FlashBlade//S Technical Specifications

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Chapter 1
Overview

FlashBlade//S is the next-generation unified fast file and object (UFFO) storage system that incorporates the latest advances in technology components and delivers significantly higher performance and capacityfor demand-intensive enterprise and AI applications. The modular design of FlashBlade//S disaggregates the compute resources from the storage, so it is simple to reconfigure and efficiently scale for capacity, performance, or both.

Features

FlashBlade//S features new hardware designs:

- Chassis
    - The FlashBlade//S chassis is 5RU high and contains bays for mounting ten blades. Fully populated with high-density blades, a chassis holds up to 3PB of raw capacity with headroom for future density increases. The 5RU chassis height accommodates the new blades and improves airflow to efficiently dissipate heat.
    - The chassis midplane distributes power and contains dual Ethernet links capable of operating at 100 Gbps to each blade. The blades connect to two next-generation Fabric I/O Modules (FIOMs) on the midplane. These FIOMs, renowned for their high-reliability and UEFI secure boot-enabled feature, employ advanced authentication protocols to enhance performance and bolster system security when connected to client networks.
    - The chassis contains four AC or DC power supply units (PSUs), each rated at 2,000 watts. The PSUs are “2+2 redundant”—any two of them can provide the chassis’ maximum rated power of 4,000 watts, anticipating the greater demands of future components.
- Blade
    - The second generation FlashBlade//S200R2 and //S500R2 blades are designed to fit into FlashBlade//S chassis and contain CPUs, NICs, DRAM, and four mounting slots for DirectFlash Module (DFM). The blades use NVMe over on-board PCIe to communicate with their DFMs and can handle PCIe Gen 3 and 4 connections. Blades operate with up to four DFMs installed. All blades in the chassis must be configured with the same number of DFMs in each blade.

- FlashBlade//S can be configured for entry-level scale-out storage or elevated for optimize performance. The following DFM capacities are supported on various models:
  - FlashBlade//S100: 18TB and 37TB
  - FlashBlade//S200 and //S200R2: 24TB, 37TB, 48TB, and 75TB
  - FlashBlade//S500 and //S500R2: 24TB, 37TB, 48TB, and 75TB

  Note: FlashBlade//S supports mixing DFM capacities starting with Purity//FB version 4.5.2.
- Systems can be configured for applications from the very read-intensive (e.g., artificial intelligence and machine learning) to those requiring very high capacity (e.g., backup and archiving).
- The blade design isolates failure domains. A failed DFM can be replaced from the chassis front without affecting its blade's ability to function. As a temporary workaround until the spare blade is made available, DFMs can be relocated to available/empty bays on different blades in a system to minimize the operational impact of recovering from blade failures or replacements.

- eXternal Fabric Modules
  - A pair of eXternal Fabric Modules (XFM-8400) available only for multi-chassis configurations interconnects all chassis and connected host servers.
  - 4 x 10, 4 x 25, 40, or 100 Gbps QSFP28/QSFP+ or 200 Gbps QSFP56 or 400Gbps QSFP-DD DR4 (only supported with XFM-8400) optical transceivers are available for connecting to client network on each XFM module.
  - Maximum total potential bandwidth between FlashBlade//S system and clients is 6400Gbps/ 6.4Tbps with XFM-8400 and 400G QSFP-DD DR4 optics.
- Networking
  - FlashBlade//S chassis uses dual FIOMs to interconnect blades and to connect them to the external environment. Each FIOM contains state-of-the-art Ethernet switches with a total of 800 Gbps cross-sectional bandwidth and eight external ports (four ports are available to be used at the moment), each capable of 10, 25, 40, or 100 Gbps communication speeds.
  - Each FIOM communicates among the blades (//S100, //S200, and //S500) in its chassis at 50 Gbps and 100 Gbps (//S200R2 and //S500R2), although both FIOM switches and blade NICs are 100 Gbps-capable, to accommodate higher bandwidth demands in the future.

- Expansion Options
  - FlashBlade//S supports multiple expansion options between the support for blade-type //S200 or //S200R2 and //S500 or //S500R2, and DFM types 24, 37, 48, and 75TB DFMs.
  - For efficient storage, all models require a minimum of seven blades. Systems can be expanded by adding DFMs to blades, blades to chassis, or additional chassis, either initially or as post-deployment upgrades.
  - FlashBlade//S (//S200 or //S200R2 and //S500 or //S500R2) single and multi-chassis configurations expand up to 10 chassis. FlashBlade//S100 are only available as single-chassis system with 18 and 37TB DFM options.
  - FlashBlade//S100 storage capacity can be expanded by adding 18TB or 37TB DFMs.

Chapter 2
FlashBlade//S Specifications

The following sections describe the physical specifications of a FlashBlade//S system.

FlashBlade//S Dimensions and Weight

The following illustrations and tables list the physical specifications of a FlashBlade//S chassis and associated components.

Figure 2.1 Chassis (Front View)

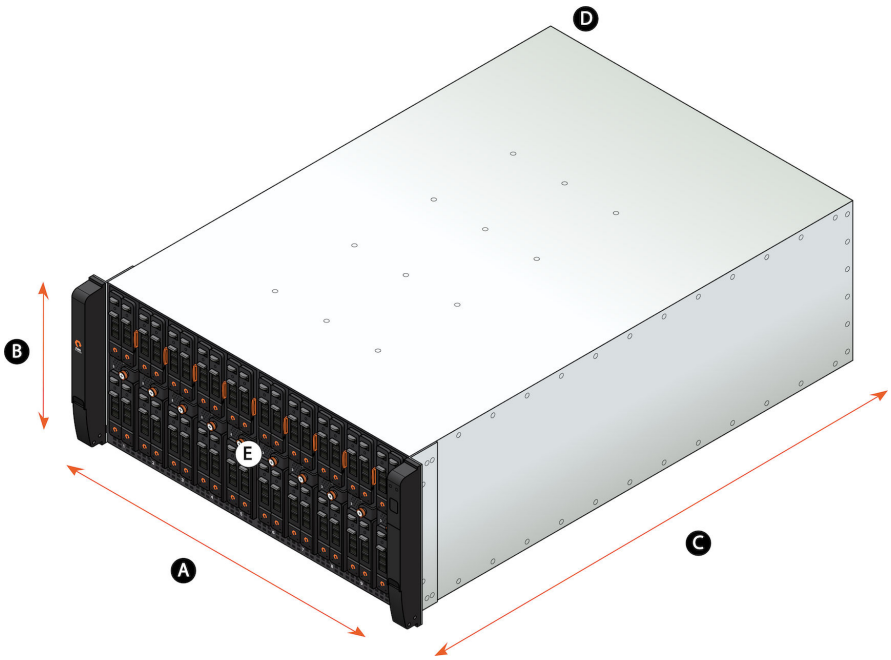


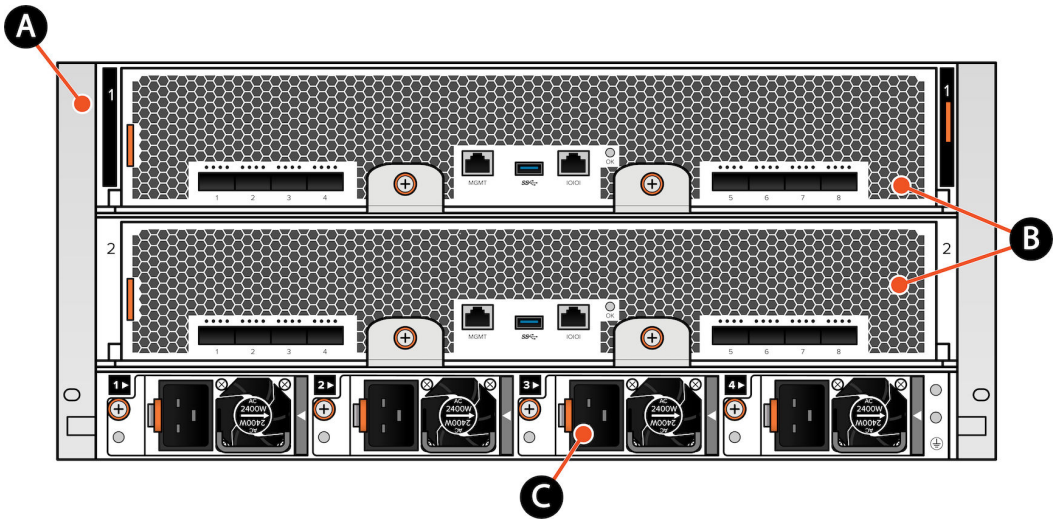
Table 2.1 Chassis Dimensions

Callout	Specification	Dimensions	Notes
A	Chassis width Overall width	44.3 cm (17.44 in.) 48.2 cm (19.00 in.)	Not including rack ears. Including rack ears and bezel.
B	Height	21.9 cm (8.62 in.)	5 RU of contiguous vertical space is required.

Table 2.1 Chassis Dimensions (continued)

Callout	Specification	Dimensions	Notes
C	Chassis length Overall length	81.3 cm (32.0 in.) 86.0 cm (34.0 in.)	From rack mount surface. Includes rack ears and bezel.
D	Rear depth allowance	3.2 cm (1.3 in.)	Clearance for PSU handle not including power cord.
E	Individual blade (without DFMs)	Length: 57.5 cm (22.7 in.) Width: 4.2 cm (1.65 in.) Height: 19.8 cm (7.80 in.)	Width value does not include EMC gaskets. Height value does not include EMC gaskets or ejector.
Not shown	Front bezel allowance	5 cm (2.0 in.)	Rack mount surface to the front bezel.
Note: The direction of the airflow enters from the front and exits through the rear of the chassis.			

Figure 2.2 Chassis Components (Rear View)



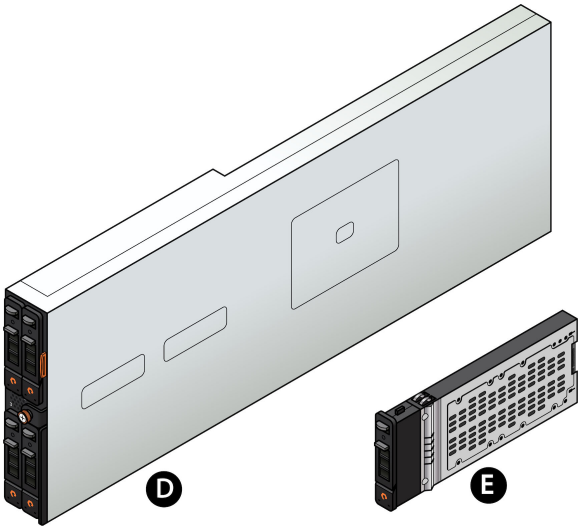


Table 2.2 Component Weight

Callout	Component	Quantity (per system)	Weight (per component)
A	Chassis	1	28.0 kg (61.8 lb)
B	Fabric I/O Module	2 per chassis	5.8 kg (12.8 lb)
C	AC/DC Power supply unit (PSU)	4 per chassis	1.0 kg (2.3 lb)
	Power supply module (Housing unit for PSU)	4 per chassis	0.6 kg (1.4 lb)
D	Blade (without DFMs)	7-10 per chassis	4.6 kg (10.2 lb)
E	DirectFlash Module	1-4 per blade 7-40 per chassis	0.2 kg (0.4 lb)

Packaging Dimensions and Weight

FlashBlade//S shipping volume, including pallet, is approximately 1.1 x 0.7 x 0.8 m (43 1/8 x 24 1/2 x 31 3/8 in.). Multi-chassis configuration shipment may include multiple pallets.

The packaging without any contents weighs approximately 36 kg (80 lb). A fully loaded shipping configuration weighs approximately 136 kg (300 lb).

Rack Specifications

Verify the rack's front and rear mounting posts are between 61 and 91 cm (24-36 in.) apart, and there are 4 RU (17.8 cm or 7 in.)5 RU (22.3 cm or 8.75 in.) of vertical space in the rack for the FlashBlade//S chassis.

Pure Storage provides #10-32 cage nuts and screws in the accessory kit to secure the chassis in a square-hole rack. For round-hole racks, use clip nuts (not provided) instead of cage nuts to secure the chassis to the rack. For round-hole racks, if you use #10-32 clip nuts, you can use the #10-32 screws provided in the accessory kit. If you use clip nuts of any other size, you must use matching screws. Clip nuts and alternate screws are not provided by Pure Storage.

The minimum mounted clearances for each chassis surface:

- Front (Cold Aisle): 81.5 cm (32 in.)
- Rear (Hot Aisle): 81.5 cm (32 in.)
- Side: 1.5 cm (0.6 in.)
- Top and Bottom: 0 cm (0 in.)

Power Specifications

The following sections provide power specifications for FlashBlade//S chassis and power supply units.

FlashBlade//S100 Power Specifications

The following tables describe the power consumption for a single FlashBlade//S100 chassis. These numbers are valid irrespective of the storage capacity or number of DirectFlash Modules.

Note: Peak power for other configurations, such as chassis with other blade quantities and multi-chassis configurations, can be obtained by adding the following modules to the configurations above.

Module	Total Peak Power (W)
FlashBlade//S100 blade	195
0-blade chassis	760

Table 2.4 AC Power

Model	# of Blades	Peak/Nominal	AC Power (W)	AC Power (VA)	AC Current at 208V (A)	AC Current at 240V (A)	Heat (BTU/hr)
FlashBlade// S100	7	Peak	2,082	2,192	10.5	9.1	7,100
		Nominal	1,696	1,785	8.6	7.4	5,782
	10	Peak	2,804	2,952	14.2	12.3	9,562
		Nominal	2,288	2,408	11.6	10.0	7,802

Table 2.5 DC Power

Model	# of Blades	Peak/Nominal	DC Power (VA)	DC Current at 48V (A)	DC Current at 60V (A)	Heat (BTU/hr)
FlashBlade//S100	7	Peak	2,192	46	37	7,100
		Nominal	1,785	37	30	5,782
	10	Peak	2,952	61	49	9,562
		Nominal	2,408	50	40	7,802

FlashBlade//S200 and //S200R2 Power Specifications

The following tables describe the power consumption for a single FlashBlade//S200 and //S200R2 chassis. These numbers are valid irrespective of the storage capacity or number of DirectFlash Modules.

Module	Total Peak Power (W)
FlashBlade//S200 and //S200R2 blade	240
0-blade chassis	760

Table 2.7 AC Power

Model	# of Blades	Peak/Nominal	AC Power (W)	AC Power (VA)	AC Current at 208V (A)	AC Current at 240V (A)	Heat (BTU/hr)
FlashBlade//S200	7	Peak	2,172	2,286	11.0	9.5	7,407
		Nominal	1,765	1,857	8.9	7.7	6,017
	10	Peak	2,894	3,046	14.6	12.7	9,869
		Nominal	2,357	2,481	11.9	10.3	8,037
FlashBlade//S200R2	7	Peak	2,408	2,535	12.2	10.6	8,211
		Nominal	1,854	1,952	9.4	8.1	6,322
	10	Peak	3,236	3,406	16.4	14.2	11,035
		Nominal	2,478	2,608	12.5	10.9	8,450

Table 2.8 DC Power

Model	# of Blades	Peak/Nominal	DC Power (VA)	DC Current at 48V (A)	DC Current at 60V (A)	Heat (BTU/hr)
FlashBlade//S200	7	Peak	2,286	48	38	7,407
		Nominal	1,857	39	31	6,017
	10	Peak	3,046	63	51	9,869
		Nominal	2,481	52	41	8,037

Table 2.8 DC Power (continued)

Model	# of Blades	Peak/Nominal	DC Power (VA)	DC Current at 48V (A)	DC Current at 60V (A)	Heat (BTU/hr)
FlashBlade// S200R2	7	Peak	2,535	53	42	8,211
		Nominal	1,952	41	33	6,322
	10	Peak	3,406	71	57	11,035
		Nominal	2,608	54	43	8,450

FlashBlade//S Power Specifications

The following tables describe the power consumption for a single FlashBlade//S chassis installed with FlashBlade//S500 and //S500R2 blades. These numbers are valid irrespective of the storage capacity or number of DirectFlash Modules.

Module	Total Peak Power (W)
FlashBlade//S500 and //S500R2 blade	245
0-blade (empty) chassis	760

Table 2.10 AC Power

Model	# of Blades	Peak/Nominal	AC Power (W)	AC Power (VA)	AC Current at 208V (A)	AC Current at 240V (A)	Heat (BTU/hr)
FlashBlade// S500	7	Peak	2,470	2,600	12.5	10.8	8,423
		Nominal	1,947	2,049	9.9	8.5	6,639
	10	Peak	3,320	3,495	16.8	14.6	11,321
		Nominal	2,610	2,747	13.2	11.4	8,900

Table 2.10 AC Power (continued)

Model	# of Blades	Peak/Nominal	AC Power (W)	AC Power (VA)	AC Current at 208V (A)	AC Current at 240V (A)	Heat (BTU/hr)
FlashBlade// S500R2	7	Peak	2,723	2,866	13.8	11.9	9,285
		Nominal	2,067	2,175	10.5	9.1	7,047
	10	Peak	3,686	3,880	18.7	16.2	12,569
		Nominal	2,771	2,916	14.0	12.2	9,447

Table 2.11 DC Power

Model	# of Blades	Peak/Nominal	DC Power (VA)	DC Current at 48V (A)	DC Current at 60V (A)	Heat (BTU/hr)
FlashBlade//S500	7	Peak	2,600	54	43	8,423
		Nominal	2,049	43	34	6,639
	10	Peak	3,495	73	58	11,321
		Nominal	2,747	57	46	8,900
FlashBlade// S500R2	7	Peak	2,866	60	48	9,285
		Nominal	2,175	45	36	7,047
	10	Peak	3,880	81	65	12,569
		Nominal	2,916	61	49	9,447

Power Supply Unit Specifications

Pure Storage's FlashBlade//S storage systems use a family of common power supply unit (PSU) form-factor called *CRPS-185mm*. All share the same physical dimensions, but vary in power output capacity (Watts). Our AC power supplies perform to the 80-Plus(™) Titanium energy efficiency standard.

The Titanium AC PSU (2000W) or an alternative DC PSU (2000W) is available for FlashBlade//S models.

Note: The DC PSU option is available for FlashBlade//S multi-chassis configurations. However, the XFM modules are equipped with AC PSUs and draw AC power.

Capacity

The Titanium power supply units are available in the following capacity models:

Table 2.12 Titanium 2000W AC Model

Item	Description
AC Input Connector:	C14 Connector
Input Voltage	200V - 240V at 50/60HZ (autoranging)
Output:	2000W
Used on:	FlashBlade//S (all models)

Note: Older Platinum 2400W model uses a C19 connector.

Figure 2.3 Input Connector Types

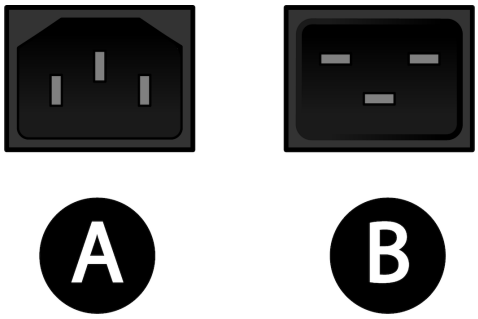


Table 2.13 Input Connector Types

Callout	Description
A	C14 receptacle
B	C20 receptacle

AC Input Voltage Models

Note: The power supply units (PSU) are equipped with power cords. The PSUs are auto-ranging and operate over 200–240 VAC (nominal). FlashBlade//S PSUs operate in a 2+2 redundant mode at 200-240 VAC.

Table 2.14 Efficiency Ratings All Titanium AC Input Voltage Models

Titanium Rating	230V / 50Hz AC Input			
Power Output	10%	20%	50%	100%
Efficiency	90%	94%	96%	91%

Table 2.15 Power Factor

Titanium Rating	230V / 50Hz AC Input			
Power Output	10%	20%	50%	100%
Minimum PF	0.9	0.96	0.98	0.99

DC Input Voltage Models

Note: The DC PSU is equipped with a 3-meter -48V DC power cord.

A DC power supply unit is available in the following capacity model:

Table 2.16 2000W DC DPS-2000AB-31 C

Item	Description
DC Input Connector:	Contact Pure Storage for more information.
Input Voltage:	-48 VDC to -60 VDC
Output:	2000W
Used on:	FlashBlade//S (all models)

Figure 2.4 Input Connector Type

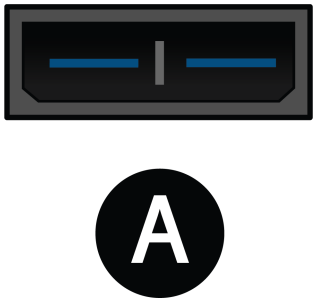


Table 2.17 Input Connector Types

Callout	Description
A	Contact Pure Storage for more information.

Table 2.18 Efficiency Ratings for DC Input Voltage Model

Platinum Rating	-48 VDC to -60 VDC Input		
Load	20%	50%	100%
Efficiency	90%	94%	91%

Environmental Limitations

The following table specifies the environmental limits for a FlashBlade//S system.

Table 2.19 FlashBlade//S Environmental Limits

Specification	Limit	Notes
Operating temperature	5° — 35°C	Derate 1°C per 300 m above 950 m
Non-operating temperature	–30° — 60°C	
Operating humidity	10 — 80% relative humidity	Non-condensing
Non-operating humidity	10 — 95%	
Operating altitude	–15 — 3,050 m	

Table 2.19 FlashBlade//S Environmental Limits (continued)

Specification	Limit	Notes
Non-operating altitude	–15 — 12,000 m	
Operating shock	3 g, 11 ms, ½ Sine	
Non-operating shock	20 g, 6 ms, ½ Sine	
Operating vibration	0.55 Grms, 5 — 500 Hz	Random, 15 minutes/axis, 3 axes
Non-operating vibration	1.87 Grms, 5 — 500 Hz	Random, 15 minutes/axis, 3 axes

Acoustic Specifications

The following table lists the acoustic specifications for a FlashBlade//S system.

Table 2.20 FlashBlade//S System Acoustic Specifications

Noise Specification	27°C and below	Above 27°C
Sound power - LwAd	8.5 B	9.5 B
Sound pressure - LpAm	72.3 dBA	82.4 dBA
Assumes: Typical workload		

Chapter 3
XFM-8400/XFM-8400R2 Specifications

The following sections describe the physical, environmental, and operating specifications of XFM-8400/ XFM-8400R2 modules.

Dimensions and Weight

The XFM-8400 (Part No. 86-0001-xx)/ XFM-8400R2 (Part No. 86-0003-xx) modules are only available with multi-chassis system configurations and the physical specifications are listed in the following tables.

Figure 3.1 XFM-8400/ XFM-8400R2 Module

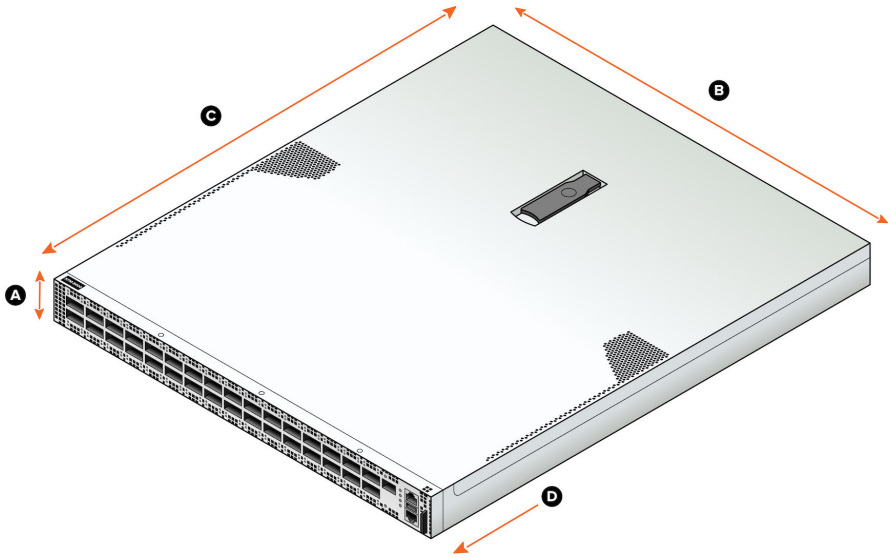


Table 3.1 Physical Dimensions

Callout	Specification	Dimension	Notes
A	Height	4.3 cm (1.70 in.)	
B	Width	43.9 cm (17.26 in.)	
C	Length	65.8 cm (25.89 in.) (Not including fan/PSU latches)	

Table 3.1 Physical Dimensions (continued)

Callout	Specification	Dimension	Notes
D			Direction of airflow

Table 3.2 Weight

Component	Quantity	Weight
Chassis (module)	1	14.22 kg (31.34 lb)
Power supply unit (hot-swappable)	2	1.16 kg (2.56 lb)

Packaging Dimensions and Weight

The XFM-8400/ XFM-8400R2 modules are shipped separately from the FlashBlade//S shipping container. Each package includes power cords, network cables, adapters, and labels.

Table 3.3 Packaging Dimensions and Weight

Length	Width	Height	Gross Weight
91.4 cm (35.98 in.)	57.15 cm (22.50 in.)	44.5 cm (17.52 in.)	31 kg (69 lb)

Power Specifications

The following table lists the typical power consumption of each XFM-8400/ XFM-8400R2 module.

Table 3.4 Typical Power Consumption

Power consumption	Value
Voltage range	200-240 VAC
Frequency	50/60 Hz
Power factor correction	>=95%

Table 3.4 Typical Power Consumption (continued)

Power consumption	Value
Inrush current	40A per power supply unit

The following tables describe the peak and typical power values of a single XFM module. Each module is equipped with two high efficiency 80 Plus Platinum Level rated AC power supplies.

Table 3.5 Peak Power Specifications

AC draw (W)	AC draw (VA)	Current at 208V (A)	Current at 240V (A)	Heat (BTU/hr)
600	630	2.9	2.5	2,046

Table 3.6 Typical Power Specifications

AC power (W)	AC Power (VA)	Current at 208V (A)	Current at 240V (A)	Heat (BTU/hr)
314	330	1.5	1.3	1,071

Note: Typical power numbers do not include optics. Numbers may vary depending on multi-chassis configuration.

Optical Links	Power
Downlinks	14W per chassis
Uplinks	10W per link

Each module includes two IEC C13/C14 (10A 250V) power cords.

Note: Power cords may vary depending on national regulations.

Environmental Limitations

The following table specifies the environmental limits for XFM-8400/ XFM-8400R2 modules.

Table 3.8 Environmental Limits

Specification	Limit	Notes
Operating temperature	0° — 40°C	
Non-operating temperature	–40° — 70°C	
Operating humidity	8 — 90% relative humidity	
Non-operating humidity	20 — 90%	
Operating altitude	Up to 3,000 m	
Non-operating altitude	Up to 12,000 m	
Operating shock	3 g, 11 m/s, ½ Sine	
Non-operating shock	18 g, 6 m/s, ½ Sine	
Operating vibration	0.26 Grms, 5 — 350 Hz	Random, 30 minutes/axis, 3 axes
Non-operating vibration	0.78 Grms, 5 — 200 Hz	Random, 30 minutes/axis, 3 axes

Chapter 4
Supported Cables and Optical Transceivers

FlashBlade//S system supports a variety of network cables and optical transceivers. For more information, visit FlashBlade//S *Transceiver and Cable Support*.

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