

Considerations for Rack Mounted ThinkStations

Lenovo ThinkStation P5/P7/P8/PX





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Introduction

The latest Lenovo Performance ThinkStations have been designed with the capability to install the systems into a server rack. This can be done to maximize system density as well as make the systems available to multiple remote users. Installing high performance workstations into a server rack requires these systems to be run in a horizontal position, using either static rail kits in a server rack for a system to be inserted into, or by installing a sliding rail kit system. A sliding rail kit requires part of the rail to be installed to the sides of the system while it is in the horizontal position. In the standard upright position this would be the top and bottom of the system.

This paper will cover some considerations that should be noted with this type of installation into a server rack when using higher-end CPUs in conjunction with the latest high-end RTX PRO series and officially supported Lenovo RTX GeForce GPUs.

ThinkStation P5

The ThinkStation P5 systems, as designed, are capable of installation into any server rack using a Lenovo ThinkStation Static Rack Rail Kit with no additional or special considerations. This rail kit does not attach to the system and does not slide. The P5 system is simply inserted onto the shelf rail system. All supported configurations of the P5 are fully supported in a rack server environment.

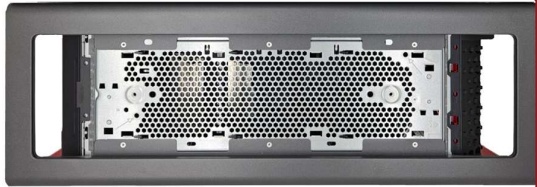
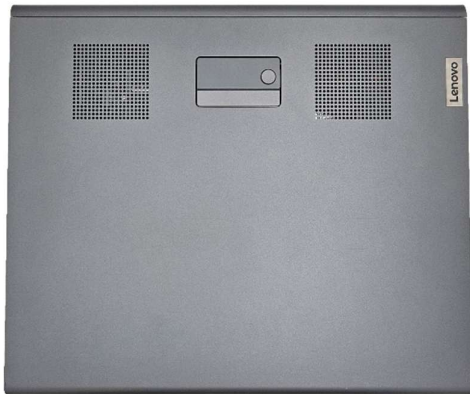
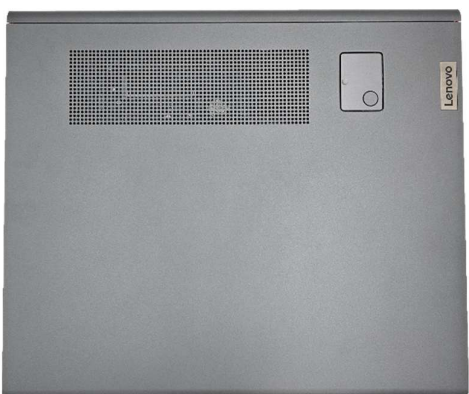
Image – P5 Static Rail Kit



ThinkStation P7/P8

The P7/P8 systems use the same overall size chassis and will be addressed together in this section. Due to the increased thermal and airflow requirements for certain high-end GPUs, Lenovo introduced a modified chassis with additional venting on the removable side panel and at the top of the system across both the inside metal frame of the chassis and the plastic insert on the outside top of the case. These updated parts are automatically included when the appropriate GPUs are ordered.

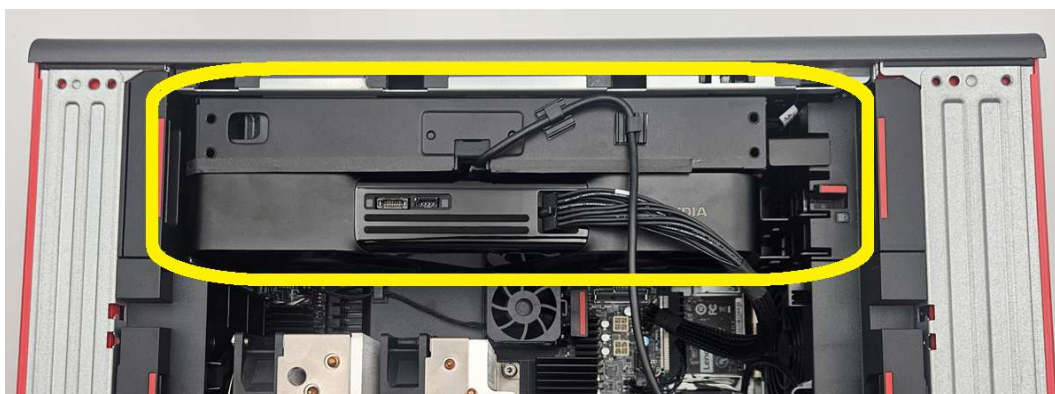
See the chart below to compare the original chassis with the updated vented chassis.

Area	Original Chassis	Updated Chassis
Top Cover*		
Top Chassis Frame		
Side Panel*		

*Only certain configurations utilize the updated top cover and side panel. See the "Updated Chassis Guide – P7 P8" for more information on the updated vented chassis at <https://support.lenovo.com>.

The modified chassis was created to accommodate the cooling needs for those systems configured for maximum processing power. This updated vented chassis is required and included with either system when purchasing the RTX PRO 6000 Blackwell Workstation Edition (BW WE) or the Lenovo GeForce 5090. When using the RTX PRO 6000 BW WE the vented chassis will also include a dual fan assembly that occupies PCIe slots 1 and 2 to help push air out of the vents on the top of the system, as seen in the image below.

Image: RTX PRO 6000 Workstation Edition with dual fan assembly installed in a P8 system



P7/P8 Server Rack Rail Kit Installation

Under normal, non-rack use, the vented chassis will properly cool the given systems in any approved configuration of CPU, GPU, and related hardware, even while the system has all components running at maximum capability. While the systems remain properly cooled, all of the parts are able to run together at full load without any impact to performance.

However, despite these new airflow features for the P7/P8 chassis it is possible that when these systems are installed into a server rack, users could experience some performance impact. The installation of a rail kit in the P7 and P8, when using these systems in a server rack set up, will result in a reduced amount of heated air that can be expelled from the system through the vented top. See the image below.

Image – P8 Vented Top with Rail Kit Installed



Adequate side panel vent clearance for RTX GeForce GPUs is also a consideration and is covered later.

This reduction in cooling capability has been found to impact systems that have been configured for maximum processing capability and are running at full loads. Through testing, it has been determined that, with the rack rail kits installed, the P7 CPU rated for 385W may exceed the thermal limits and throttle back to around 350W when the system is under a full stress test load with either of the previously mentioned GPUs. However, it is possible with the P7 and P8 that even when using a 350W CPU and an RTX Pro 6000 Blackwell GPU that users could experience limited throttling of a 350W CPU when either system is running a maximum performance load across all of the parts. Additionally, P7 users may experience limited throttling when using a 385W CPU with a GeForce RTX 5090 with the system running at maximum capability. Reference the chart below when planning on using a P7 or P8 mounted in a server rack.

Stress Testing Observations for the Vented Chassis with Rail Kit Installed:

P7 Updated Vented Chassis with Rail Kit Installed		
Installed CPU	RTX Pro 6000	Lenovo RTX 5090
385W CPU	Throttling may occur	Throttling may occur
350W CPU	Throttling may occur	No throttling should occur
P8 Updated Vented Chassis with Rail Kit Installed		
Installed CPU	RTX Pro 6000	Lenovo RTX 5090
350W CPU	Throttling may occur	No throttling should occur

NOTE: At the time of writing, the highest wattage CPU that is supported on the P7 is the 385W Intel Xeon W9-3595X. All other P7 CPUs are rated at 350W or below. For the P8 all of the supported AMD Threadripper Pro CPUs are rated at 350W. The highest performing GPUs are the 600-watt RTX PRO 6000 Blackwell Workstation Edition and the RTX GeForce 5090.

If for any reason the temperature of any of the system parts begin to exceed the thermal specifications, the affected system part will automatically throttle and reduce performance until the temperature returns to within the approved specifications. However, if only one of the primary components, the CPU or GPU is running at the maximum load, users are not expected to experience any issues or throttling. The potential issues identified were found in corner case testing when the systems were conducting stress tests which required all of the components to simultaneously run at maximum capability. The efforts taken to run these stress tests are not representative of typical workstation workloads.

When using any officially supported Lenovo RTX GeForce series GPU in a racked P7 or P8, there are several considerations:

- The venting on the side panel should be kept free from obstruction.
- It is required to leave an additional 1U of rack space between the side panel venting and the next system or component above it in the rack. See the image below.
- It is also recommended to utilize a blank panel for any open space on the front of the rack to maintain proper air flow and minimize the potential for expelled hot air recirculation back through the system.



ThinkStation PX

When using the PX with any officially supported RTX PRO series GPU there are no other hardware considerations for installing the system into a rack.

However, when using any officially supported Lenovo RTX GeForce series GPU in a racked PX, there are several considerations:

- The venting on the side panel should be kept free from obstruction.
- It is required to leave an additional 1U of rack space between the side panel venting and the next system or component above it in the rack. See the image below using a P8 as an example.
- It is also recommended to utilize a blank panel for any open space on the front of the rack to maintain proper air flow and minimize the potential for expelled hot air recirculation back through the system.



Revision History

Version	Date	Author	Changes/Updates
1.0	2/27/26	Scott C	Release

