Hewlett Packard Enterprise

Solution brief

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INTELLIGENT, SELF-MANAGING FLASH STORAGE

HPE Nimble Storage

99.9999%

guaranteed availability[1]

86%

of issues predicted and resolved automatically[2]

79%

reduction in operating costs[3]

HPE Nimble Storage is a modern enterprise storage platform that reimagines the storage experience. It combines the power of artificial intelligence (AI) with a flash-optimized storage portfolio to deliver fast and reliable access to data and radically simplifies operations. Its multicloud flash fabric intelligently extends data services across on-premises primary and secondary storage and the public cloud, defying data gravity and simplifying hybrid cloud complexity.

WHAT MAKES HPE NIMBLE STORAGE DIFFERENT?

HPE Nimble Storage was founded on two core principles:

To make storage effortless through a unique solution that reduces complexity, helps eliminate trade-offs, and improves enterprise agility from install to upgrade.

To transform operations with AI that predicts and prevents disruptions and self-optimizes application performance and resource management.

- **Intelligent, self-managing storage:** The HPE Nimble Storage approach to predictive analytics has completely reimagined how infrastructure is supported. Through HPE InfoSight advanced machine learning, 86% of problems are predicted and prevented before customers even realize they have an issue, and not just for the array but across the entire infrastructure stack.
- **Transform your support experience:** Predictive support automation has enabled HPE Nimble Storage to help eliminate Level 1 and Level 2 support, providing direct access to Level 3 HPE Nimble Storage support engineers, and removing time-consuming and frustrating escalations. This means 73% fewer support tickets, 85% less time spent resolving storage-related trouble tickets, and 69% faster time to resolve events that necessitate Level 3 support.[4]

[1] HPE Get 6-Nines Guarantee, September 2017

[2] Redefining the standard for system availability, HPE Business White Paper, August 2017

[3, 4] Assessing the Financial Impact of HPE Nimble Storage Powered by HPE InfoSight, ESG, May 2019

- **Experience effortless simplicity:** HPE Nimble Storage makes it radically simple for any IT generalist to buy, install, provision, operate, and upgrade. You can self-install the system in minutes. There are no configuration requirements, with always-on data services and app-aware intelligence that help eliminate performance and efficiency trade-offs. This effortless user experience across all aspects of the storage lifecycle means that you spend substantially less time and allocate fewer resources to managing HPE Nimble Storage, resulting in 79% lower IT operational expenses. If you want to spend less time managing storage and firefighting, look to HPE Nimble Storage.
- **Customers trust the HPE Nimble Storage user experience:** IT admins and customers have been vocal[5] about how their business demands are simplified and their user experience elevated by HPE Nimble Storage capabilities. HPE Nimble Storage's radical simplicity and transformed support experience have resulted in an overall rating of 4.8 out of 5,[6] with customers getting maximum value out of their data in a broad range of use cases supporting business-critical applications.
- **Spend less on all-flash storage:** HPE Nimble Storage guarantees industry-leading data efficiency through the HPE Store More Guarantee. Every competitor's data reduction ratios are going to be different but with advanced data reduction technologies and an efficient operating system, Hewlett Packard Enterprise guarantees that HPE Nimble Storage All Flash Arrays will store more data per raw terabyte of all flash compared to the competition.
- **Timeless Storage for HPE Nimble Storage:** With Timeless Storage for HPE Nimble Storage, we are changing storage ownership by helping eliminate surprises and enhancing investment protection for the long term. Our Timeless Storage program includes a satisfaction guarantee, a six-nines availability guarantee, a data reduction guarantee, all-inclusive software, flat support pricing, and controller upgrades.
- **Absolute resiliency:** HPE Nimble Storage is designed for business-critical applications that demand fast, consistent performance, superior data integrity, and non-stop data availability. HPE Nimble Storage has delivered over six-nines of measured availability across its installed base since inception, high data integrity with Triple+ Parity RAID, and sub-ms latency with its all-flash array.
- **Reliably fast:** HPE Nimble Storage is a modern architecture built from the ground up to help optimize flash with high efficiency, delivering fast, consistent performance for business-critical applications. With HPE InfoSight, you can rest easy that your applications are always on and always fast.
- **Multicloud flash fabric:** Every enterprise is looking at hybrid cloud, but today siloed resources exist across on-premises primary and secondary storage, as well as the public cloud. With data gravity, data is locked away in silos inhibiting the potential to leverage the capabilities of a true hybrid cloud-operating model. HPE Nimble Storage overcomes hybrid cloud complexity with its multicloud flash fabric. This is an intelligent data experience designed to make it easy and cost-effective to consume all flash, hybrid flash, and cloud storage. The multicloud flash fabric automates storage management through a common, integrated OS and enables seamless data mobility between on-premises and the public cloud.

TYPICAL USE CASES

HPE Nimble Storage is ideal for business-critical workloads including medium-scale databases, mixed workloads, virtual farms, and container farms.

HPE Nimble Storage All Flash Arrays are targeted at performance or latency-sensitive workloads, where all-flash performance is critical.

HPE Nimble Storage Adaptive Flash Arrays are ideal for two use cases:

- Mainstream and mixed primary workloads (and where cost and price performance balance is a concern)
- Secondary storage is enhanced for high-performance backup and disaster recovery, with the performance to run other applications such as development/testing and analytics

LEARN MORE AT

hpe.com/storage/nimble

[5] HPE Nimble Storage PeerPaper Report

[6] Based on Gartner Peer Insights reviews, March 2020

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Hewlett Packard Enterprise

a50001139ENW, March 2020

Overview

HPE Nimble Storage Adaptive Flash Arrays

Like having two flash arrays in one

The HPE Nimble Storage Adaptive Flash array is truly adaptive. It is designed for both Primary and Secondary flash workloads. It is a Hybrid Flash array for mixed, primary workloads, where cost-efficient flash performance is important. It is a Secondary Flash array for backup and DR while allowing you to put your backup data to work.

Experience the Power of Predictive

HPE Nimble Storage Adaptive Flash Arrays combine a flash-efficient architecture with HPE InfoSight predictive analytics to achieve fast, reliable access to data and 99.9999% guaranteed availability[1]. Your storage investment made today will support you well into the future, thanks to our technology and business-model innovations.

What's new

Now HPE Nimble Storage Adaptive Flash Arrays are NEBS (Network Equipment Building System) certified.

The HPE Nimble Storage family of adaptive flash arrays deliver the functionality of two cost-effective flash arrays in one – Hybrid flash and Secondary flash. The new arrays are up to 65% faster than and more than twice as scalable as previous adaptive flash arrays. The arrays use inline variable block deduplication and compression for maximum data reduction. Adaptive arrays are designed to deliver business value today and tomorrow as demonstrated by our **timeless storage.**

NOTE: For more information about the entire HPE Nimble Storage product portfolio, go to **https://www.hpe.com/us/en/storage/nimble.html**.

HPE Nimble Storage Adaptive Flash Array[3]

(Base array, 4U; 21 bays hold carriers with Large Form Factor HDDs,3 bays hold Dual Flash Carriers with Small Form Factor SSDs)

Standard Features

HPE InfoSight predictive analytics

- Automatically predicts and resolves 86% of problems before you even know there is an issue.
- Transforms the support experience through predictive automation and Level 3-only support.
- Sees across the infrastructure stack and resolves problems beyond storage.
- Simplifies planning with prescriptive forecasts into capacity, performance, and bandwidth needs.
- Makes infrastructure smarter and more reliable by learning from the installed base.

Radical Simplicity

- Simple to deploy. Simple to use. Simple to manage.
- Cloud-ready. Deploy flash on-premises or in the cloud with common data services and mobility between all-flash, hybrid flash, and HPE Cloud Volumes.
- Timeless Storage means no worries today or tomorrow. Flash arrays come with a satisfaction guarantee, all-inclusive software licensing, flat support pricing, no forklift upgrades, and an option to receive a free faster controller upgrade after three years.
- Radically easy to integrate with many ecosystems. Deep integration with VMware, MS applications, Oracle, Veeam, and others.
- No data worries. 99.9999% (six-nines) guaranteed availability[1]. Triple+ Parity RAID tolerates 3 simultaneous drive failures plus additional protection through intra-drive parity.

Flash Performance for Mixed, Mainstream Workloads

- Speed and efficiency for mixed workloads with sub-millisecond response and greater efficiency than other hybrid arrays[3].
- Write to cost-optimized disk at flash speeds through write serialization – defying the physics of mechanical spindles.
- Assign and change the service level of any volume at the click of a button ("Auto Flash", "All Flash", or "Minimal Flash").
- Always-on data reduction delivers up to 5X or more space savings without performance penalty[4].

Put Your Backup Data to Work

- Secondary storage that does real work: Flash performance lets you use your backup data for development/test, QA, analytics, and more.
- Eliminates the need for full backups: And speeds synthetic full backups from hours to minutes. Native application-consistent snapshots and replication plus integration with leading backup software.
- Restore backup data instantly. Fast backup verification - test backups more often. Eliminate the need to restore by running workloads directly.
- Deep integration with Veeam availability software. Array capabilities accessible through the Veeam GUI.
- Backup and DR at a third of the cost, when replicating from all-flash to adaptive flash.
- Very cost-effective with powerful dedupe and compression. App-granular, FIPS-certified encryption provides data at-rest and over-the-wire protection. Secure data shredding is built-in.
- Redundant, hot-swap components including controllers, power supplies, SSDs, HDDs, and IO cards.

NEBS Level 3 Certified

- HPE Nimble Storage Adaptive Flash Arrays are NEBS (Network Equipment Building System) level 3 certified
- Ideal for network equipment providers and communication service providers requiring NEBS certified Hybrid Flash storage arrays for their telecom infrastructure
- NEBS Level 3 certified for all Nimble Storage Adaptive Flash Arrays (HF20, HF20C, HF20H, HF40, HF40C, HF60, and HF60C)

Standard Features

HPE Nimble Storage Adaptive Flash Array models								
HPE Nimble Storage HF-Series array[1, 2]	**HF20**	**HF20H**	**HF20C**	**HF40**	**HF40C**	**HF60**	**HF60C**	**Scale-out**[3] **4X HF60**
Raw capacity (TB/TiB)[4, 7]	21-210/19-191	11-211/10-192	21-1050/19-955	21-504/19-458	21-1470/19-1337	21-1260/19-1146	21-1470/19-1337	5040/4584
Usable capacity (TB/TiB)[4]	16-169/14-153	7-164/6-149	16-846/14-770	16-406/14-369	16-1185/14-1078	16-1016/14-924	16-1185/14-1078	4065/3697
Effective capacity[5]	81-845/74-768	34-821/31-746	32-1692/28-1540	81-2030/74-1846	32-2370/28-2156	81-5080/74-4621	32-2370/28-2156	326-20324/297-18484
Max. # of expansion shelves	6	6	6	6	6	6	6	24
Flash capacity (TB/TiB)[4, 7]	1.4-28/1.3-25	0.9-28/0.8-25	0.7-38/0.6-35	1.4-48/1.3-43	0.7-60/0.6-54	1.4-156/1.3-142	1.4-156/1.3-142	624/567
RAID level Triple+ Parity								
Onboard iSCSI/Mgmt. 1 Gb/10 Gb ports per array[6]	4	4	4	4	4	4	4	16
Optional iSCSI 1 Gb ports per array	4, 8, 12, 16	4, 8, 12, 16	4, 8, 12, 16	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	96
Optional iSCSI 10 Gb ports per array	4, 8, 12, 16	4, 8, 12, 16	4, 8, 12, 16	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	96
Optional FC 8 Gb/16 Gb ports per array	4, 8, 12, 16	4, 8, 12, 16	4, 8, 12, 16	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	96
Max. power requirement (watts/kVA)	750/0.833	650/0.722	750/0.833	850/0.944	850/0.944	900/1.000	900/1.000	3600/4.000
Thermal (BTU)	2460	2132	2460	2788	2788	2952	2952	11,808

NOTES:

[1] HPE Nimble Storage HF20/HF20C and HF40/HF40C Adaptive Flash array support scale up to any model within the HF family. HF20H Adaptive Flash array supports scale up to the HF40 Adaptive Flash array.

[2] The HF20H Adaptive Flash array consists of up to 22 HDDs and 2 Dual Flash Carriers (DFCs). All other HF-Series models consist of up to 21 HDD drives and 3 DFCs (holding up to 6 SSDs).

[3] Scale-out configuration consists of 4X HF60 Adaptive Flash arrays, each with maximum supported capacity.

[4] Raw, usable, and effective capacities are shown in TB (10^{12} bytes) and TiB (2^{40} bytes). Usable and effective capacities take into account space used for parity, spares, SSD cache, and system overhead.

[5] Deduplication currently supported on HF20H, HF20, HF40, and HF60; the HF20C, HF40C, and HF60C does not support dedupe and is capacity optimized to scale to over 1PB.

[6] Each array controller has 2 x 10GbaseT ports built in. Optional ports are 1GbaseT, 10GbaseT, 10GbE SFP+, or 8/16Gb FC.

[7] The Total Max Raw Capacity/Flash Capacity per system is limited by the architecture of the system and is not to be exceeded, even if it may be possible to configure a system that exceeds this limit.

Standard Features

Expansion Shelves for HPE Nimble Storage Adaptive Flash Arrays

ES3 Expansion Shelf for Adaptive

Raw capacity (TB/TiB)[1, 4]	21–210/18–190
Usable capacity (TB/TiB)[1]	16–169/14–154[3]
Effective capacity (TB/TiB)[1, 2]	32–337/28–308
Flash capacity (TB/TiB)[1]	0.7–108/0.7–98
Max. power requirement (Watts/kVA)	500/0.56
Thermal (BTU)	1638

NOTES:

[1] Raw, usable, and effective capacities are shown in TB (10^{12} bytes) and TiB (2^{40} bytes). Usable and effective capacities take into account space used for parity, spares, SSD cache, and system overhead.

[2] Scale-out configuration consists of 4X HF60 Adaptive Flash arrays, each with maximum supported capacity.

[3] When attached to a HF20H Adaptive Flash array, capacity is 16–167/14–152.

[4] The Total Max Raw Capacity per system is limited by the architecture of the system and is not to be exceeded, even if it may be possible to configure a system that exceeds this limit.

Host OS Support

Microsoft® Windows® Server, including Microsoft® Hyper-V™ | VMware vSphere™ | HP-UX® | Ubuntu
SUSE® Linux Enterprise | SUSE® Linux Virtualization | Red Hat® Enterprise Linux® | Red Hat® Enterprise Virtualization
CentOS | Oracle® Linux® (UEK and RHEL compatible kernels) | Oracle® Solaris Citrix® | IBM® AIX®

NOTE: For the latest information on supported operating systems refer to Single Point of Connectivity Knowledge (SPOCK) for HPE Storage products, including HPE Nimble Storage: **http://www.hpe.com/storage/spock**

Optional File Controller(s)

Add optimized, secure, and reliable file services to your Nimble Storage Array with one or more pre-configured HPE Storage File Controllers. Augmenting a Nimble Storage Array with a file controller or highly-available file controller cluster creates a unified block/file solution that maximizes your total storage investment. Each HPE Storage File Controller is built on HPE ProLiant DNA and Microsoft Windows Storage Server 2016, and can serve thousands of concurrent users and multiple diverse workloads while providing a straightforward and familiar management experience for IT generalists or storage administrators.

For more information, visit **https://h20195.www2.hpe.com/v2/GetDocument.aspx?docname=a00047729enw**

Service and Support

Warranty

HPE Nimble Storage arrays come with the following warranties:

- 1 year; parts-only warranty for hardware components, including SSDs
- 90 day; software updates for defects

Additionally, HPE Nimble Storage will provide phone support for replacing a defective part. Additional support coverage is required for HPE Nimble Storage Arrays.

NOTE: For hardware warranty claims, defective part must be received before replacement parts are shipped

NOTE: Warranty is provided by HPE Nimble Storage.

NOTE: Link to **HPE Global Limited Warranty and Technical Support**

Service and Support

Support is required for all HPE Nimble Storage Arrays. Support SKUs provide up to five years of 24x7 telephone and email support for the arrays and hardware components (Including SSDs reaching the write wear limit) with a choice of Next Business Day (NBD) parts exchange, 4-hour parts delivery, or 4 hour onsite support, access to the HPE InfoSight predictive analytics platform and software updates.

NOTE: Support contract is mandatory for all HPE Nimble Storage products.

Installation Service

HPE Nimble Storage Array Start-up service

On-site installation of a new HPE Nimble Storage Array in a data center with up to six (6) shelves.

HPE Nimble Storage Upgrade service

On-site installation of upgrades kits or expansion shelves for an existing HPE Nimble Storage Array.

NOTE: Installation services are optional for all HPE Nimble Storage products.

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.

Configuration Information

Step 1 - Choose a Base configuration

All HPE Nimble Storage Adaptive Flash Arrays come in a 4U form-factor chassis with
(2) controllers with fans and NVDIMM, and
(4) 1GbE/10GbE network ports, i.e. (2) per controller for iSCSI or management traffic, and
(2) power supplies and
All-inclusive software including HPE InfoSight predictive analytics
Additional host connectivity per controller is indicated in the product descriptions below.
Flash Cache upgrades, network upgrades and expansion shelves are available for integration in the field. Upgrade information will be supplied in the next QuickSpecs update.

HPE Nimble Storage HF-Series Adaptive Flash Arrays – Base Configuration Base Array

SKU Description	SKU
HPE Nimble Storage HF20C Adaptive Dual Controller 10GBASE-T 2-port Configure-to-order Base Array	Q8H70A
HPE Nimble Storage HF20H Adaptive Dual Controller 10GBASE-T 2-port Configure-to-order Base Array	Q8H71A
HPE Nimble Storage HF20 Adaptive Dual Controller 10GBASE-T 2-port Configure-to-order Base Array	Q8H72A
HPE Nimble Storage HF40 Adaptive Dual Controller 10GBASE-T 2-port Configure-to-order Base Array	Q8H39A
HPE Nimble Storage HF40C Adaptive Dual Controller 10GBASE-T 2-port Configure-to-order Base Array	R0P42A
HPE Nimble Storage HF60 Adaptive Dual Controller 10GBASE-T 2-port Configure-to-order Base Array	Q8H40A
HPE Nimble Storage HF60C Adaptive Dual Controller 10GBASE-T 2-port Configure-to-order Base Array	R0P43A

Configuration Information

Step 2 – Choose Head HDD Capacity

All HPE Nimble Storage Adaptive Flash Arrays come with (21) LFF Hard Drives included as standard and supports (3) Dual Flash Carriers with SFF Solid State Drives. The configurations below include three SFF SSDs and accept one optional Flash Upgrade Kit to increase the Flash Cache. Additional capacity can be added by connecting up to (6) expansion shelves to the base array.

NOTE: R2 and non-R2 SKUs are functionally equivalent. The OCA quote tool will guide to the appropriate SKU option when configuring a model. Table below shows Adaptive Flash Array compatibilities with SSD Options.

Only ONE of the following options can be selected:

Head HDD Capacity Options		HF20H	HF20C	HF20	HF40/ HF40C	HF60/ HF60C
SKU	**SKU Description**					
Q8B67B	HPE Nimble Storage HF20H Adaptive Array 11TB (11x1TB) FIO HDD Bundle	Yes	No	No	No	No
Q8B68B	HPE Nimble Storage HF20/20C Adaptive Array 21TB (21x1TB) FIO HDD Bundle	No	Yes	Yes	No	No
Q8B69B	HPE Nimble Storage HF20/20C Adaptive Array 42TB (21x2TB) FIO HDD Bundle	No	Yes	Yes	No	No
Q8H75A	HPE Nimble Storage HF20/20C Adaptive Array 84TB (21x4TB) FIO HDD Bundle	No	Yes	Yes	No	No
Q8H76A	HPE Nimble Storage HF20/20C Adaptive Array 126TB (21x6TB) FIO HDD Bundle	No	Yes	Yes	No	No
Q8H77A	HPE Nimble Storage HF20/20C Adaptive Array 210TB (21x10TB) FIO HDD Bundle	No	Yes	Yes	No	No
Q8H44A	HPE Nimble Storage HF40/60 Adaptive Array 21TB (21x1TB) FIO HDD Bundle	No	No	No	Yes	Yes
Q8H45A	HPE Nimble Storage HF40/60 Adaptive Array 42TB (21x2TB) FIO HDD Bundle	No	No	No	Yes	Yes
Q8B55B	HPE Nimble Storage HF40/60 Adaptive Array 84TB (21x4TB) FIO HDD Bundle	No	No	No	Yes	Yes
Q8B56B	HPE Nimble Storage HF40/60 Adaptive Array 126TB (21x6TB) FIO HDD Bundle	No	No	No	Yes	Yes
Q8B57B	HPE Nimble Storage HF40/60 Adaptive Array 210TB (21x10TB) FIO HDD Bundle	No	No	No	Yes	Yes
R4H94A	HPE Nimble Storage HF Adaptive Array 294TB (21x14TB) FIO HDD Bundle	No	Yes	No	Yes	Yes
Max addressable Capacity (RAW) per platform		211 TB	1050 TB	210 TB	504 TB/ 1470 TB	1260 TB/ 1470 TB

Step 3 – Choose Head SSD Cache Capacity

Head HDD Capacity	Minimum Head SSD Cache Required						
	HF20H	HF20C	HF20	HF40C	HF40	HF60C	HF60
11TB	960GB	N/A	N/A	N/A	N/A	N/A	N/A
21TB	N/A	720GB	1440GB	720GB	1440GB	1440GB	1440GB
22TB	1920GB	N/A	N/A	N/A	N/A	N/A	N/A
42TB	N/A	1440GB	2880GB	1440GB	2880GB	1440GB	2880GB
84TB	N/A	2880GB	5760GB	2880GB	5760GB	2880GB	5760GB
126TB	N/A	5760GB	11520GB	5760GB	11520GB	5760GB	11520GB
210TB	N/A	5760GB	17280GB	5760GB	17280GB	5760GB	17280GB
294TB	N/A	11520GB	N/A	11520GB	23040GB	11520GB	23040GB

Configuration Information

Head SSD Capacity Options

For combinations of Bank A and Bank B of the DFC: When both banks are populated, adjacent banks should not differ by more than one step function in SSD capacity e.g. 3x480GB can have 3x240GB or 3x480GB or 3x960GB in the adjacent bank. Not allowed in the adjacent bank would be 3x1920GB or 3x3840GB.

HF20H: ONE or TWO SSD-packs of the following SSD cache options can be selected.		HF20H	HF20C/ HF40C	HF20	HF40	HF60/ HF60C
SKU	**SKU Description**					
Q8B77B	HPE Nimble Storage HF20H Adaptive Array 480GB (2x240GB) FIO Cache Bundle	Yes	No	No	No	No
Q8B79B	HPE Nimble Storage HF20H Adaptive Array R2 960GB (2x480GB) FIO Cache Bundle	Yes	No	No	No	No
HF20C/HF40C: ONE or TWO SSD-packs of the following SSD cache options can be selected.						
Q8B80B	HPE Nimble Storage HF20C Adaptive Array 720GB (3x240GB) FIO Cache Bundle	No	Yes	No	No	No
Q8B82B	HPE Nimble Storage HF20C Adaptive Array R2 1.44TB (3x480GB) FIO Cache Bundle	No	Yes	No	No	No
Q8H80A	HPE Nimble Storage HF20C Adaptive Array R2 2.88TB (3x960GB) FIO Cache Bundle	No	Yes	No	No	No
Q8H81A	HPE Nimble Storage HF20C Adaptive Array 5.76TB (3x1.92TB) FIO Cache Bundle	No	Yes	No	No	No
Q8H82A	HPE Nimble Storage HF20C Adaptive Array 11.52TB (3x3.84TB) FIO Cache Bundle	No	Yes	No	No	No
R4H69A	HPE Nimble Storage HF20C/40C Adaptive Array 23.04TB (3x7.68TB) FIO Cache Bundle	No	Yes	No	No	No
HF20: ONE SSD-packs of the following SSD cache options can be selected.						
Q8J28A	HPE Nimble Storage HF20 Adaptive Array 1.44TB (6x240GB) FIO Cache Bundle	No	No	Yes	No	No
Q8J29A	HPE Nimble Storage HF20 Adaptive Array R2 2.88TB (6x480GB) FIO Cache Bundle	No	No	Yes	No	No
Q8J30A	HPE Nimble Storage HF20 Adaptive Array R2 5.76TB (6x960GB) FIO Cache Bundle	No	No	Yes	No	No
R0P02A	HPE Nimble Storage HF20 Adaptive Array 8.64TB (3x1920GB and 3x960GB) FIO Cache Bundle	No	No	Yes	No	No
Q8J31A	HPE Nimble Storage HF20 Adaptive Array 11.52TB (6x1.92TB) FIO Cache Bundle	No	No	Yes	No	No
R0P03A	HPE Nimble Storage HF20 Adaptive Array 17.28TB (3x3840GB and 3x1920GB) FIO Cache Bundle	No	No	Yes	No	No
Q8J32A	HPE Nimble Storage HF20 Adaptive Array 23.04TB (6x3.84TB) FIO Cache Bundle	No	No	Yes	No	No
HF40/HF60/HF60C: ONE SSD-packs of the following SSD cache options can be selected.						
Q8H48A	HPE Nimble Storage HF40/60 Adaptive Array 1.44TB (6x240GB) FIO Cache Bundle	No	No	No	Yes	Yes
Q8H49A	HPE Nimble Storage HF60 Adaptive Array 2.88TB (6x480GB) FIO Cache Bundle	No	No	No		Yes
Q8B62B	HPE Nimble Storage HF60 Adaptive Array 5.76TB (6x960GB) FIO Cache Bundle	No	No	No		Yes
Q8H50A	HPE Nimble Storage HF40 Adaptive Array R2 2.88TB (6x480GB) FIO Cache Bundle	No	No	No	Yes	
Q8B63B	HPE Nimble Storage HF40 Adaptive Array R2 5.76TB (6x960GB) FIO Cache Bundle	No	No	No	Yes	
R0P04A	HPE Nimble Storage HF40/60 Adaptive Array 8.64TB (3x1920GB and 3x960GB) FIO Cache Bundle	No	No	No	Yes	Yes

Configuration Information

Q8B64B	HPE Nimble Storage HF40/60 Adaptive Array 11.52TB (6x1.92TB) FIO Cache Bundle	No	No	No	Yes	Yes
R0P05A	HPE Nimble Storage HF40/60 Adaptive Array 17.28TB (3x3840GB and 3x1920GB) FIO Cache Bundle	No	No	No	Yes	Yes
Q8B66B	HPE Nimble Storage HF40/60 Adaptive Array 23.04TB (6x3.84TB) FIO Cache Bundle	No	No	No	Yes	Yes
R4H70A	HPE Nimble Storage HF60/60C Adaptive Array 46.08TB (6x7.68TB) FIO Cache Bundle	No	No	No	No	Yes
		HF20H	**HF20C**	**HF20**	**HF40/ HF40C**	**HF60/ HF60C**
Platform RAM installed (GB) per controller		32	32	32	64	160
Min SSD capacity (RAW) range per platform basis (GB)		960	720	1440	1440/ 720	1440
Max SSD capacity (RAW) range per platform basis (GB)		15360	23040	23040	23040	23040
Platform Max SSD capacity (RAW)= (Head SSD + ES3 SSD) capacity (TB)		28TB	38TB	28TB	48TB/ 60TB	156TB

Step 4 – Choose Head Networking Option

Up to three (3) of the following options can be selected. Please refer to configuration guidelines for specific support of networking options on HF-Series arrays. The HF20, HF20C, and HF20Q support up to two (2) head networking options.

NOTE: The following minimum ports are recommended for best performance:

- HF20: at least 2-ports
- HF40: at least 4-ports
- HF60: at least 8-ports

NOTE: All 10GbE and 16Gb FC cards include SFP+ optical transceivers

NOTE: Head networking options include a total of two (2x) cards which are evenly populated in the two controllers.

Head Networking Options		**HF20H**	**HF20C**	**HF20**	**HF40/ HF40C**	**HF60/ HF60C**
Q8B84B	HPE Nimble Storage 2x1GbE 2-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
Q8B88B	HPE Nimble Storage 2x10GbE 2-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
Q8B86B	HPE Nimble Storage 2x10GBASE-T 2-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
Q8B90B	HPE Nimble Storage 2x16Gb Fibre Channel 2-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
R4G78A	HPE Nimble Storage 2x32Gb 2-port Fibre Channel FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
Q8C03B	HPE Nimble Storage 2x16Gb Fibre Channel 4-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
Q8C17B	HPE Nimble Storage 2x10GbE 4-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
Q8C20B	HPE Nimble Storage 2x10GBASE-T 4-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes
Q8C09B	HPE Nimble Storage 2x1GbE 4-port FIO Adapter Kit	Yes	Yes	Yes	Yes	Yes

Configuration Information

Step 5 – Add Expansion Shelves

ES3 Adaptive Expansion Shelves

Add up to six (6) ES3 Adaptive expansion shelves to each HF-Series array. Mix any options below up to array maximum capacity. Please refer to configuration guidelines for specific array capacity limits.

Mix any of the following options up to platform max:		HF20H	HF20C	HF20	HF40/ HF40C	HF60/ HF60C
SKU	**SKU Description**					
R0N82A	HPE Nimble Storage HF20C Adaptive ES3 126TB (21x6TB) HDD 3.8TB Cache CTO Expansion Shelf	No	Yes	No	Yes[1]	Yes[1]
R0N83A	HPE Nimble Storage HF20C Adaptive ES3 210TB (21x10TB) HDD 4.8TB Cache CTO Expansion Shelf	No	Yes	No	Yes[1]	Yes[1]
Q8B48B	HPE Nimble Storage HF20/20C/20H Adaptive ES3 21TB (21x1TB) HDD 1.44TB Cache CTO Expansion Shelf	Yes	Yes	Yes	No	No
Q8B49B	HPE Nimble Storage HF20/20C/20H Adaptive ES3 42TB (21x2TB) HDD 2.88TB Cache CTO Expansion Shelf	Yes	Yes	Yes	No	No
Q8B50B	HPE Nimble Storage HF20/20C/20H Adaptive ES3 84TB (21x4TB) HDD 5.76TB Cache CTO Expansion Shelf	Yes	Yes	Yes	No	No
Q8B51B	HPE Nimble Storage HF20/20H Adaptive ES3 126TB (21x6TB) HDD 9.6TB Cache CTO Expansion Shelf	Yes		Yes	No	No
Q8H33A	HPE Nimble Storage HF40/60 Adaptive ES3 21TB (21x1TB) HDD 1.44TB Cache CTO Expansion Shelf	No	No	No	Yes	Yes
Q8H34A	HPE Nimble Storage HF40/60 Adaptive ES3 42TB (21x2TB) HDD 2.88TB Cache CTO Expansion Shelf	No	No	No	Yes	Yes
Q8H35A	HPE Nimble Storage HF40/60 Adaptive ES3 84TB (21x4TB) HDD 5.76TB Cache CTO Expansion Shelf	No	No	No	Yes	Yes
Q8G47B	HPE Nimble Storage HF40/60 Adaptive ES3 126TB (21x6TB) HDD 9.6TB Cache CTO Expansion Shelf	No	No	No	Yes[2]	Yes[2]
Q8G48B	HPE Nimble Storage HF40/60 Adaptive ES3 210TB (21x10TB) HDD 17.28TB Cache CTO Expansion Shelf	No	No	No	Yes[2]	Yes[2]
R4H75A	HPE Nimble Storage HF40/60 Adaptive ES3 294TB (21x14TB) HDD 23.04TB Cache CTO Expansion Shelf	No	No	No	Yes[3]	Yes[3]
Platform Max SSD capacity (RAW)= (Head SSD + ES3 SSD) capacity (GB)		28TB	38 TB	28 TB	48/ 60 TB	156 TB

[1] Not supported with HF40 and HF60
[2] Not supported with HF40C and HF60C
[3] When used with HF40, HF60, or HF60C, Bank B ES3 Cache must be populated

Optional Cache for ES3 Expansion Shelves

Only ONE of the following options can be selected per shelf.
Please refer to configuration guidelines for specific array cache capacity limits.

ONE of the following SSD cache options can be selected:		HF20H	HF20C	HF20	HF40/ HF40C	HF60/ HF60C
Q8C25B	HPE Nimble Storage HF Adaptive ES3 Expansion Shelf 2.88TB (3x960GB) FIO Cache Bundle	Yes	Yes	Yes	Yes	Yes
Q8C26B	HPE Nimble Storage HF Adaptive ES3 Expansion Shelf 5.76TB (3x1.92TB) FIO Cache Bundle	Yes	Yes	Yes	Yes	Yes
Q8C28B	HPE Nimble Storage HF Adaptive ES3 Expansion Shelf 11.52TB (3x3.84TB) FIO Cache Bundle	Yes	Yes	Yes	Yes	Yes
R4H71A	HPE Nimble Storage HF Adaptive Array ES3 Expansion Shelf 23.04TB (3x7.68TB) FIO Cache Bundle	No	Yes	No	Yes[1]	Yes
Platform Max SSD capacity (RAW)= (Head SSD + ES3 SSD) capacity (GB)		28TB	28TB	28TB	48/60TB	156TB

[1] Not supported with HF40

Configuration Information

Step 6 – Add Support (Mandatory)

Support recommendations are designed to help you enhance technology operations, lower risk and make it easier for you to seek the right balance between affordability and service-level commitments. Depending on your individual support needs, choose from three levels of care that cover the entire lifecycle to better address your needs from 1, 3, 4 and 5 year durations for service levels ranging from Next Business Day parts exchange to 4 hour onsite response.

Description	SKU
NS 1/3/4/5Y FC NBD Parts Exchange Support	HT7A1A1/3/4/5
NOTE: Minimum support required 1 year Next Business Day Parts Exchange.	
NS 1/3/4/5Y FC NBD Parts Exchange w DMR Support	HT7A2A1/3/4/5
NS 1/3/4/5Y FC 4H Parts Exchange Support	HT6Z0A1/3/4/5
NS 1/3/4/5Y FC 4H Parts Exchange w DMR Support	HT6Z1A1/3/4/5
NS 1/3/4/5Y FC 4H Onsite Exchange Support	HT6Z2A1/3/4/5
NS 1/3/4/5Y FC 4H Onsite Exchange w DMR Support	HT6Z3A1/3/4/5
NS 1/3/4/5Y FC NBD Onsite Exchange Support	HT6Z4A1/3/4/5
NOTE: Support level available in Japan only.	
NS 1/3/4/5Y FC NBD Onsite Exchange w DMR Support	HT6Z5A1/3/4/5
NOTE: Support level available in Japan only.	

Controller Refresh

The Controller Refresh program provides customers with a new controller after three years provided they meet the terms of the Controller Refresh program. To add Controller Refresh it needs to be configured with the initial Nimble array order. For more details on the Controller Refresh program, please see the **timeless storage** brochure.

HPE NS 5Y FC NBD PExch L2 CtrlRfr Supp	HT7H6A5
HPE NS 5Y FC NBD PExchDMR L2CtrlRfr Supp	HT7H7A5
HPE NS 5Y NBD Ons L2 CtrlRfr Supp	HT7J2A5
NOTE: Support level available in Japan only.	
HPE NS 5Y NBD OnsDMRL2CtrlRfr Supp	HT7J3A5
NOTE: Support level available in Japan only.	
HPE NS 5Y FC 4H PExch L2 CtrlRfr Supp	HT7H8A5
HPE NS 5Y FC 4H PExch DMR L2CtrlRfr Supp	HT7H9A5
HPE NS 5Y FC 4H Onsite L2 CtrlRfr Supp	HT7J0A5
HPE NS 5Y FC 4H OnsiteDMR L2CtrlRfr Supp	HT7J1A5
HPE NS 3Y NBD PExch L2 CtrlRfr PP Supp	HU2K6A3
HPE NS 3Y NBD PExchDMR L2CtrlRfr PP Supp	HU2K7A3
HPE NS 3Y 4H PExch L2 CtrlRfr PP Supp	HU2K8A3
HPE NS 3Y 4H PExchDMR L2CtrlRfr PP Supp	HU2K9A3
HPE NS 3Y 4H Onsite L2 CtrlRfr PP Supp	HU2L0A3
HPE NS 3Y 4H OnsiteDMR L2CtrlRfr PP Supp	HU2L1A3
HPE NS 3Y NBD Onsite Controller Refresh Level 2 PP SVC	HU2L2A3
NOTE: Support level available in Japan only.	
HPE NS 3Y NBD Onsite with DMR Controller Refresh Level 2 PP SVC	HU2L3A3
NOTE: Support level available in Japan only.	

Configuration Information

Installation Services
Installation Services are intended to guide you from start to finish and to help make your installation a success. Our engagement includes the following phases:

Array Installation

- Inventory and verify HPE Nimble Storage equipment against the sales order
- Physically rack and cable all HPE Nimble Storage equipment, including connecting network
- cables provided by the customer
- Conduct power-on tests and verify operation
- Add the array to an existing HPE Nimble Storage group, if applicable
- Configure array's basic management, monitoring, & reporting capabilities
- Configure array for additional data networks / SAN connectivity as needed
- Upgrade the array to the latest recommended HPE Nimble OS version

NOTE: Installation services are optional.

Description	SKU
HPE Nimble Storage Array Start-up service	HA114A1#5MR
HPE Nimble Storage Array Upgrade service	HA124A1#5MS

Racks
HPE Nimble Storage arrays and expansion shelves are compatible with industry standard 4-post EIA 19 inch racks with square mounting holes, including HPE 36U, 42U and 48U Enterprise Shock Racks. HPE recommends HPE racks with a depth of 1200mm to best accommodate the length of the Nimble Storage chassis; the HPE 1200mm rack provides ample room for cabling and ease of serviceability. HPE racks with a depth of 1075mm can be used but may have limited space for cabling and component access. If a 3rd party rack with a depth less than 1075mm is used, the rear doors cannot be fully closed.

Recommended Racks:
HPE G2 Enterprise Series Racks

- HPE 48U 600mmx1200mm G2 Enterprise Rack
- HPE 48U 800mmx1200mm G2 Enterprise Rack
- HPE 42U 600mmx1200mm G2 Enterprise Rack
- HPE 42U 800mmx1200mm G2 Enterprise Rack

HPE G2 Advanced Series Racks

- HPE 48U 600mmx1200mm G2 Advanced Rack
- HPE 48U 800mmx1200mm G2 Advanced Rack
- HPE 42U 600mmx1200mm G2 Advanced Rack
- HPE 42U 800mmx1200mm G2 Advanced Rack
- HPE 36U 600mmx1200mm G2 Advanced Rack
- HPE 36U 800mmx1200mm G2 Advanced Rack

For more information on the HPE rack offerings, please see the following URL: **https://www.hpe.com/info/rackandpower**
For more information on rack options, see: **http://www.hpe.com/products/rackoptions**
For more information on PDUs, see: **http://www.hpe.com/servers/pdu**

Configuration Information

Required and additional power cords

HPE Nimble Storage Arrays and expansion shelves do not ship with any power cords by default and require a minimum of two power cords per system. Please ensure these are selected at time of quoting. A pair of power cords are required when connecting base arrays (C19/C14 or C19/C20) or expansion shelves (C13/C14) to Rack-Mounted Power Distribution Units (PDU). A pair of country/region specific power cords are required when connecting base arrays or expansion shelves to standard office wall power outlets.

Description	SKU
HPE Nimble Storage NEMA 5-15P to C19 125V 15Amp 2.5m US FIO Power Cord	R0P83A
HPE Nimble Storage IEC 60320 C14 to C19 250V 15Amp 1.8m FIO Power Cord	R0P84A
HPE Nimble Storage AS3112 to C19 250V 16Amp 1.8m AU FIO Power Cord	Q8J02A
HPE Nimble Storage Schuko to C19 250V 16Amp 1.8m EU FIO Power Cord	Q8J03A
HPE Nimble Storage BS 1363 UK10 to C19 250V 16Amp 1.8m UK FIO Power Cord	Q8J04A
HPE Nimble Storage NEMA L5-20P to C19 125V 20Amp 2.5m US FIO Power Cord	Q8J05A
HPE Nimble Storage GB2099 to C19 250V 16Amp 1.8m CN FIO Power Cord	Q8J06A
HPE Nimble Storage KSC8305 to C19 250V 16Amp 1.8m KR FIO Power Cord	Q8J07A
HPE Nimble Storage JIS8303 to C19 125V 15Amp 1.8m TW/JP FIO Power Cord	Q8J08A
HPE Nimble Storage JIS8303 6-30 to C19 250V 15Amp 1.8m JP FIO Power Cord	Q8J09A
HPE Nimble Storage IS1293 to LS-60 250V 16Amp 1.8m IN FIO Power Cord	Q8J10A
HPE Nimble Storage SAN164-1 to C19 250V 16Amp 1.8m ZA FIO Power Cord	Q8J11A
HPE Nimble Storage SI32 to C19 250V 16Amp 1.8m IL FIO Power Cord	Q8J12A
HPE Nimble Storage CEI 23-16 to C19 250V 16Amp 1.8m IT FIO Power Cord	Q8J13A
HPE Nimble Storage C19 to C20 250V 16Amp 1.8m PDU Base Array FIO Power Cord	Q8J14A
HPE Nimble Storage AS 3112 to C13 250V 10Amp 1.8m AU FIO Power Cord	Q8J15A
HPE Nimble Storage Schuko to C13 250V 10Amp 1.8m EU FIO Power Cord	Q8J16A
HPE Nimble Storage BS1363 UK10 to C13 250V 10Amp 1.8m UK FIO Power Cord	Q8J17A
HPE Nimble Storage NEMA 5-15P to C13 125V 10Amp 1.8m US FIO Power Cord	Q8J18A
HPE Nimble Storage GB2099 to C13 250V 10Amp 1.8m CN FIO Power Cord	Q8J19A
HPE Nimble Storage KSC8305 to C13 250V 10Amp 1.8m KR FIO Power Cord	Q8J20A
HPE Nimble Storage JIS8303 to C13 125V 12Amp 1.8m TW/JP FIO Power Cord	Q8J21A
HPE Nimble Storage JIS8303 to C13 250V 15Amp 2.5m JP FIO Power Cord	Q8J22A
HPE Nimble Storage IS1293 to C13 250V 10Amp 1.8m IN FIO Power Cord	Q8J23A
HPE Nimble Storage SANS164-1 to C13 250V 10Amp 1.8m ZA FIO Power Cord	Q8J24A
HPE Nimble Storage SI32 to C13 250V 10Amp 1.8m IL FIO Power Cord	Q8J25A
HPE Nimble Storage CEI23-16 to C13 250V 10Amp 1.8m IT FIO Power Cord	Q8J26A
HPE Nimble Storage C13 to C14 250V 10Amp 1.8m Universal FIO Power Cord	Q8J27A

Field Upgrade Options

The following product options are to upgrade currently installed Adaptive Flash Arrays

Configuration Information

Controller Upgrades						
SKU	**SKU Description**	**HF20H**	**HF20C**	**HF20**	**HF40/HF40C**	**HF60/HF60C**
Q8H51A	HPE Nimble Storage HF20X to HF40 Adaptive Array Dual Controller Field Upgrade	Yes	Yes	Yes	No	No
Q8H52A	HPE Nimble Storage HF20/40 to HF60 Adaptive Array Dual Controller Field Upgrade	No	Yes	Yes	Yes	No
HDD Capacity Upgrade						
SKU Max one (1)	**SKU Description**	**HF20H**	**HF20C**	**HF20**	**HF40/HF40C**	**HF60/HF60C**
Q8D07B	HPE Nimble Storage HF20H Adaptive Array 11TB (11x1TB) HDD Field Upgrade	Yes	No	No	No	No

Cache Upgrades						
Only one of the following options can be selected		**HF20H**	**HF20C**	**HF20**	**HF40/HF40C**	**HF60/HF60C**
Q8D11B	HPE Nimble Storage HF20H Adaptive Array 480GB (2x240GB) Cache Field Upgrade	Yes	No	No	No	No
Q8D12B	HPE Nimble Storage HF20H Adaptive Array 960GB (2x480GB) Cache Field Upgrade	Yes	No	No	No	No
Q8D13B	HPE Nimble Storage HF20/20C Adaptive Array 720GB (3x240GB) Cache Field Upgrade	No	Yes	Yes	No	No
Q8D14B	HPE Nimble Storage HF20/20C Adaptive Array 1.44TB (3x480GB) Cache Field Upgrade	No	Yes	Yes	No	No
Q8H85A	HPE Nimble Storage HF20/20C Adaptive Array 2.88TB (3x960GB) Cache Field Upgrade	No	Yes	Yes	No	No
Q8H86A	HPE Nimble Storage HF20/20C Adaptive Array 5.76TB (3x1.92TB) Cache Field Upgrade	No	Yes	Yes	No	No
Q8H87A	HPE Nimble Storage HF20/20C Adaptive Array 11.52TB (3x3.84TB) Cache Field Upgrade	No	Yes	Yes	No	No
Q8H58A	HPE Nimble Storage HF40/60 Adaptive Array 720GB (3x240GB) Cache Field Upgrade	No	Yes	Yes	No	No
Q8H59A	HPE Nimble Storage HF40/60 Adaptive Array 1.44TB (3x480GB) Cache Field Upgrade	No	No	No	Yes	Yes
Q8C99B	HPE Nimble Storage HF40/60 Adaptive Array 2.88TB (3x960GB) Cache Field Upgrade	No	No	No	Yes	Yes
Q8D00B	HPE Nimble Storage HF40/60 Adaptive Array 5.76TB (3x1.92TB) Cache Field Upgrade	No	No	No	Yes	Yes
Q8D01B	HPE Nimble Storage HF40/60 Adaptive Array 11.52TB (3x3.84TB) Cache Field Upgrade	No	No	No	Yes	Yes
R4H72A	HPE Nimble Storage HF Adaptive Array 23.04TB (3x7.68TB) Cache Field Upgrade	No	No	No	Yes[1]	Yes

NOTE:[1] Not supported with HF40

Configuration Information

Networking Upgrades						
SKU	Min 0, Max 3; Max 2 supported on Q8H73A (AF20Q), Q8H74A (AF20)	**HF20H**	**HF20C**	**HF20**	**HF40/HF40C**	**HF60/HF60C**
Q8C64B	HPE Nimble Storage 2x1GbE 2-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C63B	HPE Nimble Storage 2x10GbE 2-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C62B	HPE Nimble Storage 2x10GBASE-T 2-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C65B	HPE Nimble Storage 2x16Gb Fibre Channel 2-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
R4G79A	HPE Nimble Storage 2x32Gb 2-port Fibre Channel Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C66B	HPE Nimble Storage 2x16Gb Fibre Channel 4-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C68B	HPE Nimble Storage 2x10GbE 4-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C69B	HPE Nimble Storage 2x10GBASE-T 4-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C67B	HPE Nimble Storage 2x1GbE 4-port Adapter Field Upgrade	Yes	Yes	Yes	Yes	Yes

Upgrade Existing ES3 Shelf						
SKU	ES3 Bank B Cache (min 0 // max 1)	**HF20H**	**HF20C**	**HF20**	**HF40/HF40C**	**HF60/HF60C**
Q8C48B	HPE Nimble Storage HF Adaptive ES3 2.88TB (3x960GB) Cache Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C49B	HPE Nimble Storage HF Hybrid ES3 5.76TB (3x1.92TB) Cache Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C50B	HPE Nimble Storage HF Adaptive ES3 11.52TB (3x3.84TB) Cache Field Upgrade	Yes	Yes	Yes	Yes	Yes
Q8C50B	HPE Nimble Storage HF Adaptive ES3 23.04TB (3x7.68TB) Cache Field Upgrade	No	No	No	Yes[1]	Yes

NOTE: [1] Not supported with HF40

DC Power Supply unit (PSU)						
HF20H	**HF20C**	**HF20**	**HF40/HF40C**	**HF60/HF60C**		
Yes	Yes	Yes	Yes	Yes	HPE Nimble Storage AF/HF 3000W Dual DC Power Supply Kit	R0R06A

NOTE: The DC PSU kit includes two (2) DC PSUs; one (1) DC PSU kit per array or shelf should be ordered for systems to be installed in environments utilizing DC power infrastructure

NOTE: If NEBS compliance is required, the DC PSU kit should only be ordered with new arrays (which include DC grounding posts)

Technical Specifications

Physical Dimensions	HPE Nimble Storage HF20/20H/20C/40/60/80	HPE Nimble Storage ES3 Expansion Shelf
Width in/mm	17.3/439	17.3/439
Depth in/mm	35/890	35/890
Height in/mm/U	6.92/175.8/4	6.92/175.8/4
Weight lb/kg	135/65	115/52

Power Requirements	HF20/ HF20C	HF20H	HF40/ HF40C	HF60/ HF60C	ES3
Input Voltage, frequency (1200W AC PSU w/C14 connector**)**	100-120V, 50-60Hz 200-240V, 50-60Hz			N/A	100-120V 200-240V
Input Voltage, frequency (3000W AC PSU w/C20 connector**)**	100-120V, 50-60Hz 200-240V, 50-60Hz				N/A
Input Voltage (3000W DC PSU)	-48/-72 VDC, 40A				
Max power requirements (Watts/kVA)	750 W / 0.833 kVA	650 W 0.722 kVA	850 W 0.944 kVA	900 W 1.000 kVA	350 W 0.389 kVA
Thermal (BTU)	2460 BTU	2132 BTU	2788 BTU	2952 BTU	1147 BTU

Environmental Specifications[4]

Operating Temperature	10 - 35° C (50 - 95° F) Reduce rating by 1° F for each 1000 ft altitude (1.8° C/1,000 m)
Shipping Temperature	0° C - 40° C (32° F - 104° F) Maximum rate of change is 20°C/hr (36°F/hr)
Operating Altitude (ft/m) max.	10,000 ft / 3,048 m
Shipping Altitude (ft/m) max.	40,000ft/ 12,192 m
Humidity	8 - 90%, non-condensing
Shipping Humidity	5 - 95%, non-condensing
Operating Vibration	0.25 G, Sine 5 - 200 Hz (approx. 15 min/axis); 0.4 GRMS, Random 5 - 200 Hz (approx. 60 min/axis)
Non-operating Vibration	0.5 G, Sine 5 - 200 Hz (approx. 15 min/axis); 0.98 GRMS, Random 5 - 500Hz (approximate 30 min/axis)
Operating Shock	20 G, 2.5ms, half-sine, one shock on each side
Non-operating Shock	20 G, 10ms, square wave, one shock on each side

Electromagnetic Compatibility

- Subpart B of Part 15 of FCC Rules for Class A digital devices
- ICES-003, Issue 6, dated January 2016 (Class A)
- VCCI V-3: April 2014 (Class A)
- EN 55022:2010
- CISPR 22:2008
- AS/NZS CISPR 22:2009 +A1:2010
- EN55032:2012
- CISPR 32:2012
- EN 55024:2010
- CISPR 24:2010 +A1:2015
- TCVN 7189:2009
- NBTC TS 3001-2555
- TP TC 020/2011

Technical Specifications

Safety

- EN60950-1:2005 (Second Edition); Am1:2009 + Am2:2013
- IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013
- EN60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013
- UL/IEC 60960-1 2nd Ed. Am1 + Am2
- CNS14336-1 ('99)
- CNS13438 ('95)
- NOM-019-SCFI-1998
- NBTC TS 4001-2550
- TP TC 004/2011
- IS 13252 (PART 1):2010 +A1:2013 + A2:2-15
- SANS IEC 60950-1

NOTE: [4] Specifications are subject to change without notice.

Certifications / Markings

- UL
- cUL
- CE
- FCC Class A
- IC Class A
- VCCI Class A
- RCM
- BSMI Class A
- KC
- CCC Exemption
- NOM
- MoEc
- NBTC SDoC
- CITC/CoC
- EAC
- BIS
- LOA (S. Africa)
- RoHS 2011/65/EU, EN50581:2012
- WEEE

Summary of Changes

Date	Version History	Action	Description of Change
04-May-2020	Version 24	Changed	Overview, Standard Features and Configuration Information sections were updated
02-Mar-2020	Version 23	Changed	Configuration Information and Technical Specifications were updated.
03-Feb-2020	Version 22	Changed	Q8B95B SKU description was updated.
04-Nov-2019	Version 21	Changed	Technical Specifications section was updated.
07-Oct-2019	Version 20	Changed	Configuration Information section was updated.
05-Aug-2019	Version 19	Changed	Overview and Configuration Information sections were updated.
01-Jul-2019	Version 18	Changed	Overview, Configuration Information and Technical Specifications sections were updated.
03-Jun-2019	Version 17	Changed	Overview and Technical Specifications sections were updated.
02-Apr-2019	Version 16	Changed	Configuration Information section was updated.
04-Mar-2019	Version 15	Changed	Configuration Information section was updated.
04-Feb-2019	Version 14	Changed	Overview and Configuration Information sections were updated.
07-Jan-2019	Version 13	Changed	Overview and Configuration Information sections were updated
03-Dec-2018	Version 12	Added	Added HF40C Array and HF60C Array
		Changed	Overview and Configuration Information sections were updated.
05-Nov-2018	Version 11	Changed	Description of Change Overview, Service and Support and Configuration Information sections were revised
01-Oct-2018	Version 10	Changed	Overview and Configuration Information sections were updated
13-Aug-2018	Version 9	Changed	Configuration Information section was revised
06-Aug-2018	Version 8	Added	New upgrade options were added.
		Changed	Configuration Information section was updated.
04-Jun-2018	Version 7	Changed	HPE Nimble Storage Adaptive Flash Array models and Configuration Information were revised.
14-May-2018	Version 6	Changed	Overview section was revised.
07-May-2018	Version 5	Changed	Overview, Configuration Information, and Technical Specifications were revised.
13-Nov-2017	Version 4	Changed	Overview and Configuration Information were revised.
06-Nov-2017	Version 3	Changed	Added information on the entire HPE Nimble Storage CS-Series portfolio.
12-Jun-2017	Version 2	Changed	Detail on included power cords and SAS cables.
05-Jun-2017	Version 1	Created	Created first version, including CS1000 and CS1000H.

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