

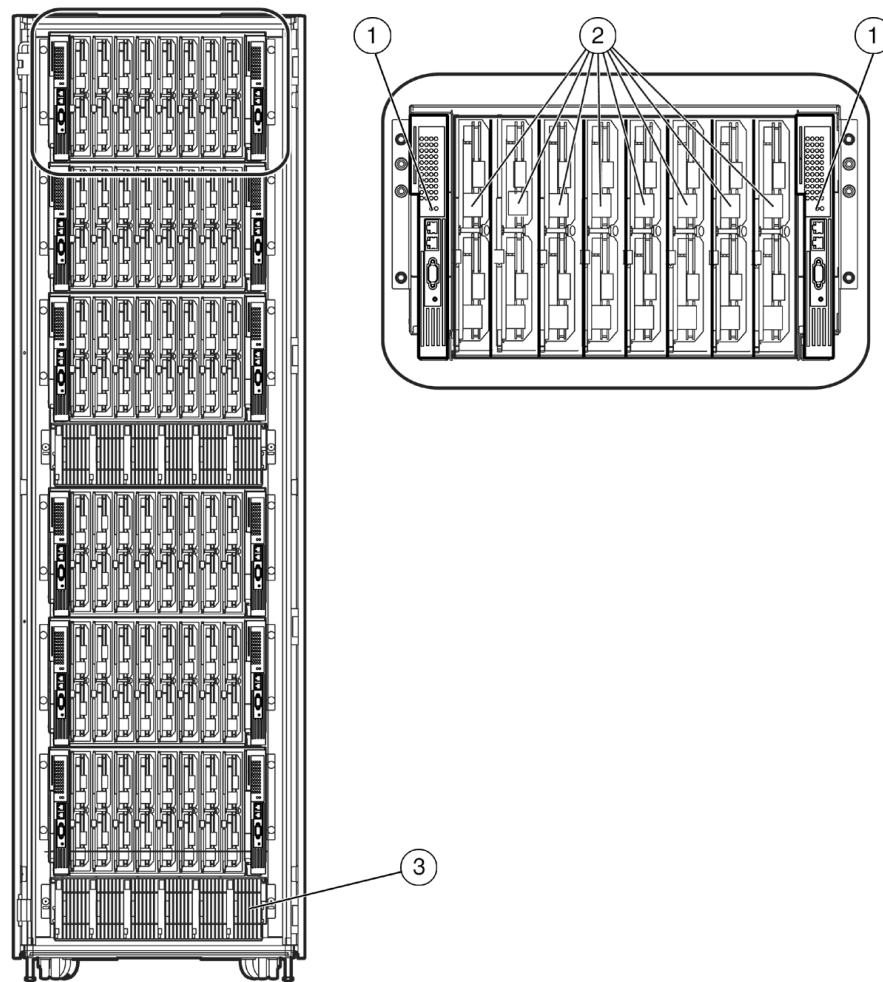
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Overview

HP BladeSystem p-Class Infrastructure

42U Rack with HP p-Class BladeSystem Installed



1. BL p-Class interconnects (2) in HP BladeSystem p-Class server blade enclosure (interconnect switch shown)
2. HP ProLiant server blades (8) in HP BladeSystem p-Class server blade enclosure
3. HP BladeSystem p-Class 3U power enclosure with hot-plug power supplies (6)

At A Glance

This document covers the HP BladeSystem p-Class Infrastructure only. For more information on HP ProLiant Server Blades and HP BladeSystem p-Class Interconnect Components please see the following QuickSpecs:

HP ProLiant Server Blades: http://h18000.www1.hp.com/products/quickspecs/north_america/11070.html

HP BladeSystem p-Class Interconnect QuickSpecs:
<http://h18004.www1.hp.com/products/blades/components/components.html>

HP BladeSystem solutions starts with a Server Blade Enclosure, power enclosure, networking interconnects, HP ProLiant Server Blades, and management tools.

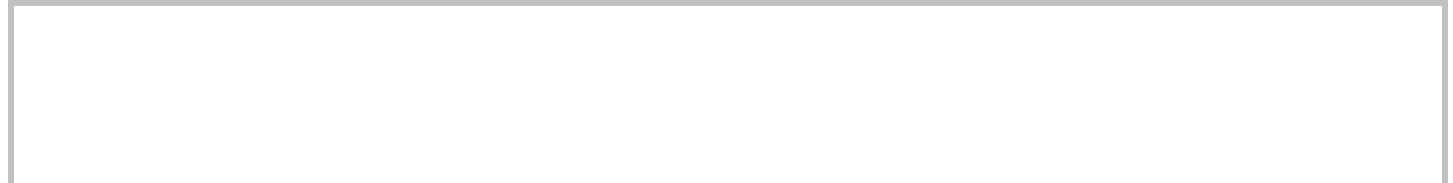
- **HP BladeSystem Starter Kit** (with 8 RDP Licenses)
 - Simplified ordering
 - One part number contains:
 - BL p-Class Server Blade Enclosure
 - 8 RDP Licenses
 - 1U Power Enclosure with 2 Power Supplies
- **HP BladeSystem p-Class Server Blade Enclosures:**
 - Server blades and interconnects blind mate into server blade enclosures for network connection and power
 - Server blade enclosure is 6U and holds HP ProLiant server blades plus two Interconnects
 - Up to 16 HP ProLiant BL30 or BL35p server blades
 - Up to 8 HP ProLiant BL20 or BL25p server blades
 - Up to 2 HP ProLiant BL40p server blades
 - Up to 4 HP ProLiant BL45p server blades
 - Or combinations of the above
 - Types of interconnects available:
 - GbE Interconnect Switches
 - GbE2 with optional Fibre Channel pass-through

- Cisco Gigabit Ethernet Switch Module (CEGSM) Interconnect Switches with optional Fibre Channel pass through
 - Patch Panels or Patch Panel 2 with Fibre Channel pass through.
 - For additional information, please visit:
<http://h18004.www1.hp.com/products/blades/components/components.html>
- **HP BladeSystem p-Class Power Enclosure Options:**
 - Use BL p-Class sizing tool to determine power based on your configuration
<http://www.hp.com/go/bladeSystem/powercalculator>
 - Choose the HP BladeSystem p-Class 3U power enclosure or the HP BladeSystem p-Class 1U power enclosure
 - BL p-Class 3U power enclosure provides shared, external, redundant power for multiple enclosures
 - Select from either single-phase or three-phase power options
 - BL p-Class 1U power enclosure provides redundant, external power for a single enclosure
 - HP BladeSystem power enclosures with power supplies are not needed if using facility -48VDC $\pm$ 10%, in this case purchase facility DC option kit
- **HP BladeSystem p-Class Power Distribution** (only required with the 3U power enclosure):
 - Distributes power from the power enclosure to the server blade enclosures
 - Four power distribution choices:
 - BL p-Class scalable bus bar
 - BL p-Class mini bus bar
 - BL p-Class power bus box
 - Dual power input kit for mini bus bar (required for support of two power enclosures)
- **Red Hat Enterprise Linux and management bundle for HP BladeSystem**
 - Combination of the RHEL operating system (RHEL 4 AS & ES), proxy server and Red Hat provisioning tools for HP BladeSystem at an affordable bundled price
 - One subscription covers all blades in the HP BladeSystem Enclosure with no need to buy separate management/provisioning tools.
 - Blades can be added or moved among different chassis and are supported as long as the chassis has an active subscription.
 - 1 or 3 year hosted RHN subscription
 - Full indemnification
 - For additional information please visit: <http://www.hp.com/go/rhel4bladebundle>
- Protected by HP Services and a worldwide network of HP Authorized Channel Partners. Three-year, on-site limited global warranty. Certain restrictions and exclusions apply.

NOTE: Power requirements for a HP BladeSystem p-Class-: 200V - 240V AC, 30 Amp or facility DC -48V $\pm$ 10%.

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HP BladeSystem p-Class Overview

HP BladeSystem Overview

As server density and network connectivity has increased traditional rack-mounted server solutions have generated increased complexity of both server management and physical infrastructure.

HP BladeSystem is the evolution of the entire rack-mounted infrastructure. A BladeSystem aims to simplify the management, building, and maintenance of the infrastructure behind your multi-server environment. It consolidates and repackages all the supporting infrastructure elements—compute, storage, network, and power into a single platform that can accelerate the integration and optimization of your data center.

With the flexibility to scale from a single enclosure holding up to 16 blades, to a rack containing 6 enclosures holding up 96 blades the p-Class infrastructure is designed to meet the needs of

today's businesses.

An HP BladeSystem is made up of several components:

- Server blades
- Server blade enclosure that provides connectivity and power for each blade
- Ethernet and Fibre Channel interconnects
- Power subsystem that provides redundant power for the enclosure

HP ProLiant Server Blade

Delivering best-in-class performance, choice and reliability on Intel® Xeon® and AMD Opteron® processors for Windows or Linux based systems, the HP portfolio of server blades supports a variety of application requirements for scale-out architectures. HP offers one-, two-, and four-processor server blades, including the widest range of performance, and form factors, and the most processing density and performance of any other portfolio.

For more information please see:

http://h18000.www1.hp.com/products/quickspecs/north_america/11070.html

HP BladeSystem p-Class Enclosure

A BladeSystem enclosure holds up to 16 ProLiant server blades plus redundant network and storage switches. It includes a shared, high-speed backplane for wire-once connectivity of server blades to network, shared storage, and power.

A management module is built in to the enclosure that reports asset and inventory information and thermal, power, and protection fuse events. With hardware management integrated across the solution, one full enclosure can be managed as easily as one server.

A BladeSystem enclosure provides the following benefits:

- Scalable: Management and network interconnects extend scalability beyond a single enclosure, allowing resources to be pooled and shared across multiple enclosures.
- Investment protection: Accommodates multiple server and network designs in one enclosure.
- Service and management: Allows multiple administrators to remotely access and maintain multiple servers simultaneously (versus other choices that only allow one session at a time).

HP BladeSystem p-Class Interconnect Options

HP also offers one of the broadest selections of Gigabit Ethernet and Fibre Channel switches and patch panel options in the industry to provide network, SAN/network attached storage (NAS), and cluster connectivity.

HP BladeSystem interconnects provide:

- Seamless integration: Standard-based switch options include Cisco, Brocade, McDATA, and Nortel products that integrate within your existing standards.
- Built-in redundancy: Front-mounting, hot plug switches that can be removed and replaced without the need to cable or recable network connections.
- Cable reduction: Fully VLAN-capable interconnect switches provide up to 32-to-1 network cable reductions per server blade enclosure

For more information HP BladeSystem p-Class Interconnect Components, please visit:

<http://h18004.www1.hp.com/products/ blades/components/components.html>

HP BladeSystem p-Class Power Sub-System

The efficient design of the BladeSystem power subsystem reduces power distribution costs and provides power capacity for current and future server blades. Power supplies are centralized to provide scalable, redundant power for a single enclosure of blades up to an entire rack full. HP offers fully redundant 1U and 3U power supply options for configurations of different sizes, supporting both single- and three-phase power.

HP BladeSystem power subsystems provide:

- Continuous power availability: N + N redundant power supplies are front accessible, hot pluggable, and can be configured for changing power requirements.

- Investment protection: Provides power capacity headroom for future power needs and compatibility with all server blade models.
- Flexibility: Rack-centralized power options for efficient multi-enclosure and multi-rack server blade installations.
- The new all-in-one 1U power enclosure brings the benefits of server blades to remote sites and small-office deployments.

Factory Express Portfolio for Servers and Storage

HP Factory Express offers configuration, customization, integration and deployment services for HP servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging and custom packaging. HP products supported through Factory Express include: a wide array of servers and storage: HP Integrity, HP ProLiant & HP ProLiant Server Blades, HP BladeSystem, HP 9000 servers as well as the MSA1000, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches.

For more information on Factory Express services for your specific server model please contact your sales representative or go to <http://www.hp.com/go/factory-express>

Service and Support

This product is covered by a global limited warranty and supported by HP Services and a worldwide network of HP Authorized Channel Partners. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Additional support may be covered under the warranty or available for an additional fee. Enhancements to warranty services are available through HP Care Pack services or customized service agreements.

NOTE: Server Blade Limited Warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. This warranty supports the HP ProLiant BL20p, HP ProLiant 25p, HP ProLiant 40 and HP ProLiant 45p Server Blades.

NOTE: Server Blade Limited Warranty includes 3 year Parts, 1 year Labor, 1-year on-site support. This warranty supports the HP ProLiant BL30p and HP ProLiant 35p Server Blades.

NOTE: Server Blade Enclosure Limited Warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. Additional information regarding worldwide limited warranty and technical support is available at: <http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>

HP Care Pack services provide total care and support expertise with committed response designed to meet your IT and business needs.

HP Care Pack services for HP BladeSystem p-Class server blade enclosure covers the enclosure including patch panels, HP supported Ethernet interconnects, power enclosure with power supplies and power distribution.

To fully capitalize on your HP BladeSystem servers' capabilities requires a service partner who thoroughly understands your server technology and systems environment. HP Services, an industry leader in provision of multi vender support solutions provides a range of support services designed to meet the varying needs of business. Whether an SMB or large global corporation HP has a HP BladeSystem server support offer to help you speedily deploy and maximize system uptime.

Recommended Service - Simplify ProLiant solution implementation, maintenance and management.

- **Support Service**- 4-Hour Response Coverage, 3-Year, 24 x 7, Same Business Day
- **Deployment Service** - Installation and Start Up for HP BladeSystem Infrastructure

Enhanced Service - Optimize service level to increase IT performance and availability

- **Support Service** - HP Proactive BladeSystem Service, 1-Year
- **Deployment Service** - Enhanced Network Installation and Start-up for HP BladeSystem Switches

Installation & Start-Up service for HP BladeSystem Infrastructure plus HP BladeSystem Enhanced Network Installation and Start-UP as per the Customer Description and/or Data Sheet. To be delivered on a scheduled basis 8am-5pm, M-F, excluding HP holidays.

For a complete listing of service offerings and information visit:

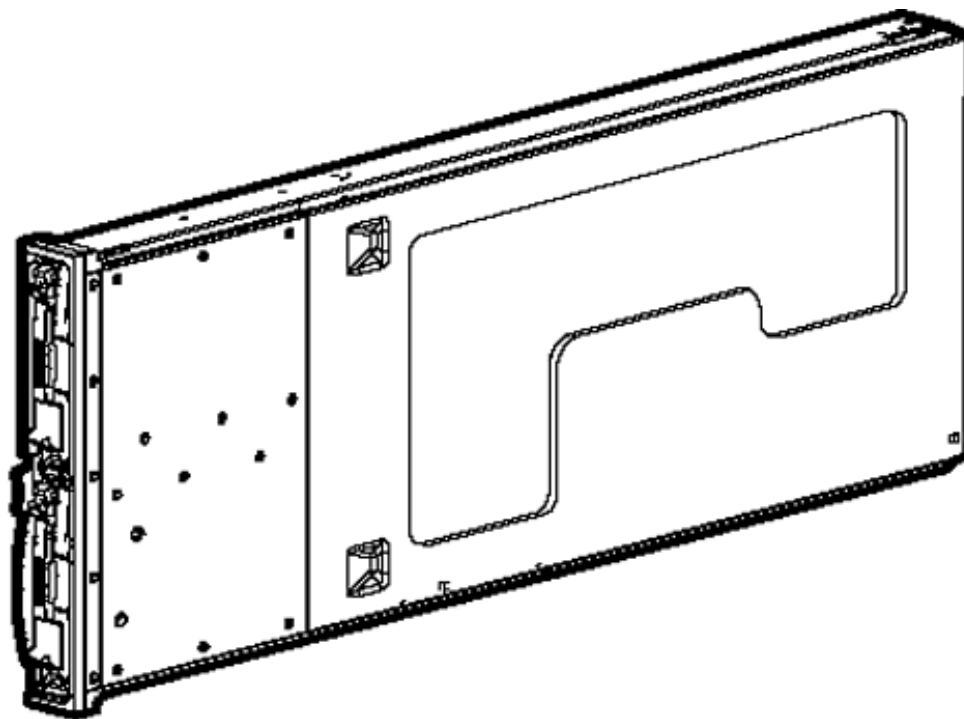
<http://www.hp.com/services/bladeSystemservices>

<http://www.hp.com/go/proliant/carepack>

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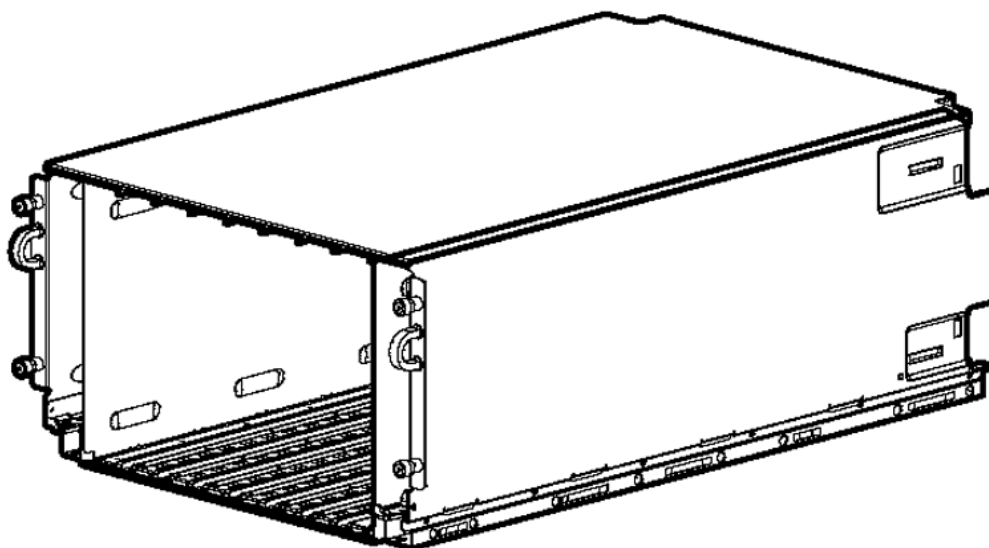
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Building an HP BladeSystem



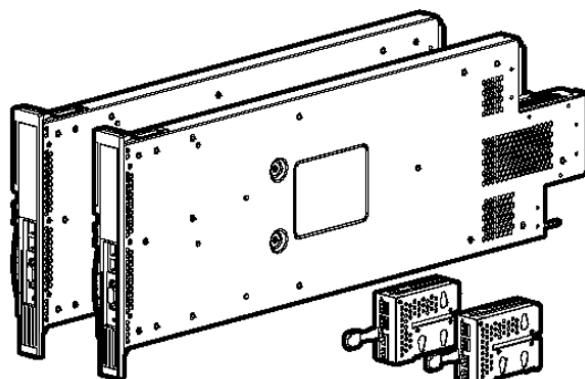
HP ProLiant p-Class Server Blade

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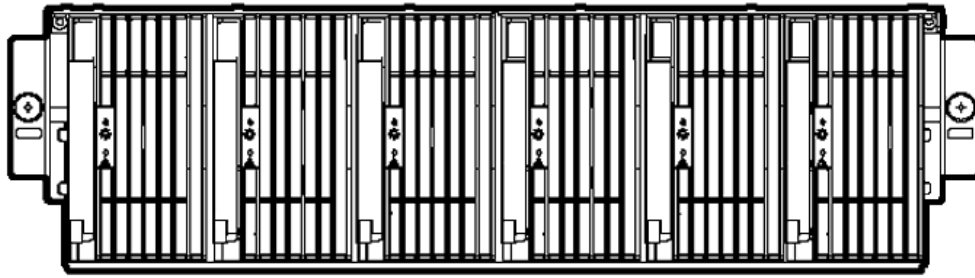
HP BladeSystem p-Class Server Blade Enclosure

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HP BladeSystem p-Class Interconnect

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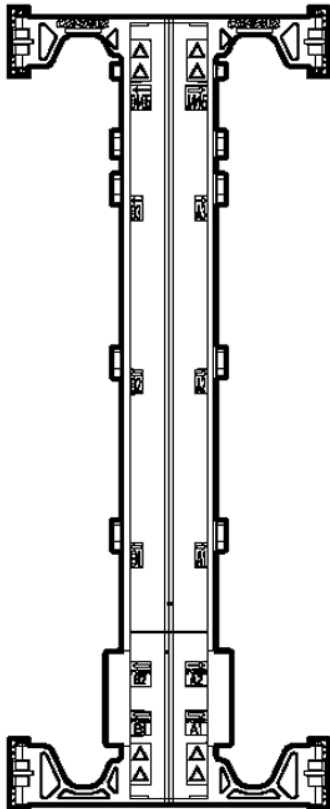
HP BladeSystem p-Class Power Enclosures and Power Supplies

OR



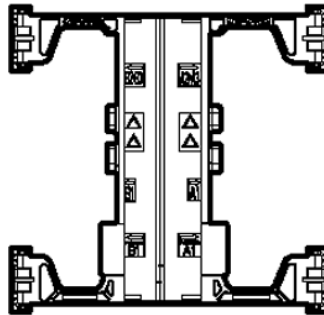
HP BladeSystem p-Class 1U Power Enclosure and Power Supplies

OR
Facility DC
+

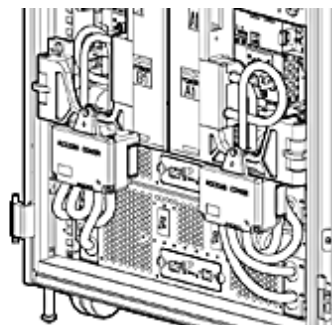


Scalable bus bar

OR

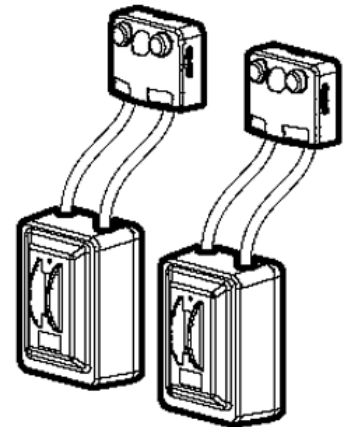


Mini bus bar



Dual power input kit for mini bus bar
(required for AC redundancy with -B22
enclosures)

OR



Bus boxes

HP BladeSystem p-Class Power Distribution (only required with the 3U power enclosure)

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Standard Features

HP BladeSystem p-Class Server Blade Enclosures and ProLiant BL p-Class Interconnects

HP BladeSystem p-Class Server Blade Enclosures

6U (10.5-inch), 19-inch wide

Holds up to 8 HP ProLiant server blades

10 bays per server blade enclosure 8 bays for server blades

2 outside bays for interconnect modules (RJ-45 Patch Panel, RJ-45 Patch Panel 2, GbE Interconnect Switch, GbE2 Interconnect Switch or Cisco GESM Interconnect Switch)

NOTE: For additional information on Interconnect Options, please visit:

http://h18000.www1.hp.com/products/quickspecs/12331_na/12331_na.HTML

Server blades blind mate into the server blade enclosure backplane for power and data connections

Server blade management module attached to the back of each HP BladeSystem p-Class 6U server blade enclosure to report events all servers and provide asset and inventory information
Single physical iLO port that provides access to all server blades

NOTE: HP ProLiant HP BladeSystem p-Class server blade enclosures with enhanced backplane components might be required depending on which HP ProLiant server blade model is selected.
<http://www.hp.com/go/bladeSystem/enclosure/compatibility>

NOTE: Server Blade Enclosure Upgrade Kit (354100-B21) contains enhanced backplane components and enables a field upgrade of a blade enclosure to support specific HP ProLiant server blade models and provide a single, physical iLO port for the enclosure.

HP BladeSystem p-Class Enclosure Power Requirements	Redundant 200V - 240V AC, 20 amp single phase for 1U enclosure Redundant 200V - 240V AC, 30 amp single-phase for single-phase 3U enclosure Redundant 208V 30amp 3-phase delta 4 wire for 3-phase 3U enclosure Redundant -48VDC $\pm$ 10% for direct DC Power connection
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Power System and Rack Information

HP BladeSystem p-Class Power System and Rack Information	NOTE: To determine power configuration please refer to the HP BladeSystem p-Class Overview and Planning Whitepaper and sizing tool at http://h18000.www1.hp.com/products/servers/proliant-bl/p-class/20p/index.html
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HP BladeSystem p-Class 1U Power Enclosure	1U (1.75-inch), 19-inch wide, 29-inch deep (0.48-meter wide, 0.74-meter deep), Multi-input single phase operation. HP BladeSystem p-Class 1U power enclosure provides external, hot-plug power. Each 1U power enclosure houses up to six hot-plug power supplies to power up to one server blade enclosure, fully populated with BL p-Class server blades and interconnects. Please use the sizing utility to determine the power needed for each configuration http://www.hp.com/go/bladeSystem/powercalculator NOTE: Power enclosures and power supplies are not needed if using facility DC (-48V DC $\pm$ 10%). If using facility DC, only Facility DC Power Connection kit part number (240563-B21) is needed.
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HP BladeSystem p-Class 3U Power Enclosure	3U (5.25-inch), 19-inch wide, 29-inch deep (0.48-meter wide, 0.74-meter deep), Dual input single phase and three phase models available. HP BladeSystem p-Class 3U power enclosure provides external, shared hot-plug power. Each three-phase power enclosure houses up to six hot-plug power supplies, each single-phase power enclosure holds up to four hot-plug power supplies to power the BL p-Class server blades and interconnects Please use the sizing utility to determine the power needed for each configuration http://www.hp.com/go/bladeSystem/powercalculator Power enclosures and power supplies are not needed if using facility DC (-48V DC $\pm$ 10%). If using facility DC, only Facility DC Power Connection kit part number (240563-B21) is needed.
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HP BladeSystem p-Class Power Distribution (only required with 3U power enclosures)	When using the HP BladeSystem 3U Power Enclosure or facility DC power, redundant -48 VDC power is distributed from the power enclosures to the server blade enclosures through the bus bar system. Hinges attach the HP BladeSystem bus bars to the rails in a rack. The bus bars swing open from the center to enable easy rear access to the server blades and network cables. Power is distributed redundantly through independent A- and B-sided bus bars. Three different power distribution solutions are available depending on the maximum number of server blade enclosures planned for the rack: • HP BladeSystem p-Class scalable bus bar • HP BladeSystem p-Class mini bus bar • HP BladeSystem p-Class power bus box
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NOTE: To support a full 42U rack of HP ProLiant server blades (6 server blade enclosures), two mini bus bars are needed.

	Power Enclosures Supported	Server Blade Enclosures Supported	Max. Rack Space Occupied
Scalable Bus Bar	1 or 2	up to 5	36U
Mini Bus Bar	1 or 2	up to 3	21U
Power Bus Box	1	1	9U
	NOTE: To support a full 42U rack of BL p-Class server blades, use two stacked pairs of mini bus bars. NOTE: Dual power input kit for mini bus bar option (364565-B21) required to support two power enclosures.		

Required Power Source

3U Power Enclosure
Two redundant power feeds per power enclosure
Connectors

- NEMA receptacles
 - NA 1-phase L6-30, 250v, 30A 3-wire
 - NA 3-phase L15-30, 250V, 30A, 4-wire
- 1U Power Enclosure
 - 6 x IEC320-C20

Optimized for power cabling from bottom and network cabling from top

Availability

Power redundancy: Redundant AC feeds into power enclosures, redundant DC feeds from power enclosure to server blade enclosures, N + N redundant power supplies

Minimum Rack Requirements

Mounts in ProLiant, and Telco racks and Third Party racks that meet the following criteria:

- Compatible with 19-inch Standard EIA rail sets
- EIA rail-to-rail depth is 29 - 30"
- Cabinet depth must be at least 36-inch deep overall (Additional min. 3.5-inch clearance from rear RETMA rail to rear door, inclusive in the 36-inch overall depth)
- Ample room for top and bottom cable egress (approximately 8 square inches for full rack configuration with patch panel)
- Must be capable of supporting 1600 lb (for full rack configuration)
- Perforated front and rear doors to accommodate front-to-back cooling
- Must have 65% open perforation on server blade enclosure doors to support airflow requirements
- Optimized for use with the HP 10000 Series racks

Rack Airflow Requirements

Rack 10000 series Cabinets

The increasing power of new high-performance processor technology requires increased cooling efficiency for rack-mounted servers. The 10000 Series Racks provide enhanced airflow for maximum cooling, allowing these racks to be fully loaded with servers using the latest processors.

CAUTION: If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors: If your 42U server rack includes closing front and rear doors, you must allow 830 square inches (5,350 sq cm) of hole evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side: The clearance between the installed rack component and the side panels of the rack must be a minimum of 2.75 inches (7 cm).

CAUTION: Always use blanking panels to fill all remaining empty front panel U-spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

ProLiant Essentials Foundation Pack Software for the ProLiant BL Server Blades

HP Systems Insight Manager

HP Systems Insight Manager (HP SIM) provides a unified, secure and extensible environment to centrally manage servers, storage and other infrastructure devices across multiple operating system platforms.

Through a single management view, HP SIM provides core management services that include device discovery and identification, event views, health monitoring, inventory data collection, software version control and reporting. HP SIM is built on industry standards and is extensible with value-added ProLiant Essentials, Integrity Essentials and Storage Essentials software to meet individual management needs. For more details on HP SIM visit <http://www.hp.com/go/hpsim>.

HP SIM provides organizations with the following benefits:

- Simplifies and consolidates infrastructure lifecycle management using task and query based functionality
- Provides the foundation for infrastructure automation and virtualization
- Enables IT management based on business processes not hardware platforms
- Lowers infrastructure maintenance cost and frees resources for innovation
- Maximizes resource utilization with virtualization technologies
- Provides a central point of integration between infrastructure and Enterprise management tools such as HP OpenView

ProLiant Essentials
Rapid Deployment Pack

Rapid Deployment Pack (RDP) is an automated deployment and provisioning solution for all ProLiant servers. RDP includes the ProLiant Integration Module featuring ProLiant server pre-configured events for OS installation, and optimized software drivers, firmware and management agents. Every RDP disc includes 10-node trial licenses for evaluation purposes. RDP requires a license for each server deployed and is available for purchase with HP servers. For more information, visit: <http://www.hp.com/servers/rdp>.

NOTE: For more information regarding ProLiant Essentials Software, please see the following URL: <http://www.hp.com/servers/proliantessentials>

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Configuration Information Factory Integrated Models

For a complete configuration of the HP BladeSystem, please do the following:

Step 1: Select desired model, configuration and quantity of HP ProLiant server blades

NOTE: For server blade information, please visit:
<http://h18000.www1.hp.com/products/quickspecs/NorthAmerica/11070.html>

Step 2: Determine quantity of HP BladeSystem p-Class Server Blade Enclosures to purchase.

NOTE: Each HP BladeSystem p-Class Server Blade Enclosure holds up to 16 HP ProLiant server blades plus two Interconnects based on server blade selection.

HP BladeSystem	HP BladeSystem p-Class Starter Kit with 8 ProLiant Essentials Rapid	390738-B21
p-Class Server Blade	Deployment Licenses	

Enclosures

BladeSystem Starter Kit contains:

- HP BladeSystem p-Class Server Blade Enclosure with enhanced backplane components
- 8 ProLiant Essentials Rapid Deployment Pack Licenses
- 1U Power Enclosure with 2 Power Supplies

NOTE: Power enclosures not required when ordering this equipment

HP BladeSystem p-Class Server Blade Enclosure with enhanced backplane components with 8 ProLiant Essentials Rapid Deployment Licenses 281404-B22

NOTE: HP BladeSystem p-Class server blade enclosures with enhanced backplane components may be required depending on which HP ProLiant server blade model is selected.

For additional information regarding Blade Enclosure Compatibility, please visit the following URL: <http://www.hp.com/go/bladeSystem/enclosure/compatibility>

HP BladeSystem p-Class Server Blade Enclosure with enhanced backplane components with ProLiant Essentials Rapid Deployment Pack Trial 243564-B22

HP BladeSystem p-Class Server Blade Enclosure with enhanced backplane components and the HP BladeSystem Management Suite 380625-B22

NOTE: Includes a HP BladeSystem p-Class Server Blade Enclosure with enhanced backplane components, a single copy of Systems Insight Manager (SIM) and 8 licenses for each of the following products: Rapid Deployment Pack (RDP), Performance Management Pack (PMP) and the Vulnerability and Patch Management Pack (VPM).

NOTE: The HP ProLiant BL25p/35p/45p server blades do not currently support PMP. Future support is planned.

Step 3: Select an interconnect kit.

Each interconnect kit contains a pair of interconnects except the Cisco GESM which contains a single switch per kit. One pair of interconnects is required with each blade enclosure. For additional information on Interconnect Options, please visit: http://h18000.www1.hp.com/products/quickspecs/12331_na/12331_na.html

HP BladeSystem p-Class Interconnects	RJ-45 Patch Panel 2 with Fibre Channel pass through	306465-B21
	NOTE: Required for Fibre Channel connectivity on HP ProLiant BLXXp when using the patch panel interconnect	
	Cisco Gigabit Ethernet Switch Module for HP BladeSystem p-Class Interconnect Kit Base Unit only	378926-B21
	NOTE: Two CGESM interconnect kits required per server blade enclosure.	
	Cisco Gigabit Ethernet Switch Module for HP BladeSystem p-Class Interconnect Kit Base Unit (populated with two RJ-45 10/100/1000 T/TX/T Small Form Factor Pluggable (SFP) Modules	378927-B21
	NOTE: Two CGESM interconnect kits required per server blade enclosure.	
	Cisco RJ-45 10/100/1000 T/TX/T SFP Module	378928-B21
	Cisco 1000BASE SX Fiber SFP Module	378929-B21
	ProLiant BL p-Class C-GbE2 Interconnect Kit (with pair of GbE2 Interconnect Switches and two QuadT2 Interconnect Modules)	283192-B22
	NOTE: Only one interconnect kit required per server blade enclosure.	
	HP ProLiant BL p-Class Storage Connectivity Kit	321745-B21
	NOTE: Required for BLXXp Fibre Channel signal pass through when using the CGESM or GbE2 Interconnect Switch.	
	NOTE: Only one Storage Connectivity Kit required per each GbE2 Interconnect Kit. NOTE: Only one Storage Connectivity Kit required for (2) CGESM Interconnect Kit.	

Step 4: Select a HP BladeSystem p-Class power enclosure and power supplies based on configuration.

Use p-Class sizing tool to help determine power configuration: <http://www.hp.com/go/bladeSystem/powercalculator>.

NOTE: Power enclosures and supplies are not needed if using facility DC (-48V ± 10%).

HP BladeSystem p-Class 3U Power Enclosure	Single phase 3U power enclosure with four power supplies (Single-phase 3U power enclosure holds a max of four power supplies)	239162-001
	Three-phase 3U power enclosure with six power supplies (Three-phase 3U power enclosure holds a max of six power supplies)	230769-001
OR		
HP BladeSystem p-Class 1U Power Enclosure	1U power enclosure with six power supplies	378284-B21
	1U power enclosure with two power supplies NOTE: Additional power supplies can also be purchased separately - see options list below	380314-B21

Step 5: Select power distribution

HP BladeSystem p-Class Power Distribution (only required with the 3U power enclosure)	Scalable bus bar - Supports up to 5 server blade enclosures*	240560-B21
	Mini bus bar - Supports up to 3 server blade enclosures*	240559-B21
	Power Bus Box - Supports only 1 server blade enclosure	240562-B21
	Dual Power Input Kit for Mini Bus Bar - required for support of two power enclosures. *NOTE: Maximum depends upon power input	364565-B21
OR		
HP PDU (only required with 1U Power Enclosure)	HP Modular Distribution Unit 40 Amp**	252663-D75
	HP Modular Distribution Unit 24 Amp** ** The Modular Distribution Unit Kits excludes the extension bars as they are not required with the HP BladeSystem p-class 1U power enclosure	252663-D74
HP Monitored Power Distribution Unit	HP 17.3 kVA S348 Monitored PDU- single input, 3Ø, 48A	AF916A
	HP Two C-13 PDU Extension Bars NOTE: Each extension bar has a C19 input and 7 C13 receptacles. The option is ideal for AF916A, model S348, and AF917A, model S332, which both have only C19 outlets (12).	AF500A

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Options

Related Options	Three phase 3U power enclosure with no power supplies	231709-001
	NOTE: Single-phase 3U power enclosure holds a max of four power supplies.	
	Single phase 3U power enclosure with no power supplies	231710-001
	NOTE: Single-phase 3U power enclosure holds a max of four power supplies.	
	Single 3U Power Supply for 3U Power enclosure	239161-B21
	Single 1U Power Supply for 1U Power enclosure	380312-B21
	Facility DC Power Connection	240563-B21
	HP BladeSystem Power Extension Kit	381686-B21
	NOTE: This kit is specifically for HP BladeSystem p-Class customers who want to upgrade their standard server blade enclosures to enhanced server blade	

enclosures and would like to install an additional, redundant 3U power enclosure above the server blade enclosures rather than below them. The option kit consists of two extension cable assemblies - one for each side (A and B).

HP BladeSystem p-Class Server Enclosure Shipping Bracket Option Kit 293121-B21
NOTE: Used to secure one server blade enclosure in a rack when moving.

HP BladeSystem p-Class Power Enclosure Shipping Bracket Option Kit 365044-B21
NOTE: Used to secure one power enclosure in a rack when moving

HP BladeSystem p-Class Server Blade Enclosure Upgrade Kit (option) 354100-B21
NOTE: Server Blade Enclosure Upgrade Kit (354100-B21) contains enhanced backplane components and enables a field upgrade of a blade enclosure to support BL p-class blades and provide a single, physical iLO port for the enclosure.

Red Hat Enterprise Linux 4 and management bundle

Red Hat Enterprise Linux 4 (AS), Update I, 1 YR RHN, 1YR 24x7, 10 Incident Support 404042-B21

NOTE: Only supported when installed on HP BladeSystem.

NOTE: Provides 1 Year access to Red Hat Network, 1 Year 24x7, 10 Incidents within 1 year of purchase.

Red Hat Enterprise Linux 4 (AS), Update I, 3 YR RHN, 1YR 24x7, 10 Incident Support 404042-B22

NOTE: Only supported when installed on HP BladeSystem.

NOTE: Provides 3 Year access to Red Hat Network, 1 Year 24x7, 10 Incidents within 1 year of purchase.

Red Hat Enterprise Server 4 (ES), Update I, 1 YR RHN, 1YR 9x5, 10 Incident Support 404042-B23

NOTE: Only supported when installed on HP BladeSystem

NOTE: Provides 1 Year access to Red Hat Network, 1 Year 9x5, 10 Incidents within 1 year of purchase.

Red Hat Enterprise Server 4 (ES) Update I, 3 YR RHN, 1YR 9x5, 10 Incident Support 404042-B24

NOTE: Only supported when installed on HP BladeSystem

NOTE: Provides 3 Year access to Red Hat Network, 1 Year 9x5, 10 Incidents within 1 year of purchase.

Red Hat Enterprise Server 4 (AS) , Update I, 1 YR RHN 399058-B21

NOTE: Only supported when installed on HP BladeSystem

NOTE: Provides 1 Year access to Red Hat Network

Red Hat Enterprise Server 4 (AS) , Update I, 3 YR RHN 399059-B21

NOTE: Only supported when installed on HP BladeSystem

NOTE: Provides 3 Year access to Red Hat Network

Red Hat Enterprise Server 4 (ES) , Update I, 1 YR RHN 399060-B21

NOTE: Only supported when installed on HP BladeSystem

NOTE: Provides 1 Year access to Red Hat Network

Red Hat Enterprise Server 4 (ES), Update I, 3 YR RHN 399061-B21

NOTE: Only supported when installed on HP BladeSystem.

NOTE: Provides 3 Year access to Red Hat Network

Red Hat Enterprise Linux 4 and management bundle Service and Support

Red Hat Enterprise Server 4 (AS) Update 1, 24x7, 10 Incidents within 1 year, Software support for HP Server Blades HC326E

NOTE: Only supported when installed on HP BladeSystem.

Red Hat Enterprise Server 4 (ES), Update 1 9x5, 10 Incidents within 1 year, Software support for HP Server Blades HC328E

NOTE: Only supported when installed on HP BladeSystem.

HP Rack 5000 Series (Metallic Carbonite)

HP 5642 Rack - Unassembled 358254-B21

NOTE: Please see the HP Rack 5642 QuickSpecs for additional part numbers and Technical Specifications such as height, width, depth, weight, and color:

http://h18000.www1.hp.com/products/quickspecs/12074_na/12074_na.HTML

NOTE: For additional information regarding Rack Cabinets, please see the following URL: <http://www.hp.com/go/rackandpower>

HP Rack 10000 G2 Series (Graphite Metallic)	10642 G2 (42U) Rack Cabinet - Pallet	AF001A
	10642 G2 (42U) Rack Cabinet - Shock Pallet	AF002A
	10642 G2 (42U) Rack Cabinet - Crated	AF003A
	10642 G2 (42U) Rack Cabinet, with Extension - Shock Pallet	AF004A
	10642 G2 (42U) Rack Shock Pallet- for field racking	AF007A
	10636 G2 (36U) Rack Cabinet - Shock Pallet	AF011A
	10636 G2 (36U) Rack Cabinet - Crated	AF012A
	10636 G2 (36U) Rack Cabinet, with Extension - Shock Pallet	AF013A
	10636 G2 (36U) Rack Cabinet, without door - Shock Pallet	AF014A
	10642 G2 (42U) Side Panels (set of two) (Graphite Metallic)	AF054A
	10636 G2 (36U) Side Panels (set of two) (Graphite Metallic)	AF056A
	10636 G2 Rear Extension Kit	AF060A
	600mm G2 Stabilizer Option Kit (Graphite)	AF062A
	NOTE: Please see the Rack 10000 G2 QuickSpecs for additional part numbers and Technical Specifications such as height, width, depth, weight, and color: http://h18000.www1.hp.com/products/quickspecs/12402_na/12402_na.html NOTE: For additional information regarding Rack Cabinets, please see the following URL: http://www.hp.com/go/rackandpower .	
HP Rack 10000 Series (Graphite Metallic)	HP S10614 (14U) Rack Cabinet - Shock Pallet	292302-B22
	HP Rack 10622 (22U) Cabinet - Pallet	245163-B21
	NOTE: xxxxxx-B21 (pallet) used to ship empty racks shipped on a truck. xxxxxx-B22 (shock pallet) used to ship racks with equipment installed (by custom systems, VARs and Channels). NOTE: It is mandatory to use a shock pallet in order to ship racks with equipment installed.	
	NOTE: Please see the Rack 10000 QuickSpecs for additional part number and Technical Specifications such as height, width, depth, weight, and color: http://h18000.www1.hp.com/products/quickspecs/10995_na/10995_na.html NOTE: For additional information regarding Rack Cabinets, please see the following URL: http://www.hp.com/go/rackandpower	
Monitors and Keyboards	TFT7210R Rack Mounted 17" Monitor	348373-B21
	NOTE: For a complete list of Monitors please view the following URL: http://www.hp.com/go/kvm .	
	TFT7600 Rackmount Keyboard Monitor	AG052A
	1U Rackmount Keyboard with USB	AG072A
	NOTE: For additional information regarding Rack Options, please see the following URL: http://www.hp.com/go/rackandpower	
HP KVM Switch Options	2x1x16 IP Console Switch with Virtual Media	AF601A
	4x1x16 IP Console Switch with Virtual Media	AF602A
	2x16 Server Console Switch with Virtual Media	AF600A
	USB Virtual Media Interface Adapter	AF603A
	PS/2 Virtual Media Interface Adapter, 1 pack	AF604A
	NOTE: Requires PS/2 and one USB port on server.	
	HP 0x1x8 Server Console Switch	336044-B21
	HP 0x2x16 Server Console Switch	336045-B21
	PS/2 Interface Adapter, 1-pack	262588-B21
	PS/2 Interface Adapter, 8-pack	262587-B21
	USB Interface Adapter, 1-pack	336047-B21
	Serial Interface Adapter, 1-pack with power supply	373045-B21

NOTE: Cat5e cables are required to connect Interface Adapters to Consoles Switches. Cat52 cables can be found at the following URL:

<http://www.hp.com/go/kvm>

NOTE For additional information regarding KVM switches, Serial Console servers, rack mount monitors, keyboards and all related options please see the following URL: <http://www.hp.com/go/kvm>

HP Serial Console Server Options	HP 16 Port Serial Console Server	AF101A
	HP 48 Port Serial Console Server	AF102A
	Serial Adapter, RJ45-DB9 DCE Female, 1 Pack	AF103A
	Serial Adapter, RJ45-DB9 DCE Female, 8 Pack	AF110A

NOTE: Cat5e cables are required to connect Serial Adapters to Serial Console Servers. Additional Serial Adapters and Cat5e cables can be found at the following URL: <http://www.hp.com/go/kvm>.

NOTE: For additional information regarding KVM switches, Serial Console servers, rack mount monitors, keyboards and all related options please see the following URL: <http://www.hp.com/go/kvm>.

Service and Support Offerings (HP Care Pack Services)

NOTE: The HP Care Pack service part numbers below for ProLiant BL p-Class server blades, cover the server blade and all HP branded hardware options qualified for the server, purchased at the same time or afterwards, internal to the server.

Hardware Services On-site Service

4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic UD188E

NOTE: The HP Care Pack service part numbers below for HP BladeSystem p-Class server blade enclosure covers the enclosure including patch panels, HP supported Ethernet interconnects, power enclosure with power supplies and power distribution.

Hardware Services On-site Service

4-Hour On-site Service, 5-Day x 13-Hour Coverage, 3 Years, Electronic HC031E

NOTE: The HP Care Pack service part numbers below covers the HP BladeSystem Brocade and McData SAN Switches.

Hardware Services On-site Service

4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, Electronic UC009E

4-Hour On-site Service, 7-Day x 24-Hour Coverage, 3 Years, (24 port) Electronic UE438E

Installation & Start-up Services

HP Installation & Startup Service for HP BladeSystem Infrastructure UC905E

NOTE: Provides for an integrated hardware and software implementation that includes remote service planning, onsite deployment of hardware and software, installation verification testing and customer orientation. Hardware deployment covers the installation of a single BladeSystem enclosure that include server blades (up to 16), Ethernet network interconnect, and power options. Software deployment covers the installation and configuration of HP Systems Insight Manager (SIM), HP Rapid Deployment Pack (RDP), and deploy up to two operating system editions of either Windows or Linux, using scripted operating system installation software.

HP BladeSystem Enhanced Network Installation and Startup Service, Electronic UE603E

HP Proactive BladeSystem Service Care Pack

1 Year, HP Proactive BladeSystem Service UG858E

NOTE: For more information, customer/resellers can contact <http://www.hp.com/hps/carepack/services/>

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Technical Specifications

HP BladeSystem
p-Class Server Blade
Enclosure

Dimensions

Height10.5 in (26.67 cm)
Width17.60 in (44.70 cm)
Depth28.86 in (73.30 cm)

Input Specifications

Rated input voltage-43 VDC to -53 VDCNominal -48 VDC
Rated input current62.5 A at -48 VDC
Rated input Power3000 W

Individual Server
Blade

Rated input voltage-43 VDC to -53 VDCNominal -48 VDC
Rated input current6.25 A at -48 VDC

Bay Ratings

Rated input Power300 W

Temperature Range	Operating	50° to 95° F (10° to 35° C)
	Non-Operating	-22° to 140° F (-30° to 60° C)
Relative Humidity (non-condensing)	Operating	20% to 80%
	Non-Operating	5% to 95%
Wet Bulb Temperature	Operating	82.4° F (28° C)
	Non-Operating	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F (1° C) per 1,000 ft (304.8 m). No direct sunlight. Upper operating limit is 10,000 ft (3,048 m) or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft (9,144 m) or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

**HP BladeSystem
p-Class Server Blade
Enclosure** (with
enhanced backplane
components)

Dimensions	Height	10.5 in (26.67 cm)	
	Width	17.60 in (44.70 cm)	
	Depth	28.86 in (73.30 cm)	
Input Specifications	Rated input voltage	-43 VDC to -53 VDC	Nominal -48 VDC
	Rated input current	125 A at -48 VDC	
	Rated input Power	6000 W	
Individual Server Blade Bay Ratings	Rated input voltage	-43 VDC to -53 VDC	Nominal -48 VDC
	Rated input current	14.6 A at -48 VDC	
	Rated input Power	700 W	
Temperature Range	Operating	50° to 95° F (10° to 35° C)	
	Non-Operating	-22° to 140° F (-30° to 60° C)	
Relative Humidity (non-condensing)	Operating	20% to 80%	
	Non-Operating	5% to 95%	
Wet Bulb Temperature	Operating	82.4° F (28° C)	
	Non-Operating	101.7° F (38.7° C)	

NOTE: Operating temperature has an altitude derating of 34° F (1° C) per 1,000 ft (304.8 m). No direct sunlight. Upper operating limit is 10,000 ft (3,048 m) or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft (9,144 m) or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

1U Power Enclosure	Enclosure Dimensions	Height	4.47 (1.75 in)		
		Width	44.7 cm (17.60 in)		
		Depth	68.96cm (27.15 in)		
	Shipping Dimensions	Height	30.17cm (11.88 in)		
		Width	60cm (23.63 in)		
		Depth	91.44cm (36.00 in)		
	Weight Shipping Weights	No Power Supplies	10Kg (22lb)		
		2 Power Supplies	25Kg (54 lb)		
		6 Power Supplies	34Kg (75 lb)		
	Input Requirements	Rated input voltage	200 VAC to 240 VAC		
		Rated input frequency	50 Hz to 60 Hz		
		Rated input current per power supply	11.1A at 208 VAC 10.5A at 220 VAC 13A Max at 180 VAC		
		Rated input power per power supply	2310 Watts Max		
		Power connector	IEC-320 C20		
	Power Cords	2 Power Supplies	2 x IEC-320 C19-C20 1.22m (4ft)		
		6 Power Supplies	6 x IEC-320 C19-C20 1.22m (4ft)		
	Output Specifications		1 Power Supply	2 Power Supplies	3 Power Supplies

	Rated output current	39 Amps	78 Amps	117 Amps
	Rated output power	2000W	4000 Watts	6000 Watts
	Rated output voltage	-48.8 VDC to -54 VDC		
	Nominal power	6000 Watts at 208 VAC		
Ambient Temperature Range (See NOTE)	Operating	10° to 35° C (50° to 95° F)		
	Shipping	-30° to 60° C (-22° to 140° F)		
Relative humidity, non-condensing (See NOTE)	Operating	20% to 80 %		
	Non-operating	5% to 95%		
Wet Bulb Temperature	Operating	28° C (82.4° F)		
	Non-operating	38.7° C (101.7° F)		

NOTE: Operating temperature has an altitude derating of 34° F (1° C) per 1,000 ft (304.8 m). No direct sunlight. Upper operating limit is 10,000 ft (3,048 m) or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft (9,144 m) or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

3U Power Enclosures

		Single-Phase Model	Three-Phase Model
Dimensions	Height	5.25 in (13.34 cm)	5.25 in (13.34 cm)
	Width	27.15 in (68.96 cm)	27.15 in (68.96 cm)
	Depth	17.60 in (44.7 cm)	17.60 in (44.7 cm)
Weights	No Hot-Plug Power Supplies	47.5 lb (21.55 kg)	47.5 lb (21.55 kg)
	All Hot-Plug Power Supplies	99.5 lb (45.13 kg)	125.5 lb (56.93 kg)
Input Requirements	Rated input voltage	200 VAC to 240 VAC	200 VAC to 240 VAC line to line
	Rated input frequency	50 Hz to 60 Hz	50 Hz to 60 Hz
	Rated input current per side	24A	24A per phase
	Rated input power per side	4992 W	8,640W
	Power cord	1 NEMAL6-30P per side	1 NEMA L15-30P per side
Output Voltage Specifications	Rated output voltage	-48.8 VDC to -54 VDC	-48.8 VDC to -54 VDC
	Rated output current	99A	170A
	Rated output power	4298 W	8310 W
	Nominal power	4158 W at 208 VAC	7202 W at 208 VAC
Ambient Temperature Range (See NOTE)	Operating	50° to 95° F (10° to 35° C)	50° to 95° F (10° to 35° C)
	Shipping	-22° to 140° F (-30° to 60° C)	-22° to 140° F (-30° to 60° C)
Relative humidity, non-condensing (See NOTE)	Operating	20% to 80%	20% to 80%
	Non-operating	5% to 95%	5% to 95%
Wet Bulb Temperature	Operating	82.4° F (28° C)	82.4° F (28° C)
	Non-operating	101.7° F (38.7° C)	101.7° F (38.7° C)

NOTE: Operating temperature has an altitude derating of 34° F (1° C) per 1,000 ft (304.8 m). No direct sunlight. Upper operating limit is 10,000 ft (3,048 m) or 70Kpa/10.1 psia. Upper non-operating limit is 30,000 ft (9,144 m) or 30.3 KPa/4.4 psia. Storage maximum humidity of 95% is based on a maximum temperature of 113° F (45° C). Altitude maximum for storage is 70 KPa.

Power Distribution Devices

	Power Bus Box	Mini Bus Bar	Scalable Bus Bar
Power Enclosures or facility DC feeds Supported (3U each)	1	1	2

Server blade enclosures supported (6U each)	1	3	5
Total rack height of supported enclosures	9U	21U	36U
Dimensions			
Height	5.1 in (12.95 cm)	19.45 in (49.40 cm)	48.57 in (123.37 cm)
Width	3.6 in (9.14 cm) each	19.74 in (50.14 cm)	19.74 in (50.14 cm)
Depth	3.25 in (8.26 cm)	2.2 in (5.59 cm)	2.2 in (5.59 cm)
Weight	3.62 lb (1.64 kg)	13.2 lb (5.9 kg)	26 lb (11.79 kg)
Rated Operating Voltage	-43.2 VDC to -54 VDC	-43.2 VDC to -54 VDC	-43.2 VDC to -54 VDC
Max Total Power Supported	3000 W	9000 W	15000 W
Total Max Input Current At Minimum Voltage	69.44 A at -43.2VDC	208.32 A at -43.2 VDC	347.2 A at -43.2 VDC (equivalent of 175A per feed)
Total Max Input Current At Nominal Voltage	62.5 A at -48VDC	187.5 A at -48 VDC	312.5 A at -48 VDC (equivalent of 175A per feed)
Max Current Per Power Feed	70A	70A	210A
Max Local Ambient Temperature	149° F (65° C)	149° F (65° C)	149° F (65° C)
NOTE: All systems support redundant A & B feeds. Scalable bus bar supports dual A and dual B feeds.			

Facility DC Power Connection	Voltage	Nominal input voltage	-48 VDC
		Operating voltage range	-48VDC ± 10% or -43.2 VDC to -52.8 VDC
		Max Input voltage slew rate	0.5V/uS
		Redundant feed voltages* (A & B)	*A and B feeds must differ by no more than 5VDC during steady state operation
		Ripple/Noise	480 mV PARD**
		Overshoot	Must remain within regulation limits on all feeds during startup or shutdown
	Current	Voltage transients	Must not exceed -60 VDC
		Max steady state input current	62.5A per server blade enclosure installed at -48VDC
		Max steady state current per feed/total	
		Power bus boxes	70 A/70A
		Mini bus bars	210 A/210A
		Scalable bus bars	210 A/350A or equivalent of 175A per feed*
	In-rush current	Must support up to 2X the maximum operating current per server blade enclosure (125 A) for up to 1.0 mS	
	Input over-current	Customer provided fusing for facility DC feeds that protects the system from catastrophic over-current within 20 uS. Fuse should sustain all in-rush and operating currents.	
	Max Input Current Slew Rate	1A/uS	

Max Rated Power	3000W per server blade enclosure
Connections and Cables	HP provided facility DC cable connection kit: • The facility DC connection kit supports the connection of up to four -48VDC, RETURN pairs and ground The power cable assemblies consist of 1/0AWG, color-coded, flexible cable rated at 105° C, terminated with bus mating connectors at one end and unterminated at the other end. The cable length provided enables the customer to route to a fuse panel within or adjacent to the rack.
*NOTE: All systems support redundant A and B feeds. Scalable bus bars support dual A and dual B feeds.	
**NOTE: Periodic and random noise (PARD). Maximum allowable peak-to-peak ripple and noise (as measured at the load on any output channel). The ripple and noise is measured over a 20 Hz to 100 MHz frequency band. A resistive load (non-electronic) is used for this measurement. Each output is by-passed to return by a 10uF tantalum capacitor with an ESR less than 100 milli-Ohms in parallel with a 0.47 uF ceramic capacitor, at the point of load. The load cable is 12 feet of twisted wire capable of carrying the current. The printed wiring board assembly is installed in its enclosure for this measurement, or the measurement leads are properly shielded with Earth grounds applied to the insert.	

Environment-friendly Products and Approach	End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to http://www.hp.com/go/green. To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.
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