Power Configurator

Lenovo ThinkStation PX

Table of Contents

Overview

The ThinkStation PX workstation is the first Lenovo workstation in the industry to offer dual power supplies to accommodate the increasing power requirements for newer CPUs and GPUs on the market. The purpose of this document is to provide users with system level power requirements and guidance to maximize configuration components while remaining within the power budget of the system.

Section 1 – Workplace Preparation

! ThinkStation PX may require more power than a traditional desk site provides. It is important to evaluate if your workspace supports the power needed.

! A dedicated power circuit is recommended for each power supply.

! Enable appropriate outlets and circuits nearby the system location to support the appropriate power cord and amperage required.

Table 1 - PSU Output

Configuration	AC voltage	BIOS mode	Maximum Output power	Maximum continuous AC current (Lowest VAC -5%)
Single or redundant PSUs	200-240	20A	1850 watts	12 amps
Single or redundant PSUs	115-127	20A	1850 watts	20 amps
Single or redundant PSUs	100-110	20A	1400 watts	17 amps
Teamed PSUs	200-240	20A	2350 watts	15 amps
Teamed PSUs	115-127	20A	2350 watts	25 amps
Teamed PSUs	100-110	20A	2350 watts	29 amps

Table 2 - Country Line Voltage Levels

Input Voltage →	100-110VAC	115-127VAC	200-240VAC
Country	Japan	US	EMEA
	Taiwan	Canada	
	Some Caribbean	LA	
		Some Caribbean	
		Venezuela	
		Colombia	
		Ecuador	
		Suriname	
		Panama	
		Costa Rica	
*This is not an exhaustive list, rather intended for high level assessment only.			

Section 2 – Key Architecture Design

The ThinkStation PX is the first Lenovo workstation to offer dual power supplies, DDR5 ECC RDIMM memory, and PCIe Gen5 support. The system can operate with just a single power supply (configuration limitations may apply) or have the ability to support redundancy or teamed power supplies through the addition of a second power supply.

PX power supplies install into the back of the chassis and connect to an edge connector on a daughter printed circuit board (PCB) that is connected to the main motherboard. Both power supplies contain an integrated latching mechanism that secures the power supplies inside the chassis.

Due to the increased power handling capabilities of the system, the PX platform utilizes a C19 power cord, as opposed to the more traditional C13 power cords used on previous generations.

See *Figure 1* for an illustration of a C19 power cord.

Figure 1 - C19 Power Cord Illustration (system side)

Additionally, the ThinkStation PX provides auxiliary power for PCIe add-in cards via 4 onboard 12VHPWR connectors.

See *Figure 2* for an illustration of the 12VHPWR connector.

Figure 2 - 12VHPWR Connector

Section 3 – Power Ratings for Key System Components

It is important to know the power ratings for various internal components used to fully understand the power capabilities within the ThinkStation PX platform. See *Table 2* for CPU power ratings and *Table 3* for PCIe add-in card ratings.

Table 3 - CPU Power Ratings (Sapphire Rapids)

CPU Name (Xeon Sapphire Rapids)	CPU Power	Additional CPU Information
Platinum 8490H	350W	1.9GHz, 60 cores, 112.5MB Cache, DDR5-4800, Turbo
Platinum 8480+*	350W	2.0GHz, 56 cores, 105MB Cache, DDR5-4800, Turbo
Platinum 8470*	350W	2.0GHz, 52 cores, 105MB Cache, DDR5-4800, Turbo
Platinum 8468	350W	2.1GHz, 48 cores, 105MB Cache, DDR5-4800, Turbo
Platinum 8460Y+*	300W	2.0GHz, 40 cores, 105MB Cache, DDR5-4800, Turbo
Platinum 8452Y*	300W	2.0GHz, 36 cores, 67.5MB Cache, DDR5-4800, Turbo
Gold 6444Y	270W	3.6GHz, 16 cores, 45MB Cache, DDR5-4800, Turbo
Gold 6442Y	225W	2.6GHz, 24 cores, 60MB Cache, DDR5-4800, Turbo
Gold 6438Y+	205W	2.0GHz, 32 cores, 60MB Cache, DDR5-4800, Turbo
Gold 6430	270W	2.1GHz, 32 cores, 60MB Cache, DDR5-4400, Turbo
Gold 6418H	185W	2.1GHz, 24 cores, 60MB Cache, DDR5-4800, Turbo
Gold 6416H	165W	2.2GHz, 18 cores, 45MB Cache, DDR5-4800, Turbo
Gold 5420+	205W	2.0GHz, 28 cores, 52.5MB Cache, DDR5-4400, Turbo
Gold 5418Y	185W	2.0GHz, 24 cores, 45MB Cache, DDR5-4400, Turbo
Gold 5416S	150W	2.0GHz, 16 cores, 30MB Cache, DDR5-4400, Turbo
Gold 5415+	150W	2.9GHz, 8 cores, 22.5MB Cache, DDR5-4400, Turbo
Silver 4416+	165W	2.0GHz, 20 cores, 37.5MB Cache, DDR5-4000, Turbo
Silver 4410Y	150W	2.0GHz, 12 cores, 30MB Cache, DDR5-4000, Turbo
Silver 4410T	150W	2.7GHz, 10 cores, 26.25MB Cache, DDR5-4000, Turbo

*CPUs offered through special bids.

Table 4 - CPU Power Ratings (Emerald Rapids)

CPU Name (Xeon Emerald Rapids)	CPU Power	Additional CPU Information
Platinum 8592+	350W	1.9GHz, 64 cores, 320MB Cache, DDR5-5600, Turbo
Platinum 8580	350W	2.0GHz, 60 cores, 300MB Cache, DDR5-5600, Turbo
Platinum 8570	350W	2.1GHz, 56 cores, 300MB Cache, DDR5-5600, Turbo
Platinum 8568Y+	350W	2.3GHz, 48 cores, 300MB Cache, DDR5-5600, Turbo
Gold 6548Y+	250W	2.5GHz, 32 cores, 60MB Cache, DDR5-5200, Turbo
Gold 6544Y	270W	3.6GHz, 16 cores, 45MB Cache, DDR5-5200, Turbo
Gold 6542Y	250W	2.9GHz, 24 cores, 60MB Cache, DDR5-5200, Turbo
Gold 6534	195W	3.9GHz, 8 cores, 22.5MB Cache, DDR5-4800, Turbo
Gold 6530	270W	2.1GHz, 32 cores, 160MB Cache, DDR5-4800, Turbo
Gold 6526Y*	195W	2.8GHz, 16 cores, 37.5MB Cache, DDR5-5200, Turbo

*CPUs offered through special bids.

Table 5 - PCIe Add-in Card Power Ratings

Max Power Rating	Card Name	Card Type	Aux Power Connectors on GPU (if any)	Lenovo Aux Power Cables Required (if any)
320W	RTX 4080 (16GB)[1]	Graphics Card (Quadruple Slot)	12VHPWR	12VHPWR to 12VHPWR R/A*[2]
300W	RTX 6000 Ada (48GB)	Graphics Card (Dual Slot)	12VHPWR	12VHPWR to 12VHPWR*
300W	RTX A6000 (48GB)	Graphics Card (Dual Slot)	8-pin (EPS)	12VHPWR to EPS 8pin*
285W	RTX 5880 Ada (48GB)	Graphics Card (Dual Slot)	12VHPWR	12VHPWR to 12VHPWR*
250W	RTX 5000 Ada (32GB)	Graphics Card (Dual Slot)	12VHPWR	12VHPWR to 12VHPWR*
230W	RTX A5500 (24GB) RTX A5000 (24GB)	Graphics Card (Dual Slot)	8-pin (PCIe)	12VHPWR to Dual PCIe 8pin*
210W	RTX 4500 Ada (24GB)	Graphics Card (Dual Slot)	12VHPWR	12VHPWR to 12VHPWR*
200W	RTX A4500 (20GB)	Graphics Card (Dual Slot)	8-pin (PCIe)	12VHPWR to Dual PCIe 8pin*
140W	RTX A4000 (16GB)	Graphics Card (Single Slot)	6-pin (PCIe)	12VHPWR to Dual PCIe 8pin*
130W	RTX 4000 Ada (20GB)	Graphics Card (Single Slot)	12VHPWR	12VHPWR to 12VHPWR*
70W	RTX A2000 (12GB)	Graphics Card (Dual Slot)	None	None
75W (or less)	T1000 (8GB) T400 (8GB)	Graphics Card (Single Slot)	None	None
	Quadro Sync II	Graphics Sync Card (Single Slot)	SATA Power	SATA power to 4-pin*
	All Other PCIe Cards	Other PCIe Cards (Single Slot)	None	None

***See appendix section for detailed drawing.**
***GeForce cards are only available via Special Bid.**

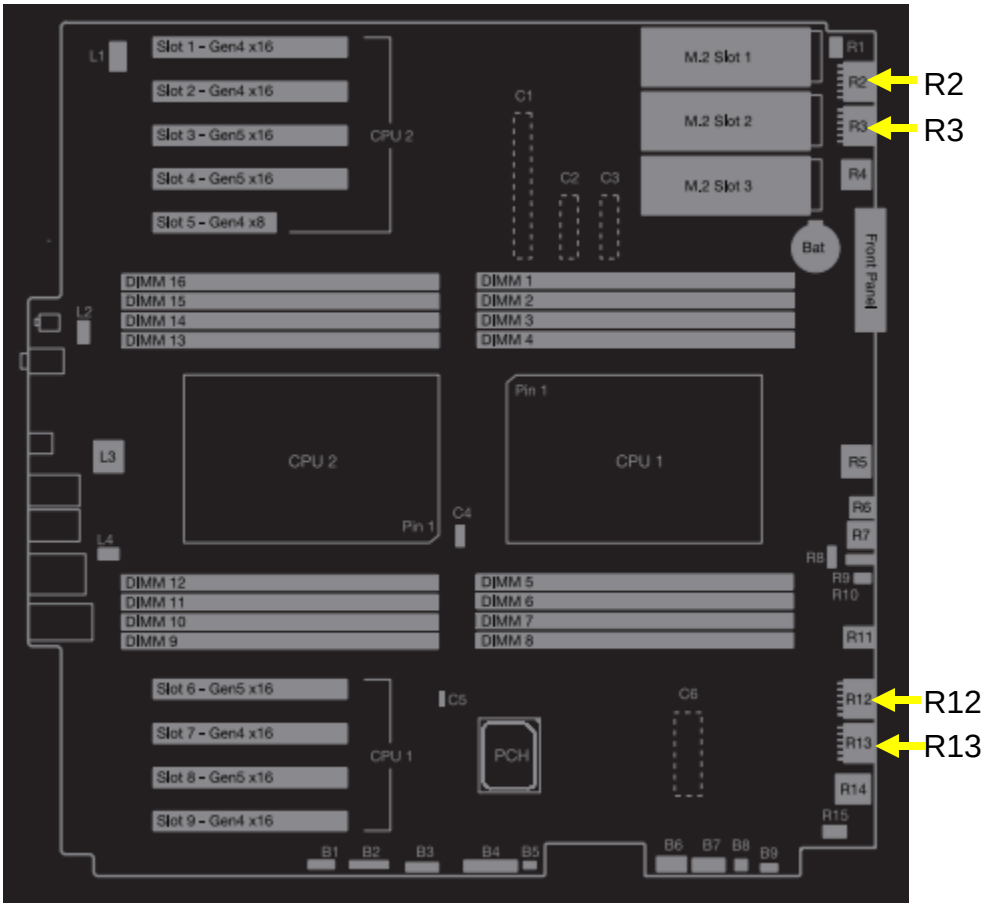
[1] Requires vented side door panel and air baffle kit
[2] R/A = Right Angle connector on the GPU end

Table 6 - Quantity of Derived Cables

GPU	GPU Quantity	Lenovo Aux Power Cables Derived			
		12VHPWR to Dual PCIe 6+2pin, 270mm	12VHPWR 2x6+4pin to CPU 8pin, 270mm	12VHPWR to 12VHPWR, 270mm	12VHPWR to 12VHPWR R/A, 450mm
None	0	1	0	0	0
RTX 4080 (16GB)	1	1	N/A	N/A	1
RTX 6000 Ada (48GB) **RTX 5880 Ada (48GB)** **RTX 5000 Ada (32GB)** **RTX 4500 Ada (24GB)** **RTX 4000 Ada (20GB)**	1 2 3 4	1 1 1 0	N/A	1 2 3 4	N/A
RTX A6000 (48GB)	1 2 3 4	1 1 1 0	1 2 3 4	N/A	N/A
RTX A5500 (24GB) **RTX A5000 (24GB)** **RTX A4500 (20GB)** **RTX A4000 (16GB)**	1 2 3 4	2 3 4 4	N/A	N/A	N/A
Non-Aux GPUs	Up to 4	1	N/A	N/A	N/A

Table 7 - Maximum Graphics Power Connectors

Graphics Power Connectors (12VHPWR)	Rating
Graphics Power 1 (R12)	600W
Graphics Power 2 (R13)	450W
Graphics Power 3 (R3)	600W
Graphics Power 4 (R2)	450W
Combined Graphics Power 1+2	750W
Combined Graphics Power 3+4	750W
Combined Graphics Power 1+2+3+4	1500W
Note: Power may be further limited by power supply and system configuration.	



Section 4 – PX Power Configurations

The ThinkStation PX platform can support up to two (2) 1850W power supplies to allow for some heavy GPU utilization. The following tables, separated by input voltage, show general configuration guidance for allowable CPU and GPU configurations. Please work with the Customer Solutions Team on any configurations that do not appear to be covered in this document!

Select input voltage below to reference the correct section.

- 200-240VAC
- 115-127VAC
- 100-110VAC

200-240VAC Input Voltage

Table 8 - Two 1850W PSUs in Team Mode

Supported Configuration for 2x 1850W PSUs (Team Mode)	
GPU	**Dual CPUs TDP (W)**
	Up to 350W
4080 (320W)	1
6000 Ada (300W)	4
5880 Ada (285W)	
5000 Ada (250W)	
4500 Ada (200W)	
4000 Ada (130W)	
A6000 (300W)	
A5500 (230W)	
A5000 (230W)	
A4500 (200W)	
A4000 (140W)	
A2000 (70W)	
Non-aux (75W)	

Note: Up to 2350W PSU Output.

Table 9 - One 1850W PSU or two 1850W PSUs in Redundant Mode

Supported Configuration for 1x 1850W PSU or 2x 1850W PSUs (Redundant Mode)													
GPU	**Dual CPUs TDP (W)**												
	350	**330**	**300**	**270**	**250**	**225**	**205**	**195**	**185**	**165**	**150**	**145**	**125**
4080 (320W)	1	1	1	1	1	1	1	1	1	1	1	1	1
6000 Ada (300W)	1	1	2	2	2	3	3	3	3	4	4	4	4
5880 Ada (285W)	1	1	2	2	2	3	3	3	4	4	4	4	4
5000 Ada (250W)	1	2	2	3	3	4	4	4	4	4	4	4	4
4500 Ada (200W)	2	3	4	4	4	4	4	4	4	4	4	4	4
4000 Ada (130W)	3	4	4	4	4	4	4	4	4	4	4	4	4
A6000 (300W)	1	1	2	2	2	3	3	3	3	4	4	4	4
A5500 (230W)	2	2	2	3	3	3	3	4	4	4	4	4	4
A5000 (230W)	2	2	3	3	4	4	4	4	4	4	4	4	4
A4500 (200W)	2	3	3	3	4	4	4	4	4	4	4	4	4
A4000 (140W)	2	3	4	4	4	4	4	4	4	4	4	4	4
A2000 (70W)	4	4	4	4	4	4	4	4	4	4	4	4	4
Non-aux (75W)	4	4	4	4	4	4	4	4	4	4	4	4	4

Note: Up to 1850W PSU Output.

115-127VAC Input Voltage

Table 10 - Two 1850W PSUs in Team Mode

Supported Configuration for 2x 1850W PSUs (Team Mode)	
GPU	**Dual CPUs TDP (W)**
	Up to 350W
4080 (320W)	1
6000 Ada (300W)	4
5880 Ada (285W)	
5000 Ada (250W)	
4500 Ada (200W)	
4000 Ada (130W)	
A6000 (300W)	
A5500 (230W)	
A5000 (230W)	
A4500 (200W)	
A4000 (140W)	
A2000 (70W)	
Non-aux (75W)	

Note: Up to 2350W PSU Output.

Table 11 - One 1850W PSU or Two 1850W PSUs in Redundant Mode

Supported Configuration for 1x 1850W PSU or 2x 1850W PSUs (Redundant Mode)													
GPU	**Dual CPUs TDP (W)**												
	350	**330**	**300**	**270**	**250**	**225**	**205**	**195**	**185**	**165**	**150**	**145**	**125**
4080 (320W)	0	0	1	1	1	1	1	1	1	1	1	1	1
6000 Ada (300W)	0	0	0	0	1	1	2	2	2	2	2	2	3
5880 Ada (285W)	0	0	0	1	1	1	2	2	2	2	3	3	3
5000 Ada (250W)	0	0	0	1	1	2	2	2	3	3	4	4	4
4500 Ada (200W)	0	0	1	2	2	3	4	4	4	4	4	4	4
4000 Ada (130W)	0	0	1	2	3	4	4	4	4	4	4	4	4
A6000 (300W)	0	0	0	0	1	1	2	2	2	2	2	2	3
A5500 (230W)	0	0	0	1	2	2	3	3	4	4	4	4	4
A5000 (230W)	0	0	0	1	2	2	3	3	4	4	4	4	4
A4500 (200W)	0	0	1	2	2	4	4	4	4	4	4	4	4
A4000 (140W)	0	0	1	2	3	4	4	4	4	4	4	4	4
A2000 (70W)	4	4	4	4	4	4	4	4	4	4	4	4	4
Non-aux (75W)	0*	0*	4	4	4	4	4	4	4	4	4	4	4

*** Check with Customer Solutions Team for configuration evaluation.**

Notes:
- Up to 1650W PSU Output
- Power Cord C19 to NEMA 5-20P

100-110VAC Input Voltage

Table 12 - Two 1850W PSUs in Team Mode

Supported Configuration for 2x 1850W PSUs (Team Mode)													
GPU	Dual CPUs TDP (W)												
	350	330	300	270	250	225	205	195	185	165	150	145	125
4080 (320W)	1	1	1	1	1	1	1	1	1	1	1	1	1
6000 Ada (300W)	2	3	3	4	4	4	4	4	4	4	4	4	4
5880 Ada (285W)	3	3	4	4	4	4	4	4	4	4	4	4	4
5000 Ada (250W)	4	4	4	4	4	4	4	4	4	4	4	4	4
4500 Ada (200W)	4	4	4	4	4	4	4	4	4	4	4	4	4
4000 Ada (130W)	4	4	4	4	4	4	4	4	4	4	4	4	4
A6000 (300W	2	3	3	4	4	4	4	4	4	4	4	4	4
A5500 (230W)	4	4	4	4	4	4	4	4	4	4	4	4	4
A5000 (230W)	4	4	4	4	4	4	4	4	4	4	4	4	4
A4500 (200W)	4	4	4	4	4	4	4	4	4	4	4	4	4
A4000 (140W)	4	4	4	4	4	4	4	4	4	4	4	4	4
A2000 (70W)	4	4	4	4	4	4	4	4	4	4	4	4	4
Non-aux (75W)	4	4	4	4	4	4	4	4	4	4	4	4	4

Notes:
- Up to 2100W PSU Output

Table 13 - One 1850W PSU or Two 1850W PSUs in Redundant Mode

Supported Configuration for 1x 1850W PSU or 2x 1850W PSUs (Redundant Mode)													
GPU	Dual CPUs TDP (W)												
	350	330	300	270	250	225	205	195	185	165	150	145	125
4080 (320W)	0	0	0	0	0	0	0	1	1	1	1	1	1
6000 Ada (300W)	0	0	0	0	0	0	0	0	0	0	1	1	1
5880 Ada (285W)	0	0	0	0	0	0	0	0	0	0	1	1	1
5000 Ada (250W)	0	0	0	0	0	0	0	0	0	1	1	1	2
4500 Ada (200W)	0	0	0	0	0	0	0	0	1	2	2	2	2
4000 Ada (130W)	0	0	0	0	0	0	0	0	1	2	2	3	4
A6000 (300W)	0	0	0	0	0	0	0	0	0	0	1	1	1
A5500 (230W)	0	0	0	0	0	0	0	0	0	1	2	2	2
A5000 (230W)	0	0	0	0	0	0	0	0	0	1	2	2	2
A4500 (200W)	0	0	0	0	0	0	0	0	1	2	2	2	3
A4000 (140W)	0	0	0	0	0	0	0	0	1	1	2	2	3
A2000 (70W)	0	0	4	4	4	4	4	4	4	4	4	4	4
Non-aux (75W)	0	0	0*	0*	0*	0*	4	4	4	4	4	4	4

*** Check with Customer Solutions Team for configuration evaluation.**

Notes:
- Up to 1400W PSU Output
- Power Cord C19 to NEMA 5-20P

Section 5 – PCIe Slot Layout

Since the ThinkStation PX platform introduces PCIe Gen 5 support, it is important to note the capability of each of the PCIe slots within the system.

Table 14 - PCIe Slot Detailed Information

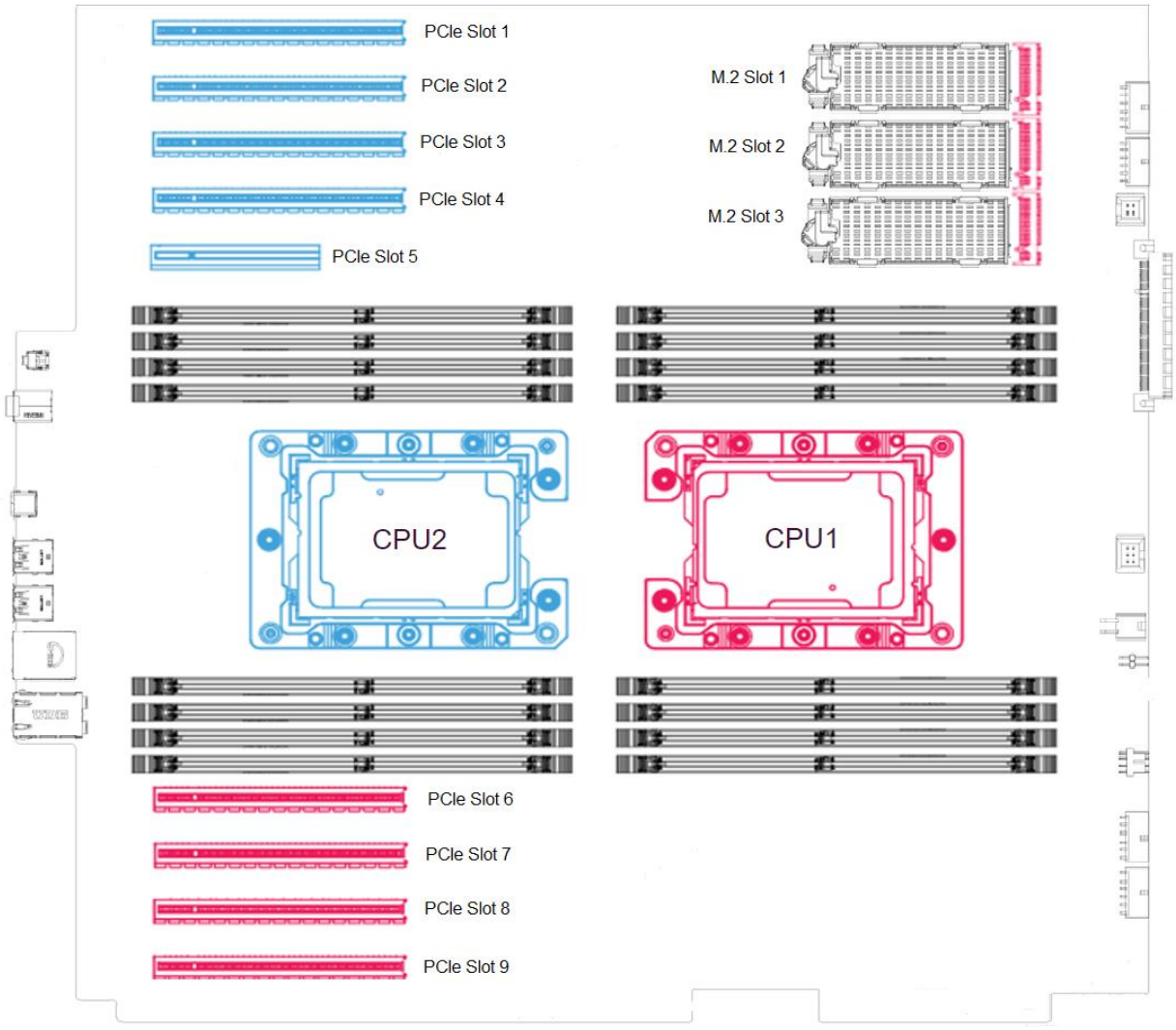
PCIe Slot Number	Slot Width	Slot Length	Generation	Additional Information
PCIe Slot 1	x16	Full	Gen 4	Connected to CPU 2*
PCIe Slot 2	x16	Full	Gen 4	Connected to CPU 2*
PCIe Slot 3	x16	Full	Gen 5	Connected to CPU 2*
PCIe Slot 4	x16	Full	Gen 5	Connected to CPU 2*
PCIe Slot 5	x8, open-ended	Full	Gen4	Connected to CPU 2*
PCIe Slot 6	x16	Full	Gen 5	Connected to CPU 1
PCIe Slot 7	x16	Full	Gen 4	Connected to CPU 1
PCIe Slot 8	x16	Full	Gen 5	Connected to CPU 1
PCIe Slot 9	x16	Full	Gen 4	Connected to CPU 1
M.2 Slot 1	x4	2280 or 22110	Gen 5	Connected to CPU 1
M.2 Slot 2	x4	2280 or 22110	Gen 5	Connected to CPU 1
M.2 Slot 3	x4	2280	Gen 5	Connected to CPU 1

***Requires dual CPUs to be installed.

Table 14 - PCIe Slot Installation Order

PCIe Slot Order	PCIe Slot Install Priority	Quantity of CPU
1st	PCIe Slot 6	1
2nd	PCIe Slot 8	
3rd	PCIe Slot 7	
4th	PCIe Slot 9	
1st	PCIe Slot 6	2
2nd	PCIe Slot 8	
3rd	PCIe Slot 3	
4th	PCIe Slot 1	
5th	PCIe Slot 4	
6th	PCIe Slot 2	
7th	PCIe Slot 7	
8th	PCIe Slot 9	
9th	PCIe Slot 5	

Figure 3 - PX Motherboard Layout



Section 6 – Configuration Notes

Due to the complexity of the new ThinkStation PX platform, it is important to note some of the following guidelines and features of the system.

- To utilize PCIe slots 1, 2, 3, 4, and 5, dual CPU's must be installed.
- The 1850W PSU is mechanically unique to the ThinkStation PX chassis and cannot be used in the other platforms.
- The 2nd PSU bay is shared with an optional storage bay. If the system is equipped with a 2nd PSU, then the optional storage bay is not supported.
- The PSU will automatically operate in a power limited mode if the system input voltage is 100-110V.
- The 300W power rating listed in the tables above does not apply to the Nvidia RTX 6000 Ada card.
- Officially supported configurations could still be limited by additional factors not defined within this document. Please work with the **Customer Solutions Team** on any configurations that do not appear to be covered in this document!

Appendix

Here are a few of the auxiliary power cables used in the all new ThinkStation PX platform.

Option Kits

4X51M50917 – ThinkStation 1850W Power Supply Unit

- *1850 Watt, 92% Tool-less PSU (Delta)*
  FRU: 5P50V03193

4XH1L18997 - ThinkStation NVLINK bridge

- *2-Slot Span NVLink Bridge for RTX A5000/A6000*
  FRU: 5C10X49822

4XF1M24240 - ThinkStation Cable Kit for Graphics Card

- *(A) Extender Bracket for RTX 4080*
  FRU: 5M11H28735

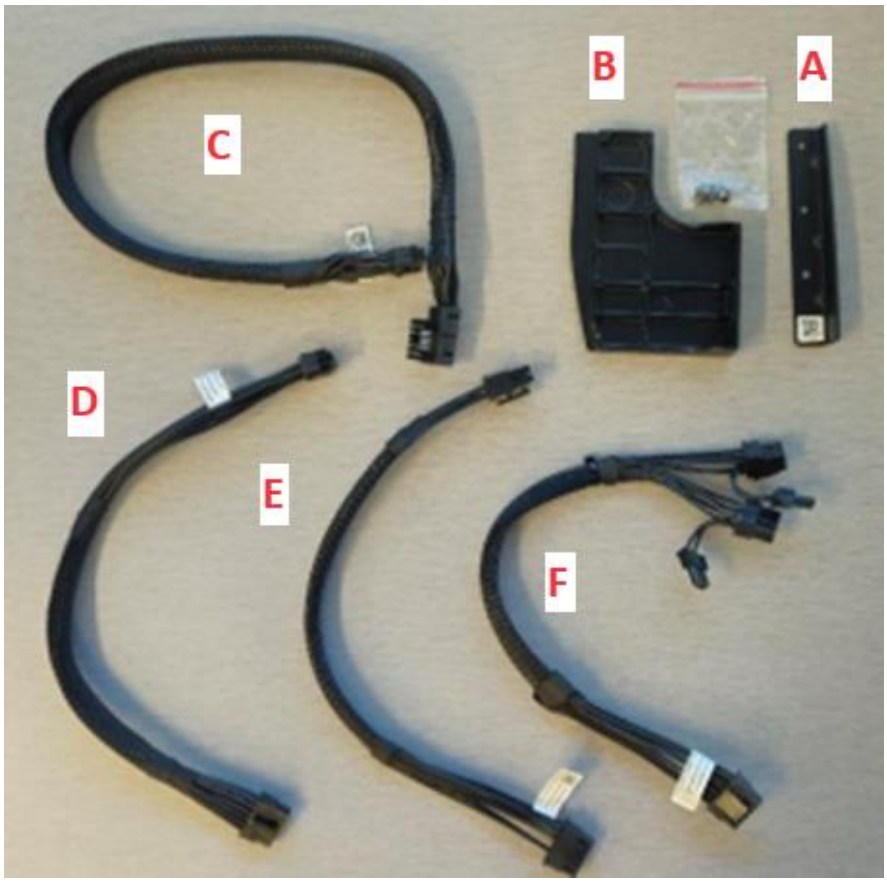
- *(B) Customized extender for graphics*
  FRU: 5M11H28540

- *(C) 12VHPWR 2x6+4pin to 12VHPWR 2x6+4pin R/A cable, 450mm*
  FRU: 5C10U58774

- *(D) 12VHPWR 2x6+4pin to 12VHPWR 2x6+4pin cable, 270mm*
  FRU: 5C10U58732

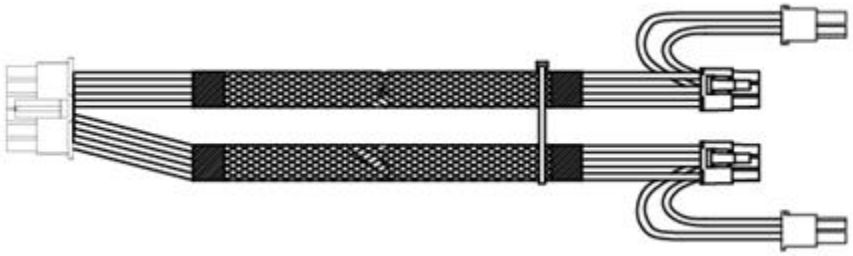
- *(E) 12VHPWR 2x6+4pin to CPU 8pin, 270mm*
  FRU: 5C10U58707

- *(F) 12VHPWR 2x6+4pin to Dual PCIe 6+2pin, 270mm*
  FRU: 5C10U58708



Field Replacement Unit (FRU)

5C10U58708 - 12VHPWR 2x6+4pin to Dual PCIe 6+2pin, 270mm



5C10U58707- 12VHPWR 2x6+4pin to CPU 8pin, 270mm

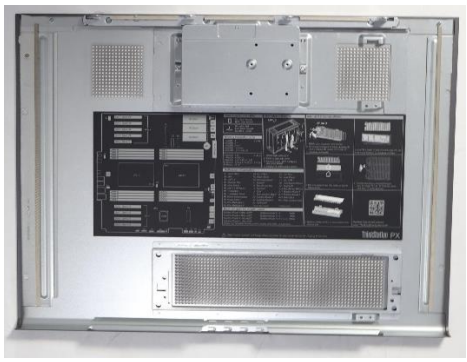
5C10U58732 - 12VHPWR 2x6+4pin to 12VHPWR 2x6+4pin cable, 270mm

5C10U58774 - 12VHPWR 2x6+4pin to 12VHPWR 2x6+4pin R/A cable, 450mm

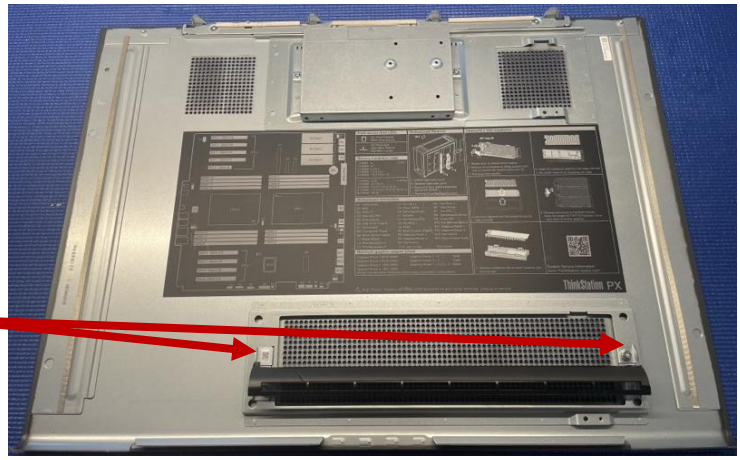
5C10U58668 - SATA Power to 4-pin for Quadro Sync II Adapter

Field Replacement Unit (FRU)

5M11H28746 – Side Cover with Open Hole Thermal Solution



5M11H28784 & 5M11H28785 – Air Baffle Kit for GeForce Graphics



5L60X67128 - US Line Cord C19 to NEMA 5-20P

Revision History

Version	Date	Author	Changes/Updates
1.6	5/8/2024	Jason M.	Added new parts.
1.5	12/5/2023	Jason M.	Added new parts.
1.4	9/6/2023	Jason M.	Added a few comments.
1.3	9/1/2023	Jason M.	Added new parts.
1.2	8/31/2023	Jason M.	Added new parts.
1.1	6/5/2023	Jason M.	Removed US Line Cord C19 to NEMA 5-15P.
1.0	5/26/2023	Jason M.	Initial launch release.