

Overview

HP Z8 G5 Workstation Desktop PC



Front View

1. Integrated Front Handle
2. Power Button
3. HDD Activity LED
4. Headphone/microphone combo
5. Front I/O:
4 SuperSpeed USB Type-A 5 Gbps signaling rate [left-most Type-A ports supports BC1.2 (Battery Charging)]
6. SD Card Reader
7. 2x External 5.25" bay¹
8. 9.5mm Optical Drive Bay

¹Only 1 external 5.25" drive configurable from factory

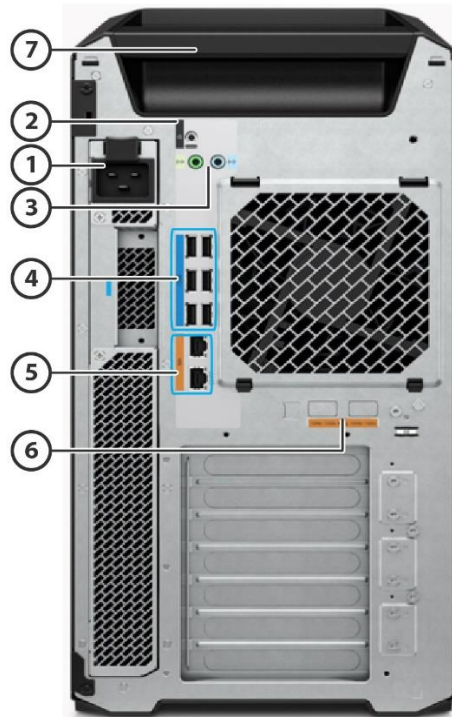
Overview



Internal View

1. 2 Intel® Xeon® Processors (Sapphire Rapids-Scalable)
2. 16 DIMM slots for DDR5 ECC Memory – 8 DIMMs per installed processor
3.
 - Slot 1: PCIe x16 Gen4
 - Slot 2: PCIe x16 Gen4 - Available ONLY when 2nd processor is installed
 - Slot 3: PCIe x4 Gen3
 - Slot 4: PCIe x16 Gen5
 - Slot 5: PCIe x8 Gen3
 - Slot 6: PCIe x16 Gen3 - Available ONLY when 2nd processor is installed
 - Slot 7: PCIe x4 Gen3
4. 2 PCIe x8 Gen4 configurable with 4 Z Turbo M.2 SSDs (2nd slot available ONLY when 2nd processor is installed)
5. 6 SATA ports
6. 3 Internal USB Ports (1 single USB2.0 port, 1 dual USB2.0 port, 1 USB3.0 port (for the SD card reader))
7. 4 Internal 3.5" bays
8. 2 External 5.25" bays and Slimline Optical Drive
9. 1 Internal NVMe connector to front removable M.2 carrier

Overview



Rear View

1. Choice of 1125W, 1450W or 1700W, 90% Efficient Power Supplies
2. Rear Power Button
3. Audio in/out
4. 6 SuperSpeed USB Type-A 5 Gbps signaling rate
5. 2 RJ-45 integrated LAN ports (1 GbE AMT, 1GbE)
6. 2 10GbE LAN ports (optional)
7. Integrated Rear Handle

Form Factor Tower

- Operating Systems**
- Preinstalled:
- Windows 11 Pro for Workstations²
 - Windows 11 Pro for Workstations (preinstalled with Windows 10 Pro for Workstations Downgrade)^{2,3}
 - Ubuntu 22.04 LTS⁴
 - HP Linux[®]-ready (minimal OS ready for customer OS installation)⁵
- License Only:
- Red Hat[®] Enterprise Linux[®] Desktop Workstation (includes paper license with 1 year support; no preinstalled OS)⁶
- Supported:
- Windows 11, version 22H2, 21H2²
 - Windows 10, version 22H2, 21H2²
 - Red Hat[®] Enterprise Linux[®] Workstation 8 & 9⁶

Overview

- SUSE Linux® Enterprise Desktop 15⁶
- Ubuntu 20.04 & 22.04 LTS⁵

Web-supported only:

- Windows 11 Enterprise^{2,1}
- Windows 10 Enterprise^{2,1}

¹ Windows Enterprise sold separately and requires that customer have an enterprise license from Microsoft.

² Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.

³ This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

⁴ Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply and additional requirements may apply over time for updates.

⁵ A certified preloaded version of Ubuntu® 20.04 LTS is available from HP for this platform. Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply, and additional requirements may apply over time for upgrades.

⁶ For detailed Linux® OS/hardware support information, see:

http://www.hp.com/support/linux_hardware_matrix

NOTE: Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows® 8 or Windows 7 operating system on products configured with Intel® and AMD® 7th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on <http://www.support.hp.com>. A full list of HP products and the Windows 10 versions tested is available on the HP support website. <https://support.hp.com/us-en/document/c05195282>

Overview

Processors

Name ¹	Cores	Threads	Frequency (GHz)		Cache (MB)	Max Memory Speed (MT/s)	TDP (W)
			Base Clock Speed	Intel® Turbo Boost Max Single-Core Frequency ²		1 DIMM per Channel	
Intel® Xeon® Gold 6448Y	32	64	2.1	4.1	60	4800	225
Intel® Xeon® Gold 6438Y+	32	64	2.0	4.0	60	4800	205
Intel® Xeon® Gold 6430	32	64	2.1	3.4	60	4400	270
Intel® Xeon® Gold 5420+	28	56	2.0	4.1	52.5	4400	205
Intel® Xeon® Gold 6442Y	24	48	2.6	4.0	60	4800	225
Intel® Xeon® Gold 5418Y	24	48	2.0	3.8	45	4400	185
Intel® Xeon® Silver 4416+	20	40	2.0	3.9	37.5	4000	165
Intel® Xeon® Gold 6444Y	16	32	3.6	4.1	45	4800	270
Intel® Xeon® Gold 6426Y	16	32	2.5	4.1	37.5	4800	185
Intel® Xeon® Gold 5416S	16	32	2.0	4.0	30	4400	150
Intel® Xeon® Silver 4410Y	12	24	2.0	3.9	30	4000	150
Intel® Xeon® Gold 6434	8	16	3.7	4.1	22.5	4800	195
Intel® Xeon® Gold 5415+	8	16	2.9	4.1	22.5	4400	150

Notes:

- 4th Gen Xeon -SP processors all feature Intel® vPro® Technology³
- 4th Gen Xeon -SP processors all support Hyper-Threading
- 4th Gen Xeon -SP processors do not offer integrated graphics

¹ Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering, branding and/or naming is not a measurement of higher performance.

² Intel Turbo Boost Max (ITBM) performance varies depending on hardware, software and overall system configuration. See <http://www.intel.com/technology/turboboost> for more information.

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³ Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro® Essentials and Enterprise vary. See <http://intel.com/vpro>

Color	Black
Convertibility	No
Expansion Slots (see system board section for more details)	<ul style="list-style-type: none"> •Slot 1: PCIe x16 Gen4 •Slot 2: PCIe x16 Gen4 - Available ONLY when 2nd processor is installed •Slot 3: PCIe x4 Gen3 •Slot 4: PCIe x16 Gen5 •Slot 5: PCIe x8 Gen3 •Slot 6: PCIe x16 Gen3 - Available ONLY when 2nd processor is installed •Slot 7: PCIe x4 Gen3
Expansion Bays (see storage section for more details)	<p>4 internal 3.5" bays (All 4 include acoustic dampening rail assemblies)</p> <p>2 external 5.25" bays (175mm depth limit)</p> <p>1 dedicated 9.5mm slim optical disk drive bay</p>
Front I/O	Front I/O: 4 SuperSpeed USB Type-A 5 Gbps signaling rate, 1 headphone/microphone combo, SD card reader (optional). [left-most Type-A ports supports BC1.2 (Battery Charging)]
Internal I/O [5]	3 Internal USB ports and 6 SATA ports.
Rear I/O	Audio in/out, 6 SuperSpeed USB Type-A 5 Gbps signaling rate, 2 RJ-45 integrated LAN ports (1 GbE AMT, 1GbE)
Optional I/O	2 10GbE LAN ports
On-board RAID Support	<p>SATA RAID 0 Striped Array</p> <p>SATA RAID 1 Mirrored Array</p> <p>SATA RAID 10 Striped/Mirrored</p> <p>SATA RAID 5 Parity Array</p>
Chassis Dimensions (H x W x D)	<p>Footprint:</p> <p>H: 17.5" [444.5mm]</p> <p>W: 8.5" [215.9mm]</p> <p>D: 21.7" [551.2mm] (measured to the rear of service panel)</p> <p>Maximum:</p> <p>H: 17.5" [444.5mm]</p> <p>W: 8.5" [215.9mm]</p> <p>D: 21.85" [555.2mm] (measured to the embossment for the rear chassis fans)</p>
Packaged Dimensions	<p>H: 25" (636mm)</p> <p>W: 13.1" (332mm)</p> <p>D: 28.9" (734mm)</p>
Palletization Profile	<p>4 units x 3 layers = 12 units per pallet</p> <p>1200x1000x2034mm (pallet included)</p>
Rack Dimensions	5U
Weight	<p>Exact weights depend upon configuration (System weight only).</p> <p>Minimum: 22.5kg (49.6lbs.)</p> <p>Typical: 24.3kg (53.7lbs.)</p> <p>Maximum: 33.8kg (74.6lbs.)</p>
Temperature	<p>Operating: 5° to 40°C (40° to 104°F)¹</p> <p>Non-operating: -40° to 60°C (-40° to 140°F)</p>

¹40°C has been validated for configs up to 2x 270W CPU (Intel Xeon Gold 6430), 2x NVIDIA® RTX A4000 graphics cards, 8x64GB RAM, 4x 2TB M.2 storage, 2x 2TB HDD storage, and 1125W PSU

Overview

Humidity	Operating: Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90%, non-condensing, 35° C maximum wet bulb
Maximum Altitude (non-pressurized)⁶	Operating: 3,048m (10,000ft) Non-operating: 9,144m (30,000ft) NOTE: Above 1524 m (5,000 feet) altitude, maximum operating temperature is reduced by 1° C (1.8° F) per 305 m (1,000 feet) elevation increase
Power Supply	Choice of 1125W, 1450W or 1700W, 90% Efficient Power Supplies NOTE: Not all configurations are supported on all power supplies. Configuration support depends on total system power budget and having sufficient number or type of PCIe supplemental power connectors. Confirm power supply and configuration support using configurator on hp.com.
Workstation ISV Certifications	See the latest list of certifications at http://www.hp.com/united-states/campaigns/workstations/partnerships.html
Chipset	Intel® C741 chipset
Memory	16 DIMM slots, supporting up to 1 TB, DDR5 4800 MT/s speed depending on the system configuration

Supported Components

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
4th Generation Intel® Xeon® Scalable Processors				
Intel® Xeon® Gold 6448Y	Y	Y	6Y3A1AA	1
Intel® Xeon® Gold 6444Y	Y	Y	6Y3A8AA	1
Intel® Xeon® Gold 6442Y	Y	Y	6Y3A5AA	1
Intel® Xeon® Gold 6438Y+	Y	Y	6Y3A2AA	1
Intel® Xeon® Gold 6434	Y	Y	6Y3B2AA	1
Intel® Xeon® Gold 6430	Y	Y	6Y3A3AA	1
Intel® Xeon® Gold 6426Y	Y	Y	6Y3A9AA	1
Intel® Xeon® Gold 5420+	Y	Y	6Y3A4AA	1
Intel® Xeon® Gold 5418Y	Y	Y	6Y3A6AA	1
Intel® Xeon® Gold 5416S	Y	Y	6Y3B0AA	1
Intel® Xeon® Gold 5415+	Y	Y	6Y3B3AA	1
Intel® Xeon® Silver 4416+	Y	Y	6Y3A7AA	1
Intel® Xeon® Silver 4410Y	Y	Y	6Y3B1AA	1

NOTE 1: When ordering two processors, the second processor must be the same as the first. Intel processor numbers are not a measurement of higher performance. Processor numbers differentiate features within each processor family, not across different processor families.

SATA Hard Drives

	Factory Configured	Option Kit	Option Kit Part Number
1TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	WOR10AA
2TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	Z2Z74AA
4TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	K4T76AA/AT
8TB 7200RPM SATA 3.5in Enterprise HDD	Y	Y	Z2Z73AA
12TB 7200RPM SATA-6G 3.5in Enterprise HDD	Y	Y	5S461AA

PCIe Solid State Drives

	Factory Configured	Option Kit	Option Kit Part Number
Z Turbo 512GB 2280 PCIe-4x4 TLC SSD	Y	Y	38T80AA
Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Y	Y	38T81AA
Z Turbo 512GB 2280 PCIe-4x4 TLC Z8 Kit SSD	N	Y	360H7AA
Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD	N	Y	360H2AA
Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Y	Y	38T76AA
Z Turbo 1TB 2280 PCIe-4x4 TLC SSD	Y	Y	38T77AA
Z Turbo 1TB 2280 PCIe-4x4 TLC Z8 Kit SSD	N	Y	360H5AA
Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD	N	Y	360H4AA
Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Y	Y	38T79AA
Z Turbo 2TB 2280 PCIe-4x4 TLC SSD	Y	Y	38T75AA
Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD	N	Y	360H1AA
Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 SSD ²	Y	Y	5S496AA/AT
Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD ²	Y	Y	5S497AA/AT

Supported Components

Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 Z8 Kit SSD ²	N	Y	5S4A0AA
HP Z Turbo Drive Dual Pro			
HP Z Turbo Drive Dual Pro PCIe-4x4 NVMe Carrier ¹	Y	Y	56Q86AA
HP Z Turbo Drive Dual Pro 512GB TLC SSD	Y	N	
HP Z Turbo Drive Dual Pro 1TB TLC SSD	Y	N	
HP Z Turbo Drive Dual Pro 2TB TLC SSD	Y	N	
HP Z Turbo Drive Dual Pro 4TB TLC SSD ²	Y	N	
Intel® Virtual RAID on CPU (Intel® VROC) for NVMe			
Intel VROC NVMe SSD Premium Ctlr Module ²	N	Y	3FJ81AA
Intel VROC NVMe SSD Standard Ctlr Module ³	N	Y	3FJ80AA

Note 1: Kit includes dual pro carrier and heatsink. Requires separate purchase of Z Turbo PCIe 4x4 M.2 SSD modules.

Note 2: Enables RAID 0, 1 & 10

Note 3: Enables RAID 0, 1 & 10 plus RAID 5 with write hole closure options

Note 4: Available in June 2023

NOTE: Internal M.2 PCIe SSDs are installed using HP Personality Card (up to 2 Personality Cards per system). Each Personality Card can support two M.2 drives.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Graphics		Factory Configured	Option Kit	Option Kit Part Number	Supported # of cards
Graphics Cable Adapters	HP DisplayPort To VGA Adapter	N	Y	AS615AA/AT	
	HP DisplayPort To VGA Adapter	N	Y	F7W97AA	
	HP DisplayPort to HDMI Adapter	Y	Y	2JA63AA	
	HP (Bulk 12) miniDP-to-DP Adapter Cables	N	Y	2KW87A6	
	HP Single miniDP-to-DP Adapter Cable	Y	Y	2MY05AA	
	HP miniDP-to-DP Adapter (2-pack)	Y	N		
	HP miniDP-to-DP Adapter (4-pack)	Y	N		
	HP miniDP-to-DP Adapter (8-pack)	Y	N		
	HP DisplayPort To DVI Adapter (Bulk 90)	N	Y	FH973A6	
	NVIDIA NVLink 3-Slot Bridge	Y	Y	340L3AA	
	NVIDIA 3D Stereo Bracket	N	Y	K0A25AA	
Ultra High-End Graphics	NVIDIA® RTX 6000 Ada 48GB ¹	Y	Y	79C23AA/AT	3
	NVIDIA® RTX A6000 48GB	Y	Y	2S6U3AA/AT	2
	AMD Radeon Pro W6800 32 GB ²	Y	Y	340K7AA	2
	NVIDIA® RTX A5000 24GB	Y	Y	20X23AA/AT	2
	NVIDIA® Long-Life RTX A5000E 24GB ¹	Y	Y	6V9V6AA/AT	2
	NVIDIA® Quadro® Sync II	N	Y	1WT20AA	
High-End Graphics	NVIDIA® RTX A4500 20GB ¹	Y	Y	5S458AA/AT	2
	NVIDIA® RTX A4000 16GB	Y	Y	20X24AA/AT	2
	NVIDIA® Long-Life RTX A4000E 16GB ¹	Y	Y	6H7J7AA/AT	2

Supported Components

Category	Component	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Midrange Graphics	NVIDIA® RTX A2000 12GB	Y	Y	5Z7D9AA/AT	2
	NVIDIA® Long-Life RTX A2000E 12GB	Y	Y	6V9V5AA/AT	2
	NVIDIA® T1000 8GB	Y	Y	5Z7D8AA/AT	2
	NVIDIA® Long-Life T1000E 8GB	Y	Y	6V9V4AA/AT	2
	AMD® Radeon™ Pro W6600 8GB ²	Y	Y	340K5AA	2
Entry Graphics	NVIDIA® T400 4GB	Y	Y	5Z7E0AA/AT	2
	AMD® Radeon™ RX 6400 4GB ²	Y	Y	6Q3U4AA/AT	1
	NVIDIA T1000 4 GB	Y	Y	20X22AA/AT	2
	Intel Arc Pro A40 6GB ¹	Y	Y	6E3Y8AA	1

Note 1: available in July 2023

Note 2: 2nd AMD graphic card configurable in July 2023

Memory	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
32GB (2x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
64GB (4x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		1
64GB (2x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		
128GB (8x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		1
128GB (4x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		1
256GB (16x16GB) DDR5 4800 DIMM ECC REG Memory	Y	N		2
256GB (8x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		1
256GB (4x64GB) DDR5 4800 DIMM ECC REG Memory	Y	N		1
512GB (16x32GB) DDR5 4800 DIMM ECC REG Memory	Y	N		2
512GB (8x64GB) DDR5 4800 DIMM ECC REG Memory	Y	N		1
1TB (16x64GB) DDR5 4800 DIMM ECC REG Memory	Y	N		2
After Market Options				
16GB (1x16GB) DDR5 4800 DIMM ECC REG Memory	Y	Y	340K1AA	
32GB DDR5 (1x32GB) 4800 DIMM ECC REG Memory	N	Y	340K2AA	
64GB DDR5 (1x64GB) 4800 DIMM ECC REG Memory	N	Y	340K3AA	

Note 1: Memory configuration is available for both single and dual CPU configurations.

Note 2: Memory configuration is only available with dual CPU configuration.

Multimedia and Audio Devices	Factory Configured	Option Kit	Option Kit Part Number
HyperX Cloud Mix Wireless Gaming Headset	N	Y	4P5K9AA
HyperX Cloud Core Gaming Headset	N	Y	4P4F2AA
HyperX Cloud Flight Wireless Gaming Headset	N	Y	4P5L4AA
HyperX Cloud Stinger Core Gaming Headset	N	Y	4P4F4AA
HyperX SoloCast - USB Microphone	N	Y	4P5P8AA
Integrated Realtek ALC 3205-CG	Y	N	

Supported Components

Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number
HP CRU QX428 Removable with 415mm Cable Frame/Carrier ^{1,4}	Y	Y	5B0U7AA
HP DX175 Removable HDD Frame/Carrier ^{2,4}	Y	Y	1ZX71AA
HP DX175 Removable HDD Spare Carrier ^{2,4}	N	Y	1ZX72AA
HP CRU Secure High Performance Storage Module with 2TB M.2 SSD ³	Y	Y	56Q87AA
HP CRU Secure High Performance Storage Module with 1TB M.2 SSD ³	Y	Y	56Q88AA
HP CRU Secure High Performance Storage Module with 512GB M.2 SSD ³	Y	Y	56Q89AA
HP 9.5mm Slim DVD-ROM Drive	Y	Y	K3R63AA
HP 9.5mm Slim BDXL Blu-Ray Writer Drive	Y	Y	K3R65AA
HP 9.5mm Slim SuperMulti DVD Writer	Y	Y	K3R64AA

Note 1: Requires separate purchase of HP CRU Secure High Performance Storage (SHIPS) Module(s).

Note 2: Only supports 4TB or lower capacity HDDs.

Note 3: Kit contains CRU Secure High Performance Storage (SHIPS) Module and M.2 SSD for install into a factory configured or after market option front removeable storage carrier (HP CRU QX428 Frame/Carrier).

Note 4: Planned to be available in June 2023

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number
HP Dual Port 10GbE NIC G2	Y	Y	360K6AA
Intel® X550 10GBASE-T Dual Port NIC	Y	Y	1QL46AA
Intel® I225-T1 Single Port 2.5GbE PCIe NIC	Y	Y	406L9AA
Intel® Ethernet I350-T4 4-Port 1Gb NIC	N	Y	W8X25AA
Allied Telesis AT-2914SX/LC-901 1GB LC Fiber NIC	Y	Y	1C7Q2AA
Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC	Y	Y	6E3Y9AA/AT
NVIDIA® Mellanox® ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC 1	Y	Y	436M8AA
Intel AX210 Wi-Fi 6E non-vPro + Bluetooth® 5.2 with External Antenna WLAN	Y	Y	340L7AA

Note1: 3rd party transceivers sold separately. You must have a transceiver installed to connect this card to a network.

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number
HP Z640/Z840/Z8 G4 Rail Rack Kit	N	Y	2FZ77AA/AT
HP Z8 Rack Rail Upgrade Kit	N	Y	2FZ76AA/AT

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number
HP 320K Wired Keyboard	Y	Y	9SR37AA/ET/UT
HP 125 Wired Keyboard	Y	Y	266C9AA/ET/UT
HP 975 USB+BT Dual-Mode Wireless Keyboard	N	Y	3Z726AA/ET/UT

Supported Components

HP 455 Programmable Wireless Keyboard	N	Y	4R177AA/ET/UT/A6
HP Wired Desktop 320MK Mouse and Keyboard	N	Y	9SR36AA/ET/UT
HP 655 Wireless Keyboard and Mouse Combo	N	Y	4R009AA/ET/UT/A6
HP Wired 320M Mouse	Y	Y	9VA80AA/ET/UT
HP Creator 935 Black Wireless Mouse	N	Y	1D0K8AA/ET/UT
HP 128 LSR Wired Mouse	Y	Y	265D9AA/ET/UT
HP 125 Wired Mouse	N	Y	265A9AA/ET/UT
HP Business Slim Smartcard Keyboard	Y	Y	Z9H48AA/AT

NOTE: Keyboard and Mouse are optional or add on features.

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number
HP C13 1.83m Power Cord Kit (halogen-free)	Y	N	
HP Z8 1450W C19 2.5m Power Cord Kit ³	N	Y	6Z9V1AA
HP 2.5in to 3.5in HDD Adapter Kit	N	Y	J5T63AA/A6
HP Internal Serial+PS/2 Port	Y	Y	56Q78AA
HP Dual TBT4 PCIe x4 Low Profile Card ⁵	Y	Y	340L1AA
HP USB 2.0 Type-A Port Adapter Kit ⁴	Y	Y	79C24AA
HP 2.5in HDD/SSD 2-in-1 Optical Bay Bracket	N	Y	K4T74AA
HP Optical Bay HDD Mounting Bracket ¹	N	Y	NQ099AA
HP SD 4 Card Reader Zx G4	Y	Y	2VK54AA
HP C13 1.83m Power Cord Kit ²	N	Y	6Z1T9AA

Note 1: NQ099AA HP Optical Bay HDD Mounting Bracket is required as a separate purchase for HDD option kits installed into an external bay.

Note 2: 6Z1T9AA is only for 1125W PSU Z8 G5.

Note 3: 6Z9V1AA is only for 1450W PSU Z8 G5.

Note 4: The USB 2.0 Type-A Port Adapter Kit has a single USB 2.0 type A connector.

Note 5: Available in July 2023

Software

	Factory Configured	Option Kit	Support Notes
HP Anyware	Y	N	
HP Performance Advisor	Y	N	1
HP PC Hardware Diagnostics UEFI (Windows OS only)	Y	N	2
HP PC Hardware Diagnostics Windows	Y	N	
HP Wolf Security	Y	N	3
HP Notifications	Y	N	
HP Desktop Support Utility	Y	N	
HP Documentation	Y	N	
HP QuickDrop	Y	N	
myHP	Y	N	
HP Easy Clean	Y	N	
Kingssoft WPS Office	Y	N	4
Z by HP Data Science Stack Manager	Y	N	5, 6

Supported Components

WSL2/Ubuntu Data Science Stack	Y	N	5
HP Image Assistant	N	N	
HP Support Assistant	N	N	
HP Smart Health	N	N	

Note 1: Supported with Windows only. Also available as a free download from <http://www.hp.com/go/performanceadvisor>

Note 2: Windows OS only

Note 3: Not available in Russia

Note 4: Not available in China

Note 5: Only available with NVIDIA® graphics

Note 6: Only available with Ubuntu

Operating Systems Windows 11 Pro for Workstations^{1,2}

Windows 11 Pro for Workstations (preinstalled with Windows 10 Pro for Workstations Downgrade)^{1,2,3}

Ubuntu 22.04 LTS⁴

HP Linux®-ready

¹ Windows Enterprise sold separately and requires that customer have an enterprise license from Microsoft.

² Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.

³ This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

⁴ Not all features are available in all editions or versions of Ubuntu. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS to take full advantage of Ubuntu functionality. Ubuntu may be automatically updated. ISP fees may apply and additional requirements may apply over time for updates.

NOTE: Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows® 8 or Windows 7 operating system on products configured with Intel® and AMD® 7th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on <http://www.support.hp.com>. A full list of HP products and the Windows 10 versions tested is available on the HP support website. <https://support.hp.com/us-en/document/c05195282>

Supported Components

HP BIOS

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Z8 G5 Workstation into the enterprise, such as PXE, remote recovery, remote configuration, remote control, and BIOS (F10) Setup support for 15 languages.
- Network firmware updates – Update your BIOS via the cloud or standardize on a BIOS version hosted on an Enterprise network.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- Class 3 UEFI specification version 2.7
- Absolute Persistence agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Workstation computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Workstation computers, including BIOS updates from within Windows (HP Firmware Update and Recovery), Capsule update, HP Client Manager, and fail-safe recovery. In addition, the HP BIOS Configuration Utility enables replication of BIOS settings within Windows while the Replicated Setup feature provides the same capability within BIOS (F10) Setup. The BIOS Configuration Utility is available from the HP support website.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery. Additional HP BIOS Features:
 - Power-On password – Helps prevent an unauthorized user from powering on the system.
 - Administrator password – Also known as the BIOS Setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS cannot be updated and changes cannot be made to BIOS settings using BIOS Setup or under the OS.
 - S4/S5 Maximum Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 0.5W in S4/S5 (when turned off). When S4/S5 Maximum Power Savings feature is enabled below features are turned off:
 - Power to expansion connectors / slots
 - Most Wake events other than power buttons and WOL (Wake on LAN supported by embedded Lan controller under S4/S5 Maximum Power Saving Enabled)
 - USB charging ports

HP Sure Start Gen7

- BIOS Integrity checking – Sure Start protection ensures that only trusted BIOS code is executed and not rootkits, viruses and malware. Verification is done upon boot up, shutdown and while the system is on.
- Sure Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability. Start is set by default to automatically repair the BIOS if corrupted or compromised but is policy driven for better manageability.
- Protecting beyond BIOS – Integrity checking and repair is extended to other data that should be protected such as network configuration parameters, platform specific information (i.e. system IDs), secure boot credentials, and other code the system needs to boot.
- Audit enabled – System Audit via Sure Start Event Logs capture data such as incident, repair date and time for troubleshooting and investigating.

Supported Components

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

BIOS

- HP BIOSphere Gen6¹³
- HP DriveLock & Automatic DriveLock
- BIOS Update via Network
- Master Boot Record Security
- Power On Authentication
- Absolute Persistence Module²³
- Pre-boot Authentication
- HP Wireless Wakeup

Software

- HP Desktop Support Utility
- HP Performance Advisor¹
- HP Privacy Settings
- HP Notifications
- myHP

Manageability Features

- HP Driver Packs²
- HP System Software Manager (SSM)
- HP BIOS Config Utility (BCU)
- HP Client Catalog
- HP Manageability Integration Kit Gen6³

Client Security Software

- HP Wolf Security (Including HP Sure Click & HP Sure Sense)²²
- HP Pro Wolf Security (Including Credential Manager)¹⁸
- HP Client Security Manager Gen 7⁴
- HP Sure Run⁹
- HP Sure Recover¹⁰
- HP Power On Authentication
- Microsoft Defender⁷

Security Management

- HP Security Update Service (SUS)
- Secure Erase¹⁶
- TPM 2.0 Embedded Security Chip(Common Criteria EAL4+ Certified)²⁴
- SATA port disablement (viaBIOS)
- Serial, USB enable/disable (viaBIOS)
- Power-on password (viaBIOS)
- Setup password (viaBIOS)
- Support for chassis padlocks and cable lock devices
- Integrated hood sensor⁰
- HP Sure Start Gen4⁸

¹ HP Performance Advisor Software - HP Performance Advisor is ready to help you get the most out of your HP Workstation from day one—and every day after. Learn more or download at: <http://hp.com/PerformanceAdvisor>

² HP Driver Packs not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>.

³ HP Manageability Integration Kit can be downloaded from <http://www8.hp.com/us/en/ads/clientmanagement/overview.html>

⁴ HP Client Security Manager Gen7 requires Windows and is available on the select HP PCs.

Supported Components

⁷ Microsoft Defender Opt in and internet connection required for updates.

⁸ HP Sure Start Gen 7 is available on select HP PCs and workstations. See product specifications for availability.

⁹ HP Sure Run Gen5 is available on select Windows 11 based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors

¹⁰ HP Sure Recover Gen4 is available on select HP PCs and requires Windows 10 and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module

¹³ HP BIOSphere Gen6 features may vary depending on the platform and configurations.

¹⁶ Secure Erase - For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane.

¹⁸ HP Wolf Pro Security Edition is available preloaded on select SKUs and, depending on the HP product purchased, includes a paid 1-year or 3-year license. The HP Wolf Pro Security Edition software is licensed under the license terms of the HP Wolf Security Software - End-User license Agreement (EULA) that can be found at: https://support.hp.com/us-en/document/ish_3875769-3873014-16 as that EULA is modified by the following: "7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Wolf Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for either a twelve (12) month or thirty-six (36) month license term ("Initial Term"). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Wolf Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP Support.

²² HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features

²³ Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription.

Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: <http://www.absolute.com/company/legal/agreements/computrace-agreement>. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.

²⁴ Firmware TPM is version 15.21. Hardware TPM is v2.0.

System Technical Specifications

System Board

System Board Form Factor	Approximately 415.04mm x 386.08mm (16.34 x 15.20 inches)	
Processor Socket	Dual LGA-4677	
CPU Bus Speed	DMI Gen3 x 8 lanes. 3 UPI x24 interconnects between CPUs that operate at 16GT/s	
Chipset	Intel C741 Emmitsburg PCH	
Super I/O Controller	Nuvoton SIO21	
Memory Expansion Slots	16 DDR5 memory slots (only 8 DDR5 memory slots with single CPU installed)	
Memory Type Supported	DDR5, RDIMM (Registered) ECC and 3DS RDIMMs	
Memory Modes	Non-Interleaved for single channel. Interleaved when multiple channels are populated	
Memory Speed Supported	Max memory speed is processor-dependent, refer to processor table for more details: 4800MT/s DDR5 or 4400MT/s DDR5 or 4000MT/s DDR5	
Memory Protection	ECC	
Maximum Memory	1TB	
Memory Configuration (Supported)	16GB, 32GB and 64GB RDIMMs are supported	
NVDIMM Memory	No	
PCI Express Connectors	<p>CPU0 Standard PCIe Slots:</p> <ul style="list-style-type: none"> • 1 PCI Express Gen5 slot x16 mechanical/ x16 electrical (full height, full length) • 1 PCI Express Gen4 slot x16 mechanical/ x16 electrical (full height, full length) • 1 PCI Express Gen3 slot x8 mechanical/ x8 electrical (full height, full length) • 1 PCI Express Gen3 slot x4 mechanical/ x4 electrical (full height, full length) <p>CPU0 Personality Slots:</p> <ul style="list-style-type: none"> • 1 PCI Express Gen4 slot x8 mechanical/ x8 electrical (full height, half length) (supports two x4 M.2 devices per personality slot) <p>CPU0 Other PCIe Connections</p> <ul style="list-style-type: none"> • 1 Front NVMe Storage SlimSAS PCIe Gen4 x8 (supports two x4 M.2 devices via QX428) • 1 10GbE (PCIe Gen3 x4) <p>CPU 1 Standard PCIe Slots:</p> <ul style="list-style-type: none"> • 1 PCI Express Gen4 slot x16 mechanical/ x16 electrical (full height, full length) • 1 PCI Express Gen3 slot x16 mechanical/ x16 electrical (full height, full length) <p>CPU1 Personality Slots:</p> <ul style="list-style-type: none"> • 1 PCI Express Gen4 slot x8 mechanical/ x8 electrical (full height, half length) (supports two x4 M.2 devices per personality slot) <p>PCH Standard PCIe Slots:</p> <ul style="list-style-type: none"> • 1 PCI Express Gen3 slot x4 mechanical/ x4 electrical (full height, full length) 	
Supported Drive Interfaces	SATA	Number of SATA ports: 6 Intel® SATA controller: secondary SATA
	Integrated RAID	On-board RAID Support Intel® VROC® SATA RAID 0, 1, 5, and 10 supported on Windows 10 and 11, RHEL 8.6 and later, SLE 15 SP4 and later Intel® VROC® NVMe RAID 0, 1, 5, and 10 supported with presence of appropriate VROC upgrade module (after-market kits) on Windows 10 and 11, RHEL 8.6 and later, SLE 15 SP4 and later

System Technical Specifications

		Factory Configured RAID: None
	Integrated Graphics	No
	Network Controller	Intel WGI210AT and WGI219LM. WGI219LM LOM provides Management capabilities: WOL, PXE 2.1, DASH 1.1 and AMT
	External SATA (eSATA)	No
	Serial	1 internal header (requires optional Serial Port Adapter Kit)
	2nd Serial	No
	HD Integrated Audio	Yes
USB Connector(s)	Front	Front I/O: 4x USB 3.1 Gen1 Type-A (left-most port supports Battery Charging 1.2) • Charging USB Type-A port provides 1.5 Amps @ 5 Volts • Standard USB Type-A Ports provide 900mA @ 5 Volts
	Rear	6x USB 3.1 Gen1 Type-A via USB hub.
	Internal	1 USB 3.1 Gen1 (via USB hub) header, with a single 12-pin shrouded connector. This header supports a USB Media Card reader. 1 USB 2.0 single port header 1 USB 2.0 dual port header
	HD Integrated Audio	Yes
	Flash ROM	Yes
	CPU Fan Header	Yes (CPU0 and CPU1)
	Memory Fan Header	No
	Chassis Fan Header	Yes (2)
	Front PCI Fan Header	Via Aux fan header if needed.
	Front Control Panel/Speaker Header	Yes
	CMOS Battery Holder - Lithium	Yes
	Integrated Trusted Platform Module	Integrated TPM 2.0. Convertible to FIPS 140-2 Certified Mode through firmware v15.21. The TPM module is disabled where restricted by law.
	Power Supply Headers	Yes
	Power Switch, Power LED & Hard Drive LED Header	Yes
	Clear Password Jumper	Yes
	Keyboard/Mouse	USB and PS/2 (option)
	Power Supply	Choice of 90% Efficient Power Supplies: • 1700W • 1450W • 1125W

¹Maximum memory capacities assume 64-bit operating systems, such as Genuine Windows® 11 Professional 64 bit, Red Hat Linux 64-bit.

²M.2 storage supports compatible devices up to 80mm

System Technical Specifications

System Configurations		
Example Configuration #1	Processor Info	1x Intel® Xeon® 5415+ 8C 2.9GHz 150W
	Memory Info	32GB DDR5 (2x16GB) RegRAM
	Graphics Info	1x NVIDIA® A2000
	Disks/Optical/Floppy	1x 1TB Internal SATA HDD + 1x DVDRW SATA
	PSU	1125W
	Other	N/A

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

Heat Dissipation (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

Example Configuration #2	Processor Info	2x Intel® Xeon® 5415+ 8C 2.9GHz 150W
	Memory Info	64GB DDR5 (4x16GB) RegRAM
	Graphics Info	1x NVIDIA® A4000
	Disks/Optical/Floppy	2x 1TB SATA HDD + 2x 4TB Internal M.2 SSD + 1x DVDRW SATA
	PSU	1125W
	Other	N/A

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

System Technical Specifications

Heat Dissipation (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

Example Configuration #3	Processor Info	2x Intel® Xeon® 6426Y 2.6GHz 16C 185W				
	Memory Info	256GB DDR5 (16x16GB) RegRAM				
	Graphics Info	1x NVIDIA® A6000				
	Disks/Optical/Floppy	4x 4TB Internal M.2 SSD + 1x DVDRW SATA				
	PSU	1450W				
	Other	N/A				

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

Heat Dissipation (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

Example Configuration #4	Processor Info	2x Intel® Xeon® 6430 32C 1.9GHz 270W				
	Memory Info	1024GB DDR5 (16x64GB) RegRAM				
	Graphics Info	2x NVIDIA® A6000				
	Disks/Optical/Floppy	4x 4TB Internal M.2 SSD + 1x DVDRW SATA				
	PSU	1450W				
	Other	N/A				

System Technical Specifications

Energy Consumption (Watts)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows long Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

Heat Dissipation (Btu/hr)	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows Idle (S0)	TBD		TBD		TBD	
Windows short Idle (S0)	TBD		TBD		TBD	
Windows Busy Typ (S0)	TBD		TBD		TBD	
Windows Busy Max (S0)	TBD		TBD		TBD	
Sleep (S3)	TBD	TBD	TBD	TBD	TBD	TBD
Off (S5)	TBD	TBD	TBD	TBD	TBD	TBD
Zero Power Mode (EuP)	TBD		TBD		TBD	

NOTE: The Power Supply Efficiency report may be found at the following links:

<https://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2>

System Technical Specifications

Operating Voltage Range	90-269 VAC
Rated Voltage Range	100-240 VAC
Rated Line Frequency	50-60 Hz
Operating Line Frequency Range	47-66 Hz
Rated Input Current	6A @ 100-240V
Heat Dissipation	Typical: 444 btu/hr (112 kcal/hr) Maximum: 1484 btu/hr (374 kcal/hr)
ENERGY STAR® certified (Config Dependent)	Yes
CECP Compliant @ 220V	Yes
FEMP Standby Power Compliant	Yes, with Wake-on-LAN disabled: <1W in S5 - Power Off
Built-in Self Test (BIST) LED	Yes
Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)	Yes
Hood Lock Header	Yes
ErP Lot 6- Tier 1 Compliance @ 230V (<1W in S5 - Power Off)	Yes
ErP Lot 6- Tier 2 Compliance @ 230V (<0.5W in S5 - Power Off)	Yes

Declared Noise Emissions (Entry-level, Mid-level, and High-end configurations; tested on floor)			
System Configuration (Entry level)	Processor Info	1 x Intel Sapphire Rapids 16C 150W	
	Memory Info	2 x 16GB DDR5-4800 RDIMM	
	Graphics Info	1 x NVIDIA RTX A2000	
	Disks/Optical	1 x 1TB HDD / Blu-Ray R/RE DVD+/-RW	
	Power Supply	1125W	
Declared Noise Emissions		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	3.8	19
	Hard drive Operating (Drive Random Seek)	3.9	20
	Active Mode	3.8	19
System Configuration (Mid-level)	Processor Info	2 x Intel Sapphire Rapids 16C 150W	
	Memory Info	4 x 16GB DDR5-4800 RDIMM	
	Graphics Info	1 x NVIDIA RTX A4000	
	Disks/Optical	2 x 512GB M.2 + 2 x 1TB HDD / Blu-Ray DVD+/-RW	
	Power Supply	1125W	
Declared Noise Emissions		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	3.7	19

System Technical Specifications

	Hard drive Operating (Drive Random Seek)	3.8	21
	Active Mode	3.8	20
System Configuration (High-end)	Processor Info	2 x Sapphire Rapids 32C 270W	
	Memory Info	16 x 64 GB DDR5-4800 RDIMM	
	Graphics Info	2 x NVIDIA RTX A6000	
	Disks/Optical	4 x 4TB M.2 + 4 x 8TB HDD / Blu-Ray DVD+/-RW	
	Power Supply	1450W	
Declared Noise Emissions		Sound Power (LWAd, bels)	Deskside Sound Pressure (LpAm, decibels)
	Idle	4.0	24
	Hard drive Operating (Drive Random Seek)	4.2	24
	Active Mode	4.1	24

Environmental Requirements

Temperature

Operating: 5° to 40°C (40° to 104°F)¹
 Non-operating: -40° to 60°C (-40° to 140°F)

¹40°C has been validated for configs up to 2x 270W CPU (Intel Xeon Gold 6430), 2x NVIDIA® RTX A4000 graphics cards, 8x64GB RAM, 4x 2TB M.2 storage, 2x 2TB HDD storage, and 1125W PSU

Humidity

Operating: 8% to 85% RH, non-condensing
 Non-operating: 8% to 90% RH, non-condensing

Maximum Altitude

Operating: 3,048 m (10,000 feet)
 Non-operating: 9,144 m (30,000 feet)

Dynamic

Shock
 Operating: ½-sine: 40g, 2-3ms (~62 cm/sec)
 Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g)
 square: 422 cm/s, 20g

NOTE: Values represent individual shock events and do not indicate repetitive shock events

Vibration

Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g²/Hz
 Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g²/Hz

NOTE: Values do not indicate continuous vibration.

Cooling

Above 1524 m (5,000 feet) altitude, the maximum operating temperature is reduced by 1° C (1.8° F) for every 305 m (1,000 feet) increase in elevation, up to 3048 m (10,000 feet)

System Technical Specifications

Physical Security and Serviceability

Access Panel	Tool-less Includes system board and memory information
Optical Drive	Tool-less, 2nd Optical Drive requires a 5.25" bay carrier
Hard Drives	Tool-less
Expansion Cards	Tool-less
Processor Socket	Screw-in processor coolers
Blue User Touch Points	Yes, on tool-less internal chassis mechanisms
Color-coordinated Cables and Connectors	Yes
Memory	Tool-less
System Board	Tool-less, retained by Front Card Guide and Top Memory Fan Holder
Power and HD LED on Front of Computer	Yes
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	No
Cable Lock Support	Yes, Kensington Cable Lock (optional): Prevents entire system theft only. 3mm x 7mm slot at rear of system
Universal Chassis Clamp Lock Support	No
Solenoid Lock and Hood Sensor	No
Rear Port Control Cover	No
Serial, USB, Audio, Network, Enable/Disable Port Control	Yes
Removable Media Write/Boot Control	Yes
Power-On Password	Yes
Setup Password	Yes, prevents an unauthorized person from changing the workstation configuration.
3.3V Aux Power LED on System PCA	None
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A torx driver (T30) is needed to remove the processor heatsink. CPU attached to heatsink via tool-less clip
Power Supply Diagnostic LED	Yes
Front Power Button	Yes
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	Yes, white
Front ODD Activity LED	Yes
Internal Speaker	Yes

System Technical Specifications

System/Emergency ROM	Yes
Flash Recovery	
Cooling Solutions	Air cooled forced convection
Power Supply Fans	2x - Dual Side Inlet Blowers
CPU Heatsink Fan	92 mm x 92 mm x 25.4 mm for each CPU
Chassis Fan	Rear: 120 mm x 38 mm Front Lower: 120 mm x 25.4 mm (PCIe zone)
Memory Heatsink Fan	Front Upper: 92mm x 25mm (upper memory bank); Front Middle: 80mm x 25mm (lower memory bank)
HP PC Hardware Diagnostics UEFI	HP PC Hardware Diagnostics (UEFI) enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support.
Access Panel Key Lock	Yes, left access panel
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none">• Allows the system to wake from a low power mode.• Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
Integrated Chassis Handles	Yes, front and rear
Power Supply	Tool-less, rear access direct-connect (blind-mate)
PCI Card Retention	Yes, rear (all), middle (full-height cards), front (cards with extender)
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes
Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes
DIMM Connectors	Yes

Service, Support, and Warranty

On-site Warranty and Service¹: One-year, limited warranty and service offering delivers on-site, next business-day² service for parts and labor and includes free telephone support³ 8am - 5pm. Global coverage² ensures that any product purchased in one country and transferred to another, non-restricted country will remain fully covered under the original warranty and service offering. 24/7 operation will not void the HP warranty. Storage devices are not covered under warranty for 24/7 operation except for Enterprise class HDDs.

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. Toll-free calling and 24x7 support service may not be available in some countries.

HP Care Pack Services extend service contracts beyond the standard warranties. Service starts from date of hardware purchase. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/lookuptool>. Service levels and response times for HP Care Packs may vary depending on your geographic location.

BIOS

PCIe 5.0 Support Full BIOS support for PCI Express through industry standard interfaces. Supported speeds and slot information vary.

System Technical Specifications

ATA/ATAPI	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Power On	Users can define a specific date and time for the system to power on.
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM.
Replicated Setup	Saves BIOS settings to USB flash device in human readable file (HpSetup.txt). BiosConfigurationUtility.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS Reference Specification, Version 3.2
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none">• NORMAL - normal temperature ranges.• ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown.• SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.
Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and resume from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system. Supports ACPI 6.0 for full compatibility with 64-bit operating systems.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS and WMI) so that management SW applications can use and report this information.
System board revision level	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.
Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 15 languages with local keyboard mappings.
Asset Tag	The user or MIS to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM enable/disable, bifurcation, speed) to be configured individually.

System Technical Specifications

Adaptive Cooling	Control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
UEFI Specification Revision	2.7
ACPI	Advanced Configuration and Power Management Interface, Version 6.0
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0 PCI Express Base Specification, Revision 4.0 PCI Express Base Specification, Revision 5.0
SATA	Serial ATA Specification, Revision 1.0a Serial ATA 3 Gb/s: Serial ATA Specification, Revision 2.5 Serial ATA 6 Gb/s: Serial ATA Specification, Revision 3.0
SPD	JEDEC JESD300-5
TPM	Trusted Computing Group TPM Specification Version 2.0 (Infineon SLB 9672). Common Criteria EAL4+ certified. FIPS 140-2 Certification TCG TPM Certified products list: http://www.trustedcomputinggroup.org/certification/tpm-certified-products/
UHCI	Universal Host Controller Interface Design Guide, Revision 1.1
USB	Universal Serial Bus Revision 1.1 Specification Universal Serial Bus Revision 2.0 Specification Universal Serial Bus Revision 3.1 Specification Universal Serial Bus Revision 3.2 Specification USB Battery Charging specification, Revision 1.2 USB Power Delivery specification Revision 3.0
SMBIOS	System Management BIOS Reference Specification, Version 3.2

Social and Environmental Responsibility

Eco-Label Certifications & Declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: <ul style="list-style-type: none"> • IT ECO declaration • ENERGY STAR® (energy-saving features available on selected configurations-Windows only) • US Federal Energy Management Program (FEMP) • EPEAT[®] Gold registered worldwide • TCO Certified • China Energy Conservation Program (CECP)
Sustainable Impact Specifications	<ul style="list-style-type: none"> • Ocean-bound plastic in system fans • 40% post-consumer recycled plastic • Contains 10% post-industrial recycled metal • Internal Power Supply 90% efficient • 80% recycled packaging content
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data is based on a "Typically Configured Desktop Workstation".

Energy Consumption
(in accordance with US
ENERGY STAR® test method)

115VAC, 60Hz

230VAC, 50Hz

100VAC, 50Hz

System Technical Specifications

Normal Operation (Sort idle)	TBD	TBD	TBD
Normal Operation (Long idle)	TBD	TBD	TBD
Sleep	TBD	TBD	TBD
Off	TBD	TBD	TBD

NOTE:

Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family . HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation*	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	TBD	TBD	TBD
Normal Operation (Long idle)	TBD	TBD	TBD
Sleep	TBD	TBD	TBD
Off	TBD	TBD	TBD

*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

**Declared Noise Emissions
(in accordance with
ISO 7779 and ISO 9296)**

	Sound Power (L_{WAd} , bels)	Sound Pressure (L_{pAm} , decibels)
Typically Configured – Idle	TBD	TBD
Fixed Disk – Random writes	TBD	TBD
Optical Drive – Sequential reads	TBD	TBD

**Longevity and
Upgrading**

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include:

- 3 USB ports
- 1 PC card slot (type I/II)
- 1 ExpressCard/54 slot
- 1 IEEE 1394 Port
- 2 SODIMM memory slots
- Optional expansion base docking station
- 1 multi-bay II storage port
- Interchangeable HDD

Spare parts are available throughout the warranty period and or for up to “5” years after the end of production.

Batteries

This battery in this product complies with EU Directive 2006/66/EC
Battery size: CR2032 (coin cell)
Battery type: Lithium Metal

The battery in this product does not contain:

- Mercury greater than 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 40 ppm by weight

System Technical Specifications

- Additional Information**
- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
 - This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
 - This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
 - This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
 - Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
 - This product is 94.8% recycle-able when properly disposed of at end of life.

Packaging Materials	External:	PAPER/Corrugated	TBD
		PAPER/Molded Pulp	TBD
	Internal:	PLASTIC/Polyethylene low density - LDPE	TBD

The corrugated paper packaging materials contains at least 62.5% recycled content.

RoHS Compliance HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam.

We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances—including PVC, BFRs, and certain phthalates—in future RoHS legislation that pertains to electrical and electronics products.

We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve.

To obtain a copy of the HP RoHS Compliance Statement, see [HP RoHS position statement](#).

Material Usage This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Bis(2-Ethylhexyl) phthalate (DEHP)
- Benzyl butyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries

System Technical Specifications

- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBDEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/go/reuse-recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/recyclers>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

HP, Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

<http://www8.hp.com/us/en/hp-information/environment/ecolabels.html>

ISO 14001 certificates:

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842>

and

<http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf>

footnotes

- Percentage of ocean-bound plastic contained in each component varies by product
- Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.
- External power supplies, WWAN modules, power cords, cables and peripherals excluded.
- 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.

System Technical Specifications

- Fiber cushions made from 100% recycled wood fiber and organic materials.

Manageability

Industry Standard Specifications

This product meets the following industry standard specifications for manageability functionality:

- DASH 1.1 (via Intel® LAN on motherboard)

Intel® Active Management Technology (AMT)

Intel® Active Management Technology (AMT) 15.20

An advanced set of remote management features and functionality providing IT administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 15.20 includes the following advanced management functions:

- Power Management (on, off, reset, graceful shutdown, sleep and hibernate)
 - Support in Max Power Savings (Shutdown and Hibernate Modes)
- Hardware Inventory (includes BIOS and firmware revisions)
- Hardware Alerting
- Agent Presence
- System Defense Filters
- Serial Over LAN (SOL)
- USB Redirect (Media Redirection)
- ME Wake-on-LAN (WOL), even with Maximum Power Savings Enabled
- DASH 1.2 compliance
- IPv6 Support
- Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance - pre-schedule when the system connects to the IT or service provider console for maintenance.
- Remote Alerts - automatically alert IT or service provider if issues arise
- Access Monitor - Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back
- Local Time Sync to UTC
- Remote Memory Dump Command – Creates memory dump for debug

Intel® vPro™ Technology

Yes, when configured with an Intel® vPro™ supporting processor.

Technical Specifications - Stable & Consistent Offerings

Stable & Consistent Offerings

Global Series SKUs As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable & Consistent Offerings are built on the foundation of a carefully chosen set of hardware and software designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section.

Stable & Consistent Offerings HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers-no special programs, no additional cost-no kidding. Simply select your hardware and software components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product.

Processors	Product #	Offering
	TBD	TBD

Graphics	Product #	Offering
	TBD	TBD

Storage	Product #	Offering
	TBD	TBD

Technical Specifications - Hard Drives

STORAGE/HARD DRIVES

Performance PCIe SSDs for HP Workstations	Z Turbo 512GB 2280 PCIe-4x4 TLC SSD	Capacity	512GB
		Protocol	PCIe
		Form Factor	M.2
		Controller	NVMe
		NAND Type	3D TLC
		Endurance	300TBW (TB Written)
		Reliability	1.5M hours
		Rated for 24/7/365 operation	No
		Interface	PCI Express 4.0 x4 electrical
		Operating Temperature	32° to 158° F (0° to 70° C)
		Performance	Sequential Read up to 6400MB/s*
			Sequential Write up to 3400MB/s*
			Random Read up to 600K IOPS*
	Random Write up to 600K IOPS*		

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Z Turbo 512GB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Capacity	512GB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	300TBW (TB Written)
	Reliability	1.5M hours
	Rated for 24/7/365 operation	No
	Interface	PCI Express 4.0 x4 electrical
	Operating Temperature	32° to 158° F (0° to 70° C)
	Performance	Sequential Read up to 6400MB/s*
		Sequential Write up to 3400MB/s*
		Random Read up to 600K IOPS*
	Random Write up to 600K IOPS*	
Self-Encrypting Drive Support	OPAL 2	

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Z Turbo 1TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Capacity	1TB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC
	Endurance	400TBW (TB Written)
	Reliability	1.5M hours

Technical Specifications - Hard Drives

Rated for 24/7/365 operation	No								
Interface	PCI Express 4.0 x4 electrical								
Operating Temperature	32° to 158° F (0° to 70° C)								
Performance	<table> <tr> <td>Sequential Read</td> <td>up to 6500MB/s*</td> </tr> <tr> <td>Sequential Write</td> <td>up to 5000MB/s*</td> </tr> <tr> <td>Random Read</td> <td>up to 800K IOPS*</td> </tr> <tr> <td>Random Write</td> <td>up to 800K IOPS*</td> </tr> </table>	Sequential Read	up to 6500MB/s*	Sequential Write	up to 5000MB/s*	Random Read	up to 800K IOPS*	Random Write	up to 800K IOPS*
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Sequential Write	up to 5000MB/s*								
Random Read	up to 800K IOPS*								
Random Write	up to 800K IOPS*								
Self-Encrypting Drive Support	OPAL 2								

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Z Turbo 1TB 2280 PCIe-4x4 TLC SSD	Capacity	1TB								
	Protocol	PCIe								
	Form Factor	M.2								
	Controller	NVMe								
	NAND Type	3D TLC								
	Endurance	400TBW (TB Written)								
	Reliability	1.5M hours								
	Rated for 24/7/365 operation	No								
	Interface	PCI Express 4.0 x4 electrical								
	Operating Temperature	32° to 158° F (0° to 70° C)								
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	Sequential Write	up to 5000MB/s*								
	Random Read	up to 800K IOPS*								
Random Write	up to 800K IOPS*									

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Z Turbo 1TB 2280 PCIe-4x4 TLC SSD	Capacity	1TB								
	Protocol	PCIe								
	Form Factor	M.2								
	Controller	NVMe								
	NAND Type	3D TLC								
	Endurance	400TBW (TB Written)								
	Reliability	1.5M hours								
	Rated for 24/7/365 operation	No								
	Interface	PCI Express 4.0 x4 electrical								
	Operating Temperature	32° to 158° F (0° to 70° C)								
	Performance	<table> <tr> <td>Sequential Read</td> <td>up to 6500MB/s*</td> </tr> <tr> <td>Sequential Write</td> <td>up to 5000MB/s*</td> </tr> <tr> <td>Random Read</td> <td>up to 800K IOPS*</td> </tr> <tr> <td>Random Write</td> <td>up to 800K IOPS*</td> </tr> </table>	Sequential Read	up to 6500MB/s*	Sequential Write	up to 5000MB/s*	Random Read	up to 800K IOPS*	Random Write	up to 800K IOPS*
	Sequential Read	up to 6500MB/s*								
	Sequential Write	up to 5000MB/s*								
	Random Read	up to 800K IOPS*								
Random Write	up to 800K IOPS*									

Technical Specifications - Hard Drives

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Z Turbo 2TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
		Random Write	up to 800K IOPS*
Self-Encrypting Drive Support	OPAL 2		

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Z Turbo 2TB 2280 PCIe-4x4 TLC SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
		Random Write	up to 800K IOPS*

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Z Turbo 4TB 2280 PCIe-4x4 TLC M.2 SSD	Capacity	4TB
	Protocol	PCIe
	Form Factor	M.2
	Controller	NVMe
	NAND Type	3D TLC

Technical Specifications - Hard Drives

Endurance	600TBW (TB Written)	
Reliability	1.5M hours	
Rated for 24/7/365 operation	No	
Interface	PCI Express 4.0 x4 electrical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	up to 6500MB/s*
	Sequential Write	up to 5000MB/s*
	Random Read	up to 700K IOPS*
	Random Write	up to 700K IOPS*

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

NOTE: available in June 2023

Z Turbo 4TB 2280 PCIe-4x4 SED OPAL2 TLC M.2 SSD	Capacity	4TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	600TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 700K IOPS*
		Random Write	up to 700K IOPS*
Self-Encrypting Drive Support	OPAL 2		

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

NOTE: available in June 2023

Performance PCIe SSDs for HP Dual Pro Carrier	HP Z Turbo Drive Dual Pro 512GB SSD	Capacity	512GB
		Protocol	PCIe
		Form Factor	M.2
		Controller	NVMe
		NAND Type	3D TLC
		Endurance	300TBW (TB Written)
		Reliability	1.5M hours
		Rated for 24/7/365 operation	No
		Interface	PCI Express 4.0 x4 electrical
		Operating Temperature	32° to 158° F (0° to 70° C)

Technical Specifications - Hard Drives

Performance	Sequential Read	up to 6400MB/s*
	Sequential Write	up to 3400MB/s*
	Random Read	up to 600K IOPS*
	Random Write	up to 600K IOPS*

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

HP Z Turbo Drive Dual Pro 1TB SSD	Capacity	1TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
	Random Write	up to 800K IOPS*	

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

HP Z Turbo Drive Dual Pro 2TB SSD	Capacity	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability	1.5M hours	
	Rated for 24/7/365 operation	No	
	Interface	PCI Express 4.0 x4 electrical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	up to 6500MB/s*
		Sequential Write	up to 5000MB/s*
		Random Read	up to 800K IOPS*
	Random Write	up to 800K IOPS*	

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

HP Z Turbo Drive Dual Pro 4TB SSD	Capacity	4TB
	Protocol	PCIe
	Form Factor	M.2

Technical Specifications - Hard Drives

Controller	NVMe	
NAND Type	3D TLC	
Endurance	500TBW (TB Written)	
Reliability	1.5M hours	
Rated for 24/7/365 operation	No	
Interface	PCI Express 4.0 x4 electrical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	Sequential Read	up to 6500MB/s*
	Sequential Write	up to 5000MB/s*
	Random Read	up to 800K IOPS*
	Random Write	up to 800K IOPS*

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

NOTE: available in June 2023

SATA Hard Drives for HP Workstations

1TB 7200RPM SATA 3.5in Enterprise HDD

Capacity	1TB	
Protocol	SATA	
Form Factor	3.5"	
Controller	AHCI	
Reliability	2.0M hours	
Rated Power On Hours	8760/yr	
Annualized Failure Rate (based on Rated POH)	<0.62%	
Rated for 24/7/365 operation	YES	
Height	1 in; 2.54 cm	
Width	Media Diameter	3.5 in; 8.9 cm
	Physical Size	4 in; 10.17 cm
Interface	Serial ATA (6.0Gb/s), NCQ enabled	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s *	
Buffer	128MB	
Cache	Adaptive	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.32 ms *
	Average	7.45 ms *
	Full Stroke	14.2 ms *
Rotational Speed	7,200 rpm	
Logical Blocks	1,953,525,168	
Operating Temperature	41° to 131° F (5° to 55° C)	
Performance	Sequential Read	up to 226MB/s*
	Sequential Write	up to 226MB/s*

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Technical Specifications - Hard Drives

2TB 7200RPM SATA 3.5in Enterprise HDD	Capacity	2TB		
	Protocol	SATA		
	Form Factor	3.5"		
	Controller	AHCI		
	Reliability	2.0M hours		
	Rated Power On Hours	8760/yr		
	Annualized Failure Rate (based on Rated POH)	<0.62%		
	Rated for 24/7/365 operation	YES		
	Height	1 in; 2.54 cm		
	Width	Media Diameter	3.5 in; 8.9 cm	
		Physical Size	4 in; 10.17 cm	
	Interface	Serial ATA (6.0Gb/s), NCQ enabled		
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s *		
	Buffer	128MB		
	Cache	Adaptive		
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.7 ms *	
		Average	8.5 ms *	
		Full Stroke	15.7 ms *	
	Rotational Speed	7,200 rpm		
	Logical Blocks	3,907,029,168		
Operating Temperature	41° to 131° F (5° to 55° C)			
Performance	Sequential Read	up to 226MB/s*		
	Sequential Write	up to 226MB/s*		

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

4TB 7200 RPM SATA 3.5in Enterprise HDD	Capacity	4TB		
	Protocol	SATA		
	Form Factor	3.5"		
	Controller	AHCI		
	Reliability	2.0M hours		
	Rated Power On Hours	8760/yr		
	Annualized Failure Rate (based on Rated POH)	<0.62%		
	Rated for 24/7/365 operation	YES		
	Height	1 in; 2.54 cm		
	Width	Media Diameter	3.5 in; 8.9 cm	
		Physical Size	4 in; 10.17 cm	
	Interface	Serial ATA (6.0Gb/s), NCQ enabled		
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s *		
	Buffer	256MB		

Technical Specifications - Hard Drives

Cache	Adaptive	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.7 ms *
	Average	8.5 ms *
	Full Stroke	15.7 ms *
Rotational Speed	7,200 rpm	
Logical Blocks	7,814,037,168	
Operating Temperature	41° to 131° F (5° to 55° C)	
Performance	Sequential Read	up to 226MB/s*
	Sequential Write	up to 226MB/s*

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

8TB 7200RPM SATA 3.5in Enterprise HDD	Capacity	8TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Rated for 24/7/365 operation	YES	
	Height	1 in; 2.54 cm	
	Width	Media Diameter	3.5 in; 8.9 cm
		Physical Size	4 in; 10.17 cm
	Interface	Serial ATA (6.0Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s *	
	Buffer	256MB	
Cache	Adaptive		
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.7 ms *	
	Average	8.5 ms *	
	Full Stroke	15.7 ms *	
Rotational Speed	7,200 rpm		
Logical Blocks	15,628,053,168		
Operating Temperature	41° to 140° F (5° to 60° C)		
Performance	Sequential Read	up to 226MB/s*	
	Sequential Write	up to 226MB/s*	

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

12TB 7200 RPM SATA-6G 3.5in Enterprise HDD	Capacity	12TB
	Protocol	SATA
	Form Factor	3.5"
	Controller	AHCI

Technical Specifications - Hard Drives

Reliability	2.0M hours
Rated Power On Hours	8760/yr
Annualized Failure Rate (based on Rated POH)	<0.62%
Rated for 24/7/365 operation	YES
Height	1 in; 2.54 cm
Width	Media Diameter 3.5 in; 8.9 cm
	Physical Size 4 in; 10.17 cm
Interface	Serial ATA (6.0Gb/s), NCQ enabled
Synchronous Transfer Rate (Maximum)	Up to 600MB/s *
Buffer	256MB
Cache	Adaptive
Seek Time (typical reads, includes controller overhead, including settling)	Single Track 0.7 ms *
	Average 8.5 ms *
	Full Stroke 15.7 ms *
Rotational Speed	7,200 rpm
Logical Blocks	23,437,770,752
Operating Temperature	41° to 140° F (5° to 60° C)
Performance	Sequential Read up to 226MB/s*
	Sequential Write up to 226MB/s*

*Actual performance may vary.

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 36GB of system disk (for Windows) is reserved for system recovery software.

Technical Specifications - Graphics

GRAPHICS

NVIDIA® RTX™ 6000 Ada 48GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1230 grams / 2.71 lbs (with extender)
	Max Power Consumption	Power: 300 Watts Cooling: Active
	GPU Memory	48GB GDDR6 memory ECC Memory Bandwidth: Up to 960 GB/s Memory Width: 384 bits
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector Stereo Sync Requires CEM 5.0 16-pin auxiliary power adapter
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NOTE: available in July 2023

NVIDIA® RTX™ A6000 48GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1230 grams / 2.71 lbs (with extender)
	Max Power Consumption	Power: 300 Watts Cooling: Active
	GPU Memory	48GB GDDR6 memory ECC optional Memory Bandwidth: Up to 768 GB/s Memory Width: 384 bit
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector NVLink® Stereo Sync Requires 8-pin auxiliary power
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® RTX™ A5000 24GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1049 grams + 80 grams extender
	Max Power Consumption	Power: 230W Cooling: Active
	GPU Memory	24GB GDDR6 memory ECC optional Memory Bandwidth: Up to 768 GB/s Memory Width: 384 bit
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector

Technical Specifications - Graphics

	NVLink® Stereo Sync Requires 8-pin auxiliary power
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 4.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® Long-Life RTX A5000E 24GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1049 grams + 80 grams extender
	Max Power Consumption	Power: 230W Cooling: Active
	GPU Memory	24GB GDDR6 memory ECC optional Memory Bandwidth: Up to 768 GB/s Memory Width: 384 bit
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector NVLink® Stereo Sync Requires 8-pin auxiliary power
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NOTE: available in June 2023

NVIDIA® RTX A4500 20GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1049 grams + 80 grams extender
	Max Power Consumption	Power: 200W Cooling: Active
	GPU Memory	20GB GDDR6 memory Memory Bandwidth: Up to 640 GB/s Memory Width: 320 bit
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector NVLink® Stereo Sync Requires 8-pin auxiliary power
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® RTX A4000 16GB	Form Factor	Full-Height Single Slot (4.4" Height x 9.5" Length) Weight: 500 grams
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Technical Specifications - Graphics

Max Power Consumption	Power: 140W Cooling: Active
GPU Memory	16GB GDDR6 memory Memory Bandwidth: Up to 448 GB/s Memory Width: 256 bit
Connectors	4x DisplayPort 1.4a Quadro Sync II connector Stereo Sync Requires 6-pin auxiliary power
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 4.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® Long-Life RTX A4000E 16GB	Form Factor	Full-Height Single Slot (4.4" Height x 9.5" Length) Weight: 500 grams
	Max Power Consumption	Power: 140W Cooling: Active
	GPU Memory	16GB GDDR6 memory Memory Bandwidth: Up to 448 GB/s Memory Width: 256 bit
	Connectors	4x DisplayPort 1.4a Quadro Sync II connector Stereo Sync Requires 6-pin auxiliary power
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NOTE: available in June 2023

NVIDIA® RTX A2000 12GB	Form Factor	Half-Height Dual Slot (2.713" Height x 6.6" Length) Weight: 306 grams
	Max Power Consumption	Power: 70W Cooling: Active
	GPU Memory	12GB GDDR6 memory Memory Bandwidth: Up to 288 GB/s Memory Width: 192 bit
	Connectors	4x mini-DisplayPort 1.4a
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

Technical Specifications - Graphics

NVIDIA® Long-Life RTX A2000E 12GB	Form Factor	Half-Height Dual Slot (2.713" Height x 6.6" Length) Weight: 306 grams
	Max Power Consumption	Power: 70W Cooling: Active
	GPU Memory	12GB GDDR6 memory Memory Bandwidth: Up to 288 GB/s Memory Width: 192 bit
	Connectors	4x mini-DisplayPort 1.4a
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® T1000 8GB	Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 132.6 grams
	Max Power Consumption	Power: 50W Cooling: Active
	GPU Memory	8GB GDDR6 memory Memory Bandwidth: Up to 160 GB/s Memory Width: 128 bit
	Connectors	4x mini-DisplayPort 1.4a
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 3.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® Long-Life T1000E 8GB	Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 132.6 grams
	Max Power Consumption	Power: 50W Cooling: Active
	GPU Memory	8GB GDDR6 memory Memory Bandwidth: Up to 160 GB/s Memory Width: 128 bit
	Connectors	4x mini-DisplayPort 1.4a
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 3.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® T1000 4GB	Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 132.6 grams
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Technical Specifications - Graphics

Max Power Consumption	Power: 50W Cooling: Active
GPU Memory	4GB GDDR6 memory Memory Bandwidth: Up to 160 GB/s Memory Width: 128 bit
Connectors	4x mini-DisplayPort 1.4a
Maximum Resolution	7680x4320 @ 120Hz
Bus Type	PCI Express 3.0 x16
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

NVIDIA® T400 4GB	Form Factor	Half-Height Single Slot (2.713" Height x 6.137" Length) Weight: 123.5 grams
	Max Power Consumption	Power: 30W Cooling: Active
	GPU Memory	4GB GDDR6 memory Memory Bandwidth: Up to 80 GB/s Memory Width: 64 bit
	Connectors	3x mini-DisplayPort 1.4a
	Maximum Resolution	7680x4320 @ 120Hz
	Bus Type	PCI Express 3.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

AMD® Radeon™ Pro W6800 32GB	Form Factor	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 850 grams
	Max Power Consumption	Power: 261W Cooling: Active
	GPU Memory	32GB GDDR6 memory Memory Bandwidth: Up to 512 GB/s Memory Width: 256 bit
	Connectors	6x mini-DisplayPort 1.4 Requires 8-pin+6-pin auxiliary power
	Maximum Resolution	7680x4320 @ 60Hz
	Bus Type	PCI Express 4.0 x16
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

AMD® Radeon™ Pro W6600 8GB	Form Factor	Full-Height Single Slot (4.38" Height x 9.50" Length) Weight: 132.6 grams
	Max Power Consumption	Power: 122W Cooling: Active

Technical Specifications - Graphics

GPU Memory	8GB GDDR6 memory Memory Bandwidth: Up to 224 GB/s Memory Width: 128 bit
Connectors	4x DisplayPort 1.4 Requires 6-pin auxiliary power
Maximum Resolution	7680x4320 @ 60Hz
Bus Type	PCI Express 4.0 x16 (x8 electrical)
Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

AMD® Radeon™ RX 6400 4GB	Form Factor	Half-Height Single Slot (4.4" Height x 10.5" Length) Weight: 155 grams
	Max Power Consumption	Power: 50W Cooling: Active
	GPU Memory	4GB GDDR6 memory Memory Bandwidth: Memory Width:
	Connectors	1x DisplayPort 1.4a 1x HDMI
	Maximum Resolution	7680x4320 @ 60Hz
	Bus Type	PCI Express 4.0 x4
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit

Intel® Arc Pro A40 6GB	Form Factor	Half-Height Single Slot (2.7" Height x 6.6" Length) Weight: 220 grams
	Max Power Consumption	Power: 50W Cooling: Active
	GPU Memory	4GB GDDR6 memory Memory Bandwidth: 192GB Memory Width: 96 bit
	Connectors	4x mini- DisplayPort 1.4
	Maximum Resolution	7680x4320 @ 60Hz
	Bus Type	PCI Express 4.0 x8
	Available Graphics Drivers	Windows 11 Windows 10

NOTE: available in July 2023

Notes for all graphics cards:

- Some graphics and GPU compute cards can consume a great deal of power, thus combinations of cards with other components may exceed a particular power supply's output capability.
- Some graphics and GPU compute cards require supplemental power cables.
- Not all chassis/PSU configurations have enough supplemental power cables of the correct type for all graphics configurations.

Technical Specifications - Graphics

Refer to the [Power Supply](#) section within [Overview](#) for more information.

OPTICAL AND REMOVABLE STORAGE

HP 9.5mm Slim Blu-Ray Writer	Description	9.5mm height, tray-load
	Mounting Orientation	Either horizontal or vertical
	Interface Type	SATA/ATAPI
	Dimensions (WxHxD)	128 x 9.5 x 127mm
	Supported Media Types	BD-ROM BD-R BD-RE DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW
	Disc Capacity	DVD-ROM 8.5 GB DL or 4.7 GB standard Blu-ray 25 GB (single-layer) 50 GB (dual-layer) 100/128 GB (BDXL)
		Full Stroke DVD < 230 ms (seek)
		Full Stroke CD < 220 ms (seek)
		Blu-ray < 230 ms (seek) (Full Stroke Blu-ray)
		Startup Time (Time to drive ready from tray loading) BD-ROM (SL/DL) 25S / 28S BD-R (SL/DL) 25S / 28S BD-RE (SL/DL) 25S / 28S DVD-ROM (SL/DL) 18S / 18S DVD-R (SL/DL) 25S / 25S DVD-RW 25S DVD+R (SL/DL) 25S / 25S DVD+RW 25S CD-ROM 15S
Maximum Data Transfer Rates	CD ROM Read CD-ROM, CD-R Up to 24X CD-RW Up to 24X	
	DVD ROM Read DVD+RW Up to 8X DVD-RW Up to 8X DVD+R DL Up to 8X DVD-R DL Up to 8X DVD-ROM Up to 8X DVD-ROM DL Up to 8X DVD+R Up to 8X DVD-R Up to 8X	
	Blu-ray BD-ROM Up to 6X BD-ROM DL Up to 6X BD-R Up to 6X	

Technical Specifications - Graphics

		BD-R DL Up to 6X BD-R Up to 6X BD-RE SL/DL Up to 6X
Power	Source	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -900 mA typical, 2000mA maximum
Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
Operating Systems Supported	Windows 11, Windows 10, Windows 7 Professional 64-bit, Red Hat® Enterprise Linux® (RHEL) 8, 9 Desktop/Workstation SUSE Linux® Enterprise Desktop 15 Ubuntu 20.04, 22.04 LTS	
	No driver is required for this device. Native support is provided by the operating system.	
Kit Contents	9.5mm Slim BDXL Blu-Ray Writer, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide As Blu-ray is a new format containing new technologies, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.	

NOTE: HD-DVD disks cannot be played on the DVD-ROM drive. No support for DVD-RAM. Actual speeds may vary. Don't copy copyright-protected materials. Double Layer discs can store more data than single layer discs. Discs burned with this drive may not be compatible with many existing single-layer DVD drives and players. Flawless playback on all systems is not guaranteed.

HP 9.5mm Slim DVD Writer	Description	9.5mm height, tray-load		
	Mounting Orientation	Either horizontal or vertical		
	Interface Type	SATA/ATAPI		
	Dimensions (WxHxD)	128 x 9.5 x 127mm		
	Supported Media Types	DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW		
	Disc Capacity	DVD-ROM	8.5 GB DL or 4.7 GB standard	
		Full Stroke DVD	< 200 ms (seek)	
		Full Stroke CD	< 200 ms (seek)	
	Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X	
		DVD ROM Read	DVD+RW Up to 8X	

Technical Specifications - Graphics

DVD-RW Up to 8X
 DVD+R DL Up to 8X
 DVD-R DL Up to 8X
 DVD-ROM Up to 8X
 DVD-ROM DL Up to 8X
 DVD+R Up to 8X
 DVD-R Up to 8X

Power	Source	SATA DC power receptacle
	DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC -< 800 mA typical, <1600 mA maximum
Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature	84° F (29° C)
Operating Systems Supported	Windows 11, Windows 10, Windows 7 Professional 64-bit, Windows Vista Business 64*, Windows 2000. Red Hat® Enterprise Linux® (RHEL) 8, 9 Desktop/Workstation SUSE Linux® Enterprise Desktop 15 Ubuntu 20.04, 22.04 LTS	

* No driver is required for this device. Native support is provided by the operating system

Kit Contents HP SATA DVD Writer drive, installation guide.

NOTE: Actual speeds may vary. No support for DVD-RAM (DVD Writer). Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

HP 9.5mm Slim DVD-ROM	Description	9.5mm height, tray-load		
	Mounting Orientation	Either horizontal or vertical		
	Interface Type	SATA/ATAPI		
	Dimensions (WxHxD)	128 x 9.5 x 127mm		
	Disc Capacity	DVD-ROM	Single layer: Up to 4.7 GB Double layer: Up to 8.5 GB	
		DVD-ROM Single Layer	< 110 ms (typical)	
	Access Times	CD-ROM Mode 1	< 110 ms (typical)	
		Full Stroke DVD	< 230 ms (typical)	
		Full Stroke CD	< 220 ms (typical)	
	Power	Source	SATA DC power receptacle	
DC Power Requirements		5 VDC ± 5%-100 mV ripple p-p		
DC Current		5 VDC -< 800 mA typical, <1600 mA maximum		
Operating Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)		
	Relative Humidity	10% to 80%		
	Maximum Wet Bulb Temperature	84° F (29° C)		

Technical Specifications - Graphics

Operating Systems Supported

Windows 11, Windows 10, Windows 8.1, Windows 7 Professional 64-bit
Red Hat® Enterprise Linux® (RHEL) 8, 9 Desktop/Workstation
SUSE Linux® Enterprise Desktop 15
Ubuntu 20.04, 22.04 LTS

No driver is required for this device. Native support is provided by the operating system.

Kit Contents

9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide

NOTE: Actual speeds may vary. No support for DVD-RAM (DVD Writer). Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players.

Technical Specifications - Networking and Communications

NETWORKING AND COMMUNICATIONS

NVIDIA® Mellanox® ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC	Connector	2 x SFP28 Transceiver Cage (Dual Port)*
	Cabling	Depends on transceiver pairing. Typically OM4 or higher MMF LC fiber optic cabling with LC SFP28 Transceivers.
	Controller	ConnectX6-DX
	Memory	256Mbit SPI Quad Flash Device
	Data Rates Supported	1/10/25GbE
	Compliance	<ul style="list-style-type: none"> – IEEE 802.3by 25 Gigabit Ethernet – IEEE 802.3ae 10 Gigabit Ethernet – IEEE 802.3ap based auto-negotiation and KR startup – IEEE 802.3ad, 802.1AX Link Aggregation – IEEE 802.1Q, 802.1P VLAN tags and priority – IEEE 802.1Qau (QCN) – Congestion Notification – IEEE 802.1Qaz (ETS) – IEEE 802.1Qbb (PFC) – IEEE 802.1Qbg – IEEE 1588v2 – Jumbo frame support (9.6KB) – Safety: CB/cTUVus/CE – EMC: CE/FCC/VCCI/ICES/RCM – RoHS Compliant
	Bus Architecture	PCIe Gen 4 x8
	Data Transfer Mode	PCI Express - stores and accesses Ethernet fabric connection information and packet data
	Power Requirements	11.5 Watts (typical)
	Network Transfer Rate	1 Gbps, 10Gbps, 25Gbps
		NOTE: Network Transfer Rate depends on transceiver model.*
Kit Contents	NVIDIA® Mellanox® ConnectX-6 DX Dual Port 10/25GbE SFP28 NIC	

*3rd party transceivers sold separately. You must have a transceiver installed in order to connect this card to a network.

Intel® X550 10GBASE-T Dual Port NIC	Connector	2 x RJ-45
	Cabling	Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps, 2.5Gbps, or 5Gbps Cat6 (or higher) for 10Gbps up to 55m Cat6a (or higher) for 10Gbps up to 100m
	Controller	Intel X550-AT2
	Memory	Jumbo Frames up to 15.5KB, 64 Tx and 64Rx Queues per port, 160KB/port of programmable memory transmit buffers
	Data Rates Supported	100Mbps (BASE-TX), 1Gbps (BASE-T, 2.5Gbps, 5Gbps, 10Gbps)
	Compliance	802.1q (VLAN), 802.1Qbb, 802.1p, 802.1Qaz
	Bus Architecture	PCIe 3x4
	Data Transfer Mode	PCIe Gen 3 x4 based interface
	Power Requirements	3.9W at 100Mbps

Technical Specifications - Networking and Communications

	5.5W at 1Gbps 11.2W at 10Gbps
Boot ROM Support	Yes
Network Transfer Mode	Autonegotiation between 1GbE, 2.5GbE, 5GbE and 10GbE
Management Capabilities	DMI 2.0 Support, Windows Management Instrumentation (WMI) and SNMP, PXE 2.0 through boot ROM, Multi-mode I/O Virtualization, VxLAN, VMDq, VLAN support with VLAN tag insertion
Kit Contents	Intel® X550 10GBASE-T Dual Port NIC

Intel® I225-T1 Single Port 2.5GbE PCIe NIC

Connector	RJ-45 (Single Port)
Cabling	Cat5e (or better) up to 100m
Controller	Intel® Ethernet I225 Controller
Memory	Jumbo Frames up to 9.5KB, 4 Tx and Rx Queues,
Data Rates Supported	2.5GbE, 1GbE, 100MbE, 10MbE
Compliance	IEEE 802.3 autonegotiation, 802.3x, 802.3z
Bus Architecture	PCIe Gen 3.1x1
Data Transfer Mode	PCIe-based interface for active state operation
Power Requirements	1.9 Watts (typical)
Management Capabilities	WOL, PXE 2.1, Power Management Protocol Offload (proxying), MAC Power Management, Active State Power Management,
Kit Contents	Intel® I225-T1 1-Port 2.5GbE NIC with standard height bracket attached and Low-profile bracket included Product Literature

Intel® Ethernet I350-T4V2 4-Port 1Gb NIC

Connector	4x RJ-45 (Quad Port)
Cabling	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps up to 100m
Controller	Intel® I350
Memory	Jumbo Frames up to 9.5KB, 8 Tx/Rx Queue pairs per port, Main Internal memory is Error Code Correcting
Data Rates Supported	10Mbps, 100Mbps, 1Gbps
Compliance	IEEE 802.3 Autonegotiation, 802.3, 802.3u, 802.3ab, 802.3x, 802.3z, IEEE1588 protocol and 802.1AS implementation, 802.3az EEE
Bus Architecture	PCI Express 2.1 x4
Data Transfer Mode	PCIe-based interface for active state operation
Power Requirements	5W
Network Transfer Mode	Multi-speed, full, and half-duplex
Network Transfer Rate	10BASE-T 100BASE-Tx 1000BASE-T
Management Capabilities	WOL, PXE 2.1, UEFI, Power Management Protocol Offload (proxying), MAC Power Management, Active State Power Management, VLAN, ACPI
Kit Contents	Intel® Ethernet I350-T4V2 4-Port 1Gb NIC with full-height bracket installed Low-profile bracket included

Technical Specifications - Networking and Communications

Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC	Connector	2 x RJ-45 (Dual Port)
	Cabling	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps up to 100m
	Memory	17 Rx and 16 Tx queues
	Data Rates Supported	10/100/1000 Mbps
	Compliance	IEEE 802.1p (Quality of Service), IEEE 802.1Q (VLANs), IEEE 802.2 (LLC), IEEE 802.3ac (MAC), IEEE 802.3x (Flow control auto-negotiation), IEEE 802.3z (1000 Base-X), IEEE 802.3ad (Link aggregation), IEEE 802.3ab (10/100/1000T) RoHS, UL, FCC/EN55022 Class A, TUV, EN55024, CE, C-TICK, VCCI
	Bus Architecture	PCIe 2x1
	Data Transfer Mode	PCIe-based interface
	Power Requirements	2.4 Watts (typical)
	Management Capabilities	VLAN support, Link aggregation LACP, Link aggregation smart switch, Failover, Smart Load Balancing (SLB), iSCSI boot support, Windows Management Instrumentation (WMI), PXE 2.1, SNMP
	Kit Contents	Allied Telesis AT-2911T/2-901 Dual Port 1GbE NIC with low-profile bracket attached and standard bracket included

Allies Telesis AT-2914SX/LC 1GB LC Fiber NIC	Connector	LC Fiber (Single Port)
	Cabling	50/125 µm (core/cladding) multimode fiber optic cable up to 500m 62.5/125 µm (core/cladding) multimode fiber optic cable up to 220m
	Memory	Jumbo Frames up to 9.6KB
	Data Rates Supported	1000SX (1GbE Fiber at 850nm Wavelength)
	Compliance	IEEE 802.1p (Quality of Service), IEEE 802.1Q (VLANs), IEEE 802.2 (LLC), IEEE 802.3ac (MAC), IEEE 802.3x (Flow control auto-negotiation), IEEE 802.3z (1000 Base-X), IEEE 802.3ad (Link aggregation) RoHS, UL, FCC/EN55022 Class A, TUV, EN55024, CE, C-TICK, VCCI
	Bus Architecture	PCIe x1
	Data Transfer Mode	PCIe-based interface
	Power Requirements	1.5 Watts (typical)
	Network Transfer Rate	1000SX only (1GbE Fiber at 850nm Wavelength)
	Management Capabilities	UEFI, Smart Load Balancing and failover, Link aggregation (IEEE802.3ad), Generic trunking (FEC/GEC) / IEEE 802.3ad-draft static, VLAN Support
Kit Contents	Allied Telesis AT-2914SX/LC 1GB LC Fiber NIC with low-profile bracket attached and standard height bracket included	

Intel® AX210 Wi-Fi 6E non-vPro + Bluetooth® 5.2 with External Antennae WLAN	Connector	Wireless
	Cabling	N/A
	Controller	Intel® AX210
	Data Rates Supported	Wi-Fi 6e (2.4GHz/5GHz/6GHz)
	Compliance	Wi-Fi Alliance* Wi-Fi Alliance CERTIFIED 6, WiFi CERTIFIED a/b/g/n/ac, WMM, WMM-Power Save, WPA2, WPA3, Wi-Fi Direct, and Wi-Fi Agile Multiband IEEE WLAN Standard 802.11-2016, 802.11a, b, d, e, g, h, l, k, n, r, u, v, w, ac, and ax, Bluetooth® 5.2
Bus Architecture	PCIe G3x1 for WLAN, USB3.1G1 for BT	

Technical Specifications - Networking and Communications

Management Capabilities Authentication Protocols: 802.1X EAP-TLS, EAP-TTLS/MSCHAPv2, PEAPv0 - MSCHAPv2 (EAP-SIM, EAP-AKA, EAP-AKA')
Encryption: 128-bit AES-CCMP, 256-bit AES-GCMP
UEFI

Kit Contents Intel® AX210 Wi-Fi 6 + Bluetooth® 5.2 PCIe NIC
External Dipole Antenna
Installation Instructions

*Wi-Fi 6E requires a Wi-Fi 6E router, sold separately to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.

Date of change:	Version History:		Description of change:
	From v1 to v2		

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