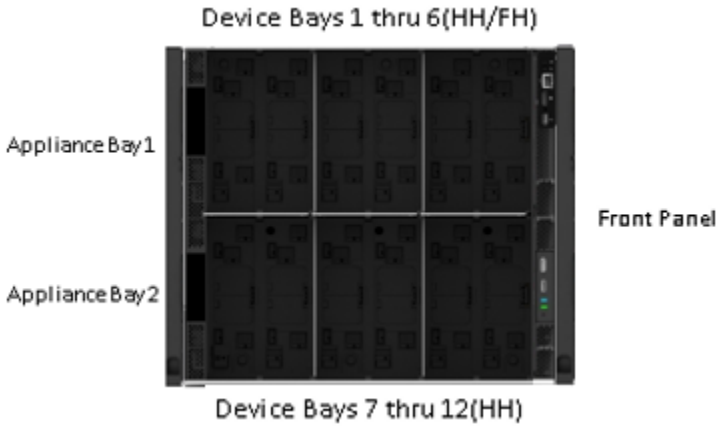
Overview

HPE Synergy 12000 Frame



HPE Synergy 12000 Frame - Front View

- 6 Zones for Compute and Storage
- 2 Appliance Bays for Management
- Front Panel, for Synergy Console connections

NOTE: See Device Bay Population Guidelines in section below

HPE Synergy 12000 Frame - Rear View

- 6 Interconnect Module Bays(3+3 Redundancy)
- 10 Fan Bays(Fans included with all models)
- 6 Power Supplies (N+N, N+1 Redundancy)
- 2 Frame Link Module Slots

What's New

The HPE Synergy 12000 Frame is the base for an HPE Synergy intelligent infrastructure with embedded management and scalable links that expands to meet business demand. The Frame is the base infrastructure that pools resources of compute, storage, fabric, cooling, power and scalability. IT can manage, assemble and scale resources on demand by using the Synergy Frame with an embedded management solution combining the Synergy Composer and Frame Link Modules. The Synergy Frame is designed to meet today's needs and future needs with continuing enhancements to compute and fabric bandwidths, including photonics-ready capabilities.

Enhancements to the HPE Synergy 12000 Frame include several new capabilities:

- Support for HPE Synergy 480 and 660 Gen10 Compute Modules,
- A guided installation experience for setting up HPE Synergy,
- Additional 2650W hot plug power supply options: HVDC, 277VAC, and -48VDC,
- Product version to comply with the Trade Agreements Act (TAA), and
- A round-hole rail kit, primarily for use in NEBS-compliant seismic racks.

HPE Synergy is a single infrastructure of physical and virtual pools of compute, storage, and fabric resources, and a single management interface that allows IT to instantly assemble and re-assemble resources in any configuration. As the foundation for new and traditional styles of business infrastructure, HPE Synergy eliminates hardware and operational complexity so IT can deliver infrastructure to applications faster and with greater precision and flexibility.
NOTE: HPE Synergy 12000 Frame are compatible with existing applications and workloads running on c-Class infrastructures today. Subject to availability of options required for specific applications.

Standard Features

HPE Synergy 12000 Frame

HPE Synergy solutions start with a Synergy 12000 Frame which includes 10 Fans and a single Frame Link Module. Once the Frame has been selected, the following options may be added for a complete solution: Synergy Compute Modules, networks and storage options, networking interconnect modules/switches, single or redundant Synergy Composer(s) with embedded OneView, additional power supplies and an additional redundant Frame Link Module for easy solutions scalability.

HPE Synergy 12000 Frame, is the base for all Synergy products and supports.

- Up to 12 half-height or 6 full-height Compute Modules, Zone designs allow space for double wide half height and full height Compute and/or Storage devices, mixing allowed in designated areas.
- Ten fans and single Frame Link Module included with every system
- Two appliance bays for redundant management appliances, embedded HPE OneView (additional solution options in future)
- Up to six 2650 Watt Power Supplies of Titanium-class efficiency providing 7950 Watts of redundant power line support
- Up to 6 Interconnect bays for full redundancy of 3 fabrics.
- Two (2) slots for Frame Link Modules, offering links to multiple frames through a private air-gapped management network
- HPE Synergy management that maximizes power and cooling efficiency
- HPE Intelligent Resources technology built-in to every frame and option for Auto-Discovery of resources

HPE Synergy Appliances

HPE Synergy Composer, is a management appliance with HPE OneView embedded. The appliance plugs directly into the Frame to manage all Synergy resources intelligently and seamlessly. The Synergy Composer appliance integrated to the system provides:

- A single point of management for single or scaled frames, which is ideal for on-demand composability.
- Management of all frame resources through HPE OneView profiles and templates.
- Auto-Discovery of Compute, Memory, Storage and Fabrics within a Frame or across multiple connected Frames.
- Activity, Health and Power LEDs for immediate status.

NOTE: The USB port is for Hewlett Packard Enterprise Certified Service Parties Only.

HPE Synergy Image Streamer is a management appliance that provides fast image/application changes to compute resources to meet your composable infrastructure needs. It integrates software-defined intelligence from embedded HPE Synergy Composer to rapidly deploy and update physical compute nodes with operating environments for fast virtualized image changeovers, quick updates, and image compliance. As a single point of management for single or scaled frames, Synergy Image Streamer is ideal for on-demand composability by enabling:

- Provisioning boot/run storage volumes and deployment of the OS,
- Personalization of the OS per the deployment plan,
- Automatic generation of iSCSI targets for the boot/run volume, and
- Rapid updates of compute modules with the latest images.

Standard Features

HPE Synergy Frame Link Module (FLM), is the frame resource information control point which also links multiple frames. It provides:

- Integrated direct access to a single or multiple frames through a HPE Synergy Composer (powered by HPE OneView),
- A dedicated 10GbE air-gapped management network for multi-frame communications,
- Immediate status and health details through HPE OneView,
- Asset and inventory information reports for the devices in the frame,
- Robust, multi-frame setup and control via HPE Synergy Composer (powered by HPE OneView),
- Thermal and power information reports, including real-time actual power usage per server and per frame,
- The option to add a second (redundant) module to assure availability of linkages in a multi-frame environment (the first Synergy Frame Link Module being included with every Synergy Frame), and
- HPE Synergy Console interfaces on each Synergy Frame Link Module.

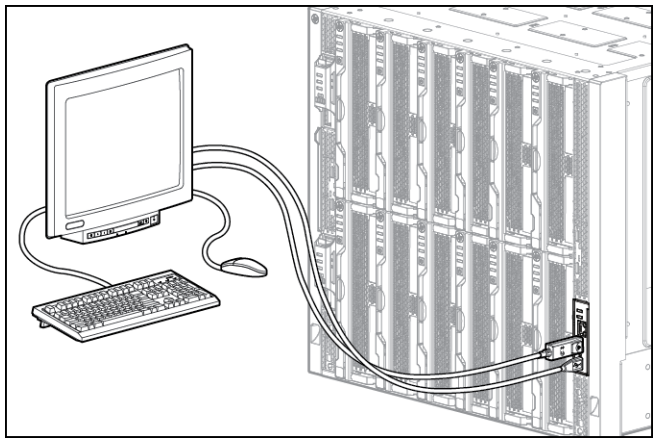
NOTE: See Step 3 for details on the Frame Link Module and cable options.

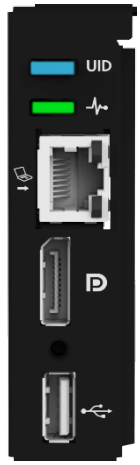
HPE Synergy Console, is the frame resource information control point. This control point connects technicians for easy setup and installation and/or also allows logins to HPE OneView for management of one or more frames.

- Front access to the Synergy Console is provided by the **Front Panel** Monitor Port and USB 2.0 connectors.
- Rear access to the Synergy Console is provided on each **Frame Link Module**.
- Laptop connection to the Synergy Console is provided from the **Front Panel** (RJ45 port) via simplet VNC services (free VNC software which can be downloaded from the internet).

NOTES: Hewlett Packard Enterprise offers and recommends the HPE LCD8500 1U Rackmount Console as the Synergy recommended Display Solution. See the Rackmount Solutions section below. The Monitor Port supports any monitor that has DisplayPort™ or an active DisplayPort adaptor for interfacing to VGA, HDMI or DVI monitors. External USB hub is required for keyboard and mouse if monitor does not include a hub.

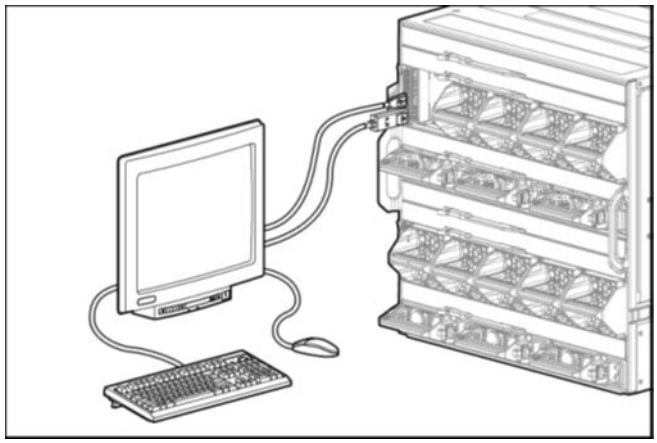
Console Connect to the Front Panel





Console Connect to a Frame Link Module - Rear

Standard Features



Warranty

The HPE Synergy is covered by a global limited warranty and supported by Hewlett Packard Enterprise Services and a worldwide network of Hewlett Packard Enterprise 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 HPE Pointnext operational services or customized service agreements.

- HPE Synergy 12000 Frame: 3-3-3; Three-year parts and labor, on-site limited global warranty. Certain restrictions and exclusions apply
- Frame options: Fans, Power Supplies, Frame Link Modules, One-year parts only or Frame warranty
- HPE Synergy Composer: 3-3-3; Three-year parts and labor, on-site limited global warranty.
- HPE Synergy Interconnect Modules/Switches: One-year parts and labor, on-site regardless of the warranty period for the system in which they are installed
- HPE Storage Fibre Channel switches have a maximum warranty period of one (1) year regardless of the warranty period for the system in which they are installed
- Hard drives have either a one-year or three-year warranty. Refer to specific hard drive Tech Specs for details.

For additional information please visit: **http://www.hpe.com/info/synergy**

Carrier Grade Configuration

HPE Synergy 12000 Frame - Carrier Grade

The HPE Synergy 12000 Frame has been certified to NEBS Level 3. The certified configuration covers the compute modules, interconnect modules, and other components that passed the NEBS Level 3 and ETSI EN 300 386-2 certifications. For more information, see **HPE Synergy 12000 Frame - Carrier Grade Supplement**

Rack Airflow Requirements

HPE Advanced and Enterprise Series Racks

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

NOTE: For the complete list of installation requirements, please see the "HPE Synergy Site Planning Guide" at **http://www.hpe.com/support**.

Third-party racks

Standard Features

NOTE: 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 server rack includes closing front and rear doors, you must have a minimum of 65% free area compared to the total area of the door evenly distributed from top to bottom to permit adequate airflow.
- Front door: The clearance from face of rack to inside of the front door must be a minimum of 77 mm (3 in).
- Rear door: The clearance between the rear of the Frame and the rear rack door must be a minimum of 175 mm (6.9 in) to accommodate system cabling.
- Side: The clearance between the installed rack component and the side panels of the rack must be a minimum of 70 mm (2.75 in).
- Width: 483 mm (19 in)
- Depth: Maximum clearance between front and rear RETMA rails is 864 mm (34 in). Minimum clearance for round-hole racks is 627 mm (24.7 in). Minimum clearance for square-hole racks is 635 mm (25 in).
- The rack must be able to accept the adjustable rack rails that are shipped with each Frame :
  - Minimum rail length: 698.5 mm (27.5 in)
  - Maximum rail length: 749.3 mm (29.5 in)

NOTE: 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 panel's results in improper cooling that can lead to thermal damage.
NOTE: For the complete list of installation requirements, please see the "HPE Synergy Frame Site Planning Guide" at **http://www.hpe.com/support**.

Factory Express Portfolio for Servers and Storage

HPE Factory Express offers configuration, customization, integration and deployment services for HPE Synergy solutions. 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. Hewlett Packard Enterprise products supported through Factory Express include: a wide array of servers and storage, 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: **https://www.hpe.com/us/en/services/factory-express.html**.

Synergy Software Release Sets (with Synergy custom SPP bundles)

HPE Synergy Software Release Sets allow users to perform firmware, driver, and related software updates. Software Release Sets include download files to allow component updates for the Synergy subset of the SPP (delivered as a custom download), HPE Synergy Composer, HPE Synergy Image Streamer, and other switches that are not managed by Composer. Combinations within a specific release set are developed and released together. **http://www.hpe.com/downloads/synergy**

HPE Power Advisor

The HPE Power Advisor is a tool provided by Hewlett Packard Enterprise to assist in the estimation of power consumption and proper selection of components including power supplies at a system, rack, and multi-rack level. A variety of additional features are also provided including a condensed bill of materials, a cost of owner ship calculator, and a power report. The HPE Power Advisor tool allows you to configure multiple Hewlett Packard Enterprise compute, storage, fabric and power infrastructure solutions into a single rack or multi-rack configuration.

Hewlett Packard Enterprise highly recommends using the HPE Power Advisor tool to ensure the number of power supply options you have selected can fully support your Synergy 12000 Frame configuration and to

Standard Features

review maximum system power ratings for facilities planning purposes.

HPE Power Advisor is available at: **http://www.hpe.com/info/hpepoweradvisor.**

HPE Synergy Planning Tool

The Synergy Planning Tool is a new simple and intuitive resource, giving you the ability to plan a Synergy systems following the standard build rules we have in ordering systems today. The tool provides multiple pre-configured starting points with the ability to customize. The tool provides a Bill of Materials to facilitate customer quotes and orders. The current version is intended for internal HPE and partner use.

Click here to download the HPE Synergy Planning Tool.

Service and Support

Service and Support

HPE Technology Services offers you a rich portfolio of consulting and support services designed to add value to our core products and solutions. We have the know-how and experience to put technology to work for you. We work closely with you, as your strategic partner, leveraging our full services portfolio to make sure that everything works to help optimize your enterprise.

Choose from services aligned to our product offerings and lifecycle. From proactive onsite services to innovative support when your products are connected to Hewlett Packard Enterprise, you choose the precise level of attention and support your business demands.

HPE Technology Services for HPE Synergy
HPE Technology Services delivers confidence, reduces risk and helps customers realize agility and stability. Connect to Hewlett Packard Enterprise to help prevent problems and solve issues faster. Our support technology lets you to tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, any time.

Protect your business beyond warranty with HPE Support Services
Hewlett Packard Enterprise support services offer complete care and support expertise with committed response choices that are designed to meet your IT and business needs.
HPE Foundation Care services offer scalable reactive support-packages for HPE Synergy and software. You choose the type and level of service that is most suitable for your IT and business needs.
HPE Proactive Care keeps your system stable and reliable helping to prevent problems and reduce outages through proactive service management and enhanced technical response.

Advise, transform, integrate, support, and flex

HPE Technology Services helps you get the most out of what you have today and transition to HPE Synergy, a composable infrastructure, at your pace and from wherever you are on the journey.

Start with the HPE Transformation Workshop to ensure that your business and IT organizations collaborate, define the topline strategy for composable, software-defined, cloud-ready infrastructure and kick-start your projects confidently. This workshop clarifies your business requirements and the issues that IT and operations teams must resolve in order to meet these requirements. A detailed executive briefing or high-level report summarizes the strategies, high-level plan and functional requirements.

HPE Modernization and Migration Services helps you choose the right platform for the right workload at the right cost and evolve your IT infrastructure, processes and organization taking advantage of "on-hybrid infrastructure" innovations such as composable, converged, software-defined, technologies. Hewlett Packard Enterprise experts advise, transform, integrate and implement for platform refresh, datacenter consolidation virtualization, migration and automation projects.

HPE Flexible Capacity is a pay per use model for on premise infrastructure. This offers needed HPE Synergy capacity in the datacenter, plus a buffer of additional capacity. As HPE Synergy will be a dynamic environment, this provides enough room to grow your environment, but only pay for actual metered use. Technology transitions and refresh can be built in, infrastructure and services are billed monthly, enabling you to align costs to business use.

Optimized Support

HPE Proactive Care Advanced - 24x7 coverage, three year Support Service
Builds and incorporates on Proactive Care and also gives customers personalized technical and operational advice from an assigned, local Account Support Manager for personalized technical collaboration, flexible access to specialist skills to help optimize business critical IT, and Critical Incident Management to help so the business is not affected if there is a system or device outage. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues.

Service and Support

https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA5-3259ENW.pdf

Standard Support

HPE Proactive Care with 24x7 coverage, three year Support Service
Hardware and software support services designed specifically for your technology with rapid access to Advanced Solution Center specialists for start to finish case management plus proactive reports and recommendations for firmware and software management and best practice advice. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues.
https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf

Deploy and integrate

HPE Synergy First Frame Installation and Startup - Provides for hardware installation (HPE Synergy compute modules, Storage Modules, Virtual Connect modules, Interconnect Link Modules, Frame Link Modules, and HPE Synergy D3940 Storage Modules) and software startup for the first frame of your HPE Synergy deployment. Additional frames can be added using the HPE Synergy Additional Frame Installation and Startup Service.

HPE Synergy Additional Frame Installation and Startup Service - Add additional frames to your HPE Synergy First Frame Startup service or expand your existing HPE Synergy Infrastructure.

HPE Factory Express Initial Frame Service for Synergy
Factory Express allows a customers' configurations to be pre-configured in the HPE Integration center with an implementation project manager to manage the deployment end to end. The project manager will act as a single point of contact to coordinate the build, delivery and onsite installation and commissioning of the solution. In addition to the configuration and deployment activities, your HPE Synergy configuration goes through comprehensive testing and a detailed documentation package on the configuration and settings of the delivered solution will be provided.

HPE Factory Express Synergy Additional Frame Service for Synergy
Add additional frames to your HPE Synergy Factory Express service or expand your existing HPE Synergy Infrastructure.

HPE Education

Training your IT staff is critical to help drive the value of HPE Synergy with increased efficiencies and better business outcomes. Training is key to the transformation and management of HPE Synergy.
See **http://http://www.hpe.com/ww/learnconvergedsystems**

Parts and Materials

Hewlett Packard Enterprise will provide HPE-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by Hewlett Packard Enterprise due to malfunction.

For more information

More information on HPE services can be found at **http://www.hpe.com/services**.

Platform Information

HPE Recommended Options have the best performance, value and availability.

Recommended Options have been selected by Hewlett Packard Enterprise experts to provide the right technology for a range of workloads and market segments. Fully integrated into the ProLiant management and security experience, Recommended Options provide the best fit with timely availability. **View the list for your region.**

Extended Options provide an extended catalog of products tailored for customers in specific markets or with specific workloads, requiring the utmost in performance or value. Fully integrated into the ProLiant management and security experience, Extended Options represent great value and performance but typically have a longer lead-time.

Models

HPE Synergy 12000 Frame Options

NOTE: Hewlett Packard Enterprise does not allow factory integration of options into pre-configured models. Any additional options purchased will be shipped separately.

NOTE: If you desire a custom configuration, please see the "Configuration Information - Factory Integrated Models" section of this QuickSpecs.

NOTE: Each Synergy 12000 Frame holds up to 12 half-height compute module, 6 full-height compute modules, and/or 6 double wide half-height compute/storage modules or 3 double wide full-height compute modules.

Configure To Order - Recommended

HPE Synergy 12000 Configure-to-order Frame with 1x Frame Link Module 10x Fans (Recommended)	797740-B21

NOTE: This Frame includes a single Frame Link Module, and 10 hot-plug fans, with KVM ports built-in, and the blanks based on the configuration of the Frame.

HPE Synergy 12000 TAA-compliant Configure-to-order Frame with 2x FLM 6x Power Supplies 10x Fans (Recommended)	797740-B22

NOTE: This Frame includes 2 Frame Link Modules, 6 power supplies, and 10 hot-plug fans, with KVM ports built-in, and the blanks based on the configuration of the Frame.

NOTE: HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.

Configure-to-Order – Factory Integrated Models

HPE Recommended Options have the best performance, value and availability.

Recommended Options have been selected by Hewlett Packard Enterprise experts to provide the right technology for a range of workloads and market segments. Fully integrated into the ProLiant management and security experience, Recommended Options provide the best fit with timely availability. **View the list for your region.**

Extended Options provide an extended catalog of products tailored for customers in specific markets or with specific workloads, requiring the utmost in performance or value. Fully integrated into the ProLiant management and security experience, Extended Options represent great value and performance but typically have a longer lead-time.

NOTE: This section lists some of the required and optional steps to configure a Factory Integrated Model. To ensure only valid configurations are ordered, Hewlett Packard Enterprise recommends contacting your local sales representative for information on Factory Integrated Model product offerings and requirements.

For a complete configuration of the HPE Synergy Frame System, please do the following:

Step 1: Select desired model, configuration, and quantity of HPE Synergy Frames and options per Frame (required)

NOTE: HPE Synergy 12000 Frame will support all new components as part of the new Synergy Solutions program. Please review the links below to specific for Frame, Compute, Storage and Interconnects for details.
NOTE: Each HPE Synergy Frame holds up to 12 half height or 6 full height compute modules. Compute blanks will be shipped in all empty bays.

NOTE: For Synergy Compute Module information, please visit: **http://www.hpe.com/info/synergy**

Select the base Frame configuration (required)

HPE Synergy Frame	Recommended	
	NOTE: Frames listed below include KVM connections for Synergy Console and Synergy Composer (HPE OneView) via access on the Front Panel of the Frames. Additional management appliances, Frame Link Modules, power supply kits, power cables, interconnects, additional fans, etc. are added in the following steps. **NOTE:** Frames listed below include the required blanking panels (device bay, interconnect module, power, redundant Appliance bays and Frame Link Modules as required per the ordered configuration. If the configuration is modified at a later date, additional blanking panels (ordered separately) may be required.	
	HPE Synergy 12000 Configure-to-order Frame with 1x Frame Link Module 10x Fans (Recommended)	797740-B21
	NOTE: The Frame above includes a single Frame Link Module and 10 hot-plug fans.	
	HPE Synergy 12000 TAA-compliant Configure-to-order Frame with 2x FLM 6x Power Supplies 10x Fans (Recommended)	797740-B22
	NOTE: The Frame above includes 2 Frame Link Modules, 6 power supplies, and 10 hot-plug fans.	
	NOTE: HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.	

Configure-to-Order – Factory Integrated Models

Select the Frame power options (required)

HPE Synergy Power Supplies

Synergy Power Supply – Recommended (Up to 6)

NOTE: Hewlett Packard Enterprise highly recommends using the HPE Power Advisor or the HPE Synergy Planning Tool to ensure the number of power supply options you have selected can fully support your Synergy System configuration and to review maximum system power ratings for facilities planning purposes. HPE Power Advisor is simply a power start up advisor and does not reflect the actual power usage on each Frame or the values that may appear in OneView. HPE Power Advisor is available at: **http://www.hpe.com/info/hpepoweradvisor**.

HPE Synergy Planning Tool is available at:

Click here to download the HPE Synergy Planning Tool.
https://sizersllb.itcs.hpe.com/sb/installs/HPESynergyPlanningTool.zip

NOTE: Each Frame must include only one type of power supply. Mixing of power supplies is not supported, except during hot swaps to different level or higher efficient power supplies. OneView will exhibit a mismatch or not available error due to mixed power supplies until all power supplies are matched.

NOTE: HPE Synergy 12000 Frame AC power supplies meet 80 PLUS Titanium power efficiency requirements: Titanium (96%). The 80 PLUS program is a unique forum that unites electric utilities, the computer industry, and consumers in an effort to bring energy efficient technology solutions to the marketplace. 80 PLUS independently tests power supply efficiency and publically posts the results on **https://plugloadsolutions.com/80PlusPowerSupplies.aspx**. DC power supplies are not eligible for 80 PLUS testing; efficiency is per Hewlett Packard Enterprise internal testing.

HPE 6x 2650W Performance Hot Plug Titanium Plus FIO Power Supply Kit (Recommended) 798096-B21

NOTE: This option is for factory install only.
NOTE: This option contains Intelligent Auto-Discovery features for HPE OneView.
NOTE: The bundle includes a quantity of 6 HPE 2650W Titanium 96% PSU so a full Frame can be configured with a single part number.
NOTE: HPE Synergy Power supplies meet multiple Energy Efficiency Initiatives: 2650W, 96%: Climate Savers Computing Initiative TITANIUM and ECOS Consulting 80 Plus Titanium.

HPE 2650W Performance Hot Plug Titanium Plus Power Supply Kit (Recommended) 798095-B21

NOTE: This option contains Intelligent Auto-Discovery features for HPE OneView.
NOTE: HPE Synergy Power supplies meet multiple Energy Efficiency Initiatives: 2650W, 96%: Climate Savers Computing Initiative Titanium and ECOS Consulting 80 Plus Titanium.
NOTE: Mixing of Power Supplies Is Not Supported on Synergy 12000 Frames, except during hot swaps to different level power supplies. HPE OneView will exhibit a mismatch error due to mixed power supplies until all power supplies are matched and performance issues may arise.

HPE 2650W -48VDC Hot Plug Power Supply Kit (Recommended) 798099-B21

NOTE: This option contains Intelligent Auto-Discovery features for HPE OneView.
NOTE: HPE Synergy 2650W -48VDC Power Supplies provide 93% energy efficiency.
NOTE: Mixing of Power Supplies Is Not Supported on Synergy 12000 Frames, except during hot swaps to different level power supplies. HPE OneView will exhibit a mismatch error due to mixed power supplies until all power supplies are matched and performance issues may arise.

Configure-to-Order – Factory Integrated Models

HPE Synergy Power Supplies	**Extended**	
	HPE 2650W HVDC Hot Plug Power Supply Kit (Extended)	798342-B21
	NOTE: This option contains Intelligent Auto-Discovery features for HPE OneView. **NOTE:** HPE Synergy 2650W HVDC Power Supplies provide 94% energy efficiency. **NOTE:** Mixing of Power Supplies Is Not Supported on Synergy 12000 Frames, except during hot swaps to different level power supplies. HPE OneView will exhibit a mismatch error due to mixed power supplies until all power supplies are matched and performance issues may arise.	
	HPE 2650W 277VAC Hot Plug Power Supply Kit (Extended)	798101-B21
	NOTE: This option contains Intelligent Auto-Discovery features for HPE OneView. **NOTE:** HPE Synergy 2650W 277VAC Power Supplies provide 95% energy efficiency. **NOTE:** Mixing of Power Supplies Is Not Supported on Synergy 12000 Frames, except during hot swaps to different level power supplies. HPE OneView will exhibit a mismatch error due to mixed power supplies until all power supplies are matched and performance issues may arise.	

Step 2: Select Management Appliance Options

HPE Synergy Frame Management Appliance Options	**Recommended**	
	NOTE: Required for the first HPE Synergy Frame system. **NOTE:** HIGHLY RECOMMENDED that a second HPE Synergy Composer appliance module be added for high availability or redundancy. **NOTE:** No direct license is required. Supports any HPE Synergy Compute module and other installed module options.	
	HPE Synergy TAA-compliant Composer (Recommended)	804353-B22
	NOTE: HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.	
	HPE Synergy Composer provides enterprise-level management to deploy the exact resources to your application needs. Its software-defined intelligence uses embedded HPE OneView to aggregate Compute, Storage, Fabric resources in a manner that scales linearly to your application needs, instead of being restricted to the fixed ratios of traditional resource offerings. HPE Synergy Composer is a management appliance that directly integrates into the Frame of the system and communicates directly with the Frame Link Module. A single Synergy Composer manages one or more Frames linked through the Frame Link Modules. The Synergy Composer option selected determines the number of Frames linked and managed. Use of two HPE Synergy Composer modules is recommended for redundancy and high availability.	
	HPE Synergy Image Streamer (Recommended)	804937-B21
	NOTE: For more details on the HPE Synergy Image Streamer configuration and setup please refer to the Image Streamer Quick Specs for more details. **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04815217**	
	HPE Synergy TAA-compliant Image Streamer (Recommended)	804937-B22
	NOTE: HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.	
	HPE Synergy Composer	804353-B21
	HPE Synergy Image Streamer is a management appliance that provides fast image/workload changes to compute resources to meet your Composable Infrastructure	

Configure-to-Order – Factory Integrated Models

needs. It integrates software-defined intelligence from embedded HPE Synergy Composer to deploy and update physical compute nodes with operating environments at extreme speed for fast virtualized image changeovers, secure boot, and image compliance.

Step 3: Select optional Redundant Synergy Frame Link Modules

HPE Synergy Frame Link Modules **Recommended**

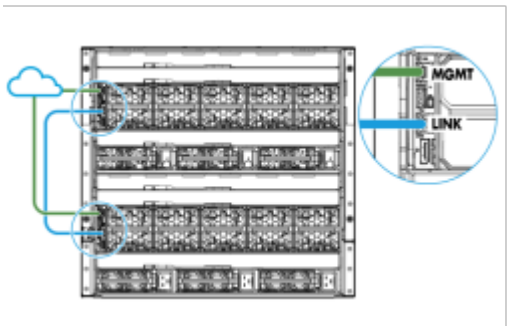
NOTE: Every Synergy 12000 Frame comes with at least one Frame Link Module. For redundancy and linking multiple frames it is REQUIRED that a second Frame Link Module be purchased for each additional Frame connected/linked.

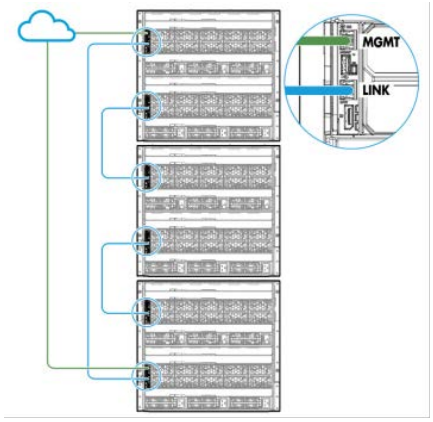
NOTE: The Frame Link Module comes with 10 Gb/s private Ethernet networking solution included and requires a CAT6A or CAT7 cabling between Frames for connection to multiple Frames or forming a Management ring between multiple Frames. Multiple CAT6A cables are offered through Hewlett Packard Enterprise below Use 1 meter cables within a frame or between frames and a 3 meter cable to go from a bottom frame in a rack to the top frame or frame in another rack or from the management connector to the management network.

HPE Synergy Frame Link Module (Recommended) 804942-B21

The Frame Link Module is the control and information link for a highly intelligent self-aware system of hardware options. It provides a direct link for resource information to the Synergy Composer (powered by HPE OneView). The link module provides an option for an air-gapped 10GbE management network ring that allows for multi-frame connectivity. Single or multiple Frames directly linked through this management network can be automatically discovered by HPE OneView along with their resources (compute, storage, networking, and other options) the instant they are plugged in and/or powered on.

See Frame Link Topology below.





Management Network

Single Frame MGMT Port and LINK Port Topology

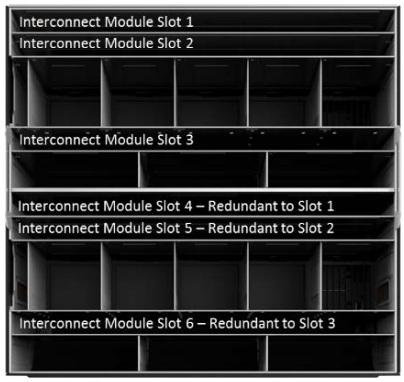
Multiple Frame MGMT Port and LINK Port Topology

Configure-to-Order – Factory Integrated Models

HPE Frame Link Topology Cables -	**Extended**	
	HPE Synergy Frame Link Module CAT6A 1.2m Cable (Extended)	861412-B21
	NOTE: For linking consecutive Frames	
	HPE Synergy Frame Link Module CAT6A 3m Cable (Extended)	861413-B21
	NOTE: For linking bottom Frames to top Frames in a rack.	

Step 4: Select 1 or more interconnect switches/link modules for each Frame (as required)

For more information related to Frame interconnect modules and switches and cables required please consult the specific Interconnect Switches/Module QuickSpecs.
NOTE: The HPE Synergy 12000 Frame provides Slots for 3 redundant Fabrics as shown here. Redundancy is 1 & 4, 2 & 5 and 3 & 6.



The following is a list of various HPE Synergy 12000 Frame Interconnect switches and link modules (Virtual Connect, Ethernet, Fibre Channel, SAS and Satellite Interconnect Modules). A pair of interconnects must be ordered if redundancy is required. For detailed interconnect options, consult the specific Synergy Interconnect Switches/Modules QuickSpecs.
NOTE: Interconnect bays provide direct connect to Mezzanines within the Compute Modules in the front bays of the Frame. All Compute Mezzanine 1's connect to ICM slots 1 with redundancy in slot 4. All Compute Mezzanine 2's connect to ICM slots 2 with redundancy in slot 5. All Compute Mezzanine 3's connect to ICM slots 3 with redundancy in slot 6.
NOTE: For HPE Best Practices placement see notes with each ICM and place the associated mezzanines in the Compute slots associated with the ICM slots.
NOTE: The HPE Synergy interconnects ship as single units unless otherwise noted. Interconnects must be ordered in quantities of two for redundancy support.
NOTE: Options to specific Synergy interconnects are not included in the list below. Consult the individual interconnect QuickSpecs to obtain part numbers for interconnect options such as cables, SFPs, etc.

HPE Synergy Network Interconnects	HPE Virtual Connect SE 40Gb F8 Module for Synergy	794502-B23
	Mellanox SH2200 TAA-compliant Switch Module for HPE Synergy	866573-B21
	HPE Synergy 10Gb Interconnect Link Module	779215-B21
	HPE Synergy 20Gb Interconnect Link Module	779218-B21
	HE Synergy 10Gb Pass-Thru Module	799330-B21
	NOTE: HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.	

HPE Storage and SAS Switch	**NOTE:** The HPE Synergy Storage Module and 12Gb SAS connection modules are supported on all Synergy 12000 Frame(s).	
	HPE Synergy D3940 12Gb SAS CTO Drive Enclosure with 40 SFF (2.5in) Drive Bays	835386-B21
	NOTE: The HPE Synergy Storage Module requires at least one and a maximum of two 12Gb SAS Connection Modules per frame.	
	12Gb SAS Connection Modules per frame.	

Configure-to-Order – Factory Integrated Models

	HPE Synergy D3940 Redundant I/O Adapter	757323-B21
	NOTE: One I/O Adapter is configured automatically in each Synergy D3940 Storage Module. A second I/O Adapter can be selected for redundancy.	
	HPE Synergy 12Gb SAS Connection Module with 12 Internal Ports	755985-B21
	NOTE: A SAS Connection Module must be placed in ICM bay 1 and ICM bay 4. If only configuring a single module in the frame, a connection module in ICM bay 1 will support storage modules in bays 1 – 6. A connection module in ICM bay 4 will support storage modules in bays 7-12. A second connection module can be configured in the frame for failover.	
	HPE Smart Array P542D/2GB FBWC 12Gb Mezzanine SAS Controller	759557-B21
	NOTE: Each compute module connecting to a Synergy D3940 storage module must be configured with a Smart Array P542D controller in mezzanine slot 1.	
HPE Synergy SAN Interconnects	**NOTE:** HPE Fibre Channel interconnect switches and modules supporting up to a 16Gbps internal port downlink speed (connection speed from the compute modules to the interconnect) (P/N: 779227-B21, K2Q83A, K2Q84A, K2Q86A) are supported on all HPE Synergy 12000 Frames.	
	NOTE: For a list of complete 16Gb FC SAN Switch Module SAN management software, hardware, cables and transceiver options for HPE Synergy, please refer to the Brocade 16Gb FC Switch Module QuickSpecs for HPE Synergy at:	
	NOTE: Brocade 16Gb FC Switch Module 12-port Upgrade can be used on any FC switch module option, scalable up to 36 FC ports.	
	Brocade 16Gb/12 Fibre Channel SAN Switch Module for HPE Synergy	K2Q83A
	Brocade 16Gb/24 Fibre Channel SAN Switch Module for HPE Synergy	K2Q84A
	Brocade 16Gb/24 Power Pack+ Fibre Channel SAN Switch Module for HPE Synergy	K2Q86A
	Brocade 16Gb Fibre Channel SAN Switch Module 12-port Upgrade LTU for HPE Synergy	D4U69A
	Brocade 16Gb Fibre Channel SAN Switch Module 12-port Upgrade E-LTU for HPE Synergy	D4U69AAE
	HPE Virtual Connect SE 16Gb Fibre Channel Module for Synergy	779227-B21
HPE Synergy Converged Network Adapters	HPE Synergy 3820C 10/20Gb Converged Network Adapter	777430-B21
	HPE Synergy 2820C 10Gb Converged Network Adapter	794538-B21
HPE Synergy Ethernet Adapters	HPE Synergy 6810C 25/50G Ethernet Adapter	867322-B21
HPE Synergy Fibre Channel Host Bus Adapters	HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter	777452-B21
	HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter	777454-B21
HPE Synergy Transceivers and Cable options	**NOTE:** Check the QuickSpecs for each Synergy interconnect module to view the complete list of supported transceivers and cables.	
	HPE Synergy 40GbE/4x10GbE/4x8Gb FC QSFP+ Transceiver	817040-B21
	HPE Synergy Dual 10GBASE-T QSFP+ 30m RJ45 Transceiver	838327-B21
	HPE QSFP28 to SFP28 Adapter	845970-B21

Configure-to-Order – Factory Integrated Models

HPE B-series 4x16 Short Wave QSFP Transceiver	K2Q87A
HPE Synergy Interconnect Link 1.6m Direct Attach Copper Cable	804098-B21
HPE Synergy Interconnect Link 2.1m Direct Attach Copper Cable	804155-B21
HPE Synergy Interconnect Link 3m Active Optical Cable	804101-B21
HPE Synergy Interconnect Link 5m Active Optical Cable	804104-B21
HPE Synergy Interconnect Link 15m Active Optical Cable	804110-B21
NOTE: The following cables can be used for 100Gb uplink connections on the Mellanox SH2200 Switch Module (866573-B21). Check its QuickSpecs to view the complete list of supported transceivers and cables.	
HPE 100Gb QSFP28 to QSFP28 7m Active Optical Cable	845410-B21
HPE 100Gb QSFP28 to QSFP28 10m Active Optical Cable	845412-B21
HPE 100Gb QSFP28 to QSFP28 15m Active Optical Cable	845414-B21

HPE Best Practices for ICM Slot Priority Placement

- Best practices for ICM Slot priority placements are to use:
  - Fabric 1 for the storage fabric (ICM bays 1 and 4), where the SAS storage ICM takes precedence over FC ICMs,
  - Fabric 2 for a secondary Ethernet fabric or storage fabric, if two of either are present (ICM bays 2 and 5), and
  - Fabric 3 for the main Ethernet/Converged fabric (ICM bays 3 and 6).
- Populate both respective ICM bays for each fabric in support of module redundancy.
- Do not mix different types of Ethernet, Fibre Channel, or SAS ICMs in any redundant Interconnect Bay Set. Also, the two interconnect slots of an Interconnect Bay Set cannot support different types of fabrics (Ethernet, Fibre Channel, SAS).
- Both ICM bays within a fabric must contain the same ICM module unless the fabric is a Synergy Composable Fabric.
  - For Synergy Composable Fabrics the frame can be populated with combinations of Master or Satellite modules depending on the intended multi-frame configuration.
- ICM Bays are set up to be redundant: 1 and 4, 2 and 5, 3 and 6.
  - Primary bays are 1, 2 and 3.
  - Do not place an Ethernet interconnect in slots 1, 2, 4, or 5 unless interconnect slots 3 and/or 6 are filled.
  - Do not place Fibre Channel interconnects in ICM slots 1 or 4 if slots 2 and 5 are free, unless you have compute modules with unpopulated CPU2 sockets.

		ICM Slot Numbers (top to bottom of Frame)						
Part#	**Option**	**1**	**2**	**3**	**4**	**5**	**6**	**Fabric Type**
		Slot Priorities for each Options						
779224-B21	HPE Synergy 40Gb F8 Switch Module	3	5	1	4	6	2	Ethernet
794502-B23	HPE Virtual Connect SE 40Gb F8 Module for HPE Synergy	3	5	1	4	6	2	Ethernet
799330-B21	HPE Synergy 10Gb Pass Thru Module	3	5	1	4	6	2	Ethernet
755985-B21	HPE Synergy 12Gb SAS Connection Module with 12 Internal Ports	1			2			SAS
779218-B21	HPE Synergy 20Gb Interconnect Link Module	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Ethernet
779215-B21	HPE Synergy 10Gb Interconnect Link Module	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Ethernet

Configure-to-Order – Factory Integrated Models

K2Q83A	Brocade 16Gb/12 Fibre Channel SAN Switch Module for HPE Synergy	1	3	5	2	4	6	Fibre Channel
K2Q84A	Brocade 16Gb/24 Fibre Channel SAN Switch Module for HPE Synergy	1	3	5	2	4	6	Fibre Channel
779227-B21	HPE Virtual Connect SE 16Gb FC Module for HPE Synergy	1	3	5	2	4	6	Fibre Channel

Synergy 12000 Frame - Best Practices for placing Products in Mezzanine Slots

Best Practices for ICM/Mezzanine #1

This is the Primary Fabric/ICM Slot for a Synergy D3940 Storage module in Front Frame device bays 1-thru-6. This fabric slot must be used for SAS ICM Bay#1 with SAS Mezzanine Controller (Mezz #1) of the Compute module. If the D3940 Storage Module is in device bays 7-thru-12, then a SAS ICM must be in ICM Bay #4. Regardless of storage module placement, ICM Bays #1 and #4 are redundant slots. If there is no D3940 Storage Module being used in the frame, then this ICM bay and Mezzanine slot are open for Ethernet or Fibre Channel networking use.

	Compute Mezzanine Slots: M1 or M1/M4		ICM Bay 1 (and redundant ICM Bay 4)
Priority*	**Mezz Slots**	**Compute Mezzanine Description**	**Interconnect Module Description**
Primary	M1 for SY480	HPE Smart Array P542D Controller (759557-B21)	HPE Synergy 12Gb SAS Connection Module with 12 Internal Ports (755985-B21)
		HPE Smart Array P416ie-m Controller (804428-B21)	
Alternate-1	M1/M4 for SY660	HPE Synergy 2820C 10/20Gb Converged Network Adapter (794538-B21)	HPE Virtual Connect SE 40Gb F8 Module for Synergy (794502-B23)
		HPE Synergy 3820C 10/20Gb Converged Network Adapter (777430-B21)	HPE Synergy 40Gb F8 Switch Module (779224-B23)
			HPE Synergy 20Gb Interconnect Link Module (779218-B21)
Alternate-2		HPE Synergy 3830C 16G FC HBA (Fibre) (777452-B21)	Brocade 16Gb/24 Fibre Channel SAN Switch Module for HPE Synergy (K2Q84A)
		HPE Synergy 3530C 16G FC HBA (Fibre) (7774524-B21)	Brocade 16Gb/24 Power Pack+ Fibre Channel SAN Switch Module for HPE Synergy (K2Q86A)
			HPE Virtual Connect SE 16Gb Fibre Channel Module for Synergy (779227-B21)
			Brocade 16Gb/12 Fibre Channel SAN Switch Module for HPE Synergy (K2Q83A)

Best Practices for ICM/Mezzanine #2

This ICM Bay/Mezzanine slot is usually the primary Fibre Channel fabric, when storage modules are included in the Frame. It can also be used as a secondary Ethernet fabric. When using single processor Synergy Compute Modules, these Bays will be unavailable. Storage Mezzanine controller/ICM is not supported in this mezzanine/slot.

	Compute Mezzanine Slots: M2 or M2/M5		ICM Bay 2 (and redundant ICM Bay 5)
Priority*	**Mezz Slots**	**Compute Mezzanine Description**	**Interconnect Module Description**
Alternate-1	M2 for SY480	HPE Synergy 3830C 16G FC HBA (Fibre) (777452-B21)	Brocade 16Gb/24 Fibre Channel SAN Switch Module for HPE Synergy (K2Q84A)
	M2/M5 for SY660	HPE Synergy 3530C 16G FC HBA (Fibre) (777454-B21)	Brocade 16Gb/24 Power Pack+ Fibre Channel SAN Switch Module for HPE Synergy (K2Q86A)
			HPE Virtual Connect SE 16Gb Fibre Channel Module for Synergy (779227-B21)

Configure-to-Order – Factory Integrated Models

		Brocade 16Gb/12 Fibre Channel SAN Switch Module for HPE Synergy (K2Q83A)
Alternate-2	HPE Synergy 2820C 10/20Gb Converged Network Adapter (794538-B21) HPE Synergy 3820C 10/20Gb Converged Network Adapter (777430-B21)	HPE Virtual Connect SE 40Gb F8 Module for Synergy (794502-B23) HPE Synergy 40Gb F8 Switch Module (779224-B23) HPE Synergy 20Gb Interconnect Link Module (779218-B21) HPE Synergy 10Gb Interconnect Link Module (779215-B21)

Best Practices for ICM/Mezzanine #3

Mezzanine #3 in the Compute module, together with Frame ICM Bays #3 and #6, are to be used for the Primary Ethernet Fabric. Storage Mezzanine controller/ICM is not supported in this mezzanine/slot.

	Compute Mezzanine Slots: M3 or M3/M6		**ICM Bay 3 (and redundant ICM Bay 6)**
Priority*	**Mezz Slots**	**Compute Mezzanine Description**	**Interconnect Module Description**
Alternate-1	M3 for SY480	HPE Synergy 2820C 10/20Gb Converged Network Adapter (794538-B21)	HPE Virtual Connect SE 40Gb F8 Module for Synergy (794502-B23)
		HPE Synergy 6810C 25/50Gb Ethernet Adapter (867322-B21)	
	M3/M6 for SY660	HPE Synergy 3820C 10/20Gb Converged Network Adapter (777430-B21)	HPE Synergy 40Gb F8 Switch Module (779224-B23)
		HPE Synergy 3520C 10/20Gb Converged Network Adapter (777434-B21)	HPE Synergy 20Gb Interconnect Link Module (779218-B21)
			HPE Synergy 10Gb Interconnect Link Module (779215-B21)
Alternate-2		HPE Synergy 3830C 16G FC HBA (Fibre) (777452-B21)	Brocade 16Gb/24 Fibre Channel SAN Switch Module for HPE Synergy (K2Q84A)
		HPE Synergy 3530C 16G FC HBA (Fibre) (777454-B21)	Brocade 16Gb/24 Power Pack+ Fibre Channel SAN Switch Module for HPE Synergy (K2Q86A)
			HPE Virtual Connect SE 16Gb Fibre Channel Module for Synergy (779227-B21)
			Brocade 16Gb/12 Fibre Channel SAN Switch Module for HPE Synergy (K2Q83A)

NOTES:
ICM Bays 1 & 4, 2 & 5, and 3 & 6 are Redundant. The Primary ICM Bays are 1, 2, and 3.
You cannot mix different types of Ethernet, Fibre or SAS ICMs in any redundant Interconnect Bay Set.
The two interconnect slots of an interconnect Bay set cannot support different types of fabrics (Ethernet, Fibre Channel, and SAS).

Best Practices
ICM Slots 1 & 4 for are for SAS, Slots 2 & 5 are for Fibre Channel or for secondary Ethernet, and Slots 3 & 6 are primarily for Ethernet fabrics. Do not place an Ethernet interconnect in Slots 1, 2, 4, or 5 unless interconnect Slots 3 and/or 6 are filled.
FibreChannel: Use Mezz and ICM slots 2 and 5 if they are available. Do not place a Fibre Channel in Mezz 1 or 4, and Interconnects in ICM slots 1 or 4, if Mezz and ICM slots 2 and 5 are free. Also, Mezz slots 2 and 5 require that the CPU2 & CPU4 processors be installed.
SY660 must match Mezzanine options slots 1 & 4, 2 & 5, and 3 & 6.

***Priority of Slot Choices**	**Primary**	Primary slotting (which is key for internal D3940 Storage Module)
	Alternate-1	First Choice, if not filled with Primary slot priority

Configure-to-Order – Factory Integrated Models

Alternate-2 Second Choice, if not filled with Primary or Alternate-1 slot priorities

Step 5: HPE Synergy Storage Module(Optional)

HPE Synergy Storage Modules

NOTE: The HPE Synergy Storage Module and 12Gb SAS connection modules are supported on all Synergy 12000 Frame(s).

HPE Synergy D3940 12Gb SAS CTO Drive Enclosure with 40 SFF (2.5in) Drive Bays	835386-B21

NOTE: The HPE Synergy Storage Module requires at least one and a maximum of two 12Gb SAS Connection Modules per frame.

HPE Synergy D3940 Redundant I/O Adapter	757323-B21

NOTE: One I/O Adapter is configured automatically in each Synergy D3940 Storage Module. A second I/O Adapter can be selected for redundancy.

HPE Synergy 12Gb SAS Connection Module with 12 Internal Ports	755985-B21

NOTE: A SAS Connection Module must be placed in ICM bay 1 and ICM bay 4. If only configuring a single module in the frame, a connection module in ICM bay 1 will support storage modules in bays 1 – 6. A connection module in ICM bay 4 will support storage modules in bays 7-12. A second connection module can be configured in the frame for failover.

HPE Smart Array P542D/2GB FBWC 12Gb Mezzanine SAS Controller	759557-B21

NOTE: Each compute module connecting to a Synergy D3940 storage module must be configured with a Smart Array P542D controller in mezzanine slot 1.

Step 6: Select your Rack (optional)

HPE Data Center Racks

NOTE: Hewlett Packard Enterprise highly recommends the use of racks with a depth of 1200mm (47.2 in) or deeper to ensure adequate space in the back of the rack for cable and power management. Additional Hewlett Packard Enterprise Data Center racks are available other than those listed below. For more information on the full line of Hewlett Packard Enterprise Data Center Racks and rack accessories, please see **https://www.hpe.com/us/en/integrated-systems/rack-power-cooling.html**.
NOTE: Static load capacity for Advanced G2 and Enterprise G2 racks is 3000 lbs. and represents the maximum weight load for racks that are configured directly in the data center and will never be moved with installed equipment. **Dynamic load capacity** is 2250 lbs. for Advanced G2 racks and 3000 lbs. for Enterprise G2 racks. Dynamic load capacity represents the maximum load capacity for racks that are shipped fully configured using a shock pallet rack model option. Due to the Dynamic load capacity limitations for Advanced G2 racks, a limit of 2-3 Synergy frames is recommended based on the overall load weight of all equipment included in a single rack.

HPE Advanced G2 Series Racks

HPE 42U 600mmx1200mm G2 Kitted Advanced Pallet Rack with Side Panels and Baying	P9K09A
HPE 42U 600mmx1200mm G2 Kitted Advanced Shock Rack with Side Panels and Baying	P9K10A
HPE 42U 800mmx1200mm G2 Kitted Advanced Pallet Rack with Side Panels and Baying	P9K15A
HPE 42U 800mmx1200mm G2 Kitted Advanced Shock Rack with Side Panels and Baying	P9K16A
HPE 42U 800mmx1200mm G2 Kitted Advanced Shock Network Rack with Side Panels and Baying	P9K18A

Configure-to-Order – Factory Integrated Models

HPE Enterprise G2 Series Racks

HPE 42U 600mmx1200mm G2 Enterprise Pallet Rack	P9K39A
HPE 42U 600mmx1200mm G2 Enterprise Shock Rack	P9K40A
HPE 42U 800mmx1200mm G2 Enterprise Pallet Rack	P9K45A
HPE 42U 800mmx1200mm G2 Enterprise Shock Rack	P9K46A
HPE 42U 800mmx1200mm G2 Enterprise Shock Network Rack	P9K48A
HPE 48U 600mmx1200mm G2 Enterprise Pallet Rack	P9K51A
HPE 48U 600mmx1200mm G2 Enterprise Shock Rack	P9K52A
HPE 48U 800mmx1200mm G2 Enterprise Pallet Rack	P9K57A
HPE 48U 800mmx1200mm G2 Enterprise Shock Rack	P9K58A
HPE 48U 800mmx1200mm G2 Enterprise Shock Network Rack	P9K60A

NOTE: Hewlett Packard Enterprise provides both standard pallet and shock pallet shipping options for most racks. If there is a requirement to transport the rack with any IT equipment installed, Hewlett Packard Enterprise highly recommends choosing a shock pallet option to protect your equipment during transport.

NOTE: HPE Network Racks are designed for dense network equipment. These racks have the front vertical rails moved back 75mm to facilitate front to rear cabling and have additional bristle covered cable access slots in the front and on top of the racks to prevent mixing of hot and cold air and to allow for large cable bundles.

Step 7: Select rack power distribution unit (PDU) (optional)

NOTE: A pair of PDUs must be ordered for AC feed redundancy.
NOTE: HPE G2 PDUs with C13 and/or C19 outlets support HPE IEC Locking Power Cords. One locking power cord is included with each compatible PDU model. Additional IEC Locking Power Cords are available for purchase from HPE – see Power Cord section for additional details.
NOTE: Additional HPE Power Distribution Units (PDUs) are available than those listed below. For a complete list of all Hewlett Packard Enterprise PDUs, please visit: **https://www.hpe.com/us/en/integrated-systems/rack-power-cooling.html** .

HPE Power Distribution Units (PDUs)

HPE G2 Basic Single-Phase Power Distribution Units

HPE G2 Basic Modular 4.9kVA/L6-30P 24A/208V Outlets (6) IEC C19/1U Horizontal NA/JP PDU	P9Q39A
HPE G2 Basic 4.9kVA/L6-30P 24A/208V Outlets (36) C13 (6) C19/Vertical NA/JP PDU	P9Q42A
HPE G2 Basic Modular 7.3kVA/60309 3-wire 32A/230V Outlets (6) C19/1U Horizontal INTL PDU	P9Q43A
HPE G2 Basic 7.3kVA/60309 3-wire 32A/230V Outlets (36) C13 (6) C19/Vertical INTL PDU	P9Q46A
HPE G2 Basic Modular 8.3kVA/CS8265C 40A/208V Outlets (6) C19/1U Horizontal NA/JP PDU	P9Q47A
HPE G2 Basic 8.3kVA/CS8265C 40A/208V Outlets (30) C13 (6) C19/Vertical NA/JP PDU	P9Q48A
HPE G2 Basic 9.2kVA/50A Term Block 40A/208V Outlets (30) C13 (6) C19/Vertical WW PDU	P9Q49A
HPE G2 Basic 11kVA/60309 63A 3-wire 48A/230V Outlets (30) C13 (6) C19/Vertical INTL PDU	P9Q50A
HPE G2 Basic Modular 14.4kVA/60309 63A 3-wire 48A/230V Outlets (6) C19/1U Horizontal INTL PDU	P9Q51A

NOTE: G2 PDU Extension Bars can be added to any PDU model with an available C19 outlet. See “Extension Bars” section for more details.

HPE G2 Metered Single-Phase Power Distribution Units

Configure-to-Order – Factory Integrated Models

HPE G2 Metered Modular 4.9kVA/L6-30P 24A/208V Outlets (6) IEC C19/1U Horizontal NA/JP PDU	P9R51A
HPE G2 Metered 4.9kVA/L6-30P 24A/208V Outlets (12) C13 (4) C19/2U Horizontal NA/JP PDU	P9R52A
HPE G2 Metered 4.9kVA/L6-30P 24A/208V Outlets (32) C13 (6) C19/Vertical NA/JP PDU	P9R53A
HPE G2 Metered Modular 7.3kVA/60309 3-wire 32A/230V Outlets (6) C19/1U Horizontal INTL PDU	P9R54A
HPE G2 Metered 7.3kVA/60309 3-wire 32A/230V Outlets (12) C13 (4) C19/2U Horizontal INTL PDU	P9R55A
HPE G2 Metered 7.3kVA/60309 3-wire 32A/230V Outlets (32) C13 (6) C19/Vertical INTL PDU	P9R56A
HPE G2 Metered 8.3kVA/CS8265C 40A/208V Outlets (30) C13 (6) C19/Vertical NA/JP PDU	P9R57A
HPE G2 Metered Modular 8.3kVA/CS8265C 40A/208V Outlets (6) C19/1U Horizontal NA/JP PDU	P9R77A
NOTE: G2 PDU Extension Bars can be added to any PDU model with an available C19 outlet. See “Extension Bars” section for more details.	
HPE G2 Switched Single-Phase Power Distribution Units	
HPE G2 Switched 4.9kVA/L6-30P 24A/208V Outlets (12) C13 (4) C19/2U Horizontal NA/JP PDU	P9S13A
HPE G2 Switched 4.9kVA/L6-30P 24A/208V Outlets (20) C13 (4) C19/Vertical NA/JP PDU	P9S14A
HPE G2 Switched 7.3kVA/60309 3-wire 32A/230V Outlets (12) C13 (4) C19/2U Horizontal INTL PDU	P9S16A
HPE G2 Switched 7.3kVA/60309 3-wire 32A/230V Outlets (20) C13 (4) C19/Vertical INTL PDU	P9S17A
NOTE: G2 PDU Extension Bars can be added to any PDU model with an available C19 outlet. See “Extension Bars” section for more details.	
HPE G2 Metered & Switched Single-Phase Power Distribution Unit	
HPE G2 Metered/Switched 4.9kVA/L6-30P 24A/208V Outlets (20) C13 (4) C19/Vertical NA/JP PDU	P9S15A
HPE G2 Metered/Switched 7.3kVA/60309 3-wire 32A/230V Outlets (20) C13 (4) C19/Vertical INTL PDU	P9S18A
NOTE: G2 PDU Extension Bars can be added to any PDU model with an available C19 outlet. See “Extension Bars” section for more details.	
HPE Intelligent Single-Phase Power Distribution Units	
HPE Intelligent Modular 4.9kVA/L6-30P 24A/208V Outlets (6) C19/Horizontal NA/JP PDU	AF520A
HPE Intelligent Modular 7.3kVA/60309 3-wire 32A/230V Outlets (6) C19/Horizontal INTL PDU	AF525A
HPE Intelligent Modular 8.3kVA/CS8265C 40A/208V Outlets (6) C19/Horizontal NA/JP PDU	AF521A
HPE Intelligent Modular 4.9kVA/L6-30P 24A/208V Outlets (6) C19/Horizontal NA/JP PDU*	AF531A*
HPE Intelligent Modular 7.3kVA/60309 3-wire 32A/230V Outlets (6) C19/Horizontal INTL PDU Kit*	AF534A*
HPE Power Distribution Extension Bars	

Configure-to-Order – Factory Integrated Models

HPE PDU Extension Bars	HPE G2 IEC C20 Input/(4) C13 (2) C19 Expansion Outlets/PDU Extension Bar Kit	P9Q67A
	HPE G2 IEC C20 Input/(7) 5-20R Expansion Outlets/PDU Extension Bar Kit	P9Q68A
	NOTE: G2 Extension Bars Kits include 2 extensions bars per kit. G2 Extension Bars can be used with any HPE PDU; however, C20 receptacle on input power cord will only lock onto compatible G2 Basic, Metered, Switched, and Metered & Switched PDUs.	

Step 8: Select an uninterruptible power system (UPS) (optional)

NOTE: Additional HPE Uninterruptable Power Systems (UPSs) are available other than those listed here. For a complete list of all Hewlett Packard Enterprise UPS options and additional information, please visit **https://www.hpe.com/us/en/integrated-systems/rack-power-cooling.html** .

HPE UPS systems	**HPE Single-Phase UPS Models**	
	HPE R5000 Uninterruptible Power System (UPS)	
	HPE R5000 3U L630 High Voltage NA/JP Uninterruptible Power System	AF460A
	HPE R5000 3U IEC309-32A High Voltage INTL Uninterruptible Power System	AF461A
	HPE R7000 Uninterruptible Power System (UPS)	
	HPE R7000 4U 50A High Voltage NA/JP Uninterruptible Power System	AF462A
	HPE R7000 4U IEC-32A High Voltage INTL Uninterruptible Power System	AF463A
	HPE Three-Phase UPS Models	
	HPE R8000/3 Uninterruptible Power System (UPS)	
	HPE R8000/3 8000kVA Three Phase NA 6U Rackmount Uninterruptible Power System	AF431A
	HPE R8000/3 8000kVA Three Phase INTL 6U Rackmount Uninterruptible Power System	AF432A
	HPE R12000/3 Uninterruptible Power System (UPS)	
	HPE R12000/3 12000VA Three Phase NA 6U Rackmount Uninterruptible Power System	AF429A
	HPE R12000/3 12000VA Three Phase INTL 6U Rackmount Uninterruptible Power System	AF430A

Step 9: Select power cords (optional)

NOTE: For additional power cable information, please visit: **http://h20195.www2.hpe.com/v2/GetDocument.aspx?docname=4aa6-6836enw**.
NOTE: For Carrier Grade (NEBS-compliant) configurations, including Seismic Rack Kits and Cable Kits used with the -48VDC Power Supply, please see: **HPE Synergy 12000 Frame - Carrier Grade Supplement**.

HPE iPDU Power Cords (C19-C20)	**Intelligent Power Distribution Unit (iPDU) Power Jumper Cords - Extended**	
	NOTE: These power cables are designated by bright blue IEC connectors.	
	HPE 2.0m 250V 16A C19-C20 WW Single IPD Enabled Jumper Cord (Extended)	TK738A
HPE PDU Power Cords (C19-C20)	**Power Distribution Unit (PDU) Power Jumper Cords - Extended**	
	HPE C19 - C20 WW 250V 16Amp Flint Gray 1.20m Jumper Cord (Extended)	AF575A
	HPE C19 - C20 WW 250V 16Amp Flint Gray 2.0m Jumper Cord (Extended)	AF574A
	HPE C19 - C20 WW 250V 16Amp 2.5m Jumper Cord (Extended)	295633-B22
HPE Locking IEC Power Cords (C19-C20)	**Recommended**	
	NOTE: These IEC power cords will lock onto the G2 PDUs and will also lock onto the Synergy power supplies.	
	HPE C19 - C20 WW 250V 16Amp 2m Black Locking Power Cord (Recommended)	Q0P72A

Configure-to-Order – Factory Integrated Models

HPE Locking IEC Power Cords (C19-C20) - Extended	**Extended**	
	HPE C19 - C20 WW 250V 16Amp 0.7m Black Locking Power Cord (Extended)	Q0R19A
	HPE C19 - C20 WW 250V 16Amp 1.2m Black Locking Power Cord (Extended)	Q0P71A
	HPE C19 - C20 WW 250V 16Amp 2.5m Black Locking Power Cord (Extended)	Q0P73A
	HPE C19 - C20 WW 250V 16Amp 0.7m 6-pack Black Locking Power Cord (Extended)	Q0R15A
	HPE C19 - C20 WW 250V 16Amp 1.2m 6-pack Black Locking Power Cord (Extended)	Q0R16A
	HPE C19 - C20 WW 250V 16Amp 2m 6-pack Black Locking Power Cord (Extended)	Q0R17A
	HPE C19 - C20 WW 250V 16Amp 2.5m 6-pack Black Locking Power Cord (Extended)	Q0R18A
HPE HVDC Power Cords	**High Voltage Direct Current (HVDC) Power Jumper Cords - Recommended**	
	HPE SAFDGRID-SAFDGRID 277V 15Amp DC 2.0m Jumper Cord (Recommended)	J6X00A
	HPE SAFDGRID-LS-25 277V 15Amp AC 2.0m Jumper Cord (Recommended)	J6X03A
Additional HPE Power Cords	**HPE High Line Power Cords 200 - 240V AC - Recommended**	
	HPE C19 - Nema L6-20P NA/JP 250V 20Amp High Voltage 3.6m Power Cord (Recommended)	AF593A
Additional HPE Power Cords	**Extended**	
	HPE C19 - CEE-VII EU 250V 16Amp 3.6m Power Cord (Extended)	AF576A
	HPE C19 - GB-1002 CN 250V 16Amp 2.5m Power Cord (Extended)	AF584A
HPE 277VAC Power Cords	**Power Cords used with 277VAC Power Supply - Extended**	
	HPE SDG23A-SDG23B 277V 0.76m Jumper Cord (Extended)	P9B75A
	HPE SDG23A-SDG23B 277V 2.0m Jumper Cord (Extended)	P9B77A

Related Options

HPE Recommended Options have the best performance, value and availability.

Recommended Options have been selected by Hewlett Packard Enterprise experts to provide the right technology for a range of workloads and market segments. Fully integrated into the ProLiant management and security experience, Recommended Options provide the best fit with timely availability. **View the list for your region.**

Extended Options provide an extended catalog of products tailored for customers in specific markets or with specific workloads, requiring the utmost in performance or value. Fully integrated into the ProLiant management and security experience, Extended Options represent great value and performance but typically have a longer lead-time.

HPE Synergy Spares Options

HPE Synergy 12000 Frame Options

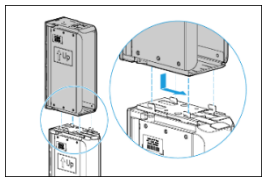
For purchasing any of the following option spares please go to HPE Parts Store at **https://parts.hpe.com/Hpparts/Default.aspx?mscssid=08A46B692773436E9BC247202DCEFC43&cc=GB&lang=EN**

HPE Synergy Fan Module Option Kit 807967-001

NOTE: 10 Fans come included in every Synergy 12000 Frame

HPE Synergy Compute Bay Half-Height Blank Option Kit 813561-001

NOTE: 1 blank for half-height server bay



HPE Synergy Compute Bay Full-Height Blank-Coupler Option Kit 417894-B21

NOTE: The coupler option is intended for use with two Half-Height Bay Blanks (2x 813561-001) to for a single full-height bay blank for insertion in open full-height Bay.
NOTE: For optimal cooling and operating performance there should be no open bays or slots.

HPE Synergy Half-Shelf Option Kit 813570-001

NOTE: The half-shelf option is designed for mixing half-height and full-height compute nodes in a specific zone. With the middle shelf removed between Bays 1 & 2 and 7 & 8 you may install two full-height Compute modules in what become Bays 1 & 2 for full-heights. If you need to mix half-height with full-height Compute nodes you can install the Half-Shelf option in the leftmost slots between 1 & 7 bays. This allows for two half-height compute module in the leftmost slots 1 & 7 with a full-height compute note in bay 2(2&8). This is the only Zone that allows mixing of compute modules.
NOTE: For optimal cooling and operating performance there should be no open bays or slots.

HPE Synergy Full-Shelf Option Kit 813569-001

NOTE: The full-shelf is for spares purposes or to replace lost shelves. The Frame is designed with 3 of these shelves inserts to accommodate 12 half-height compute modules.
NOTE: For optimal cooling and operating performance there should be no open bays or slots.

HPE Synergy Frame Lift Handle Option Kit 813567-001

Configure-to-Order – Factory Integrated Models

NOTE: The Lift Handle option comes with one (1) handle that latches to the side of a Synergy Frame. Four (4) Lift Handles are required for 4 persons to execute a safe and proper lift of the Synergy 12000 Frame.
CAUTION: All Frames, chassis, or enclosures generally require multiple people when lifting from the shipping container to a work bench or table or into the rack. The Synergy 12000 Frame requires 4 people to safely and properly lift when empty.
NOTE: It is HIGHLY RECOMMENDED that any HPE Synergy be empty of all key compute, interconnects, power supplies, fans and options prior to attempting to lift and place into a rack system.

HPE Synergy Interconnect Module/Switch Blank Option Kit	813563-001
NOTE: This is a single blank for open interconnect module/switch bays. **NOTE:** For optimal cooling and operating performance there should be no open bays or slots.	
HPE Synergy Frame Rack Rail Option Kit	813568-001
NOTE: This is a single rack rail kit for installing Synergy Frames into desired racking solutions.	
HPE Synergy Frame Round Hole Rack Rail Kit (Recommended)	871749-B21
NOTE: This rack rail kit provides round hole capability for installing Synergy Frames into racking solutions which require round holes (versus the default square holes).	
HPE Synergy Appliance Bay Blank Option Kit	813562-001
NOTE: This blank is for an open Appliance Bay. **NOTE:** For optimal cooling and operating performance there should be no open bays or slots.	
HPE Synergy Frame Link Module Bay Blank Option Kit	813560-001
NOTE: This blank is for an open Appliance Bay. **NOTE:** For optimal cooling and operating performance there should be no open bays or slots.	
HPE Synergy Power Supply Bay Blank Option Kit	813564-001
NOTE: This blank is for an open Appliance Bay. **NOTE:** For optimal cooling and operating performance there should be no open bays or slots.	

HPE Tape Backup

NOTE: For the complete range of tape drives, autoloaders, libraries and media see: **https://www.hpe.com/us/en/storage/storeever-tape-storage.html**. For hardware and software compatibility of Hewlett Packard Enterprise tape backup products see: **http://www.hpe.com/storage/spock**.

HPE LTO-6 Ultrium 6250 Internal Tape Drive	EH969A
HPE StoreEver LTO-6 Ultrium 6250 External Tape Drive	EH970A

HPE System Management Options

NOTE: The HPE Synergy 12000 Frame comes with a single USB and DisplayPort ports on the Front Panel of the Frame and on each of the Frame Link Modules in the rear. Synergy Console and OneView must be accessed at the Front Panel of the Frame that has the Synergy Composer installed. When multiple Frames are linked properly and the Synergy Composer/OneView is running you may access Synergy Console from any Front Panel, Frame Link Module or network connections.
NOTE: For additional information regarding Rack Options, please see the following URL: **https://www.hpe.com/us/en/integrated-systems/rack-power-cooling.html** .

HPE 1U Rackmount Keyboard with USB - Recommended

NOTE: Single to multi-port USB Adaptor required for Keyboard and Mouse.

Configure-to-Order – Factory Integrated Models

HPE USB US Keyboard/Mouse Kit (Recommended)	631341-B21
HPE USB UK Keyboard/Mouse Kit (Recommended)	631344-B21
HPE USB FR Keyboard/Mouse Kit (Recommended)	631346-B21
HPE USB ES Keyboard/Mouse Kit (Recommended)	631348-B21
HPE USB DE Keyboard/Mouse Kit (Recommended)	631358-B21
HPE USB JP Keyboard/Mouse Kit (Recommended)	631360-B21
HPE USB IT Keyboard/Mouse Kit (Recommended)	631362-B21
HPE USB CN Keyboard/Mouse Kit (Recommended)	631364-B21
HPE USB AE Keyboard/Mouse Kit (Recommended)	638212-B21
HPE USB RU Keyboard/Mouse Kit (Recommended)	638214-B21
HPE LCD8500 1U Rackmount KVM Console Kit Models - Recommended	
HPE LCD8500 1U US Rackmount Console Kit (Recommended)	AF630A
HPE LCD8500 1U JP Rackmount Console Kit (Recommended)	AF642A
HPE LCD8500 1U INTL Rackmount Console Kit (Recommended)	AF644A
NOTE: The DisplayPort cable option below is required for any of these Display solutions	
HPE LCD8500 1U Rackmount KVM Console Kit Models - Extended	
HPE LCD8500 1U UK Rackmount Console Kit (Extended)	AF631A
HPE LCD8500 1U DE Rackmount Console Kit (Extended)	AF632A
HPE LCD8500 1U FR Rackmount Console Kit (Extended)	AF633A
HPE LCD8500 1U RU Rackmount Console Kit (Extended)	AF643A
HPE LCD8500 1U US TAA Rackmount Console Kit (Extended)	AF645A
HPE LCD8500 1U Rackmount KVM Console Kit Models - Extended	
HPE Kit LCD 1.83m Latch Display Port Cable (Extended)	G7T29A
HPE KVM Analog Console Switches – Recommended	
HPE 0x1x8 G3 KVM Console Switch (Recommended)	AF651A
HPE 0x2x16 G3 KVM Console Switch (Recommended)	AF652A
HPE KVM Analog Console Switches - Extended	
HPE 1x4 USB/PS2 KVM Console Switch (Extended)	AF611A
HPE KVM Analog Console Switches with Virtual Media and CAC Support - Extended	
HPE 0x2x16 KVM Server Console Switch G2 with Virtual Media CAC Software (Extended)	AF618A
HPE 0x2x32 KVM Server Console Switch G2 with Virtual Media CAC Software (Extended)	AF619A
HPE KVM IP Console Switches with Virtual Media and CAC Support - Extended	
HPE 1x1Ex8 KVM IP Console Switch G2 with Virtual Media CAC Software (Extended)	AF620A
HPE 2x1Ex16 KVM IP Console Switch G2 with Virtual Media CAC Software (Extended)	AF621A
HPE 4x1Ex32 KVM IP Console Switch G2 with Virtual Media CAC Software (Extended)	AF622A

HPE Synergy Services

HP Synergy Proactive Care Services	
HPE 3 Year Proactive Care 24x7 Synergy 1200 Frame Service	H0VL5E
HPE 3 Year Proactive Care Advanced 24x7 Synergy 1200 Frame Service	H0VL8E
Deployment/Installation & Start-up Services	
HPE Synergy First Frame Startup Service	U8JM3E
HPE Synergy Additional Frame Startup Service	U8JM4E
HPE FE Synergy Initial Frame Package 4 Service	HA454A1-300
HPE FE Synergy Add-on Frame Package 4 Service	HA454A1-301

Power Supply Specifications

NOTE: HPE highly recommends using the HPE Power Advisor tool to ensure the number of power supply options you have selected can fully support your Synergy Frame configuration and to review maximum system power ratings for facilities planning purposes. HPE Power Advisor is available at: **http://www.hpe.com/info/hpepoweradvisor**.

HPE 2650 Watts Titanium Hot Plug AC Power Supply					
Part Number	**798095-B21**				
Input Voltage Range (Vrms)	**200-240**				
Frequency Range (Nominal) (Hz)	**50 – 60**				
Nominal Input Voltage (Vrms)	**200**	**208**	**220**	**230**	**240**
Maximum Rated Output Wattage	2650	2650	2650	2650	2650
Nominal Input Current (A rms)	14.4	13.9	13.1	12.5	12.0
Maximum Rated Input Wattage Rating (Watts)	2879	2877	2873	2869	2866
Maximum Rated VA (Volt-Amp)	2882	2882	2878	2875	2871
Efficiency (%)	92%	92.1%	92.2%	92.4%	92.5
Power Factor	0.9				
Leakage Current (mA)	0.87	0.9	0.96	1	1.04
Maximum Inrush Current (A peak)	30				
Maximum Inrush Current duration (mS)	0.2				
Maximum British Thermal Unit Rating (BTU-Hr)	9823	9817	9803	9790	9780

- See the “Technical Specifications” section for additional power specifications.Accept IEC C19-C20 and C19-C20 Intelligent Power Distribution Unit (iPDU) power cables. One WW 250W C19-C20 2.0m (non-iPDU) power cable is included per supported power supply. iPDU power cables are ordered separately.Accept IEC C19-C20 power cables. One WW 250W C19-C20 2.0m power cable is included per supported power supply. Rated 200 to 240 VAC line-to-neutral. The Frame will not operate from higher line-to-line voltage with the WYE wall plug configuration. This power input module is configured to provide 200 to 240 VAC to the power supplies.Each Frame must include only one type of power supply. Mixing of power supplies is not supported, except during hot swaps to different level or higher efficient power supplies. The Onboard Administrator will exhibit a mismatch error due to mixed power supplies until all power supplies are matched.Power cables with APP Saf-D-Grid connectors are ordered separately.

HPE 2650 Watts Hot Plug 380V HVDC Power Supply					
Part Number	**798342-B21**				
Input Voltage Range (VDC)	**240 - 420**				
Frequency Range (Nominal) (Hz)	N/A				
Nominal Input Voltage (VDC)	**240**	**380**	**420**		
Maximum Rated Output Wattage	2650	2650	2650		
Nominal Input Current (A rms)	11.7	7.4	6.7		
Maximum Rated Input Wattage Rating (Watts)	2816	2804	2795		
Maximum Rated VA (Volt-Amp)	2816	2804	2795		
Efficiency (%)	94.1%	94.5%	94.8%		
Power Factor	NA				
Leakage Current (mA)	N/A	N/A	N/A		
Maximum Inrush Current (A peak)	30				
Maximum Inrush Current duration (mS)	0.2				
Maximum British Thermal Unit Rating (BTU-Hr)	9609	9568	9538		

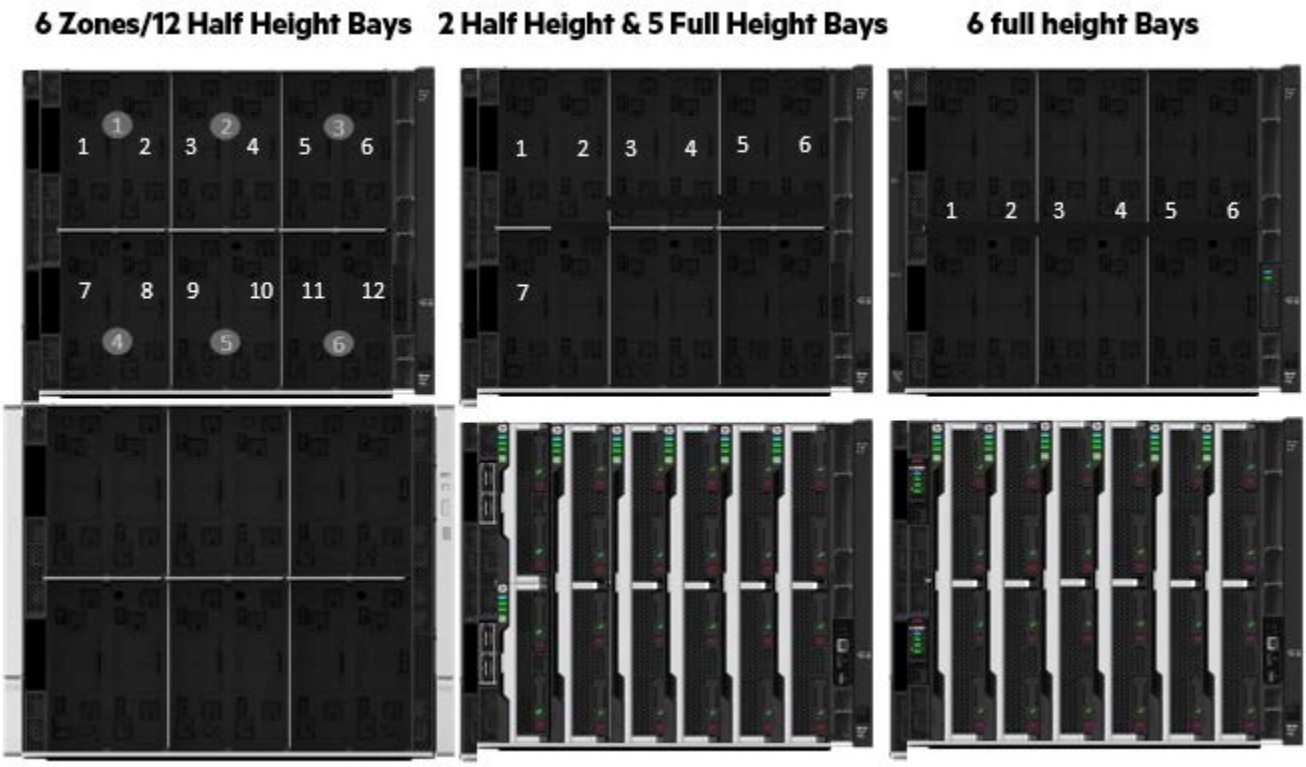
Power Supply Specifications

HPE 2650 Watts Hot Plug 277V HVAC Power Supply					
Part Number	**798101-B21**				
Input Voltage Range (Vrms)	**180 - 305**				
Frequency Range (Nominal) (Hz)	**50 - 60**				
Nominal Input Voltage (Vrms)	**180**	**277**	**305**		
Maximum Rated Output Wattage	2650	2650	2650		
Nominal Input Current (A rms)	16.2	10.3	9.3		
Maximum Rated Input Wattage Rating (Watts)	2856	2801	2792		
Maximum Rated VA (Volt-Amp)	2914	2858	2849		
Efficiency (%)	92.8%	94.6%	94.9%		
Power Factor	0.98				
Leakage Current (mA)	0.49	0.75	0.83		
Maximum Inrush Current (A peak)	30				
Maximum Inrush Current duration (mS)	0.2				
Maximum British Thermal Unit Rating (BTU-Hr)	9743	9558	9528		

HPE 2650 Watts Hot Plug -48VDC Power Supply					
Part Number	**798099-B21**				
Input Voltage Range (VDC)	**−40 to −72**				
Frequency Range (Nominal) (Hz)	N/A				
Nominal Input Voltage (VDC)	**-40**	**-48**	**-72**		
Maximum Rated Output Wattage	2650	2650	2650		
Nominal Input Current (A rms)	-71.8	-59.4	-39.5		
Maximum Rated Input Wattage Rating (Watts)	2871	2850	2841		
Maximum Rated VA (Volt-Amp)	2871	2850	2841		
Efficiency (%)	92.3%	93.0%	93.3%		
Power Factor	N/A				
Leakage Current (mA)	N/A	N/A	N/A		
Maximum Inrush Current (A peak)	180				
Maximum Inrush Current duration (mS)	0.2				
Maximum British Thermal Unit Rating (BTU-Hr)	9796	9725	9695		

HPE Synergy Frame Device Bay Numbering and Population Guidelines

Mixed Configuration - Full Height and Half-Height Population rules



Frame Device Bay Options: Half Height, Full Height, Half Height Double Wide, Full Height Double Wide

NOTE: The 12000 Frame is divided into 6 quadrants by the vertical and horizontal support metalwork. The horizontal supports or shelves are removable to support full height devices. Only quadrants 1 and 4 can mix Full-Height with Half-Height Compute modules with an optional Half Shelf kit.

Technical Specifications

HPE Synergy 12000 Frame	**Dimensions**	Height	17.4 in (442 mm)
		Width	18.98 in (482 mm)
		Depth	36.88 in (936 mm)
	Shipping Dimensions	Height	30.13 in (mm)
		Width	24.50 in (mm)
		Depth	40.50in (mm)
	Frame Weight	Unboxed	137 lb (62 kg)
		Shipping	495 lb (kg)

NOTE: The Frame weight above includes only an empty Frame- Compute, storage, power supplies, fans, interconnect modules, Management Appliances and Frame Link Modules are not included. The weight for power supplies, fans, and other option(s) is listed below. Please see the specific compute module and interconnect module QuickSpecs for their respective weight.

Power Supply Weight (minimum 1, maximum 6)	4.8 lbs (2 kg)	
HPE Synergy Fan Weight (minimum 0, maximum 10)	1.5 lbs (1 kg)	
Management Appliances (minimum 1, maximum 2)	3 lbs (1.4 kg)	
Frame Link Modules (minimum 1 maximum 2)	1.4 lbs (1 kg)	
Maximum Frame Weight (approximate)	Unboxed Shipping	521 lb (236 kg) 495 lb (kg)

NOTE: The approximate maximum Frame weight above includes 12 480 Compute Modules, 6 six power supplies, 10 fans, 6 interconnect modules, 2 Composer Management Appliances and 2 Frame Link Modules.

Temperature Range	Operating	50° to 95° F (10° to 35° C)
	Non-Operating	-22° to 140° F (-30° to 60° C)
Relative Humidity	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.
	Non-Operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F)maximum wet bulb temperature, non-condensing.

NOTE: Operating temperature has an altitude derating of 1.8° 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.
NOTE: For detailed environmental and other installation requirements, please see the "HPE Site Planning Guide" at **http://www.hpe.com/support**.

Environmental-friendly Products and Approach	**End-of-life Management and Recycling**	Hewlett Packard Enterprise offers end-of-life Hewlett Packard Enterprise product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to **http://www.hpe.com/info/recycle** To recycle your product, please go to: **http://www.hpe.com/info/recycle** or contact your nearest Hewlett Packard Enterprise sales office. Products returned to Hewlett

Technical Specifications

Packard Enterprise 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 Enterprise web site at: **http://www.hpe.com/info/recycle.** These instructions may be used by recyclers and other WEEE treatment facilities as well as Hewlett Packard Enterprise OEM customers who integrate and re-sell Hewlett Packard Enterprise equipment.

Summary of Changes

Date	Version History	Action	Description of Change
06-Aug-2018	Version 14	Changed	Service and Support, Platform Information, and Configure-to-order - Factory Integrated Models were updated.
		Added	SKUs added: 845970-B21, 807967-001, 813561-001.
		Removed	Obsolete SKUs were deleted: TK744A, TK745A, TK739A, TK740A, TK741A, TK742A, TK743A, E7804A, E7805A, AF592A, 359615-031, AF577A, AF579A, AF580A, AF581A, AF582A, AF583A, 807967-B21, 813561-B21, C0L99A, AF653A, P9Q40A, P9Q41A, P9Q44A, P9Q45A, P9Q52A, P9Q53A, P9Q54A, P9Q55A, P9Q56A, P9Q57A, P9Q58A, P9Q59A, P9Q60A, P9Q61A, P9Q62A, P9Q63A, P9Q64A, P9Q65A, P9R58A, P9R59A, P9R60A, P9R61A, P9R79A, P9R80A, P9R82A, P9R83A, P9R86A, P9R81A, P9R87A, P9R84A, P9R85A, P9S20A, P9S21A, P9S22A, P9S23A, P9S24A, P9S25A, AF522A, AF526A, AF533A, AF523A, AF901A, AF527A, AF535A, AF538A, AF532A, P9Q66A, AF547A, AF528A.
07-May-2018	Version 13	Changed	Standard Features, Models, Configure-to-Order – Factory Integrated Models, and Related Options sections were updated.
		Added	Obsolete SKUs were deleted: 797738-B21, 797739-B21, 798349-B21, 798102-B21, 798100-B21, 804942-B22, 861414-B21, 755984-B21, 804095-B21, 804107-B21, 755984-B21, P9B76A.
04-Dec-2017	Version 12	Changed	Overview, Standard Features, and Related Options sections were updated.
		Added	SKU added in Relate Options section: 871749-B21.
		Removed	SKUs deleted in Related Options section: 872033-B21, 872036-B21, 872034-B21. OBS SKUs deleted: 779224-B21.
25-Sep-2017	Version 11	Changed	Related Options section was updated.
		Added	SKUs added in Related Options section: 779224-B21, 866573-B21, 794502-B23, 845410-B21, 845412-B21, 845414-B21, P9K09A, P9K10A, P9K15A, P9K16A, P9K18A, P9K39A, P9K40A, P9K45A, P9K46A, P9K48A, P9K51A, P9K52A, P9K57A, P9K58A, P9K60A, P9Q39A, P9Q40A, P9Q41A, P9Q42A, P9Q43A, P9Q44A, P9Q45A, P9Q46A, P9Q47A, P9Q48A, P9Q49A, P9Q50A, P9Q51A, P9Q52A, P9Q53A, P9Q54A, P9Q55A, P9Q56A, P9Q57A, P9Q58A, P9Q59A, P9Q60A, P9Q61A, P9Q62A, P9Q63A, P9Q64A, P9Q65A, P9R51A, P9R52A, P9R53A, P9R54A, P9R55A, P9R56A, P9R57A, P9R77A, P9R58A, P9R59A, P9R78A, P9R60A, P9R61A, P9R79A, P9R80A, P9R82A, P9R83A, P9R86A, P9R81A, P9R87A, P9R84A, P9R85A, P9S13A, P9S14A, P9S16A, P9S17A, P9S15A, P9S18A, P9S19A, P9S20A, P9S21A, P9S22A, P9S23A, P9S24A, P9S25A, P9Q66A, P9Q67A, P9Q68A, AF547A, AF528A, Q0R19A, Q0P71A, Q0P72A, Q0P73A, Q0R15A, Q0R16A, Q0R17A, Q0R18A, 813562-001.
		Removed	SKUs removed from Related Options section: H5M59A, H5M60A, H5M75A, H5M71A, 252663-D71, 252663-B24, 252663-D72, 252663-B33, 252663-B21, 252663-D75, 252663-D73, H5M62A, H5M64A, H5M72A, H5M73A, H5M67A, AF512A, AF513A, AF519A, AF511A, AF518A, D9N47A, D9N48A, D9N50A, D9N49A, D9N53A, D9N55A, D9N57A, D9N58A, D9N62A, D9N61A, D9N54A, D9N59A, G9Z07A, D9N60A, G9Z08A, D9N56A, H8B50A, H8B51A, H8B52A, H8B53A, H8B54A, H8B55A, H8B56A, 813570-001.

Summary of Changes

07-Aug-2017	Version 10	Changed	Overview, Service and Support, Related Options, and Power Supply Specifications sections were updated.
		Added	SKUs were added in Related Options section: 798102-B21, 798101-B21, 798100-B21, 798099-B21, 872033-B21, 872036-B21, 872034-B21, 872035-B21, AF592A, 359615-031, AF576A, AF577A, AF579A, AF580A, AF581A, AF582A, AF583A, AF584A, P9B75A, P9B76A, P9B77A, U8JM3E , U8JM4E.
		Removed	SKUs removed from Related Options sections: U8JM3E, U8JM4E, H5M70A, 252663-D74.
11-Jul-2017	Version 9	Changed	Overview, Standard Features, Service and Support, Platform Information, and Related Options sections were updated
		Added	SKUs added in Platform Information and Related Options sections: 797740-B22, 804942-B21, 804942-B22, 794502-B23, 779224-B21, 779215-B21, 866573-B21, 779215-B22, 779218-B22, 799330-B22, 867322-B21, 777452-B21, 777454-B21, 817040-B21,
		Removed	Obsolete SKUs were deleted: 779224-B21
05-Jun-2017	Version 8	Changed	Service and Support, Related Options, Power Supply Specifications, and Technical Specifications sections were updated.
		Added	SKUs added in Related Options section: 798349-B21, 798342-B21, AF575A, J6W98A, J6W99A, J6X00A, J6X01A, J6X02A, J6X03A.
		Removed	Obsolete SKUs were deleted in Related Options section: 794502-B21, AF900A, AF537A, H0VL6E, H0VL9E.
13-Jan-2017	Version 7	Changed	Service and Support, All Synergy Frame Models, and Related Options sections were updated.
26-Sep-2016	Version 6	Changed	QuickSpecs sections were updated.
		Added	SKU added in Related Options: 838327-B21
29-Jul-2016	Version 5	Changed	QuickSpecs deleted.
		Removed	SKU deleted: 777434-B21
06-Jun-2016	Version 4	Changed	Related Options section was updated.
		Added	SKUs added in Related Options section: 799330-B21
		Removed	Obsolete SKUs were deleted: 804937-B21, 779224-B21, AF902A, AG072A, AG073A, AG084A, AG086A.
15-Apr-2016	Version 3	Changed	Format changes all over document to solve HTML/PB issues.
31-Mar-2016	Version 2	Changed	Overview and Related Options sections were updated.
		Added	SKUs added to QuickSpecs: 797740-B21, 797738-B21, 797739-B21, 798096-B21, 798095-B21, 804353-B21, 804937-B21, 804942-B21, 861412-B21, 861413-B21, 861414-B21, 794502-B21, 779215-B21, 779218-B21, 835386-B21, 755984-B21, 757323-B21, 755985-B21, 759557-B21, K2Q83A, K2Q84A, K2Q86A, D4U69A, D4U69AAE, 779227-B21, 777430-B21, 777434-B21, 777452-B21, 777454-B21, 794538-B21, 817040-B21, K2Q87A, 804095-B21, 804098-B21, 804155-B21, 804101-B21, 804104-B21, 804107-B21, 804110-B21, 835386-B21, H6J67A, H6J68A, H6J69A, H6J70A, BW899A, BW900A, BW907A, BW908A, BW910A, BW966A, BW919A, BW920A, BW968A, TK756A, TK766A, TK760A, TK772A, BW913A, BW914A, BW936A, H5M59A, H5M60A, H5M70A, H5M75A, H5M71A, 252663-D71, 252663-B24, 252663-D74, 252663-D72, 252663-B31, 252663-B33, 252663-B21, 252663-D75, 252663-D73,

Summary of Changes

			H5M62A, H5M64A, H5M72A, H5M73A, H5M67A, AF512A, AF513A, AF519A, AF511A, AF518A, D9N47A, D9N48A, D9N50A, D9N49A, D9N53A, D9N51A, D9N55A, D9N57A, D9N58A, D9N62A, D9N61A, D9N54A, D9N59A, G9Z07A, D9N60A, G9Z08A, D9N56A, H8B50A, H8B51A, H8B52A, H8B53A, H8B54A, H8B55A, H8B56A, AF520A, AF525A, AF521A, AF531A, AF534A, AF522A, AF526A, AF900A, AF533A, AF523A, AF902A, AF901A, AF527A, AF535A, AF537A, AF538A, AF532A, AF460A, AF461A, AF462A, AF463A, AF431A, AF432A, AF429A, AF430A, G9Y75A, AF479A, TK744A, TK745A, TK738A, TK739A, TK740A, TK741A, TK742A, TK743A, AF575A, AF574A, 295633-B22, E7804A, E7805A, AF593A, AF592A, 359615-031, AF576A, AF577A, AF579A, AF580A, AF581A, AF582A, AF583A, AF584A, 807967-B21, 813561-B21, 417894-B21, 813570-001, 813569-001, 813567-001, 813563-001, 813568-001, 813560-001, 813564-001, C0L99A, EH969A, EH970A, AG072A, AG073A, AG084A, AG086A, 631341-B21, 631344-B21, 631346-B21, 631348-B21, 631358-B21, 631360-B21, 631362-B21, 631364-B21, 638212-B21, 638214-B21, AF629A, AF630A, AF631A, AF632A, AF633A, AF642A, AF643A, AF644A, AF645A, G7T29A, AF611A, AF651A, AF652A, AF653A, AF618A, AF619A, AF620A, AF621A, AF622A, H0VL5E, H0VL6E, H0VL8E, H0VL9E, HA454A1-300, HA454A1-301, U8JM3E, U8JM4E.
1-Dec-2015	Version 1	Created	New QuickSpecs

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