or iSCSI host bus adapters (HBAs)	

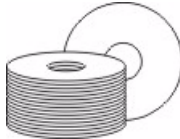
## Cables and Connectors on the 6180 Array Module Configuration

**Table 2 Cables and Connectors**

	Item	Included with the Array Module
	<p>AC power cords</p> <p>The array module ships with power cords for connecting to an external power source, such as a wall plug. Your cabinet might have special power cords that you use instead of the power cords that ship with the array module.</p>	✓
	<p>DC power connector cables (optional)</p> <p>With the DC power option, the array module ships with two or four DC power connector cables (depending on the requirements for redundancy). You use the DC power connector cables to connect to a DC power source.</p> <p><b>NOTE</b> – A two-pole 20-amp circuit breaker is required between the DC power source and the array module.</p>	<p>✓</p> <p>Included only with the DC power option</p>
	<p>Fiber-optic cables</p> <p>Use these cables for connections to the hosts and within the storage array.</p> <p>For the differences between the fiber-optic cables and the copper Fibre Channel (FC) cables, see the "Step 1 – Deciding on the Management Method" topic from <i>Storage Array Installation and Initial Configuration for SANtricity ES Storage Manager Version 10.77</i>, in either the online documentation or from the SANtricity ES Storage Manager Installation DVD.</p>	
	<p>Small Form-factor Pluggable (SFP) transceivers</p> <ul style="list-style-type: none"> <li>■ The SFP transceivers connect fiber-optic cables to host ports and drive ports.</li> <li>■ Four or eight SFP transceivers are included with the array module; one for each of the host channel ports on the controllers.</li> <li>■ Depending on your connection requirements, you might need to purchase additional SFP transceivers (two SFP transceivers for each fiber-optic cable).</li> <li>■ Depending on the configuration of your storage array, you might need to use various combinations of four different types of SFP transceivers: 8-Gb/s Fibre Channel, 4-Gb/s Fibre Channel, 10-Gb/s iSCSI, or 1-Gb/s iSCSI. These SFP transceivers are not generally interchangeable.</li> <li>■ You must purchase <i>only</i> Restriction of Hazardous Substances (RoHS)-compliant SFP transceivers.</li> </ul>	✓
	<p>Copper Fibre Channel cables (optional)</p> <p>Use these cables for connections within the storage array.</p> <p>For the differences between the fiber-optic cables and the copper Fibre Channel cables, see "<a href="#">Small Form-factor Pluggable (SFP) transceiver</a>".</p>	
	<p>Ethernet cable</p> <p>This cable is used for out-of-band storage array management and for 1-Gb/s iSCSI connections.</p> <p>For information about out-of-band storage array management, see the "Step 1 – Deciding on the Management Method" topic from <i>Storage Array Installation and Initial Configuration for SANtricity ES Storage Manager Version 10.75</i>, in either the online documentation or from the SANtricity ES Storage Manager Installation DVD.</p>	




## Product DVDs

**Table 3 Product DVDs**

	Item	Included with the Array Module
	Firmware DVD <ul style="list-style-type: none"> <li>Firmware is already installed on the controllers.</li> <li>The files on the DVD are backup copies.</li> </ul> SANtricity ES Storage Manager Installation DVD <ul style="list-style-type: none"> <li>SANtricity ES Storage Manager software and documentation.</li> <li>To access product documentation, use the documentation map file, <code>doc_launcher.html</code>, which is located in the <code>docs</code> directory.</li> </ul>	✓

## Tools and Other Items

**Table 4 Tools and Other Items**

	Item	Included with the Module
	Labels Help you to identify cable connections and lets you more easily trace cables from one module to another	
	A cart Holds the module and components	
	A mechanical lift (optional)	
	A Phillips screwdriver	
	A flat-blade screwdriver	
	Anti-static protection	
	A flashlight	

Use the Compatibility Matrix, at the following website, to obtain the latest hardware compatibility information.

<http://www.lsi.com/compatibilitymatrix/>



## Things to Know – SFP Transceivers, Fiber-Optic Cables, Copper Cables, and SAS Cables

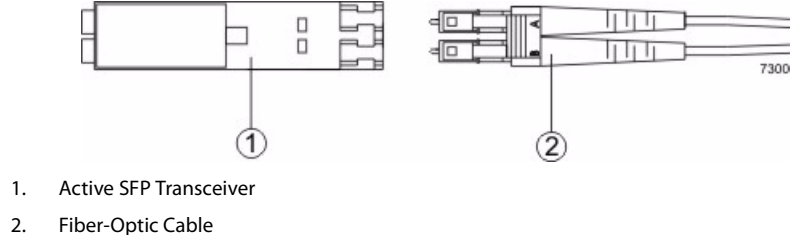
The figures in this topic display the fiber-optic, copper cables, and SFP transceivers.

**NOTE** Your SFP transceivers and cables might look slightly different from the ones shown. The differences do not affect the performance of the SFP transceivers.

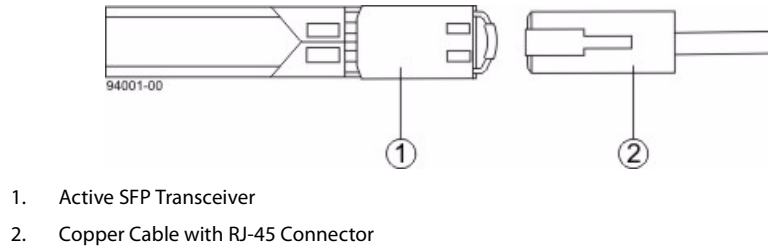
The array module supports SAS, Fibre Channel (FC), and iSCSI host connections and SAS drive connections. FC host connections might operate at 8 Gb/s or at a lower data rate. Ports for 8-Gb/s Fibre Channel host connections require SFP transceivers designed for this data rate. These SFP transceivers look similar to other SFP transceivers but are not compatible with other types of connections. SFP transceivers for 1-Gb/s iSCSI connections and 10-Gb/s iSCSI connections have a different physical interface for the cable and are not compatible with other types of connections.

**WARNING (W03) Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

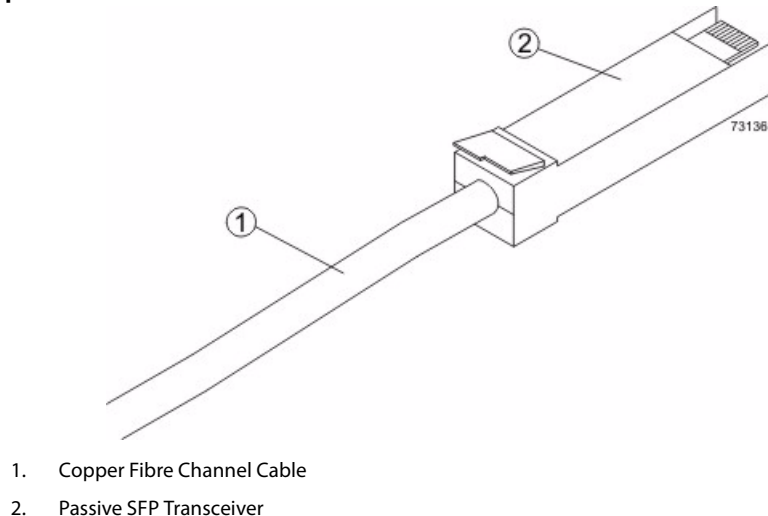
**Figure 1 Fiber-Optic Cable Connection**



**Figure 2 1-Gb/s iSCSI Cable Connection**



**Figure 3 Copper Fibre Channel Cable Connection**

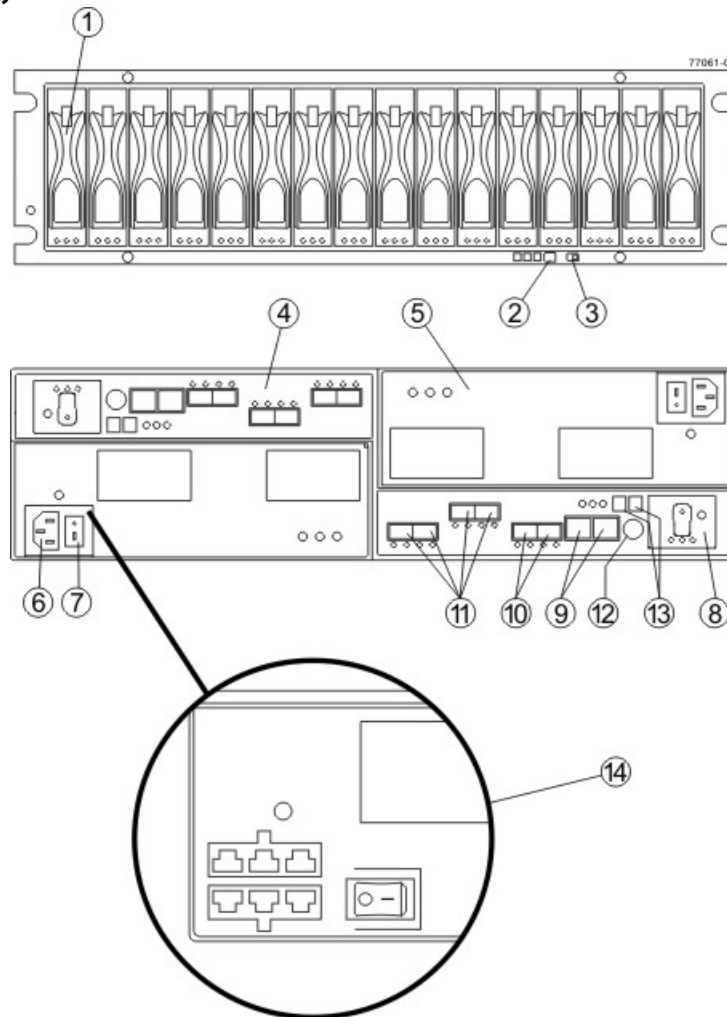


## Things to Know – Taking a Quick Glance at the Hardware

For the 6180 array module:

- The top controller, controller A, is inverted from the bottom controller, controller B.
- The top of the array module is the side with labels.
- The configuration of the host ports might appear different on your system depending on which host interface card configuration is installed.

**Figure 4 6180 Array Module – Front View and Rear View**



1. (Front View) Drive CRU
2. Alarm Mute Switch
3. Link Rate Switch
4. Controller A (Inverted)
5. Power-Fan CRU
6. AC Power Connector
7. AC Power Switch
8. Battery CRU
9. Ethernet Ports
10. Drive Channels

11. Host Channels
12. Serial Port
13. Seven-Segment Display
14. Optional DC Power Connector and DC Power Switch

For the CSM200 drive module:

- The top-left ESM is inverted from the bottom-right ESM.
- The top-right power-fan CRU is inverted from the bottom-left power-fan CRU.
- The drive module is in the correct (top) orientation when the lights of the drives are at the bottom (Figure


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**NOTE** The drive module is available in rackmount models and deskside models. The components for the deskside model are identical to the components of the rackmount model. The deskside model is situated as if the rackmount model is sitting on its left side.


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**NOTE** You must use the current drive CRUs in the drive module to ensure proper performance. Using older or “legacy” drives might damage the connectors. Additionally, the latch might not hold the drive in place, which causes the drive to be disconnected and taken offline. For more information on supported drives, contact a Sun Customer Care Center representative.

---

 **WARNING (W14) Risk of bodily injury** – A qualified service person is required to make the DC power connection according to NEC and CEC guidelines.

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 **CAUTION (C05) Electrical grounding hazard** – This equipment is designed to permit the connection of the DC supply circuit to the earthing conductor at the equipment.

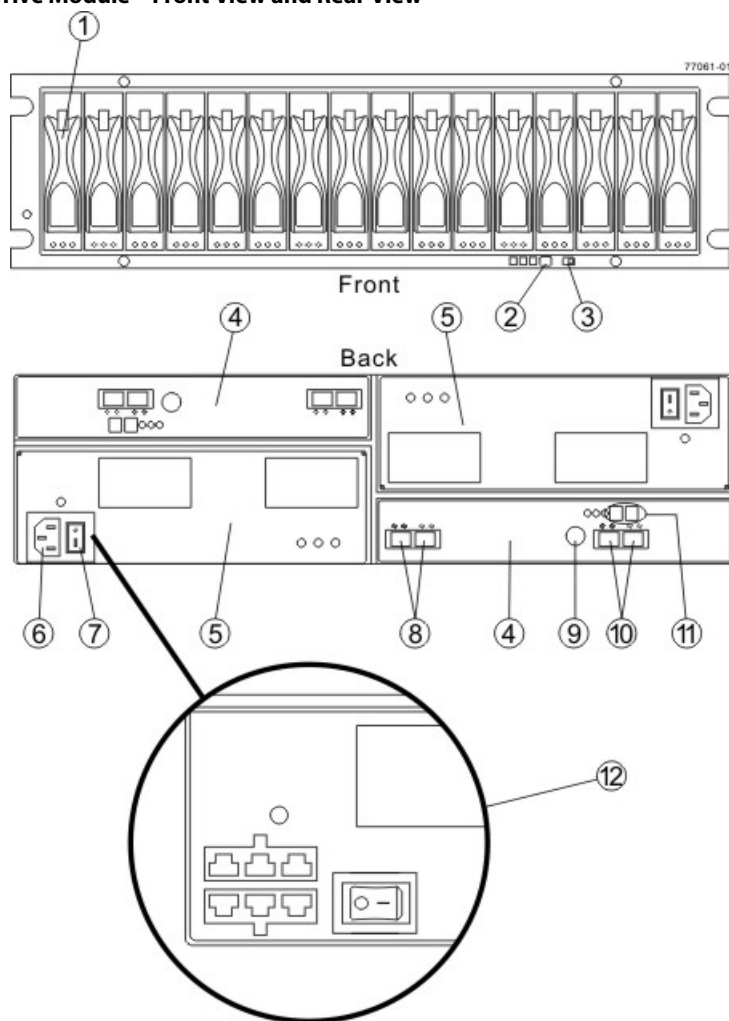
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**ATTENTION Risk of equipment malfunction** – To avoid exceeding the functional and environmental limits, install only drives that have been provided or approved by the original manufacturer. Drives might be shipped but not installed. System integrators, resellers, system administrators, or users can install the drives.

---

**NOTE** Each module in the storage array must have a minimum of two drives for proper operation. If the module has fewer than two drives, a power supply error is reported.

---

**Figure 5 CSM200 Drive Module – Front View and Rear View**

1. Drive CRU
2. Alarm Mute Button
3. Link (Data) Rate Switch (4 Gb/s or 2 Gb/s)
4. ESM CRU
5. Power-Fan CRU
6. AC Power Connector
7. AC Power Switch
8. In/Out Ports
9. Serial Port
10. In/Out Ports (Reserved for future use)
11. Tray ID / Seven-Segment Diagnostic Display
12. (Optional) DC Power Connectors and DC Power Switch

**ATTENTION Possible equipment damage** – You must use the drives in the drive module to ensure proper performance. Using older or “legacy” drives might damage the connectors. Additionally, the latch might not hold the drive in place, which causes the drive to be disconnected and taken offline. For information on supported drives, contact a Customer and Technical Support representative.

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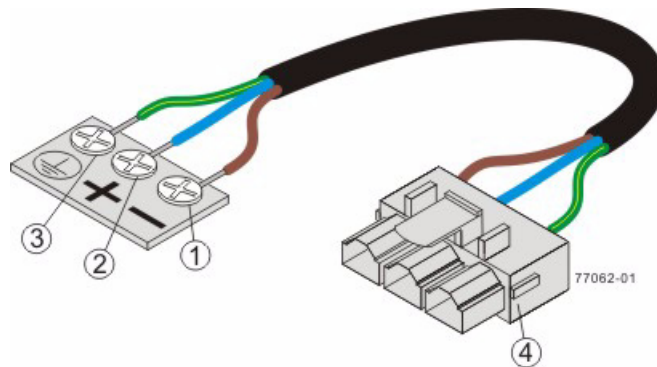
**ATTENTION Risk of equipment malfunction** – To avoid exceeding the functional and environmental limits, install only drives that have been provided or approved by the original manufacturer. Not all array modules are shipped with pre-populated drives. System integrators, resellers, system administrators, or users of the array module can install the drives.

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The following warning applies if you have the DC power option for the array module.

**WARNING (W12) Risk of electrical shock** – This unit has more than one power source. To remove all power from the unit, all DC MAINS must be disconnected by removing all power connectors (item 4 below) from the power supplies.

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1. Supply (Negative), Brown Wire, -48 VDC
2. Return (Positive), Blue Wire
3. Ground, Green/Yellow Wire
4. DC Power Connector

## For Additional Information

Refer to the *Storage System Site Preparation Guide* on the SANtricity ES Storage Manager Installation DVD for information about the installation requirements of the various 6180 storage array components.



## Step 2 – Installing and Configuring the Switches

### Things to Know – Switches

**NOTE** Most of the switches, as shipped from the vendor, require an update to their firmware to work correctly with the storage array.

Depending on the configuration of your storage array, you might use Fibre Channel switches and iSCSI switches.

The switches in the following table are certified for use with a ST2500 M2 storage array, a CDE2600-60 storage array, a 6180 storage array, and a 6580/6780 storage array, which all use SANtricity ES Storage Manager Version 10.77.

**Table 5 Supported Switches**

Vendor	Model	Fibre Channel	iSCSI	SAS
Brocade	200E	Yes	No	No
	3200	Yes	No	No
	3800	Yes	No	No
	3900	Yes	No	No
	3950	Yes	No	No
	12000	Yes	No	No
	3850	Yes	No	No
	3250	Yes	No	No
	24000	Yes	No	No
	4100	Yes	No	No
	48000	Yes	No	No
	5000	Yes	No	No
	300	Yes	No	No
	5100	Yes	No	No
	5300	Yes	No	No
	7500	Yes	No	No
	7800	Yes	No	No
	DCX	Yes	No	No
	FCOE	No	Yes	No

Vendor	Model	Fibre Channel	iSCSI	SAS
Cisco	9506	Yes	No	No
	9509	Yes	No	No
	9216	Yes	No	No
	9216i	Yes	No	No
	9120	Yes	No	No
	914x	Yes	No	No
	9513	Yes	No	No
	9020	Yes	No	No
	MDS9000	Yes	No	No
	9222i	Yes	No	No
	9134	Yes	No	No
	Catalyst 2960	No	Yes	No
	Catalyst 3560	No	Yes	No
	Catalyst 3750G-24TS	No	Yes	No
LSI	6160	No	No	Yes
McData	3232	Yes	No	No
	3216	Yes	No	No
	4300	Yes	No	No
	4500	Yes	No	No
	6064	Yes	No	No
	6140	Yes	No	No
	4400	Yes	No	No
	4700	Yes	No	No
QLogic	6140	No	Yes	No
	6142	No	Yes	No
	SANbox2-8	Yes	No	No
	SANbox2-16	Yes	No	No
	SANbox5200	Yes	No	No
	SANbox3600	Yes	No	No
	SANbox3800	Yes	No	No
	SANbox5208	Yes	No	No
	SANbox5600	Yes	No	No
	SANbox5800	Yes	No	No
	SANbox9000	Yes	No	No
PowerConnect	5324	No	Yes	No
	6024	No	Yes	No

If required, make the appropriate configuration changes for *each* switch that is connected to the storage array.

Refer to the switch's documentation for information about how to install the switch and how to use the configuration utilities that are supplied with the switch.



## Procedure – Installing and Configuring Switches

1. Install your switch according to the vendor's documentation.
2. Use the Compatibility Matrix at the website <http://www.lsi.com/compatibilitymatrix/> to obtain this information:
  - The latest hardware compatibility information
  - The models of the switches that are supported
  - The firmware requirements and the software requirements for the switches
3. Update the switch's firmware by accessing it from the applicable switch vendor's website.  
This update might require that you cycle power to the switch.
4. Find your switch in the following table to see whether you need to make further configuration changes. Use your switch's configuration utility to make the changes.

**Table 6 Supported Switch Vendors and Required Configuration Changes**

Switch Vendor	Configuration Changes Required?	Next Step
Brocade	Yes Change the In-Order Delivery (IOD) option to ON.	Make the change, and go to <a href="#">Step 3 – Installing the Host Bus Adapters for the 6180 Array Module Configuration</a> .
Cisco	Yes Change the In-Order Delivery (IOD) option to ON.	Make the change, and go to <a href="#">Step 3 – Installing the Host Bus Adapters for the 6180 Array Module Configuration</a> .
McData	No	<a href="#">Step 3 – Installing the Host Bus Adapters for the 6180 Array Module Configuration</a> .
QLogic	No	<a href="#">Step 3 – Installing the Host Bus Adapters for the 6180 Array Module Configuration</a> .
PowerConnect	No	<a href="#">Step 3 – Installing the Host Bus Adapters for the 6180 Array Module Configuration</a> .

## Step 3 – Installing the Host Bus Adapters for the 6180 Array Module Configuration

### Key Terms

#### HBA host port

The physical and electrical interface on the host bus adapter (HBA) that provides for the connection between the host and the controller. Most HBAs will have either one or two host ports. The HBA has a unique World Wide Identifier (WWID) and each HBA host port has a unique WWID.

#### HBA host port world wide name

A 16-character unique name that is provided for each port on the host bus adapter (HBA).

#### host bus adapter (HBA)

A physical board that resides in the host. The HBA provides for data transfer between the host and the controllers in the storage array over the I/O host interface. Each HBA contains one or more physical ports.

### Things to Know – Host Bus Adapters and Ethernet Network Interface Cards

- The ST2500 M2 array module supports dual 6-Gb/s SAS host connections and optional host interface cards (HICs) for dual 6-Gb/s SAS, four 1-Gb/s iSCSI, two 10-Gb iSCSI, and four 8-Gb/s FC connections. The connections on a host must match the type (SAS HBAs for SAS, FC HBAs for FC, or iSCSI HBAs or Ethernet network interface cards [NICs] for iSCSI) of the HICs to which you connect them. For the best performance, HBAs for SAS and FC connections should support the highest data rate supported by the HICs to which they connect.
- For maximum hardware redundancy, you must install a minimum of two HBAs (for either SAS or FC host connections) or two NICs or iSCSI HBAs (for iSCSI host connections) in each host. Using both ports of a dual-port HBA or a dual-port NIC provides two paths to the storage array but does not ensure redundancy if an HBA or a NIC fails.

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**NOTE** You can use the Compatibility Matrix to obtain information about the supported models of the HBAs and their requirements. Go to <http://www.lsi.com/compatibilitymatrix/>, and select the desired Developer Partner Program link. Check its Compatibility Matrix to make sure you have an acceptable configuration.

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- Most of the HBAs, as shipped from the vendor, require updated firmware and software drivers to work correctly with the storage array. For information about the updates, refer to the website of the HBA vendor.

## Procedure – Installing Host Bus Adapters

1. Go to <http://www.lsi.com/compatibilitymatrix/>, and select the desired Developer Partner Program link. Check its Compatibility Matrix to make sure you have an acceptable configuration.

The Compatibility Matrix provides this information:

- The latest hardware compatibility information
- The models of the HBAs that are supported
- The firmware requirements and the software requirements for the HBAs

2. Install your HBA according to the vendor documentation.

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**NOTE** If your operating system is Windows Server 2008 Server Core, you might have additional installation requirements. Refer to the Microsoft Developers Network (MSDN) for more information about Windows Server 2008 Server Core. You can access these resources from [www.microsoft.com](http://www.microsoft.com).

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3. Install the latest version of the firmware for the HBA. You can find the latest version of the firmware for the HBA at the HBA vendor website.

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**NOTE** The remaining steps are general steps to obtain the HBA host port World Wide Name from the HBA BIOS utility. If you have installed the host context agent on all of your hosts, you do not need to perform these steps. If you are performing these steps, the actual prompts and screens vary depending on the vendor that provides the HBA. Also, some HBAs have software utilities that you can use to obtain the world wide name for the port instead of using the BIOS utility.

---

4. Reboot or start your host.
5. While your host is booting, look for the prompt to access the HBA BIOS utility.
6. Select each HBA to view its HBA host port world wide name.
7. Record the following information for each host and for each HBA connected to the storage array:
  - The name of each host
  - The HBAs in each host
  - The HBA host port world wide name of each port on the HBA

The following table shows examples of the host and HBA information that you must record.

**Table 7 Examples of HBA Host Port World Wide Names**

Host Name	Associated HBAs	HBA Host Port World Wide Name
ICTENGINEERING	Vendor x, Model y (dual port)	37:38:39:30:31:32:33:32
		37:38:39:30:31:32:33:33
	Vendor a, Model y (dual port)	42:38:39:30:31:32:33:42
		42:38:39:30:31:32:33:44
ICTFINANCE	Vendor a, Model b (single port)	57:38:39:30:31:32:33:52
	Vendor x, Model b (single port)	57:38:39:30:31:32:33:53

## Step 4 – Installing the 6180 Array Module

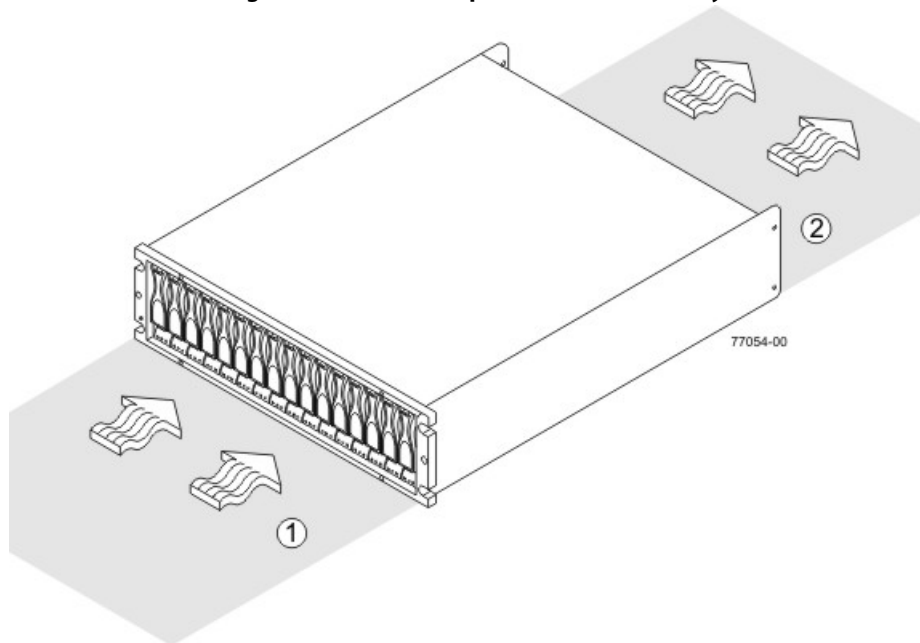
### Things to Know – General Installation

The power supplies meet standard voltage requirements for both domestic and worldwide operation.

**NOTE** Make sure that the combined power requirements of your modules do not exceed the power capacity of your cabinet.

### Procedure – Installing the 6180 Array Module

Figure 6 Airflow Direction Through and Clearance Requirements for the Array Module



1. 76-cm (30-in.) clearance in front of the cabinet
2. 61-cm (24-in.) clearance behind the cabinet

**WARNING (W09) Risk of bodily injury –**



>35 kg (70.5 lbs)

**WARNING** Three persons are required to safely lift the component.

1. Make sure that the cabinet is in the final location. Make sure that the cabinet installation site meets the clearance requirements.
2. Lower the feet on the cabinet, if required, to keep it from moving.

3. Install the mounting rails in the cabinet. For more information, refer to the installation instructions that are included with your mounting rails.
  - If you are installing the mounting rails above an existing module, position the mounting rails directly above the module.
  - If you are installing the mounting rails below an existing module, allow 17.8-cm (7.00-in.) clearance below the existing module.

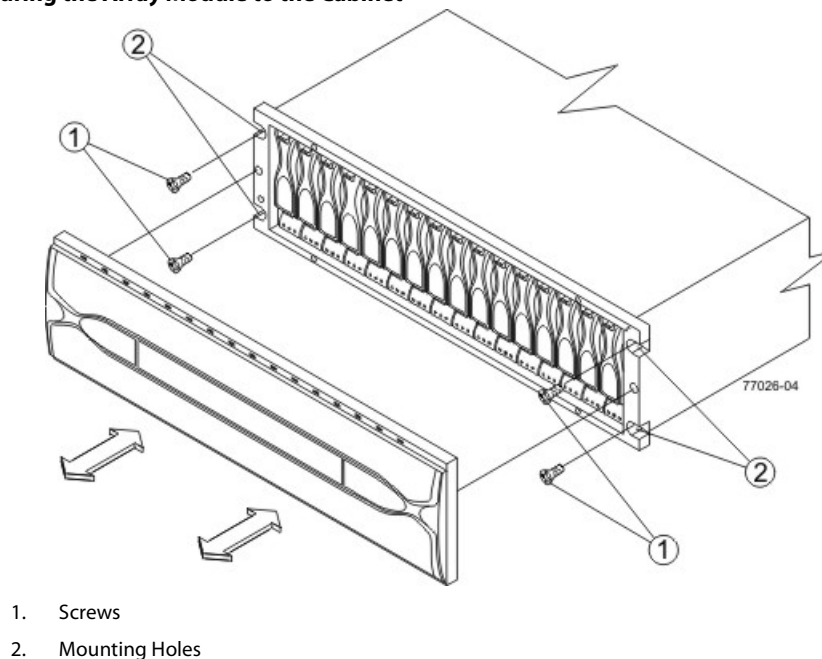
**ATTENTION Risk of equipment malfunction** – To avoid exceeding the functional and environmental limits, install only drives that have been provided or approved by the original manufacturer. Not all array modules are shipped with pre-populated drives. System integrators, resellers, system administrators, or users of the array module can install the drives.

**NOTE** Make sure that you place the array module in the middle portion of the cabinet while allowing room for drive modules to be placed above and below the array module. As you add drive modules, position them below and above the array module, alternating so that the cabinet does not become top heavy.

4. With the help of two other persons, slide the rear of the array module onto the mounting rails. Make sure that the top mounting holes on the array module align with the mounting rail holes of the cabinet.

The rear of the array module slides into the slots on the mounting rails.

**Figure 7 Securing the Array Module to the Cabinet**



**NOTE** The rear of the array module contains two controllers. The top of the array module is the side with the labels.

5. Secure screws in the top mounting holes and the bottom mounting holes on each side of the array module.
6. Secure the back or the of the array module to the cabinet by using two screws to attach the flanges on each side at the back of the array module to the support rails.
7. Install the bezel on the front of the array module.
8. Install the drive modules. See [Step 6 – Installing the Drive Modules for the 6180 Array Module Configurations](#).

## Step 5 – Connecting the 6180 Array Module to the Hosts

### Key Terms

#### direct topology

A topology that does not use a switch.

#### switch topology

A topology that uses a switch.

#### topology

The logical layout of the components of a computer system or network and their interconnections. Topology deals with questions of what components are directly connected to other components from the standpoint of being able to communicate. It does not deal with questions of physical location of components or interconnecting cables. (*The Dictionary of Storage Networking Terminology*)

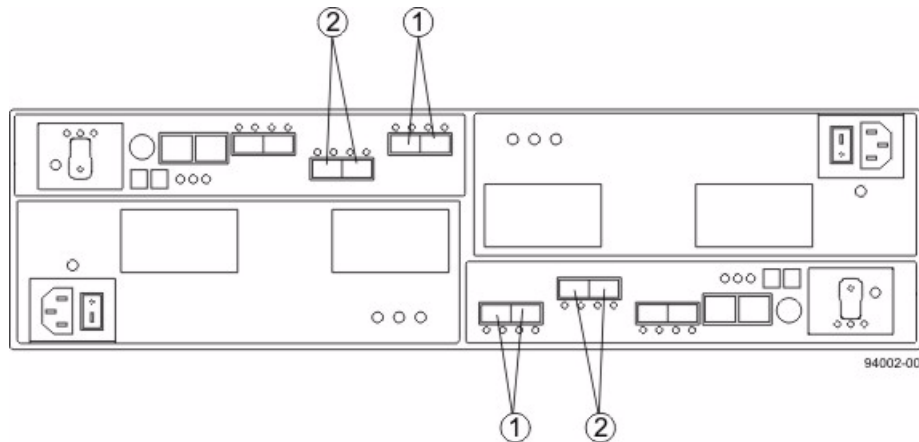
### Things to Know – Host Channels

---

**ATTENTION Possible hardware damage** – To prevent electrostatic discharge damage to the module, use proper antistatic protection when you handle module components.

---

- Each controller has two or four host ports.
- Two of the host ports are standard and support 8-Gb/s, 4-Gb/s or 2 Gb/s Fibre Channel (FC) data rates. The data rate will auto-negotiate to the highest value supported by the host.
- Two of the host ports are optional, and, if present, are located on a replaceable host interface card (HIC). Two different types of HICs are supported. One option has two FC host ports with the same specifications as the standard host ports. The second option has two iSCSI host ports. The iSCSI host ports can be used for 10-Gb/s connections or 1-Gb/s connections. The data rate for the iSCSI ports must be set manually, and each data rate requires a different type of SFP transceiver.
- Labeling on the face plate of the HIC identifies the type of connection: FC or iSCSI. If no HIC is installed, a blank face plate covers the location for the HIC.
- Controller A is inverted from controller B, which means that its host channels are upside-down.

**Figure 8 Host Channels on the Controllers – Rear View**

1. Standard Host Channels
2. Optional Host Channels

**WARNING (W03) Risk of exposure to laser radiation** – Do not disassemble or remove any part of a Small Form-factor Pluggable (SFP) transceiver because you might be exposed to laser radiation.

## Procedure – Connecting Host Cables

**NOTE** Make sure that you have installed your HBAs. Refer to the documentation for your HBAs for information about how to install the HBA and how to use the supplied configuration utilities.

The type of HICs, Fibre Channel (FC) or iSCSI, must match the type of the host bus adapters (HBAs) to which you connect them. If you are mixing FC host connections and iSCSI host connections, each host connection of a redundant pair must connect to the same type of host port, one on controller A and one on controller B.

Fiber-optic connections for 8-Gb/s FC require special SFP transceivers that support the higher data rate. Similarly, 10-Gb/s fiber-optic iSCSI connections require special SFP transceivers. 10-Gb/s iSCSI connections require both special SFP transceivers and Ethernet cables. SFP transceivers installed in the controller, the host, and, optionally, the switch must all support the same data rate to achieve the best performance.

If you are using iSCSI with a fabric topology, the iSCSI connections might require a different type of switch from the FC connections.

Refer to the figures just below for example cabling patterns.

1. Make sure that the appropriate type of SFP transceiver is inserted into the host channel.
2. If a black, plastic plug is in the SFP transceiver, remove it.
3. Starting with the first host channel of each controller, plug one end of the cable into the SFP transceiver in the host channel.  
The cable is an Ethernet cable with RJ-45 connectors for 1-Gb/s iSCSI connections, or a fiber-optic cable for all other types of connections.
4. Plug the other end of the cable into an HBA in the host (direct topology) or into a switch (fabric topology).

5. Affix a label to each end of the cable with this information. A label is very important if you need to disconnect cables to service a controller. Include this information on the labels:
  - The host name and the HBA port (for direct topology)
  - The switch name and the port (for fabric topology)
  - The controller ID (for example, controller A)
  - The host channel ID (for example, host channel 1)

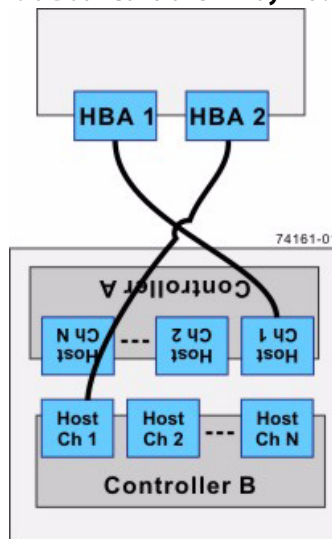
**Example label abbreviation** – Assume that a cable is connected between port 1 in HBA 1 of a host named Engineering and host channel 1 of controller A. A label abbreviation could be as follows.

Heng-HBA1/P1, CtA-Hch1

6. Repeat step 1 through step 5 for each controller and host channel that you intend to use.

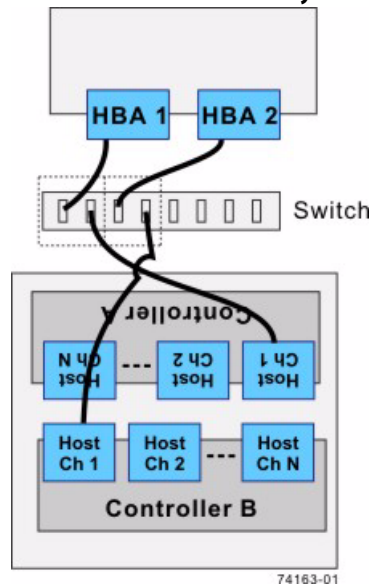
**NOTE** If you do not use a Fibre Channel host port, remove the SFP transceiver. You might be able to use this SFP transceiver in a drive channel port or in an ESM on a drive module.

**Figure 9 Direct Topology – One Host and a Dual-Controller Array Module**

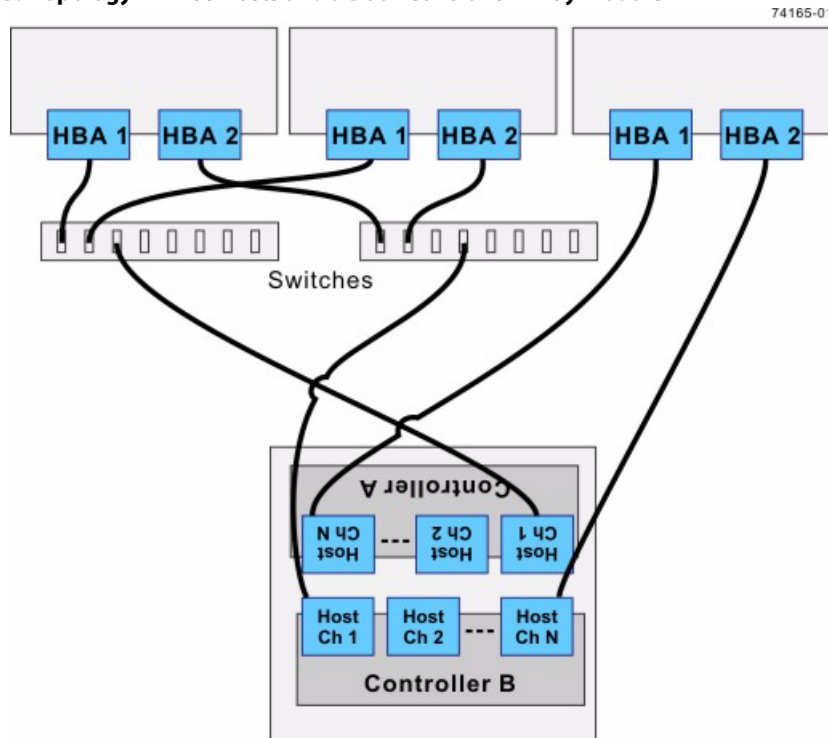


The box on the top in is the host, and the box on the bottom is the array module.



**Figure 10 Fabric Topology – One Host and a Dual-Controller Array Module with a Switch**

The box on the top of the switch is the host, and the box on the bottom is the array module.

**Figure 11 Mixed Topology – Three Hosts and a Dual-Controller Array Module**

The boxes on the top of the switch are the hosts, and the box on the bottom is the array module.

**NOTE** The highest numbered host channel is generally used for Data Replicator Software connections. If Data Replicator Software connections are required, do not connect a host to the highest numbered host channel.

## Step 6 – Installing the Drive Modules for the 6180 Array Module Configurations

### Things to Know – General Installation

**NOTE** If you are installing the drive module in a cabinet with other modules, make sure that the combined power requirements of the drive module and the other modules do not exceed the power capacity of your cabinet.

- Special site preparation is not required for this drive module beyond what is normally found in a computer lab environment.
- The power supplies meet standard voltage requirements for both domestic and worldwide operation.
- If you are installing drive modules and the array module at the same time, take these precautions:
  - Install the array module in a location within the cabinet that lets you evenly distribute the drive modules around the array module.
  - Keep as much weight as possible in the bottom half of the cabinet.

**NOTE** After you install the drive module, you might replace drives or install additional drives. If you replace or add more than one drive without powering down the drive module, install the drives one at a time. Wait 10 seconds after you insert each drive before inserting the next one.

### For Additional Information on Drive Module Installation

Refer to the *Storage System Site Preparation Guide* on the SANtricity ES Storage Manager Installation DVD for important considerations about cabinet installation.

### Procedure – Installing the CSM200 Drive Module

**WARNING** (W09) **Risk of bodily injury** –



>35 kg (70.5 lbs)

**WARNING** Three persons are required to safely lift the component.

**WARNING** (W05) **Risk of bodily injury** – If the bottom half of the cabinet is empty, do not install components in the top half of the cabinet. If the top half of the cabinet is too heavy for the bottom half, the cabinet might fall and cause bodily injury. Always install a component in the lowest available position in the cabinet.

Install the CSM200 drive module into an industry standard cabinet.

This procedure describes how to install the mounting rails into an industry standard cabinet.

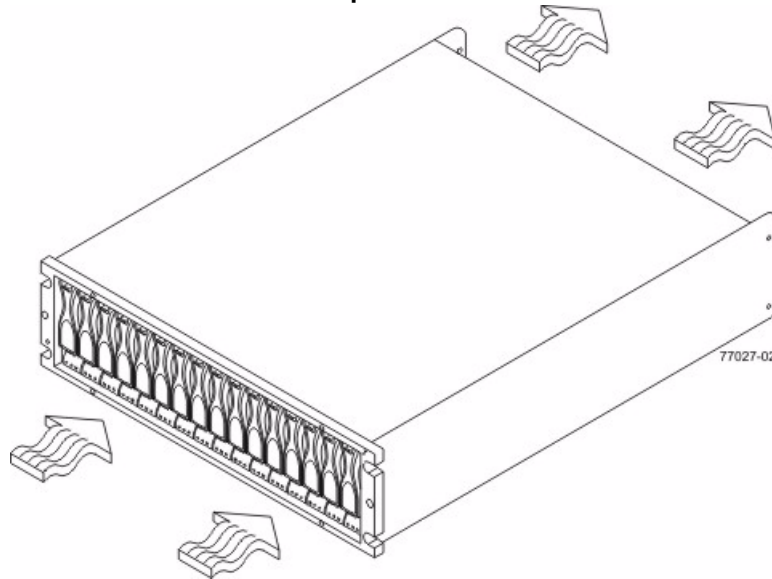
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**ATTENTION Possible hardware damage** – To prevent electrostatic discharge damage to the tray, use proper antistatic protection when handling tray components.

---

1. Make sure that the cabinet is in the final location. Make sure that you meet the clearance requirements shown below.

**Figure 12 Drive Module Airflow and Clearance Requirements**



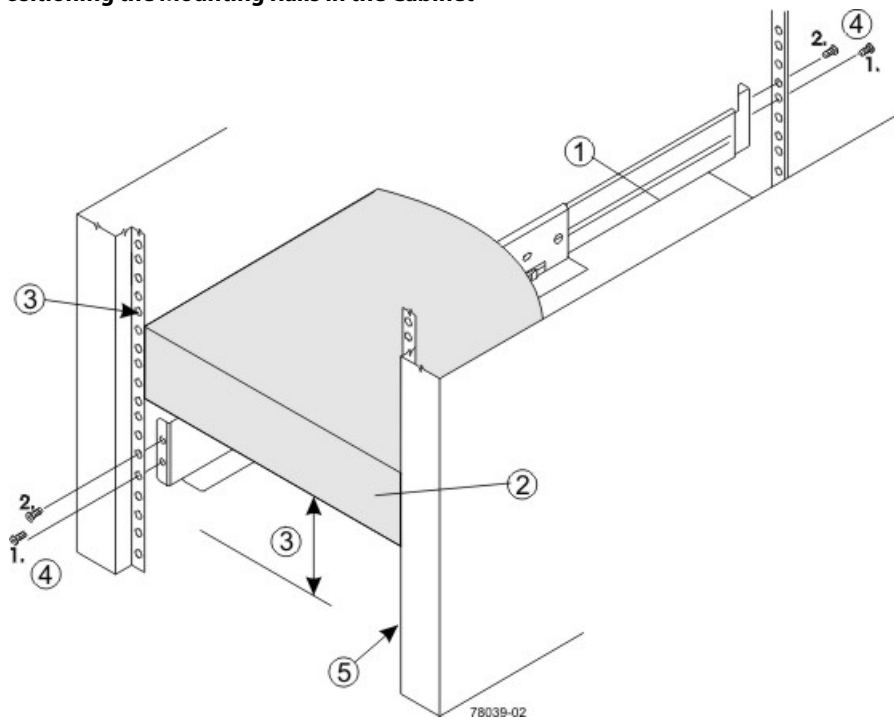
1. 76 cm (30 in.) clearance in front of the cabinet
2. 61 cm (24 in.) clearance behind the cabinet

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**NOTE** Fans pull air through the module from front to rear across the drives.

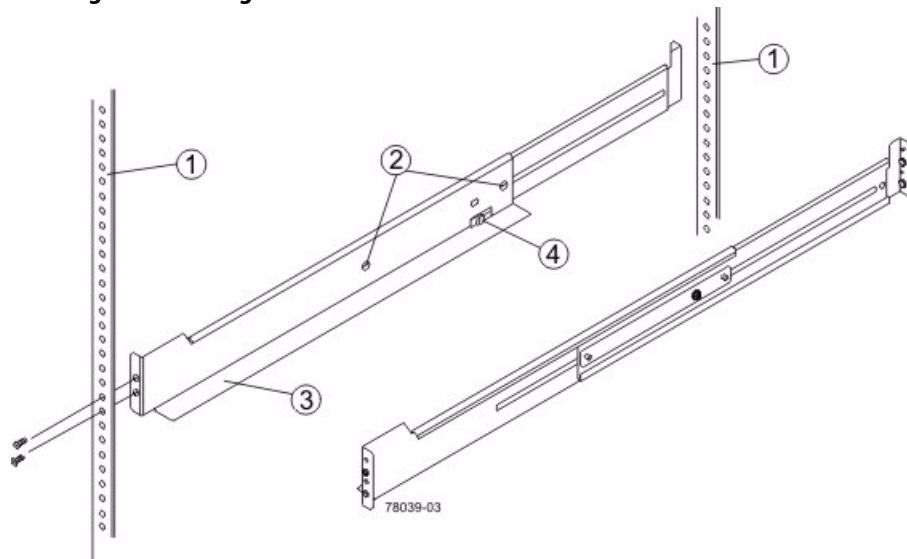
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2. Lower the feet on the cabinet to keep the cabinet from moving.
3. Remove the drive module and all contents from the shipping carton.
4. Position the mounting rails in the cabinet.

**Figure 13 Positioning the Mounting Rails in the Cabinet**

1. Mounting Rail
2. Existing Module
3. Clearance Above and Below the Existing Module
4. Screws for Securing the Mounting Rail to the Cabinet (Front and Rear)
5. Industry Standard Cabinet

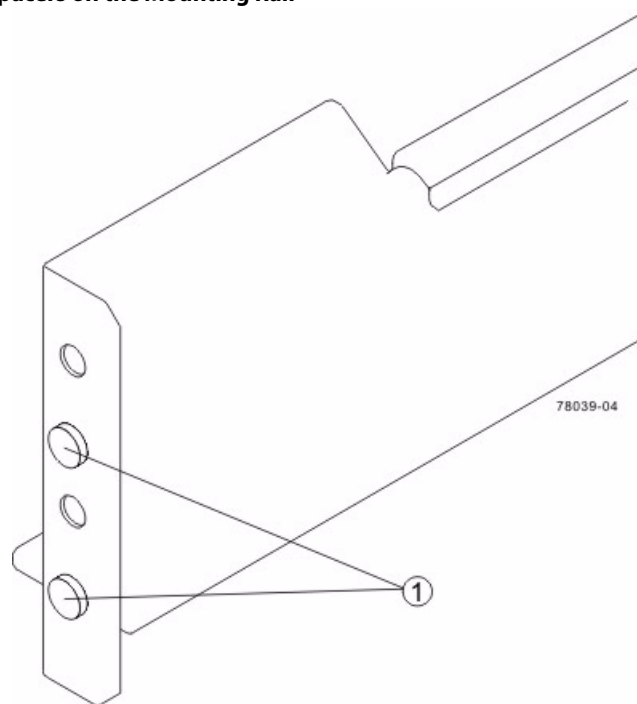
- If you are installing the mounting rails above an existing module, position the mounting rails directly above the module.
  - If you are installing the mounting rails below an existing module, allow 8.8-cm (3.5-in.) vertical clearance for the drive module.
5. Attach the mounting rails to the cabinet by performing these substeps:
    - a. Make sure that the adjustment screws on the mounting rail are loose so that the mounting rail can extend or contract as needed.

**Figure 14 Attaching the Mounting Rails to the Cabinet**

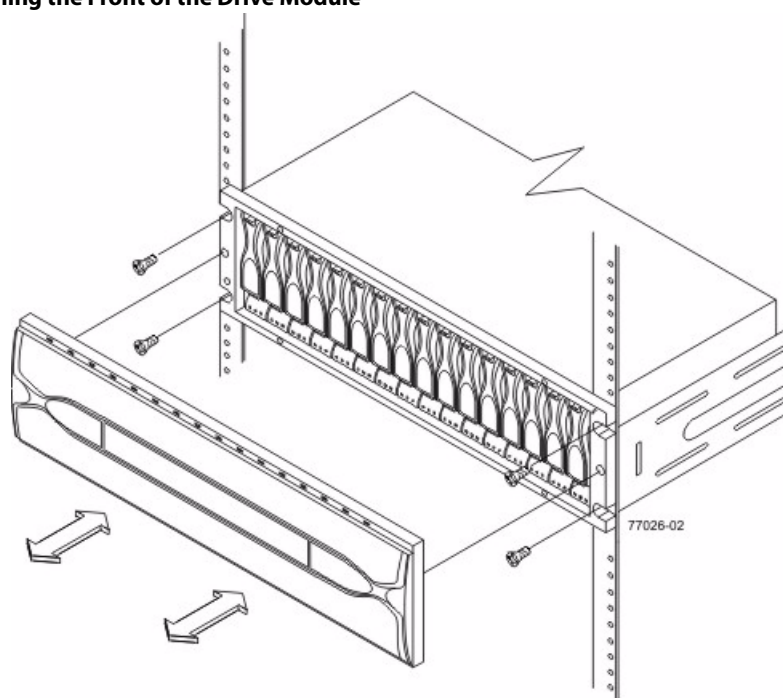
1. Cabinet Mounting Holes
2. Adjustment Screws for Locking the Mounting Rail Length
3. Mounting Rails
4. Clip for Securing the Rear of the Drive Module

- b. Place the mounting rail inside the cabinet, and extend the mounting rail until the flanges on the mounting rail touch the inside of the cabinet.
- c. Make sure that the alignment spacers on the front flange of the mounting rail fit into the mounting holes in the cabinet.

The front flange of each mounting rail has two alignment spacers. The alignment spacers are designed to fit into the mounting holes in the cabinet. The alignment spacers help position and hold the mounting rail.

**Figure 15 Alignment Spacers on the Mounting Rail**

1. Alignment Spacers
  - d. Insert one M5 screw through the front of the cabinet and into the top captured nut in the mounting rail. Tighten the screw.
  - e. Insert two M5 screws through the rear of the cabinet and into the captured nuts in the rear flange in the mounting rail. Tighten the screws.
  - f. Tighten the adjustment screws on the mounting rail.
  - g. Repeat substep a through substep f to install the second mounting rail.
6. With the help of two other persons, slide the rear of the drive module onto the mounting rails. The mounting holes on the front flanges of the drive module align with the mounting holes on the front of the mounting rails.
7. Secure the front of the drive module to the cabinet by using four screws.

**Figure 16 Attaching the Front of the Drive Module**

1. Screws for Securing the Front of the Drive Module

8. Using two screws, attach the flange on each side of the rear of the drive module to the mounting rails.

## Things to Know – Adding Drive Modules to an Existing Storage Array

If you plan to add a new drive module to an existing storage array, select one of the following procedures.

**ATTENTION Potential loss of data access** – If you plan to add a drive module to an existing storage array while the storage array is powered on and receiving data I/O (method 3 below), you must contact a Sun Customer Care Center representative to assist you in adding the drive module.

**NOTE** Drive modules can be powered by either the standard AC power supply or the optional DC power supply (–48 VDC). Before turning off any power switches on a DC-powered drive module, you must disconnect the two-pole 20-amp circuit breaker.

**Table 8 Procedures for Adding a Drive Module to an Existing Storage Array**

Addition Methods	Storage Array Receiving Power?	Storage Array Receiving Data?	Procedure
1 – Power but no I/O activity	Yes	No	
2 – No power and no I/O activity	No	No	
3 – Power and I/O activity	Yes	Yes	Contact a Sun Customer Care Center representative before beginning this procedure.

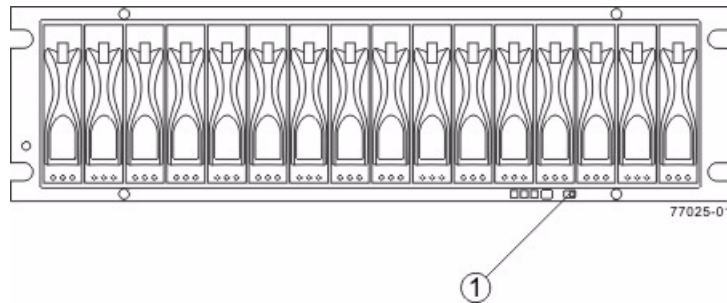
## Things to Know – Link Rate Switch on the CSM200 Drive Module

**NOTE** Change the Link Rate switch only when the power is not turned on to the drive module.

- Use the Link Rate switch to select the data transfer rate between the ESMs, the drives, and the controllers. The Link Rate switch is located on the rear of the drive module on the ESMs.
- All drive modules that are connected to the same drive channel must be set to operate at the same data transfer rate (speed).
- The drives in the drive module must support the selected link rate speed.
- The setting of the Link Rate switch determines the speed of the drives.
- If a drive in the drive module does not support the link rate speed, the drive will show up as a bypassed drive in the storage management software.

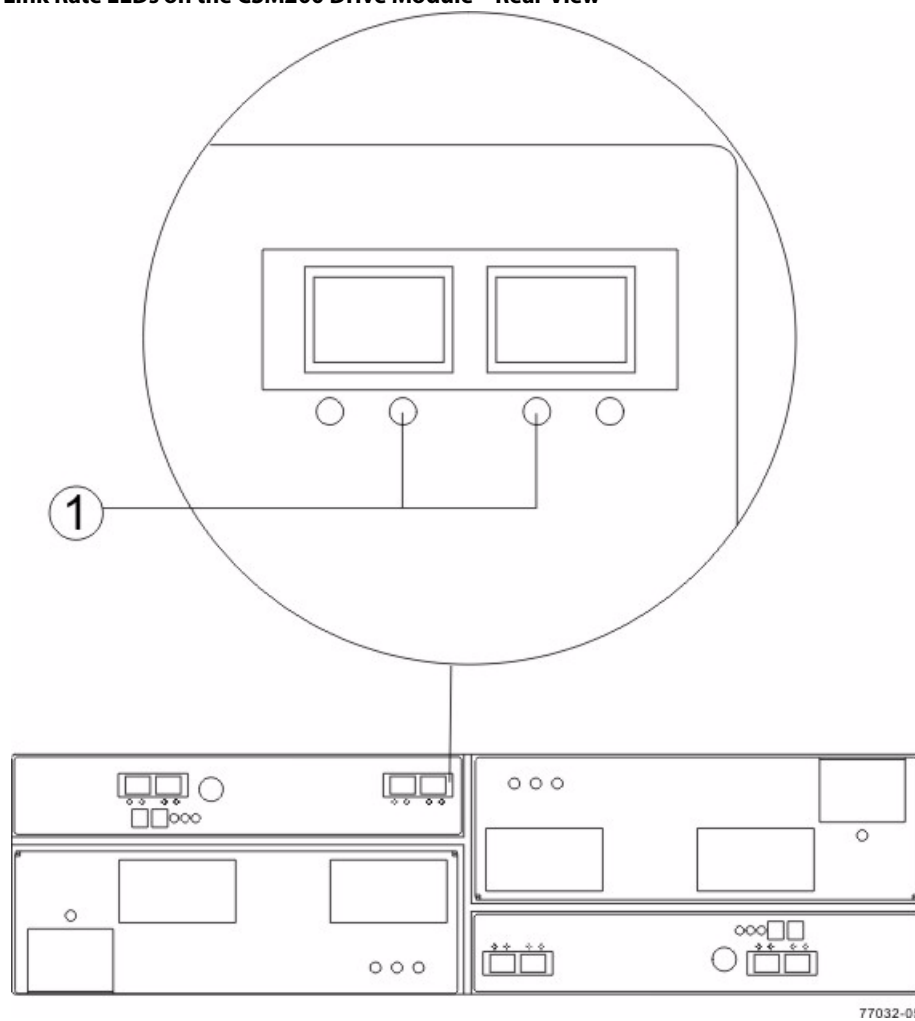
**NOTE** Change the Link Rate switch only when no power is applied to the drive module.

**Figure 17 Setting the Link Rate Switch on the CSM200 Drive Module – Front View**



1. Link Rate Switch (4 Gb/s or 2 Gb/s)



**Figure 18 Link Rate LEDs on the CSM200 Drive Module – Rear View**

1. Link Rate LEDs Right On = 2 Gb/s Left and Right On = 4 Gb/s

77032-05

## Procedure – Setting the Link Rate Switch on the CSM200 Drive Module

1. Check to see if the Link Rate switch is set to the 4-Gb/s data transfer rate.
  - If the link rate is set to 4-Gb/s, you do not need to change the setting.
  - If the link rate is set to 2-Gb/s, go to step 2.
2. Make sure that no power is applied to the drive module.
3. Move the switch to the 4-Gb/s (left) position.

## Step 7 – Connecting the 6180 Array Module to the Drive Modules

**NOTE** The maximum number of drives in a configuration is 112. These numbers include drives in the array module and drives in the drive modules that are attached to the array module.

### Key Terms

#### drive channel

The path for the transfer of data between the controllers and the drives in the storage array.

#### environmental services monitor (ESM)

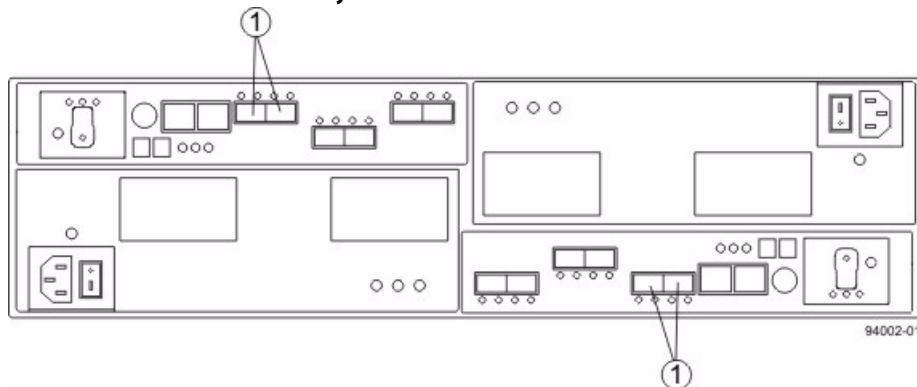
A CRU in the drive module that monitors the status of the components. An ESM also serves as the connection point to transfer data between the drive module and the controller.

### Things to Know – 6180 Array Module

**ATTENTION Possible hardware damage** – To prevent electrostatic discharge damage to the module, use proper antistatic protection when you handle module components.

- The 6180 array module supports CSM200 drive modules for expansion. You cannot connect any other type of drive module to the array module.
- The maximum number of drives in the storage array is 112, including those in the 6180 array module. Some 6180 array module models have a lower limit for the number of drives. You must not exceed the limit for your model. Adding more drive modules makes the storage array invalid. The controllers cannot perform operations that modify the configuration, such as creating new volumes.
- Each controller has one dual-ported drive channel.
- Controller A is inverted from controller B, which means that its drive channels are upside-down.

**Figure 19 Drive Channel Ports on the Array Module – Rear View**



1. Drive Channel Ports

- A array module has two redundant path pairs that are formed using one drive channel of controller A and one drive channel of controller B. See the following table for a list of the numbers of the redundant path pairs and the drive ports of the drive channels from which the redundant path pairs are formed.

**NOTE** To maintain data access in the event of the failure of a controller, an ESM, or a drive channel, you must connect a drive module or a string of drive modules to both drive channels on a redundant path pair.

**Table 9 Redundant Path Pairs on a Array Module**

Drive Ports on Controller A	Drive Channels on Controller A	Drive Ports on Controller B	Drive Channels on Controller B
Port 1	Channel 1	Port 1	Channel 2
Port 2	Channel 1	Port 2	Channel 2

## Procedure – Cabling a Drive Module to a Storage Array with Power but No I/O Activity

The drive module can have either standard power connections to an AC power source or the optional connections to a DC power source (–48 VDC).

1. Make sure that there is no I/O activity to the storage array.
2. Choose one of the following actions based on whether you will connect the drive module with the standard power connections to an AC power source to the optional connections to a DC power source.
  - **Connect to a DC power source** – Perform step 3 through step 6.
  - **Connect to an AC power source** – Perform step 7 through step 11.
3. Disconnect the two-pole 20-amp circuit breaker for the storage array.
4. Make sure that all of the DC power switches on the DC-powered drive module are turned off.
5. Connect the DC power connector cables to the DC power connectors on the rear of the drive module.

**NOTE** The three source wires on the DC power connector cable (–48 VDC) connect the drive module to centralized DC power plant equipment, typically through a bus bar located above the cabinet.

**NOTE** You do not need to connect the second DC power connection on each of the drive module's DC power-fan CRUs. The second DC power connection is for additional redundancy only and may be connected to a second DC power bus.

6. Have a qualified service person connect the other end of the DC power connector cables to the DC power plant equipment as follows:
  - a. Connect the brown –48 VDC supply wire to the negative terminal.
  - b. Connect the blue return wire to the positive terminal.
  - c. Connect the green/yellow ground wire to the ground terminal. You are finished with this procedure.
7. Add the AC-powered drive module to the end of the series of existing drive modules (for cabling details, refer to the *Hardware Cabling Guide* and the related topics online or that document on the SANtricity ES Storage Manager Installation DVD).
8. Make sure that both of the Power switches on the drive module are turned off.
9. Connect the primary AC power cords from the cabinets to the external power source.
10. Connect a cabinet power ladder (or power cords specific to your particular cabinet) to the AC power connector on each power-fan CRU in the drive module.

11. If you are installing other drive modules in the cabinet, connect a power cord to each power-fan CRU in the drive modules.

## Procedure – Cabling a Drive Module to a Storage Array with No Power and No I/O Activity

The drive module can have either standard power connections to an AC power source or the optional connections to a DC power source (–48 VDC).

---

**NOTE** Make sure that you do not turn on power to the drive module until this document instructs you to do so. For the proper procedure for turning on the power, see [Step 10 – Turning on the Power and Checking for Problems in a 6180 Array Module Configuration](#).

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1. Add the drive module to the end of the series of existing drive modules (for cabling details, refer to either the *Hardware Cabling* electronic document topics or the PDF on the SANtricity ES Storage Manager Installation DVD).
2. Choose one of the following actions based on whether you will connect the drive module with the standard power connections to an AC power source to the optional connections to a DC power source.
  - **Connect to a DC power source** – Perform step 3 through step 6.
  - **Connect to an AC power source** – Perform step 7 through step 9.

---

**NOTE** Before turning off any power switches on a DC-powered drive module, you must disconnect the two-pole 20-amp circuit breaker.

---

3. Disconnect the two-pole 20-amp circuit breaker for the storage array.
4. Make sure that all of the DC power switches on the DC-powered drive module are turned off.
5. Connect the DC power connector cables to the DC power connectors on the rear of the drive module.

---

**NOTE** The three source wires on the DC power connector cable (–48 VDC) connect the drive module to centralized DC power plant equipment, typically through a bus bar located above the cabinet.

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**NOTE** You do not need to connect the second DC power connection on each of the drive module's DC power-fan CRUs. The second DC power connection is for additional redundancy only and may be connected to a second DC power bus.

---

6. Have a qualified service person connect the other end of the DC power connector cables to the DC power plant equipment as follows:
  - a. Connect the brown –48 VDC supply wire to the negative terminal.
  - b. Connect the blue return wire to the positive terminal.
  - c. Connect the green/yellow ground wire to the ground terminal.
7. Make sure that both of the Power switches on the drive module are turned off.
8. Connect the primary AC power cords from the cabinets to the external power source.
9. Connect a cabinet power ladder (or power cords specific to your particular cabinet) to the AC power connector on each power-fan CRU in the drive module.
10. If you are installing other drive modules in the cabinet, connect a power cord to each power-fan CRU in the drive modules.

## Step 8 – Connecting the Ethernet Cables

### Key Terms

#### in-band management

A method to manage a storage array in which a storage management station sends commands to the storage array through the host input/output (I/O) connection to the controller.

#### out-of-band management

A method to manage a storage array in which a storage management station sends commands to the storage array through the Ethernet connections on the controller.

### Things to Know – Connecting Ethernet Cables

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**ATTENTION Risk of security breach** – Connect the Ethernet ports on the controller module to a private network segment behind a firewall. If the Ethernet connection is not protected by a firewall, your storage array might be at risk of being accessed from outside of your network.

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- These Ethernet connections are intended for out-of-band management and have nothing to do with the iSCSI host interface cards (HICs), whether 1Gb/s or 10Gb/s.
- Ethernet port 2 on each controller is reserved for access by your Sun Customer Care Center representative.
- In limited situations in which the storage management station is connected directly to the controller module, you must use an Ethernet crossover cable. An Ethernet crossover cable is a special cable that reverses the pin contacts between the two ends of the cable.

### Procedure – Connecting Ethernet Cables

Perform these steps to connect Ethernet cables for out-of-band management. If you use only in-band management, skip these steps.

1. Connect one end of an Ethernet cable into the Ethernet port 1 on controller A.
2. Connect the other end to the applicable network connection.
3. Repeat step 1 through step 2 for controller B.



## Step 9 – Connecting the Power Cords in a 6180 Array Module Configuration

The 6180 array module and the CSM200 drive module can have either standard power connections to an AC power source or the optional connections to a DC power source (–48 VDC).

**NOTE** Make sure that you do not turn on the power to the array module or the connected drive modules until this documentation instructs you to do so. For the correct procedure for turning on the power, see [Step 10 – Turning on the Power and Checking for Problems in a 6180 Array Module Configuration](#).

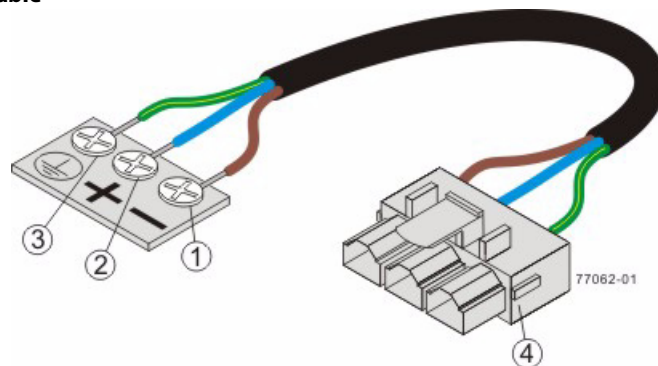
### Things to Know – AC Power Cords

- For each AC power connector on the drive module, make sure that you use a separate power source in the cabinet. Connecting to independent power sources maintains power redundancy.
- To ensure proper cooling and assure availability, the drive modules always use two power supplies.
- You can use the power cords shipped with the drive module with typical outlets used in the destination country, such as a wall receptacle or an uninterruptible power supply (UPS). These power cords, however, are not intended for use in most EIA-compliant cabinets.

### Things to Know – DC Power Cords

If your drive module has the DC power option installed, review the following information.

**Figure 20 DC Power Cable**



1. Supply (negative), brown wire, –48 VDC
  2. Return (positive), blue wire
  3. Ground, green/yellow wire
  4. DC power connector
- Each power-fan CRU has two DC power connectors. Be sure to use a separate power source for each power-fan CRU in the drive module to maintain power redundancy. You may, optionally, connect each DC power connector on the same power-fan CRU to a different source for additional redundancy.
  - A two-pole 30-amp circuit breaker is required between the DC power source and the drive module for over-current and short-circuit protection.



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**WARNING (W14) Risk of bodily injury** – A qualified service person is required to make the DC power connection according to NEC and CEC guidelines.

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## Procedure – Connecting AC Power Cords

1. Make sure that the circuit breakers in the cabinet are turned off.
2. Make sure that both of the Power switches on the drive modules are turned off.
3. Connect the primary power cords from the cabinet to the external power source.
4. Connect a cabinet interconnect power cord (or power cords specific to your particular cabinet) to the AC power connector on each power CRU in the drive module.
5. If you are installing other drive modules in the cabinet, connect a power cord to each power CRU in the drive modules.

## Procedure – Connecting DC Power Cords



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**WARNING (W14) Risk of bodily injury** – A qualified service person is required to make the DC power connection according to NEC and CEC guidelines.

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**NOTE** Make sure that you do not turn on power to the drive module until this guide instructs you to do so. For the proper procedure for turning on the power, see “Turning on the Power”.

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**NOTE** Before turning off any power switches on a DC-powered drive module, you must disconnect the two-pole 20-amp circuit breaker.

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1. Disconnect the two-pole 20-amp circuit breaker for the storage array.
2. Make sure that all of the DC power switches on the DC-powered drive module are turned off.
3. Connect the DC power connector cables to the DC power connectors on the rear of the controller module or array module, and drive modules.

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**NOTE** The three source wires on the DC power connector cable (–48 VDC) connect the drive module to centralized DC power plant equipment, typically through a bus bar located above the cabinet.

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**NOTE** It is not mandatory that the second DC power connection on each of the drive module’s DC power-fan CRUs be connected. The second DC power connection is for additional redundancy only and may be connected to a second DC power bus.

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4. Have a qualified service person connect the other end of the DC power connector cables to the DC power plant equipment as follows:
  - a. Connect the brown –48 VDC supply wire to the negative terminal.
  - b. Connect the blue return wire to the positive terminal.
  - c. Connect the green/yellow ground wire to the ground terminal.



## Step 10 – Turning on the Power and Checking for Problems in a 6180 Array Module Configuration

Once you complete this task, you can install the begin to install the software and perform basic configuration tasks on your storage array. Continue with the *Initial Configuration and Software Installation* in these electronic document topics or through the PDF that is available on the SANtricity ES Storage Manager Installation DVD.

### Procedure – Turning On the Power to the Storage Array and Checking for Problems in a 6180 Array Module Configuration

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**NOTE** You must turn on the power to all of the connected drive modules before you turn on the power for the array module. Performing this action makes sure that the controllers recognize each attached drive module.

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**NOTE** While the power is being applied to the modules, the LEDs on the front and the rear of the modules come on and go off intermittently.

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1. Turn on both Power switches on each drive module that is attached to the array module. Depending on your configuration, it can take several minutes for each drive module to complete the power-on process.
- 











**NOTE** Before you go to step 2, check the LEDs on the drive modules to verify that the power was successfully applied to all of the drive modules. Wait 30 seconds after turning on the power to the drive modules before turning on the power to the array module.






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2. Turn on both Power switches on the rear of the array module. Depending on your configuration, it can take several minutes for the array module to complete the power-on process.
3. Check the LEDs on the front and the rear of the array module and the attached drive modules.
4. If you see any amber LEDs, make a note of their location.

## Things to Know – LEDs on the Array Module

**Table 10 LEDs on the Array Module**

LED	Symbol	Location (CRUs)	Function
Power		Power-fan Interconnect-battery	<ul style="list-style-type: none"> <li>On – The CRU has power.</li> <li>Off – The CRU does not have power.</li> </ul> <p><b>NOTE</b> – The controller CRUs do not have a Power LED. They receive their power from the power supplies inside the power-fan CRUs.</p>
Battery Charging		Battery	<ul style="list-style-type: none"> <li>On – The battery is charged and ready.</li> <li>Off – There is a battery fault or the battery has discharged.</li> <li>Blinking – The battery is charging.</li> </ul>
Service Action Allowed		Drive (left light, no symbol) Power-fan Controller Battery	On – You can remove the CRU safely.
Service Action Required (Fault)		Front frame Drive (middle light, no symbol) Power-fan Controller Battery	On – A problem exists with the CRU.
Locate		Front frame	On – This LED assists in locating the module.
Host Channel Speed		Controller	<p>The speed of the host channel is indicated:</p> <ul style="list-style-type: none"> <li>Left LED on – 2 Gb/s</li> <li>Right LED on – 4 Gb/s</li> <li>Left LED and right LED on – 8 Gb/s</li> </ul>
Host Channel Connection (iSCSI)		Controller	<p>The status of the host channel is indicated:</p> <ul style="list-style-type: none"> <li>"L" LED on – A link is established.</li> <li>"A" LED on – Activity (data transfer) is present.</li> </ul>
Drive Port Bypass		Controller	On – A bypassed port is indicated.
Drive Channel Speed		Controller	<p>The speed of the drive channel is indicated:</p> <ul style="list-style-type: none"> <li>Right LED on – 2 Gb/s</li> <li>Left LED and right LED on – 4 Gb/s</li> </ul>
Cache Active		Controller	<p>The activity of the cache is indicated:</p> <ul style="list-style-type: none"> <li>Blinking – Data is in the cache.</li> <li>Off – No data is in the cache.</li> </ul>

LED	Symbol	Location (CRUs)	Function
Seven Segment ID Numeric Display and Diagnostic Display		Controller	The module ID or a diagnostic code is indicated. For more information, refer to the table below on Seven Segment Diagnostic Display codes. For example, if some of the cache memory dual in-line memory modules (DIMMs) are missing in a controller, error code L8 appears in the diagnostic display.
AC power		Power-fan <b>NOTE</b> – The LED is directly above or below the AC power switch and the AC power connector.	Indicates that the power supply is receiving AC power input.
DC power		Power-fan <b>NOTE</b> – The LED is directly above or below the DC power switch and the DC power connector.	Indicates that the power supply is receiving DC power input.
Direct Current Enabled		Power-fan	Indicates that the power supply is outputting DC power.
Ethernet Speed and Ethernet Activity		Controller	The speed of the Ethernet ports and whether a link has been established are indicated: <ul style="list-style-type: none"> <li>■ Left LED on – 1000BASE-T speed.</li> <li>■ Left LED off – 100BASE-T or 10BASE-T speed.</li> <li>■ Right LED on – A link is established.</li> <li>■ Right LED off – No link exists.</li> <li>■ Right LED blinking – Activity is occurring.</li> </ul>






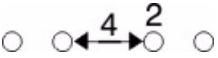



**Table 11 Supported Diagnostic Codes**

Diagnostic Code	Description
L0	The controller types are mismatched.
L1	The interconnect-battery CRU is missing.
L2	A persistent memory error has occurred.
L3	A persistent hardware error has occurred.
L4	A persistent data protection error has occurred.
L5	The auto-code synchronization (ACS) has failed.
L6	An unsupported host interface card is installed.
L7	The sub-model identifier is not set or is mismatched.
L8	A memory configuration error has occurred.
L9	A link speed mismatch has occurred.
LA	Reserved
Lb	A host card configuration error has occurred.
LC	A persistent cache backup configuration error has occurred.
Ld	Mixed cache memory DIMMs are present.

Diagnostic Code	Description
LE	Uncertified cache memory DIMM sizes exist.
LF	Lockdown with limited SYMBOL support exists.
LH	A controller firmware mismatch has occurred.

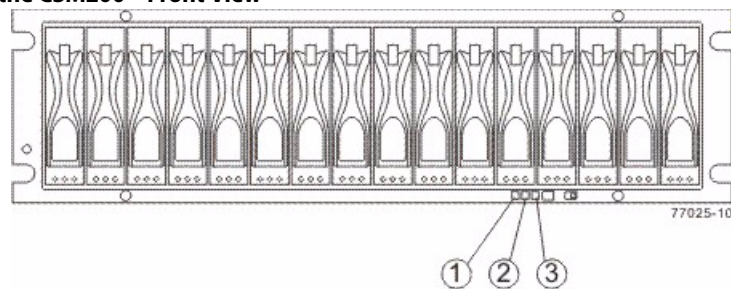
## General Behavior of the LEDs on the Drive Modules

**Table 12 LED Symbols and General Behavior on the Drive Modules**

LED	Symbol	Location	General Behavior
Power		Drive module ESM CRU Power-fan CRU	<b>On</b> – Power is applied to the drive module or the CRU. <b>Off</b> – Power is not applied to the drive module or the CRU.
Service Action Allowed		ESM CRU Power-fan CRU Drive	<b>On</b> – It is safe to remove the ESM CRU, the power-fan CRU, or the drive. <b>Off</b> – Do not remove the ESM CRU, the power-fan CRU, or the drive. The drive has an LED but no symbol.
Service Action Required (Fault)		ESM CRU Power-fan CRU Drive	<b>On</b> – When the drive module LED is on, a component within the drive module needs attention. <b>On</b> – The ESM CRU, the power-fan CRU, or the drive needs attention. <b>Off</b> – The ESM CRU, the power-fan CRU, and the drive are operating normally. The drive has an LED but no symbol.
Locate		Front bezel on the drive module	<b>On or blinking</b> – Indicates the drive module that you are trying to find.
Drive Port Bypass		ESM CRU	Indicates if a port has been bypassed.
Drive Channel Speed		ESM CRU	Indicates the speed of the drive channel: If the right LED is <b>On</b> -- 2 Gb/s If both LED are <b>Off</b> -- 4 Gb/s
AC Power		ESM CRU Power-fan CRU <b>Note</b> LED is directly above or below AC Power Switch and AC Power Connectors	<b>On</b> – AC power is present. <b>Off</b> – AC power is not present.
DC Power (optional)		Power-fan CRU <b>Note</b> LED is directly above or below DC Power Switch and DC Power Connectors	<b>On</b> – Regulated DC power from the power CRU and the fan CRU is present. <b>Off</b> – Regulated DC power from the power-fan CRU is not present.
DC Power		Power-fan CRU	Indicates the power supply is outputting DC power

## LEDs on the CSM200 Drive Module

**Figure 21 LEDs on the CSM200 – Front View**

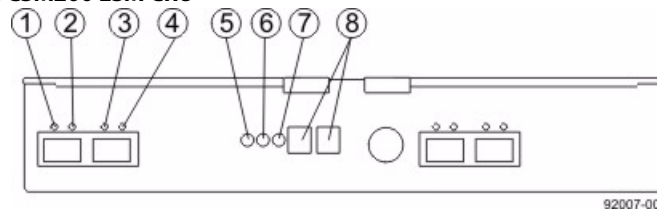


1. Drive Module Locate LED
2. Drive Module Service Action Required LED
3. Power LED

**Table 13 LEDs on the CSM200 Left End Cap**

Location	LED	Color	On	Off
1	Drive Module Locate	White	Identifies a drive module that you are trying to find.	Normal status.
2	Service Action Required	Amber	A component within the drive module needs attention.	Normal status.
3	Power	Green	Power is present.	Power is not present.

**Figure 22 LEDs on the CSM200 ESM CRU**

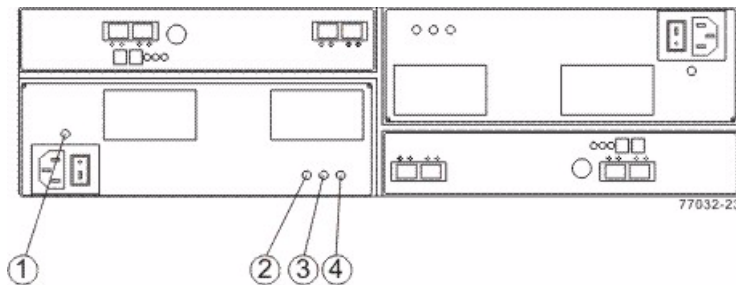


1. ESM Link Fault LED (Port 1A Bypass)
2. ESM Link LED (Port 1A Data Rate)
3. ESM Link LED (Port 1B Data Rate)
4. ESM Link Fault LED (Port 1B Bypass)
5. ESM Service Action Allowed LED
6. ESM Service Action Required LED
7. ESM Power LED
8. Seven-Segment Module ID

**Table 14 LEDs on the CSM200 ESM CRU**

Location	LED	Color	On	Off
1	ESM Link Fault (Port 1A Bypass)	Amber	A link error has occurred.	No link error has occurred.
2	ESM Link (Port 1A)	Green	The link is up.	A link error has occurred.
3	ESM Link (Port 1B Bypass)	Green	The link is up.	A link error has occurred.
4	ESM Link Fault (Port 1B)	Amber	A link error has occurred.	No link error has occurred.

Location	LED	Color	On	Off
5	ESM Service Action Allowed	Blue	The ESM can be removed safely from the drive module.	The ESM cannot be removed safely from the drive module.
6	ESM Service Action Required	Amber	A fault exists within the ESM.	Normal status.
7	ESM Power	Green	Power to the ESM is present.	Power is not present to the ESM.
8	Seven-Segment Module ID	Green	For more information, see "Supported Diagnostic Codes on the Seven-Segment Display".	Not applicable.

**Figure 23 LEDs on the CSM200 Power CRU**

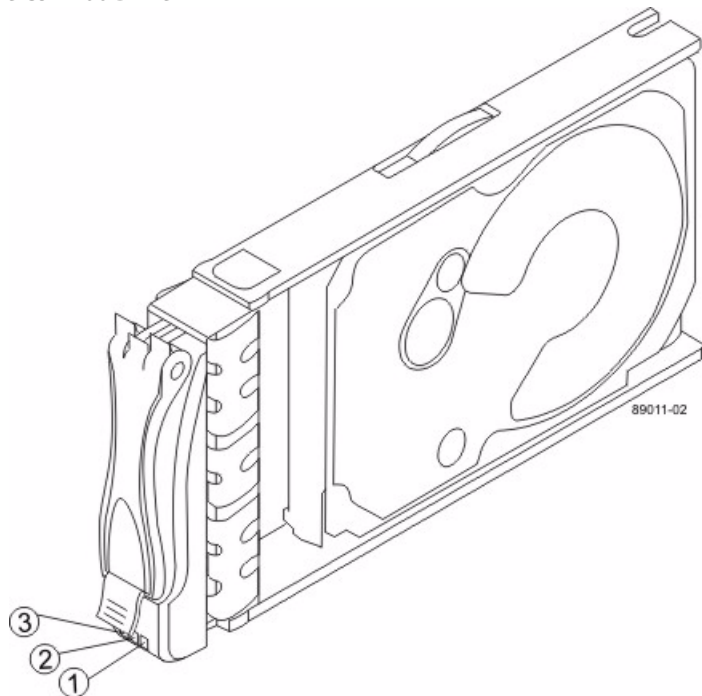
1. Power AC Power LED
2. Power Service Action Allowed LED
3. Power Service Action Required LED
4. Power DC Power LED

**Table 15 LEDs on the CSM200 Power CRU**

Location	LED	Color	On	Off
1	Power AC Power	Green	AC power to the power CRU is present.	AC power to the power CRU is not present.
2	Power Service Action Allowed	Blue	The power CRU can be removed safely from the drive module.	The power CRU cannot be removed safely from the drive module.
3	Power Service Action Required	Amber	A fault exists within the power CRU.	Normal status.
4	Power DC Power	Green	DC power from the power CRU is available.	DC power from the power CRU is not available.

# LEDs on the CSM200 Drives

Figure 24 LEDs on the CSM200 Drive



- 1. Drive Power LED
- 2. Drive Service Action Required LED
- 3. Drive Service Action Required LED

Table 16 LEDs on the Drives

Location	LED	Color	On	Blinking	Off
1	Drive Power	Green	The power is turned on, and the drive is operating normally.	Drive I/O is taking place.	The power is turned off.
2	Drive Service Action Required	Amber	An error has occurred.		Normal status.
3	Drive Service Action Allowed	Blue	The drive CRU can be removed safely from the drive module.		The drive CRU cannot be removed safely from the drive module.

## Things to Know – Service Action Allowed LEDs

Each controller CRU, power-fan CRU, and battery CRU has a Service Action Allowed LED. The Service Action Allowed LED lets you know when you can remove a CRU safely.

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**ATTENTION Possible loss of data access** – Never remove a controller CRU, a power-fan CRU, or a battery CRU unless the appropriate Service Action Allowed LED is on.

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If a controller CRU or a power-fan CRU fails and must be replaced, the Service Action Required (Fault) LED on that CRU comes on to indicate that service action is required. The Service Action Allowed LED also comes on if it is safe to remove the CRU. If data availability dependencies exist or other conditions that dictate a CRU should not be removed, the Service Action Allowed LED stays off.

The Service Action Allowed LED automatically comes on or goes off as conditions change. In most cases, the Service Action Allowed LED comes on when the Service Action Required (Fault) LED comes on for a CRU.

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**NOTE** If the Service Action Required (Fault) LED comes on but the Service Action Allowed LED is off for a particular CRU, you might need to service another CRU first. Check your storage management software to determine the action that you should take.

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## Regulatory Compliance Statements

### FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

LSI Corporation, and Sun Microsystems, Inc. are not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI and Sun. It is the user's responsibility to correct interference caused by such unauthorized modification, substitution, or attachment.

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This equipment uses Small Form-factor Pluggable (SFP) optical transceivers, which are unmodified Class 1 laser products pursuant to 21 CFR, Subchapter J, Section 1040.10. All optical transceivers used with this product are required to be 21 CFR certified Class 1 laser products. For outside the USA, this equipment has been tested and found compliant with Class 1 laser product requirements contained in European Normalization standard EN 60825-1 1994+A11. Class 1 levels of laser radiation are not considered to be hazardous and are considered safe based upon current medical knowledge. This class includes all lasers or laser systems which cannot emit levels of optical radiation above the exposure limits for the eye under any exposure conditions inherent in the design of the laser products.

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*This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.*

*Cet appareil numérique de la classé A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.*

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