

# Storage System

## Site Preparation Guide

EC1435-2-E1, First Edition



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## **Document Description**

Document EC1435-2-E1, First Edition. July 2004

This document describes the site and environmental requirements for the 72-inch cabinet; the FLX280, FLX280, D178, and FLX240 control modules; the FLX210, FLX240, and FLX240 Drive Limited array modules; and the FLC200, FLA200, 9170-014, 9170-010, and FLA300 drive modules, and will remain the official reference source for all revisions/releases of these products until rescinded by an update.

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**WARNING** indicates a potentially hazardous situation that could result in death or severe personal injury.

**CAUTION** indicates a potentially hazardous situation that could result in moderate or minor personal injury.

### Definitions of Informational Notices

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**IMPORTANT** indicates information or criteria that is necessary to perform a procedure correctly.

**NOTE** indicates a concept that will be clarified or a maintenance tip that will be presented.

## Revision Record

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## About This Book

This book defines the hardware, power, and environmental requirements that must be met prior to installation of the 72-inch cabinet; the FLX280, FLX280, D178, and FLX240 control modules; the FLX210, FLX240, and FLX240 Drive Limited array modules; and the FLC200, FLA300, FLA200, 9170-014, and 9170-010 drive modules. Use this book prior to delivery and installation to ensure that the appropriate and required preparations have been completed. This book does *not* explain procedures for installation of the hardware modules, or software installation and configuration. Read the SANtricity Storage Manager Product Release Notes for any updated information regarding hardware, software, or firmware products that may not be covered in this document.

## Intended Readers

This book is intended for system administrators and service personnel who are directly involved in the planning or installation of SAN hardware or disk subsystems, including the FLX280, FLX280, D178, and FLX240 control modules; the FLX210, FLX240, and FLX240 Drive Limited array modules; and the FLC200, FLA300, FLA200, 9170-014, and 9170-010 drive modules. The reader must have a basic knowledge of SAN hardware functionality (controllers, drives, hosts) and SAN cabling techniques; must be familiar with cabinet installations; and must understand disk array, Redundant Array of Independent Disks (RAID), network, and Fibre Channel technologies.

## Web Address

For web sites related to the products in this publication, please see the *Product Release Notes*.



## *72-Inch Cabinet Site Preparation*

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This chapter provides site preparation information for the 72-inch cabinet, including area, environmental, and power requirements. To ensure safe and proper operation of the system, and ease of maintenance, make sure that all of these requirements have been met before beginning the installation of the 72-inch cabinet.

## Cabinet Features

The rackmount cabinet has a detachable back door and standard Electronic Industry Association (EIA) rails that provide mounting holes for installing 19-inch wide devices. The cabinet has four roller casters and four adjustable glides (located beneath the cabinet) for moving and leveling the cabinet during installation and relocation. Newer models of this cabinet have interface cable access holes on the top. In addition, each cabinet has a removable stability foot that prevents the cabinet from tipping when it is moved. [Figure 1-1](#) shows the features of a 72-inch cabinet.

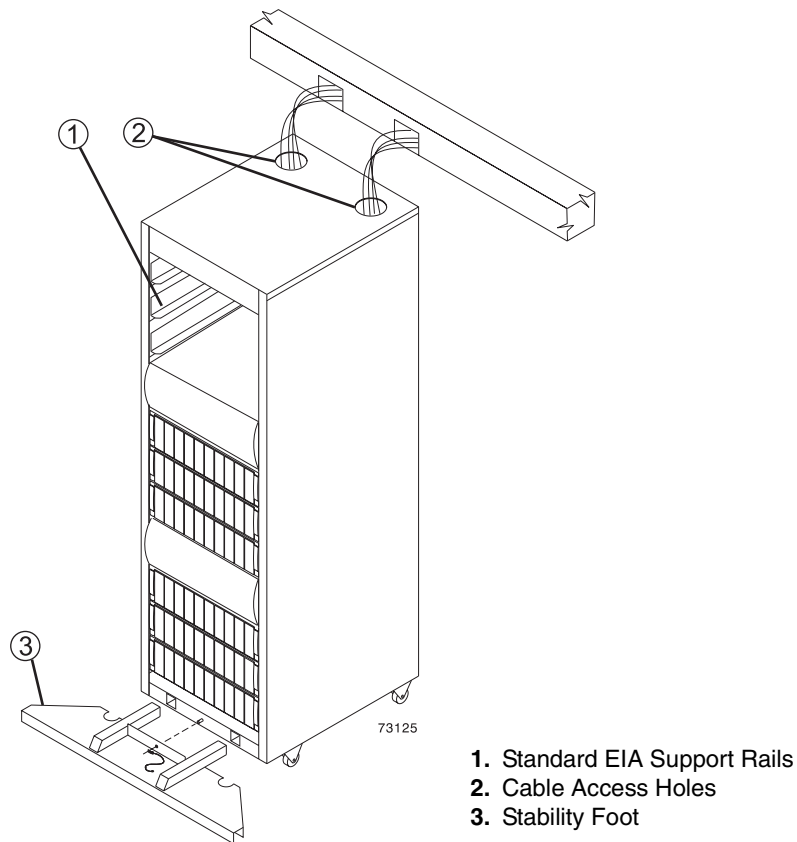


Figure 1-1 72-inch Cabinet with Stability Foot

You can customize the cabinet to meet your data storage needs, based on performance, capacity, and availability requirements. The cabinet contains two AC power distribution boxes and can hold twelve modules. Standard configurations consist of a combination of the following module types:

- **Control Module** - a unit that contains one or two controllers, a battery, and redundant cooling fans and power supplies



- **Array Module** - a unit that contains up to fourteen drives, redundant fans and power supplies, and, depending on the model, one or two controllers
- **Drive Module** - a unit that contains up to fourteen drives, redundant fans and power supplies, and one or two environmental services monitors (ESMs)

## Area Requirements

The floor area at the installation site must provide enough stability to support the weight of the cabinet and installed devices; sufficient space to install and service the cabinet and components; and sufficient ventilation to provide a free flow of air to the cabinet.

## Dimensions

Figure 1-2 shows the cabinet dimensions and the dimensions of the removable stability foot.

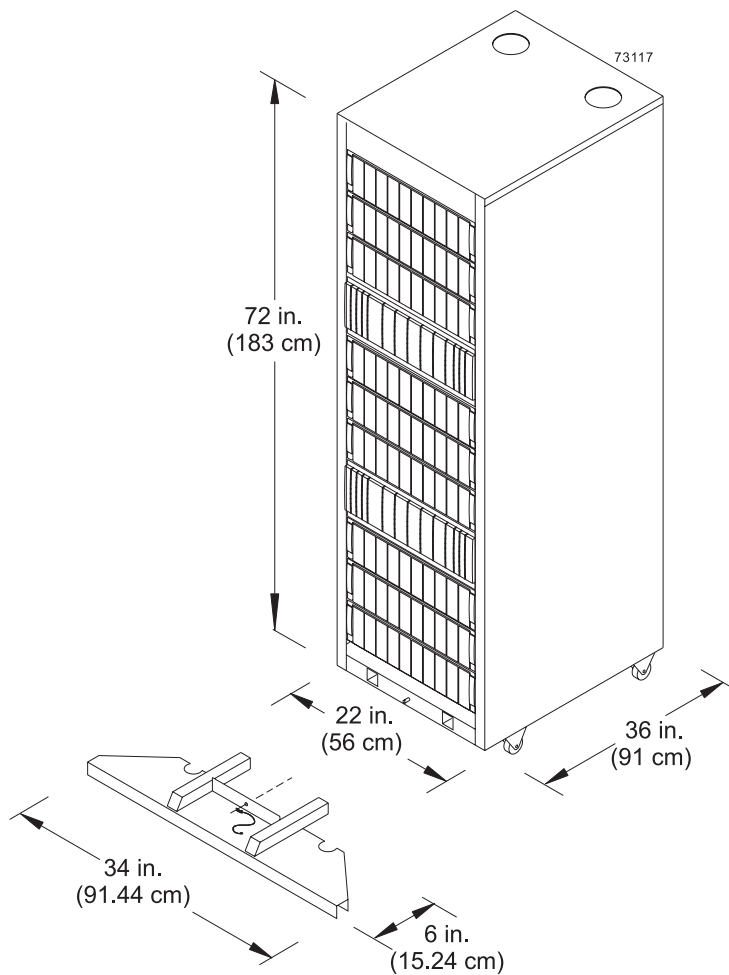


Figure 1-2 Cabinet Dimensions

## Weight

The weight of the populated cabinet depends upon the number and type of modules installed in the cabinet. [Table 1-1](#) lists the weight of an empty cabinet and the maximum weight of each component. Use these weights to estimate the total weight of your system, based on the number of modules installed in the cabinet. Record the total weight in an easy-to-find place to reference when checking flooring load or elevator weight restrictions.

Table 1-1 Cabinet and Module Weights

Component	Weight	Notes
Cabinet	122.7 kg (270.0 lb)	Empty
9170-010 Drive Module	36.3 kg (80.0 lb)	Maximum configuration
9170-014 Drive Module	40.8 kg (90.0 lb)	Maximum configuration
FLA200 Drive Module	40.4 kg (89.0 lb)	Maximum configuration
FLA300 Drive Module	40.0 kg (88.0 lb)	Maximum configuration
FLC200 Drive Module	40.0 kg (88.0 lb)	Maximum configuration
FLX280 Control Module	40.4 kg (89.0 lb)	Maximum configuration
D178 Control Module	40.4 kg (89.0 lb)	Maximum configuration
FLX240 Control Module	28.2 kg (62.0 lb)	Maximum configuration
FLX210 Array Module	40.4 kg (89.0 lb)	Maximum configuration
FLX240 Array Module	42.2 kg (93.0 lb)	Maximum configuration
FLX240 Drive Limited Array Module	42.2 kg (93.0 lb)	Maximum configuration

## Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit and the amount of heat that is generated by normal operation of the unit.

### Temperature and Humidity

Table 1-2 shows the temperature and relative humidity ranges within which the cabinet and its components are designed to operate. The maximum allowed dewpoint is 28° C (82° F), with a maximum humidity gradient of 10% per hour.

Table 1-2 Cabinet Temperature and Humidity Requirements

Environment	Temperature Range	Temperature Change	Relative Humidity
Operating <sup>a</sup>	10° C to 35° C (50° F to 95° F)	10° C per hour (18° F per hour)	20% to 80%
Storage	-10° C to 65° C (14° F to 149° F)	15° C per hour (27° F per hour)	10% to 90%
Transit	-40° C to 65° C (-40° F to 149° F)	20° C per hour (36° F per hour)	5% to 95%

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

### Altitude

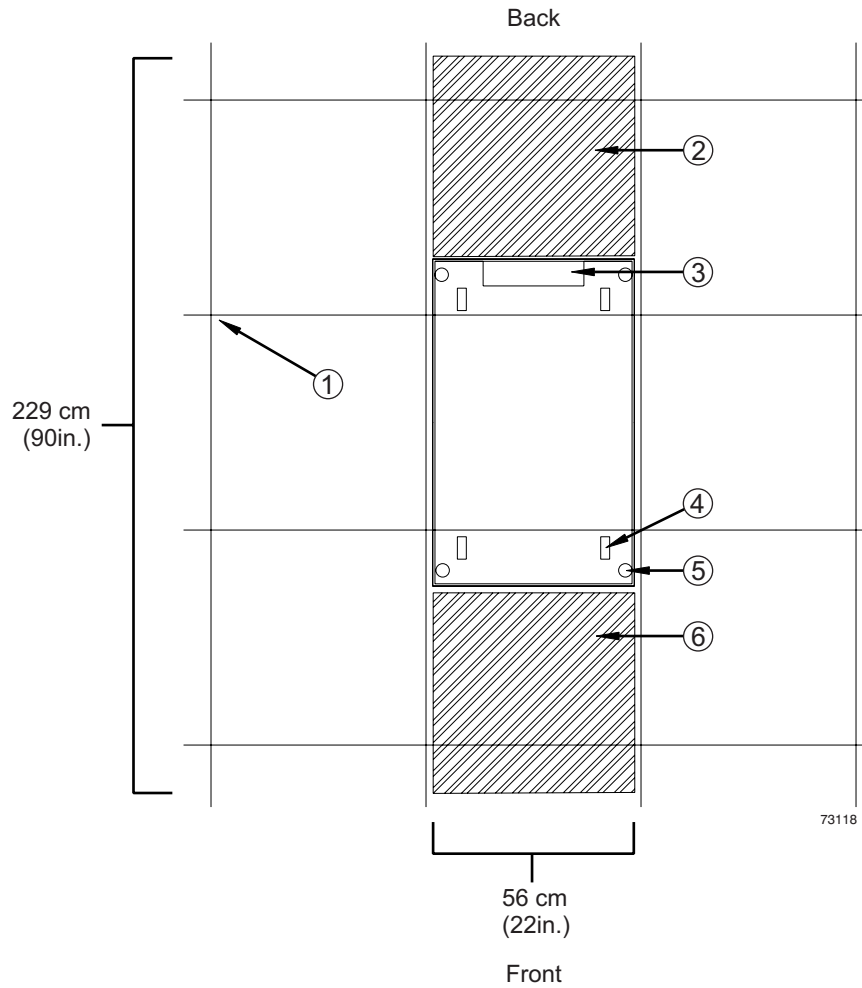
Table 1-3 shows the altitudes at which the cabinet and its components are designed to operate.

Table 1-3 Cabinet Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

### Airflow, Heat Dissipation, and Service Clearances

Cabinet airflow is from front to back. Allow at least 30 inches in front of the cabinet, and at least 24 inches behind the cabinet for service clearance, proper ventilation, and heat dissipation. The cabinet is 22 inches in width and does not require side clearances. Figure 1-3 shows the cabinet area requirements.



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- |   |   |
|---|---|
| <b>1.</b> Computer Floor Grid<br>(24 x 24 in.)    | <b>3.</b> Cable Access                            |
| <b>2.</b> Required Service Area<br>61 cm (24 in.) | <b>4.</b> Roller Caster                           |
|   | <b>5.</b> Stability Foot                          |
|   | <b>6.</b> Required Service Area<br>76 cm (30 in.) |

Figure 1-3 Top View of Cabinet Area Requirements

Total heat dissipation is a function of the number and type of modules you have installed in the cabinet. [Table 1-4](#) provides heat dissipation numbers for individual components. Use the heat dissipation numbers for the individual modules to calculate the heat dissipation for your particular configuration. [Table 1-5](#) provides examples of cabinet heat dissipation rates for four different configurations.

Table 1-4 Module Heat Dissipation Rates

Component	Btu/Hr	kVA	W
9170-010 Drive Module	933.0	0.276	273.0
9170-014 Drive Module	1143.0	0.338	335.0
FLA200 Drive Module	1229.0	0.375	360.0
FLA300 Drive Module	1259.0	0.384	369.0
FLC200 Drive Module	1078.0	0.329	316.0
FLX280 Control Module	786.6	0.230	228.0
D178 Control Module	790.0	0.233	231.0
FLX240 Control Module	404.0	0.120	118.0
FLX210 Array Module	1199.0	0.366	351.0
FLX240 Array Module	1289.0	0.393	378.0
FLX240 Drive Limited Array Module	1289.0	0.393	378.0

Table 1-5 Cabinet Heat Dissipation Examples

Configuration	Heat Dissipation		
	kVA	W	Btu/hr
1 control module and 5 drive modules	1.875	1856	6338
2 control modules and 10 drive modules	3.749	3712	12,677
3 control modules and 8 drive modules	3.321	3288	11,228
1 array module and 4 drive modules	1.721	1661	5669

## Electrical Requirements

This section provides information on site power and wiring considerations, AC power distribution box specifications, and ladder cord and power cord routing instructions.

### Site Wiring and Power

The AC power distribution boxes in the cabinet use common industrial wiring. Consider the following information when preparing the cabinet installation site:

- **AC power source** – The AC power source must provide the correct voltage, current, and frequency specified on the module model and serial number label.
- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the AC power distribution boxes and other components in the cabinet, use an external, independent power source that is isolated from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Module power distribution** – All units attached to the two accessory outlets inside that cabinet must be auto-ranging between 180 and 264 VAC, 50-60 Hz.
- **Power interruptions** – The cabinet and modules will withstand the following applied voltage interruptions (with or without an integrated uninterruptible power supply [UPS]):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Maximum frequency** – once every ten seconds
- **Power failures** – If a total power failure occurs, the modules within the cabinet will automatically perform a power-up recovery without operator intervention after power is restored.

### Power Requirements

[Table 1-6](#) lists the cabinet voltage, current, and frequency limits.

Table 1-6 Cabinet AC Power Requirements

	Requirement
Nominal Voltage	180 to 264 VAC
Frequency	50 to 60 Hz
Nominal Current <sup>a</sup>	8.31 A - 24.0 A

a. Varies depending upon the number and type of modules in the cabinet.

The 72-inch cabinet contains two switches (one on each power distribution box) that set 25 A circuit breakers.

## AC Power Distribution

The cabinet has two identical AC power distribution boxes, each with a separate power cord. Depending on the configuration ordered, each box supports either domestic (inside USA) or international (outside USA) units and includes the following parts.

- One domestic plug (NEMA L6-30P, 30 A, 220 VAC) or one international plug (IEC 309, 32 A, 3-pin, 230 VAC)
- One circuit breaker (25 A)
- Two power outlets (IEC 320, 16 A, C-19, filtered individually for international and domestic EMC compliance)
- Two ladder cords that support up to 12 attachments per box (24 per cabinet)

Figure 1-4 shows the entire power distribution chain, from wall outlets on independent circuits to redundant power supplies in a module.



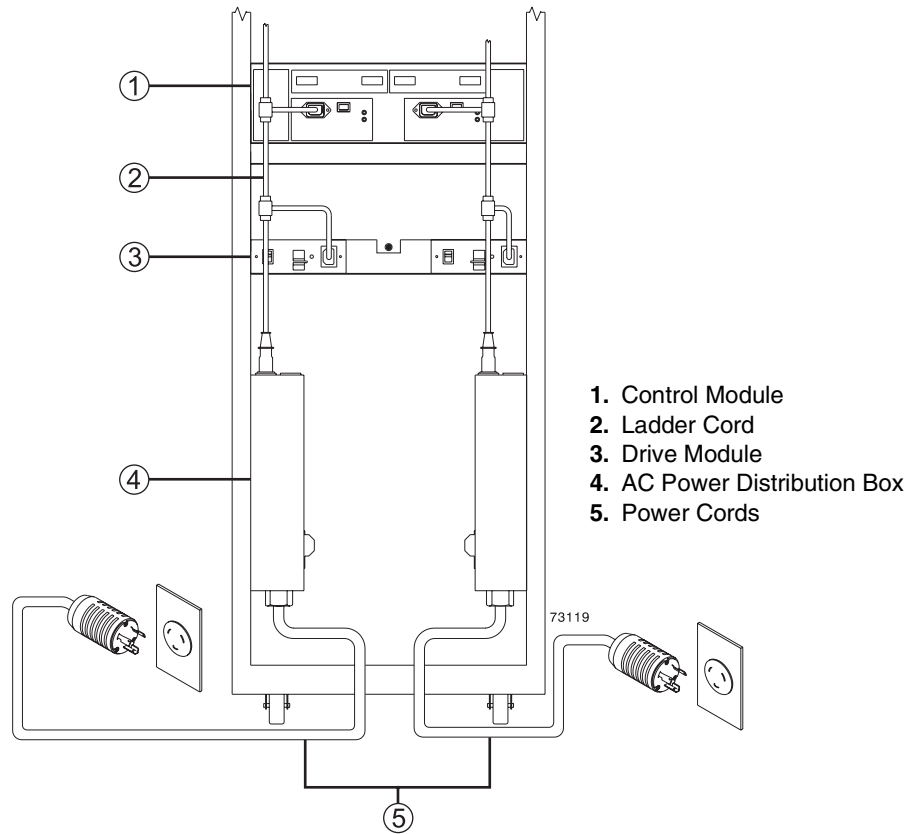


Figure 1-4 Redundant AC Power Connections to Modules

## Ladder Cords

Each AC power distribution box outlet supports one ladder cord that you can connect to a maximum of six modules. You can connect up to twelve 220/230 VAC modules to each AC power distribution box for a maximum of twenty-four power attachments inside the cabinet.

Although the cabinet may not be fully populated when shipped, the cabinet is shipped with two ladder cords. Route the ladder cords between the mounting rails and the side skins of the cabinet. [Table 1-7 on page 1-12](#) describes the cord specifications.

Table 1-7 Ladder Cord Specifications

Component	Specification
Power	10 A per cord (1.67 A per connection if all are used)
Input Connector	IEC 320, C-19, 16 A, 250 VAC
Plugs	IEC 320, C-14, 10 A, 250 VAC
Ladder Step	5.25 inches between connections

## Power Cords and Receptacles

The cabinet is equipped with two AC power distribution boxes. Each power distribution box contains an independent 25 A circuit breaker. Depending upon your installation, the distribution boxes in your cabinet have either domestic (inside USA) or international (outside USA) cords. Each AC power distribution box power cord should be connected to an independent power source outside the cabinet. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) show the power cords, plugs, and receptacles that are located inside the cabinet on the top of each AC power distribution box.

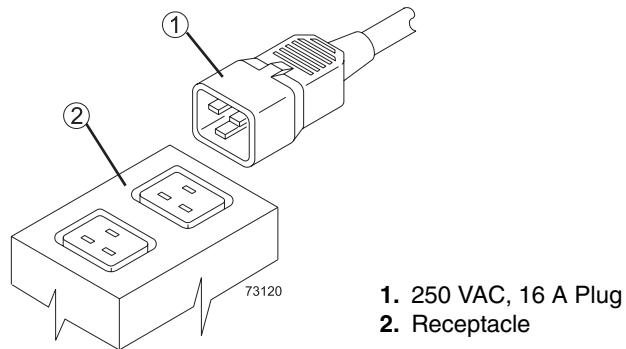


Figure 1-5 IEC 320 C-19 Power Cord and Receptacle

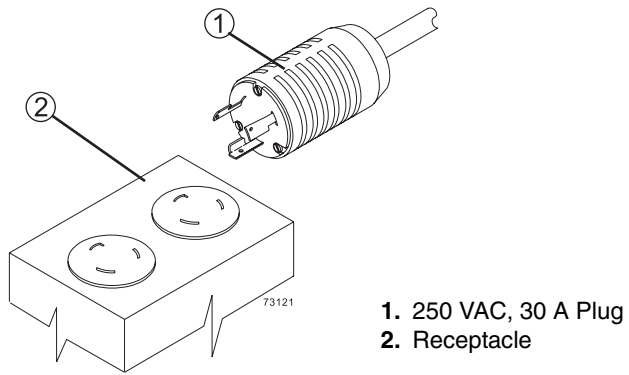


Figure 1-6 NEMA L6-30 (Domestic) Power Cord and Receptacle

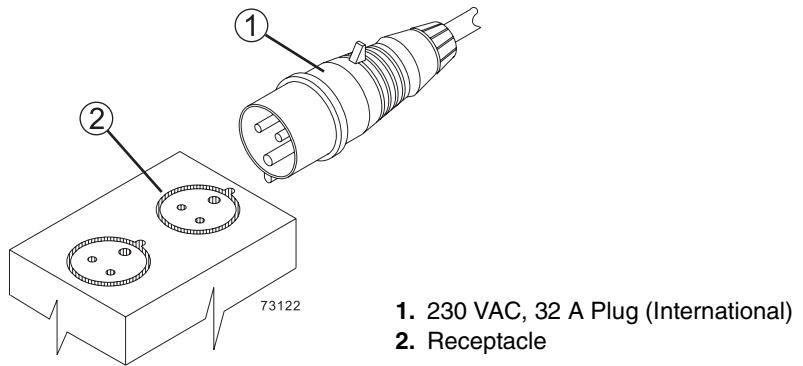


Figure 1-7 IEC 309 (International) Power Cord and Receptacle



## *FLX280 Control Module Site Preparation*

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This chapter provides site specifications for the FLX280 control module. Before installing a control module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLX280 control module is a compact unit that manages high performance disk arrays to provide storage in a Fibre Channel environment. The control module contains two controllers, a fan/communications CRU, two power supplies, a controller fan, an alarm system, and up to eight minihubs. The array module is equipped with Ethernet and serial connections for out-of-band disk subsystem management and configuration, and fault isolation. An optional backup battery can be added for data cache protection.

Figure 2-1 shows front and back views of the control modules.

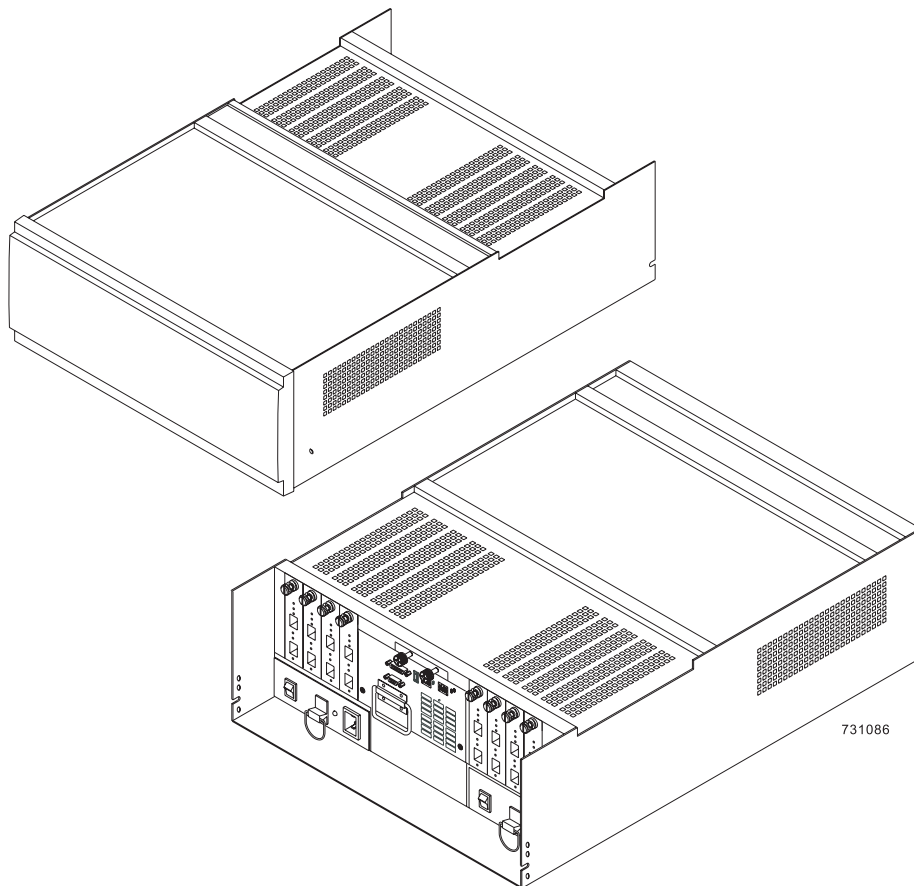


Figure 2-1 Front and Back Views of the FLX280 Control Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the control module and associated equipment; sufficient space to install, operate, and service the control module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 2-2 shows the dimensions of the FLX280 control module.

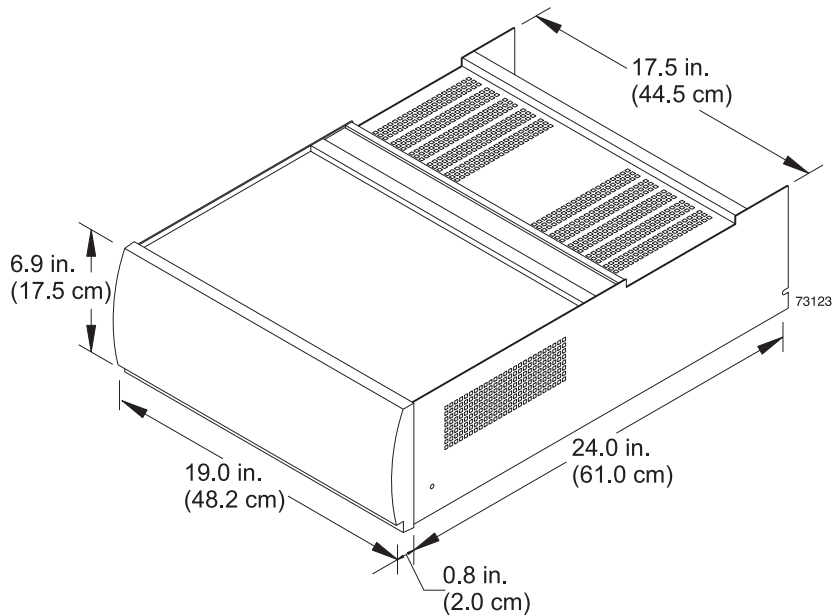


Figure 2-2 FLX280 Control Module Dimensions

### Weight

The total weight of the control module depends on the number of components installed. Table 2-1 on page 2-4 lists the maximum, empty, and shipping weights for the control module. Table 2-2 on page 2-4 lists the weights of individual components.

Table 2-1 FLX280 Control Module Weights

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLX280 control module, rackmount	40.4 kg (89.0 lb)	13.2 kg (29.0 lb)	54.0 kg (119.0 lb)

<sup>1</sup> Maximum weight indicates a control module with all components installed (fully loaded).  
<sup>2</sup> Empty weight indicates a control module with all components removed.  
<sup>3</sup> Shipping weight indicates the maximum weight of the control module and all shipping materials.

Table 2-2 FLX280 Control Module Component Weights

Unit	Weight
Battery	10.9 kg (24.0 lb)
Controller	3.0 kg (6.6 lb)
Controller Fan	0.9 kg (1.9 lb)
Power Supply	1.5 kg (3.3 lb)
Fan/Communications CRU	1.84 kg (4.06 lb)
SFP Minihub	0.567 kg (1.25 lb)

## Shipping Dimensions

Table 2-3 lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 2-3 FLX280 Control Module Shipping Carton Dimensions

Height	Width	Depth
44.4 cm (17.5 in.)	62.2 cm (24.5 in.)	78.7 cm (31.0 in.)



# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 2-4 lists the acceptable temperature and humidity ranges in which the control module is designed to operate.

Table 2-4 FLX280 Array Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	0° C to 40° C (32° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 93%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3048 m, (3280 ft. to 10,000 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 2-5 on page 2-6 lists the acceptable altitudes for operating, storing, and shipping the control module.

Table 2-5 FLX280 Control Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3048 m (10,000 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3048 m (10,000 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 2-3 illustrates the intended airflow for an FLX280 control module and an FLX280 array module. Allow at least 30 inches in front of the control module and at least 24 inches behind the array module for service clearance, proper ventilation, and heat dissipation. The FLX280 control modules dissipate heat at a rate of 786.6 Btu per hour (0.230 kVA or 228.0 W).

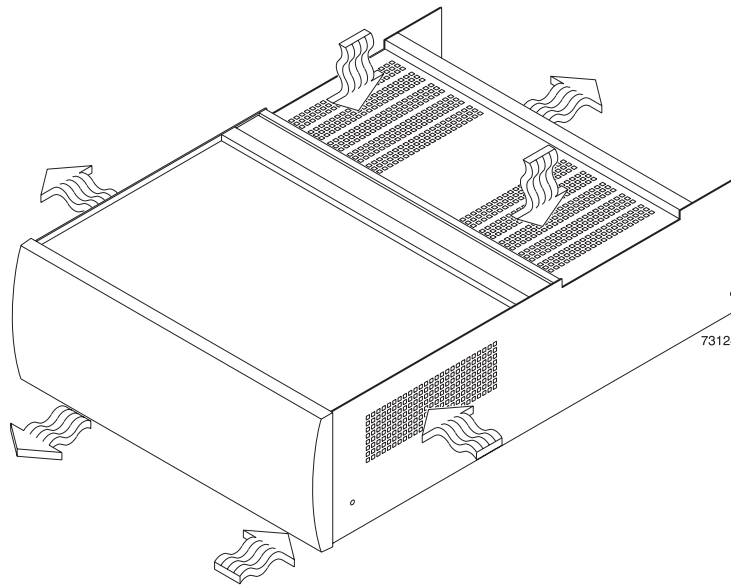


Figure 2-3 FLX280 Control Modules Airflow

## Acoustic Noise

Table 2-6 lists the maximum sound levels emitted by the control module.

Table 2-6 FLX280 Control Modules Sound Level

<b>Measurement</b>	<b>Level</b>
Sound Power	6.5 bels
Sound Pressure	65 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, control module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The control module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the control module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The control modules can withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit automatically performs a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power source must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 2-7](#) shows the limits within which the control module can run without interruption.

Table 2-7 FLX280 Control Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Nominal Current	2 A <sup>a</sup>	1 A <sup>b</sup>

a. Typical voltage: 120 V AC, 60 Hz at 0.70 power supply efficiency and 0.99 power factor.

b. Typical voltage: 240 V AC, 60 Hz at 0.70 power supply efficiency and 0.99 power factor.

Each power supply contains one 3 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.99 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages [1-12](#) and [1-13](#) show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution” on page 1-10](#).



## *D178 Control Module Site Preparation*

---

This chapter provides site specifications for the D178 control module. Before installing a control module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The D178 control module is a compact unit that manages high performance disk arrays to provide storage in a Fibre Channel environment. Each control module contains two controllers, a fan/communications CRU, two power supplies, a controller fan, an alarm system, and up to eight minihubs. The array module is equipped with Ethernet and serial connections for out-of-band disk subsystem management and configuration, and fault isolation. An optional backup battery can be added for data cache protection.

Figure 3-1 shows the front and back views of the control module.

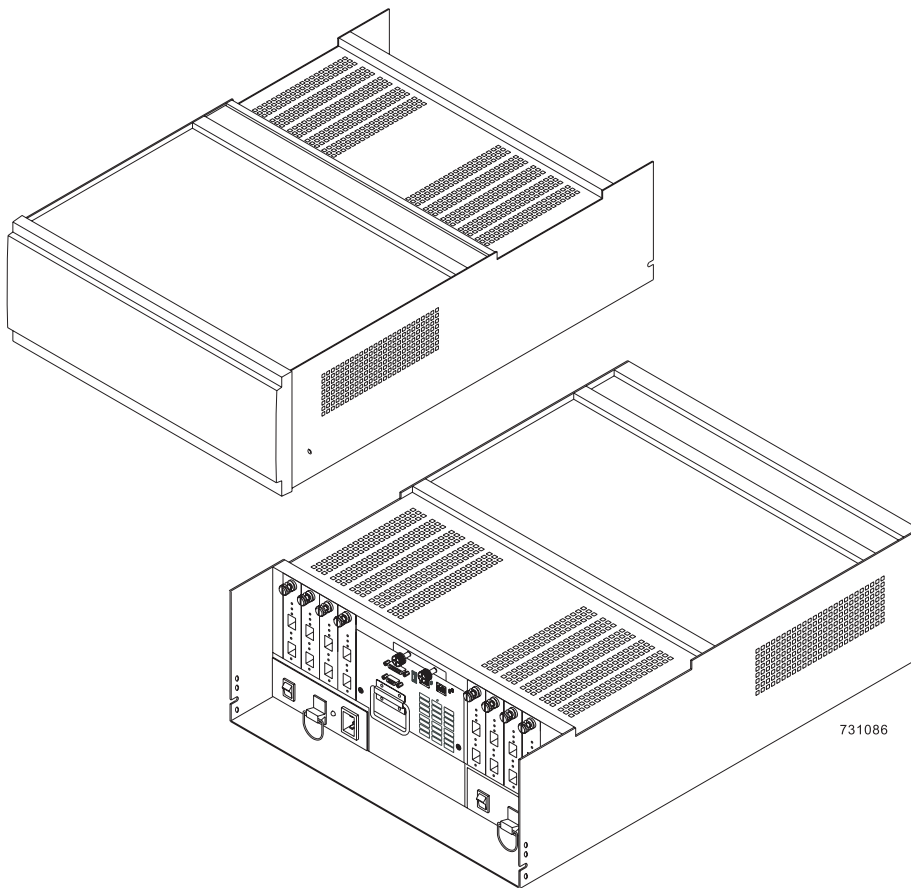


Figure 3-1 Front and Back Views of an D178 Control Module



## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the control module and associated equipment; sufficient space to install, operate, and service the control module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 3-2 shows the dimensions of the D178 control module.

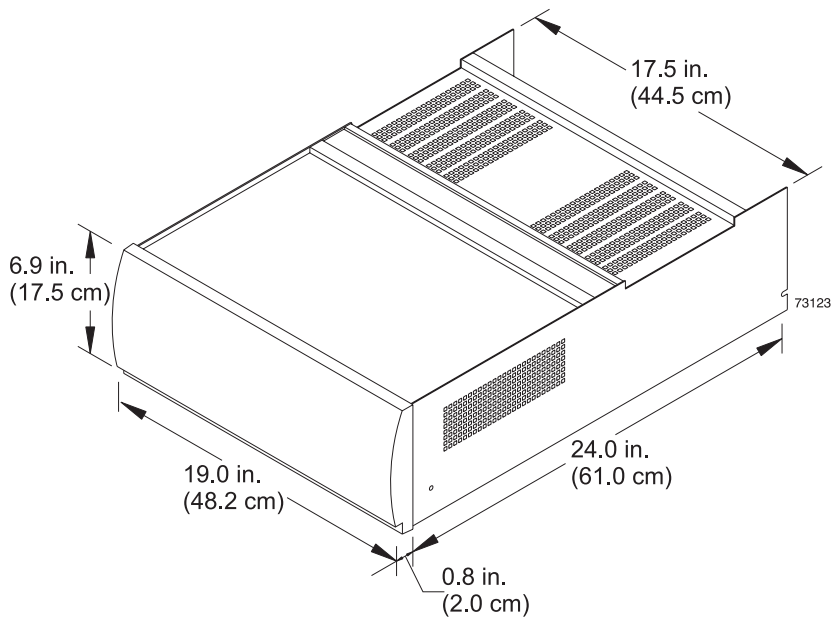


Figure 3-2 D178 Control Module Dimensions

### Weight

The total weight of the control module depends on the number of components installed. [Table 3-1 on page 3-4](#) lists the maximum, empty, and shipping weights for the control module. [Table 3-2 on page 3-4](#) lists the weights of individual components.

Table 3-1 D178 Control Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
D178 control module, rackmount	40.7 kg (89.0 lb)	13.2 kg (29.0 lb)	54.0 kg (119.0 lb)

<sup>1</sup> Maximum weight indicates a control module with all components installed (fully loaded).

<sup>2</sup> Empty weight indicates a control module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the control module and all shipping materials.

Table 3-2 D178 Control Module Component Weight

Unit	Weight
Battery	10.9 kg (24.0 lb)
Controller	3.0 kg (6.6 lb)
Controller Fan	0.9 kg (1.9 lb)
Power Supply	1.5 kg (3.3 lb)
Fan/Communications CRU	1.9 kg (4.1 lb)
SFP Minihub	0.567 kg (1.25 lb)

## Shipping Dimensions

Table 3-3 lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 3-3 D178 Control Module Shipping Carton Dimensions

Height	Width	Depth
44.4 cm (17.5 in.)	62.2 cm (24.5 in.)	78.7 cm (31.0 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 3-4 lists the acceptable temperature and humidity ranges in which the control module is designed to operate.

Table 3-4 D178 Array Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	0° C to 40° C (32° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 93%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3048 m, (3280 ft. to 10,000 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 3-5 on page 3-6 lists the acceptable altitudes for operating, storing, and shipping the control module.

Table 3-5 D178 Control Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3048 m (10,000 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3048 m (10,000 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 3-3 illustrates the intended airflow for an D178 control module. Allow at least 30 inches in front of the control module and at least 24 inches behind the control module for service clearance, proper ventilation, and heat dissipation. The D178 control module dissipates heat at a rate of 790.0 Btu per hour (0.233 kVA or 231.0 W).

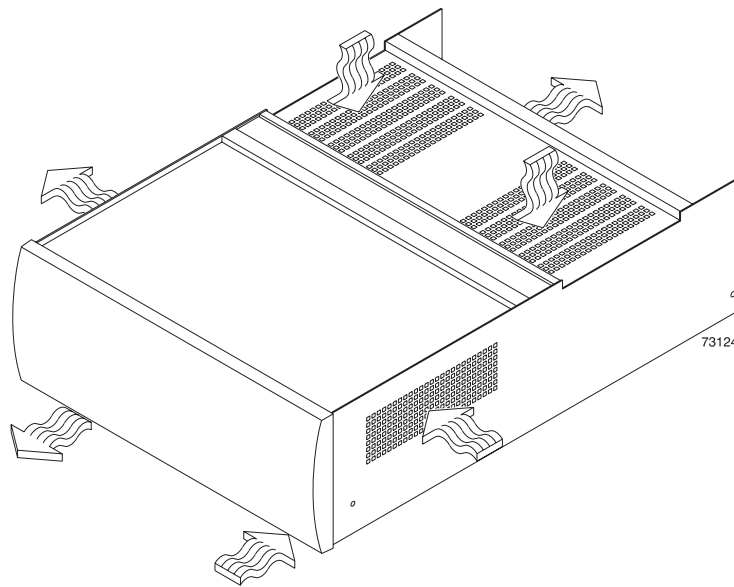


Figure 3-3 D178 Array Module Airflow

## Acoustic Noise

Table 3-6 lists the maximum sound levels emitted by the control module.

Table 3-6 D178 Array Module Sound Level

<b>Measurement</b>	<b>Level</b>
Sound Power	6.5 bels
Sound Pressure	65 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, control module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The control module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the control module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The control modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit automatically performs a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power source must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 3-7](#) shows the limits within which the control module can run without interruption.

Table 3-7 D178 Control Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Nominal Current	2 A <sup>a</sup>	1 A <sup>b</sup>

a. Typical voltage: 120 V AC, 60 Hz at 0.70 power supply efficiency and 0.99 power factor.

b. Typical voltage: 240 V AC, 60 Hz at 0.70 power supply efficiency and 0.99 power factor.

Each power supply contains one 3 A slow-blow fuse.

### Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.99 with nominal input voltage.

### Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages 1-12 and 1-13 show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution”](#) on page 1-10.

D178 Control Module Site Preparation . . . . .



## *FLX240 Control Module Site Preparation*

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This chapter provides site specifications for the FLX240 control module. Before installing the control module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLX240 control module is a compact unit that manages high performance disk arrays to provide storage in a Fibre Channel environment. The array module is available in both a desktide model and a rackmount model. Each unit contains two controllers, power supplies, and fans. The array module is equipped with Ethernet and serial connections for out-of-band disk subsystem management and configuration, and fault isolation.

Figure 4-1 shows the front and back views of the rackmount FLX240 control module.

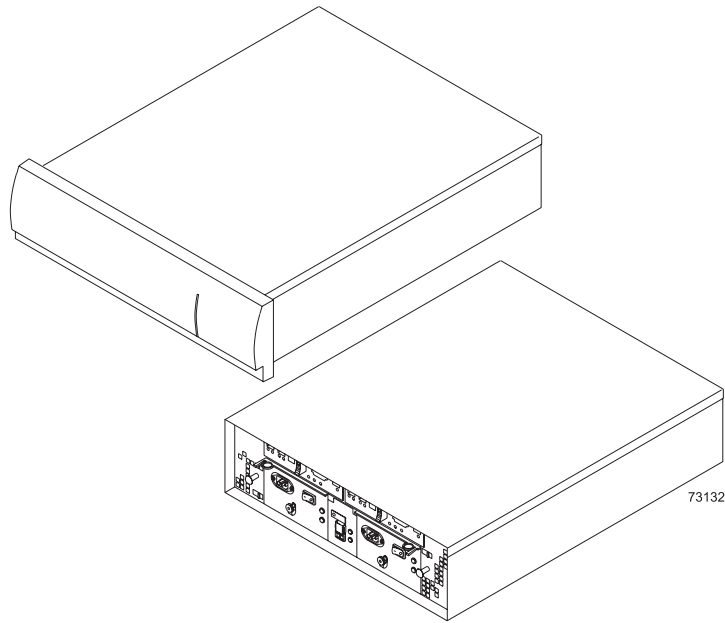


Figure 4-1 Front and Back Views of a Rackmount FLX240 Control Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the control module and associated equipment; sufficient space to install, operate, and service the control module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 4-2 shows the dimensions of the deskside (left) and rackmount (right) models of the FLX240 control module.

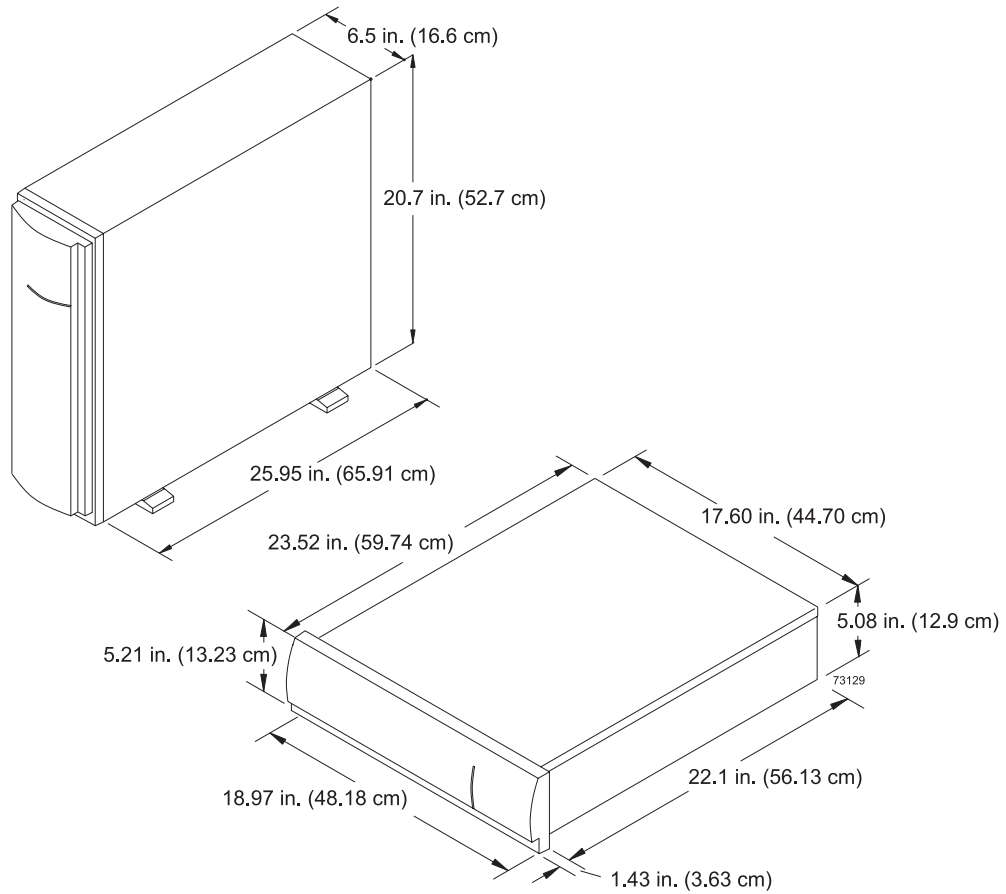


Figure 4-2 FLX240 Control Module Dimensions

## Weight

The total weight of the control module depends on the number of components installed. [Table 4-1](#) lists the approximate maximum, empty, and shipping weights of the control module. [Table 4-2](#) lists the weight of individual components.

Table 4-1 FLX240 Control Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLX240 control module, deskside	40.9 kg (90.0 lb)	26.7 kg (58.8 lb)	52.7 kg (116.0 lb)
FLX240 control module, rackmount	28.2 kg (62.0 lb)	15.8 kg (34.8 lb)	40.0 kg (88.0 lb)

<sup>1</sup> Maximum weight indicates a control module with all components installed.

<sup>2</sup> Empty weight indicates a control module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the control module and all shipping material.

Table 4-2 FLX240 Control Module Component Weight

Unit	Weight
Controller	2.31 kg (5.10 lb)
Power Supply	2.44 kg (5.39 lb)
Fan	1.01 kg (2.23 lb)

## Shipping Dimensions

[Table 4-3](#) lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 4-3 FLX240 Control Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 4-4 lists the acceptable temperature and humidity ranges in which the control module is designed to operate.

Table 4-4 FLX240 Control Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 4-5 on page 4-6 lists the acceptable altitudes for operating, storing, and shipping the control module

Table 4-5 FLX240 Control Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 4-3 illustrates the intended airflow for both a deskside model and a rackmount model of the FLX240 control module. Allow at least 30 inches in front of the control module and at least 24 inches behind the control module for service clearance, proper ventilation, and heat dissipation. The FLX240 control module dissipates heat at a rate of 404 Btu per hour (0.120 kVA or 118 W).

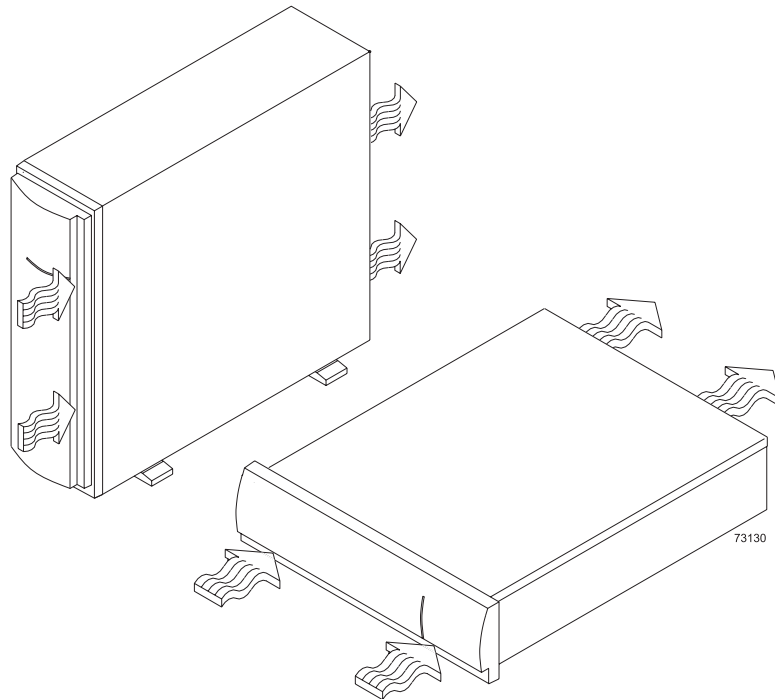


Figure 4-3 FLX240 Control Module Airflow

## Acoustic Noise

Table 4-6 lists the maximum sound levels emitted by the control module.

Table 4-6 FLX240 Control Module Noise Level

<b>Parameter</b>	<b>Requirement</b>
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, control module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The control module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the control module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The control modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention once power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 4-7](#) shows the limits within which the control module can run without interruption.



Table 4-7 FLX240 Control Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	.96 A <sup>a</sup>	.51 A <sup>b</sup>
Maximum Operating Current	.97 A	.52 A

a. Typical voltage: 115 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

b. Typical voltage: 230 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.96 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages [1-12](#) and [1-13](#) show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution”](#) on page [1-10](#).



## *FLX210 Array Module Site Preparation*

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This chapter provides site specifications for the FLX210 array module. Before installing the array module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLX210 array module is a compact unit that manages high performance disk arrays to provide storage in a Fibre Channel environment. The array module is available in both a desktide model and a rackmount model. Each unit contains up to 14 SATA disk drives, and one or two controllers, power supplies, and fans. The array module is equipped with Ethernet and serial connections for out-of-band disk subsystem management and configuration, and fault isolation.

Figure 5-1 shows the front and back views of the rackmount FLX210 array module.

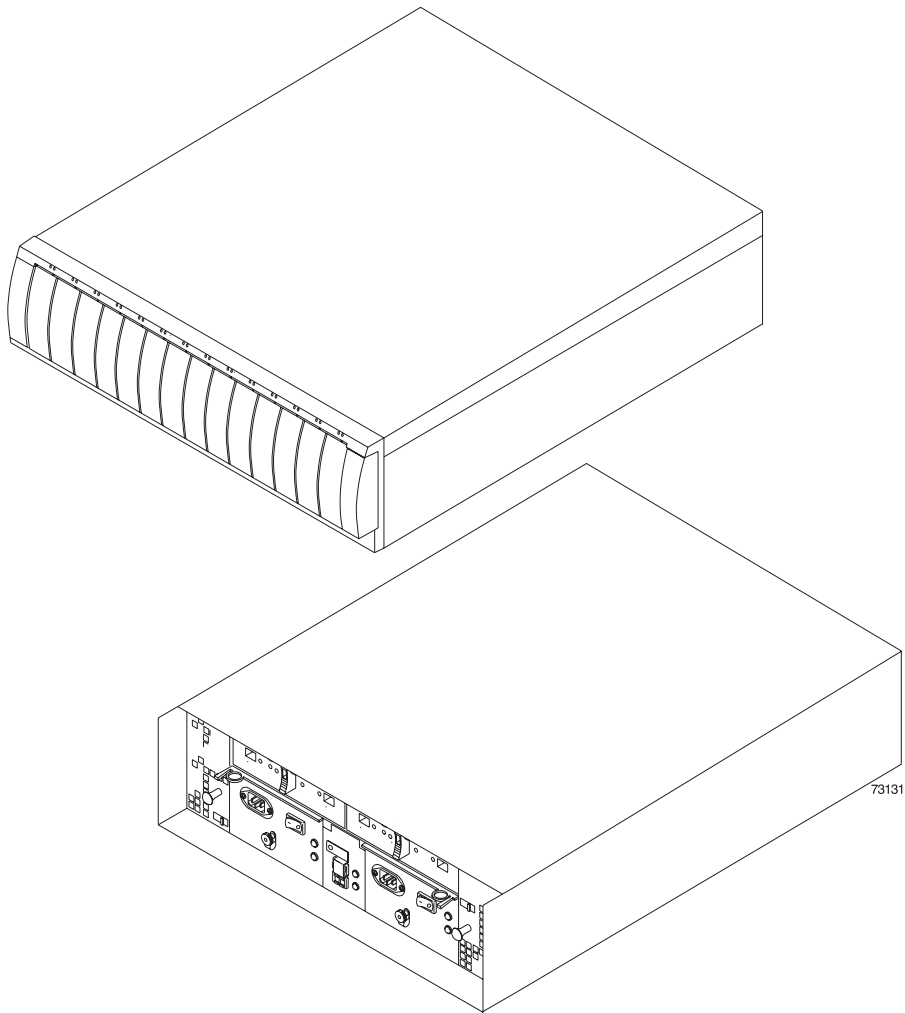


Figure 5-1 Front and Back Views of a Rackmount FLX210 Array Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the array module and associated equipment; sufficient space to install, operate, and service the array module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 5-2 shows the dimensions of the deskside (left) and rackmount (right) models of the FLX210 array module.

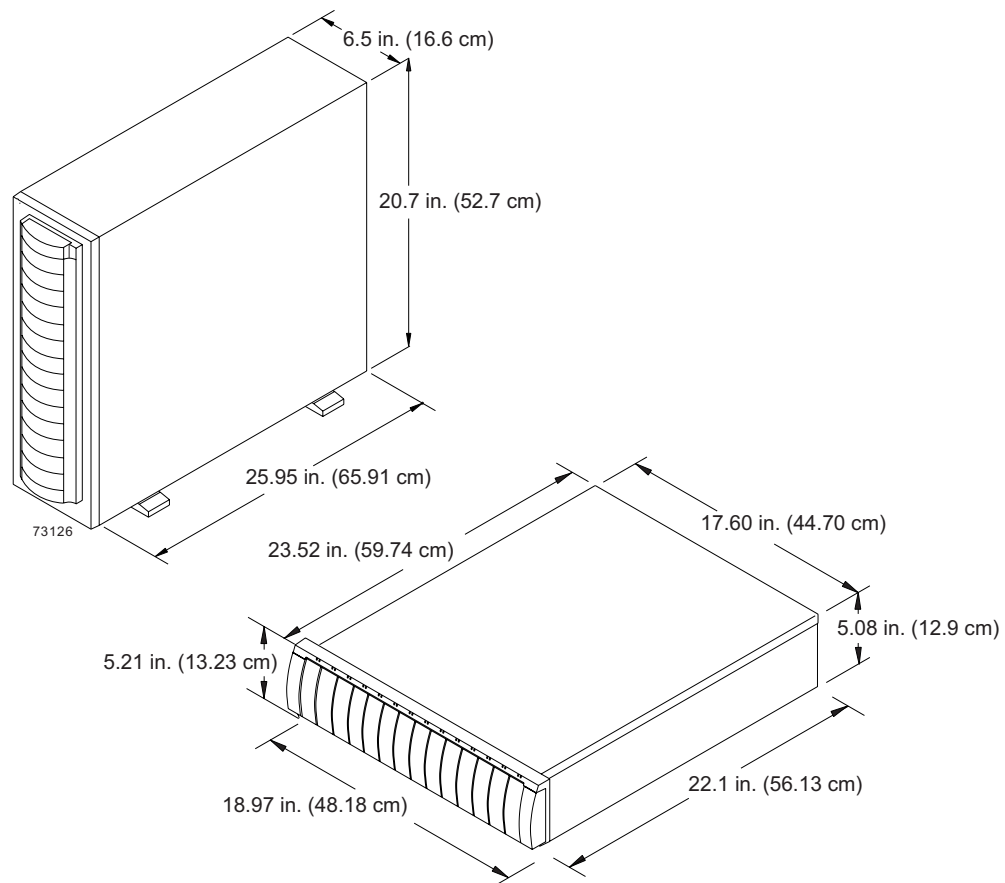


Figure 5-2 FLX210 Array Module Dimensions

### Weight

The total weight of the array module depends on the number of components installed. Table 5-1 on page 5-4 lists the maximum, empty, and shipping weights for the array module in different configurations. Table 5-2 on page 5-4 lists the weight of individual components.

Table 5-1 FLX210 Array Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLX210 array module, deskside	53.06 kg (117 lb)	29.02 kg (64 lb)	64.85 kg (143 lb)
FLX210 array module, rackmount	40.36 kg (89 lb)	16.33 kg (36 lb)	52.15 kg (115 lb)

<sup>1</sup> Maximum weight indicates an array module with drives, and all other components installed.

<sup>2</sup> Empty weight indicates an array module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the array module and all shipping material.

Table 5-2 FLX210 Array Module Component Weight

Unit	Weight
Controller	2.31 kg (5.10 lb)
Power Supply	2.44 kg (5.39 lb)
Fan	1.01 kg (2.23 lb)
Drive	0.98 kg (2.15 lb)

## Shipping Dimensions

Table 5-3 lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 5-3 FLX210 Array Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 5-4 lists the acceptable temperature and humidity ranges in which the array module is designed to operate.

Table 5-4 FLX210 Array Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 5-5 on page 5-6 lists the acceptable altitudes for operating, storing, and shipping the array module

Table 5-5 FLX210 Array Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 5-3 illustrates the intended airflow for both a deskside model and a rackmount model of the FLX210 array module. Allow at least 30 inches of clearance in front of the array module and 24 inches behind the array module for proper ventilation and heat dissipation. The FLX210 array module dissipates heat at a rate of 1199 Btu per hour (0.366 kVA or 351 W).

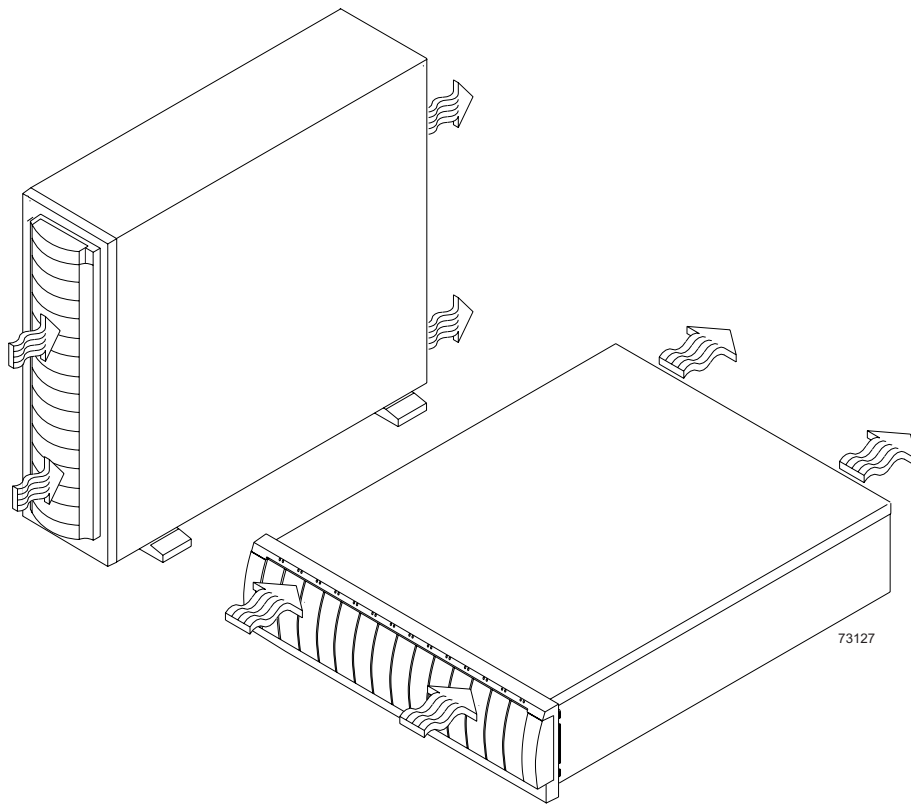


Figure 5-3 FLX210 Array Module Airflow



## Acoustic Noise

Table 5-6 lists the maximum sound levels emitted by the array module.

Table 5-6 FLX210 Array Module Noise Level

<b>Parameter</b>	<b>Requirement</b>
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, array module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The array module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the array module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The array modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 5-7](#) shows the limits within which the array module can run without interruption.

Table 5-7 FLX210 Array Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	2.50 A <sup>a</sup>	1.33 A <sup>b</sup>
Maximum Operating Current	3.01 A <sup>a</sup>	1.57 A <sup>b</sup>

a. Typical voltage: 115 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

b. Typical voltage: 230 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.96 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages 1-12 and 1-13 show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution”](#) on page 1-10.



## *FLX240 Array Module Site Preparation*

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This chapter provides site specifications for the FLX240 array module. Before installing the array module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLX240 array module is a compact unit that manages high performance disk arrays to provide storage in a Fibre Channel environment. The array module is available in both a desktside model and a rackmount model. Each unit contains up to 14 disk drives, two controllers, power supplies, and fans. The array module is equipped with Ethernet and serial connections for out-of-band disk subsystem management and configuration, and fault isolation.

Figure 6-1 shows the front and back views of the rackmount FLX240 array module.

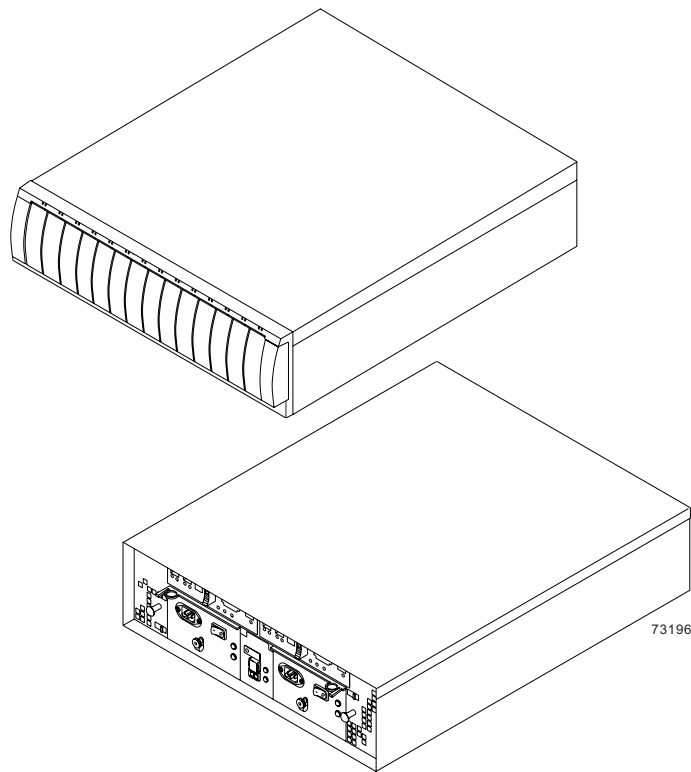


Figure 6-1 Front and Back Views of a Rackmount FLX240 Array Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the array module and associated equipment; sufficient space to install, operate, and service the array module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 6-2 shows the dimensions of the deskside (left) and rackmount (right) models of the FLX240 array module.

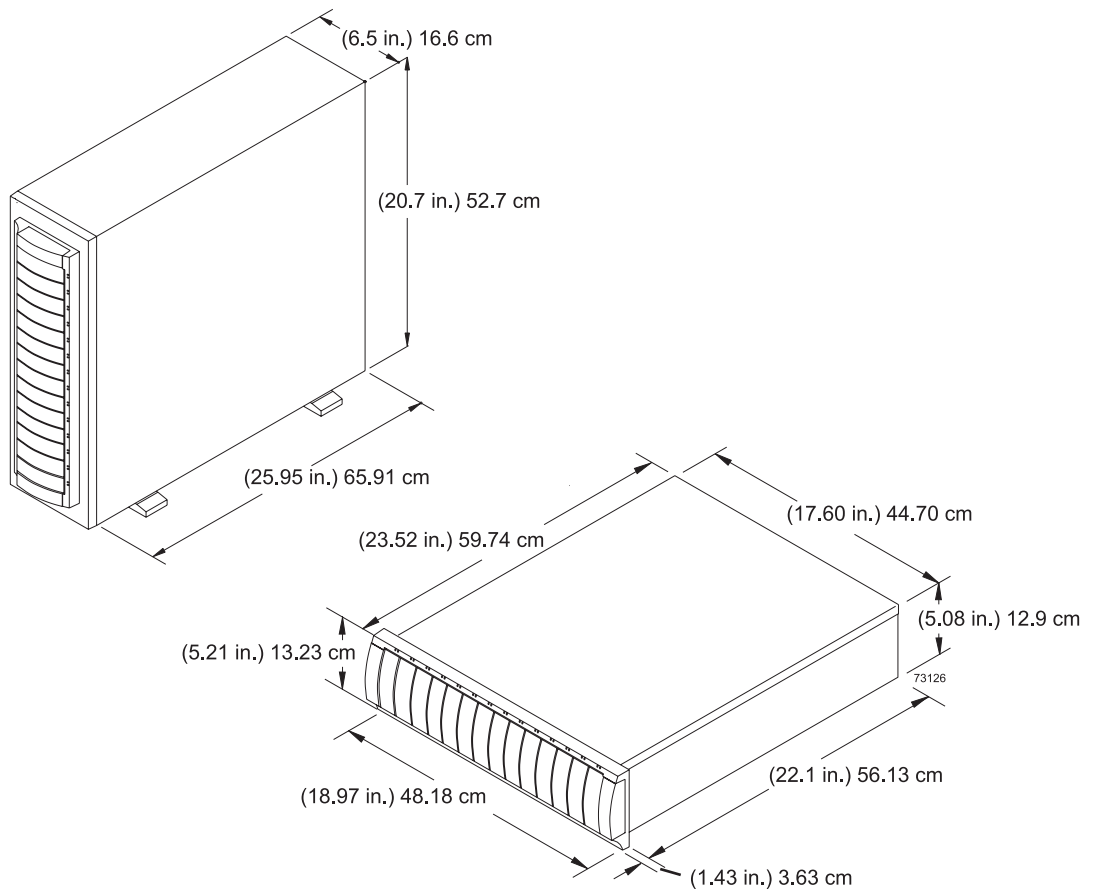


Figure 6-2 FLX240 Array Module Dimensions

## Weight

The total weight of the array module depends on the number of components installed. [Table 6-1](#) lists the maximum, empty, and shipping weights for the array module in different configurations. [Table 6-2](#) lists the weight of individual components.

Table 6-1 FLX240 Array Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLX240 array module, deskside	54.9 kg (121 lb)	28.6 kg (63 lb)	66.7 kg (147 lb)
FLX240 array module, rackmount	42.2 kg (93 lb)	15.9 kg (35 lb)	54.0 kg (119 lb)

<sup>1</sup> Maximum weight indicates an array module with drives, and all other components installed.

<sup>2</sup> Empty weight indicates an array module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the array module and all shipping material.

Table 6-2 FLX240 Array Module Component Weight

Unit	Weight
Controller	2.31 kg (5.10 lb)
Power Supply	2.44 kg (5.39 lb)
Fan	1.01 kg (2.23 lb)
Drive	1.04 kg (2.29 lb)

## Shipping Dimensions

[Table 6-3](#) lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 6-3 FLX240 Array Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)



# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 6-4 lists the acceptable temperature and humidity ranges in which the array module is designed to operate.

Table 6-4 FLX240 Array Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 6-5 on page 6-6 lists the acceptable altitudes for operating, storing, and shipping the array module

Table 6-5 FLX240 Array Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 6-3 illustrates the intended airflow for both a deskside model and a rackmount model of the FLX240 array module. Allow at least 30 inches of clearance in front of the array module and 24 inches behind the array module for proper ventilation and heat dissipation. The FLX240 array module dissipates heat at a rate of 1289 Btu per hour (0.393 kVA or 378 W).

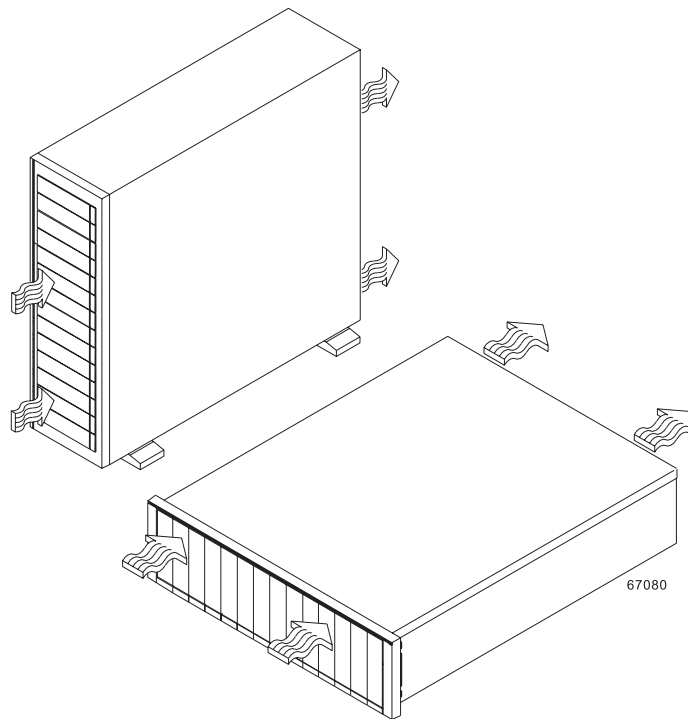


Figure 6-3 FLX240 Array Module Airflow

## Acoustic Noise

Table 6-6 lists the maximum sound levels emitted by the array module.

Table 6-6 FLX240 Array Module Noise Level

<b>Parameter</b>	<b>Requirement</b>
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, array module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The array module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the array module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The array modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 6-7](#) shows the limits within which the array module can run without interruption.

Table 6-7 FLX240 Array Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	2.50 A <sup>a</sup>	1.33 A <sup>b</sup>
Maximum Operating Current	3.01 A <sup>a</sup>	1.57 A <sup>b</sup>

a. Typical voltage: 115 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

b. Typical voltage: 230 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.96 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages [1-12](#) and [1-13](#) show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution”](#) on page [1-10](#).



## *FLX240 Drive Limited Array Module Site Preparation*

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This chapter provides site specifications for the FLX240 Drive Limited array module. Before installing the array module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLX240 Drive Limited array module is a compact unit that manages high performance disk arrays to provide storage in a Fibre Channel environment. The FLX240 Drive Limited array module is available in both a deskside model and a rackmount model. It contains up to 14 disk drives, and two controllers, power supplies, and fans. The array module is equipped with Ethernet and serial connections for out-of-band disk subsystem management and configuration, and fault isolation.

Figure 7-1 shows the front and back views of the rackmount FLX240 Drive Limited array module.

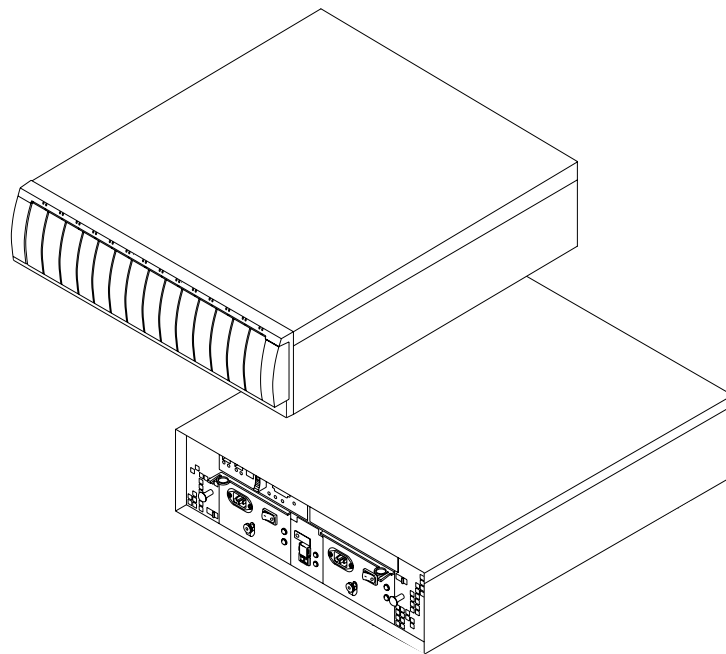


Figure 7-1 Front and Back Views of a Rackmount FLX240 Drive Limited Array Module



## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the array module and associated equipment; sufficient space to install, operate, and service the array module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 7-2 shows the dimensions of the deskside (left) and rackmount (right) models of the FLX240 Drive Limited array module.

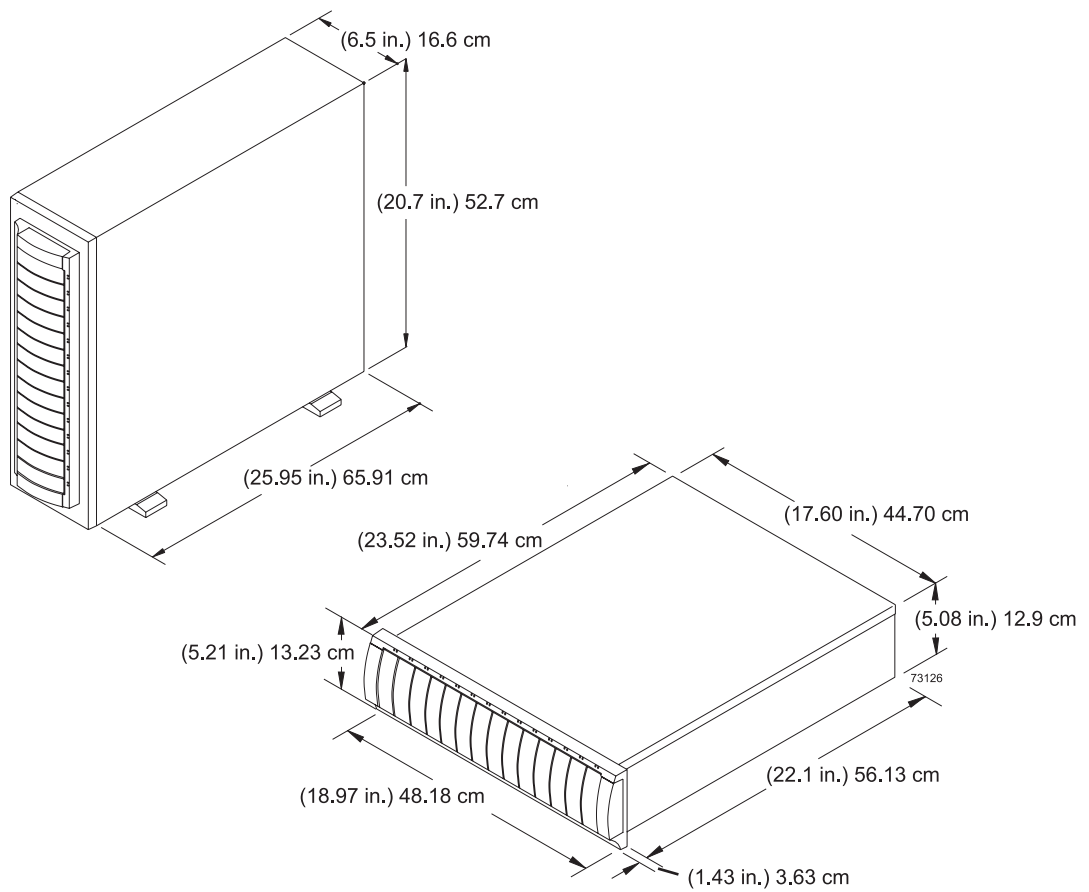


Figure 7-2 FLX240 Drive Limited Array Module Dimensions

## Weight

The total weight of the array module depends on the number of components installed. [Table 7-1](#) lists the maximum, empty, and shipping weights for the array module in different configurations. [Table 7-2](#) lists the weight of individual components.

Table 7-1 FLX240 Drive Limited Array Module Weights

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLX240 Drive Limited array module, deskside	54.9 kg (121 lb)	28.6 kg (63 lb)	66.7 kg (147 lb)
FLX240 Drive Limited array module, rackmount	42.2 kg (93 lb)	15.9 kg (35 lb)	54.0 kg (119 lb)

<sup>1</sup> Maximum weight indicates an array module with drives, and all other components installed.

<sup>2</sup> Empty weight indicates an array module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the array module and all shipping material.

Table 7-2 FLX240 Drive Limited Array Module Component Weight

Unit	Weight
Controller	2.31 kg (5.10 lb)
Power Supply	2.44 kg (5.39 lb)
Fan	1.01 kg (2.23 lb)
Drive	1.04 kg (2.29 lb)

## Shipping Dimensions

[Table 7-3](#) lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 7-3 FLX240 Drive Limited Array Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 7-4 lists the acceptable temperature and humidity ranges in which the array module is designed to operate.

Table 7-4 FLX240 Drive Limited Array Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 7-5 on page 7-6 lists the acceptable altitudes for operating, storing, and shipping the array module

Table 7-5 FLX240 Drive Limited Array Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 7-3 illustrates the intended airflow for both a deskside model and a rackmount model of the FLX240 Drive Limited array module. Allow at least 30 inches of clearance in front of the array module and 24 inches behind the array module for proper ventilation and heat dissipation. The FLX240 Drive Limited array module dissipates heat at a rate of 1289 Btu per hour (0.393 kVA or 378.0 W).

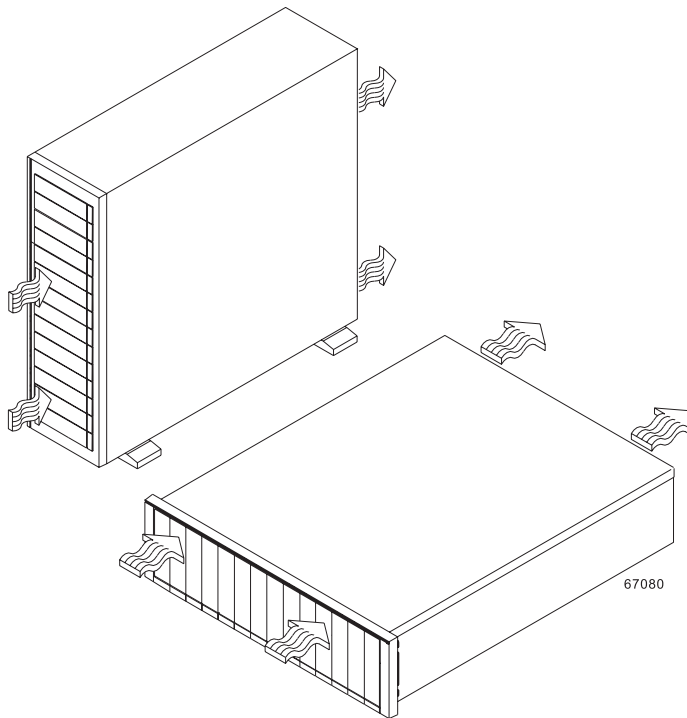


Figure 7-3 FLX240 Drive Limited Array Module Airflow

## Acoustic Noise

Table 7-6 lists the maximum sound levels emitted by the array module.

Table 7-6 FLX240 Drive Limited Array Module Noises Levels

<b>Parameter</b>	<b>Requirement</b>
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, array module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The array module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the array module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The array modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 7-7](#) shows the limits within which the array module can run without interruption.

Table 7-7 FLX240 Drive Limited Array Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	2.44 A <sup>a</sup>	1.27 A <sup>b</sup>
Maximum Operating Current	2.89 A <sup>a</sup>	1.49 A <sup>b</sup>
Maximum Surge Current	4.10 A <sup>a</sup>	2.06 A <sup>b</sup>

a. Typical voltage: 115 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

b. Typical voltage: 230 V AC, 60 Hz at 0.77 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.96 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages [1-12](#) and [1-13](#) show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution” on page 1-10](#).





## *FLC200 Drive Module Site Preparation*

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This chapter provides site specifications for the FLC200 drive module. Before installing the drive module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLC200 drive module is a compact deskside or rackmount unit that houses SATA drives to provide storage in a Fibre Channel environment. Each drive module contains up to 14 disk drives, one or two environmental service monitors (ESMs), two power supplies, and fans.

Figure 8-1 shows the front and back views of the rackmount FLC200 drive module.

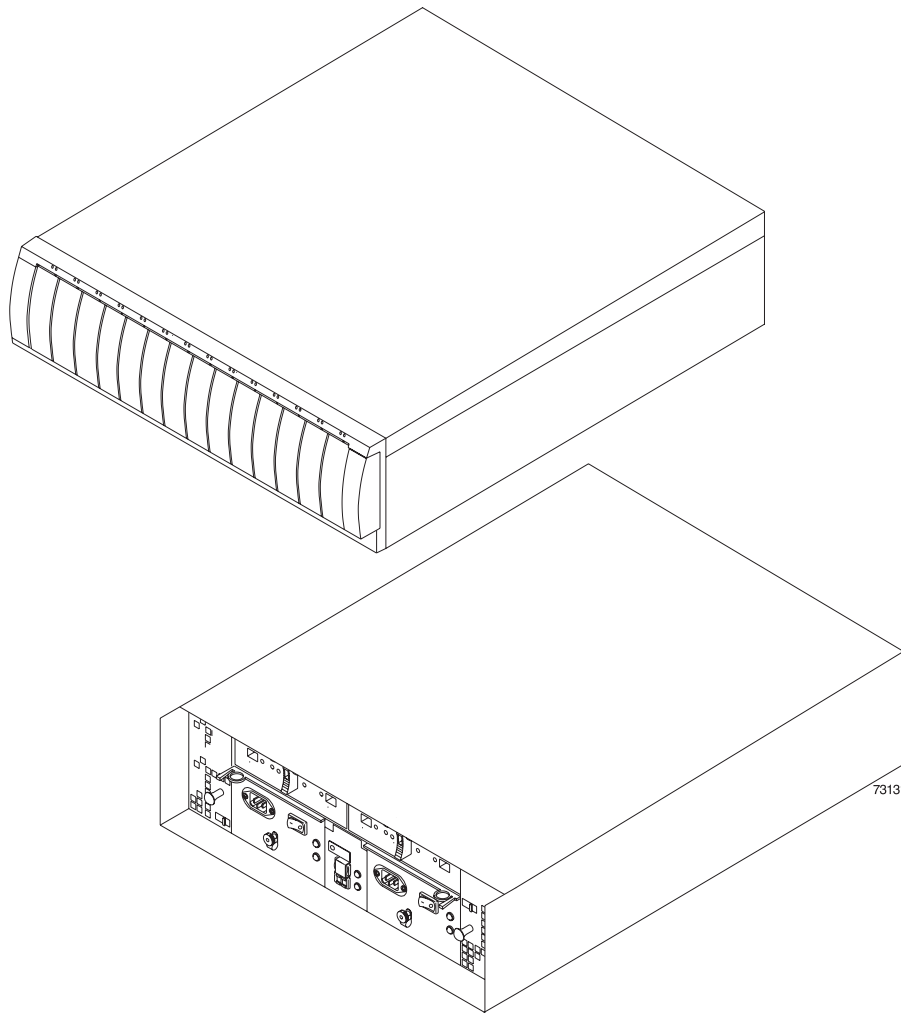


Figure 8-1 Front and Back Views of a Rackmount FLC200 Drive Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the drive module and associated equipment; sufficient space to install, operate, and service the drive module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 8-2 shows the dimensions of the deskside (left) and rackmount (right) models of the FLC200 drive module.

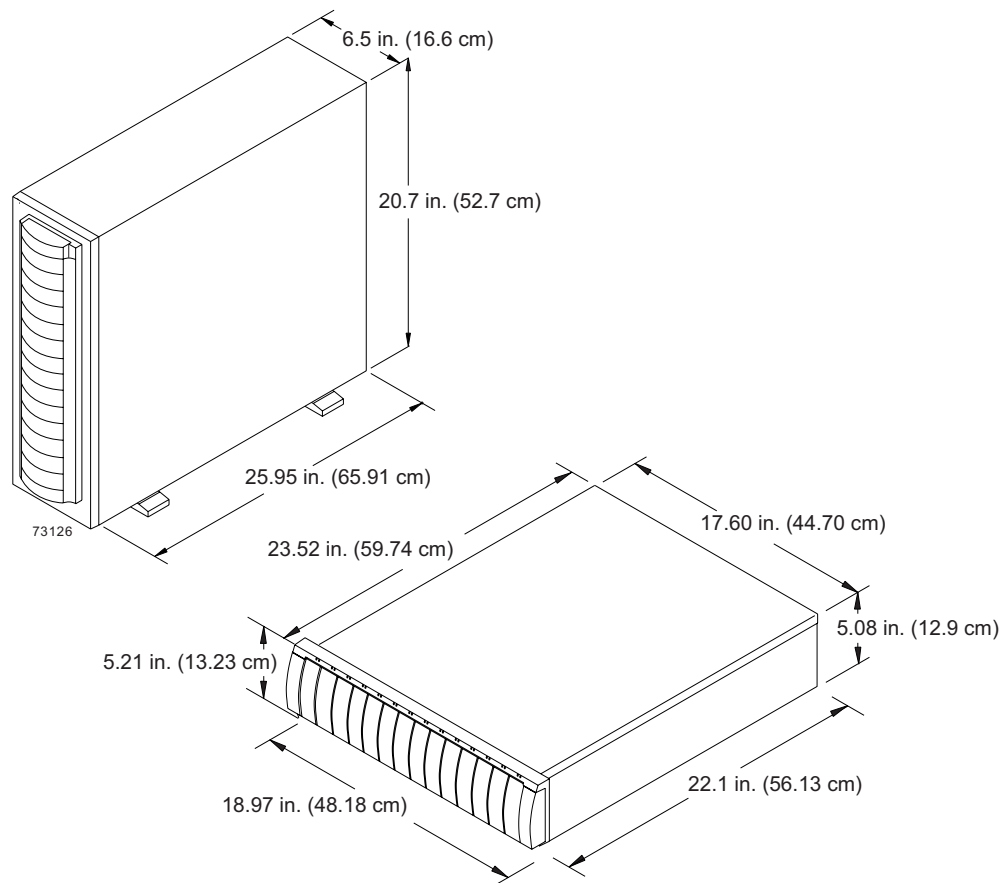


Figure 8-2 FLC200 Drive Module Dimensions

### Weight

The total weight of the drive module depends on the number of components installed. Table 8-1 on page 8-4 lists the maximum, empty, and shipping weights for the drive module in different configurations. Table 8-2 on page 8-4 lists the weight of individual components.

Table 8-1 FLC200 Drive Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLC200 drive module, deskside	52.7 kg (116.0 lb)	26.6 kg (63.0 lb)	64.5 kg (142.0 lb)
FLC200 drive module, rackmount	40.0 kg (88.0 lb)	15.9 kg (35.0 lb)	51.8 kg (114.0 lb)

<sup>1</sup> Maximum weight indicates a drive module with all components installed (fully loaded).

<sup>2</sup> Empty weight indicates a drive module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the drive module and all shipping material.

Table 8-2 FLC200 Drive Module Component Weight

Unit	Weight
Drive	0.98 kg (2.15 lb)
ESM	1.65 kg (3.65 lb)
Power Supply	2.44 kg (5.39 lb)
Fan	1.01 kg (2.23 lb)

## Shipping Dimensions

Table 8-3 lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 8-3 FLC200 Drive Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 8-4 lists the acceptable temperature and humidity ranges in which the drive module is designed to operate.

Table 8-4 FLC200 Drive Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 8-5 lists the acceptable altitudes for operating, storing, and shipping the drive module.

Table 8-5 FLC200 Drive Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 8-3 illustrates the intended airflow for both a deskside model and a rackmount model of the FLC200 drive module. Allow at least 30 inches in front of the drive module and at least 24 inches behind the drive module for service clearance, proper ventilation, and heat dissipation. The FLC200 drive module dissipates heat at a rate of 1078 Btu per hour (0.329 kVA or 316.0 W).

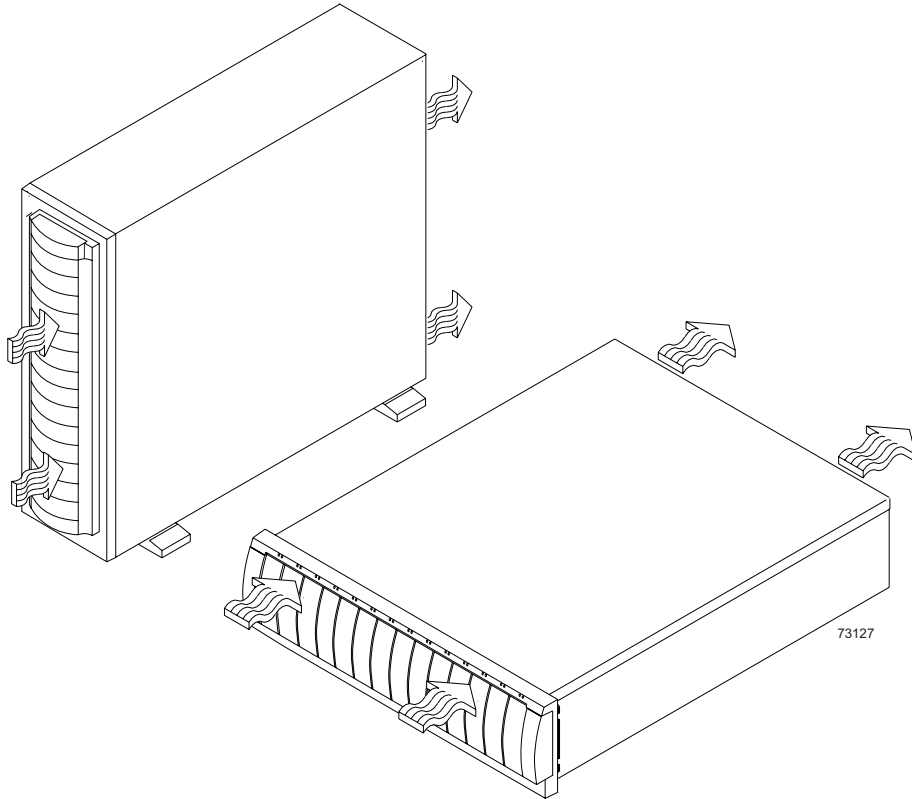


Figure 8-3 FLC200 Drive Module Airflow

## Acoustic Noise

Table 8-6 lists the maximum sound levels emitted by the drive module.

Table 8-6 FLC200 Drive Module Noise Level

Measurement	Level
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, drive module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The drive module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the drive module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The drive modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 8-7 on page 8-8](#) shows the limits within which the drive module can run without interruption.

Table 8-7 FLC200 Drive Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	2.65 A <sup>a</sup>	1.31 A <sup>b</sup>
Maximum Operating Current	2.78 A <sup>a</sup>	1.43 A <sup>b</sup>
Maximum Surge Current	4.00 A <sup>a</sup>	2.03 A <sup>b</sup>

a. Typical current: 115 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

b. Typical current: 230 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.99 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages 1-12 and 1-13 show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution” on page 1-10](#).



## *FLA300 Drive Module Site Preparation*

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This chapter provides site specifications for the FLA300 drive module. Before installing the drive module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLA300 drive module is a compact deskside or rackmount unit that houses SATA drives to provide storage in a Fibre Channel environment. Each drive module contains up to 14 disk drives, one or two switched environmental service monitors (ESMs), two power supplies, and fans.

Figure 9-1 shows the front and back views of the rackmount FLA300 drive module.

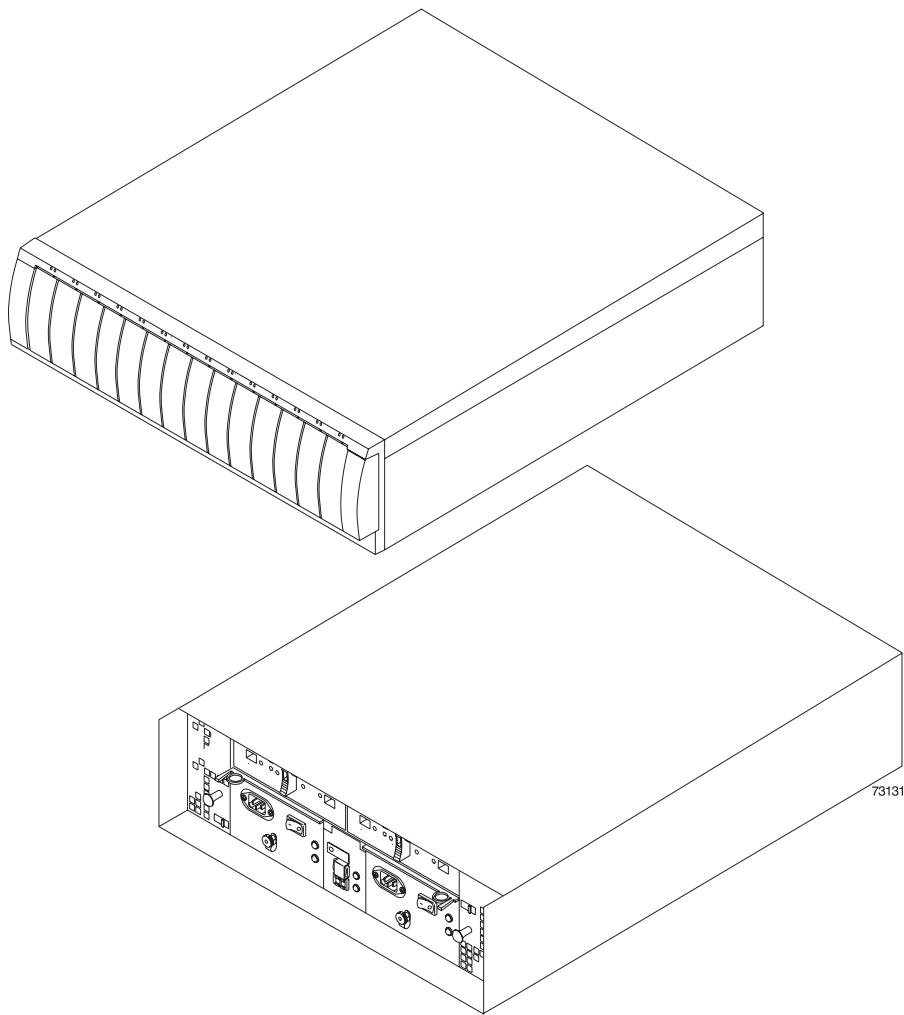


Figure 9-1 Front and Back Views of a Rackmount FLA300 Drive Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the drive module and associated equipment; sufficient space to install, operate, and service the drive module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 9-2 shows the dimensions of the deskside (left) and rackmount (right) models of the FLA300 drive module.

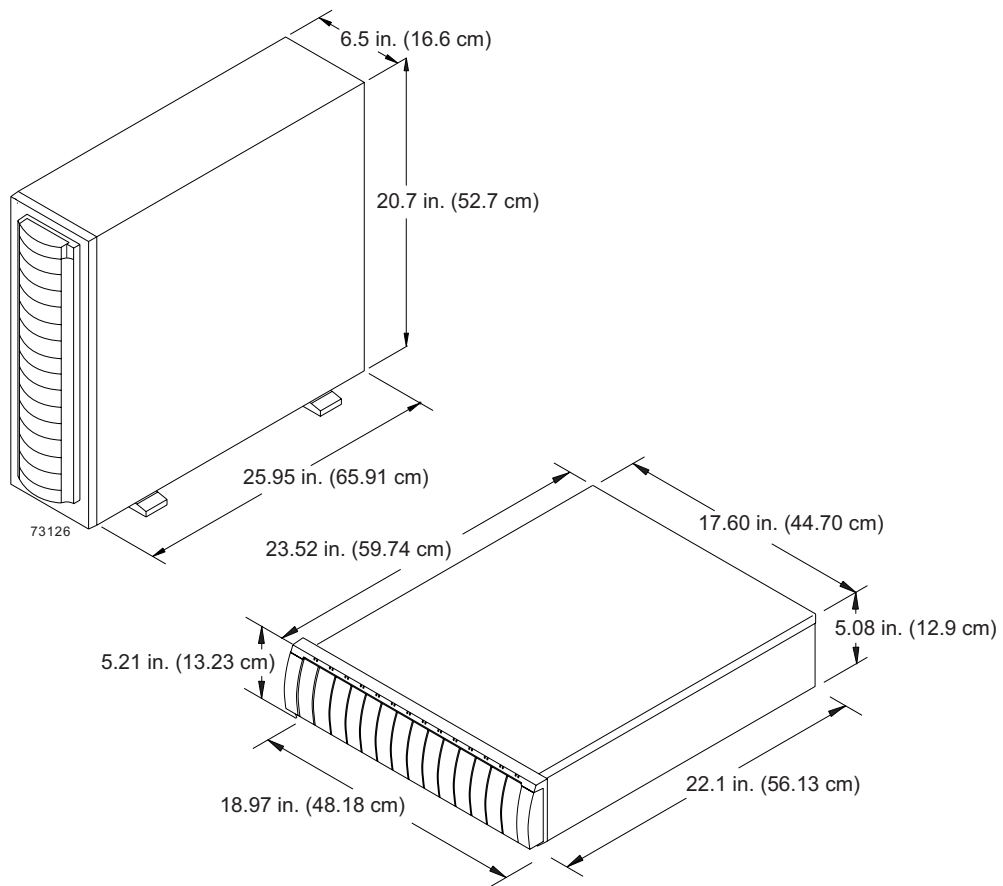


Figure 9-2 FLA300 Drive Module Dimensions

## Weight

The total weight of the drive module depends on the number of components installed. [Table 9-1](#) lists the maximum, empty, and shipping weights for the drive module in different configurations. [Table 9-2](#) lists the weight of individual components.

Table 9-1 FLA300 Drive Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLA300 drive module, deskside	52.7 kg (116.0 lb)	26.6 kg (63.0 lb)	64.5 kg (142.0 lb)
FLA300 drive module, rackmount	40.0 kg (88.0 lb)	15.9 kg (35.0 lb)	51.8 kg (114.0 lb)

<sup>1</sup> Maximum weight indicates a drive module with all components installed (fully loaded).

<sup>2</sup> Empty weight indicates a drive module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the drive module and all shipping material.

Table 9-2 FLA300 Drive Module Component Weight

Unit	Weight
Drive	0.98 kg (2.15 lb)
ESM	1.65 kg (3.65 lb)
Power Supply	2.44 kg (5.39 lb)
Fan	1.01 kg (2.23 lb)

## Shipping Dimensions

[Table 9-3](#) lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 9-3 FLA300 Drive Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 9-4 lists the acceptable temperature and humidity ranges in which the drive module is designed to operate.

Table 9-4 FLA300 Drive Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 9-5 lists the acceptable altitudes for operating, storing, and shipping the drive module.

Table 9-5 FLA300 Drive Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 9-3 illustrates the intended airflow for both a deskside model and a rackmount model of the FLA300 drive module. Allow at least 30 inches in front of the drive module and at least 24 inches behind the drive module for service clearance, proper ventilation, and heat dissipation. The FLA300 drive module dissipates heat at a rate of 1259 Btu per hour (0.384 kVA or 369.0 W).

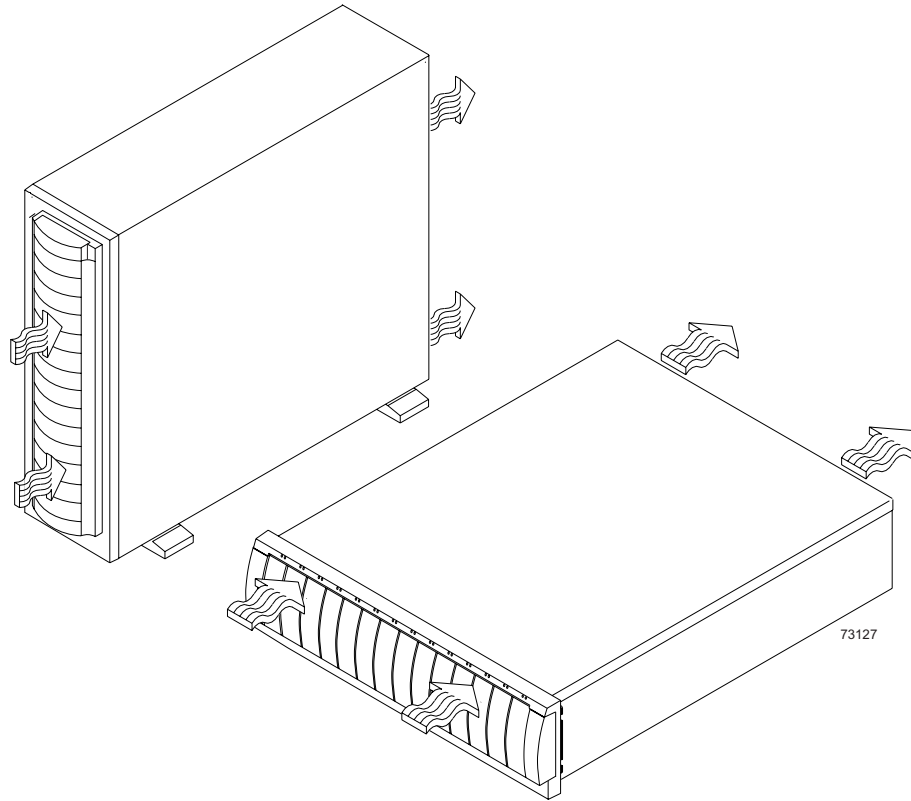


Figure 9-3 FLA300 Drive Module Airflow

## Acoustic Noise

Table 9-6 lists the maximum sound levels emitted by the drive module.

Table 9-6 FLA300 Drive Module Noise Level

Measurement	Level
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, drive module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The drive module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the drive module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The drive modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 9-7 on page 9-8](#) shows the limits within which the drive module can run without interruption.

Table 9-7 FLA300 Drive Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	2.90 A <sup>a</sup>	1.49 A <sup>b</sup>
Maximum Operating Current	3.26 A <sup>a</sup>	1.67 A <sup>b</sup>
Maximum Surge Current	4.57 A <sup>a</sup>	3.06 A <sup>b</sup>

a. Typical current: 115 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

b. Typical current: 230 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.99 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages 1-12 and 1-13 show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution” on page 1-10](#).



## *FLA200 Drive Module Site Preparation*

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This chapter provides site specifications for the FLA200 drive module. Before installing the drive module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The FLA200 drive module is a compact deskside or rackmount unit that houses drives to provide storage in a Fibre Channel environment. Each drive module contains up to 14 disk drives, one or two environmental service monitors (ESMs), two power supplies, and fans.

Figure 10-1 shows the front and back views of the rackmount FLA200 drive module.

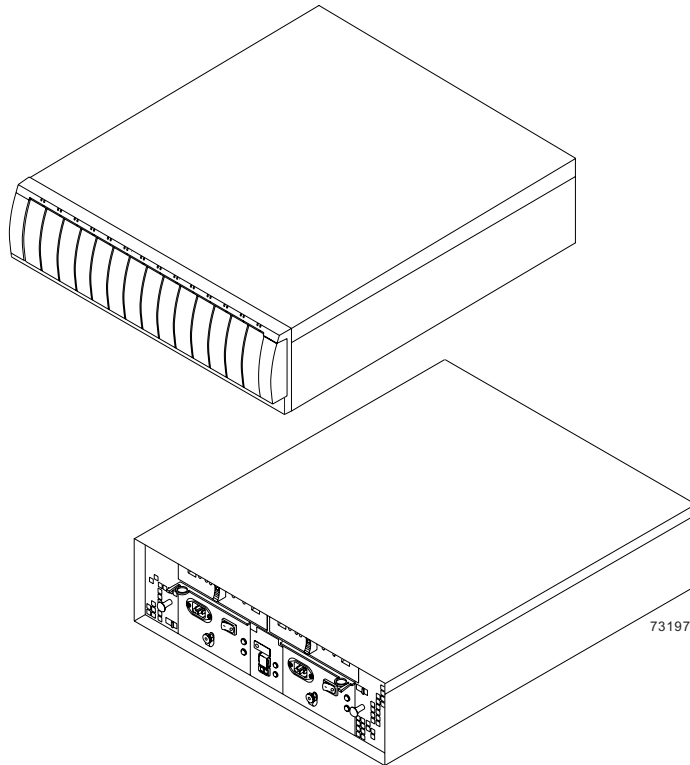


Figure 10-1 Front and Back Views of a Rackmount FLA200 Drive Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the drive module and associated equipment; sufficient space to install, operate, and service the drive module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 10-2 shows the dimensions of the deskside (left) and rackmount (right) models of the FLA200 drive module.

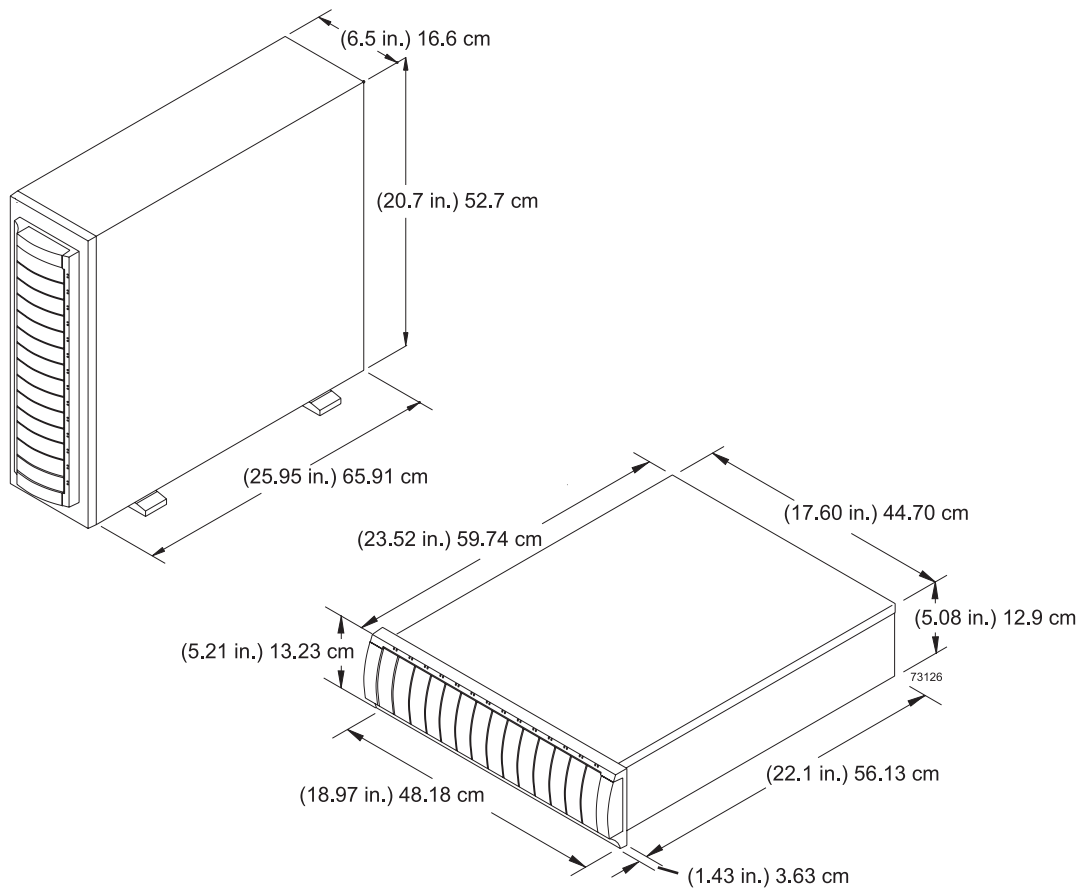


Figure 10-2 FLA200 Drive Module Dimensions

### Weight

The total weight of the drive module depends on the number of components installed. Table 10-1 on page 10-4 lists the maximum, empty, and shipping weights for the drive module in different configurations. Table 10-2 on page 10-4 lists the weight of individual components.

Table 10-1 FLA200 Drive Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
FLA200 drive module, deskside	53.1 kg (117.0 lb)	28.0 kg (63.0 lb)	64.9 kg (143.0 lb)
FLA200 drive module, rackmount	40.40 kg (89.0 lb)	15.9 kg (35.0 lb)	52.2 kg (115.0 lb)

<sup>1</sup> Maximum weight indicates a drive module with all components installed (fully loaded).

<sup>2</sup> Empty weight indicates a drive module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the drive module and all shipping material.

Table 10-2 FLA200 Drive Module Component Weight

Unit	Weight
Drive	1.00 kg (2.2 lb)
ESM	1.59 kg (3.7 lb)
Power Supply	2.45 kg (5.39 lb)
Fan	1.01 kg (2.23 lb)

## Shipping Dimensions

Table 10-3 lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 10-3 FLA200 Drive Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 10-4 lists the acceptable temperature and humidity ranges in which the drive module is designed to operate.

Table 10-4 FLA200 Drive Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 10-5 lists the acceptable altitudes for operating, storing, and shipping the drive module.

Table 10-5 FLA200 Drive Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 10-3 illustrates the intended airflow for both a desktop model and a rackmount model of the FLA200 drive module. Allow at least 30 inches in front of the drive module and at least 24 inches behind the drive module for service clearance, proper ventilation, and heat dissipation. The FLA200 drive module dissipates heat at a rate of 1229 Btu per hour (0.375 kVA or 3660.0 W).

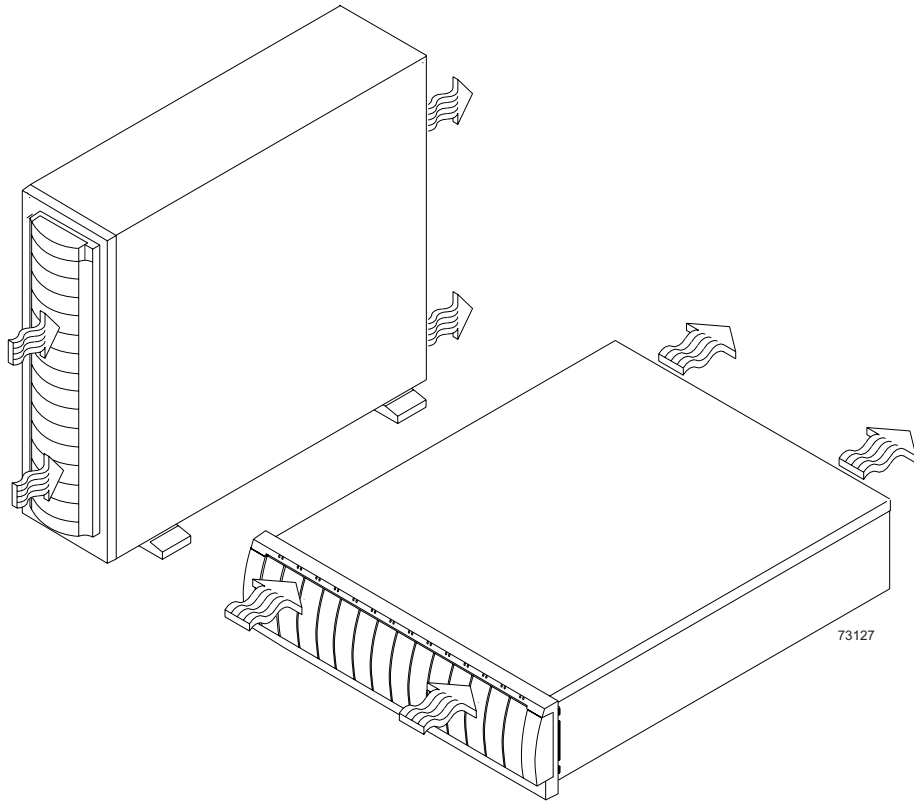


Figure 10-3 FLA200 Drive Module Airflow

## Acoustic Noise

Table 10-6 lists the maximum sound levels emitted by the drive module.

Table 10-6 FLA200 Drive Module Noise Level

Measurement	Level
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, drive module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The drive module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the drive module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The drive modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 10-7 on page 10-8](#) shows the limits within which the drive module can run without interruption.

Table 10-7 FLA200 Drive Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	2.93 A <sup>a</sup>	1.27 A <sup>b</sup>
Maximum Operating Current	3.18 A <sup>a</sup>	1.37 A <sup>b</sup>
Maximum Surge Current	5.85 A <sup>a</sup>	2.36 A <sup>b</sup>

a. Typical current: 115 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

b. Typical current: 230 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.99 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages 1-12 and 1-13 show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution” on page 1-10](#).



## *9170-014 Drive Module Site Preparation*

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This chapter provides site specifications for the 9170-014 drive module. Before installing the drive module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The 9170-014 drive module is a compact desktside or rackmount unit that houses drives to provide storage in a Fibre Channel environment. Each drive module contains up to 14 disk drives, one or two environmental service monitors (ESMs), two power supplies, and fans.

Figure 11-1 shows the front and back views of the rackmount 9170-014 drive module.

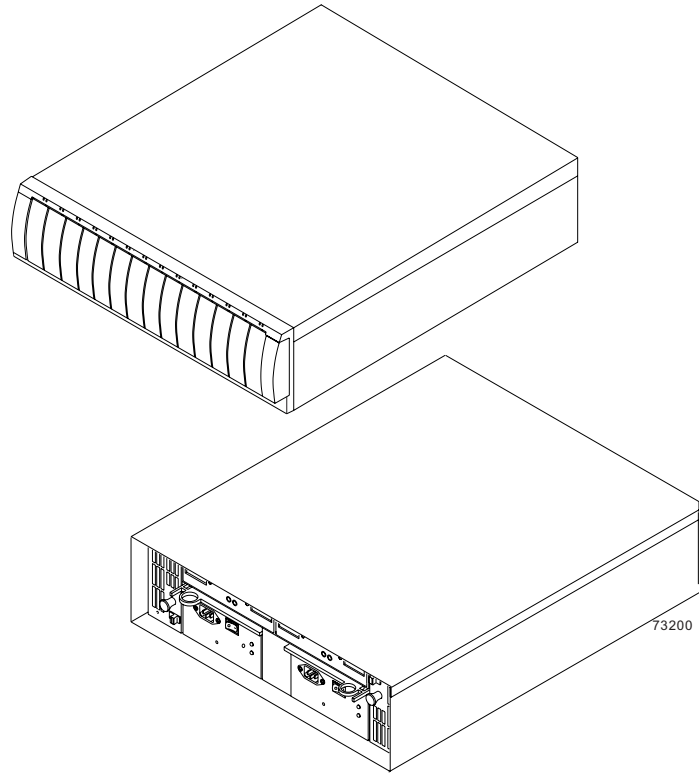


Figure 11-1 Front and Back Views of a Rackmount 9170-014 Drive Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the drive module and associated equipment; sufficient space to install, operate, and service the drive module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 11-2 shows the dimensions of the deskside (left) and rackmount (right) models of the 9170-014 drive module.

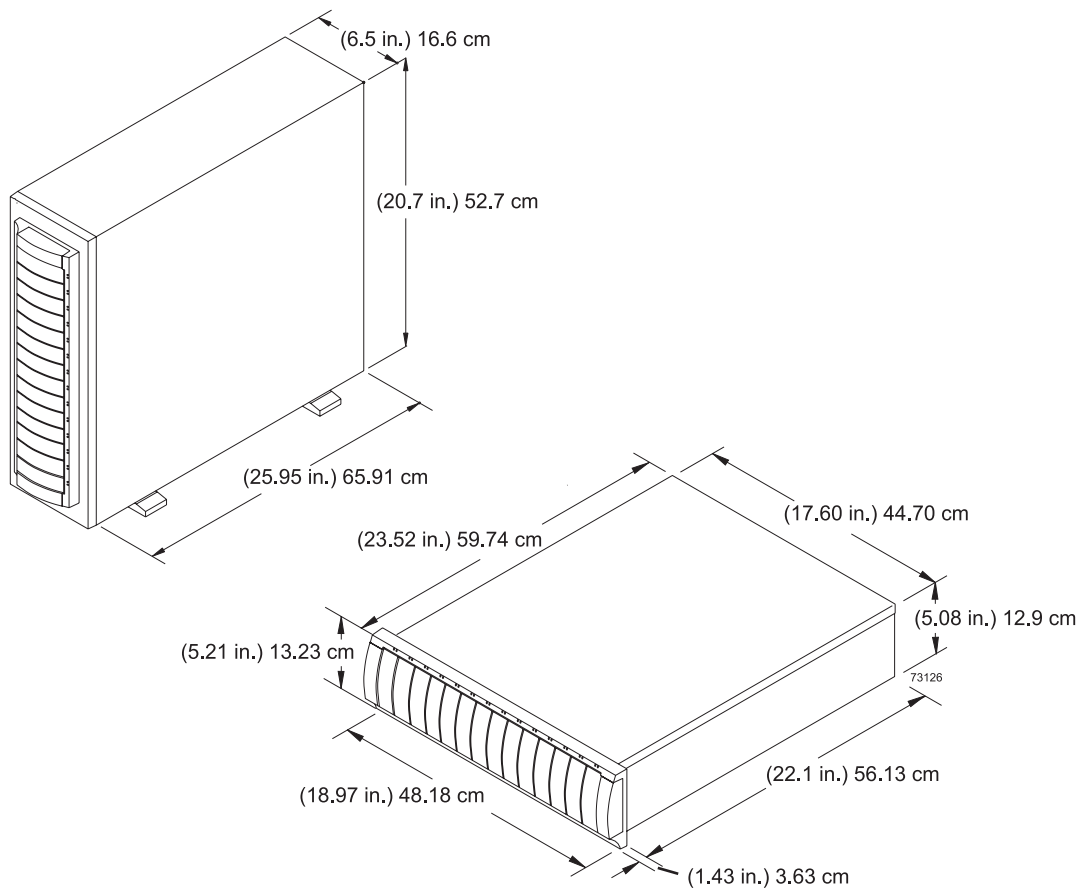


Figure 11-2 9170-014 Drive Module Dimensions

## Weight

The total weight of the drive module depends on the number of components installed. [Table 11-1](#) lists the maximum, empty, and shipping weights for the drive module in different configurations. [Table 11-2](#) lists the weight of individual components.

Table 11-1 9170-014 Drive Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
9170-014 drive module, deskside	53.5 kg (118.0 lb)	29.0 kg (64.0 lb)	65.3 kg (144.0 lb)
9170-014 drive module, rackmount	40.8 kg (90.0 lb)	16.3 kg (36.0 lb)	52.6 kg (116.0 lb)

<sup>1</sup> Maximum weight indicates a drive module with all components installed (fully loaded).

<sup>2</sup> Empty weight indicates a drive module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the drive module and all shipping material.

Table 11-2 9170-014 Drive Module Component Weight

Unit	Weight
Drive	1.0 kg (2.2 lb)
ESM	1.67 kg (3.7 lb)
Power Supply	2.49 kg (5.5 lb)
Fan	1.0 kg (2.2 lb)

## Shipping Dimensions

[Table 11-3](#) lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 11-3 9170-014 Drive Module Shipping Carton Dimensions

Height	Width	Depth
44.45 cm (17.5 in.)	62.23 cm (24.5 in.)	74.93 cm (29.5 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 11-4 lists the acceptable temperature and humidity ranges in which the drive module is designed to operate.

Table 11-4 9170-014 Drive Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 11-5 lists the acceptable altitudes for operating, storing, and shipping the drive module

Table 11-5 9170-014 Drive Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 11-3 illustrates the intended airflow for both a desktop model and a rackmount model of the 9170-014 drive module. Allow at least 30 inches in front of the drive module and at least 24 inches behind the drive module for service clearance, proper ventilation, and heat dissipation. The 9170-014 drive module dissipates heat at a rate of 1143 Btu per hour (0.338 kVA or 335.0 W).

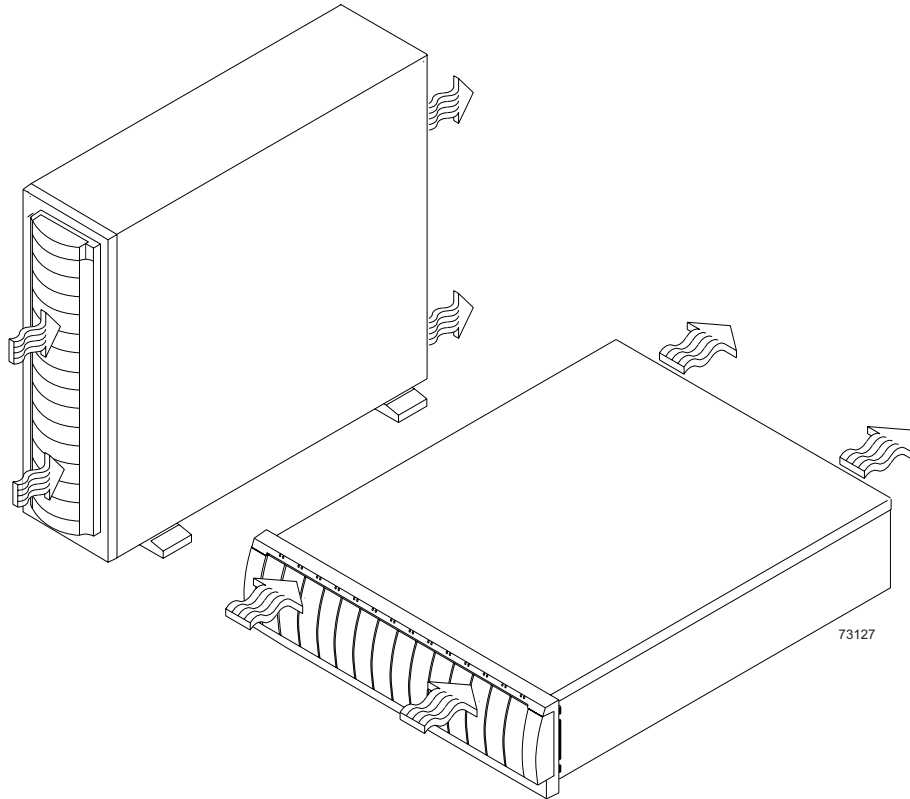


Figure 11-3 9170-014 Drive Module Airflow

## Acoustic Noise

Table 11-6 lists the maximum sound levels emitted by the drive module.

Table 11-6 9170-014 Drive Module Noise Level

Measurement	Level
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, drive module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The drive module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the drive module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The drive modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 11-7 on page 11-8](#) shows the limits within which the drive module can run without interruption.

Table 11-7 9170-014 Drive Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	2.95 A <sup>a</sup>	1.42 A <sup>b</sup>
Maximum Operating Current	3.03 A <sup>a</sup>	1.46 A <sup>b</sup>
Maximum Surge Current	4.28 A <sup>a</sup>	1.97 A <sup>b</sup>

a. Typical current: 115 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

b. Typical current: 230 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.99 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages 1-12 and 1-13 show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution” on page 1-10](#).



## *9170-010 Drive Module Site Preparation*

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This chapter provides site specifications for the 9170-010 drive module. Before installing the drive module, you must either verify that your planned installation site meets these requirements, or prepare the site so that it does meet these requirements. Preparations may involve meeting area requirements, environmental requirements, and electrical requirements for module installation, service, and operation.

## Module Features

The 9170-010 drive module is a compact desktside or rackmount unit that houses drives to provide storage in a Fibre Channel environment. Each drive module contains up to 10 disk drives, one or two environmental service monitors (ESMs), 2 power supplies, and fans.

Figure 12-1 shows the front and back views of the rackmount 9170-010 drive module.

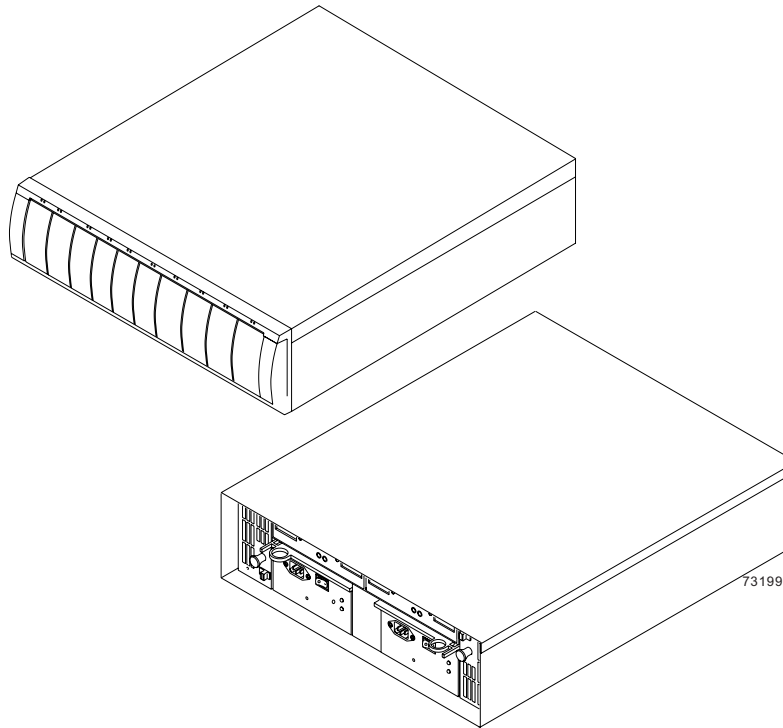


Figure 12-1 Front and Back Views of a Rackmount 9170-010 Drive Module

## Area Requirements

The floor space at the installation site must provide enough strength to support the weight of the drive module and associated equipment; sufficient space to install, operate, and service the drive module; and sufficient ventilation to provide a free flow of air to the unit.

### Dimensions

Figure 12-2 shows the dimensions of the deskside (left) and rackmount (right) models of the 9170-010 drive module.

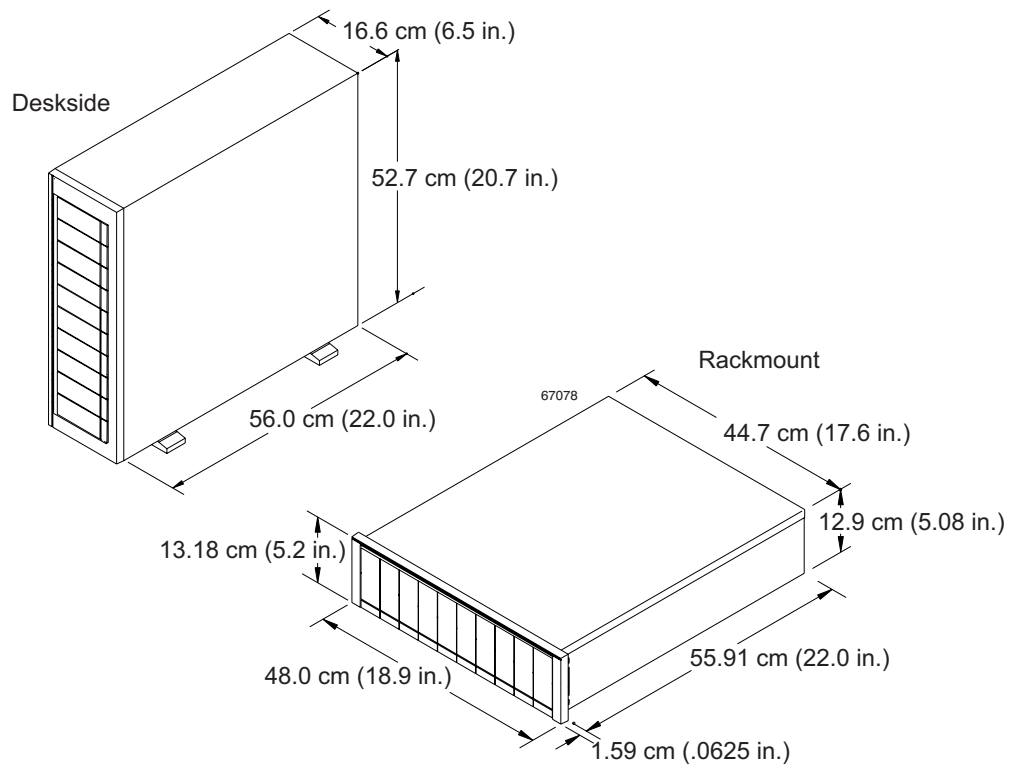


Figure 12-2 9170-010 Drive Module Dimensions

### Weight

The total weight of the drive module depends on the number of components installed. Table 12-1 on page 12-4 lists the maximum, empty, and shipping weights for the drive module in different configurations. Table 12-2 on page 12-4 lists the weight of individual components.

Table 12-1 9170-010 Drive Module Weight

Unit	Weight		
	Maximum <sup>1</sup>	Empty <sup>2</sup>	Shipping <sup>3</sup>
9170-010 drive module, deskside	49.0 kg (108.0 lb)	26.6 kg (63.0 lb)	60.8 kg (134.0 lb)
9170-010 drive module, rackmount	36.3 kg (80.0 lb)	15.9 kg (35.0 lb)	48.1 kg (106.0 lb)

<sup>1</sup> Maximum weight indicates a drive module with all components installed (fully loaded).

<sup>2</sup> Empty weight indicates a drive module with all components removed.

<sup>3</sup> Shipping weight indicates the maximum weight of the drive module and all shipping material.

Table 12-2 9170-010 Drive Module Component Weight

Unit	Weight
Drive	1.06 kg (2.34 lb)
ESM	1.7 kg (3.8 lb)
Power Supply	2.3 kg (5.0 lb)
Fan	1.0 kg (2.3 lb)

## Shipping Dimensions

Table 12-3 lists shipping carton dimensions. The height shown includes the height of the pallet.

Table 12-3 9170-010 Drive Module Shipping Carton Dimensions

Height	Width	Depth
38.1 cm (15.0 in.)	61.4 cm (24.0 in.)	83.2 cm (32.7 in.)

# Environmental Requirements and Specifications

This section describes the environmental conditions that are prerequisite to installing the unit, and heat and sound conditions that are generated by normal operation of the unit.

## Temperature and Humidity

Table 12-4 lists the acceptable temperature and humidity ranges in which the drive module is designed to operate.

Table 12-4 9170-010 Drive Module Temperature and Humidity Requirements

Condition	Parameter	Requirement
Temperature <sup>a</sup>	Operating Range	10° C to 40° C (50° F to 104° F)
	Maximum Rate of Change	10° C (18° F) per hour
	Storage Range	-10° C to 65° C (14° F to 149° F)
	Maximum Rate of Change	15° C (27° F) per hour
	Transit Range	-40° C to 65° C (-40° F to 149° F)
	Maximum Rate of Change	20° C (36° F) per hour
Relative Humidity (No condensation)	Operating Range	20% to 80%
	Storage Range	10% to 90%
	Transit Range	5% to 95%
	Maximum Dew Point	26° C (79° F)
	Maximum Gradient	10% per hour

a. If you plan to operate a system at an altitude between 1000 m to 3000 m, (3280 ft. to 9842 ft.) above sea level, lower the environmental temperature 1.7° C (3.3° F) for every 1000 m (3280 ft.) above sea level.

## Altitude

Table 12-5 lists the acceptable altitudes for operating, storing, and shipping the drive module

Table 12-5 9170-010 Drive Module Altitude Ranges

Environment	Altitude
Operating	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Storage	30.5 m (100 ft.) below sea level to 3000 m (9842 ft.) above sea level
Transit	30.5 m (100 ft.) below sea level to 12,000 m (40,000 ft.) above sea level

## Airflow/Heat Dissipation

Figure 12-3 illustrates the intended airflow for both a deskside model and a rackmount model of the 9170-010 drive module. Allow at least 30 inches in front of the drive module and at least 24 inches behind the drive module for service clearance, proper ventilation, and heat dissipation. The 9170-010 drive module dissipates heat at a rate of 933 Btu per hour (0.276 kVA or 273.0 W).

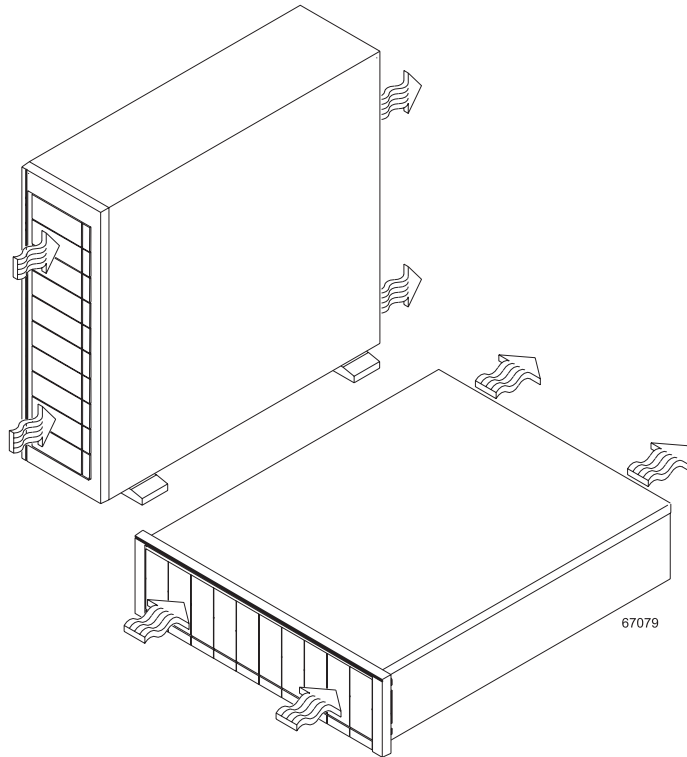


Figure 12-3 9170-010 Drive Module Airflow

## Acoustic Noise

Table 12-6 lists the maximum sound levels emitted by the drive module.

Table 12-6 9170-010 Drive Module Noise Level

Measurement	Level
Sound Power	6.0 bels
Sound Pressure	60 dBA

## Electrical Requirements

This section provides information regarding site power and wiring, drive module AC power requirements, and power cord routing instructions.

### Site Wiring and Power

The drive module uses wide-ranging, redundant power supplies that automatically accommodate voltages to the AC power source. The power supplies meet standard voltage requirements for both domestic (inside USA) and international (outside USA) operation. They use standard industrial wiring with line-to-neutral or line-to-line power connections.

Consider the following information when preparing the drive module installation site:

- **Earth ground** – Site wiring must include an earth ground connection to the AC power source.
- **Circuit overloading** – Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the unit, isolate its power source from large switching loads (such as air conditioning motors, elevator motors, and factory loads).
- **Power interruptions** – The drive modules will withstand the following applied voltage interruptions (with or without an integrated UPS):
  - **Input transient** – 50% of nominal voltage
  - **Duration** – one-half cycle
  - **Frequency** – once every 10 seconds
- **Power failures** – If a total power failure occurs, the unit will automatically perform a power-up recovery sequence without operator intervention after power is restored.

### Power Input

The AC power sources must provide the correct voltage, current, and frequency specified on the module model and serial number label. [Table 12-7 on page 12-8](#) shows the limits within which the drive module can run without interruption.

Table 12-7 9170-010 Drive Module AC Power Requirements

	Low Range	High Range
Nominal Voltage	90 to 136 VAC	180 to 264 VAC
Frequency	50 to 60 Hz	50 to 60 Hz
Idle Current	3.02 A <sup>a</sup>	1.31 A <sup>b</sup>
Maximum Operating Current	3.11 A <sup>a</sup>	1.34 A <sup>b</sup>
Maximum Surge Current (10-drive spin up)	4.70 A <sup>a</sup>	1.92 A <sup>b</sup>

a. Typical current: 115 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

b. Typical current: 230 V AC, 60 Hz at 0.73 power supply efficiency and 0.96 power factor.

Each power supply contains one 10 A slow-blow fuse.

## Power Factor Correction

Power factor correction is applied within the fan-and-power-supply CRU of each unit. This maintains the power factor of the unit at greater than 0.99 with nominal input voltage.

## Power Cords and Receptacles

All modules are shipped with two AC power cords that are appropriate for use in a typical outlet in the destination country. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) on pages 1-12 and 1-13 show the three standard cord and outlet designs. Each power cord connects one of the power supplies in a module to an independent, external power source, such as a wall receptacle or uninterruptible power supply (UPS).

If you have a rackmount cabinet with internal power cabling, such as a ladder cord, you do not need these power cords. See [“AC Power Distribution”](#) on page 1-10.



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