Storage Configurator

Lenovo ThinkStation P2 Tower

Table of Contents

Overview

The purpose of this document is to provide guidelines for users on how to optimally configure the system storage in the ThinkStation P2 platform to ensure proper functionality.

Below is a table showing the drive type support of each system in the P2:

Table 1 – P2 Storage Support

System	M.2 NVMe	SATA	Notes
P2 Tower	Supported, Max QTY: 3*	Supported, Max QTY: 3**	3.5” SATA or 2.5” SATA with adapter

* MAXIMUM 2 PCS M.2 Onboard Slot and 1xM.2 VIA the PCIe to M.2 AIC Adapter

** MAXIMUM 2PCS 3.5 inch HDD and one ODD Driver Support

The following sections give detailed instructions on the installation of M.2 NVMe and SATA drives, as well as provide part numbers for required components needed for proper installation.

Component Type:	Total Max QTY:	Total Max QTY （2.5 wide GPU*）:
M.2 Gen4	2	2
M.2 Gen3	1	0
3.5 HDD	2	2
FASE HDD	1	*0 Not support
HDD (3.5)+FASE HDD	2	*Not support
CD	1	1
HDD (3.5)+CD	3	3

*2.5 wide GPU will Occupy 3 physical PCIe slots (EXP. NVIDIA RTX 4070)

P2 Tower, support RAID levels 0 & 1 for onboard NVMe drives. P2 Tower can support levels 0, 1for SATA drives depending on system configuration.

RAID configurations and setup instructions are discussed in Section 3 and Section 4.

Section 1 – Installing NVMe Devices in P2 Tower

M.2 NVMe devices can be installed into the following locations on the ThinkStation P2 Tower motherboard below. The M.2 NVMe drives may use the dedicated PCIe Gen 4 capable onboard M.2 slots or use a Gen 3 PCIe M.2 Add-In Card (AIC) in PCIe Slot 3. P2 Tower supports up to two double-sided 4TB M.2 2280 drives in the onboard slots and up to one single-sided 2TB M.2 2280 in the AIC. The P2 chassis has the ability to mount M.2 22110 and M.2 2242 drives, however at the time of this writing, all Lenovo supported M.2drives for P2 Tower are 2280.

Figure 1 – P2 Tower Motherboard Diagram with NVMe Callouts

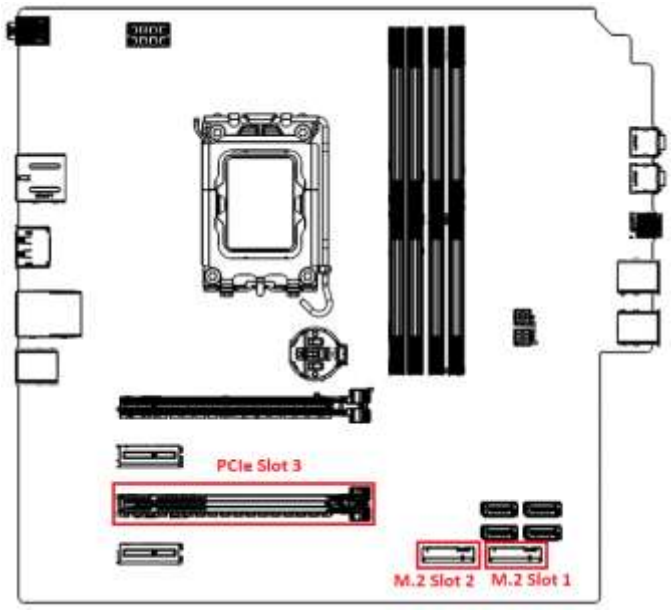
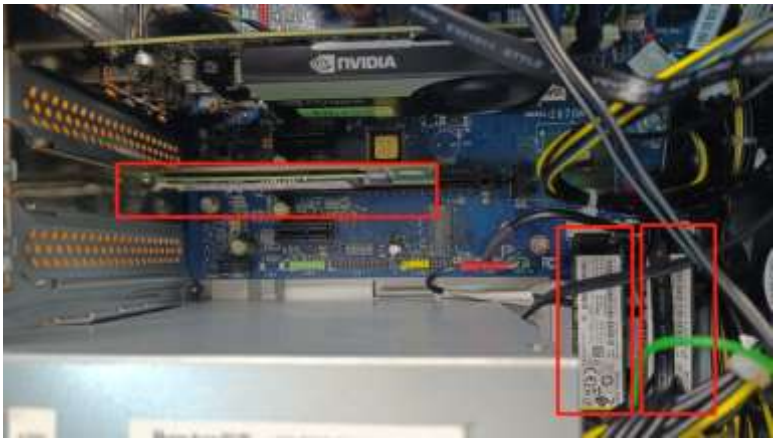


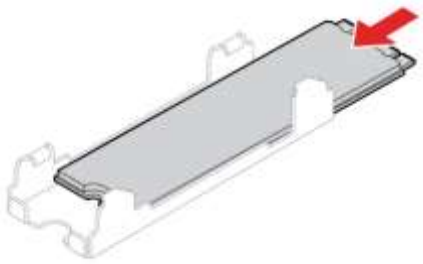
Figure 2 – P2 Tower Chassis with NVMe Callouts

（Update clearer images or delete them in the future）

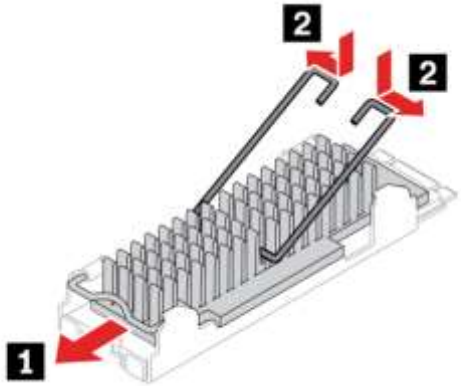


For M.2 NVMe drives in the onboard M.2 slots:

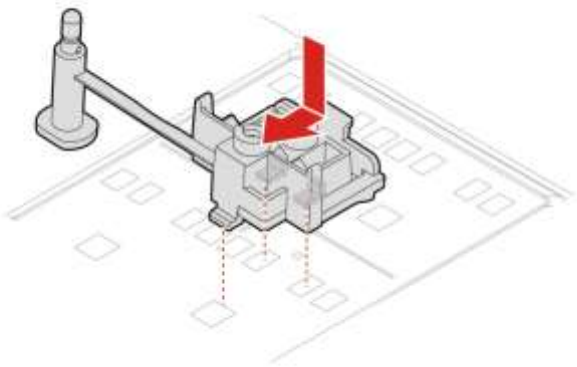
1. Remove the film that covers the thermal pad on the carrier, if any. Then, install the M.2 solid-state drive by sliding the drive in the carrier.



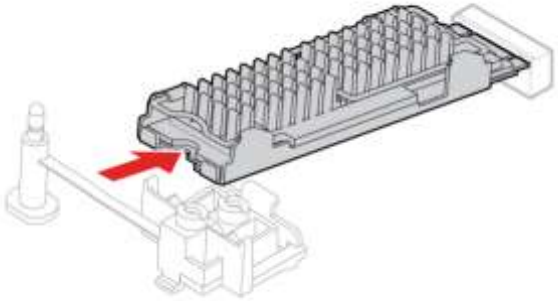
2. Remove the film that covers the thermal pad at the bottom of the heat sink, if any. Then, install the heat sink onto the M.2 drive in the bracket.



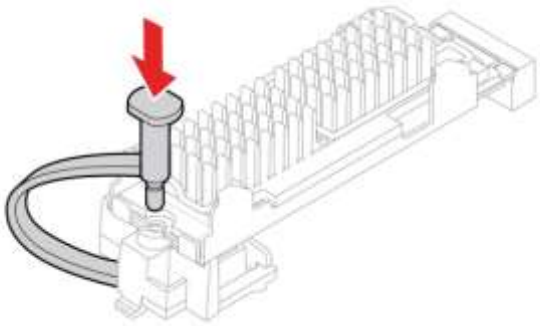
3. If not already present, install the M.2 drive bracket into the system.



4. Install the heat sink with the bracket into the system.



5. Insert the stopper.



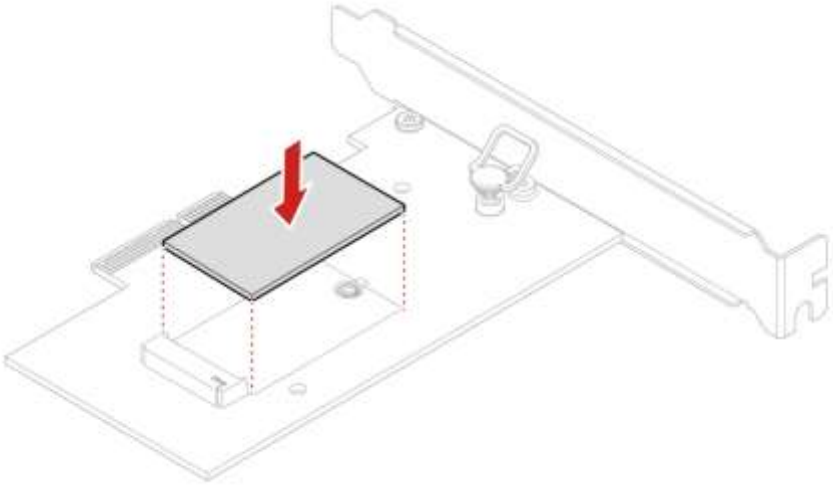
Note: P2 Tower systems come equipped with only the necessary onboard M.2 parts required for the configuration when it was originally ordered from Lenovo. Adding an M.2 drive to an open onboard slot requires the option kit 4XF1C39743, which includes the heatsink assembly and stopper seen in the instructions above. For supported double-sided 4TB M.2 drives, FRU 5F10U94103 is needed instead.

Further clarification is needed on the differences and uses of these three thermal pads

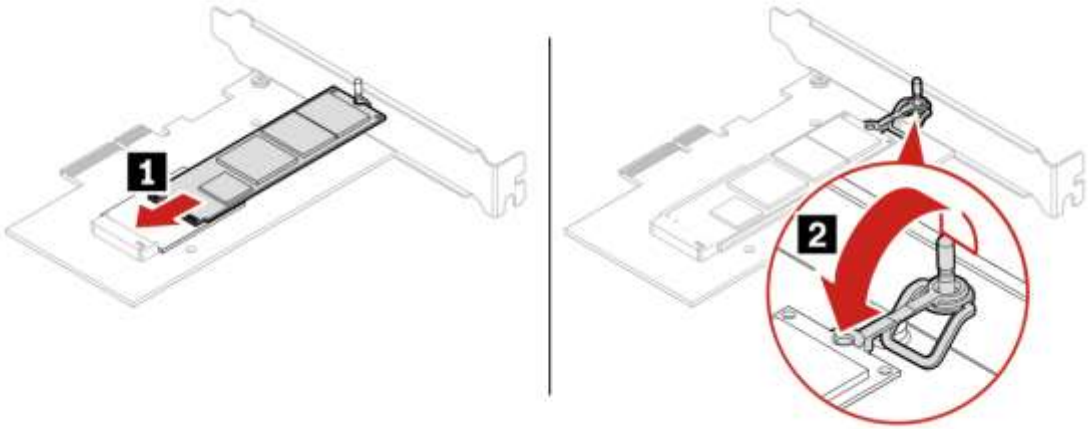
OB 2280/2242 M.2 Heat Sink kit	1	SBB1K33094				
M2 2280 SSD HS,TSL	2		TSL		SH40X54068	5H40U92990
Two sides 2280 M2 SSD HS,TSL(4TB only)	1	SBB1K33095				
Two side 2280 M2 SSD HS,TSL	2		Taisol		SH41E38933	5F10U94103
OB 2280 M.2 Heat Sink kit(512GB only)	1	SBB1K33150				
M2 2280 SSD DFC HS,FXC	2		FOXCONN		SH40X54490	5H40U92991

For M.2 NVMe drives installed in the PCIe Add-in Card (AIC):

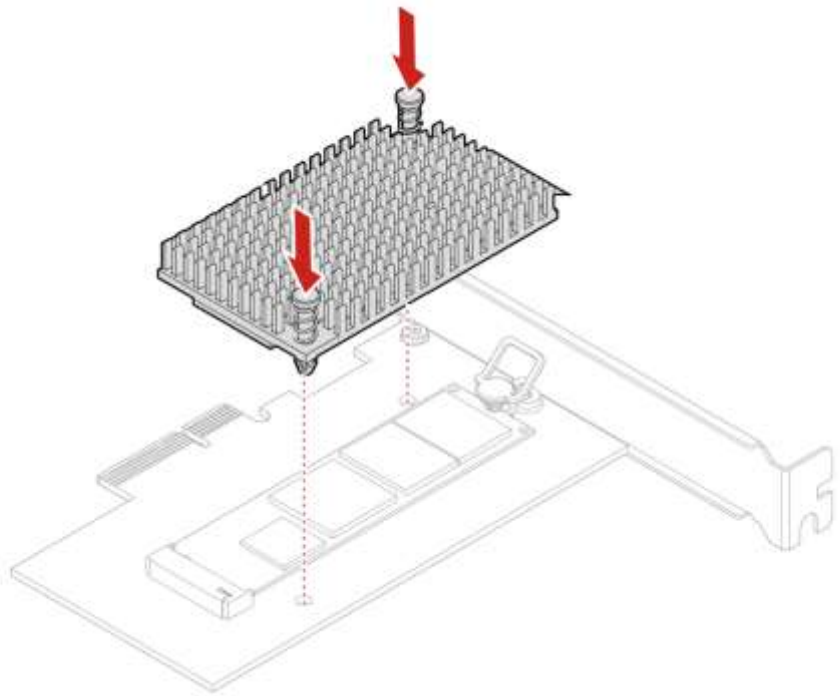
1. Ensure that a thermal pad is placed in position on the M.2 solid-state drive PCIe adapter.



2. Insert the new M.2 solid-state drive into the M.2 slot. Then, insert the plug of the retention latch into the hole to secure the new drive.



3. Position the heat sink on the M.2 solid-state drive PCIe adapter. Ensure that the two mounting studs in the heat sink are aligned with the holes in the M.2 solid-state drive PCIe adapter. Then, push the mounting studs downward to secure the heat sink to the adapter.



Note: The M.2 NVMe Add-in Card's option part number is 4XH0L08578. This kit will include the add-in card, thermal pad, and heatsink.

Section 2 – Installing SATA Drives in P2 Tower

The ThinkStation P2 Tower can hold a maximum of four SATA drives. The P2 Tower motherboard has four SATA port connections, labelled SATA1, SATA2, SATA3, and SATA4 (eSATA) in the order they show up in the system BIOS.

Figure 3 – P2 Tower Motherboard with SATA Callouts

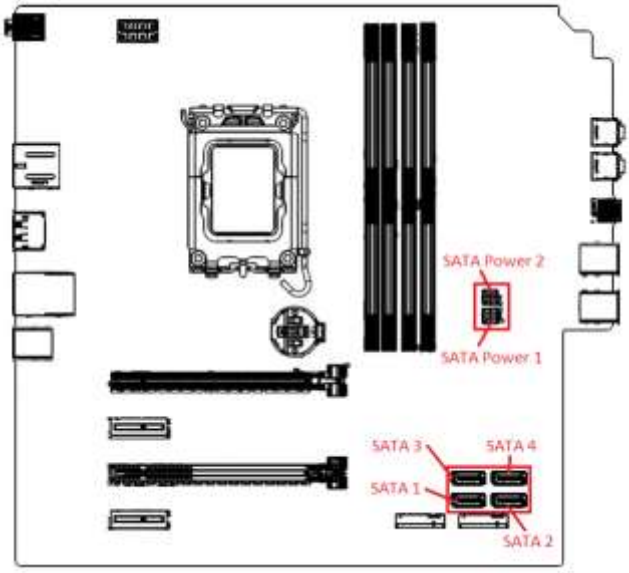
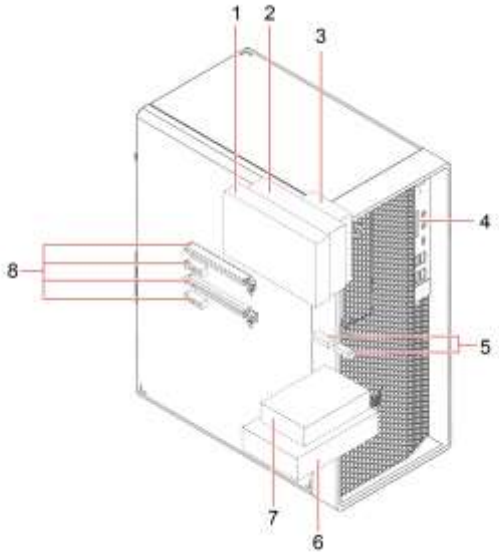


Figure 4– P2 Tower Storage location layout



1 – Slim optical drive

2 – Flex bay (optional) to install a 3.5” secondary storage drive cage or a 3.5” front-access storage enclosure (FASE)

3 – 2.5” secondary (optional) storage drive cage （Not ship support by P2）

4 – Media Card slot

5 – Two M.2 solid-state drive slots

6 – 3.5” storage drive

7 – 2.5” Frist (optional) storage drive cage

7 – 2.5” Frist (optional) storage drive cage （Not ship support by P2）

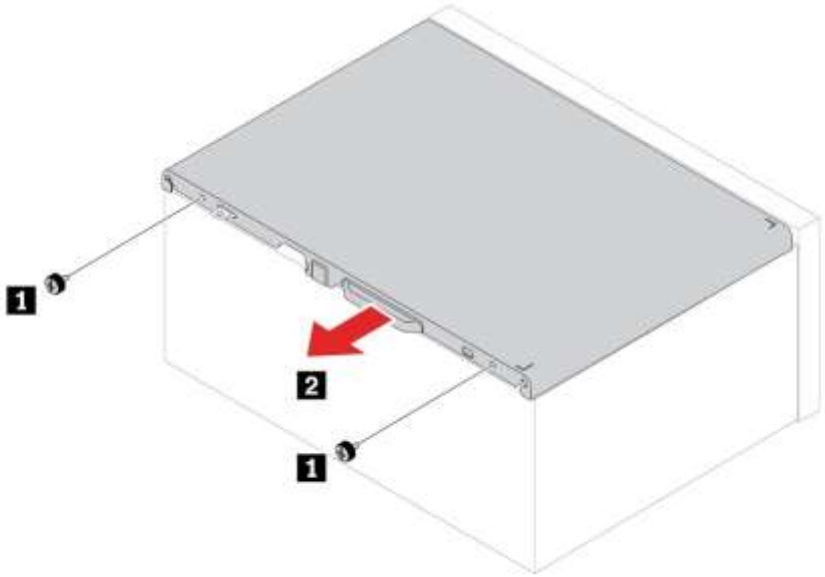
8 – PCIe slot （16x 1x and 4x）

Note 1: When adding additional drives after purchase, additional parts will likely be required such as, Add-In-Cards, enclosures, and cables. See Appendix in Section X (Check later).

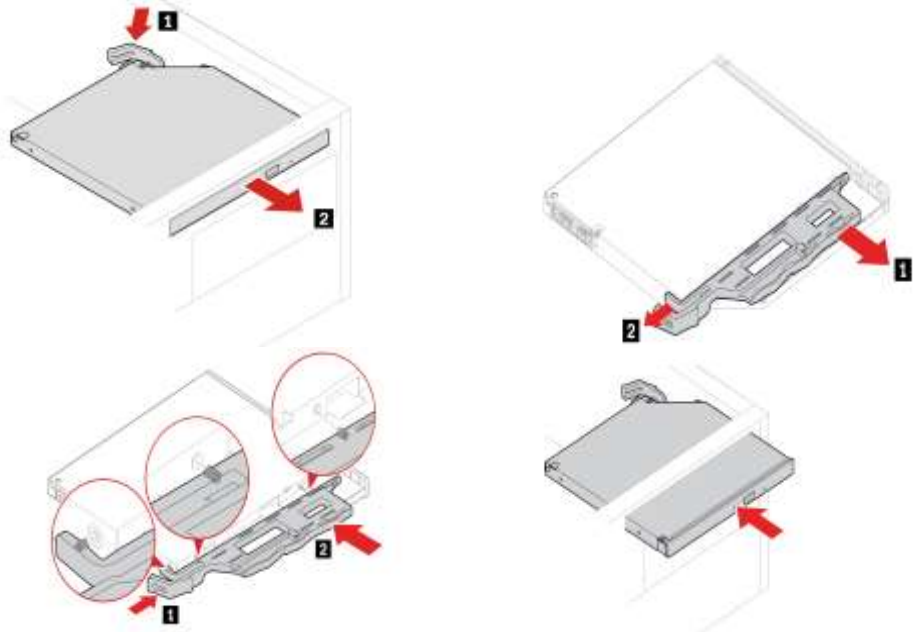
Note 2: if the unit was purchased without a slim ODD, FASE, 2nd 3.5” HDD, or 2nd 2.5” drive, then the slim ODD bracket will not be present. Users wishing to add any of those components will need to purchase the option kit for the device to be added, as well as the option kit for the slim ODD bracket in order to complete the installation. (see Appendix).

Removal and installation of the Slim ODD:

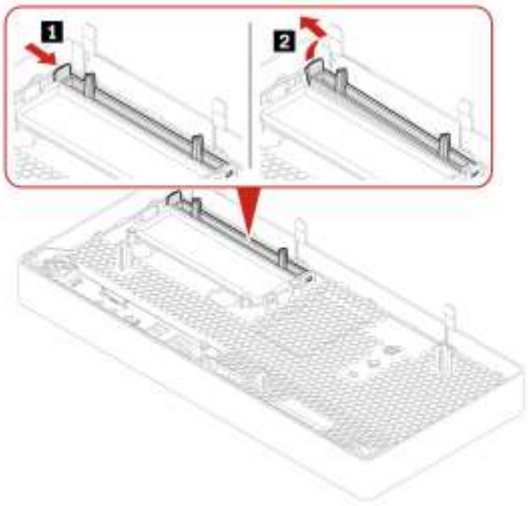
1. Remove the “Computer cover”



2. Disconnect the signal and power cable from the slim optical drive.



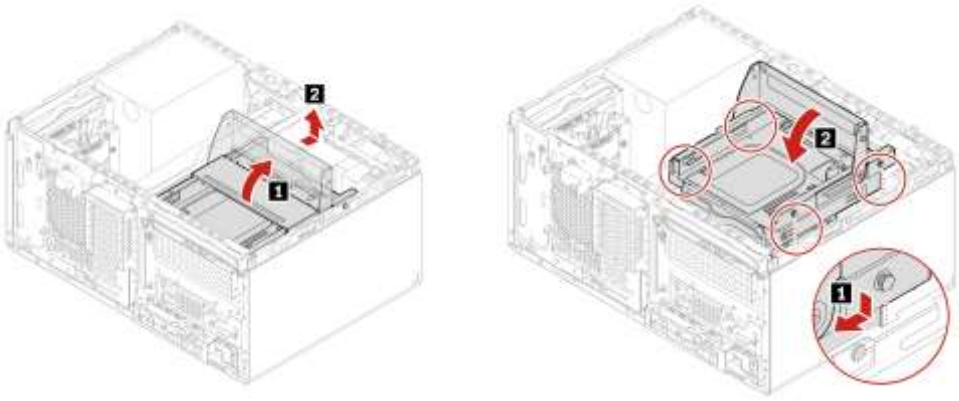
Note: To install a new slim optical drive, if there is a plastic shield in the front bezel, remove the plastic shield first as shown.



Slim-optical-drive cage

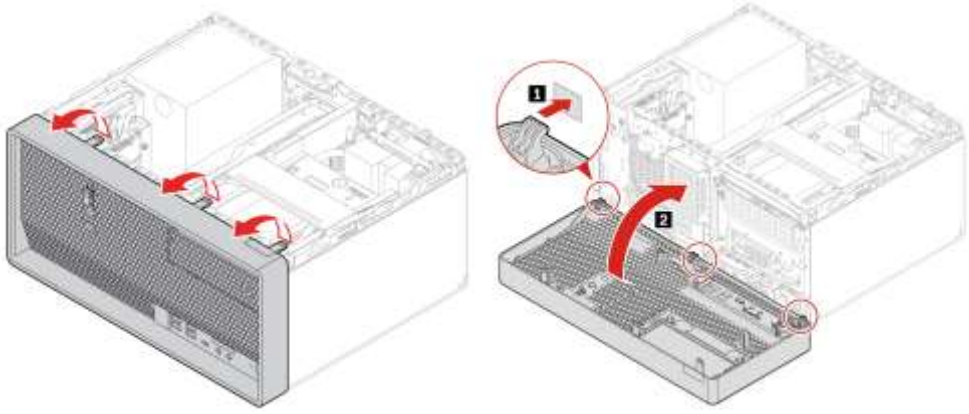
For access, do the following: Remove these parts in order, if any:

1. “Computer cover”
2. “Slim optical drive”
3. “Front bezel”



Disconnect the signal cable and power cable (if any) from the secondary storage drive under the slim- optical-drive.

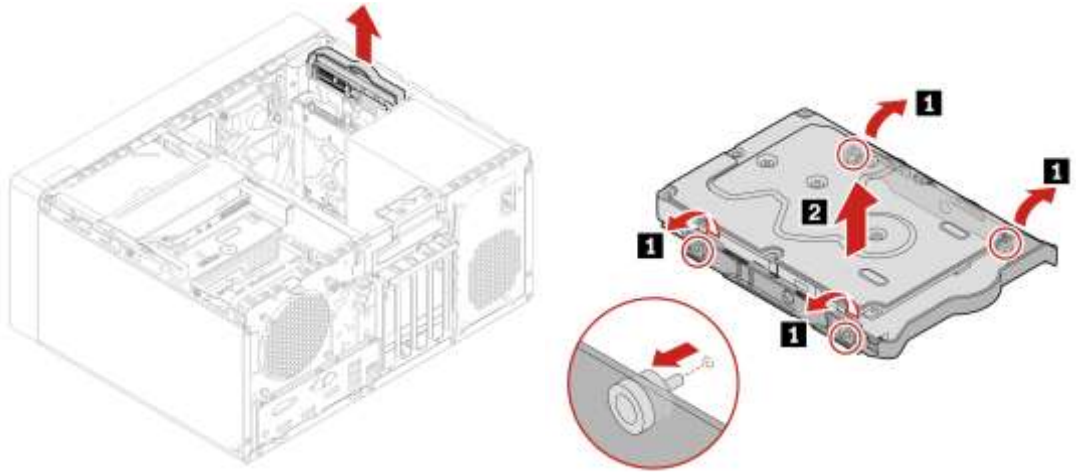
Front bezel



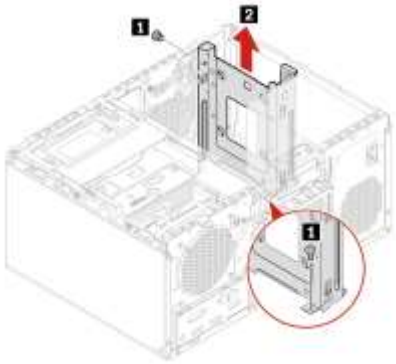
Removal and installation SATA Drives:

Removal steps of the 3.5-inch primary storage drive and bracket

1. Remove the “Computer cover”
2. Disconnect the signal cable and the power cable from the 3.5-inch primary storage drive.
3. Remove the 3.5-inch primary storage drive and bracket.



3.5-inch primary storage drive cage



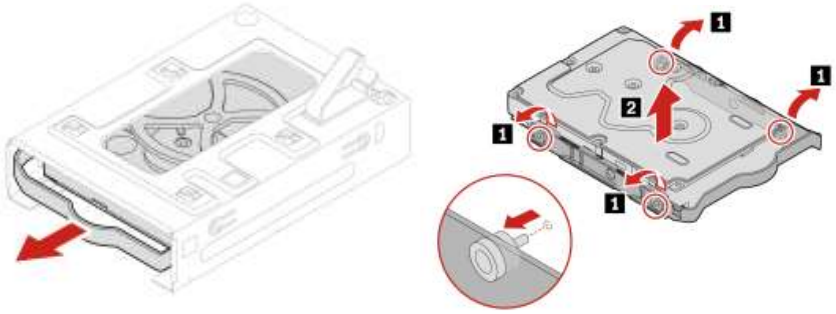
Removal and installation of the Secondary storage drives:

1. Disconnect power and data cables from the drive. Push on the marked lever on the rear of the drive cage and lift out of the chassis.

Replace the internal storage drive only for upgrade or repair. The internal storage drive is not designed for frequent changes or replacement.
Before replacing the internal storage drive, make a backup copy of all the data that you want to keep.
Do not touch the contact edge of the internal storage drive. Otherwise, the internal storage drive might get damaged.
Do not apply pressure to the internal storage drive.
Do not make the internal storage drive subject to physical shocks or vibration. Put the internal storage drive on a soft material, such as cloth, to absorb physical shocks.

- “Computer cover”
- “Slim optical drive”
- “Front bezel”
- “Slim-optical-drive cage”

Removal steps of the 3.5-inch secondary storage drive, plastic bracket, and cage



Storage drive in the front-access storage enclosure

The storage drive in the front-access storage enclosure is hot-swappable only when the following requirements are met:

The eSATA mode of the SATA 4 connector is enabled in BIOS by doing the following:
Restart the computer. When the logo screen is displayed, press F1 or Fn+F1.
Select **Devices → ATA Drive Setup → SATA Drive 4 Hot-Plug Support** and press Enter.
Select **Enabled** and press Enter.
Press F10 or Fn+F10 to save the changes and exit.

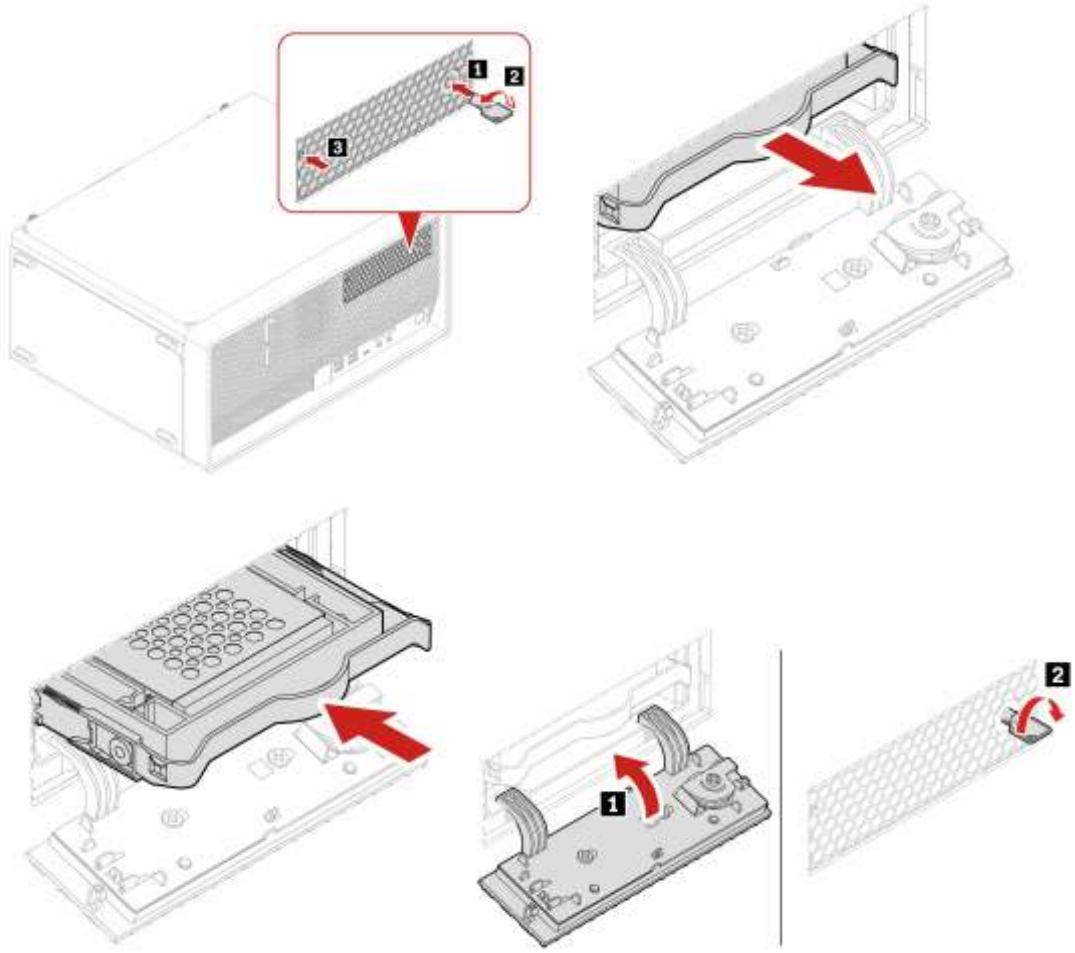
The SATA cable of the front-access storage enclosure is connected to the SATA 4 connector on the system board.

The operating system of your computer does not reside on the storage drive installed in the front-access storage enclosure.

Attention: If any of the above requirements are not met, do not install or replace the storage drive when the computer is turned on. Otherwise, data on the storage drive might get damaged.

Removal steps of the 3.5-inch storage drive

Note: Before removing an old 3.5-inch storage drive, safely eject the old storage drive from the operating system first. For more information, see the Windows help system



Below are some important notes about SATA drive capabilities in P2Tower:

The ability to maximize the number of SATA drives is dependent upon using a "3rd HDD enclosure" or "Front-Access Storage Enclosure" (FASE), depending on CPU SKU and fan cooler (See *Table 2 & Figures 8 & 9*).

Section 3 – RAID Levels

General:

- Before creating or altering a RAID config, always backup important data to an external location to prevent accidental data loss.
- A given array should not mix drive types or logical sizes. It is recommended to only use drives officially supported by Lenovo for the given platform.
- Each RAID level requires a certain minimum and or maximum number of drives. If altering the system storage devices after purchase or a previous configuration, it will be necessary to verify the proper types and number of devices for a desired RAID configuration have been installed. Altering or creating an array may require any existing OS to be reinstalled.
- P2 Tower utilize Intel Rapid Storage Technology (RST) for configuring RAID.

P2 Tower:

- At the time of writing there are no add-in RAID controllers certified on this platform.
- At the time of writing, the following drive quantities are supported for the respective SATA RAID levels:
  - RAID 0 & RAID 1 - Two SATA drives
- Only drives in the two onboard Gen 4 M.2 slots can be utilized together in a RAID configuration. RAID configurations utilizing both onboard and AIC M.2 drives are not supported.

The table below shows various RAID levels supported on each P2 platform.

Table 4 – P2 Series RAID Capabilities

System	Max # of RAIDable M.2 NVMe Drives	M.2 NVMe RAID Levels	Max # of RAIDable SATA Drives	SATA RAID Levels
P2 Tower	3*	0,1	2	0,1,

* M.2 2280 sized drives from being installed in the two onboard M.2 slots, 3rd M.2 (installed in an add-in card).

Section 4 – Configuring RAID

Please refer to the following steps to configure RAID for both NVMe and SATA drives. Examples may show configurations that are not possible on all systems. **Backup any important data before editing RAID configurations!**

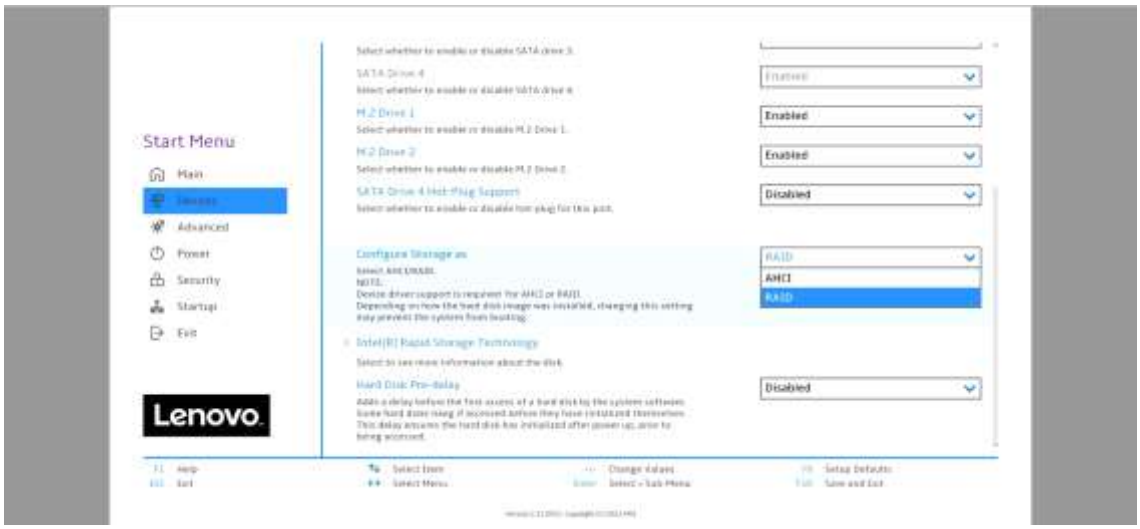
1. Boot into the BIOS by pressing the function F1 key at the “Lenovo” splash screen.

2. Select “System Summary” and scroll down to verify BIOS is recognizing all the drives installed in the system.

Note: From this point forward, the examples will utilize the M.2 NVMe drives. The process is the same for both drive types.

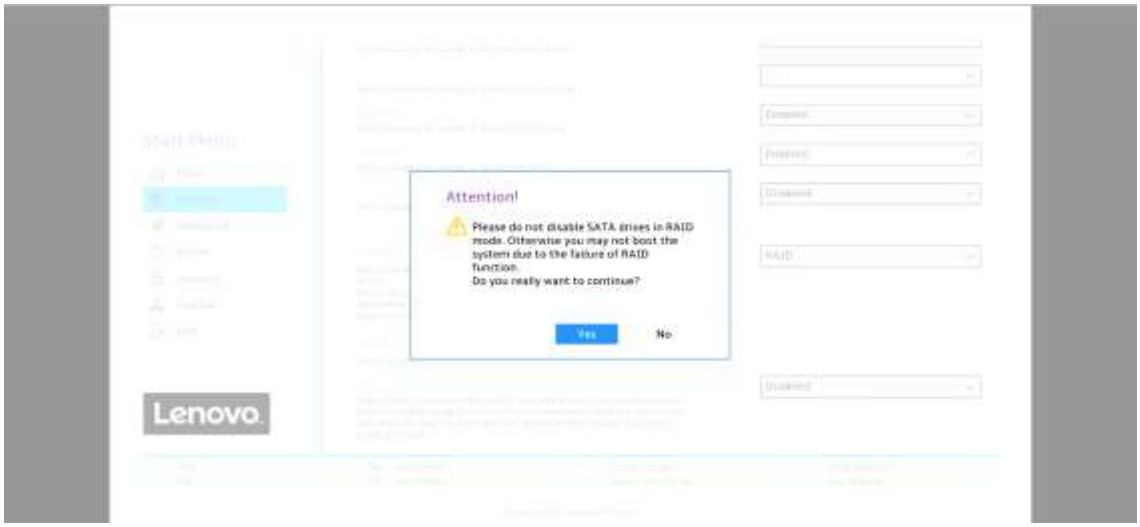
3. Select the “Devices” menu at the BIOS main screen setup utility and then select “Storage Setup”.

4. In the “Storage Setup” menu, select “Configure Storage as” and change or verify the option is set to “RAID”.

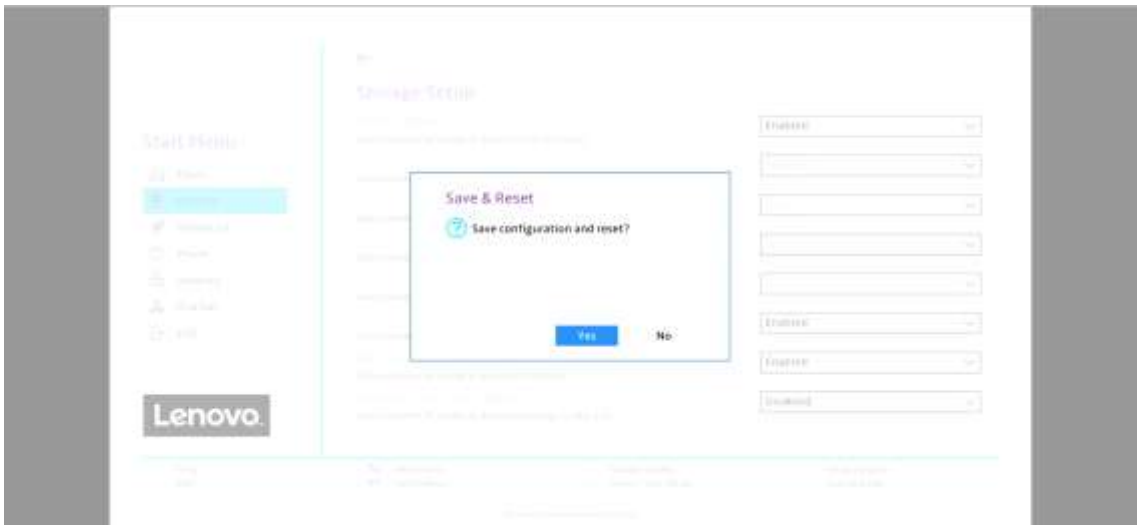


Notes: In order to Secure Erase any drives, the ‘Configure Storage as’ option must be set to ‘AHCI’ mode. Changing storage modes may cause issues with boot OS and data on existing drives.

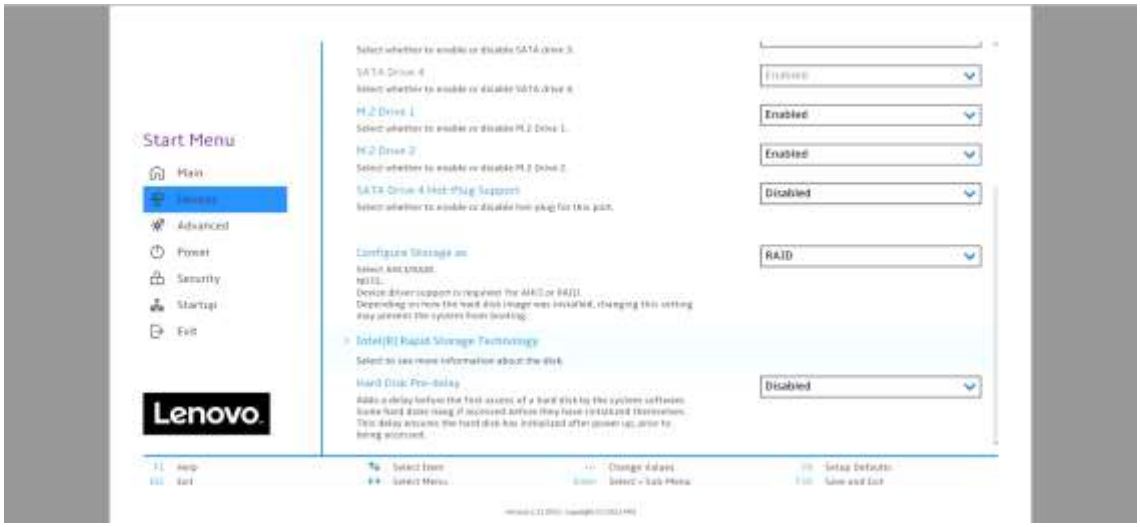
5. When selecting to enable RAID the system will prompt a warning that changing the setting may result in the failure of the system to boot. Select “Yes” to continue.



6. Press F10 to save and Exit BIOS setup.



7. As the system reboots, press the function F1 key at the Lenovo splash screen to enter the BIOS setup. Select the “Devices” menu at the BIOS main screen setup utility and then “Intel(R) Rapid Storage Technology”.



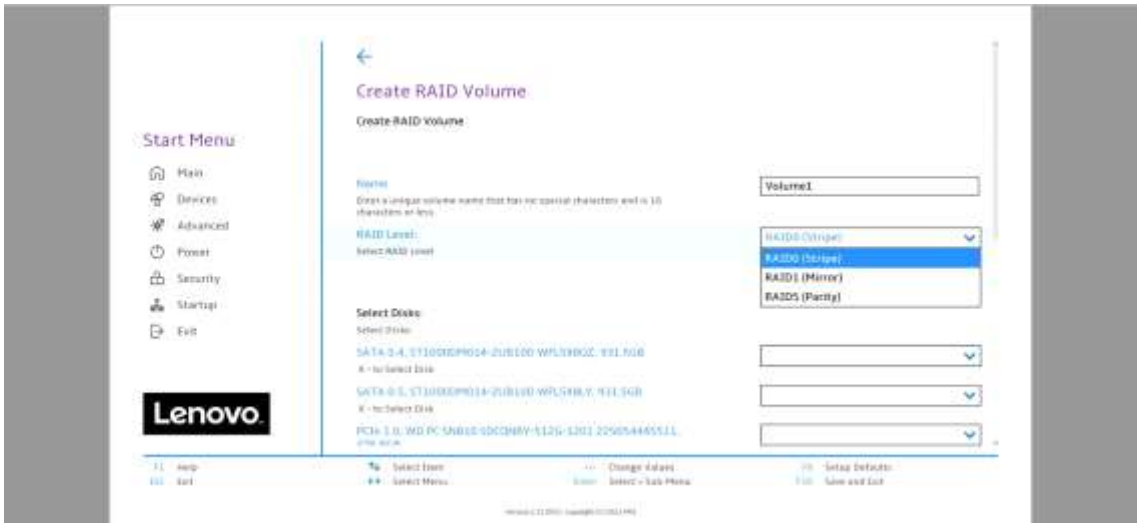
8. Verify all the desired drives are available.

9. If all the disks installed are not shown as available, it may be necessary to clear any previous data from the disks. If no arrays have been created previously but there is an existing volume shown, it will be necessary to delete any previous arrays. Advance to step 15 to complete the process to delete any arrays. Return and proceed to step 10 once the desired drives are available.

10. Select “Create RAID Volume”.

11. Choose a name for the volume.

12. Select the drop-down box for “RAID Level” and select the desired RAID level. The RAID level options displayed are based on the type and number of drives available in the system.



13. On the same page, select the drop-down box for each drive and select “X” to add the drive to the array. Once all the required drives are added, select “Create Volume”. Unselected drives will appear in an OS like normal.

14. From the opening page of the “Intel(R) Rapid Storage Technology”, verify the volume was created properly.

15. To delete an array, select a displayed volume to view information about it.

16. Select the “Delete” option.

17. Select “Yes” to confirm the deletion of the volume.

18. To verify the array was deleted, return the opening page of the “Intel(R) Rapid Storage Technology” and verify the drives are once again seen as available for the creation of a new array.

Note: The user may not see the RAID array show up in the BIOS boot sequence until after a bootable operating system has been installed on the array.

Section 5 – Appendix

- On some P2 Tower configurations, the hardware required to support the addition of certain storage components (listed below) may be not present. In order to install these components, it might be necessary to add the Slim ODD Bracket assembly, which is available via Option PN 4XF1L42848 or FRU 5M11C16639. This additional bracket will add the required supporting structure to allow these additional storage options to be installed properly.
    - Slim ODD
    - Flex bay/FASE
    - Secondary 2.5” storage bay

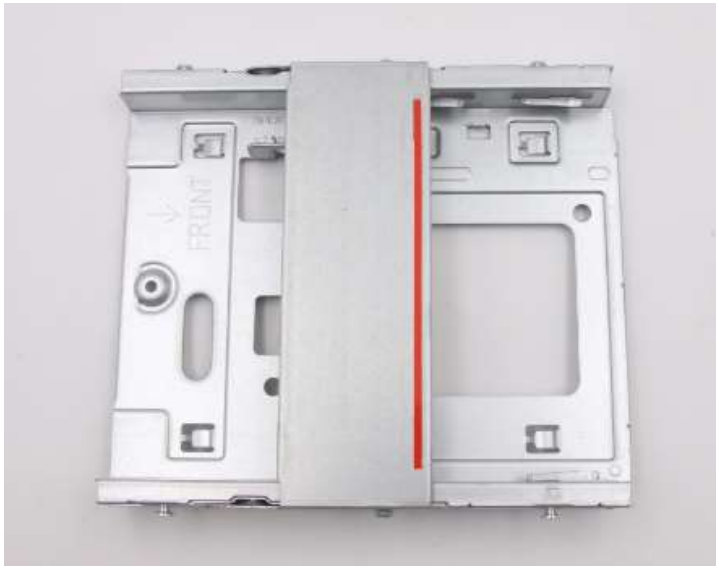
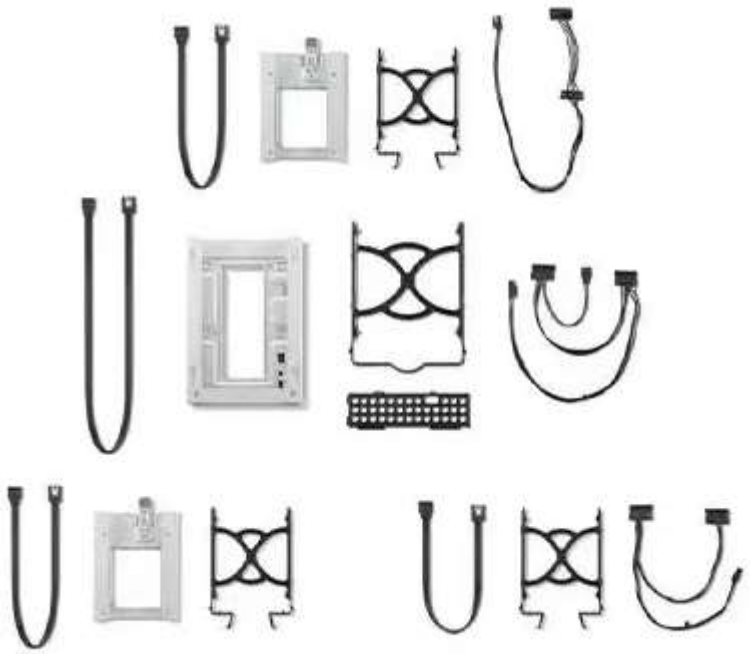


Figure 1 – Slim ODD Bracket Assembly (Tower only)

- Additional detail for the ThinkStation 3.5” FASE kit – Option PN 4XH1B85931 (Tower only)

- Additional detail for the ThinkStation Storage Kit – Option PN 4XH1B85930



- Additional detail for the 2.5”” to 3.5” Conversion Kit – Option PN 4XF0G94539

(4XF1M24244) ThinkStation Front Access Storage Enclosure for P2 Tower contains:

- FASE HDD Cage Hot-Swap Assembly
- Front Access Bezel
    - 4x #6-32 Screws (for bezel installation)
    - 2x Keys for locking HDD front access
- 3.5” to 2.5” HDD Bracket
- 3.5” HDD Tray
- Data+Power SATA Cable (520+150mm)
- Single-drop SATA Power Cable (380mm)

(4XH0L08578) ThinkStation PCIe to M.2 Riser Card High Profile contains:

- PCIe to M.2 Riser Card with Thermal Pad
- M.2 Push Pin Heatsink Module

(4XF1C39743) ThinkCentre M.2 2280 SSD Kit III contains:

- M.2 2280 Heatsink (Top heatsink and carrier, supports one-sided M.2 drives)
- M.2 2280 Carrier (Bottom component only)
- M.2 Bracket with stopper

For double-sided 4TB M.2 drives:

(FRU 5F10U94103) M.2 heatsink set for double-sided M.2 drives

(FRU 5M10U50407) M.2 bracket with stopper

Section 6 – Document Revision History

Version	Date	Author	Updates
V0.1	01/11/24	Zhu Zheng	Initial Draft
V1.0	10/30/24	Zhu Zheng	Initial Release