

### Overview

### HPE Nimble Storage Adaptive Flash Arrays

The HPE Nimble Storage platform leverages flash storage and the power of predictive analytics to deliver fast and reliable access to data. This approach closes the app-data gap and radically simplifies operations. HPE InfoSight predictive analytics predict and prevent issues to deliver guaranteed 99.9999% availability<sup>1</sup>. Utilize a single multicloud architecture to flexibly deploy workloads on flash arrays, converged infrastructure, and the public cloud.

As part of the HPE Nimble Storage platform, Adaptive Flash hybrid storage arrays combine affordable flash performance with radical simplicity for mixed, mainstream workloads. Adaptive Flash Arrays are cloud-ready – providing an easy on-ramp to the cloud through HPE Cloud Volumes. Backed by our Timeless Storage guarantee<sup>2</sup>, optional software is included and forklift upgrades are a thing of the past.



**HPE Nimble Storage Adaptive Flash Array<sup>3</sup>**  
**(Base array, 4U; 21 bays hold carriers with Large Form Factor HDDs,  
3 bays hold Dual Flash Carriers with Small Form Factor SSDs)**

#### NOTES:

<sup>1</sup> For details on the HPE Nimble Storage 6-nines guarantee, refer

to <https://www.hpe.com/h20195/v2/Getdocument.aspx?docname=a00018503enw><sup>2</sup> Refer

to <https://www.hpe.com/h20195/v2/Getdocument.aspx?docname=a00021804enw> for details.

<sup>3</sup> HPE Nimble Storage CS1000H Adaptive Flash Array (not shown) has 22 bays holding LFF Hard drives and 2 bays holding Dual Flash Carriers with SFF Solid State Drives.

#### HPE InfoSight

- Automatically predicts and resolves 86% of problems<sup>4</sup> 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 deployment. Simple configuration. Simple management.
- Deploy flash anywhere, on-prem, or in the public cloud through common data services across the HPE Nimble Storage family.
- Seamlessly migrate data between all-flash, hybrid-flash, and multicloud storage
- The Timeless Storage guarantee is your assurance of business value. No worries today. No worries tomorrow.
- Radically easy to integrate with many ecosystems. Deep integration with VMware and Veeam.

#### Flash Performance for Mixed, Mainstream Workloads

- Speed and efficiency for mixed workloads with sub-millisecond response and greater efficiency than other hybrid arrays<sup>5</sup>.
- Write to cost-optimized disk at flash speeds through write serialization

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- Dynamic flash caching accelerates reads even as workloads change in real time
- 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 2X space savings without performance penalty<sup>6</sup>.

### Absolute Resiliency

- 99.9999% (six-nines) guaranteed availability<sup>7</sup>
- Triple+ Parity RAID tolerates 3 simultaneous drive failures plus additional protection through intra-drive parity
- App-granular, FIPS-certified encryption provides over-the-wire protection. Secure data shredding is built-in.
- Built-in application-consistent snapshots and replication. Integration with leading backup software.

### NOTE:

<sup>4</sup> Based on internal study of HPE Nimble Storage's installed base. See

<https://www.hpe.com/h20195/v2/Getdocument.aspx?docname=a00018503ENW>

<sup>5</sup> Response times based on actual customer data collected by the HPE Nimble Storage Support organization. Efficiency comparisons based on a combination of technologies including write serialization, dynamic flash caching of reads, and the use of 3D NAND flash.

<sup>6</sup> The HPE Nimble Storage Operating System (NOS) is built to optimize the use of system resources including the CPU and memory. This enables the arrays to provide Always-on data reduction without affecting the storage performance that is delivered.

<sup>7</sup> HPE Six Nines Guarantee: <https://www.hpe.com/h20195/v2/Getdocument.aspx?docname=a00026086enw>

## HPE Nimble Storage Adaptive Flash Array models

HPE Nimble Storage CS-Series array <sup>1,2</sup>	CS1000H	CS1000	CS3000	CS5000	CS7000	Scale-out <sup>3</sup> 4X CS7000
Raw capacity (TB/TiB) <sup>4</sup>	11-1198/10-1090	21-1218/19-1108	21-1470/19-1337	21-1470/19-1337	21-1470/19-1337	5880/5348
Usable capacity (TB/TiB) <sup>4</sup>	7-952/6-866	16-982/14-893	16-1185/14-1078	16-1185/14-1078	16-1185/14-1078	4742/4313
Data Reduction <sup>5</sup>	Thin Provisioning Inline Variable-block Compression Inline Variable-block Deduplication <sup>5</sup> Zero Pattern Elimination					
Max. # of expansion shelves (hybrid/all flash)	6/1	6/1	6/1	6/1	6/1	24/4
Flash capacity (TB/TiB) <sup>4</sup>	0.5-28/0.4-25	0.7-28/0.65-25	0.7-36/0.65-33	0.7-76/0.65-69	0.7-108/0.65-98	2.9-432/2.6-393
RAID level	Triple+ Parity					
Onboard iSCSI/Mgmt. 1 Gb/10 Gb ports per array <sup>6</sup>	4	4	4	4	4	16
Optional iSCSI 1 Gb ports per array <sup>6</sup>	4 or 8	4 or 8	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 <sup>6</sup>	4 or 8	4 or 8	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 or 8	4 or 8	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	4, 8, 12, 16, 20, 24	96
Max. power requirement (watts/kVA)	500 W/0.56 kVA	600 W/0.67 kVA	700 W/0.78 kVA	800 W/0.89 kVA	900 W/1 kVA	3600 W/4 kVA

## Overview

Thermal (BTU)	1638	1965	2293	2620	2948	11,792
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### NOTES:

- 1 HPE Nimble Storage CS1000, CS3000, and CS5000 Adaptive Flash array support scale up to any model within the CS family. CS1000H Adaptive Flash array supports scale up to the CS3000 Adaptive Flash array.
- 2 The CS1000H Adaptive Flash array consists of up to 22 HDDs and 2 Dual Flash Carriers (DFCs). All other CS-Series models consist of up to 21 HDD drives and 3 DFCs (holding up to 6 SSDs).
- 3 Scale-out configuration consists of 4X CS7000 Adaptive Flash arrays, each with six maximum capacity expansion shelves.
- 4 Raw, usable, and effective capacities are shown in TB (10<sup>12</sup> bytes) and TiB (2<sup>40</sup> bytes). Usable and effective capacities take into account space used for parity, spares, SSD cache, and system overhead.
- 5 Deduplication currently supported on CS3000/5000 only (additional models planned for the future); additional flash may be required; deduplication capacity limits apply (first 100 TiB usable on CS5000, first 40TiB usable on CS3000).
- 6 Each array controller has 2 x 10GbE ports built in. Optional ports are 1GbaseT, 10GbaseT, or 10GbE SFP+.

### Expansion Shelves for HPE Nimble Storage Adaptive Flash Arrays

	ES2 Expansion Shelf for Hybrid	AFS2 All-Flash Expansion Shelf for Hybrid <sup>7</sup>
Raw capacity (TB/TiB) <sup>8</sup>	21-210/18-190	N/A
Usable capacity (TB/TiB) <sup>8</sup>	16-169/14-154 <sup>10</sup>	N/A
Effective capacity (TB/TiB) <sup>8,9</sup>	32-337/28-308	N/A
Flash capacity (TB/TiB) <sup>8</sup>	0.7-108/0.7-98	3.8-184/3.5-167
Max. power requirement (Watts/kVA)	500/0.56	325/0.36
Thermal (BTU)	1638	1638

### NOTES:

- 7 The ES2-All Flash for Hybrid accommodates up to 48 SSDs, which can be populated in packs of four at a time.
- 8 Raw, usable, and effective capacities are shown in TB (10<sup>12</sup> bytes) and TiB (2<sup>40</sup> bytes). Usable and effective capacities take into account space used for parity, spares, SSD cache, and system overhead.
- 9 Scale-out configuration consists of 4X CS7000 Adaptive Flash arrays, each with six maximum capacity expansion shelves.
- 10 When attached to a CS1000H Adaptive Flash array, capacity is 16-167/14-152.

### 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®

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>

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## Service and Support and Warranty Information

### Warranty

HPE Nimble Storage arrays come with the following warranties:

- 1 year; parts-only warranty for hardware components
- 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.

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### 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 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.

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### 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.

## 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.

### HPE Nimble Storage CS-Series Adaptive Flash Arrays – Base Configuration

<b>Base Array</b>	HPE Nimble Storage CS1000H Hybrid Dual Controller 10GBASE-T 2-port Base Array	Q8B37A
	HPE Nimble Storage CS1000 Hybrid Dual Controller 10GBASE-T 2-port Base Array	Q8B38A
	HPE Nimble Storage CS3000 Hybrid Dual Controller 10GBASE-T 2-port Base Array	Q8B39A
	HPE Nimble Storage CS5000 Hybrid Dual Controller 10GBASE-T 2-port Base Array	Q8B31A
	HPE Nimble Storage CS7000 Hybrid Dual Controller 10GBASE-T 2-port Base Array	Q8B32A

### HPE Nimble Storage CS-Series – Controller Upgrades

Use the appropriate controller upgrade to convert a previously existing CS-Series array to a higher level CS-Series array.

<b>Controller Upgrade</b>	HPE Nimble Storage CS3000 Hybrid Array Dual Controller Field Upgrade (from CS1000/H)	Q8D05A
	HPE Nimble Storage CS5000 Hybrid Array Dual Controller Field Upgrade (from CS1000/H or CS3000)	Q8C91A
	HPE Nimble Storage CS7000 Hybrid Array Dual Controller Field Upgrade (from CS1000/H, CS3000 or CS5000)	Q8C92A

**NOTE:** CS1000H must be upgraded to be fully populated (22TB raw) before it can be upgraded to a CS3000; CS1000H cannot be upgraded to a controller beyond the CS3000.

### 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.

#### Head HDD Capacity Options

HPE Nimble Storage CS1000H Hybrid Array 11x1TB HDD Bundle (CS1000H only)	Q8B67A
HPE Nimble Storage CS/SF Hybrid Array 21x1TB HDD Bundle	Q8B68A
HPE Nimble Storage CS/SF Hybrid Array 21x2TB HDD Bundle	Q8B69A
HPE Nimble Storage CS/SF Hybrid Array 21x4TB HDD Bundle	Q8B55A
HPE Nimble Storage CS/SF Hybrid Array 21x6TB HDD Bundle	Q8B56A
HPE Nimble Storage CS/SF Hybrid Array 21x10TB HDD Bundle	Q8B57A

### Head HDD Capacity Upgrade for CS1000H

Use this option for upgrading an 11TB CS1000H to a fully populated 21TB configuration

HPE Nimble Storage CS1000H Hybrid Array 11x1TB HDD Field Upgrade	Q8D07A
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## Configuration Information

### Step 3 – Choose Head SSD Cache Capacity

Cache bundles should be selected to meet the minimum cache required for the selected Head HDD capacity:

Head HDD Capacity	Typical capacity*	Minimum cache bundle
11TB	960GB	2x240GB
21TB	1.44TB	3x240GB
42TB	2.88TB	3x480GB
84TB	5.76TB	3x960GB
126TB	11.52TB	3x1.92TB
210TB	11.52TB	3x1.92TB

A single cache bundle populates half the Dual Flash Carrier (DFC) slots and a second bundle can be added with the initial configuration, or as an upgrade in the field if more cache is required.

\* “Typical capacity”, or greater, is often required to deliver good performance across multiple application workloads.

#### Head SSD Cache Capacity Options

HPE Nimble Storage CS1000H Hybrid Array 2x240GB Cache Bundle	Q8B77A
HPE Nimble Storage CS1000H Hybrid Array R2 2x480GB Cache Bundle	Q8B79A
HPE Nimble Storage CS Hybrid Array 3x240GB Cache Bundle	Q8B80A
HPE Nimble Storage CS7000/9000/SF Hybrid Array 3x480GB Cache Bundle	Q8B81A
HPE Nimble Storage CS1000 Hybrid Array R2 3x480GB Cache Bundle	Q8B82A
HPE Nimble Storage CS7000/9000/SF Hybrid Array 3x960GB Cache Bundle	Q8B62A
HPE Nimble Storage CS1000 Hybrid Array R2 3x960GB Cache Bundle	Q8B63A
HPE Nimble Storage CS/SF Hybrid Array 3x1.92TB Cache Bundle	Q8B64A
HPE Nimble Storage CS/SF Hybrid Array 3x3.84TB Cache Bundle	Q8B66A
* the R2 version is only selectable in the quote tool for CS1000/1000H/3000/5000, but is functionally identical to the non-R2 version	

#### Head SSD Cache Upgrade Options

HPE Nimble Storage CS1000H Hybrid Array 2x240GB Cache Field Upgrade	Q8D11A
HPE Nimble Storage CS1000H Hybrid Array 2x480GB Cache Field Upgrade	Q8D12A
HPE Nimble Storage CS Hybrid Array 3x240GB Cache Field Upgrade	Q8D13A
HPE Nimble Storage CS/SF Hybrid Array 3x480GB Cache Field Upgrade	Q8D14A
HPE Nimble Storage CS/SF Hybrid Array 3x960GB Cache Field Upgrade	Q8C99A
HPE Nimble Storage CS/SF Hybrid Array 3x1.92TB Cache Field Upgrade	Q8D00A
HPE Nimble Storage CS/SF Hybrid Array 3x3.84TB Cache Field Upgrade	Q8D01A

### Step 4 – Choose Head Networking Option

#### Head Networking Options

**Only ONE of the following options can be selected. Please refer to configuration guidelines for specific support of networking options on CS-Series arrays**

HPE Nimble Storage 2x1GbE 2-port Adapter Kit	Q8B84A
HPE Nimble Storage 4x1GbE 2-port Adapter Kit	Q8B85A
HPE Nimble Storage 2x10GBASE-T 2-port Adapter Kit	Q8B86A
HPE Nimble Storage 4x10GBASE-T 2-port Adapter Kit	Q8B87A
HPE Nimble Storage 2x10GbE 2-port Adapter Kit	Q8B88A
HPE Nimble Storage 4x10GbE 2-port Adapter Kit	Q8B89A
HPE Nimble Storage 2x16Gb Fibre Channel 2-port Adapter Kit	Q8B90A

## Configuration Information

HPE Nimble Storage 4x16Gb Fibre Channel 2-port Adapter Kit	Q8B91A
HPE Nimble Storage 6x16Gb Fibre Channel 2-port Adapter Kit	Q8B92A
HPE Nimble Storage 2x10GBASE-T 2-port and 2x16Gb Fibre Channel 2-port Adapter Kit	Q8B93A
HPE Nimble Storage 2x10GBASE-T 2-port and 4x16Gb Fibre Channel 2-port Adapter Kit	Q8B94A
HPE Nimble Storage 2x10GbE 2-port and 2x16Gb Fibre Channel 2-port Adapter Kit	Q8B95A
HPE Nimble Storage 2x10GbE 2-port and 4x16Gb Fibre Channel 2-port Adapter Kit	Q8B96A
HPE Nimble Storage 4x10GBASE-T 2-port and 2x16Gb Fibre Channel 2-port Adapter Kit	Q8B97A
HPE Nimble Storage 4x10GbE 2-port and 2x16Gb Fibre Channel 2-port Adapter Kit	Q8B98A
HPE Nimble Storage 2x1GbE 2-port and 2x10GBASE-T 2-port Adapter Kit	Q8B99A
HPE Nimble Storage 2x1GbE 2-port and 4x10GBASE-T 2-port Adapter Kit	Q8C00A
HPE Nimble Storage 6x10GbE 2-port Adapter Kit	Q8C01A
HPE Nimble Storage 6x10GBASE-T 2-port Adapter Kit	Q8C02A
HPE Nimble Storage 2x16Gb Fibre Channel 4-port Adapter Kit	Q8C03A
HPE Nimble Storage 4x16Gb Fibre Channel 4-port Adapter Kit	Q8C04A
HPE Nimble Storage 6x16Gb Fibre Channel 4-port Adapter Kit	Q8C05A
HPE Nimble Storage 2x10GbE 2-port and 4x16Gb Fibre Channel 4-port Adapter Kit	Q8C06A
HPE Nimble Storage 4x10GbE 2-port and 2x16Gb Fibre Channel 4-port Adapter Kit	Q8C07A
HPE Nimble Storage 2x10GbE 2-port and 2x16Gb FC 4-port and 2x16Gb FC 2-port Adapter Kit	Q8C08A
HPE Nimble Storage 2x1GbE 4-port Adapter Kit	Q8C09A
HPE Nimble Storage 2x10GBASE-T 2-port and 4x16Gb Fibre Channel 4-port Adapter Kit	Q8C10A
HPE Nimble Storage 4x1GbE 4-port Adapter Kit	Q8C11A
HPE Nimble Storage 6x1GbE 4-port Adapter Kit	Q8C12A
HPE Nimble Storage 2x1GbE 4-port and 2x16Gb Fibre Channel 2-port Adapter Kit	Q8C13A
HPE Nimble Storage 2x1GbE 4-port and 2x10GbE 2-port Adapter Kit	Q8C14A
HPE Nimble Storage 2x1GbE 4-port and 4x16Gb Fibre Channel 2-port Adapter Kit	Q8C15A
HPE Nimble Storage 2x1GbE 4-port and 4x10GbE 2-port Adapter Kit	Q8C16A
HPE Nimble Storage 2x10GbE 4-port Adapter Kit	Q8C17A
HPE Nimble Storage 4x10GbE 4-port Adapter Kit	Q8C18A
HPE Nimble Storage 6x10GbE 4-port Adapter Kit	Q8C19A
HPE Nimble Storage 2x10GBASE-T 4-port Adapter Kit	Q8C20A
HPE Nimble Storage 4x10GBASE-T 4-port Adapter Kit	Q8C21A
HPE Nimble Storage 6x10GBASE-T 4-port Adapter Kit	Q8C22A
HPE Nimble Storage 2x10GbE 4-port and 4x16Gb Fibre Channel 4-port Adapter Kit	Q8C23A
HPE Nimble Storage 4x10GbE 4-port and 2x16Gb Fibre Channel 4-port Adapter Kit	Q8C24A

## Head Network Upgrade Options

**Only ONE of the following options can be selected. Please refer to configuration guidelines for specific support of networking options on CS-Series arrays.**

HPE Nimble Storage 2x10GBASE-T 2-port Adapter Field Upgrade	Q8C62A
HPE Nimble Storage 2x10GbE 2-port Adapter Field Upgrade	Q8C63A
HPE Nimble Storage 2x1GbE 2-port Adapter Field Upgrade	Q8C64A
HPE Nimble Storage 2x16Gb Fibre Channel 2-port Adapter Field Upgrade	Q8C65A
HPE Nimble Storage 2x16Gb Fibre Channel 4-port Adapter Field Upgrade	Q8C66A

## Configuration Information

HPE Nimble Storage 2x1GbE 4-port Adapter Field Upgrade	Q8C67A
HPE Nimble Storage 2x10GbE 4-port Adapter Field Upgrade	Q8C68A
HPE Nimble Storage 2x10GBASE-T 4-port Adapter Field Upgrade	Q8C69A
HPE Nimble Storage Card Cage 2x1GbE 2-port Adapter Field Upgrade	Q8C70A
HPE Nimble Storage Card Cage 4x1GbE 2-port Adapter Field Upgrade	Q8C71A
HPE Nimble Storage Card Cage 2x10GBASE-T 2-port Adapter Field Upgrade	Q8C72A
HPE Nimble Storage Card Cage 4x10GBASE-T 2-port Adapter Field Upgrade	Q8C73A
HPE Nimble Storage Card Cage 2x10GbE 2-port Adapter Field Upgrade	Q8C74A
HPE Nimble Storage Card Cage 4x10GbE 2-port Adapter Field Upgrade	Q8C75A
HPE Nimble Storage Card Cage 2x16Gb Fibre Channel 2-port Adapter Field Upgrade	Q8C76A
HPE Nimble Storage Card Cage 4x16Gb Fibre Channel 2-port Adapter Field Upgrade	Q8C77A
HPE Nimble Storage Card Cage 6x16Gb Fibre Channel 2-port Adapter Field Upgrade	Q8C78A
HPE Nimble Storage Card Cage 2x10GBASE-T 2-port and 2x16Gb FC 2-port Adapter Field Upgrade	Q8C79A
HPE Nimble Storage Card Cage 2x10GBASE-T 2-port and 4x16Gb FC 2-port Adapter Field Upgrade	Q8C80A
HPE Nimble Storage Card Cage 2x10GbE 2-port and 2x16Gb Fibre Channel 2-port Adapter Field Upgrade	Q8C81A
HPE Nimble Storage Card Cage 2x10GbE 2-port and 4x16Gb Fibre Channel 2-port Adapter Field Upgrade	Q8C82A
HPE Nimble Storage Card Cage 4x10GBASE-T 2-port and 2x16Gb FC 2-port Adapter Field Upgrade	Q8C83A
HPE Nimble Storage Card Cage 4x10GbE 2-port and 2x16Gb Fibre Channel 2-port Adapter Field Upgrade	Q8C84A
HPE Nimble Storage Card Cage 2x16Gb Fibre Channel 4-port Adapter Field Upgrade	Q8C85A
HPE Nimble Storage Card Cage 2x1GbE 4-port Adapter Field Upgrade	Q8C86A
HPE Nimble Storage Card Cage 2x10GbE 4-port Adapter Field Upgrade	Q8C87A
HPE Nimble Storage Card Cage 2x10GBASE-T 4-port Adapter Field Upgrade	Q8C88A

## Step 5 – Add Expansion Shelves

### ES2 Hybrid Expansion Shelves

Add up to 6 ES2 hybrid expansion shelves to each CS-Series array. Mix any options below up to array maximum capacity. **Please refer to configuration guidelines for specific array capacity limits.**

HPE Nimble Storage CS Hybrid ES2 21x1TB HDD 3x240GB Cache Expansion Shelf	Q8B48A
HPE Nimble Storage CS Hybrid ES2 21x2TB HDD 2x480GB and 240GB Cache Expansion Shelf	Q8B49A
HPE Nimble Storage CS Hybrid ES2 21x4TB HDD 2x960GB and 480GB Cache Expansion Shelf	Q8B50A
HPE Nimble Storage CS1000/3000 Hybrid ES2 21x6TB HDD 1.92TB and 2x960GB Cache Expansion Shelf	Q8B51A
HPE Nimble Storage CS1000/3000 Hybrid ES2 21x10TB HDD 2x1.92TB and 960GB Cache Expansion Shelf	Q8B52A
HPE Nimble Storage CS5000/7000 Hybrid ES2 21x6TB HDD 1.92TB and 2x960GB Cache Expansion Shelf	Q8G47A
HPE Nimble Storage CS5000/7000 Hybrid ES2 21x10TB HDD 2x1.92TB and 960GB Cache Expansion Shelf	Q8G48A



## Configuration Information

### Optional Cache for ES2 Expansion Shelves

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

HPE Nimble Storage CS/SF Hybrid ES2 Expansion Shelf 3x960GB Cache Bundle	Q8C25A
HPE Nimble Storage CS/SF Hybrid ES2 Expansion Shelf 3x1.92TB Cache Bundle	Q8C26A
HPE Nimble Storage CS/SF Hybrid ES2 Expansion Shelf 3x3.84TB Cache Bundle	Q8C28A

### Cache Upgrade Options for ES2 Expansion Shelves

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

HPE Nimble Storage CS/SF Hybrid ES2 3x960GB Cache Field Upgrade	Q8C48A
HPE Nimble Storage CS/SF Hybrid ES2 3x1.92TB Cache Field Upgrade	Q8C49A
HPE Nimble Storage CS/SF Hybrid ES2 3x3.84TB Cache Field Upgrade	Q8C50A

### AFS2 All-flash (SSD) Expansion Shelves

Add up to 1 AFS2 all-flash expansion shelf to each CS-Series array. **Please refer to configuration guidelines for specific array capacity limits.**

HPE Nimble Storage AF All Flash AFS2 Expansion Shelf	Q8B53A
HPE Nimble Storage AF All Flash AFS2 Expansion Shelf 24x240GB Flash Bundle	Q8C29A
HPE Nimble Storage AF All Flash AFS2 Expansion Shelf 24x480GB Flash Bundle	Q8C30A
HPE Nimble Storage AF All Flash AFS2 Expansion Shelf 24x960GB Flash Bundle	Q8C31A

### Cache Upgrade Options for AFS2 Expansion Shelves

**Please refer to configuration guidelines for specific array cache capacity limits.**

HPE Nimble Storage CS Hybrid Array ES2-AFS2 Shelf 4x960GB Cache Field Upgrade	Q8C59A
HPE Nimble Storage CS Hybrid Array ES2-AFS2 Shelf 4x1.92TB Cache Field Upgrade	Q8C60A
HPE Nimble Storage CS Hybrid Array ES2-AFS2 Shelf 4x3.84TB Cache Field Upgrade	Q8C61A

## 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.

NS 1/3/4/5Y FC NBD Parts Exchange Support	HT7A1A1/3/4/5*
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**
NS 1/3/4/5Y FC NBD Onsite Exchange w DMR Support	HT6Z5A1/3/4/5**

#### NOTES:

\* Minimum support required 1 year Next Business Day Parts Exchange

## Configuration Information

\*\* Support level available in Japan only

### 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.

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 47U Enterprise Shock Racks.

For more information on the HPE rack offerings, please see the following URL:

<http://h18004.www1.hpe.com/products/servers/platforms/rackandpower.html>

For more information on rack options, see:

<http://www.hpe.com/products/rackoptions>

For more information on PDUs, see:

<http://h18004.www1.hpe.com/products/servers/proliantstorage/power-protection/pdu.html>

## 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 2 power cords per system. Please ensure these are selected at time of quoting. A pair of C13/C14 power cords are required when connecting base arrays or expansion shelves 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

	<b>SKU</b>
HPE NS AS 3112 to C13 AU Power Cord	Q8F89A
HPE NS WS-010A to C13 EU Power Cord	Q8F90A
HPE NS BS 1363 UK10 to C13 UK Power Cord	Q8F91A
HPE NS NEMA 5-15P to C13 US Power Cord	Q8F92A
HPE NS GB2099 to C13 CN Power Cord	Q8F93A
HPE NS WS-010A to C13 KR Power Cord	Q8F94A
HPE NS JIS 8303 to C13 TW/JP Power Cord	Q8F95A
HPE NS NEMA 6-15P to C13 JP Power Cord	Q8F96A
HPE NS C13/C14 PDU Base Array Power Cord	Q8F97A
HPE NS PE361L to LS-60 IN Power Cord	Q8G57A
HPE NS WS-016 to C13 ZA Power Cord	Q8G58A
HPE NS SI-32 to C13 IL Power Cord	Q8G59A
HPE NS CEI 23-16 to C13 IT Power Cord	Q8G60A

## Technical Specifications

Physical Dimensions	Width in/mm	Depth in/mm	Height in/mm/U	Weight lb/kg
HPE Nimble Storage CS1000H	17.5/445	26.5/673	7/175/4	90/41
HPE Nimble Storage CS1000H 11TB HDD Upgrade Kit	15/381	21/533	15/381	15/7
HPE Nimble Storage CS1000/3000/5000/7000	17.5/445	26.5/673	7/175/4	105/48
HPE Nimble Storage CS-Series Expansion Shelves	17.5/445	26.5/673	7/175/4	90/41
HPE Nimble Storage CS-Series Flash Upgrade Kits	12/305	12/305	7/175	3/2

Power Requirements	CS1000H	CS1000/3000/5000/7000
Input Voltage		
AC PCM option	100 to 240 VAC (50 to 60 Hz)	
Max power requirements (Watts/kVA)	500 W / 0.56 kVA	600 W / 0.56 kVA
Thermal (BTU)	1638 BTU	1965 BTU

### Environmental Specifications<sup>4</sup>

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

## Technical Specifications

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		
Acoustics Sound pressure level measured per ISO 7779 specs during normal operating fan	Fan Speed (RPM)	Standard Speed (3540 RPM)	Full Speed (13000 RPM)
	Front	65.5	72.0
	Back	71.2	75.8
	Left	65.6	69.0
	Right	65.6	70.7
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:** <sup>4</sup> 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
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## Summary of Changes

Date	Version History	Action	Description of Change
13-Nov-2017	From Version 3 to 4	Changed	Overview and Configuration Information were revised.
06-Nov-2017	From Version 2 to 3	Changed	Added information on the entire HPE Nimble Storage CS-Series portfolio for Braeburn NPI
12-Jun-2017	From Version 1 to 2	Changed	Detail on included power cords and SAS cables
5-Jun-2017	Version 1	Created	Created first version, including CS1000 and CS1000H



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