

# Power Configurator

Lenovo ThinkStation P620





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## Overview

The ThinkStation P620 is the first AMD CPU powered workstation in the Lenovo ThinkStation portfolio. It offers processors with up to 64 cores, PCIe Gen 4 support, both Nvidia Quadro RTX and AMD Radeon Pro GPUs, and up to 1TB of system memory to support the most demanding workstation applications.

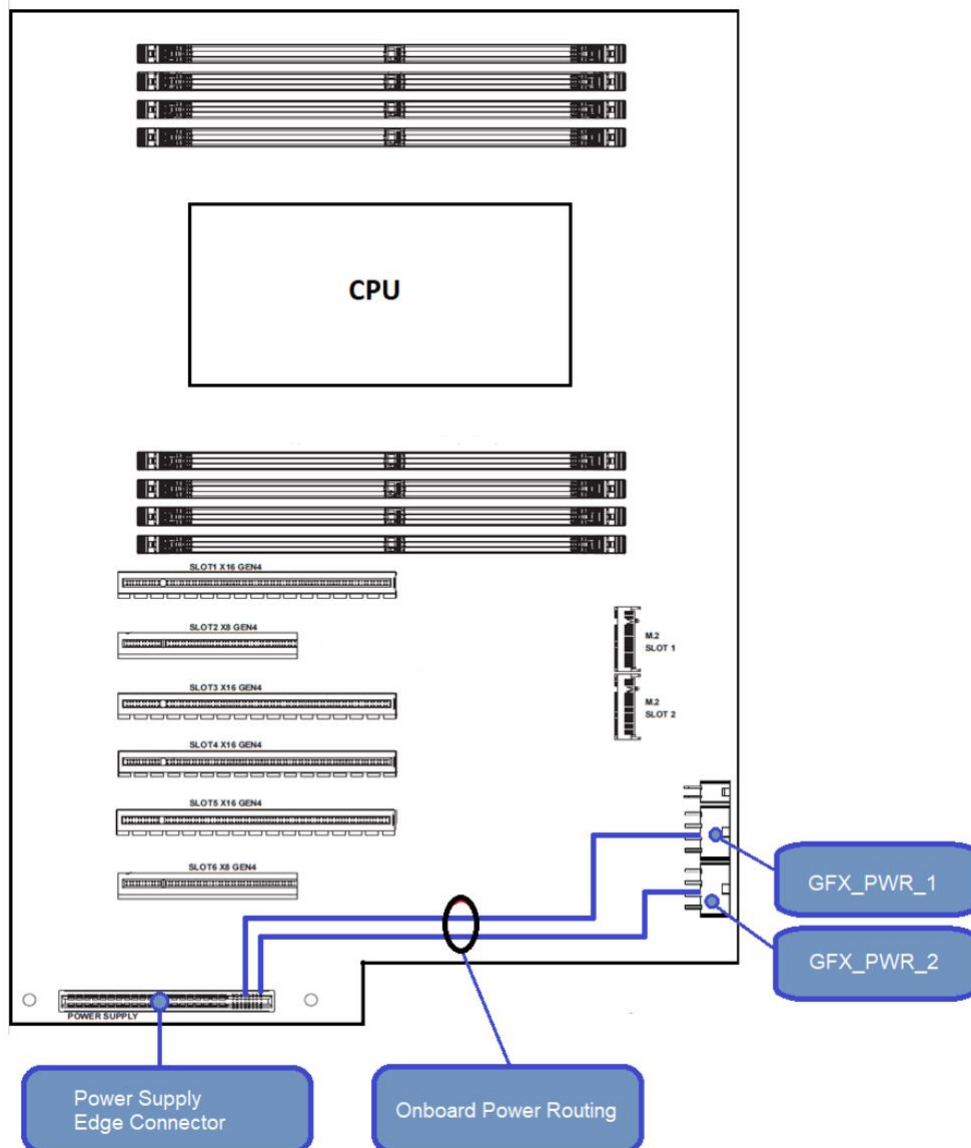
The purpose of this document is to highlight system power requirements so that users can make informed decisions on how to maximize component configuration while remaining within the P620 power budget.

## Section 1 – Key Architectural Design

The ThinkStation P620 has a power subsystem design that is very similar to that of the P520 ThinkStations. The power supply (PSU) for P620 is the same 1000W supply that is used in P520.

The PSU is connected to the motherboard via an edge connector at the bottom of the motherboard (see Figure 1 below). The PSU also has an integrated latch that locks the PSU into place both mechanically and electrically when it is inserted into the chassis and mated with the edge connector on the motherboard.

Figure 1: P620 power design



As illustrated in Figure 1, auxiliary power for certain add-in cards is routed to two connectors on the lower righthand corner of the board (labeled GFX\_PWR\_1 and GFX\_PWR\_2). Each of these connectors is populated with an aux power cable that terminates in two connectors, one 6-pin and one 8-pin (the 8-pin connector is technically a 6+2-pin connector, which can be inserted into either a 6-pin or 8-pin connector on an add-in card). Examples of each of these connectors can be found in the Appendix at the end of this document.

**2023 update:**

Introduction of the RTX 6000 Ada card as a supported GPU for the P620 platform (and GeForce RTX 4080 as a special bid GPU), drove the need for a 12VHPWR connector in the system. This connector is provided by a new motherboard connected cable that replaces the dual 8-pin PCIe to dual 8-pin PCIe cable that is assembled on all standard models. The new cable is a dual 8-pin PCIe to 12VHPWR 550mm cable, available via the P5/P620 Option Kit (*Option PN 4XF1M24242*), described in the Appendix at the end of this document. The new cable is a direct replacement that is connected to the two motherboard connectors, GFX\_PWR\_1 and GFX\_PWR\_2, described in the paragraph and diagram above.

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## Section 2 – Power Ratings for Key System Components

To fully understand the power capabilities of the ThinkStation P620 platform, it's important to understand the defined power ratings for the various internal components used within the system. Figure 3 shows the power ratings for all CPUs supported on the P620 platforms.

*Figure 3 - CPU Power Ratings*

CPU Name (Threadripper Pro)	CPU Power	Additional CPU Information
<b>3945WX</b>	280W	4.0GHz, 12 cores, 64M L3 cache, 3200MHz
<b>3955WX</b>	280W	3.9GHz, 16 cores, 64M L3 cache, 3200MHz
<b>3975WX</b>	280W	3.5GHz, 32 cores, 128M L3 cache, 3200MHz
<b>3995WX</b>	280W	2.7GHz, 64 cores, 256M L3 cache, 3200MHz
<b>5945WX</b>	280W	4.1GHz, 12 cores, 64M L3 cache, 3200MHz
<b>5955WX</b>	280W	4.0GHz, 16 cores, 64M L3 cache, 3200MHz
<b>5965WX</b>	280W	3.8GHz, 24 cores, 128M L3 cache, 3200MHz
<b>5975WX</b>	280W	3.6GHz, 32 cores, 128M L3 cache, 3200MHz
<b>5995WX</b>	280W	2.7GHz, 64 cores, 256M L3 cache, 3200MHz

Figure 4 lists the power ratings for the various add-in cards supported on the P620 platform.

Figure 4 - Add-in Card Power Ratings

Max Power	Card Name (memory)	Card Type	Aux Power Connectors Required (if any)
<b>350W</b>	GeForce RTX 3080Ti*	Gfx Card (Triple Slot)	Dual 8-pin (PCIe)
<b>320W</b>	GeForce RTX 3080* GeForce RTX 4080*	Gfx Card (Triple Slot) Gfx Card (Quad Slot)	Dual 8-pin (PCIe) 16-pin (12VHPWR)
<b>300W Ada</b>	RTX 6000 Ada	Gfx Card (Dual Slot)	16-pin (12VHPWR)
<b>300W</b>	RTX A6000 (48GB)	Gfx Card (Dual Slot)	8-pin (EPS) to dual 8-pin (PCIe)
<b>295W</b>	RTX 6000 (24GB), RTX 8000 (48GB)	Gfx Card (Dual Slot)	8-pin + 6-pin (PCIe)
<b>265W</b>	RTX 5000 (16GB)	Gfx Card (Dual Slot)	8-pin + 6-pin (PCIe)
<b>261W</b>	Radeon Pro W6800 (32GB)	Gfx Card (Dual Slot)	8-pin + 6-pin (PCIe)
<b>250W</b>	GeForce RTX 2080 Super*	Gfx Card (Triple Slot)	8-pin + 6-pin (PCIe)
	GV100 (32GB)	Gfx/Compute Card (Dual Slot)	8-pin (PCIe)
<b>230W</b>	RTX A5000 & A5500 (24GB)	Gfx Card (Dual Slot)	8-pin (PCIe)
	Radeon Pro VII (16GB)	Gfx Card (Dual Slot)	8-pin + 6-pin (PCIe)
<b>205W</b>	Radeon Pro W5700 (8GB)	Gfx Card (Dual Slot)	8-pin + 6-pin (PCIe)
<b>200W</b>	GeForce RTX 3060Ti*	Gfx Card (Triple Slot)	8-pin (PCIe)
	RTX A4500 (20GB)	Gfx Card (Dual Slot)	8-pin (PCIe)
	GeForce RTX 4070*	Gfx Card (Triple Slot)	8-pin (PCIe)
<b>160W</b>	RTX 4000 (8GB)	Gfx Card (Single Slot)	8-pin (PCIe)
<b>140W</b>	RTX A4000 (16GB)	Gfx Card (Single Slot)	6-pin (PCIe)
<b>130W</b>	Radeon Pro W5500 (8GB) & W6600 (8GB)	Gfx Card (Single Slot)	6-pin (PCIe)
<b>75W max</b>	A2000 (6GB/12GB)	Gfx Card (Dual Slot)	None
	T1000(4GB/8GB), T400(4GB), T600(4GB), P620(2GB), P1000(4GB), P2200(5GB) Radeon Pro WX3200(4GB) & W6400(4GB)	Gfx Card (Single Slot)	None
	Aquantia 10G	LAN (Single Slot)	None
	Thunderbolt	High Speed Bus (Single Slot)	None

\*Note: Nvidia GeForce cards are available via Special Bid only – contact your Lenovo sales rep

## Section 3 – P620 Power Configurations

P620 supports a single 1000W power supply, which allows for many different GPU configurations. The following tables show allowable GPU configurations for both Nvidia and AMD cards.

### General Rules

- Nvidia and AMD graphics cards cannot be mixed
- Different models of AMD graphics cards cannot be mixed

### Nvidia GPU Configurations

- Both onboard power connections are active (GFX\_PWR1 and GFX\_PWR2).
- Includes dual 8-pin + 6-pin drop cables for powering GPUs or other cards.
- Provides 2 dedicated 12V rails.
- Some supported GPU configurations might require additional cabling (See Appendix).

**\*\*Two RTX A6000 cards are supported, but only 1 RTX 6000 Ada card is supported**

CPU (280W)	All RDIMM Memory	No Storage Limitations	GPU Support
			350W (Triple Slot) x 1 OR 320W (2.5 Slot) x 1 OR 300W (Dual Slot) x 2** OR 295W (Dual Slot) x 2 OR 265W (Dual Slot) x 2 OR 250W (2.5 Slot) x 1 OR 230W (Dual Slot) x 2
			OR [250W (Dual Slot) x 2 and up to 75W (Single Slot) x 1]
			OR [250W (Dual Slot) x 1 and up to 75W (Single Slot) x 2]
			OR 160W (Single Slot) x 4 OR 75W (Single Slot) x 4
			Dual 8 + 6 pin Power Drop



## AMD GPU Configurations

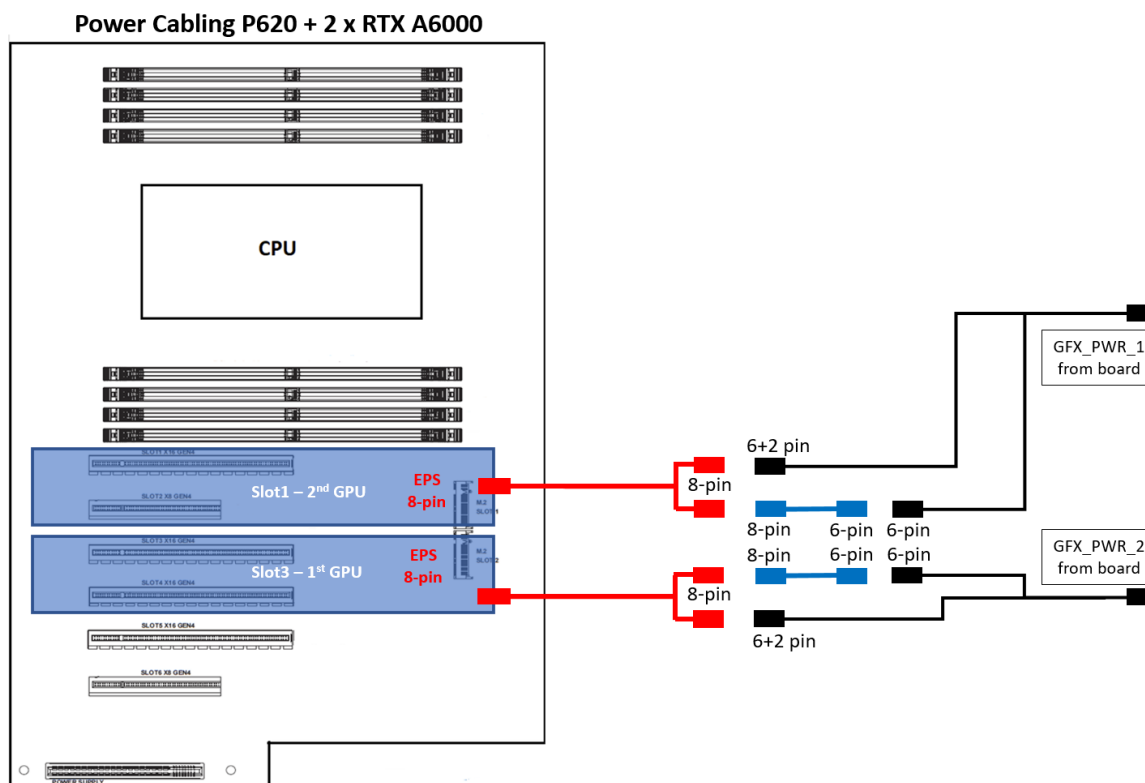
- Both onboard power connections are active (GFX\_PWR1 and GFX\_PWR2).
- Includes dual 8-pin + 6-pin drop cables for powering GPUs or other cards.
- Provides 2 dedicated 12V rails.
- Some supported GPU configurations might require additional cabling (See Appendix).

CPU (280W)	All RDIMM Memory	No Storage Limitations	<p style="text-align: center;"><u>GPU Support</u></p> <p>230W (Dual Slot) x 2 OR 205W (Dual Slot) x 1 OR 130W (Single Slot) x 4 OR 75W (Single Slot) x 4</p> <p style="text-align: center;">Dual 8 + 6 pin Power Drop</p>
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- **For configurations that are not listed above but appear to be feasible, please work with the Technical Solutions Team to have the configuration validated/vetted.**
- Officially supported configurations could still be limited by additional factors not defined within this document.

## Section 4 – P620 with dual RTX A6000

Use the following diagram to assist with configuring P620 with dual RTX A6000 adapters.



### Notes:

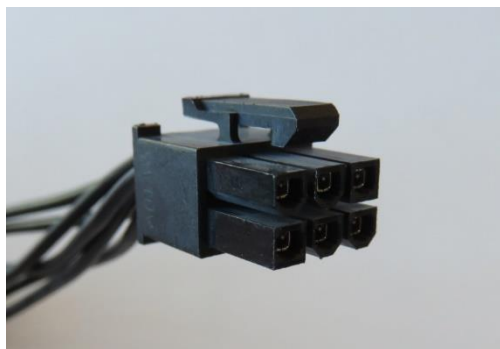
1. The RTX A6000 adapter has an EPS12V 8-pin connector, not to be confused with a PCIe 8-pin connector. This card ships with the EPS 8-pin to dual PCIe 8-pin splitter cable (**Red Cable**) listed above.
2. Part numbers for the other cable listed above:  
**Blue Cable**, PCIe 6-pin to PCIe 8-pin (100mm): FRU 00XL159

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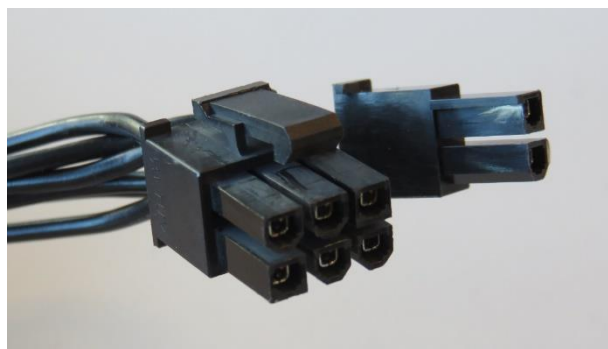
## Section 5 – Appendix

This section contains additional useful information about the hardware used to power adapter cards in ThinkStation systems.

### *PCIe Power Connectors*



***6-pin PCIe Power Connector***



***6+2 pin PCIe Power Connector***

### *Supported PCIe Power Cable Adapters*



***6-pin PCIe to 8-pin PCIe Converter, 100mm (FRU = 00XL159)***



**8-pin to dual 6-pin PCIe Splitter, 50mm (FRU = 04X2387)**



**EPS 8-pin to dual PCIe 8-pin**

**ThinkStation GPU Kit - P5/P620 (Option PN 4XF1M24242)**

- Contains the following parts for adding additional GPU adapters
  - o 4080 Extender Bracket
  - o RTX Custom Extender Bracket
  - o 12VHPWR to 12VHPWR RA 420mm Cable
  - o Dual 8-pin PCIe to 12VHPWR 550mm Cable\*
  - o 12VHPWR to dual 8-pin PCIe 375mm Cable
  - o 12VHPWR to 8-pin CPU 375mm Cable

\*Note: Dual 8-pin PCIe to 12VHPWR 550mm Cable is needed for the RTX 6000 Ada and GeForce RTX 4080 cards and replaces the standard motherboard aux power connectors, as described in Section 1.

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## Section 6 – Revision History

Version	Date	Author	Changes/Updates
1.4	10/30/2023	Jim P	Changed description of cable 00XL159 in Section 4 Added new GPUs Added paragraph to describe 12VHPWR cable Listed the new GPU option kit
1.3	9/12/2022	Jim P	Added new CPUs, GPUs Added interactive TOC
1.2	8/25/2021	Jim P	Added new GPUs to matrix Added section for dual RTX A6000 config Added some new cable pictures in the Appendix
1.1	6/6/2021	Jim P	Added new GPUs to matrix
1.0	7/15/2020	Jim P	Initial launch release