

# **NEC Express5800/R120f-2E**

## **Configuration Guide**

### Storage-Rich model



#### **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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# Technical Specification

## Key Features

- High performance with the latest Intel® Xeon® processor E5-2600 v3 product family
- Up to 512 GB of memory capacity, supporting high speed and energy efficient DDR4-2
- Up to 26 x 2.5-inch hard drives or twelve 3.5-inch hard drives plus two 2.5-inch hard drives
- High energy efficiency with power capping feature and 80 PLUS® Platinum power supply
- Full manageability by integrated EXPRESSCOPE Engine 3

## Specification

### 2.5-inch Drive Model

Model		R120f-2E		
<b>Part Number</b>		N8100-2277F		
<b>Processor</b>	<b>Type</b>	Intel® Xeon® processor E5-2620 v3	Intel® Xeon® processor E5-2640 v3	Intel® Xeon® processor E5-2660 v3
	<b>Clock speed</b>	2.40 GHz	2.60 GHz	2.60 GHz
	<b>Number of Processors</b>	1 to 2		
	<b>Cache</b>	15 MB	20 MB	25 MB
	<b>Cores and Threads</b>	6C-12T	8C-16T	10C-20T
<b>Chipset</b>		Intel® C612 Chipset		
<b>Memory</b>	<b>Type</b>	DDR4-2133 Registered DIMM (4/8/16GB), DDR4-2133 Load Reduced DIMM (32GB)		
	<b>Standard Capacity</b>	0 GB		
	<b>Maximum Capacity</b>	512 GB (16 x 32 GB)		
	<b>Memory protection</b>	ECC, x4 SDDC, Memory Mirroring, Memory Lockstep, Memory Sparing		
<b>Internal Storage</b>	<b>Standard Capacity</b>	0 GB		
	<b>Maximum Capacity</b>	SAS HDD : 46.8 TB (26 x 1.8 TB) SATA HDD : 26 TB (26 x 1 TB) SAS SSD : 10.4 TB ( 26 x 400 GB) SATA SSD : 20.8 TB ( 26 x 800 GB)		
	<b>Disk Controller</b>	SATA: 6Gb/s (Integrated) SAS: 12Gb/s (Optional)		
	<b>RAID</b>	SATA : RAID 0/1/10 (Optional), RAID 5/6/50/60 (Optional) SAS : RAID 0/1/5/6/10/50/60 (Optional)		
	<b>Hot Plug</b>	Supported		
	<b>Optical Disk Drive</b>	Optional		
	<b>Optical Drive Bays</b>	0		
	<b>3.5-inch Media Bays</b>	0		
	<b>Disk Drive Bays</b>	26 <sup>1</sup>		
	<b>Expansion Slots</b>	<b>Standard</b>	Total: 5 slots available 2 PCIe 3.0 x16 (x16 connector) 1 PCIe 3.0 x8 (x8 connector) 1 PCIe 3.0 x8 (x8 connector) (Dual processor configuration only) 1 PCIe 2.0 x4 (x8 connector)	

Model		R120e-2E		
Video	Controller (VRAM)	Integrated in Server Management Controller (32MB)		
	Resolution / Color	1600 x 1200 / 16.7M <sup>2</sup>		
Interfaces		2 x VGA (15-pin mini D-sub, 1 x front, 1 x rear) 5 x USB3.0 (2 x front, 2 x rear, 1 x internal) 2 x USB2.0 (2 x rear) 1 to 2 x Serial (9-pin mini D-sub, RS232-C, 1 to 2 x rear) 2 x 1000BASE-T LAN connector (RJ-45, 2 x rear) 1 x Management LAN connector (RJ-45, 1 x rear)		
Server Management		EXPRESSSCOPE Engine 3		
Redundant Fan		Optional, hot plug		
Redundant Power Supply		Optional, hot plug		
Power Supply		1 to 2 x 800 Watt 80 PLUS® Platinum certified hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz		
Power Consumption	Max. Config, Idling	353 VA / 350 Watt	354 VA / 351 Watt	356 VA / 353 Watt
	Max. Config, Operating	763 VA / 758 Watt	821 VA / 815 Watt	902 VA / 895 Watt
Acoustic Noise (Sound Pressure Level) <sup>3</sup>	Max. Config, Idling	53.0dB	53.0dB	53.0dB
	Max. Config, Operating	61.1 dB	62.0 dB	64.2 dB
Dimensions (W x D x H)		448.0 x 683.8 x 87.2 mm / 17.6 x 26.9 x 3.4 in (2U)		
Weight (Minimum / Maximum)		18 kg / 30 kg, 39.68 lbs. / 66.14 lbs.		
Temperature, Relative Humidity (non-condensing)		Operating: 10° to 40° C <sup>4</sup> / 50° to 104° F, 20 to 80% Non-Operating: -10° to 55° C / 14° to 131° F, 20 to 80%		
Regulatory and Safety		FCC, UL, CB, CE, BSMI, UL(Mexico), KC, RoHS		
Operating Systems		Microsoft® Windows Server® 2008 Standard (x86) Microsoft® Windows Server® 2008 Enterprise (x86) Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Red Hat Enterprise Linux 6.5 or later (x86) <sup>5</sup> Red Hat Enterprise Linux 6.5 or later (x86_64) <sup>5</sup> VMware ESXi™ 5.1 Update 2 <sup>6</sup> VMware ESXi™ 5.5 Update 2 <sup>6</sup> VMware ESXi™ 6.0 <sup>6</sup>		

<sup>1</sup> An optional drive cage is required to install more than 24 hard drives.

<sup>2</sup> Maximum resolution available via EXPRESSSCOPE Engine 3 remote console is 1280 x 1024 / 65K colors.

<sup>3</sup> Noise emission was measured in accordance with ISO 7779. The actual value may vary by the operating environment.

<sup>4</sup> Operable up to 35°C (95°F) when N8181-126 Redundant Fan Kit is installed and any of N8150-474/-490/-477/-478/-483/-486/-513 SAS HDD is installed in the rear HDD cage.

<sup>5</sup> For Linux support, contact our sales representative or go to the NEC website at:  
<http://www.nec.com/global/prod/express/linux/index.html>

<sup>6</sup> 5GB or more memory is required.

### 3.5-inch Drive Model

<b>Model</b>	<b>R120d-2E</b>			
<b>Part Number</b>	N8100-2140F, N8100-2141F			
<b>Processor</b>	<b>Type</b>	Intel® Xeon® processor E5-2603 v3	Intel® Xeon® processor E5-2620 v3	Intel® Xeon® processor E5-2640 v3
	<b>Clock speed</b>	1.60 GHz	2.40 GHz	2.60 GHz
	<b>Number of Processors</b>	1 to 2		
	<b>Cache</b>	15 MB	15 MB	20 MB
	<b>Cores and Threads</b>	6C-6T	6C-12T	8C-16T
	<b>Chipset</b>	Intel® C612 Chipset		
<b>Memory</b>	<b>Type</b>	DDR4-2133 Registered DIMM (4/8/16GB), DDR4-2133 Load Reduced DIMM (32GB)		
	<b>Standard Capacity</b>	0 GB		
	<b>Maximum Capacity</b>	512 GB (16 x 32 GB)		
	<b>Memory protection</b>	ECC, x4 SDDC, Memory Mirroring, Memory Lockstep, Memory Sparing		
<b>Internal Storage</b>	<b>Standard Capacity</b>	0 GB		
	<b>Maximum Capacity</b>	SATA HDD : 72 TB (12 x 6 TB) plus 2.5-inch SATA: 2 TB (2 x 1 TB) 2.5-inch SAS: 3.6 TB (2 x 1.8 TB) 2.5-inch SATA SSD: 1.6 TB (2 x 800 GB) 2.5-inch SAS SSD: 800 GB (2 x 400 GB)		
	<b>Disk Controller</b>	SATA: 6Gb/s (Integrated) SAS: 12Gb/s (Optional)		
	<b>RAID</b>	SATA : RAID 0/1/10 (Optional), RAID 5/6/50/60 (Optional) SAS : RAID 0/1/5/6/10/50/60 (Optional)		
	<b>Hot Plug</b>	Supported		
	<b>Optical Disk Drive</b>	Optional		
	<b>Optical Drive Bays</b>	0		
	<b>3.5-inch Media Bays</b>	0		
	<b>Disk Drive Bays</b>	14 <sup>1</sup>		
	<b>Expansion Slot</b>	<b>Standard</b>	Total: 5 slots available 2 PCIe 3.0 x16 (x16 connector) 1 PCIe 3.0 x8 (x8 connector) 1 PCIe 3.0 x8 (x8 connector) (Dual processor configuration only) 1 PCIe 2.0 x4 (x8 connector)	
<b>Video</b>	<b>Controller (VRAM)</b>	Integrated in Server Management Controller (32MB)		
	<b>Resolution / Color</b>	1600 x 1200 / 16.7M <sup>2</sup>		
<b>Interfaces</b>	2 x VGA (15-pin mini D-sub, 1 x front, 1 x rear) 5 x USB3.0 (2 x front, 2 x rear, 1 x internal) 2 x USB2.0 (2 x rear) 1 to 2 x Serial (9-pin mini D-sub, RS232-C, 1 to 2 x rear) 2 x 1000BASE-T LAN connector (RJ-45, 2 x rear) 1 x Management LAN connector (RJ-45, 1 x rear)			
<b>Server Management</b>	EXPRESSSCOPE Engine 3			
<b>Redundant Fan</b>	Optional, hot plug			

Model		R120e-2E		
<b>Redundant Power Supply</b>		Optional, hot plug		
<b>Power Supply</b>		1 to 2 x 800 Watt 80 PLUS® Platinum certified hot plug PSU 100-240 VAC ± 10% 50 / 60 Hz ± 3 Hz		
<b>Power Consumption</b>	<b>Max. Config, Idling</b>	247 VA / 245 Watt	244 VA / 243 Watt	246 VA / 244 Watt
	<b>Max. Config, Operating</b>	605 VA / 601 Watt	664 VA / 660 Watt	730 VA / 725 Watt
<b>Acoustic Noise (Sound Pressure Level)<sup>3</sup></b>	<b>Max. Config, Idling</b>	53.0dB	53.0dB	53.0dB
	<b>Max. Config, Operating</b>	61.1 dB	61.1 dB	62.0 dB
<b>Dimensions (W x D x H)</b>		448.0 x 683.8 x 87.2 mm / 17.6 x 26.9 x 3.4 in (2U)		
<b>Weight (Minimum / Maximum)</b>		18 kg / 31 kg, 39.68 lbs. / 68.34 lbs.		
<b>Temperature, Relative Humidity (non-condensing)</b>		Operating: 10° to 40° C <sup>4</sup> / 50° <sup>4</sup> to 104° F, 20 to 80% Non-Operating: -10° to 55° C / 14° to 131° F, 20 to 80%		
<b>Regulatory and Safety</b>		FCC, UL, CB, CE, BSMI, UL(Mexico), KC, RoHS		
<b>Operating Systems</b>		Microsoft® Windows Server® 2008 Standard (x86) Microsoft® Windows Server® 2008 Enterprise (x86) Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2012 Standard Microsoft® Windows Server® 2012 Datacenter Red Hat Enterprise Linux 6.5 or later (x86) <sup>5</sup> Red Hat Enterprise Linux 6.5 or later (x86_64) <sup>5</sup> VMware ESXi™ 5.1 Update 2 <sup>6</sup> VMware ESXi™ 5.5 Update 2 <sup>6</sup> VMware ESXi™ 6.0 <sup>6</sup>		

<sup>1</sup> An optional drive cage is required to install more than 12 hard drives.

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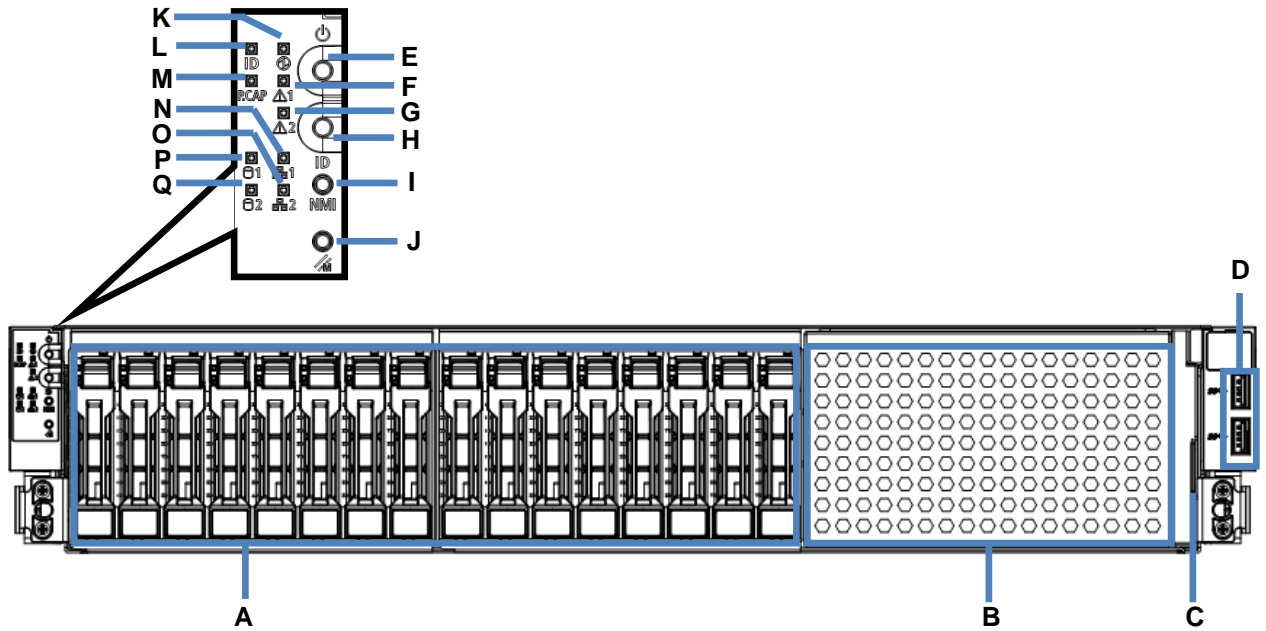
<sup>5</sup> For Linux support, contact our sales representative or go to the NEC website at:  
<http://www.nec.com/global/prod/express/linux/index.html>

<sup>6</sup> 5GB or more memory is required.

# External Views

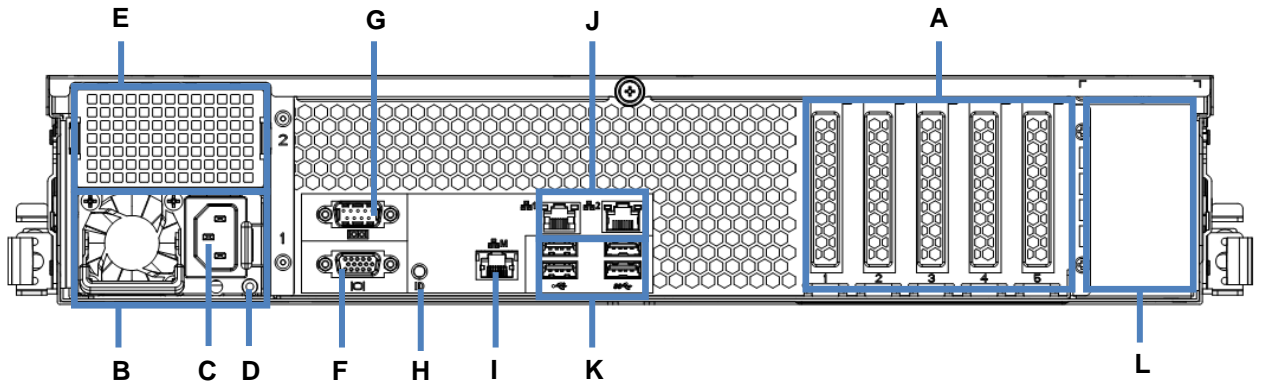
## Front and Rear Views

### Front View for 2.5-inch Drive Model



Legend			
A.	2.5-inch Drive Bays	J.	BMC RESET Switch
B.	2.5-inch Additional HDD Cage Bay	K.	POWER LED
C.	Pull-out Tab	L.	UID LED
D.	USB Connectors	M.	Power Capping LED
E.	POWER Switch	N.	LINK/ACT LED(LAN1)
F.	STATUS LED 1	O.	LINK/ACT LED(LAN2)
G.	STATUS LED 2	P.	DISK LED 1
H.	UID Switch	Q.	DISK LED 2
I.	DUMP (NMI) Switch		

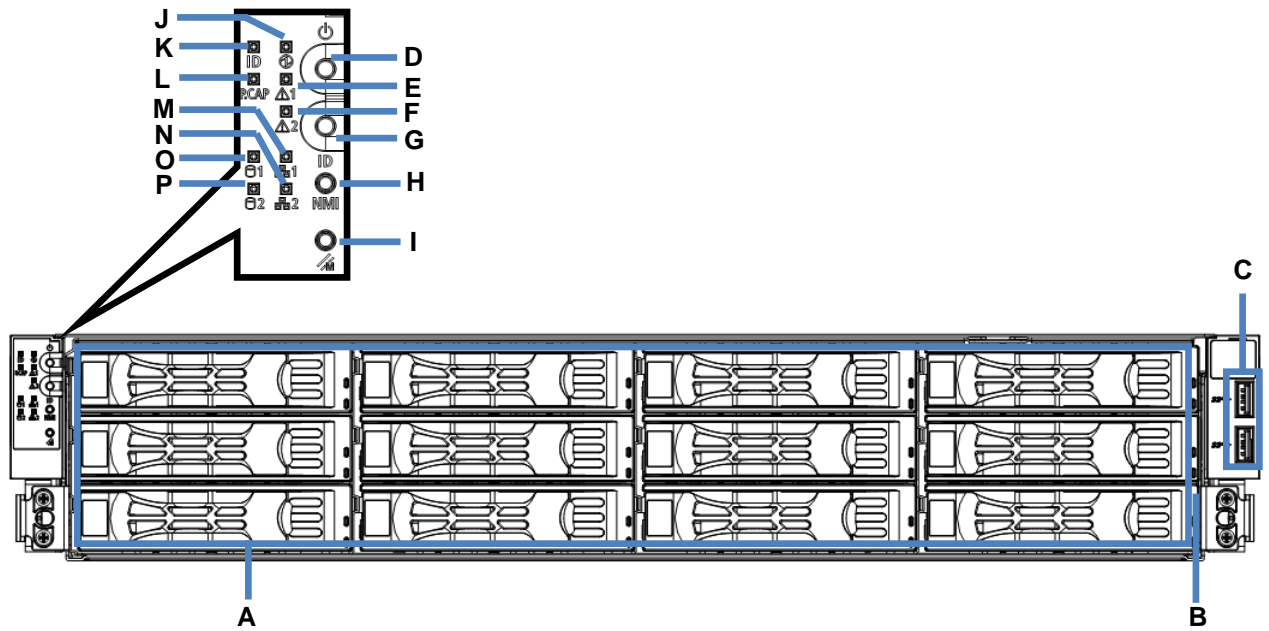
Rear View for 2.5-inch Drive Model



Legend			
A.	PCI Slots (Low-Profile)	G.	Serial Port Connector
B.	Power Supply	H.	UID Switch/LED
C.	AC Inlet	I.	Management LAN Connector
D.	AC POWER LED	J.	LAN Connector
E.	Additional Power Supply Slot	K.	USB Connectors
F.	Display Connector	L.	2.5-inch Additional HDD Cage bay

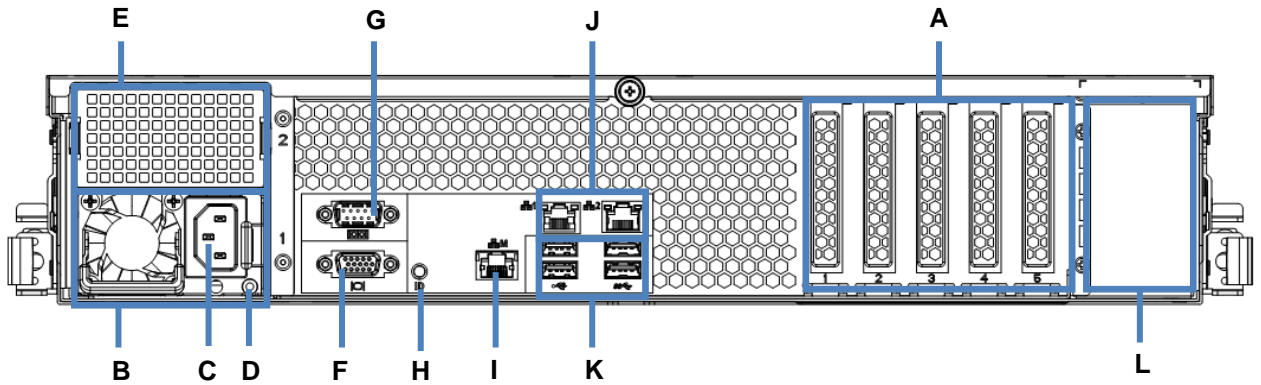


Front View for 3.5-inch Drive Model



Legend	
<b>A.</b>	3.5-inch Drive Bays
<b>B.</b>	Pull-out Tab
<b>C.</b>	USB Connectors
<b>D.</b>	POWER Switch
<b>E.</b>	STATUS LED 1
<b>F.</b>	STATUS LED 2
<b>G.</b>	UIDSwitch
<b>H.</b>	Dump (NMI) Switch
<b>I.</b>	BMC RESET Switch
<b>J.</b>	POWER LED
<b>K.</b>	UID LED
<b>L.</b>	Power Capping LED
<b>M.</b>	LINK/ACT LED(LAN1)
<b>N.</b>	LINK/ACT LED(LAN2)
<b>O.</b>	DISK LED 1
<b>P.</b>	DISK LED 2

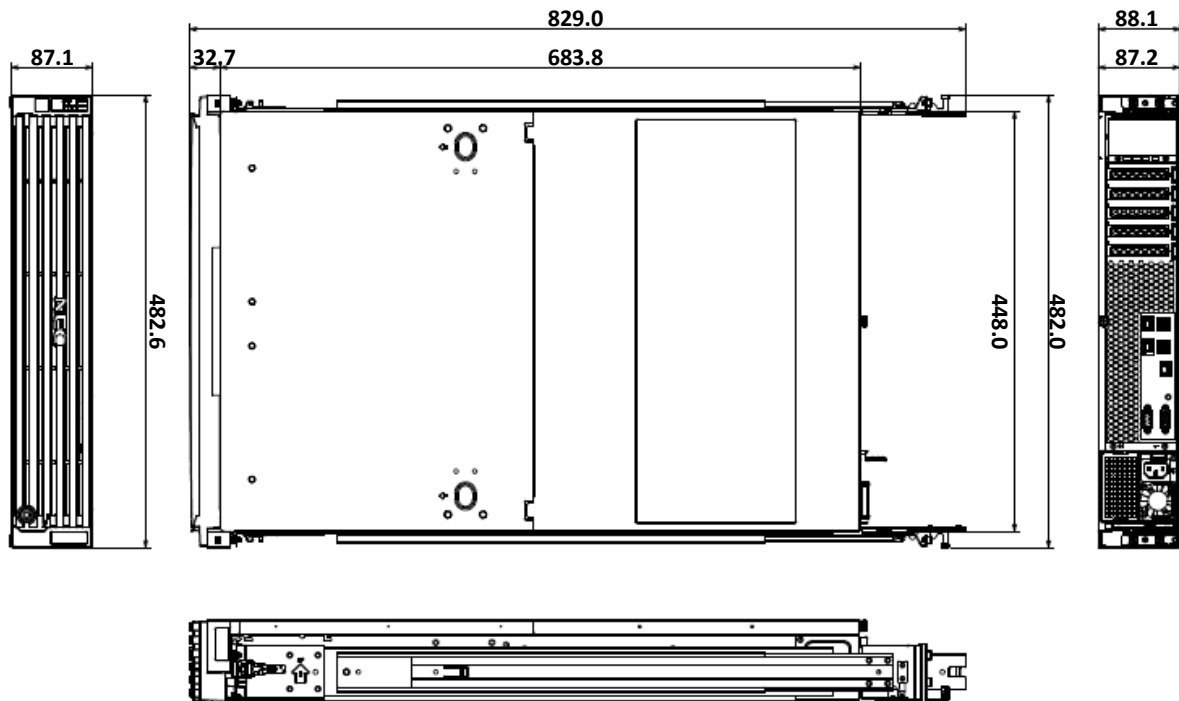
Rear View for 3.5-inch Drive Model



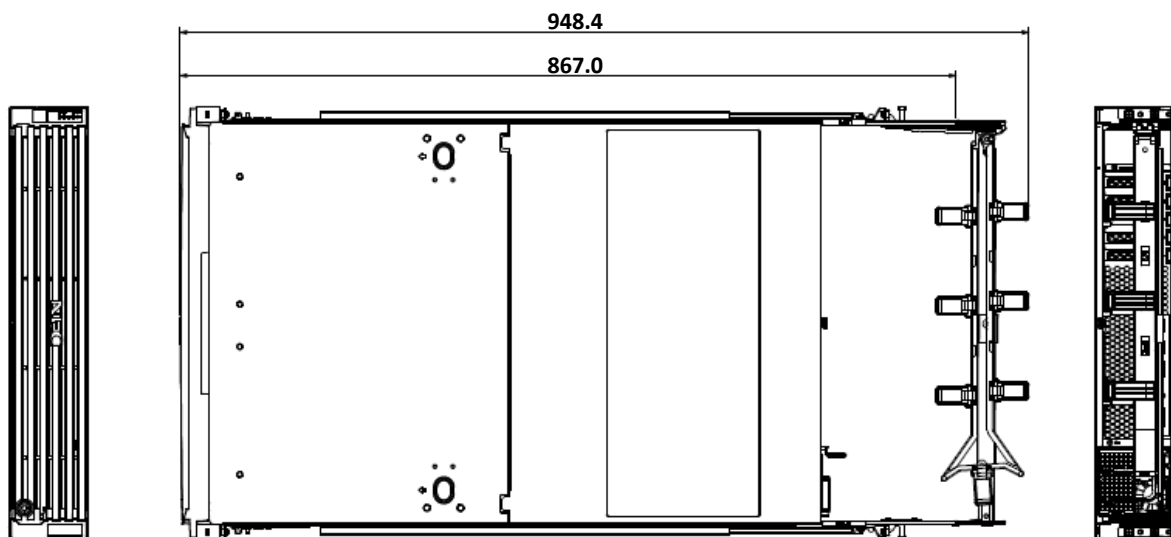
Legend			
A.	PCI Slots (Low-Profile)	G.	Serial Port Connector
B.	Power Supply	H.	UID Switch/LED
C.	AC Inlet	I.	Management LAN Connector
D.	AC POWER LED	J.	LAN Connector
E.	Additional Power Supply Slot	K.	USB Connectors
F.	Display Connector	L.	2.5-inch Additional HDD Cage bay

## Dimensions (mm)

### Without Cable Arm

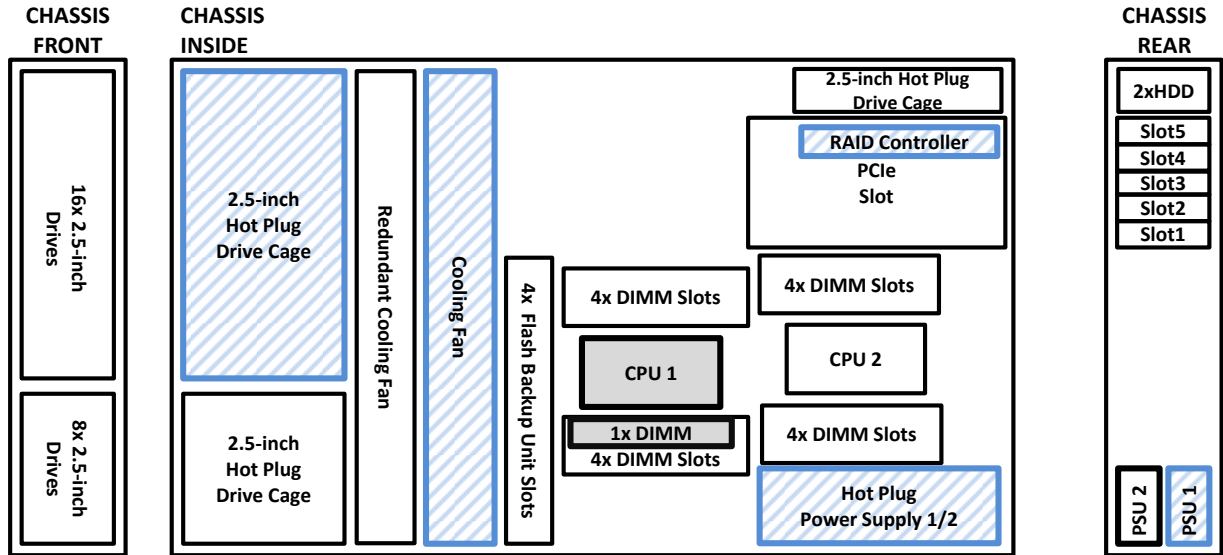


### With Cable Arm



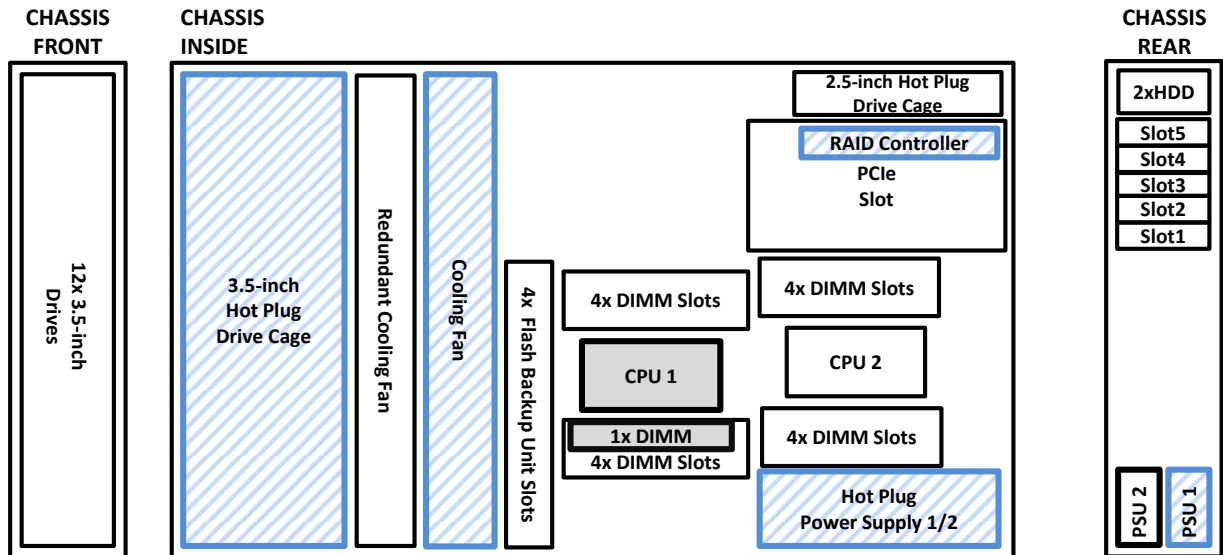
# Configuration Diagram

## 2.5-inch Drive Model



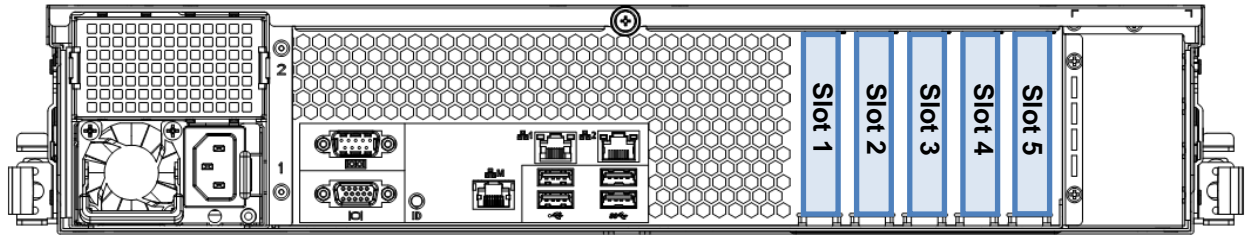
Legend: Standard Components Minimum required components

## 3.5-inch Drive Model



Legend: Standard Components Minimum required components

## Expansion Slot



Legend		Remarks
#1	PCIe 3.0 x8, x8 connector, Low-profile, up to 168 mm length	2 CPUs required
#2	PCIe 3.0 x16, x16 connector, Low-profile, up to 200 mm length	
#3	PCIe 3.0 x8, x8 connector, Low-profile, up to 200 mm length	
#4	PCIe 3.0 x16, x16 connector, Low-profile, up to 200 mm length	
#5	PCIe 2.0 x4, x8 connector, Low-profile, up to 168 mm length	

**NOTE:**

- Slot #1 is only available in a dual processor configuration.

# Server Configuration

## 1 Base Models

### 2.5-inch Drive Model

Product Name / Description	Part Number
<b>NEC Express5800/R120f-2E</b> no processor, no RAM, no HDD, no ODD Including : 1 x 800 Watt 80 PLUS® Platinum Power Supply Unit, Front Bezel, 16 x 2.5-inch Drive Cage, SAS Expander card, 2 sets of Mini-SAS HD cable, EXPRESSBUILDER DVD	N8100-2277F

**NOTE:**

- The base model must be ordered with a processor kit and a memory kit.

### 3.5-inch Drive Model

Product Name / Description	Part Number
<b>NEC Express5800/R120f-2E</b> no processor, no RAM, no HDD, no ODD Including : 1 x 800 Watt 80 PLUS® Platinum Power Supply Unit, Front Bezel, 12 x 3.5-inch Drive Cage, SAS Expander card, 2 sets of Mini-SAS HD cable, EXPRESSBUILDER DVD	N8100-2281F

**NOTE:**

- The base model must be ordered with a processor kit and a memory kit.

## 2 Processors and Heat Sink

### 2.1 For 2.5-inch Drive Model

Available sockets: 2

Category	Product Name / Description	Part Number
<b>Processors</b> 1 Processor Required	<b>Xeon E5-2620 v3 Processor Kit</b> Intel® Xeon® Processor E5-2620 v3 (2.40 GHz, 6C/12T, 15 MB)	N8101-921F
	<b>Xeon E5-2640 v3 Processor Kit</b> Intel® Xeon® Processor E5-2640 v3 (2.60 GHz, 8C/16T, 20 MB)	N8101-923F
	<b>Xeon E5-2660 v3 Processor Kit</b> Intel® Xeon® Processor E5-2660 v3 (2.60 GHz, 10C/20T, 25 MB)	N8101-925F
<b>Heat Sink</b>	<b>1st Processor Heat Sink</b> For 1 <sup>st</sup> Processor	(Standard)
	<b>2nd Processor Heat Sink</b> For 2 <sup>nd</sup> Processor	N8101-927F

**NOTE:**

- Minimum one processor kit from above must be installed.
- The processors must be the same to configure dual processor system.

## 2.2 For 3.5-inch Drive Model

Available sockets: 2

Category	Product Name / Description	Part Number
<b>Processors</b> 1 Processor Required	<b>Xeon E5-2603 v3 Processor Kit</b> Intel® Xeon® Processor E5-2603 v3 (1.60 GHz, 6C/6T, 15 MB)	N8101-919F
	<b>Xeon E5-2620 v3 Processor Kit</b> Intel® Xeon® Processor E5-2620 v3 (2.40 GHz, 6C/12T, 15 MB)	N8101-921F
	<b>Xeon E5-2640 v3 Processor Kit</b> Intel® Xeon® Processor E5-2640 v3 (2.60 GHz, 8C/16T, 20 MB)	N8101-923F
<b>Heat Sink</b>	<b>1st Processor Heat Sink</b> For 1 <sup>st</sup> Processor	(Standard)
	<b>2nd Processor Heat Sink</b> For 2 <sup>nd</sup> Processor	N8101-927F

**NOTE:**

- Minimum one processor kit from above must be installed.
- The processors must be the same to configure dual processor system.

### 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.

Number of Logical Processors Supported by Operating Systems	Maximum Available Number of Logical Processors
Microsoft Windows Server 2008 Standard (x86) Microsoft Windows Server 2008 Enterprise (x86)	32 <sup>1</sup> 32
Microsoft Windows Server 2008 R2 Standard (x64) Microsoft Windows Server 2008 R2 Enterprise (x64)	256 <sup>1</sup> 48
Microsoft Windows Server 2012 Standard Microsoft Windows Server 2012 Datacenter Microsoft Windows Server 2012 R2 Standard Microsoft Windows Server 2012 R2 Datacenter	640 <sup>1</sup> 48
Red Hat Enterprise Linux 6	32 32
Red Hat Enterprise Linux 6 (x86_64)	160 48
VMware ESXi 5.1	160 48
VMware ESXi 5.5	320 48
VMware ESXi 6.0	480 48

<sup>1</sup> The maximum numbers of logical processors when using Hyper-V are below:  
 - Windows Server 2008 : 24 logical processors  
 - Windows Server 2008 R2 : 64 logical processors  
 - Windows Server 2012 : 320 logical processors  
 - Windows Server 2012 R2 : 320 logical processors

## 3 Memory

### 3.1 Memory Configuration

Refer to the section in accordance with your memory configuration:

#### Other OS than Windows Server 2008 Standard

- Independent Channel: Refer to [3.2.1](#)
- Memory Sparing Configuration: Refer to [3.2.2](#)
- Memory Mirroring / Memory Lockstep Configuration: Refer to [3.2.3](#)

#### Windows Server 2008 Standard

- Independent Channel: Refer to [3.3.1](#)

### Memory Configuration Feature Comparison

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

	Independent Channel	Memory Sparing	Memory Lockstep	Memory Mirroring
<b>Performance</b>	Best	Better	Better	Good
<b>Data Protection</b>	No	Multiple single bit error protection	No	Multiple single bit and multi bit error protection
<b>Redundancy</b>	No	Partly	No	Fully
<b>Data Correction</b>	ECC, x4 SDDC	ECC, x4 SDDC	ECC, x8 SDDC	ECC, x4 SDDC
<b>Available Memory</b>	Full physical memory	3/4 physical memory (16GB DIMM)	Full physical memory	Half physical memory
<b>Available Memory Channels</b>	4	4	4	4
<b>Notes</b>	-	All DIMMs in the system must be identical.	Paired DIMMs must be identical.	Paired DIMMs must be identical.

### 3.2 Other OS than Windows Server 2008 Standard

#### 3.2.1 Independent Channel Configuration

Available slots: 8 per processor

Category	Product Name / Description	Part Number
<b>Registered DIMM (RDIMM)</b>	<b>4GB DDR4-2133 REG Memory Kit (1x4GB)</b> 1 x 4GB Registered ECC DIMM, DDR4-2133(PC4-2133)	N8102-644F
	<b>8GB DDR4-2133 REG Memory Kit (1x8GB)</b> 1 x 8GB Registered ECC DIMM, DDR4-2133(PC4-2133)	N8102-645F
	<b>16GB DDR4-2133 REG Memory Kit (1x16GB)</b> 1 x 16GB Registered ECC DIMM, DDR4-2133(PC4-2133)	N8102-646F
<b>Load Reduced DIMM (LRDIMM)</b>	<b>32GB DDR4-2133 LR Memory Kit (1x32GB)</b> 1 x 32GB Load Reduced ECC DIMM, DDR4-2133(PC4-2133)	N8102-647F

**NOTE:**

- Minimum one memory kit per processor must be installed.
- It is recommended to install memory kits in multiples of four (four identical DIMMs) for quad-channel symmetric memory configurations to increase memory transfer speed.



- When two processors are installed, balance the DIMMs across the two processors.
- Mix configurations of UDIMM/RDIMM are not supported.
- At least 5 GB of memory is required for VMware ESXi 5.5 and VMware ESXi 6.0.

### 3.2.2 Memory Sparing Configuration

Available slots: 8 per processor

Product Name / Description	Part Number
<b>32GB DDR4-2133 REG Memory Kit (2x16GB)</b> 2 x 16GB Registered ECC DIMM, DDR4-2133(PC4-2133)	N8102-655

**NOTE:**

- Minimum one memory kit per processor must be installed.
- The configured memories must be identical.
- The logical memory capacity becomes three-fourths of physical capacity.

### 3.2.3 Memory Mirroring / Memory Lockstep Configuration

Available slots: 8 per processor

Product Name / Description	Part Number
<b>16GB DDR4-2133 REG Memory Kit (2x8GB)</b> 2 x 8GB Registered ECC DIMM, DDR4-2133(PC4-2133)	N8102-650
<b>32GB DDR4-2133 REG Memory Kit (2x16GB)</b> 2 x 16GB Registered ECC DIMM, DDR4-2133 (PC4-2133)	N8102-651

**NOTE:**

- Minimum one memory kit per processor must be installed.
- The logical memory capacity becomes a half of physical capacity on memory mirroring configuration.

## 3.3 Windows Server 2008 Standard

### 3.3.1 Independent Channel Configuration

Available slots: 1

Product Name / Description	Part Number
<b>4GB DDR4-2133 REG Memory Kit (1x4GB)</b> 1 x 4GB Registered ECC DIMM, DDR4-2133(PC4-2133)	N8102-644F

**NOTE:**

- Only one Memory Kit can be installed regardless of the number of processors.

### Maximum Memory Speed

See the table below for the actual maximum memory transfer speed in Independent Channel / Memory Sparring Configuration.

DDR4 memory speed depends on the type of DIMMs, the native memory bus speed of the memory controller and memory configuration. All memory buses operate at the clock frequency of the DIMM with the lowest frequency.

Processor Type	Populated DIMMs	# of DIMMs per processor	DIMM Speed
E5-2603 v3	RDIMM: 4, 8, 16 GB LRDIMM: 32GB	-	1600 MHz

E5-2620 v3	RDIMM: 4, 8, 16 GB	-	1866 MHz
E5-2640 v3	LRDIMM: 32GB	-	
E5-2660 v3	RDIMM: 4, 8, 16 GB	-	2133 MHz
	LRDIMM: 32GB		

### Maximum Available Memory

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

The maximum available memory is less than the maximum physical memory supported by your system because some chipsets require PCI resource space of about 750MB. PCI resource requirements vary depending on the type and the number of PCI cards you are using.

	Maximum Memory Size Supported by OS	Maximum Available Memory
Microsoft Windows Server 2008 Standard (x86) <sup>1</sup>	<b>4 GB</b>	<b>4 GB (HW-DEP enabled)</b> <b>App. 2 GB (HW-DEP disabled)</b>
Microsoft Windows Server 2008 R2 Standard <sup>1</sup>	<b>32 GB</b>	<b>32 GB</b>
Microsoft Windows Server 2008 Enterprise (x86) <sup>1</sup>	<b>64 GB</b>	<b>64 GB</b>
Microsoft Windows Server 2008 R2 Enterprise <sup>1</sup>	<b>2 TB</b>	<b>512 GB</b>
Microsoft Windows Server 2012 Standard <sup>1</sup>	<b>4 TB</b>	<b>512 GB</b>
Microsoft Windows Server 2012 Datacenter <sup>1</sup>		
Microsoft Windows Server 2012 R2 Standard <sup>1</sup>		
Microsoft Windows Server 2012 R2 Datacenter <sup>1</sup>		
Red Hat Enterprise Linux 6	<b>16 GB</b>	<b>16 GB</b>
Red Hat Enterprise Linux 6 (x86_64)	<b>3 TB</b>	<b>512 GB</b>
VMware ESXi 5.1 <sup>2</sup>	<b>2 TB</b>	<b>512 GB</b>
VMware ESXi 5.5 <sup>2</sup>	<b>4 TB</b>	<b>512 GB</b>
VMware ESXi 6.0 <sup>3</sup>	<b>6 TB</b>	<b>512 GB</b>

<sup>1</sup> The maximum available memory size of Hyper-V systems are below:

- Windows Server 2008 Standard (x64) and Windows Server 2008 R2 Standard : 32 GB
- Windows Server 2008 Enterprise (x64) and Windows Server 2008 R2 Enterprise : 1TB
- Windows Server 2012, Windows Server 2012 R2 : 4 TB

<sup>2</sup> Up to 1 TB of the main memory is available to each virtual machine.

<sup>3</sup> Up to 4TB of main memory is available to each virtual machine.

## 4 Internal Hard Disk Drives

### 4.1 RAID Configuration

Refer to the section in accordance with your disk form factor and RAID configuration.

#### 4.1.1 2.5-inch Drive Model

Refer to the section in accordance with your OS and RAID configuration. For example, when you would like to configure RAID 0/1/10 1GB cache with Windows Server 2012 R2, refer to the section 4.2.1 for the required components and then refer to the section 4.3.2 for the hard drives.

Operating System	Supported RAID configuration		Supported HDD/SSD	
	RAID and Cache	Section		
Windows Server 2008 Standard	RAID 0/1/10	1GB Cache	4.2.1	4.3.1
Windows Server 2008 Enterprise	RAID 5/6/50/60	1GB Cache	4.2.2	
Windows Server 2008 R2 Standard	RAID 5/6/50/60	2GB Cache	4.2.3	
Windows Server 2008 R2 Enterprise				
Red Hat Enterprise Linux 6				
Windows Server 2012 Standard	RAID 0/1/10	1GB Cache	4.2.1	4.3.2
Windows Server 2012 Datacenter	RAID 5/6/50/60	1GB Cache	4.2.2	
Windows Server 2012 R2 Standard	RAID 5/6/50/60	2GB Cache	4.2.3	
Windows Server 2012 R2 Datacenter				
Red Hat Enterprise Linux 6 (x86_64) <sup>1</sup>				
VMware ESXi 5.1	RAID 0/1/10	1GB Cache	4.2.1	4.3.3
VMware ESXi 5.5	RAID 5/6/50/60	1GB Cache	4.2.2	
VMware ESXi 6.0	RAID 5/6/50/60	2GB Cache	4.2.3	

<sup>1</sup> If you use Red Hat Enterprise Linux 6 (x86\_64) KVM, select HDD/SSD from the section 4.3.1

**NOTE:**

- All drives within a RAID array should be of the same type, capacity and rotation speed. Also, hard drives in the back side (slot 24 to 25) must be in a separate RAID array than RAID arrays of hard drives in the front side (slot 0 to 23) for configuration 4.2.1 to 4.2.3.
- Dedicated Hot Spare / Global Hot Spare are supported by using RAID controller card (PCI Express). However, Global Hot Spare is not supported on the configuration 4.2.1 to 4.2.3. Also, hard drives in the back side cannot be used as Hot Spare drives of a RAID array of hard drives in the front side and front side drives cannot be used as Hot Spare drives of a RAID array of hard drives in the back side.
- Up to two kinds of drives selected from SAS 10K HDDs, SAS 15K HDDs, SATA HDDs, SAS SSDs and SATA SSDs can be mixed in each drive cage.
- 512B sector HDD and 4KB sector HDD cannot be mixed.
- It is recommended to set RAID array configuration drives less than eight per disk group in order to minimize the risk of becoming multiple hard drives failure.
- 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.
- Operable ambient temperature is up to 35°C (95°F) when N8181-126 Redundant Fan Kit is installed and any of N8150-474/-490/-477/-478/-483/-486/-513 SAS HDD is installed in the rear HDD cage.

### 4.1.2 3.5-inch Drive Model

Refer to the section in accordance with your OS and RAID configuration. For example, when you would like to configure RAID 0/1/10 1GB cache with Windows Server 2012 R2, refer to the section 4.2.4 for the required components and then refer to the section 4.3.5 and/or 4.3.2 for the hard drives.

Operating System	Supported RAID configuration		Section	Supported HDD/SSD
	RAID and Cache			
Windows Server 2008 Standard	RAID 0/1/10	1GB Cache	4.2.4	3.5-inch: 4.3.4
Windows Server 2008 Enterprise	RAID 5/6/50/60	1GB Cache	4.2.5	2.5-inch: 4.3.1
Windows Server 2008 R2 Standard	RAID 5/6/50/60	2GB Cache	4.2.6	
Windows Server 2008 R2 Enterprise				
Red Hat Enterprise Linux 6				
Windows Server 2012 Standard	RAID 0/1/10	1GB Cache	4.2.4	3.5-inch: 4.3.5
Windows Server 2012 Datacenter	RAID 5/6/50/60	1GB Cache	4.2.5	2.5-inch: 4.3.2
Windows Server 2012 R2 Standard	RAID 5/6/50/60	2GB Cache	4.2.6	
Windows Server 2012 R2 Datacenter				
Red Hat Enterprise Linux 6 (x86_64) <sup>1</sup>				
VMware ESXi 5.1	RAID 0/1/10	1GB Cache	4.2.4	3.5-inch: 4.3.4
VMware ESXi 5.5	RAID 5/6/50/60	1GB Cache	4.2.5	2.5-inch: 4.3.3
VMware ESXi 6.0	RAID 5/6/50/60	2GB Cache	4.2.6	

<sup>1</sup> If you use Red Hat Enterprise Linux 6 (x86\_64) KVM, select HDD/SSD from the section 4.3.4 and 4.3.1.

**NOTE:**

- All drives within a RAID array should be of the same type, capacity and rotation speed. Also, hard drives in the back side (slot 24 to 25) must be in a separate RAID array than RAID arrays of hard drives in the front side (slot 0 to 11) for configuration 4.2.4 to 4.2.6.
- Dedicated Hot Spare / Global Hot Spare are supported by using RAID controller card (PCI Express). However, Global Hot Spare is not supported on the configuration 4.2.4 to 4.2.6. Also, hard drives in the back side cannot be used as Hot Spare drives of a RAID array of hard drives in the front side and front side drives cannot be used as Hot Spare drives of a RAID array of hard drives in the back side.
- It is recommended to set RAID array configuration drives less than eight per disk group in order to minimize the risk of becoming multiple hard drives failure.
- 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.
- Operable ambient temperature is up to 35°C (95°F) when N8181-126 Redundant Fan Kit is installed and any of N8150-474/-490/-477/-478/-483/-486/-513 SAS HDD is installed in the rear HDD cage.

## 4.2 Internal Drive Configuration for 2.5-inch Drive Model

### 4.2.1 Up to 26 Drives with RAID 0/1 Controller with 1GB Cache

Category	Product Name / Description	Part Number
<b>Storage Controller Required</b>	<b>RAID Controller (1GB, RAID 0/1)</b> LSI MegaRAID SAS 9362-8i RAID 0/1/10, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-176
<b>Flash Backup Recommended</b>	<b>Flash Backup Unit</b> for LSI MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x mini-SAS to 1 x mini-SAS, 2 sets	(Standard)
<b>Drive Cage</b>	<b>2.5-inch Drive Cage</b> 16 x 2.5-inch hot plug drive bays	(Standard)
<b>Optional Drive Cage (For more than 16 Drives on the front)</b>	<b>2.5-inch Hot Plug Drive Cage Kit</b> 8 x 2.5-inch hot plug drive bays Including 2 sets of 1 x Mini SAS HD to 1 x Mini SAS HD cable	N8154-75
<b>Optional Drive Cage (Rear side)</b>	<b>2.5-Inch Drive Cage</b> 2 x 2.5-inch hot plug drive bays Including 1 set of 1 x Mini SAS HD to 1 x Mini SAS HD cable and non-hot plug Fan.	N8154-76

**NOTE:**

- For Supported HDD/SSD, refer to [4.3.1](#) for Windows Server 2008/2008R2, Red Hat Enterprise Linux 6 or Red Hat Enterprise Linux 6(x86\_64) with KVM feature. Refet to [4.3.2](#) for Windows Server 2012/2012R2, Red Hat Enterprise Linux 6(x86\_64) without KVM feature. Refer to [4.3.3](#) for VMware.
- 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, SAS SSDs and SATA SSDs can be mixed in each drive cage.

### 4.2.2 Up to 26 Drives with RAID 5/6 Controller with 1GB Cache

Category	Product Name / Description	Part Number
<b>Storage Controller Required</b>	<b>RAID Controller (1GB, RAID 0/1/5/6)</b> LSI MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-177
<b>Flash Backup Recommended</b>	<b>Flash Backup Unit</b> for LSI MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x mini-SAS to 1 x mini-SAS, 2 sets	(Standard)
<b>Drive Cage</b>	<b>2.5-inch Drive Cage</b> 16 x 2.5-inch hot plug drive bays	(Standard)
<b>Optional Drive Cage (For more than 16 Drives on the front)</b>	<b>2.5-inch Hot Plug Drive Cage Kit</b> 8 x 2.5-inch hot plug drive bays Including 2 sets of 1 x Mini SAS HD to 1 x Mini SAS HD cable	N8154-75
<b>Optional Drive Cage (Rear side)</b>	<b>2.5-Inch Drive Cage</b> 2 x 2.5-inch hot plug drive bays Including 1 set of 1 x Mini SAS HD to 1 x Mini SAS HD cable and non-hot plug Fan.	N8154-76

**NOTE:**

- For Supported HDD/SSD, refer to [4.3.1](#) for Windows Server 2008/2008R2, Red Hat Enterprise Linux 6 or Red Hat Enterprise Linux 6(x86\_64) with KVM feature. Refet to [4.3.2](#) for Windows Server 2012/2012R2, Red Hat Enterprise Linux 6(x86\_64) without KVM feature. Refer to [4.3.3](#) for VMware.
- 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, SAS SSDs

and SATA SSDs can be mixed in each drive cage.

#### 4.2.3 Up to 26 Drives with RAID 5/6 Controller with 2 GB Cache

Category	Product Name / Description	Part Number
<b>Storage Controller Required</b>	<b>RAID Controller (2GB, RAID 0/1/5/6)</b> LSI MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-178
<b>Flash Backup Recommended</b>	<b>Flash Backup Unit</b> for LSI MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x mini-SAS to 1 x mini-SAS, 2 sets	(Standard)
<b>Drive Cage</b>	<b>2.5-inch Drive Cage</b> 16 x 2.5-inch hot plug drive bays	(Standard)
<b>Optional Drive Cage (For more than 16 Drives on the front)</b>	<b>2.5-inch Hot Plug Drive Cage Kit</b> 8 x 2.5-inch hot plug drive bays Including 2 sets of 1 x Mini SAS HD to 1 x Mini SAS HD cable	N8154-75
<b>Optional Drive Cage (Rear side)</b>	<b>2.5-Inch Drive Cage</b> 2 x 2.5-inch hot plug drive bays Including 1 set of 1 x Mini SAS HD to 1 x Mini SAS HD cable and non-hot plug Fan.	N8154-76

**NOTE:**

- For Supported HDD/SSD, refer to [4.3.1](#) for Windows Server 2008/2008R2, Red Hat Enterprise Linux 6 or Red Hat Enterprise Linux 6(x86\_64) with KVM feature. Refet to [4.3.2](#) for Windows Server 2012/2012R2, Red Hat Enterprise Linux 6(x86\_64) without KVM feature. Refer to [4.3.3](#) for VMware.
- 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, SAS SSDs and SATA SSDs can be mixed in each drive cage.

#### 4.2.4 3.5-inch and 2.5-inch Drives with RAID 0/1 Controller with 1GB Cache

Category	Product Name / Description	Part Number
<b>Storage Controller Required</b>	<b>RAID Controller (1GB, RAID 0/1)</b> LSI MegaRAID SAS 9362-8i RAID 0/1/10, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-176
<b>Flash Backup Recommended</b>	<b>Flash Backup Unit</b> for LSI MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 2 sets	(Standard)
<b>Drive Cage</b>	<b>3.5-inch Drive Cage</b> 12 x 3.5-inch hot plug drive bays	(Standard)
<b>Optional Drive Cage (Rear side)</b>	<b>2.5-Inch Drive Cage</b> 2 x 2.5-inch hot plug drive bays Including 1 set of 1 x Mini SAS HD to 1 x Mini SAS HD cable and non-hot plug Fan.	N8154-76

**NOTE:**

- For Supported HDD/SSD, refer to [4.3.4](#) (3.5-inch) and [4.3.1](#) (2.5-inch) for Windows Server 2008/2008R2, Red Hat Enterprise Linux 6 or Red Hat Enterprise Linux 6(x86\_64) with KVM feature. Refet to [4.3.5](#) (3.5-inch) and [4.3.2](#) (2.5-inch) for Windows Server 2012/2012R2, Red Hat Enterprise Linux 6(x86\_64) without KVM feature. Refer to [4.3.4](#) (3.5-inch) and [4.3.3](#) for VMware.
- All drives within a RAID array should be of the same type, capacity and rotation speed.

#### 4.2.5 3.5-inch and 2.5-inch Drives with RAID 5/6 Controller with 1GB Cache

Category	Product Name / Description	Part Number
<b>Storage Controller</b> <b>Required</b>	<b>RAID Controller (1GB, RAID 0/1/5/6)</b> LSI MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 1GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-177
<b>Flash Backup</b> <b>Recommended</b>	<b>Flash Backup Unit</b> for LSI MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 2 sets	(Standard)
<b>Drive Cage</b>	<b>3.5-inch Drive Cage</b> 12 x 3.5-inch hot plug drive bays	(Standard)
<b>Optional Drive Cage</b> <b>(Rear side)</b>	<b>2.5-Inch Drive Cage</b> 2 x 2.5-inch hot plug drive bays Including 1 set of 1 x Mini SAS HD to 1 x Mini SAS HD cable and non-hot plug Fan.	N8154-76

**NOTE:**

- For Supported HDD/SSD, refer to [4.3.4](#) (3.5-inch) and [4.3.1](#) (2.5-inch) for Windows Server 2008/2008R2, Red Hat Enterprise Linux 6 or Red Hat Enterprise Linux 6(x86\_64) with KVM feature. Refer to [4.3.5](#) (3.5-inch) and [4.3.2](#) (2.5-inch) for Windows Server 2012/2012R2, Red Hat Enterprise Linux 6(x86\_64) without KVM feature. Refer to [4.3.4](#) (3.5-inch) and [4.3.3](#) for VMware.
- All drives within a RAID array should be of the same type, capacity and rotation speed.

#### 4.2.6 3.5-inch and 2.5-inch Drives with RAID 5/6 Controller with 2GB Cache

Category	Product Name / Description	Part Number
<b>Storage Controller</b> <b>Required</b>	<b>RAID Controller (2GB, RAID 0/1/5/6)</b> LSI MegaRAID SAS 9362-8i RAID0/1/5/6/10/50/60, 2GB, Int. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s	N8103-178
<b>Flash Backup</b> <b>Recommended</b>	<b>Flash Backup Unit</b> for LSI MegaRAID SAS 9362-8i 650mm Cable for Flash Backup Unit included	N8103-181
<b>Cable</b>	<b>Internal SAS/SATA Cable</b> 1 x Mini SAS HD to 1 x Mini SAS HD, 2 sets	(Standard)
<b>Drive Cage</b>	<b>3.5-inch Drive Cage</b> 12 x 3.5-inch hot plug drive bays	(Standard)
<b>Optional Drive Cage</b> <b>(Rear side)</b>	<b>2.5-Inch Drive Cage</b> 2 x 2.5-inch hot plug drive bays Including 1 set of 1 x Mini SAS HD to 1 x Mini SAS HD cable and non-hot plug Fan.	N8154-76

**NOTE:**

- For Supported HDD/SSD, refer to [4.3.4](#) (3.5-inch) and [4.3.1](#) (2.5-inch) for Windows Server 2008/2008R2, Red Hat Enterprise Linux 6 or Red Hat Enterprise Linux 6(x86\_64) with KVM feature. Refer to [4.3.5](#) (3.5-inch) and [4.3.2](#) (2.5-inch) for Windows Server 2012/2012R2, Red Hat Enterprise Linux 6(x86\_64) without KVM feature. Refer to [4.3.4](#) (3.5-inch) and [4.3.3](#) for VMware.
- All hard drives within a RAID array should be of the same capacity and rotation speed.

### 4.3 Supported HDD/SDD

#### 4.3.1 2.5-inch drives for RAID Controller Configuration (1)

For Windows Server 2008/2008R2, Red Hat Enterprise Linux 6, or KVM in Red Hat Enterprise Linux 6(x86\_64)

Category		Product Name / Description	Part Number	
<b>Drive</b> <b>For</b> <b>2.5-inch</b> <b>drive</b> <b>model:</b> <b>Standard :</b> <b>16 slots</b> <b>available</b> <b>Max :</b> <b>26 slots</b> <b>available</b>  <b>For</b> <b>3.5-inch</b> <b>drive</b> <b>model:</b> <b>2 slots</b> <b>available</b>	<b>SAS HDD</b>	<b>300GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-479	
		<b>450GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-480	
		<b>600GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-481	
		<b>900GB 10K Hot Plug 2.5-inch SAS HDD</b> 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-482	
		<b>1.2TB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-483	
		<b>300GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512B sector	N8150-485	
		<b>450GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512B sector	N8150-486	
		<b>600GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512B sector	N8150-518	
		<b>SATA HDD</b>	<b>250GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 250 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512B sector	N8150-487
		<b>500GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512B sector	N8150-488	
		<b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512B sector	N8150-489	
		<b>SAS SSD</b>	<b>200GB Hot Plug 2.5-inch SAS SSD</b> 1 x 200 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512B sector	N8150-721
		<b>400GB Hot Plug 2.5-inch SAS SSD</b> 1 x 400 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512B sector	N8150-722	
		<b>SATA SSD</b>	<b>100GB Hot Plug 2.5-inch SATA SSD</b> 1 x 100 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-724
	<b>200GB Hot Plug 2.5-inch SATA SSD</b> 1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-725		
	<b>400GB Hot Plug 2.5-inch SATA SSD</b> 1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-726		
	<b>800GB Hot Plug 2.5-inch SATA SSD</b> 1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-727		

**NOTE:**

- 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, SAS SSDs and SATA SSDs can be mixed in each drive cage



### 4.3.2 2.5-inch drives for RAID Controller Configuration (2)

For Windows Server 2012/2012R2 or Red Hat Enterprise Linux 6(x86\_64) without KVM

Category	Product Name / Description	Part Number
<b>Drive For 2.5-inch drive model: Standard : 16 slots available Max : 26 slots available For 3.5-inch drive model: 2 slots available</b>	<b>SAS HDD (4KB) See NOTE</b> <b>300GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 4KB sector	N8150-470
	<b>450GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 4KB sector	N8150-471
	<b>600GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 4KB sector	N8150-472
	<b>900GB 10K Hot Plug 2.5-inch SAS HDD</b> 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 4KB sector	N8150-473
	<b>1.2TB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 4KB sector	N8150-474
	<b>1.8TB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 1.8TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 4KB sector	N8150-490
	<b>300GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 4KB sector	N8150-476
	<b>450GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 4KB sector	N8150-477
	<b>600GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 4KB sector	N8150-478
	<b>SAS HDD (512B)</b> <b>300GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-479
	<b>450GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-480
	<b>600GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-481
	<b>900GB 10K Hot Plug 2.5-inch SAS HDD</b> 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-482
	<b>1.2TB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-483
<b>300GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512B sector	N8150-485	
<b>450GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512B sector	N8150-486	
<b>600GB 15K Hot Plug 2.5-inch SAS HDD</b> 1x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm, 512B sector	N8150-518	
<b>SATA HDD (4KB)</b> <b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 4KB sector	N8150-520	

	<b>2TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 2 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 4KB sector	N8150-521
<b>SATA HDD (512B)</b>	<b>250GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 250 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512B sector	N8150-487
	<b>500GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512B sector	N8150-488
	<b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm, 512B sector	N8150-489
<b>SAS SSD</b>	<b>200GB Hot Plug 2.5-inch SAS SSD</b> 1 x 200 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512B sector	N8150-721
	<b>400GB Hot Plug 2.5-inch SAS SSD</b> 1 x 400 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s, 512B sector	N8150-722
<b>SATA SSD</b>	<b>100GB Hot Plug 2.5-inch SATA SSD</b> 1 x 100 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-724
	<b>200GB Hot Plug 2.5-inch SATA SSD</b> 1 x 200 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-725
	<b>400GB Hot Plug 2.5-inch SATA SSD</b> 1 x 400 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-726
	<b>800GB Hot Plug 2.5-inch SATA SSD</b> 1 x 800 GB SATA SSD, MLC, 2.5-inch, 6b/s, 512B sector	N8150-727

**NOTE:**

- 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, SAS SSDs and SATA SSDs can be mixed in each drive cage.
- When you select 4KB sector HDD, confirm whether your applications support hard drives with 4 KB sector size.
- 512B sector HDD and 4KB sector HDD cannot be mixed.

**4.3.3 2.5-inch drives for RAID Controller Configuration (3)**

For VMware

Category	Product Name / Description	Part Number
<b>Drive For 2.5-inch drive model: Standard : 16 slots Max : 26 slots For 3.5-inch drive model: 2 slots</b>	<b>300GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-479
	<b>450GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-480
	<b>600GB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-481
	<b>900GB 10K Hot Plug 2.5-inch SAS HDD</b> 1x 900 GB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-482
	<b>1.2TB 10K Hot Plug 2.5-inch SAS HDD</b> 1 x 1.2TB SAS HDD, 2.5-inch, 12Gb/s, 10,000 rpm, 512B sector	N8150-483

	<b>300GB 15K Hot Plug 2.5-inch SAS HDD</b> 1 x 300 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm 512B sector	N8150-485
	<b>450GB 15K Hot Plug 2.5-inch SAS HDD</b> 1 x 450 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm 512B sector	N8150-486
	<b>600GB 15K Hot Plug 2.5-inch SAS HDD</b> 1 x 600 GB SAS HDD, 2.5-inch, 12Gb/s, 15,000 rpm 512B sector	N8150-518
<b>SATA HDD</b>	<b>250GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 250 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm 512B sector	N8150-487
	<b>500GB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm 512B sector	N8150-488
	<b>1TB 7.2K Hot Plug 2.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 2.5-inch, 6Gb/s, 7,200 rpm 512B sector	N8150-489
<b>SAS SSD</b>	<b>200GB Hot Plug 2.5-inch SAS SSD</b> 1 x 200 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s 512B sector	N8150-721
	<b>400GB Hot Plug 2.5-inch SAS SSD</b> 1 x 400 GB SAS SSD, eMLC, 2.5-inch, 12Gb/s 512B sector	N8150-722

**NOTE:**

- 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, SAS SSDs and SATA SSDs can be mixed in each drive cage.

#### 4.3.4 3.5-inch drives for RAID Controller Configuration (1)

For Windows Server 2008/2008R2, Red Hat Enterprise Linux 6, VMware or KVM in Red Hat Enterprise Linux 6(x86\_64)

Category	Product Name / Description	Part Number
<b>Drive</b> <b>12 slots</b> <b>available</b>	<b>3.5-inch SATA HDD (512B)</b> <b>500GB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-524
	<b>1TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-504
	<b>2TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 2 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-505
	<b>3TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 3 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-506
	<b>4TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 4 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-507

**NOTE:**

- All drives within a RAID array should be of the same type, capacity and rotation speed.

### 4.3.5 3.5-inch drives for RAID Controller Configuration (2)

For Windows Server 2012/2012R2 or Red Hat Enterprise Linux 6(x86\_64) without KVM

Category	Product Name / Description		Part Number
Drive 12 slots available	3.5-inch SATA HDD (4KB)	<b>2TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 2 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 4K Sector	N8150-499
		<b>4TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 4 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 4K Sector	N8150-501
		<b>6TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 6 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 4K Sector	N8150-503
	3.5-inch SATA HDD (512B)	<b>500GB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 500 GB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-524
		<b>1TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 1 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-504
		<b>2TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 2 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-505
		<b>3TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 3 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-506
		<b>4TB 7.2K Hot Plug 3.5-inch SATA HDD</b> 1 x 4 TB SATA HDD, 3.5-inch, 6Gb/s, 7,200 rpm, 512 Sector	N8150-507

**NOTE:**

- All drives within a RAID array should be of the same type, capacity and rotation speed.
- When you select 4KB sector HDD, confirm whether your applications support hard drives with 4 KB sector size.
- 512B sector HDD and 4KB sector HDD cannot be mixed.

## 5 Optical Drive

Category	Product Name / Description	Part Number
External	<b>External DVD-ROM drive</b> DVD-ROM drive, Bus powered, 1.2 A required DVD Read speed: 4x (DVD-ROM / DVD-R / DVD-RW) CD read speed: 12x (CD-ROM / CD-R/RW)	N8160-91

**NOTE:**

- Up to 1 optical drive can be connected.

## 6 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.

### 6.1 Network Interface Controller

Category	Product Name / Description		Part Number
Adapter	1GbE	<b>1000BASE-T Adapter</b> Broadcom @ BCM5718 Gigabit Ethernet Controller PCIe 2.0 x1	N8104-150
		<b>Dual Port 1000BASE-T Adapter</b> Broadcom @ BCM5718 Gigabit Ethernet Controller PCIe 2.0 x1	N8104-151
		<b>Dual Port 1000BASE-T Adapter</b> Intel@ 82580 Gigabit Ethernet Controller PCIe 2.0 x4	N8104-145

	<b>Quad Port 1000BASE-T Adapter</b> Broadcom® BCM5719 Gigabit Ethernet Controller PCIe 2.0 x4 <b>NOTE:</b> - Network cables with RJ-45 plug covers cannot be used.	N8104-152
<b>10GbE</b>	<b>10GBASE SFP+ Adapter (SFP+/2ch)</b> Broadcom® NetXtreme II BCM57810S PCIe 2.0 x8, Low Profile / Full Height <b>NOTE:</b> - N8104-129 SFP+ Module is required to connect with an optical cable. - The latest driver is required for Window Server 2008 and Windows Server 2008 R2.	N8104-149
	<b>Dual Port 10GBASE-T Adapter</b> Intel® Ethernet Controller X540 PCIe 2.0(x8) , Low Profile / Full Height	N8104-153
<b>SFP+ Module</b>	<b>SFP+ Module (10G-SR)</b> 1 x SFP+ Module for N8104-149	N8104-129

**NOTE:**

- Supports up to three 10GbE network adapters in a single-processor configuration, and up to five in a dual-processor configuration. However, up to two when WS2008(x86) is installed, and up to one when RHEL 6(x86) is installed.
- Network performance may be reduced depending on the applications and memory performance when three or more 10Gb Network Adapters are installed.

### Types and Number of Available NICs and FC HBAs when Running with VMware ESXi

See the table below for the types and number of available NICs and FC HBAs when running with VMware ESXi.

The condition depends on interrupt processes managed by the operating system and insufficient interrupt resources may lead to system failure.

NICs and FC HBAs Type	Number of Available Adapters	Total Number of Available Adapters when mixed
N8104-152 Quad Port 1000BASE-T Adapter	Up to two adapter	Up to three adapters
N8104-145 Dual Port 1000BASE-T Adapter N8104-151 Dual Port 1000BASE-T Adapter N8104-150 1000BASE-T Adapter	Up to four adapters	
N8104-153 Dual Port 10GBASE-T Adapter N8104-149 10GBASE SFP+ Adapter (SFP+/2ch)	Up to four adapters	Up to four adapters
N8104-158A Fibre Channel Controller (2ch) N8104-160 Fibre Channel Controller	Up to four adapters	

**NOTE:**

- There are following limitations when using ESXi 6.0;
  - (1) N8104-152 cannot be installed when using N8104-149/153.
  - (2) Up to one adapter can be selected from N8104-150/151/145

## NIC Teaming feature – NIC Teaming and bonding features

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

Windows Server 2008 supports BASP (Broadcom Advanced Server Program) or Intel PROSet teaming while Windows Server 2012 and Linux support teaming with bonding function supported by OS.

Network Interface	Team	Operating Systems
<b>1GbE NIC</b> Embedded/N8104-150/-151/-152	Up to four ports per one team	Windows Server 2008 Windows Server 2008 R2 Windows Server 2012 Windows Server 2012 R2 Red Hat Enterprise Linux
N8104-145	Up to four ports per one team	Windows Server 2008 R2
<b>10GbE NIC (10GBASE-SR)</b> N8104-149	Up to four ports per one team	Windows Server 2008 Windows Server 2008 R2 Windows Server 2012 Windows Server 2012 R2 Red Hat Enterprise Linux
<b>10GbE NIC (10GBASE-T)</b> N8104-153	Up to four ports per one team	Windows Server 2012 Windows Server 2012 R2 Red Hat Enterprise Linux

### NOTE:

- NIC Teaming feature is not supported on iSCSI interfaces.
- The network interfaces for each teaming must be the same.
- When 10GbE NIC teaming and 1GbE NIC teaming are mixed, the teams must be up to five per one system.
- When using Windows Server 2008 or Windows Server 2008 R2, the teams must be up to four per one system.

## Using iSCSI

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

Category	Network Interface	Operating Systems
<b>1GbE</b>	<b>Embedded 1GbE NIC/ N8104-150/-151/-152</b>	Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, Red Hat Enterprise Linux, VMware
	<b>N8104-145</b>	Windows Server 2008 R2, VMware
<b>10GbE (10GBASE-SR)</b>	<b>N8104-149</b>	Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, Red Hat Enterprise Linux, VMware
<b>10GbE (10GBASE-T)</b>	<b>N8104-153</b>	Windows Server 2012, Windows Server 2012 R2, Red Hat Enterprise Linux 6.5 (x86_64) or later, VMware

### NOTE:

- NIC Teaming feature is not supported on iSCSI interfaces.

## 6.2 InfiniBand

Category	Product Name / Description	Part Number
<b>Controller</b>	<b>Single Port InfiniBand Adapter</b> Mellanox ConnectX-3 VPI, MCX353A-FCBT, FDR, PCIe 3.0(x8)	N8104-146
	<b>Dual Port InfiniBand Adapter</b> Mellanox ConnectX-3 VPI, MCX354A-FCBT, FDR, PCIe 3.0(x8)	N8104-147

<b>Cable</b>		<b>InfiniBand Cable 2m/FRD</b> Copper	K410-304(02)
		<b>InfiniBand Cable 3m/FRD</b> Copper	K410-304(03)
<b>Switch</b>	<b>Unit</b>	<b>InfiniBand Switch 36 ports/FDR</b> Mellanox MSX6036F-1SFR 36 ports, FDR, One power supply module included, no power cord	NE3707-061
	<b>Power Supply</b>	<b>Redundant Power Supply Unit</b> Power supply module for 36 ports InfiniBand switch, no power cord	NE3707-063

**NOTE:**

- Up to two InfiniBand adapters can be installed into the system and two adapters should be of the same type.
- The InfiniBand adapters and other options are make-to-order products. Please consult our sales representative in regards to production lead time.

### 6.3 PCIe SSD Adapter

Category	Product Name / Description	Part Number
<b>PCIe SSD</b>	<b>PCIe SSD Adapter 365GB</b> Fusion-io ioDrive2 365GB PCIe 2.0(x4), Low Profile / Full Height	N8118-01

**NOTE:**

- Server Core is not supported
- Warranty period is the shorter of 3 years (37 months) or until the total bytes of written value (PBW) exceeds 4 PB. Check the PBW periodically with the utility for the PCIe SSD adapter.
- At least 8GB of memory per one PCIe SSD Adapter is required for adequate performance with this product. Refer to the user's guide for details.
- Operating system can not be installed in this product.

### 6.4 External Storage Controller

#### 6.4.1 RAID Controller

Category	Product Name / Description	Part Number
<b>Controller</b>	<b>RAID Controller (2GB, RAID0/1/5/6)</b> LSI MegaRAID SAS 9380-8e RAID0/1/5/6/10/50/60, 2GB, Ext. 8, PCIe 3.0 x8, SAS 12Gb/s, SATA 6Gb/s, Flash cache protection modules included	N8103-179

**NOTE:**

- 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 less than eight in order to minimize the risk of becoming multiple hard drives failure.

## Types and Number of Available RAID Controllers when Running with VMware ESXi

See the table below for the types and number of available RAID Controllers when running with VMware ESXi.

The condition depends on interrupt processes managed by the operating system and insufficient interrupt resources may lead to system failure.

Processor Type	Controller Type	Number of available controllers	Total Number of available controllers
E5-2603 v3	N8103-176 RAID Controller (1 GB, RAID 0/1)	Up to one controller	Up to three controllers
E5-2620 v3	N8103-177 RAID Controller (1 GB, RAID 0/1/5/6)		
E5-2630 v3	N8103-178 RAID Controller (2 GB,RAID 0/1/5/6)		
E5-2650 v3	N8103-179 RAID Controller (2 GB,RAID 0/1/5/6)	Up to two controllers	
E5-2660 v3			
E5-2680 v3	N8103-176 RAID Controller (1 GB, RAID 0/1)	Up to one controller	Up to two controllers
E5-2690 v3	N8103-177 RAID Controller (1 GB, RAID 0/1/5/6)		
	N8103-178 RAID Controller (2 GB,RAID 0/1/5/6)		
	N8103-179 RAID Controller (2 GB,RAID 0/1/5/6)		

### 6.4.2 Fibre Channel / SAS Controller

Category	Product Name / Description	Part Number
<b>Fibre Channel</b>	<b>Fibre Channel Controller (1ch)</b> Emulex LightPulse LPe1250-F8 Host Bus Adapter 8Gb/s, Optical, PCIe 2.0 x8	N8190-159
	<b>Fibre Channel Controller (2ch)</b> Emulex LightPulse LPe12002-M8 Host Bus Adapter 8Gb/s, Optical, PCIe 2.0 x8	N8190-160
	<b>Fibre Channel Controller (1ch)</b> Emulex LightPulse LPe16000B-M6 Host Bus Adapter 16Gb/s, Optical, PCIe 3.0 x8	N8190-157A
	<b>Fibre Channel Controller (2ch)</b> Emulex LightPulse LPe16002B-M6 Host Bus Adapter 16Gb/s, Optical, PCIe 3.0 x8	N8190-158A
	<b>SAS Controller</b> LSI SAS9212-4i4e Host Bus Adapter 6Gb/s SAS, Int. 4 / Ext. 4, 7-pin SATA / SFF-8088, PCIe 2.0 x8	N8103-142
<b>SAS Controller</b> LSI SAS9300-8e Host Bus Adapter 12Gb/s SAS, ext. 8(SFF-8644 x2), PCIe 3.0 x8	N8103-184	

**NOTE:**

- With regard to 16Gb/s Fiber Channel Controllers, up to two ports in a single processor configuration with Xeon E5-2603 v3, and up to six ports in a dual processor configuration with Xeon E5-2603 v3 are allowed in the system.
- Up to three SAS Controllers can be installed.
- For VMware environment, there are limitations regarding the number of PCI cards. Refer to 6.1 for details

### 6.5 Serial Port Adapter

Product Name / Description	Part Number
<b>Serial Port Adapter</b> Serial port fixed to PCI bracket	N8117-01A

**NOTE:**

- Up to one Serial Port Adapter can be installed.



## 7 Other Add-in Components

### 7.1 Redundant Power Supply Module

Product Name / Description	Part Number
<b>800W Hot Plug Power Supply</b> 1 x 800 Watt 80 PLUS® Platinum	N8181-122F

### 7.2 Redundant Fan Kit

Product Name / Description	Part Number
<b>Redundant Fan Kit</b> hot plug redundant cooling fans for R120f-2E	N8181-126

### 7.3 Trusted Platform Module Kit

Product Name / Description	Part Number
<b>Trusted Platform Module Kit</b> TPM 1.2 module	N8115-21

**NOTE:**

- The kit is not available in China.
- The kit is not removable after attachment.
- "TPM Support" in BIOS setup menu must be activated prior to use of this kit.
- 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.

### 7.4 Internal Flash Memory

Product Name / Description	Part Number
<b>VMware ESXi support kit</b> Internal USB flash memory to install VMware ESXi system	N8106-009

**NOTE:**

- The kit does not include VMware ESXi installation media and license.

### 7.5 Flash FDD

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

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

**NOTE:**

- Up to one drive can be connected.

## 8 Add-on Components

### 8.1 17-inch LCD Console Drawer

Category		Product Name / Description	Part Number
Drawer w/ KVM	Drawer	<b>17-inch LCD Console Drawer (8port)</b> 17-inch LCD, US 83-keys Keyboard, Optical mouse, 8 port KVM switch, 1U height	N8143-106F
	Cable	<b>Switch Unit Connection Cable Set (USB, 1.8m)</b> 1.8 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(1A)
		<b>Switch Unit Connection Cable Set (USB, 3m)</b> 3 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(03)
		<b>Switch Unit Connection Cable Set (USB, 5m)</b> 5 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(05)
Drawer w/o KVM	Drawer	<b>17inch LCD Console Unit 1U</b> 17-inch LCD, US 83-keys Keyboard, Optical mouse, 1U height, 4-pin USB B to 4-pin USB A cable 2 m, PS/2 Y-splitter cable 2m, 15-pin mini D-sub VGA cable 2 m	N8143-105F
		<b>17inch LCD Console Drawer (1port)</b> 17-inch LCD, US 103-keys Keyboard with 10-key, Touch pad with 3-button, 1U height, 4-pin USB B to 4-pin USB A cable 1.8 m, Two PS/2 cable 1.8 m, 15-pin mini D-sub VGA cable 1.8 m	N8143-108F
	Keypad	<b>Keyboard Unit (JP)</b> JP 108-keys Keyboard with 10-key for N8143-108F 17inch LCD Console Drawer (1port)	N8143-109
		<b>Keyboard Unit (UK)</b> UK 104-keys Keyboard with 10-key, for N8143-108F 17inch LCD Console Drawer (1port)	N8143-111

**NOTE:**

- There are two VGA connectors on R120f-2E, one on the front side and one on the rear side. However, the front side only works when both are connected at the same time.

### 8.2 KVM Switch

Category		Product Name / Description	Part Number
KVM Switch		<b>Server Switch Unit (8 server)</b> 1U USB 8 port KVM switch	N8191-14F
Cable	KVM	<b>Switch Unit Connection Cable Set (USB,1.8m)</b> 1.8 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(1A)
		<b>Switch Unit Connection Cable Set (USB,3m)</b> 3 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(03)
		<b>Switch Unit Connection Cable Set (USB,3m)</b> 5 m, 1 x 15-pin mini D-sub to 1 x 15-pin mini D-sub / 1 x 4-pin USB A	K410-118(05)
	Cascading	<b>Switch Unit Connection Cable 1.8 m</b> 1.8 m, 1 x 15-pin mini D-sub - 1x 15-pin mini D-Sub / 2x PS/2	K410-119(1A)

**NOTE:**

- There are two VGA connectors on R120f-2E, one on the front side and one on the rear side. However, the front side only works when both are connected at the same time.

### 8.3 Cable Management Arm

Product Name / Description	Part Number
<b>Cable Management Arm 2U Kit</b> for R120f-2E	N8143-95

### 8.4 Server Management License

The server integrates the EXPRESSSCOPE Engine 3 as standard. Refer to [Server Management](#) for the standard management features. For more extensive remote KVM and remote media features, choose the following kit.

Product Name / Description	Part Number
<b>Remote KVM and Media License Kit</b> License for one server. Remote KVM and remote media are enabled regardless of OS status. Remote KVM: <ul style="list-style-type: none"> <li>- Displays a graphics console on the web browser of the remote terminal (PC/server).</li> <li>- Controls keyboard and mouse via the remote terminals' web browser</li> </ul> Remote media: <ul style="list-style-type: none"> <li>- Enables the user to use the CD / DVD / FD / Flash memory of the remote terminals (PC/server) as if accessing the local drives.</li> </ul>	N8115-04

**NOTE:**

- Remote KVM and remote media features are not available for virtual machines.

## References

### Boot Mode Setting

The server supports Legacy mode and UEFI mode (default) as an OS Boot Mode. See the table below for the Boot Mode and X2APIC setting for each Operating System. As the default settings at the factory, UEFI mode is set as OS Boot mode and X2APIC is enabled. Refer to the User's Guide and change the settings before installing an Operating System requiring Legacy Mode.

Operating System	Supported Boot Mode	Supported X2APIC Setting
Windows Server 2008(x86)	Legacy	Disabled
Windows Server 2008 R2 (x64)	Legacy	Disabled
Windows Server 2012	UEFI	Enabled
Windows Server 2012 R2	UEFI	Enabled
Red Hat Enterprise Linux 6	Legacy	Disabled
Red Hat Enterprise Linux 6(x86_64)	UEFI	Enabled
VMware ESXi 5.1 Update2	Legacy	Disabled
VMware ESXi 5.5 Update2	Legacy	Disabled
VMware ESXi 6.0	Legacy	Disabled

## Server Management

The EXPRESSSCOPE Engine 3, integrated into the server, provides superior remote control and system management features listed in the table below.

		Standard	With Remote KVM and Media License kit
<b>Hardware monitoring</b>	Temperature/voltage/power/RAID/standard LANfan /degeneration (memory/hard drive)	✓	✓
	Hardware configuration information collection	✓	✓
	Hardware event log collection	✓	✓
<b>Boot monitoring</b>	BIOS/POST stall, Booting, OS stall, shutdown	✓ <sup>1</sup>	✓ <sup>1</sup>
<b>Alerting</b>	HW error, Boot error , and OS panic (by SNMP, E-Mail)	✓	✓
<b>Remote KVM (via LAN)</b>	POST/BIOS setup, ROM utility	✓ <sup>2</sup>	✓
	Panic screen, Boot screen	✓ <sup>2, 3, 4</sup>	✓
	CUI-based screen (OS console)	✓ <sup>2, 4</sup>	✓
	GUI-based screen (OS console)	-	✓
	Remote console recording function	-	✓
	Video recording	-	✓
<b>Remote control (via LAN)</b>	Remote reset/power on-off/ dump	✓	✓
	Remote power capping	✓	✓
	BIOS/BMC FW update	✓	✓
	Remote BIOS setup(partial configuration only)	✓	✓
	OS shutdown	✓ <sup>1</sup>	✓ <sup>1</sup>
	Remote media (CD/DVD/FD/USB)	-	✓
	CLP (Command Line Protocol) (DMTF compliant)	✓	✓
	Remote control via Web browser (multi user login at the same time)	✓	✓
	Scheduling (without UPS)	✓ <sup>1</sup>	✓ <sup>1</sup>
<b>Maintenance</b>	EXPRESSSCOPE® Profile key (Backup/restore BIOS/BMC setup information)	✓	✓
<b>Others</b>	Set automatic IP address via DNS/DHCP	✓	✓
	LDAP/Active Directory verification/user control	✓	✓
	Clock synchronization of main unit and the RTC	✓	✓
	Access log collection	✓	✓
	IPMI	2.0	2.0
	IPv6(Web console/CLP only)	✓	✓

<sup>1</sup> The feature is not supported on VMware ESXi systems.

<sup>2</sup> The optional serial port is not available for the feature.

<sup>3</sup> Monitoring boot screens is not supported on VMware systems.

<sup>4</sup> In VMware systems, only the direct console user interface is supported.

## OS Support Matrix for PCI Cards and Embedded Controller

Part number	Product Name	WS 2012 R2	WS 2008 R2	WS 2008	RHEL 6	RHEL 6 x64	ESXi 6.0	ESXi 5.5	ESXi 5.1
-	Embedded SATA non-RAID Controller	✓	✓	✓	✓	✓	✓	✓	✓
-	Embedded SATA RAID Controller	✓	✓	✓	✓	-	-	-	-
-	Embedded 1GbE NIC	✓	✓	✓	✓	✓	✓	✓	✓
N8103-176	RAID Controller (1 GB, RAID 0/1)	✓	✓	✓	✓	✓	✓	✓	✓
N8103-177	RAID Controller (1 GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓	✓	✓	✓
N8103-178	RAID Controller (2 GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓	✓	✓	✓
N8103-179	RAID Controller (2 GB, RAID 0/1/5/6)	✓	✓	✓	✓	✓	✓	✓	✓
N8118-01	PCIe SSD Adapter 365GB	✓	✓	-	-	-	-	-	-
N8190-158A	Fibre Channel Controller (2ch)	✓	✓	✓	-	-	✓	✓	-
N8190-157A	Fibre Channel Controller	✓	✓	✓	-	-	✓	✓	-
N8104-147	Dual Port InfiniBand Adapter	✓	✓	-	-	-	✓	-	-
N8104-146	Single Port InfiniBand Adapter	✓	✓	-	-	-	✓	-	-
N8103-184	SAS Controller	✓	✓	-	-	-	✓	✓	-
N8190-160	Fibre Channel Controller (2ch)	✓	✓	✓	✓	✓	✓	✓	✓
N8190-159	Fibre Channel Controller	✓	✓	✓	✓	✓	✓	✓	✓
N8104-153	Dual Port 10GBASE-T Adapter	✓	✓	-	-	✓	✓	✓	✓
N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	✓	✓	✓	✓	✓	✓	✓	✓
N8103-142	SAS Controller	✓	✓	✓	✓	✓	✓	✓	✓
N8104-152	Quad Port 1000BASE-T Adapter	✓	✓	✓	✓	✓	✓	✓	✓
N8104-145	Dual Port 1000BASE-T Adapter	-	-	✓	-	✓	✓	-	✓
N8104-151	Dual Port 1000BASE-T Adapter	✓	✓	✓	✓	✓	✓	✓	✓
N8104-150	1000BASE-T Adapter	✓	✓	✓	✓	✓	✓	✓	✓

## Supported PCI Cards and Installable Slots

Priority	Part Number	Product Name	Slots				
			#1 <sup>1</sup>	#2	#3	#4	#5
(1)	N8103-176	RAID Controller (1 GB, RAID 0/1)	(4)	(2)	(1)	(3)	-
(2)	N8103-177	RAID Controller (1 GB, RAID 0/1/5/6)	(4)	(2)	(1)	(3)	-
(3)	N8103-178	RAID Controller (2 GB,RAID 0/1/5/6)	(4)	(2)	(1)	(3)	-
(4)	N8103-179	RAID Controller (2 GB,RAID 0/1/5/6)	(4)	(2)	(1)	(3)	-
(5)	N8118-01	PCIe SSD Adapter 365GB	(4)	(2)	(1)	(3)	-
(6)	N8190-158A	Fibre Channel Controller (2ch)	(4)	(2)	(1)	(3)	-
(7)	N8190-157A	Fibre Channel Controller	(4)	(2)	(1)	(3)	-
(8)	N8104-147	Dual Port InfiniBand Adapter	(4)	(2)	(1)	(3)	-
(9)	N8104-146	Single Port InfiniBand Adapter	(4)	(2)	(1)	(3)	-
(10)	N8103-184	SAS Controller	(4)	(2)	(1)	(3)	-
(11)	N8190-160	Fibre Channel Controller (2ch)	(4)	(2)	(1)	(3)	-
(12)	N8190-159	Fibre Channel Controller	(4)	(2)	(1)	(3)	-
(13)	N8104-153	Dual Port 10GBASE-T Adapter	(4)	(2)	(1)	(3)	(5)
(14)	N8104-149	10GBASE SFP+ Adapter (SFP+/2ch)	(4)	(2)	(1)	(3)	(5)
(15)	N8103-142	SAS Controller	(4)	(2)	(1)	(3)	(5)
(16)	N8104-152	Quad Port 1000BASE-T Adapter	(4)	(2)	(1)	(3)	(5)
(17)	N8104-145	Dual Port 1000BASE-T Adapter	(4)	(2)	(1)	(3)	(5)
(18)	N8104-151	Dual Port 1000BASE-T Adapter	(4)	(2)	(1)	(3)	(5)
(19)	N8104-150	1000BASE-T Adapter	(4)	(2)	(1)	(3)	(5)
(20)	N8117-01A	Serial Port Adapter	-	-	(1)	(2)	(3)

<sup>1</sup> The slot #1 is not available when a single processor configuration.

**NOTE:**

- The number between parentheses shows the population priority (recommendation). For example, install N8103-176 (1) in the slot #3, N8190-160 (11) in the slot #2 and N8104-153 (13) in the slot #4 when you have those cards.

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



## Revision History

Revision	Date	Description
3.0	April 17, 2015	<b>New products added:</b> 1TB 7.2K Hot Plug 2.5-inch SATA HDD / N8150-520 2TB 7.2K Hot Plug 2.5-inch SATA HDD / N8150-521 <b>Others:</b> Added ESXi 6 to the list of operating system supported
2.1	March 20, 2015	<b>Error correction:</b> Deleted 80 PLUS® Titanium descriptions
2.0	February 18, 2015	<b>New products added:</b> VMware ESXi support kit / N8106-009 <b>Others:</b> Added note to configure with VMware Systems
1.1	January 28, 2015	<b>Error correction:</b> Removed N8151-123, N8151-124F and N8181-118F
1.0	January 16, 2015	Initial release