

NEC Express5800/T120h System Configuration Guide



Introduction

This document contains product and configuration information that will enable you to configure your system. The guide will ensure fast and proper configuration of your NEC Express5800 server.

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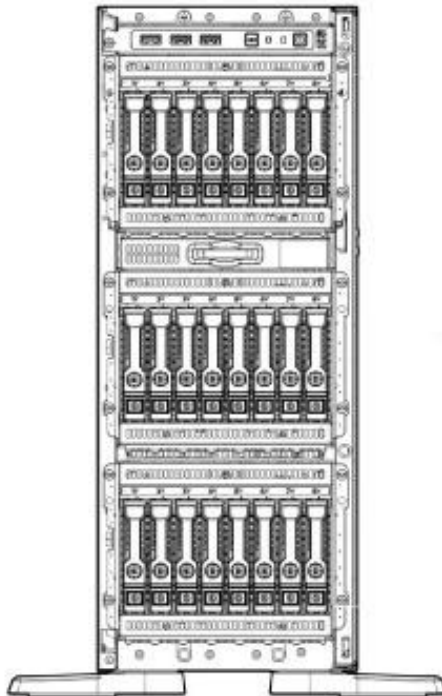
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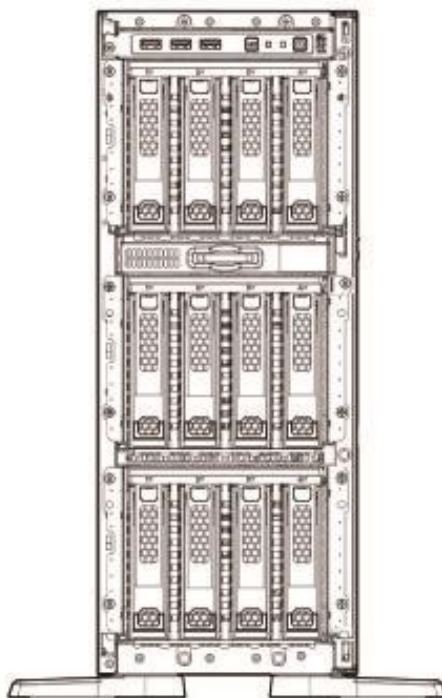
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MODEL LINEUP

24x2.5-inch Drive Model



12x3.5-inch Drive Model



Technical Specification

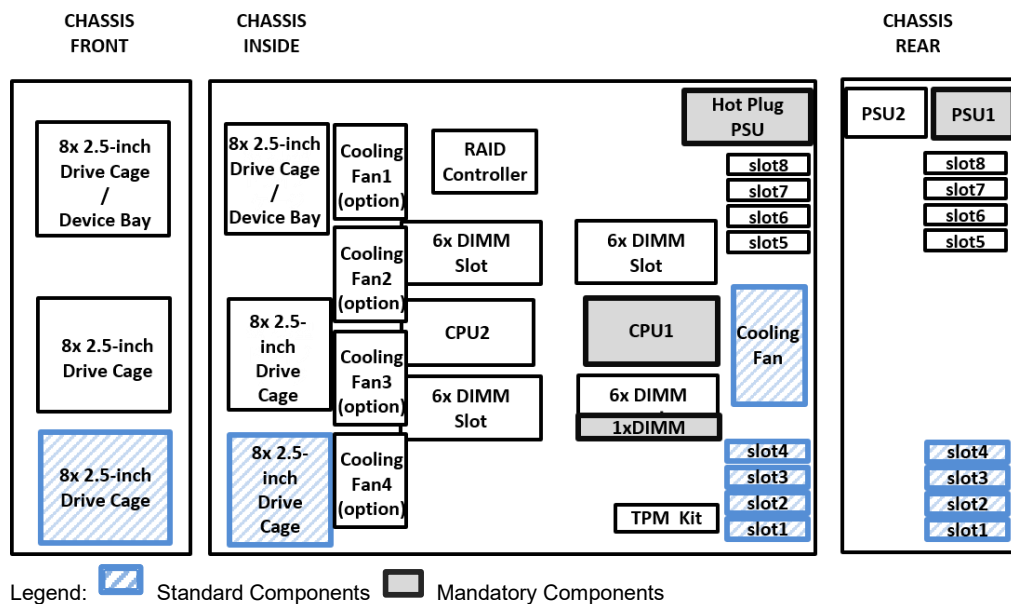
Specification

Model		T120h	
		24x 2.5-inch Drive Model	12x 3.5-inch Drive Model
Part Number		N8100-2640F	N8100-2641F
Processor	Type	Intel® Xeon® Processor Bronze 3104(6C/6T, 1.70 GHz, 8.25MB, TDP 85W) Bronze 3106(8C/8T, 1.70 GHz, 11MB, TDP 85W) Silver 4108(8C/16T, 1.80 GHz, 11MB, TDP 85W) Silver 4110(8C/16T, 2.10 GHz, 11MB, TDP 85W) Silver 4112(4C/8T, 2.60 GHz, 8.25MB, TDP 85W) Silver 4114(10C/20T, 2.20 GHz, 13.75MB, TDP 85W) Silver 4116(12C/24T, 2.10 GHz, 16.50MB, TDP 85W) Gold 5115(10C/20T, 2.40 GHz, 13.75MB, TDP 85W) Gold 5118(12C/24T, 2.30 GHz, 16.50MB, TDP 105W) Gold 5120(14C/28T, 2.20 GHz, 19.25MB, TDP 105W) Gold 5122(4C/8T, 3.60 GHz, 16.50MB, TDP 105W) Gold 6126(12C/24T, 2.60 GHz, 19.25MB, TDP 125W) Gold 6128(6C/12T, 3.40 GHz, 19.25MB, TDP 115W) Gold 6130(16C/32T, 2.10 GHz, 22MB, TDP 125W) Gold 6132(14C/28T, 2.60 GHz, 19.25MB, TDP 140W) Gold 6134(8C/16T, 3.20 GHz, 24.75MB, TDP 130W) Gold 6136(12C/24T, 3 GHz, 24.75MB, TDP 150W) Gold 6138(20C/40T, 2GHz, 27.50MB, TDP 125W) Gold 6140(18C/36T, 2.30 GHz, 24.75MB, TDP 140W) Gold 6142(16C/32T, 2.60 GHz, 22MB, TDP 150W) Gold 6144 (3.50 GHz, 8C/16T, 24.75MB, TDP 150W) Gold 6146 (3.20 GHz, 12C/24T, 24.75MB, TDP 165W) Gold 6148 (2.40 GHz, 20C/40T, 27.50MB, TDP 150W) Gold 6150 (2.70 GHz, 18C/36T, 24.75MB, TDP 165W) Gold 6152 (2.10 GHz, 22C/44T, 30.25MB, TDP 140W) Gold 6154 (3 GHz, 18C/36T, 24.75MB, TDP 200W) Platinum 8153 (2 GHz, 16C/32T, 22MB, TDP 125W) Platinum 8156 (3.60 GHz, 4C/8T, 16.50MB, TDP 105W) Platinum 8158 (3 GHz, 12C/24T, 24.75MB, TDP 150W) Platinum 8160 (2.10 GHz, 24C/48T, 33MB, TDP 150W) Platinum 8164 (2 GHz, 26C/52T, 35.75MB, TDP 150W) Platinum 8168 (2.70 GHz, 24C/48T, 33MB, TDP 205W) Platinum 8170 (2.10 GHz, 26C/52T, 35.75MB, TDP 165W) Platinum 8176 (2.10 GHz, 28C/56T, 38.50MB, TDP 165W) Platinum 8180 (2.50 GHz, 28C/56T, 38.50MB, TDP 205W) Gold 6134M (3.20 GHz, 8C/16T, 24.75MB, TDP 130W) Platinum 8180M (2.50 GHz, 28C/56T, 38.50MB, TDP 205W)	
	Number of Processors	1 or 2	
Chipset		Intel® C622 Chipset	
Memory	Type	DDR4-2666 Registered DIMM (8/16/32GB) DDR4-2666 Load Reduced DIMM (64GB)	
	Standard Capacity	0 GB	
	Maximum Capacity	3.0 TB (24 x 128 GB)	
	Memory protection	ECC, x4 SDDC, x4 DDDC, Memory Mirroring, Memory Sparring	
Internal Storage	Standard Capacity	0 GB	
	Disk Controller	SATA : 6Gb/s, RAID 0/1/5/6/10/50/60 (Optional) SAS: 12 Gb/s, RAID 0/1/5/6/10/50/60 (Optional)	
	Hot Plug	Supported	
	Optical Disk Drive	Optional	
	5-inch Media Bays	2 (Optional)	
	Optical Drive Bays	1 (Optional)	
	Standard Disk Drive Bays	8	4
Expansion Slots	Standard	Total: 9 slots available 4 PCIe 3.0 x16 (x16 connector) 2 PCIe 3.0 x8 (x8 connector)	

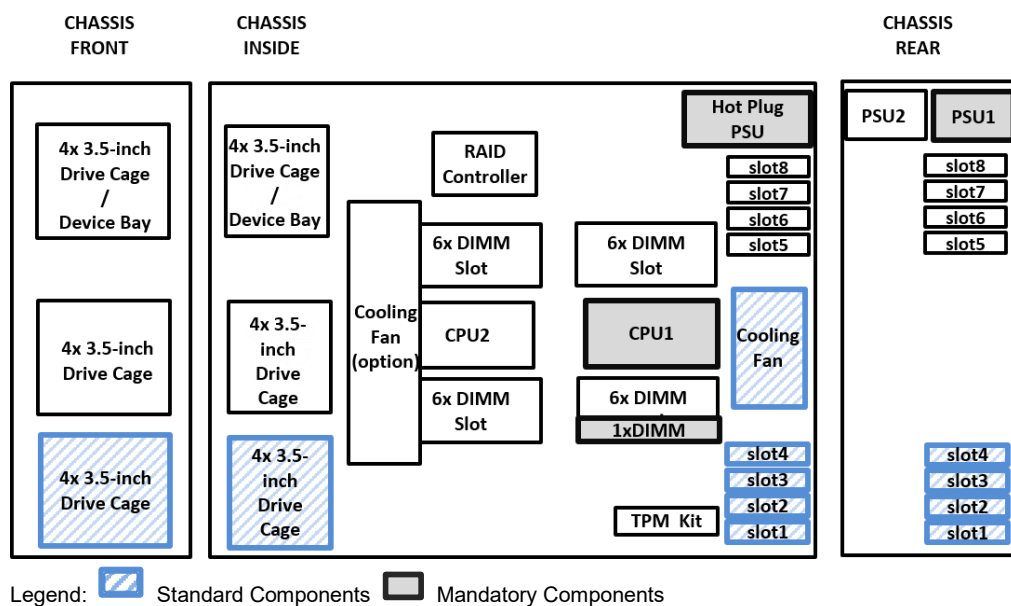
Model		T120h
		24x 2.5-inch Drive Model
		12x 3.5-inch Drive Model
Video	Controller (VRAM)	2 PCIe 3.0 x4 (x8 connector) 1 PCIe 3.0 x8 (x8 connector) for a dedicated RAID card
		Integrated in Server Management Controller (16MB)
Interfaces	Resolution	640x480, 800x600, 1,024x768, 1,280x1,024, 1,600x1,200, 1,920x1,200
	Front	2x USB3.0
	Rear	2x USB3.0, 1x VGA (15-pin mini D-sub), 1x Management LAN connector (RJ-45), 4x Data LAN connector (RJ-45), 1x Serial (9-pin mini D-sub, Optional)
Internal		1x USB3.0, 1x USB2.0
Redundant Fan		Optional, hot plug
Redundant Power Supply		Optional, hot plug
Power Supply		1-2 x 500 Watt, 800 Watt, 1600 Watt, 80 PLUS® Platinum certified hot plug PSU 500 Watt, 800 Watt, 1600 Watt : 100-120/200-240VAC± 10% 50 / 60 Hz ± 3 Hz 1-2 x 800 Watt 80 PLUS® Titanium certified hot plug PSU 800Watt, Watt : 200-240 VAC± 10% 50 / 60 Hz ± 3 Hz
Dimensions (W x D x H)		462.2 x 648.0 x 174.0 mm 18.2 x 25.5 x 6.8 in (2U)
Temperature, Relative Humidity (non-condensing)		Operating: 10° to 35° C / 50° to 95° F, 8 to 90% Non-Operating: -30° to 60° C / -22° to 140° F, 5 to 95%
Regulatory and Safety		FCC, UL/cUL, CB, CE, Mexico (CoC), RCM, RoHS, WEEE
Operating Systems		Microsoft® Windows Server® 2012 R2 Standard Microsoft® Windows Server® 2012 R2 Datacenter Microsoft® Windows Server® 2016 Standard Microsoft® Windows Server® 2016 Datacenter Red Hat Enterprise Linux 6.9 or later Red Hat Enterprise Linux 7.3 or later VMware ESXi™ 6.0 Update 3 VMware ESXi™ 6.5 Update 1 or later VMware ESXi™ 6.7 or later

Configuration Diagram

24x 2.5-inch Drive Model



12x 3.5-inch Drive Model



Server Configuration

1 Base Models

Product Name / Description	Part Number
NEC Express5800/T120h 24x 2.5-inch Drive Model No processor, no RAM, no HDD, no SAS/SATA Cable, no ODD, no Power Supply Unit. Including : Front Bezel, 1x 2.5-inch Drive Cage, Standard Fan Kit	N8100-2640F
NEC Express5800/T120h 12x 3.5-inch Drive Model No processor, no RAM, no HDD, no SAS/SATA Cable, no ODD, no Power Supply Unit. Including : Front Bezel, 1x 3.5-inch Drive Cage, Standard Fan Kit	N8100-2641F

NOTE:

- The base model must be ordered with a processor kit, a memory kit, SAS/SATA cable, a power supply kit.
- The Redundant Fan Kit is required depending on your system configuration. See 9.2 Cooling Fan Kit for detail.

2 Processors

Available sockets: 2

Category	Product Name / Description	Part Number
Xeon® Bronze 3100 Series	Xeon Bronze 3104 Processor Kit Intel® Xeon ® Bronze 3104 (1.70 GHz, 6C/6T, 8.25MB, TDP 85W)	N8101-1381(1st) N8101-1382 (2nd)
	Xeon Bronze 3106 Processor Kit Intel® Xeon ® Bronze 3106 (1.70 GHz, 8C/8T, 11MB, TDP 85W)	N8101-1383 (1st) N8101-1384 (2nd)
	Xeon Silver 4108 Processor Kit Intel® Xeon ® Silver 4108 (1.80 GHz, 8C/16T, 11MB, TDP 85W)	N8101-1385 (1st) N8101-1386 (2nd)
	Xeon Silver 4110 Processor Kit Intel® Xeon ® Silver 4110 (2.10 GHz, 8C/16T, 11MB, TDP 85W)	N8101-1387 (1st) N8101-1388 (2nd)
Xeon® Silver 4100 Series	Xeon Silver 4112 Processor Kit Intel® Xeon ® Silver 4112 (2.60 GHz, 4C/8T, 8.25MB, TDP 85W)	N8101-1389 (1st) N8101-1390 (2nd)
	Xeon Silver 4114 Processor Kit Intel® Xeon ® Silver 4114 (2.20 GHz, 10C/20T, 13.75MB, TDP 85W)	N8101-1391 (1st) N8101-1392 (2nd)
	Xeon Silver 4116 Processor Kit Intel® Xeon ® Silver 4116 (2.10 GHz, 12C/24T, 16.50MB, TDP 85W)	N8101-1393 (1st) N8101-1394 (2nd)
	Xeon Gold 5115 Processor Kit Intel® Xeon ® Gold 5115 (2.40 GHz, 10C/20T, 13.75MB, TDP 85W)	N8101-1395 (1st) N8101-1396 (2nd)
Xeon® Gold 5100 Series	Xeon Gold 5118 Processor Kit Intel® Xeon ® Gold 5118 (2.30 GHz, 12C/24T, 16.50MB, TDP 105W)	N8101-1397 (1st) N8101-1398 (2nd)
	Xeon Gold 5120 Processor Kit Intel® Xeon ® Gold 5120 (2.20 GHz, 14C/28T, 19.25MB, TDP 105W)	N8101-1399 (1st) N8101-1400 (2nd)
	Xeon Gold 5122 Processor Kit Intel® Xeon ® Gold 5122 (3.60 GHz, 4C/8T, 16.50MB, TDP 105W)	N8101-1401 (1st) N8101-1402 (2nd)
	Xeon Gold 6126 Processor Kit Intel® Xeon ® Gold 6126 (2.60 GHz, 12C/24T, 19.25MB, TDP 125W)	N8101-1403 (1st) N8101-1404 (2nd)
Xeon® Gold 6100 Series	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6128 Processor Kit Intel® Xeon ® Gold 6128 (3.40 GHz, 6C/12T, 19.25MB, TDP 115W)	N8101-1405 (1st) N8101-1406 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6130 Processor Kit Intel® Xeon ® Gold 6130 (2.10 GHz, 16C/32T, 22MB, TDP 125W)	N8101-1407 (1st) N8101-1408 (2nd)
Xeon® Gold 6100 Series	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6132 Processor Kit Intel® Xeon ® Gold 6132 (2.60 GHz, 14C/28T, 19.25MB, TDP 140W)	N8101-1409 (1st) N8101-1410 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6134 Processor Kit Intel® Xeon ® Gold 6134 (3.20 GHz, 8C/16T, 24.75MB, TDP 130W)	N8101-1411 (1st) N8101-1412 (2nd)
Xeon® Gold 6100 Series	NOTE:	

Xeon® Platinum 8100 Series	- The processor kit is make-to-order product.	
	Xeon Gold 6136 Processor Kit	N8101-1413 (1st)
	Intel® Xeon® Gold 6136 (3 GHz, 12C/24T, 24.75MB, TDP 150W)	N8101-1414 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6138 Processor Kit	N8101-1415 (1st)
	Intel® Xeon® Gold 6138 (2 GHz, 20C/40T, 27.50MB, TDP 125W)	N8101-1416 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6140 Processor Kit	N8101-1417 (1st)
	Intel® Xeon® Gold 6140 (2.30 GHz, 18C/36T, 24.75MB, TDP 140W)	N8101-1418 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6142 Processor Kit	N8101-1419 (1st)
	Intel® Xeon® Gold 6142 (2.60 GHz, 16C/32T, 22MB, TDP 150W)	N8101-1420 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6144 Processor Kit	N8101-1421 (1st)
	Intel® Xeon® Gold 6144 (3.50 GHz, 8C/16T, 24.75MB, TDP 150W)	N8101-1422 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6146 Processor Kit	N8101-1423 (1st)
	Intel® Xeon® Gold 6146 (3.20 GHz, 12C/24T, 24.75MB, TDP 165W)	N8101-1424 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6148 Processor Kit	N8101-1425 (1st)
	Intel® Xeon® Gold 6148 (2.40 GHz, 20C/40T, 27.50MB, TDP 150W)	N8101-1426 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6150 Processor Kit	N8101-1427 (1st)
	Intel® Xeon® Gold 6150 (2.70 GHz, 18C/36T, 24.75MB, TDP 165W)	N8101-1428 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6152 Processor Kit	N8101-1429 (1st)
	Intel® Xeon® Gold 6152 (2.10 GHz, 22C/44T, 30.25MB, TDP 140W)	N8101-1430 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6154 Processor Kit	N8101-1431 (1st)
	Intel® Xeon® Gold 6154 (3 GHz, 18C/36T, 24.75MB, TDP 200W)	N8101-1432 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8153 Processor Kit	N8101-1433 (1st)
	Intel® Xeon® Platinum 8153 (2 GHz, 16C/32T, 22MB, TDP 125W)	N8101-1434 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8156 Processor Kit	N8101-1435 (1st)
	Intel® Xeon® Platinum 8156 (3.60 GHz, 4C/8T, 16.50MB, TDP 105W)	N8101-1436 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8158 Processor Kit	N8101-1437 (1st)
	Intel® Xeon® Platinum 8158 (3 GHz, 12C/24T, 24.75MB, TDP 150W)	N8101-1438 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8160 Processor Kit	N8101-1439 (1st)
	Intel® Xeon® Platinum 8160 (2.10 GHz, 24C/48T, 33MB, TDP 150W)	N8101-1440 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8164 Processor Kit	N8101-1441 (1st)
	Intel® Xeon® Platinum 8164 (2 GHz, 26C/52T, 35.75MB, TDP 150W)	N8101-1442 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8168 Processor Kit	N8101-1443 (1st)
	Intel® Xeon® Platinum 8168 (2.70 GHz, 24C/48T, 33MB, TDP 205W)	N8101-1444 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8170 Processor Kit	N8101-1445 (1st)
	Intel® Xeon® Platinum 8170 (2.10 GHz, 26C/52T, 35.75MB, TDP 165W)	N8101-1446 (2nd)

NOTE: - The processor kit is make-to-order product.		
Xeon® Gold 6100 Series Up to 1.5TB/Socket Memory	Xeon Platinum 8176 Processor Kit	N8101-1447 (1st)
	Intel® Xeon® Platinum 8176 (2.10 GHz, 28C/56T, 38.50MB, TDP 165W)	N8101-1448 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8180 Processor Kit	N8101-1449 (1st)
Xeon® Platinum 8100 Series Up to 1.5TB/Socket Memory	Intel® Xeon® Platinum 8180 (2.50 GHz, 28C/56T, 38.50MB, TDP 205W)	N8101-1450 (2nd)
	NOTE: - The processor kit is make-to-order product.	
	Xeon Gold 6134M Processor Kit	N8101-1451 (1st)
	Intel® Xeon® Gold 6134M (3.20 GHz, 8C/16T, 24.75MB, TDP 130W)	N8101-1452 (2nd)
Xeon® Platinum 8100 Series Up to 1.5TB/Socket Memory	NOTE: - The processor kit is make-to-order product.	
	Xeon Platinum 8180M Processor Kit	N8101-1463 (1st)
	Intel® Xeon® Platinum 8180M (2.50 GHz, 28C/56T, 38.50MB, TDP 205W)	N8101-1464 (2nd)
	NOTE: - The processor kit is make-to-order product.	

NOTE:

- The processor kit for the 1st CPU must be ordered with a base model.
- The processors must be the same to configure dual processor system.
- Estimated production lead time for the make-to-order processor kits will be approximately 3 months
- The high performance CPU heatsink is shipped with the processor with 105 Watt or higher. The standard CPU heatsink is shipped with all other processors.
- When using 5 slots (except a dedicated RAID card slot) or more, it is necessary to select the 2 CPU configuration.
- In the 2 CPU configuration, N8181-169 Redundant Fan Kit and Power Supply of 800 Watt or Higher are required.

The maximum number of logical processors supported by OS

See the table below for the maximum number of logical processors that you can actually use on your system.

Operating Systems	Number of Logical Processors Supported by Operating Systems	Maximum Available Number of Logical Processors
Microsoft Windows Server 2012 R2 Standard	640 ¹	112
Microsoft Windows Server 2012 R2 Datacenter		
Microsoft Windows Server 2016 Standard	640 ¹	112
Microsoft Windows Server 2016 Datacenter		
Red Hat Enterprise Linux 7	384	112
VMware ESXi 6.0	480	112
VMware ESXi 6.5	576	112
VMware ESXi 6.7	768	112

¹ The maximum numbers of logical processors when using Hyper-V are below:

- Windows Server 2012 R2: 320
- Windows Server 2016: 512

Maximum memory capacity

Maximum memory available depending on the type of processor, see below.

CPU	Maximum memory capacity per CPU
Processors containing an "M" in the model Xeon® Platinum 8180M Xeon® Gold 6134M	1.5TB
Others	768GB

3 Memory

3.1 Memory Configuration Feature Comparison

See the table below for feature comparisons of memory configurations supported.

	Independent Channel	Memory Sparing	Memory Mirroring
Performance	Best	Better	Good
Data Protection	No	Multiple single bit error protection	Multiple single bit and multi bit error protection
Redundancy	No	Partly	Fully
Data Correction	ECC, x4 SDDC	ECC, x4 SDDC	ECC, x4 SDDC
Available Memory	Full physical memory	Two ranks of memory per channel : Half physical memory Four ranks of memory per channel : 3/4 physical memory Eight ranks of memory per channel : 7/8 physical memory 16 ranks of memory per channel : 3/4 physical memory	Half physical memory
Available Memory Channels	6	6	6
Notes	-	All DIMMs in the system must be identical. Eight or twelve DIMMs per processor are supported, two DIMMs are populated per channel	All DIMMs in the system must be identical. Twelve DIMMs per processor are supported,

NOTE:

- Single Rank Memory (N8102-708/-709) does not support Memory Mirroring Mode Configuration Service.
- Refer to “10.1 Memory RAS Settings”

3.2 Memory

Available slots: 12 per processor

Category	Product Name / Description	Part Number
Registered DIMM (RDIMM)	8GB DDR4-2666 REG Memory Kit (1x8GB/SR) 1 x 8GB Registered ECC DIMM, DDR4-2666(PC4-2666), Single Rank	N8102-708
	16GB DDR4-2666 REG Memory Kit (1x16GB/SR) 1 x 16GB Registered ECC DIMM, DDR4-2666(PC4-2666), Single Rank	N8102-709
	16GB DDR4-2666 REG Memory Kit (1x16GB/DR) 1 x 16GB Registered ECC DIMM, DDR4-2666(PC4-2666), Dual Rank	N8102-710
	32GB DDR4-2666 REG Memory Kit (1x32GB/DR) 1 x 32GB Registered ECC DIMM, DDR4-2666(PC4-2666), Dual Rank	N8102-711
Load Reduced DIMM (LRDIMM)	64GB DDR4-2666 LR Memory Kit (1x64GB/QR) 1 x 64GB Load Reduced ECC DIMM, DDR4-2666(PC4-2666), Quad Rank	N8102-712
	128GB DDR4-2666 LR Memory Kit (1x128GB/OR) 1 x 128GB Load Reduced ECC DIMM, DDR4-2666(PC4-2666), Octal Rank	N8102-713

NOTE:

- Minimum one memory kit per processor must be installed.
- It is recommended to install memory kits in multiples of 6 identical DIMMs for 6-channel symmetric memory configurations to increase memory transfer speed.
- Mix configurations of RDIMM and LRDIMM are not supported. Do NOT mix LRDIMM 64GB with LRDIMM 128GB.
- If you install more than six times N8102-713 128GB DDR4-2666 LR Memory Kit, you require one of the following CPU Processor codes containing an “M” (N8101-1451/-1452/-1453/-1454/-1455/-1456/-1457/-1458/-1459/-1460/-1461/-1462/-1463/-1464)
- See page for additional memory configuration information

Maximum Memory Speed

See the table below for the actual maximum memory transfer speed. DDR4 memory speed depends on the native memory bus speed of the processor.

Processor Type	DIMM Speed
Xeon ® Platinum 8100 Series Xeon ® Gold 6100 Series Xeon ® Gold 5122 Processor	2666 MHz
Xeon ® Gold 5100 Series (except Xeon ® Gold 5122 Processor) Xeon ® Silver 4100 Series	2400 MHz
Xeon ® Bronze 3100 Series	2133 MHz

Maximum Available Memory

See the table below for the maximum memory size that you can actually use on your system.

Operating Systems	Maximum Memory Size Supported by Operating Systems	Maximum Available Memory
Microsoft Windows Server 2012 R2 Standard Microsoft Windows Server 2012 R2 Datacenter	4 TB	3 TB ¹
Microsoft Windows Server 2016 Standard Microsoft Windows Server 2016 Datacenter	24 TB	3 TB ¹
Red Hat Enterprise Linux 7	12 TB	3 TB
VMware ESXi 6.0	6 TB	3 TB ²
VMware ESXi 6.5	12 TB	3 TB ³
VMware ESXi 6.7	16 TB	3 TB ³

¹ The maximum available memory size of Hyper-V systems is below:

- Windows Server 2012 R2 : 4 TB
- Windows Server 2016 : 24 TB

² Up to 4 TB of the main memory is available to each virtual machine.

³ Up to 6 TB of the main memory is available to each virtual machine.

4 Internal Storage

4.1 Drive Bay Configuration

Choose appropriate drive model and optional drive cages in accordance with the type and number of the drive you want to install.

List of the number that Internal Drive can be mounted

Category	24x 2.5-inch Drive Cage	12x 3.5-inch Drive Cage
Drive Cage 1	Expansion: <ul style="list-style-type: none"> • 8x2.5-inch SAS/SATA Drive • Internal DVD Drive Installation Kit • Internal Backup Drive Installation Kit (Up to 1 RDX and up to 1 LTO) 	Expansion: <ul style="list-style-type: none"> • 4x3.5-inch SAS/SATA Drive • Internal DVD Drive Installation Kit • Internal Backup Drive Installation Kit (Up to 1 RDX and up to 1 LTO)
Drive Cage 2	Expansion: 8x2.5-inch SAS/SATA Drive	Expansion: 4x3.5-inch SAS/SATA Drive
Drive Cage 3	Standard: 8x2.5-inch SAS/SATA Drive	Standard: 4x3.5-inch SAS/SATA Drive

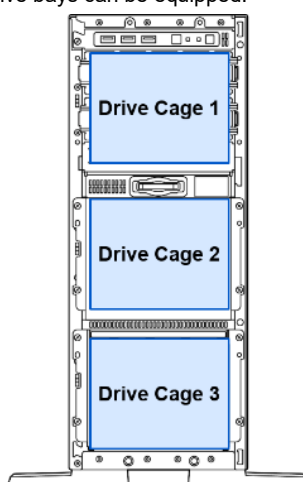
NOTE:

- The order of mounting the optional Drive Cage is 2 → 1.
- The internal drives are installed into the Drive Cage in the order of Cage 3 → Cage 2 → Cage 1, the smaller capacity drive is installed preferentially.
- If all Drive Cages are selected, N8181-169 Redundant Fan Kit is required. (except a configuration that only internal DVD drive is installed in the Drive Cage 1)
- No Internal SAS/SATA cable is attached to the Drive Cages. Since the necessary SAS / SATA cable varies depending on the RAID configuration, select the appropriate cables.
- Mix configurations of Internal DVD Drive Installation Kit and Internal Backup Drive Installation Kit are supported.
- Up to 24 Drives can be installed in 2.5-inch Drive Model. However, when Internal DVD Drive Installation Kit or Internal Backup Drive Installation Kit is selected, up to 16 Drives can be installed.
- Up to 12 Drives can be installed in 3.5-inch Drive Model. However, when Internal DVD Drive Installation Kit or Internal Backup Drive Installation Kit is selected, up to 8 Drives can be installed.
- If 8x2.5-inch Drive Cage or 4x3.5-inch Drive Cage is selected in Drive Cage 1, Internal DVD Drive Installation Kit and/or Internal Backup Drive Installation Kit cannot be installed.
- If N8154-121 Internal Backup Drive Installation Kit is selected, a LTO drive with a controller (N8103-195) or a RDX drive is required.
- RDX drive and N8154-121 Internal Backup Drive Installation Kit must be installed after shipment.
- If N8154-122 Internal DVD Drive Installation Kit is selected, Internal DVD drive must be installed.

4.1.1 Front Drive Bay

Drive Bay

For 24x 2.5-inch Drive Model, eight 2.5-inch drive bays in Drive cage 3 are standard. With optional 2.5-inch drive cages, up to 24 2.5-inch drive bays can be equipped. Also for 12x 3.5-inch Drive Model, four 3.5-inch drive bays in Drive Cage 3 are standard. With optional 3.5-inch drive cages, up to 12 3.5-inch drive bays can be equipped.



4.2 Optional Drive Cages

Category	Product Name / Description		Part Number
Drive Cage 3 (Standard)	2.5-inch Drive Model	8x 2.5-inch Drive Cage 8x 2.5-inch SAS/SATA HDD	(Standard)
	3.5-inch Drive Model	4x 3.5-inch Drive Cage 4x 3.5-inch SAS/SATA HDD	(Standard)
Drive Cage 2 (Optional)	2.5-inch Drive Model	2.5-inch Drive Cage 8x 2.5-inch SAS/SATA HDD	N8154-109
	3.5-inch Drive Model	3.5-inch Drive Cage 4x 3.5-inch SAS/SATA HDD	N8154-108
Drive Cage 1 (Optional)	2.5-inch Drive Model	2.5-inch Drive Cage 8x 2.5-inch SAS/SATA HDD	N8154-109
	3.5-inch Drive Model	3.5-inch Drive Cage 4x 3.5-inch SAS/SATA HDD	N8154-108
	Both Model	Internal Backup Drive Installation Kit 2x 5-inch media bay, including an internal USB cable for a RDX and SAS cable for LTO.	N8154-121
		Internal DVD Drive Installation Kit Equipping with one optical drive bay, including a SATA cable for a DVD drive.	N8154-122

NOTE:

- If the Drive Cage kit is installed into Drive Cage 1, the Internal DVD Drive Installation Kit and/or Internal Backup Drive Installation Kit cannot be installed.
- When installing the drive cage and internal drive, install Drive Cage in the order of 3 → 2 → 1.
- If Optional Drive Cage is selected, Internal SAS/SATA Cable is required to be selected.
- Refer to "7 Internal Tape / RDX Drives" for RDX and LTO.
- Refer to "5 Optical Drive" for Internal DVD.

4.3 Storage Controllers and Options

4.3.1 Configuration selection of RAID

Please select according to function and performance.

Configuration	Maximum mountable number	RAID function	Support OS
Single connection	8 (2.5-inch Drive Model) 12(3.5-inch Drive Model)	Non	Windows Server 2012 R2 Windows Server 2016 VMware ESXi 6.0 Update3 VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
On board RAID	8 (2.5-inch Drive Model) 12(3.5-inch Drive Model)	RAID 0/1/10	Windows Server 2012 R2 Windows Server 2016
Internal RAID Controller(8 port)	8	RAID 0/1/5/6/10 /50/60	Windows Server 2012 R2 Windows Server 2016 VMware ESXi 6.0 Update3 VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
Internal RAID Controller(16 port)	16(2.5-inch Drive Model) 12(3.5-inch Drive Model)		Red Hat Enterprise Linux 6.9 or later Red Hat Enterprise Linux 7.3 or later
Internal RAID Controller + SAS Expander Card	24(2.5-inch Drive Model)		

4.3.2 Embedded SATA Controller

Category	Product Name / Description		Part Number
Storage Controller	Embedded SATA Controller 2.5-inch Drive Model: 8x 6Gb/s SATA 3.5-inch Drive Model: 12x 6Gb/s SATA		(Standard)
Cable	2.5-inch Drive Model	Internal SAS/SATA Cable Including two interface cables Connectable to only Drive Cage 3 and up to 8 drives.	K410-402(00)
	3.5-inch	Internal SAS/SATA Cable	K410-401(00)

Drive Model	Including three interface cables Up to 12 drives
--------------------	-----------------------------------------------------

NOTE:

- Hot plug insertion/removal are not supported in the configuration.

4.3.3 Embedded SATA RAID Controller (RAID 0/1/10)

Category	Product Name / Description	Part Number
Storage Controller	Embedded SATA Controller 2.5-inch Drive Model: 8x 6Gb/s SATA 3.5-inch Drive Model: 12x 6Gb/s SATA	(Standard)
Cable	2.5-inch Drive Model Internal SAS/SATA Cable Including two interface cables Connectable to only Drive Cage 3 and up to 8 drives	K410-402(00)
	3.5-inch Drive Model Internal SAS/SATA Cable Including three interface cables Up to 12 drives	K410-401(00)

NOTE:

- The Embedded SATA RAID Controller is available for Windows operating system only.
- When you use the Embedded SATA RAID controller, choose an external DVD drive.
- Internal SAS/SATA Cable is required.

4.3.4 RAID Controller for Dedicated PCI Slot

Choose the appropriate RAID controller in accordance with RAID feature required, the number of drives to install.

Category	Product Name / Description	Part Number
Storage Controller (Up to 1)	RAID Controller (RAID 0/1) RAID 0/1/5/10 and SAS HBA mode, 0MB, Int. 8 port, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s, Standard heatsink	N8103-189
	RAID Controller (2GB, RAID 0/1/5/6) RAID 0/1/5/6/10/50/60, 2GB, Int. 8 port, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s, Standard heatsink	N8103-190
	RAID Controller (4GB, RAID 0/1/5/6) RAID 0/1/5/6/10/50/60, 4GB, Int. 16 port, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s, Standard heatsink	N8103-191
Battery Backup (Up to 1)	Battery Backup Unit Lithium-ion Battery for RAID controller with cache memory. 1 battery provides power to all RAID controller.	N8103-203
Expander Card	SAS Expander Card PCI card form factor, Int. 32, SAS 12Gb/s, SATA 6Gb/s	N8116-83
	NOTE: The card is required when you install the number of internal drives that exceeds the number of the internal ports of a RAID controller. Including Internal SAS/SATA Cable, not necessary to select the cable K410-396(00) The card supports only 2.5-inch Drive Model.	
Cable	2.5-inch Drive Model Internal SAS/SATA Cable Including four interface cables Connectable to up to 16 Drives.	K410-396(00)
	NOTE: - Connectable Configuration - Drive Cage 1 and 2 or Drive Cage 2 and 3	
	3.5-inch Drive Model Internal SAS/SATA Cable Including three interface cables Connectable to up to 12 Drives.	K410-395(00)

NOTE:

- One battery backup unit must be installed per system.
- N8103-189 supports RAID5 in addition to RAID 0/1 although the product name does not contain "5". If higher performance is needed, choose RAID controller with cache memory.
- Redundant Fan Kit is required depending on your system configuration. See 9.2 Cooling Fan Kit for detail.
- If more than 8 Drives are installed in 24x 2.5-inch Drive Model, N8116-83 SAS Expander Card or N8103-191 RAID Controller (4GB, RAID 0/1/5/6) is required.

4.3.5 RAID Controller for Standard PCI Slot

Category	Product Name / Description		Part Number
Storage Controller	RAID Controller (RAID 0/1) RAID 0/1/5/10 and SAS HBA mode, 0MB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s		N8103-195
	RAID Controller (2GB, RAID 0/1/5/6) RAID 0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s		N8103-201
Battery Backup	Battery Backup Unit Lithium-ion Battery for RAID controller with cache memory. 1 battery provides power to all RAID controller.		N8103-203
Expander Card	SAS Expander Card PCI card form factor, Int. 32, SAS 12Gb/s, SATA 6Gb/s NOTE: The card is required when you install the number of internal drives that exceeds the number of the internal ports of a RAID controller. Including Internal SAS/SATA Cable, not necessary to select the cable K410-396(00) The card supports only 2.5-inch Drive Model.		N8116-83
Cable	2.5-inch Drive Model	Internal SAS/SATA Cable Including two interface cables Up to 8 drives	K410-400(00)
	3.5-inch Drive Model	Internal SAS/SATA Cable Including two interface cables Up to 8 drives	K410-399(00)

NOTE:

- The RAID controllers must be installed after shipment, not support default factory integration, however when N8103-195 or N8103-201 is connecting to LTO drives, N8103-195 or N8103-201 operates as a SAS controller, in this configuration N8103-195 or N8103-201 can be integrated in factory.
- One battery backup unit must be installed per system.
- N8103-195 supports RAID5 in addition to RAID 0/1 although the product name does not contain "5". If higher performance is needed, choose RAID controller with cache memory.
- K410-399(00) / -400(00) Internal SAS/SATA Cables with LTO drives can be integrated in factory.

4.3.6 M.2 SATA SSD Installation kit

Category	Product Name / Description	Part Number
PCIe card type installation kit	M.2 SATA SSD Installation kit PCI card form factor, 2x M.2 SATA SSD can be Installed for OS boot (single connection or On board RAID0/1). NOTE: Up to one kit can be installed per a system without Internal DVD drive. N8181-169 Redundant Fan Kit is required.	N8118-312

4.4 Internal Drives

4.4.1 2.5-inch SATA Hard Disk Drives

Category	Product Name / Description	Part Number
512n Sector	1TB 7.2K Hot Plug 2.5-inch SATA HDD 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-596
512e Sector	2TB 7.2K Hot Plug 2.5-inch SATA HDD 1 x 2 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512e sector	N8150-545

NOTE:

- 512e sector drives are not available for VMware ESXi 6.0 system.
- All drives within a RAID array should be of the same capacity.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.

4.4.2 2.5-inch SATA Solid State Drives

Category	Product Name / Description	Part Number
Read Intensive DWPD ≈ 1	240GB Hot Plug 2.5-inch SATA SSD 1 x 240GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Read Intensive	N8150-1740
	480GB Hot Plug 2.5-inch SATA SSD 1 x 480GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Read Intensive	N8150-1741
	960GB Hot Plug 2.5-inch SATA SSD 1 x 960GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Read Intensive	N8150-1742
	1.92TB Hot Plug 2.5-inch SATA SSD 1 x 1.92TB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Read Intensive	N8150-1743
	3.84TB Hot Plug 2.5-inch SATA SSD 1 x 3.84TB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Read Intensive	N8150-1744
Value Endurance DWPD ≈ 3	480GB Hot Plug 2.5-inch SATA SSD 1 x 480GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Value Endurance	N8150-1737
	960GB Hot Plug 2.5-inch SATA SSD 1 x 960GB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Value Endurance	N8150-1738
	1.92TB Hot Plug 2.5-inch SATA SSD 1 x 1.92TB SATA SSD, 2.5-inch, 6Gb/s, 512n sector, Value Endurance	N8150-1739

NOTE:

- 512e sector drives are not available for VMware ESXi 6.0 system.
- All drives within a RAID array should be of the same capacity and endurance.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.

4.4.3 2.5-inch SAS Hard Disk Drives

Category	Product Name / Description	Part Number
512n Sector / 10,000 rpm	300GB Hot Plug 2.5-inch SAS HDD 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-546
	600GB Hot Plug 2.5-inch SAS HDD 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-547
	1.2TB Hot Plug 2.5-inch SAS HDD 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512n sector	N8150-549
512e Sector / 10,000 rpm	1.8TB Hot Plug 2.5-inch SAS HDD 1 x 1.8TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512e sector	N8150-550
	2.4TB Hot Plug 2.5-inch SAS HDD 1 x 2.4 TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512e sector	N8150-591
512n Sector / 15,000 rpm	300GB 15K Hot Plug 2.5-inch SAS HDD 1x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-551
	600GB 15K Hot Plug 2.5-inch SAS HDD 1x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-552
	900GB 15K Hot Plug 2.5-inch SAS HDD 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512n sector	N8150-602

NOTE:

- 512e sector drives are not available for VMware ESXi 6.0 system.
- All drives within a RAID array should be of the same type, capacity and rotation speed.
- Up to two kinds of drives selected from SAS 10K HDDs, SAS 15K HDDs, SATA HDDs, and SATA SSDs can be mixed.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.

4.4.4 2.5-inch SAS Solid State Drives

Category	Product Name / Description	Part Number
Middle Endurance DWPD ≈ 10	400GB Hot Plug 2.5-inch SAS SSD 1 x 400GB SAS SSD, 2.5-inch, 12Gb/s, 512n sector, Middle Endurance	N8150-1750
	800GB Hot Plug 2.5-inch SAS SSD 1 x 800GB SAS SSD, 2.5-inch, 12Gb/s, 512n sector, Middle Endurance	N8150-1751
Value Endurance DWPD ≈ 3	400GB Hot Plug 2.5-inch SAS SSD 1 x 400GB SAS SSD, 2.5-inch, 12Gb/s, 512n sector, Value Endurance	N8150-1752
	800GB Hot Plug 2.5-inch SAS SSD 1 x 800GB SAS SSD, 2.5-inch, 12Gb/s, 512n sector, Value Endurance	N8150-1753

Read Intensive DWPD ≈ 1	960GB Hot Plug 2.5-inch SAS SSD 1 x 960GB SAS SSD, 2.5-inch, 12Gb/s, 512n sector, Read Intensive	N8150-1754
	1.92TB Hot Plug 2.5-inch SAS SSD 1 x 1.92TB SAS SSD, 2.5-inch, 12Gb/s, 512n sector, Read Intensive	N8150-1755

NOTE:

- All drives within a RAID array should be of the same type, capacity and rotation speed.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.

4.4.5 3.5-inch SATA Hard Disk Drives

Category	Product Name / Description	Part Number
512n Sector	1TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 1 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-565
	2TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 2 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-566
	4TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 4 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512n sector	N8150-568
	6TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 6 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e sector	N8150-569
512e Sector	8TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 8 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e sector	N8150-570
	12TB 7.2K Hot Plug 3.5-inch SATA HDD 1 x 12 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512e sector	N8150-588

NOTE:

- 512e sector drives are not available for VMware ESXi 6.0 system.
- All drives within a RAID array should be of the same type, capacity.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.

4.4.6 3.5-inch Near Line SAS Hard Disk Drives

Category	Product Name / Description	Part Number
512e Sector	8TB 7.2K Hot Plug 3.5-inch SAS HDD 1 x 8 TB Near Line SAS HDD, 3.5-inch, 12Gb/s, 7,200 rpm, 512e sector NOTE: - This HDD is make-to-order product.	N8150-573
	12TB 7.2K Hot Plug 3.5-inch SAS HDD 1 x 12 TB Near Line SAS HDD, 3.5-inch, 12Gb/s, 7,200 rpm, 512e sector	N8150-590

NOTE:

- 512e sector drives are not available for VMware ESXi 6.0 system.
- All drives within a RAID array should be of the same capacity.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.
- Near Line SAS HDD (7200 rpm) and SAS-HDD (10,000rpm / 15,000rpm) are equipped with SAS interface, they have the same maximum transfer speed and error recovery capabilities from the perspective of the interface specification, however Near Line SAS HDDs have the same I/O performance and endurance life as SATA HDDs(7200rpm) have.

4.4.7 M.2 SATA Solid State Drives

Category	Product Name / Description	Part Number
Value Endurance DWPD ≈ 1.5	240GB Non-hot-plug M.2 SATA SSD 1 x 240 GB M.2 SATA SSD, Value Endurance	N8150-1709
Read Intensive DWPD ≈ 0.5	480GB Non-hot-plug M.2 SATA SSD 1 x 480 GB M.2 SATA SSD, Read Intensive	N8150-1710

NOTE:

- N8118-312 M.2 SATA SSD Installation kit is required.
- M.2 SATA SSD is connected to Embedded SATA controller in Single connection or On-board RAID configuration regardless of whether optional RAID controllers are installed or not.

5 Optical Drive

Category	Product Name / Description		Part Number
Internal	Installation Kit	Internal DVD Drive Installation Kit Equipping with one optical drive bay NOTE: The kit must be installed in the Drive Cage 1. If the optional drive cage is installed in the Drive Cage 1, the Kit cannot be installed.	N8154-122
	Drive	Internal DVD-ROM drive Slim DVD-ROM drive	N8151-137
		Internal DVD-SuperMulti Drive Slim DVD Super Multi drive, including writing software NOTE: - Not supported for Linux or VMware	N8151-138
		External DVD-ROM Drive Slim DVD-ROM drive, Bus powered, 1.6A required	N8160-102

NOTE:

- Up to one optical drive can be connected.
- If N8151-137/-138 Internal Slim DVD-ROM drive/ Internal DVD-Super Multi Drive selected, N8154-122 Internal DVD Drive Installation Kit is needed.
- If N8154-122 Internal DVD Drive Installation Kit is selected, an Internal DVD drive must be selected.

6 Flash FDD

Choose the Flash FDD if you need to prepare an alternative device for a floppy drive.

Category	Product Name / Description	Part Number
External	Flash FDD USB flash emulating USB floppy disk, Native capacity 1.44 MB	N8160-96

NOTE:

- Up to one drive can be connected.

7 Internal Tape / RDX Drives

7.1 Tape / RDX Drive Selection

Refer to the section in accordance with your type of tape drives:

- Tape devices cannot be directly connected to VMware ESXi servers. For an ESXi environment, it is recommended to connect and configure an additional backup server via network.

7.2 Tape / RDX Configuration

7.2.1 RDX Drive

Category	Product Name / Description	Part Number
Controller	Internal USB Controller 1 x USB port	(Standard)
Installation Kit	Internal Backup Drive Installation Kit 2x 5-inch media bay, including internal USB and SAS cable NOTE: The kit must be installed in the Drive Cage 1. If the optional drive cage is installed in the Drive Cage 1, the Kit cannot be installed.	N8154-121
Drive	Internal RDX (USB)	N8151-139
Data Cartridge	RDX Data Cartridge(1TB)	N8153-13
	RDX Data Cartridge(2TB)	N8153-14
	RDX Data Cartridge(3TB)	N8153-15
	RDX Data Cartridge(4TB)	N8153-16

NOTE:

- One RDX drive can be installed

7.2.2 LTO Drive

Category	Product Name / Description	Part Number
Controller Required	RAID Controller (RAID 0/1) RAID 0/1/10 and SAS HBA mode, 0MB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-195
Installation Kit	Internal Backup Drive Installation Kit 2x 5-inch media bay, including internal USB NOTE: The kit must be installed in the Drive Cage 1. If the optional drive cage is installed in the Drive Cage 1, the Kit cannot be installed.	N8154-121
Cable	Internal SAS/SATA Cable For 2.5-inch Drive Model NOTE: Required with LTO drive	K410-400(00)
	Internal SAS/SATA Cable For 3.5-inch Drive Model NOTE: Required with LTO drive	K410-399(00)
Drive	Internal LTO (SAS) LTO5, Half height, Native capacity 1.5 TB	N8151-141
	Internal LTO (SAS) LTO6, Half height, Native capacity 2.5 TB	N8151-142
	Internal LTO (SAS) LTO7, Half height, Native capacity 6 TB	N8151-143

NOTE:

- When you install an internal LTO drive, the system operates with non-redundant fan configuration, while the Redundant Fan Kit is installed.
- One LTO drive can be installed

8 PCI Card

Please refer to [Supported PCI Cards and Installable Slots](#) with regard to the position of PCI slot which can mount PCI card supported.

8.1 Network Interface Controller

Category		Product Name / Description	Part Number
Adapter	1GbE	Dual Port 1000BASE-T Adapter Broadcom BCM5720 Gigabit Ethernet Controller PCIe 2.0(x1)	N8104-178
		Dual Port 1000BASE-T Adapter Intel Ethernet Controller I350 PCIe 2.0(x4)	N8104-180
		NOTE: - Network cables with RJ-45 plug covers cannot be used.	
		Quad Port 1000BASE-T Adapter Broadcom BCM5719 Gigabit Ethernet Controller PCIe 2.0(x4)	N8104-179
		NOTE: - Network cables with RJ-45 plug covers cannot be used.	
		Quad Port 1000BASE-T Adapter Intel Ethernet Controller I350 PCIe 2.0(x4)	N8104-181
		NOTE: - Network cables with RJ-45 plug covers cannot be used.	
	10GbE	Dual Port 10GBASE-T Adapter QLogic 57810S PCIe 2.0(x8)	N8104-182
		Dual Port 10GBASE-T Adapter Cavium QL41401, PCIe3.0(x8)	N8104-183
		Dual Port 10GBASE-T Adapter Intel X550-AT2, PCIe3.0(x4)	N8104-184
		Dual Port 10GBASE SFP+ Adapter QLogic 57810S PCIe 2.0(x8)	N8104-185
		NOTE: - N8104-189 SFP+ Module is required to connect with an optical cable. - Up to 2 SFP+ Modules can be installed.	
		Dual Port 10GBASE SFP+ Adapter Intel Ethernet Controller X710 PCIe 3.0(x8)	N8104-186
		NOTE: - N8104-189 SFP+ Module is required to connect with an optical cable. - Up to 2 SFP+ Modules can be installed.	
	25GbE	Dual Port 25GBASE SFP28 Adapter Cavium QL41401, PCIe3.0(x8)	N8104-187
		NOTE: - N8104-190 SFP28 Module is required to connect with an optical cable. - Up to 2 SFP28 Modules can be installed. - 6 or more memories per processor are needed for maximum performance.	
SFP Module	10GbE	SFP+ Module (10G-SR) 1 x SFP+ Module	N8104-189
	25GbE	SFP28 Module(25G-SR) 1 x SFP28 Module	N8104-190

NOTE:

- The NIC cards must be installed under the maximum configuration limits for networking when running with VMware systems. For more detail, see the Networking Maximum in the Configuration Maximums document for VMware.
<https://configmax.vmware.com/>

- When 10G LAN and 1000BASE-T are installed in VMware ESXi 6.0/6.5/6.7 systems, up to 16 ports for 10G LAN and up to 4 ports for 1000BASE-T are available. T120h is equipped with 4 ports 1000BASE-T as standard, no more 1000BASE-T port is added.
- The Redundant Fan Kit is required depending on your system configuration. See 9.2 Cooling Fan Kit for detail.

NIC Teaming feature – NIC Teaming and bonding features

The Express 5800 server supports NIC teaming, which enables you to configure multiple NICs as a virtual single network interface for dual path, load balancing, for fault tolerance and network load balancing respectively.

See the table below for supported network interfaces and OS combinations.

Network Interface	Team	Operating Systems
1GbE NIC N8104-178/179	Up to four ports per one team	Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 6.9 or later Red Hat Enterprise Linux 7.3 or later VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
1GbE NIC N8104-180/-181	Up to four ports per one team	Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 6.9 or later Red Hat Enterprise Linux 7.3 or later VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
10GbE NIC N8104-182/-185	Up to four ports per one team	Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 6.9 or later Red Hat Enterprise Linux 7.3 or later VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
10GbE NIC N8104-183	Up to four ports per one team	Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 7.3 or later VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
10GbE NIC N8104-184	Up to four ports per one team	Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 6.9 or later Red Hat Enterprise Linux 7.3 or later VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
10GbE NIC N8104-186	Up to four ports per one team	Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 6.9 or later Red Hat Enterprise Linux 7.3 or later VMware ESXi 6.5 Update1 or later VMware ESXi 6.7 or later
25GbE NIC N8104-187	Up to four ports per one team	Windows Server 2012 R2 Windows Server 2016 Red Hat Enterprise Linux 7.3 or later

NOTE:

- When 1GbE, 10GbE and 25GbE NIC teams are mixed, the maximum number of teams is five per one system.

8.2 External Storage Controller

8.2.1 External RAID Controller

Category	Product Name / Description	Part Number
Controller	RAID Controller (4GB, RAID0/1/5/6) RAID0/1/5/6/10/50/60, 4GB, 8 External port PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-196
Battery Backup	Battery Backup Unit Lithium-ion Battery for RAID controller with cache memory.	N8103-203

NOTE:

- Only one SAS JBOD Enclosure can be connected to one RAID controller.

- 4Kn sector drives are not supported with the RAID controller.
- One battery backup unit must be installed per system.
- To configure a large-capacity RAID array, it is recommended to configure in RAID 6 or RAID 60 in order to minimize the risk of becoming multiple hard drives failure during the RAID rebuilding process.
- It is recommended to set RAID array configuration drives up to eight in order to minimize the risk of becoming multiple hard drives failure.

8.2.2 Fibre Channel / SAS Controller

Category	Product Name / Description	Part Number
Fibre Channel	Fibre Channel Controller (1ch) Cavium QLogic, QLE2690 16Gb/s, Optical, PCIe 3.0 x8 NOTE: <ul style="list-style-type: none"> - The controller is qualified with NEC Storage M series, OS support WS2012R2 and WS2016 - The controller is qualified with NEC Storage T series, OS support WS2012R2, WS2016 and RHEL7.3 	N8190-165
	Fibre Channel Controller (2ch) Cavium QLogic, QLE2692 16Gb/s, Optical, PCIe 3.0 x8 NOTE: <ul style="list-style-type: none"> - The controller is qualified with NEC Storage M series, OS support WS2012R2 and WS2016. - The controller is qualified with NEC Storage T series, OS support WS2012R2, WS2016 and RHEL7.3 	N8190-166
	Fibre Channel Controller (1ch) Broadcom, LPe31000 16Gb/s, Optical, PCIe 3.0 x8 NOTE: <ul style="list-style-type: none"> - The controller is qualified with NEC Storage M series, OS support WS2012R2, WS2016, RHEL7 and VMware ESXi 6.5 - The controller is not qualified with NEC Storage T series 	N8190-163
	Fibre Channel Controller (2ch) Broadcom, LPe31002 16Gb/s, Optical, PCIe 3.0 x8 NOTE: <ul style="list-style-type: none"> - The controller is qualified with NEC Storage M series, OS support WS2012R2, WS2016, RHEL7 and VMware ESXi 6.5 - The controller is not qualified with NEC Storage T series 	N8190-164
	Fibre Channel Controller (1ch) Broadcom, LPe32000 32Gb/s, Optical, PCIe 3.0 x8 NOTE: <ul style="list-style-type: none"> - The controller is qualified with NEC Storage M series, OS support WS2012R2, WS2016, and RHEL7 - The controller is not qualified with NEC Storage T series 	N8190-171
	Fibre Channel Controller (2ch) Broadcom, LPe32002 32Gb/s, Optical, PCIe 3.0 x8 NOTE: <ul style="list-style-type: none"> - The controller is qualified with NEC Storage M series, OS support WS2012R2, WS2016, and RHEL7 - The controller is not qualified with NEC Storage T series 	N8190-172
	SAS Controller 12Gb/s SAS, ext. 8(SFF-8644 x2), PCIe 3.0 x8 NOTE: <ul style="list-style-type: none"> - Support tape connection via Device Expansion Unit only 	N8103-197
	SAS Controller LSI SAS9300-8e Host Bus Adapter 12Gb/s SAS, ext. 8(SFF-8644 x2), PCIe 3.0(x8) NOTE: <ul style="list-style-type: none"> - Support for connection to NEC Storage T series and M series and LTO - Up to 3 controllers can be installed in slots 1/3/5/6/7/8 (page 40), when 	N8103-184

- installed in slot 1 or 3, no PCIe cards can be installed in slot 2 and 4.
- N8181-169 Redundant Fan Kit is required and need to change the cooling setting on System Utilities(F9). Refer to a detailed instruction of "Notes of using SAS controller (N8103-184)" in a document attached to the server of "Precautions for Using Express5800/T120".
- The controller is not qualified with Tape drive connection via Device Expansion Unit.
- Please download the driver kit from Express5800 website
- This controller must be installed after shipment.

- Please refer to the NEC Storage website for supported OS and device
- For FC-SAN boot, please refer to "FC SAN Boot Configuration Guide"
- For the cluster configuration, please refer to the ExpressCluster website
- Fibre Channel (FC) link speed varies by types and length of cables.

9 Other Add-in Components

9.1 Power Supply

Category	Product Name / Description	Part Number
Power Supply Unit	500W Hot Plug Power Supply 1 x 500 Watt 80 PLUS® Platinum, including one 2m IEC320 C14 power cord	N8181-159
	800W Platinum Hot Plug Power Supply 1 x 800 Watt 80 PLUS® Platinum, including one 2m IEC320 C14 power cord	N8181-160
	800W Titanium Hot Plug Power Supply 1 x 800 Watt 80 PLUS® Titanium, including one 2m IEC320 C14 power cord	N8181-161
	NOTE: - 200 VAC input only supported	
	1600W Hot Plug Power Supply 1 x 1600 Watt 80 PLUS® Platinum, including one 2m IEC320 C14 power cord	N8181-162
	NOTE: 200 VAC input only supported	

NOTE:

- Minimum one power supply kit must be installed.
- The power supply kit must be the same to configure redundancy.
- If two CPU are selected, N8181-169 Redundant Fan Kit and Power Supply of 800 Watt or Higher are required.

Available Power Supplies

See the table below for the available power supplies based on your system configuration

24x 2.5-inch Drive Model

Number of Processors	Redundant Fan	Type of Processor	Number of Drives	Type of DIMMs	Number of DIMMs	Available Power Supply
One	Non	Processor with 115 Watt or less	-	-	-	500W or more
		Processor between 125 Watt and 150 Watt	Up to 12	RDIMM	-	500W or more
				LRDIMM	-	800W or more
		Processor with 165 Watt or more	13 or more	-	-	800W or more
				-	-	800W or more
	Yes	Processor with between 85 Watt and 130 Watt	Up to 16	RDIMM	-	800W or more
				LRDIMM	Up to 6 7 or more	800W or more 1600W
		17 or more	RDIMM	Up to four 5 or more	-	800W or more 1600W
						1600W
						1600W

Two	Yes	Processor with 140 Watt or more	-	-	-	1600W
		Processor with 85 Watt	Up to 10	RDIMM	Up to 12	800W or more
					13 or more	1600W
				LRDIMM	Up to six	800W or more
					7 or more	1600W
			11 or more	-	-	1600W
		Processor with 105 Watt or 115 Watt	Up to 8	RDIMM	Up to 6	800W or more
					7 or more	1600W
				LRDIMM	-	1600W
					-	1600W
		Processor with 125 Watt or more	-	-	-	1600W

NOTE:

- Refer to the table of dual processor configurations (5 or more PCI Card Installed) for the available power supplies on systems with dual processors and five or more PCI cards.
- 128GB LRDIMM requires 1600W power supply.

12x 3.5-inch Drive Model

Number of Processors	Redundant Fan	Type of Processor	Number of Drives	Type of DIMMs	Number of DIMMs	Available Power Supply
One	Non	Processor with 85 Watt	-	-	-	500W or more
		Processor with 105 Watt or 115 Watt	-	RDIMM	-	500W or more
				LRDIMM	-	800W or more
		Processor with between 125 Watt and 140 Watt	-	RDIMM	Up to 6	500W or more
				LRDIMM	7 or more	800W or more
					-	800W or more
		Processor with 150 Watt	Up to 6	RDIMM	Up to 6	500W or more
				LRDIMM	7 or more	800W or more
					-	800W or more
		Processor with 165 Watt or more	-	-	-	800W or more
	Yes	Processor with 85 Watt	-	-	-	800W or more
		Processor with between 105 Watt and 130 Watt	-	RDIMM	-	800W or more
				LRDIMM	-	1600W
		Processor with 140 Watt or 150 Watt	-	RDIMM	Up to 6	800W or more
				LRDIMM	7 or more	1600W
					-	1600W
		Processor with 165 Watt or more	-	-	-	1600W
Two	Yes	Processor with 85 Watt	Up to 8	RDIMM	Up to 12	800W or more
				LRDIMM	13 or more	1600W
					Up to 6	800W or more
					7 or more	1600W
			9 to 11	RDIMM	Up to 6	800W or more
				LRDIMM	7 or more	1600W
					-	1600W
					-	1600W
			12	RDIMM	Up to 4	800W or more
				LRDIMM	5 or more	1600W
					-	1600W
					-	1600W
			Up to 6	RDIMM	Up to 6	800W or more
				LRDIMM	7 or more	1600W
					-	1600W
					-	1600W
		Processor with 125 Watt or more	-	-	-	1600W

NOTE:

- Refer to the table of Dual Processor Configurations (5 or more PCI Card Installed) for the available power supplies on systems with dual processors and five or more PCI cards.
- 128GB LRDIMM requires 1600W power supply.

Dual Processor Configuration (5 or more PCI Card Installed)

Type of Processor	Number of Drives	Type of DIMMs	Number of DIMMs	Available Power Supply
Processor with 85 Watt	Up to eight	RDIMM	Up to 12	800W or more
	-		13 or more	1600W
	-	LRDIMM	up to 6	800W or more
			7 or more	1600W
	Nine or more	-	-	1600W
Processor with 105 Watt or more	-	-	-	1600W

- 128GB LRDIMM requires 1600W power supply.

Guideline of Maximum Power Consumption

See the following table for the guideline of the maximum power consumption based on the TDP and Input voltage. The actual maximum power consumption varies depend on the type of processor while the TDP of processor is the same.

200VAC Input

CPU TDP	24 x 2.5-inch	12 x 3.5-inch
85 Watt	1207W / 1209VA	1137W / 1138VA
105 Watt	1253W / 1256VA	1183W / 1185VA
115 Watt	1269W / 1271VA	1199W / 1200VA
125 Watt	1302W / 1305VA	1232W / 1234VA
130 Watt	1302W / 1305VA	1232W / 1234VA
140 Watt	1343W / 1345VA	1272W / 1274VA
150 Watt	1367W / 1370VA	1296W / 1299VA
165 Watt	1405W / 1407VA	1334W / 1337VA
200 Watt	1508W / 1510VA	1438W / 1440VA
205 Watt	1510W / 1510VA	1438W / 1440VA

9.2 Cooling Fan Kit

Product Name / Description	Part Number
Non Redundant Fan Kit Hot plug fans	(Standard)
Redundant Fan Kit Hot plug redundant cooling fans	N8181-169

NOTE:

- The following system configuration requires you to order the Redundant Fan Kit:
 - Dual processor system
 - System installed with three drive cages
 - System installed with 2.5-inch SAS drives
 - System installed into a rack cabinet with rack conversion kit
 - System installed with N8104-183 Dual Port 10GBASE-T Adapter or N8103-191 RAID Controller (4GB, RAID 0/1/5/6)
- When you install an internal LTO or RDX drive, the system operates with non-redundant fan configuration, while the Redundant Fan Kit is installed.

9.3 Trusted Platform Module Kit

Product Name / Description	Part Number
Trusted Platform Module Kit TPM 2.0 module	N8115-35

NOTE:

- The kit is not available in China.
- The kit is not removable after attachment.
- The kit supports only with Windows operating system configured with UEFI boot mode.
- "Chipset-TPM" in BIOS setup menu must be activated prior to use of this product.
- To use Windows BitLocker drive encryption, be sure to keep the "recovery password" of BitLocker function. The recovery password is required to restore data for hardware replacement during a system error.

9.4 USB Memory Kit

Product Name / Description	Part Number
8GB USB Memory	N8106-017
Dual 8GB microSD Kit(USB) Including 2x 8GB microSD, USB dual microSD memory card reader, RAID1 Support	N8106-016

NOTE:

- The USB memory kit is installed in the system when you order it with the base model.
- The kit does not include VMware ESXi installation media and license.

9.5 Power Cable for GPU

Product Name / Description	Part Number
Graphics Card Installation Kit Power cables for video card	K410-440(00)

10 Factory Server Setting Service

10.1 Memory RAS Settings

If you need to change the BIOS settings for the memory RAS feature at the factory, select the appropriate configuration service.

Product Name / Description	Part Number
Memory Mirroring Mode Configuration Service Setup option to change the Memory RAS of BIOS menu to Memory Mirroring Mode	NESV16-013
Memory Sparing Mode Configuration Service Setup option to change the Memory RAS of BIOS menu to Memory Sparing Mode	NESV16-014

10.2 RAID Configuration Service

If RAID configuration setup is NOT needed when a RAID controller is installed at the factory, select this option service.

Product Name / Description	Part Number
RAID Config Option(None) Server setting option service without RAID configuration setup when a RAID controller is installed.	NESV16-039

11 Add-on Components

11.1 Input Devices

Product Name / Description	Part Number
Keyboard (US) 1 x 104-keys White USB keyboard	N8170-25
Mouse 1 x USB White Optical Wheel Mouse	N8170-22

11.2 Server Management License

Choose the following license kit to use additional remote and system management features.

Product Name / Description	Part Number
License for Remote Management (Advanced) License per server Remote console: - Integrated Remote Console (IRC) with full functionality Remote media: - Virtual media access via Integrated Remote Console (IRC) - Scripted virtual media access System management: - Global team collaboration for up to six consoles - Integrated Remote Console (IRC) recording and playback	N8115-33
License for Remote Management (Scale-Out) License per server Remote console: - Text-based remote console via SSH - Integrated Remote Console (IRC) under Pre-OS System management: - Email alert - Remote Syslog feature - Virtual Serial Port recording and playback	N8115-34

NOTE:

- Remote management features are not available for virtual machines.

11.3 Rack Conversion Kit

Product Name / Description	Part Number
Rack Conversion Kit Convert to 5U form factor	N8143-136

11.4 Dust / Insect Proof Kit

Category	Product Name / Description	Part Number
Front Bezel	Dustproof Bezel Including 1 set of dust proof filters	N8146-98
Filter	Dustproof Bezel Filter For N8146-98 Dust Proof Bezel Removal capacity of particles : Up to 1 µm-sized	N8147-34

NOTE:

- The dustproof filter kit is make-to-order products. Estimated production lead time for the kit will be approximately 1 months.

11.5 Starter Pack DVD

The starter pack DVD includes the software and driver qualified by NEC. In order to obtain technical support from NEC, please be sure to install the software and drivers provided with the starter pack. The latest DVD image can be downloaded for free from NEC website during the warranty period.

Product Name / Description	Part Number
Express5800/T120h Starter Pack	UL9020-B113

NOTE:

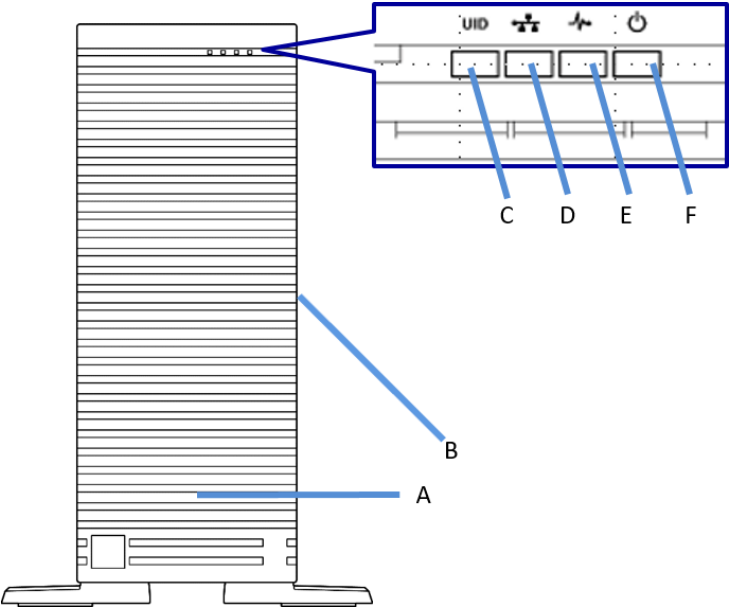
- By applying Starter Pack, Driver software qualified by NEC can be installed. To use servers, UL9020-B113 Starter Pack or Starter Pack downloaded from Web site must be installed.
- Starter Pack may be updated without notice. The latest version of Starter Pack is available in Web site. Starter Pack can be downloaded within Warranty term.
- User Guide of this product is supplied as PDF file in NEC Web site.

References

External Views

Front and Rear Views

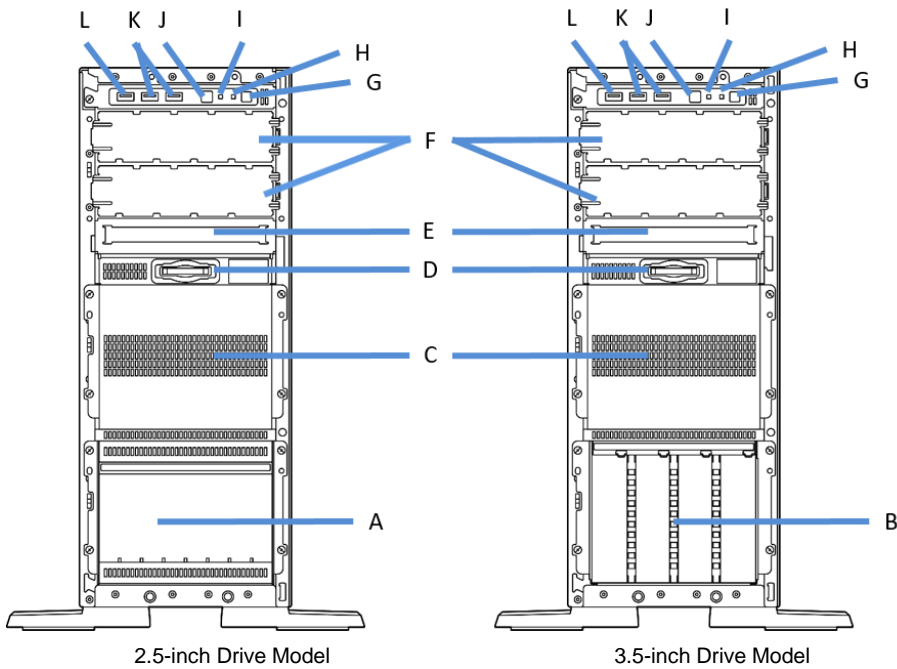
Front View (With Front Bezel)



Legend

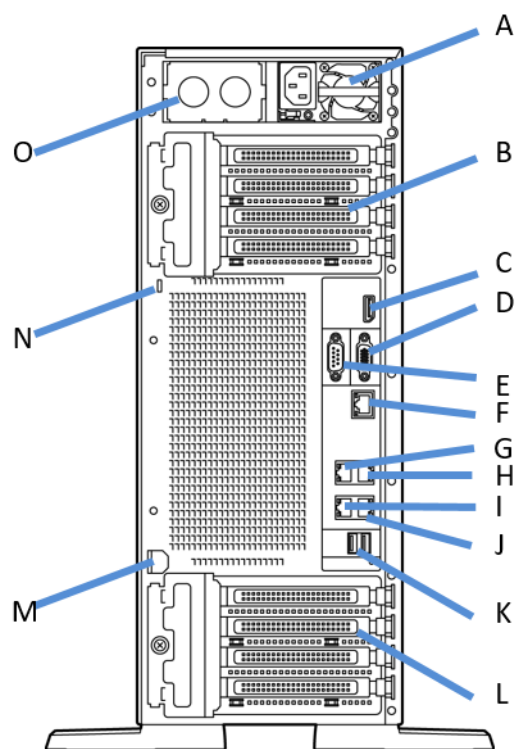
A.	Front Bezel	D.	Network Link/Activity LED
B.	Front Bezel Key	E.	Health LED
C.	UID Button/LED	F.	Power Button/LED

Front View (without Front Bezel)



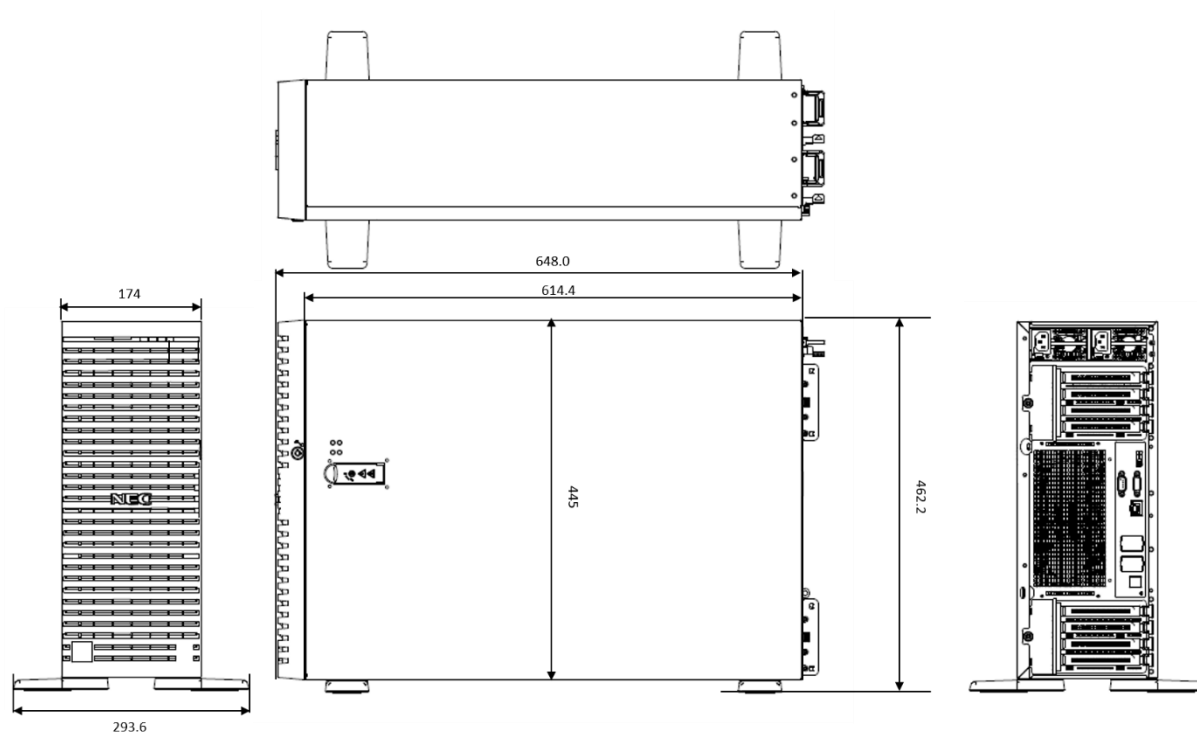
Legend

A.	2.5-inch Drive Bay	G.	Power Button/LED
B.	3.5-inch Drive Bay	H.	Health LED
C.	Optional Drive Cage	I.	Network Link/Activity LED
D.	Pull-out tab	J.	UID Button/LED
E.	Optical Drive Bay (Option)	K.	USB Connectors
F.	Half-Height Media Bay (Option)	L.	iLO Service Connector

Rear View**Legend**

A.	Power Supply	I.	NIC Connector 3 (1Gb)
B.	PCIe Slots	J.	NIC Connector 4 (1Gb)
C.	DisplayPort Connector(unusable)	K.	USB 3.0 Connectors
D.	VGA Connector	L.	PCIe Slots
E.	Serial Port	M.	Padlock Eye
F.	Management Port	N.	Kensington Security Slot
G.	NIC Connector 1 (1Gb)	O.	Power Supply (optional)
H.	NIC Connector 2 (1Gb)		

Dimensions (mm)



General Supplementary Matters

HDD

- The Capacity of Hard disk drive is indicated in decimal not binary. 1GB=1000³B, 1TB=1000⁴B.

PCI expansion slot

- Transfer speed of PCI Express
 - ◆ PCI Express (PCIe): 2.5Gb/s (simplex) per lane
 - ◆ PCI Express 2.0 (PCIe 2.0): 5Gb/s (simplex) per lane
 - ◆ PCI Express 3.0 (PCIe 3.0): 8Gb/s (simplex) per lane

Time display

- A system clock is affected by temperature conditions in storage. If high accuracy of the system clock is required, use of NPT servers is recommended.

Memory Supplementary Matters

Installation rule

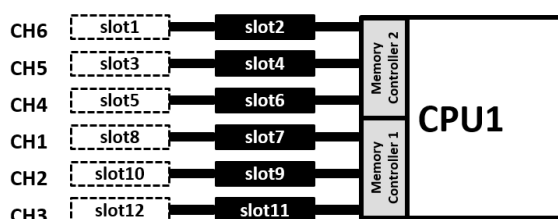
- The number of memory which can be installed varies depending on number of installed CPUs.
- This installation rule is defined to maximize performance efficiently in multiple cores and tasks operation.
- Registered DIMM (RDIMM), Load Reduced DIMM (LRDIMM) can be installed up to 12 per 1CPU.
- Mixing of RDIMM and LRDIMM is not allowed to be installed.

When install DIMMs, higher capacity memory must be installed preferentially, if this rule is ignored, it may cause failures of DIMMs. This rule applies to the factory installation.

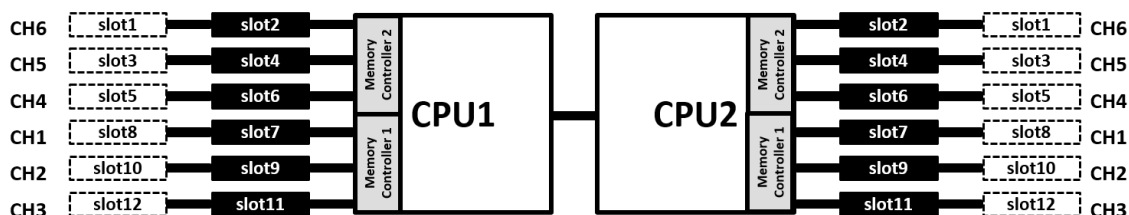
For dual CPU system, install DIMM to CPU1 firstly and then to CPU2 alternately.

Memory population varies with number of installed DIMMs. In installation of 5, 7, 9 or 11 DIMMs per CPU, optimal performance might NOT be obtained. Other memory populations are recommended.

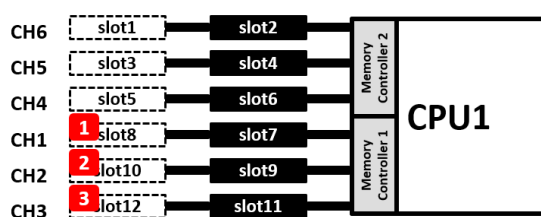
Single CPU system



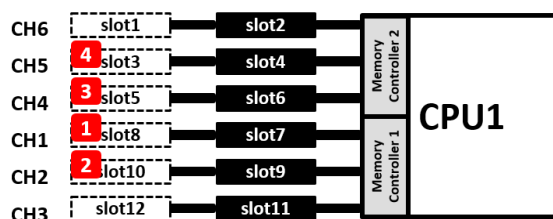
Dual CPU system



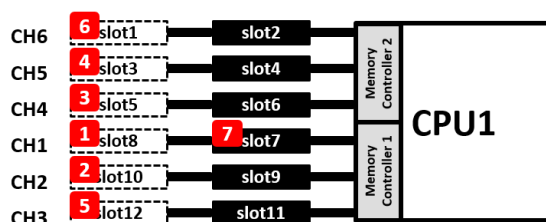
1-3x DIMM(s)



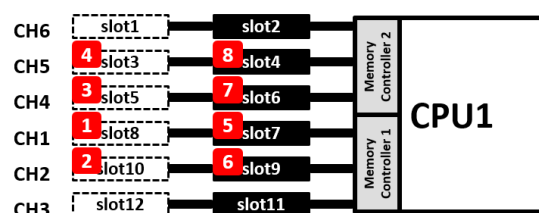
4x DIMMs



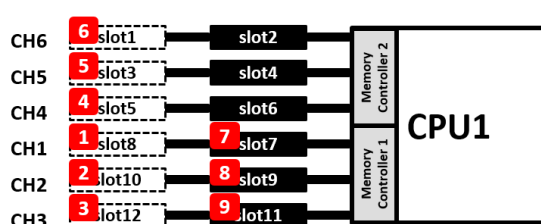
5-7x DIMMs



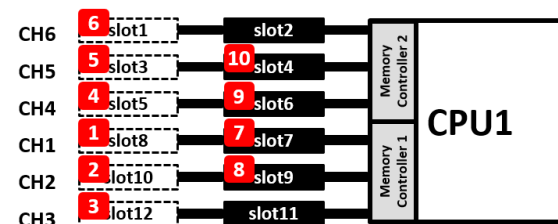
8x DIMMs



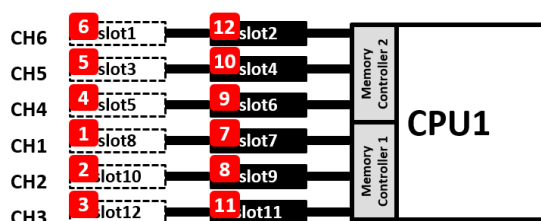
9x DIMMs



10x DIMMs



11-12x DIMMs



Internal Drive Supplementary Matters

Conditions of Internal Drives in the default factory configuration

In the default factory configuration, there are some conditions of drive types and RAID levels that can be installed as below.

Common

- For the shipment with a RAID array, select the drives in the same capacity as many as needed.
- In the default factory configuration, up to two types of Internal Drives can be installed in accordance with the following conditions and restrictions.

Conditions for mixing Internal Drives in the default factory configuration

- Up to two types of Internal Drives can be installed in the default factory configuration.
- M.2 SATA SSD can be installed at the factory regardless of mixing Internal Drives.
- The type of Internal Drives is classified according to form factors (2.5"/3.5"), interfaces (SAS/SATA), devices (HDD/SSD), Data transfer speeds, and rotational speeds. The current categories are below.
 - ◆ 3.5 inch SAS HDD, 12Gb/s, 7,200rpm
 - ◆ 3.5 inch SATA HDD, 6Gb/s, 7,200rpm
 - ◆ 2.5 inch SAS HDD, 12Gb/s, 10,000rpm
 - ◆ 2.5 inch SAS HDD, 12Gb/s, 15,000rpm
 - ◆ 2.5 inch SAS SSD, 12Gb/s
 - ◆ 2.5 inch SATA HDD, 6Gb/s, 7,200rpm
 - ◆ 2.5 inch SATA SSD, 6Gb/s

For example, 2.5 inch SATA HDD, 1TB, 7,200rpm 512n sector and 2.5 inch SATA HDD, 2TB, 7,200rpm 512n sector are regarded as the same type of Internal Drives.

Common restrictions of mixing Internal Drives in the default factory configuration

- Internal Drives with a different sector size cannot be mixed, even if they are the same type.
For example, a mixing of 2.5 inch SATA HDD, 1TB, 7,200rpm 512n sector and 2.5 inch SATA HDD, 2TB, 7,200rpm 512e sector is NOT supported in the default factory configuration.
- SSDs of different Endurance (ME, VE, RI) cannot be mixed, even if they are the same type.
For example, a mixing of 2.5 inch SATA SSD, 400GB, 6Gb/s VE (Value Endurance) and 2.5 inch SATA HDD, 800GB, 6Gb/s RI (Read Intensive) is NOT supported in the default factory configuration.

Mounting order of mixing Internal Drives in the default factory configuration

- In the default factory configuration, the drive mounting order is defined as below.
- The Internal drives is installed in the order of Front Cage, Middle Cage, Rear Cage.

Order	2.5 inch Drives	Order	3.5 inch Drives
1	2.5 inch SAS HDD	1	3.5 inch SAS HDD
2	2.5 inch SAS SSD	2	3.5 inch SATA HDD
3	2.5 inch SATA HDD	-	-
4	2.5 inch SATA SSD	-	-

- The Internal drives are installed in the ascending order of a slot number, when the same type of the drives are selected, the drives are installed according to the order below.

Order	Factors	Priority; high	Priority; middle	Priority; low
1	Drive capacity	Smaller	Bigger	-
2	Data transfer speed	6Gb/s	12Gb/s	-
3	Rotational speed	7,200rpm	10,000rpm	15,000rpm

RAID controller configuration

- Capacity of Logical drive can be within 2TB with legacy boot mode, capacity of logical drive can be within the total capacity of logical disks with UEFI boot mode.
- As the factory shipment, initial cache policy of RAID controllers is Write Through for N8103-189, Write back for N8103-190/191.

RAID configuration for the default factory shipment

Available RAID level is determined by the RAID configurations and the number of drives as below.

RAID configuration for shipment	Number of Drives	Number of Drives in RAID levels
Non RAID	2.5inch model: 1-8	Non
	3.5inch model: 1-12	
Embedded RAID(On-board RAID) configuration (RAID 0/1/10)	1	RAID0 (Single drive)
	2	RAID1
	3	2 in RAID1, 1 for hot spare
	4/6/8	4/6/8 in RAID10
	5/7	4/6/8 in RAID10, 1 for a hot spare
	9 (3.5inch model only)	
	10 (3.5inch model only)	8 in RAID10, 2 in RAID1
	11 (3.5inch model only)	8 in RAID10, 2 in RAID1, 1 for a hot spare
	12 (3.5inch model only)	8 in RAID10, 4/6/8 in RAID10
RAID controller configuration(RAID 0/1/10)	1	RAID0(Single drive)
	2	RAID1
	3	2 in RAID1, 1 for a hot spare
	4/6/8	4/6/8 in RAID10
	5/7/9	4/6/8 in RAID10, 1 for a hot spare
	10	8 in RAID10, 2 in RAID1
	11	8 in RAID10, 2 in RAID1, 1 for a hot spare
	12/14/16	8 in RAID10, 4/6/8 in RAID10
	13/15/17	8 in RAID10, 4/6/8 in RAID10, 1 for a hot spare
	18	2x 8 in RAID10, 2 in RAID1
	19	2x 8 in RAID10, 2 in RAID1, 1 for a hot spare
	20/22/24	2x 8 in RAID10, 4/6/8 in RAID10
RAID controller configuration (RAID 0/1/5/6/10)	1	RAID0(Single drive)
	2	RAID1
	3-8	RAID5
	9	8 in RAID 5, 1 in RAID0 (Single drive)
	10	8 in RAID 5, 2 in RAID 1
	11-16	8 in RAID 5, 3-8 in RAID5
	17	2x 8 in RAID 5, 1 in RAID0 (Single drive)
	18	2x 8 in RAID 5, 2 in RAID 1
	19-24	2x 8 in RAID 5, 3-8 in RAID5

Conditions for mixing of Internal Drives

- RAID controller is required for mixing of Internal Drives
- Mixed Internal Drives cannot be installed in the same RAID array.
- When using hot spare disk for different RAID arrays which consist of various type of drives, assign “Dedicated Hot Spare” to each RAID arrays with the same type of drive, to prevent from mixing different type of drives in a RAID array. “Global Hot Spare” cannot be used.

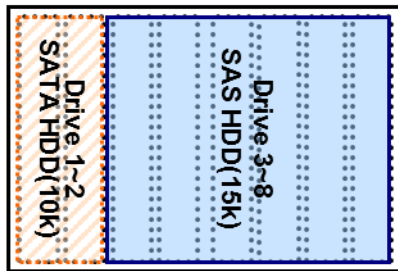
Mixing of different type of drives

Two types of drive can be installed in standard drive cage (8slots) and optional drive cage (8slots), in total, up to four types of drive using both cages. There is nine “type”, such as SAS HDD 10,000rpm(512n), SAS HDD 10,000rpm(512e), SAS HDD 15,000rpm(512n), SAS HDD 7,200rpm(512e), SATA HDD 7,200rpm(512n), SATA HDD 7,200rpm(512e), SATA SSD(ME/VE/RI).

See some examples as below.

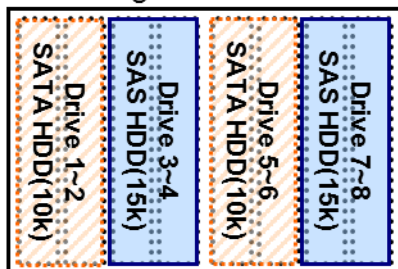
OK

Up to two types of drives can be installed in the drive cage. Any combination of drives is ok.
(Ex. 2 SATA HDD and 6 SAS HDDs)



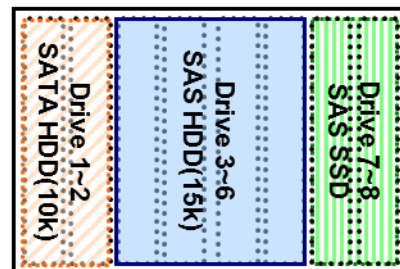
N/A

Same type drives cannot be put in 2 places or more separately in the drive cage



N/A

More than two types of drives cannot be installed in the drive cage



Server Management

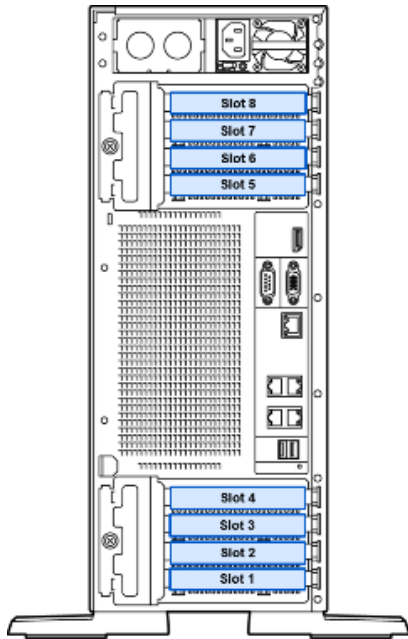
The integrated server management controller provides superior remote control and system management features listed in the table below.

	Standard	Remote Management License (Scale-out)	Remote Management License (Advanced)
Authentication with Active Directory and LDAP	-	-	✓
Two-factor and Kerberos authentication	-	-	✓
Virtual media access via Integrated Remote Console (IRC)	-	-	✓
Scripted virtual media access	-	-	✓
Integrated Remote Console (IRC)	Pre-OS Only	Pre-OS Only	✓
Global team collaboration for up to six consoles	-	-	✓
Integrated Remote Console (IRC) recording and playback	-	-	✓
Virtual Serial Port recording and playback	-	✓	✓
Text-based remote console via SSH	-	✓	✓
Email alert	-	✓	✓
Remote Syslog feature	-	✓	✓
Advanced power management (power history graph, power capping)	-	✓	✓
BMC federation management	-	✓	✓
BMC detection for BMC federation	✓	✓	✓
Remote serial console (Virtual Serial Port)	✓	✓	✓
Server Health Summary	✓	✓	✓
Restart BMC from web-based management console	✓	✓	✓
Redfish™ API	✓	✓	✓
Agentless Management	✓	✓	✓
Server Health monitoring	✓	✓	✓
Web-based GUI	✓	✓	✓
Virtual power buttons	✓	✓	✓
SSH / SMASH Command-Line Protocol (including serial console redirection)	✓	✓	✓
IPMI / DCMI (including serial console redirection)	✓	✓	✓

OS Support Matrix for PCI Cards and Embedded Controllers

Part number	Product Name	WS 2016	WS 2012 R2	RHEL 7	ESXi 6.0	ESXi 6.5	ESXi 6.7
-	Embedded SATA non-RAID Controller	✓	✓	-	-	✓	✓
-	Embedded SATA RAID Controller	✓	✓	-	-		
N8103-189	RAID Controller (RAID 0/1)	✓	✓	✓	✓	✓	✓
N8103-190	RAID Controller (2GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓	✓
N8103-191	RAID Controller (4GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓	✓
N8103-195	RAID Controller (4GB, RAID 0/1)	✓	✓	✓	✓	✓	✓
N8103-201	RAID Controller (2GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓	✓
N8103-196	RAID Controller (4GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓	✓
N8103-197	SAS Controller	✓	✓	✓	-	-	-
N8104-178	Dual Port 1000BASE-T Adapter	✓	✓	✓	✓	✓	✓
N8104-179	Quad Port 1000BASE-T Adapter	✓	✓	✓	✓	✓	✓
N8104-180	Dual Port 1000BASE-T Adapter	✓	-	✓	✓	✓	✓
N8104-181	Quad Port 1000BASE-T Adapter	✓	-	✓	✓	✓	✓
N8104-182	Dual Port 10GBASE-T Adapter	✓	✓	✓	✓	✓	✓
N8104-183	Dual Port 10GBASE-T Adapter	✓	✓	✓	✓	✓	✓
N8104-184	Dual Port 10GBASE-T Adapter	✓	✓	✓	✓	✓	✓
N8104-185	Dual 10GBASE SFP+ Adapter	✓	✓	✓	✓	✓	✓
N8104-186	Dual 10GBASE SFP+ Adapter	✓	✓	✓	✓	✓	✓
N8104-187	Dual Port 25GBASE SFP28 Adapter	✓	✓	✓	✓	✓	✓
N8190-165	Fibre Channel Controller (1ch)	✓	✓	✓	-	-	-
N8190-166	Fibre Channel Controller (2ch)	✓	✓	✓	-	-	-
N8190-171	Fibre Channel Controller (1ch)	✓	✓	✓	✓	✓	✓
N8190-172	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓	✓
N8190-163	Fibre Channel Controller (1ch)	✓	✓	✓	✓	✓	✓
N8190-164	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓	✓
N8103-184	SAS Controller	✓	✓	✓	✓	✓	✓

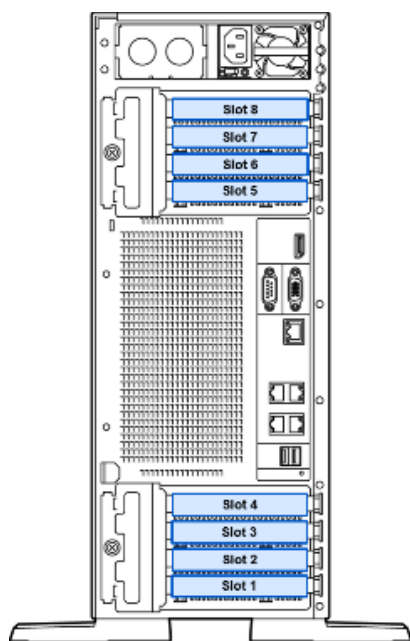
Supported PCI Cards and Installable Slots



Each card in the table below is installed in order from the top in the factory installation. The number in the table shows priority of installable slot.

Part Number	Product Name	RAID	SLOT1	SLOT2	SLOT3	SLOT4	SLOT5	SLOT6	SLOT7	SLOT8
N8103-189	RAID Controller (RAID 0/1)	1	-	-	-	-	-	-	-	-
N8103-190	RAID Controller (2GB, RAID 0/1/5/6)	1	-	-	-	-	-	-	-	-
N8103-191	RAID Controller (4GB, RAID 0/1/5/6)	1	-	-	-	-	-	-	-	-
N8116-83	SAS Expander Card	-	-	-	-	1	-	-	-	-
N8103-201	RAID Controller (2GB, RAID 0/1/5/6)	-	2	7	1	8	5	4	6	3
N8103-195	RAID Controller (4GB, RAID 0/1/5/6)	-	2	7	1	8	5	4	6	3
N8103-196	RAID Controller (4GB, RAID 0/1/5/6)	-	2	7	1	8	5	4	6	3
N8103-197	SAS Controller	-	2	7	1	8	5	4	6	3
N8190-165	Fibre Channel Controller (1ch)	-	2	7	1	8	5	4	6	3
N8190-166	Fibre Channel Controller (2ch)	-	2	7	1	8	5	4	6	3
N8190-171	Fibre Channel Controller (1ch)	-	2	7	1	8	5	4	6	3
N8190-172	Fibre Channel Controller (2ch)	-	2	7	1	8	5	4	6	3
N8190-163	Fibre Channel Controller (1ch)	-	2	7	1	8	5	4	6	3
N8190-164	Fibre Channel Controller (2ch)	-	2	7	1	8	5	4	6	3
N8104-185	Dual 10GBASE-SFP+ Adapter	-	1	3	5	2	4	6	7	8
N8104-182	Dual Port 10GBASE-T Adapter	-	2	7	1	8	5	4	6	3
N8104-186	Dual 10GBASE-SFP+ Adapter	-	1	3	5	2	4	6	7	8
N8104-184	Dual Port 10GBASE-T Adapter	-	4	1	5	8	6	2	7	3
N8104-187	Dual Port 25GBASE SFP28 Adapter	-	2	7	1	8	5	4	6	3
N8104-183	Dual Port 10GBASE-T Adapter	-	2	7	1	8	5	4	6	3
N8104-179	Quad Port 1000BASE-T Adapter	-	4	1	5	8	6	2	7	3
N8104-181	Quad Port 1000BASE-T Adapter	-	4	1	5	8	6	2	7	3
N8104-178	Dual Port 1000BASE-T Adapter	-	4	1	5	8	6	2	7	3
N8104-180	Dual Port 1000BASE-T Adapter	-	4	1	5	8	6	2	7	3
N8103-184	SAS Controller	-	2	-	1	-	5	4	6	3

Expansion Slots



Slot Name	Standard	Bus Width	Connector Width	Height	Length	Processor	NOTE
RAID	PCIe 3.0	x8	x8	-	-	CPU1	
Slot 1	PCIe 3.0	x16	x16	Full-height	Full-length	CPU1	
Slot 2	PCIe 3.0	x4	x8	Full-height	Full-length	CPU1	
Slot 3	PCIe 3.0	x16	x16	Full-height	Full-length	CPU1	
Slot 4	PCIe 3.0	x4	x8	Full-height	Full-length	CPU1	
Slot 5	PCIe 3.0	x16	x16	Full-height	Full-length	CPU2	
Slot 6	PCIe 3.0	x8	x8	Full-height	Full-length	CPU2	
Slot 7	PCIe 3.0	x16	x16	Full-height	Full-length	CPU2	
Slot 8	PCIe 3.0	x8	x8	Full-height	Full-length	CPU2	

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For hard drive capacity measurements, 1 GB = 1 billion bytes. Actual formatted capacity is less.

Revision History

Revision	Date	Description
7.0	January 25, 2019	New products added: <ul style="list-style-type: none"> • 400GB Hot Plug 2.5-inch SAS SSD / N8150-1750 • 800GB Hot Plug 2.5-inch SAS SSD / N8150-1751 • 400GB Hot Plug 2.5-inch SAS SSD / N8150-1752 • 800GB Hot Plug 2.5-inch SAS SSD / N8150-1753 • 960GB Hot Plug 2.5-inch SAS SSD / N8150-1754 • 1.92TB Hot Plug 2.5-inch SAS SSD / N8150-1755 • 900GB 15K Hot Plug 2.5-inch SAS HDD / N8150-602 Discontinued products deleted: <ul style="list-style-type: none"> • 900GB 15K Hot Plug 2.5-inch SAS HDD / N8150-553 • 10TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-571 • 10TB 7.2K Hot Plug 3.5-inch SAS HDD / N8150-574 • 4TB 7.2K Hot Plug 3.5-inch SAS HDD / N8150-572 • 400GB Hot Plug 2.5-inch SAS SSD / N8150-748 • 800GB Hot Plug 2.5-inch SAS SSD / N8150-749 • 400GB Hot Plug 2.5-inch SAS SSD / N8150-750 • 800GB Hot Plug 2.5-inch SAS SSD / N8150-751 Correction of errors
6.0	November 12, 2018	New products added: <ul style="list-style-type: none"> • 480GB Hot Plug 2.5-inch SATA SSD / N8150-1737 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-1738 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-1739 • 240GB Hot Plug 2.5-inch SATA SSD / N8150-1740 • 480GB Hot Plug 2.5-inch SATA SSD / N8150-1741 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-1742 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-1743 • 3.84TB Hot Plug 2.5-inch SATA SSD / N8150-1744 Discontinued products deleted: <ul style="list-style-type: none"> • Xeon Gold 6140M Processor Kit / N8101-1453 (1st), N8101-1454 (2nd) • Xeon Gold 6142M Processor Kit / N8101-1455 (1st), N8101-1456 (2nd) • Xeon Platinum 8160M Processor Kit / N8101-1457 (1st), N8101-1458 (2nd) • Xeon Platinum 8170M Processor Kit / N8101-1459 (1st), N8101-1460 (2nd) • Xeon Platinum 8176M Processor Kit / N8101-1461 (1st), N8101-1462 (2nd) • 480GB Hot Plug 2.5-inch SATA SSD / N8150-1701 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-1702 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-1703 • 240GB Hot Plug 2.5-inch SATA SSD / N8150-1704 • 480GB Hot Plug 2.5-inch SATA SSD / N8150-1705 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-1706 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-1707 • 3.84TB Hot Plug 2.5-inch SATA SSD / N8150-1708 Others: <ul style="list-style-type: none"> • Description related to VMware ESXi is updated. • Required cables for LTO drives in the factory configuration are added • M.2 SATA SSD Installation kit / N8118-312 is added. • Available power supply unit tables are updated. • PCIe card installable slot table is updated. Correction of errors
5.0	July 12, 2018	New products added: <ul style="list-style-type: none"> • 480GB Hot Plug 2.5-inch SATA SSD / N8150-1701 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-1702 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-1703 • 240GB Hot Plug 2.5-inch SATA SSD / N8150-1704 • 480GB Hot Plug 2.5-inch SATA SSD / N8150-1705 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-1706 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-1707 • 3.84TB Hot Plug 2.5-inch SATA SSD / N8150-1708 • 2.4TB Hot Plug 2.5-inch SAS HDD / N8150-591 • 12TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-588 • 12TB 7.2K Hot Plug 3.5-inch NLSAS HDD / N8150-590 • 240GB Non-Hot Plug M.2 SATA SSD / N8150-1709 • 480GB Non-Hot Plug M.2 SATA SSD / N8150-1710 • RDX Cartridge (4TB) / N8153-16 Discontinued products deleted:

		<ul style="list-style-type: none"> • 480GB Hot Plug 2.5-inch SATA SSD / N8150-740 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-741 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-742 • 240GB Hot Plug 2.5-inch SATA SSD / N8150-743 • 480GB Hot Plug 2.5-inch SATA SSD / N8150-744 • 960GB Hot Plug 2.5-inch SATA SSD / N8150-745 • 1.92TB Hot Plug 2.5-inch SATA SSD / N8150-746 • 3.84TB Hot Plug 2.5-inch SATA SSD / N8150-747 <p>Correction of errors</p>
4.0	April 27, 2018	<p>New products / service added:</p> <ul style="list-style-type: none"> • 1TB 7.2K Hot Plug 2.5-inch SATA HDD / N8150-596 • RAID Config Option(None) / NESV16-039 <p>Others:</p> <ul style="list-style-type: none"> • Enable to mix Internal devices in the default factory configuration • Enable to use Internal DVD-ROM drive when the Embedded SATA Controller is used <p>Correction of errors</p>
3.0	March 26, 2018	<p>Discontinued products deleted:</p> <ul style="list-style-type: none"> • 3TB 7.2K Hot Plug 3.5-inch SATA HDD / N8150-567 • 1TB 7.2K Hot Plug 2.5-inch SATA HDD / N8150-544 • 480GB Hot Plug 2.5-inch SAS SSD / N8150-752 • 960GB Hot Plug 2.5-inch SAS SSD / N8150-753 • Quad Port 25GBASE QSFP28 Adapter / N8104-188 <p>Added product</p> <ul style="list-style-type: none"> • SAS controller / N8103-184 (Not support default factory integration) <p>Others:</p> <ul style="list-style-type: none"> • Information in References is updated • Improvement of description in 4. Internal Storage • Correction of errors
2.1	December 25, 2017	<p>Others:</p> <ul style="list-style-type: none"> • N8150-739 240GB Hot Plug 2.5-inch SATA SSD deleted
2.0	December 22, 2017	<p>New products added:</p> <ul style="list-style-type: none"> • 400GB Hot Plug 2.5-inch SAS SSD / N8150-748 • 800GB Hot Plug 2.5-inch SAS SSD / N8150-749 • 400GB Hot Plug 2.5-inch SAS SSD / N8150-750 • 800GB Hot Plug 2.5-inch SAS SSD / N8150-751 • 480GB Hot Plug 2.5-inch SAS SSD / N8150-752 • 960GB Hot Plug 2.5-inch SAS SSD / N8150-753 • Dual Port 25GBASE SFP28 Adapter / N8104-187 • SFP+ Module (10G-SR) / N8104-189 • SFP28 Module(25G-SR) / N8104-190 • QSFP28 Module(100G-SR4) / N8104-191 • 500W Hot Plug Power Supply / N8181-159 <p>Others:</p> <ul style="list-style-type: none"> • Supported SATA drives with SAS Expander Card • Updated the table of the Available Power Supplies
1.0	November 22, 2017	Initial release