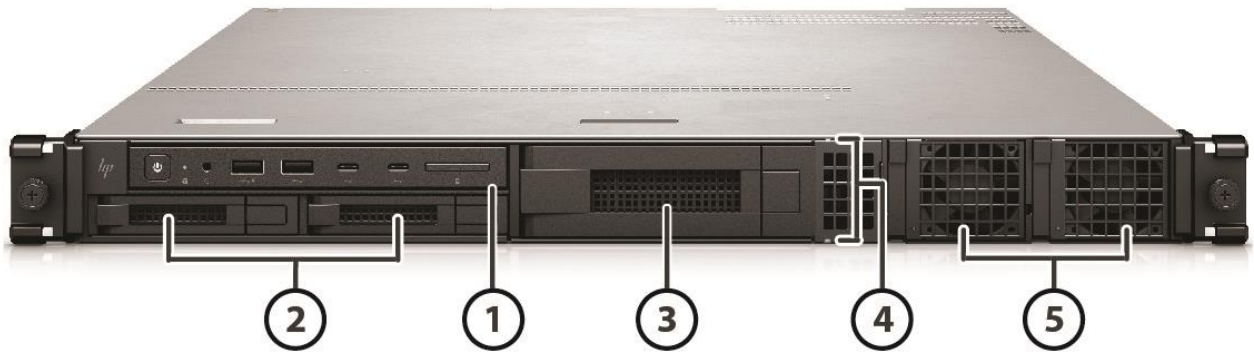
Overview

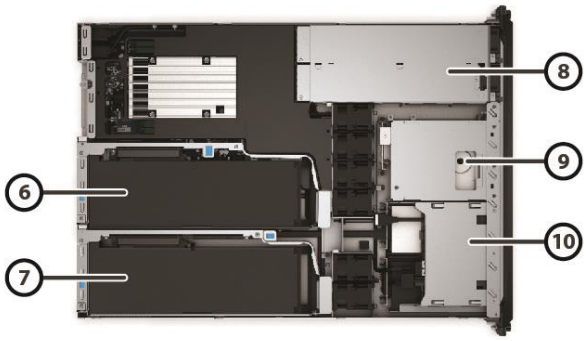
HP ZCentral 4R Workstation

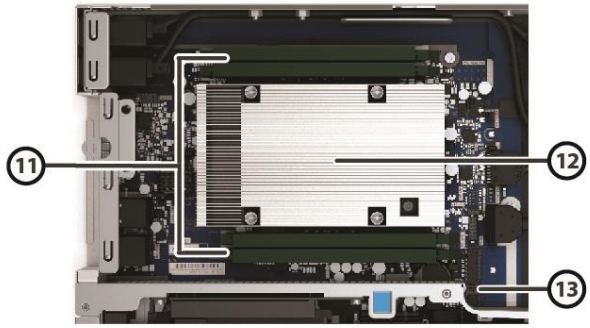


Front view

1. Front I/O module options
   - Premium (optional - shown here): power button, 2 USB 3.1 G1 Type-A, 2 USB 3.1 G2 Type-C®, Headset audio, (Left-most Type-A port has charging capability), Smart Card not supported
   - Standard (optional): power button, 4 USB 3.1 G1 Type-A (left-most Type-A port has charging capability), Headset audio, Smart Card not supported
2. 2 x 2.5” external drive bays
3. 1 x 3.5” external drive bay (can be configured with 1 x 3.5” drive or 2 x 2.5” drives)
4. Locator LED
5. 2 x external 675W PSU bays
   ENTRY
   Contains one (1) PSU 675W power supply.
   ENTRY REDUNDANT
   Contains two (2) 675W PSUs operating in redundant mode for a maximum system power of 675W.
   HIGH END
   Contains two (2) 675W PSUs operating in aggregate mode for a total system power of 1350W (2x675W).

Overview

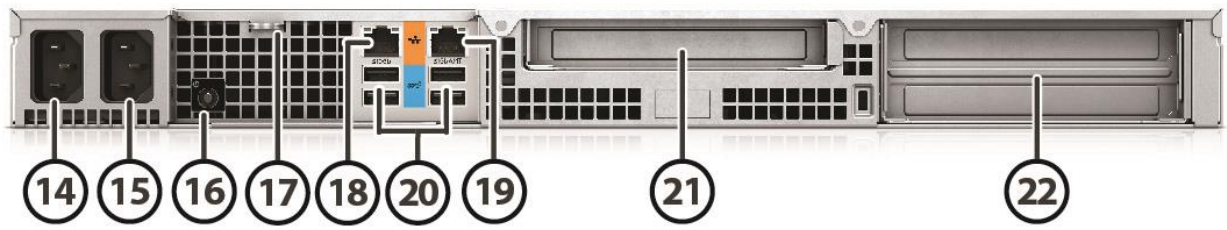




Internal views

6. Single Slot Riser (1 PCIe G3 x16); includes a single 6+2 auxiliary power cable
7. Dual Slot Riser* (1 PCIe G3 x16; 1 PCIe G3 x16 wired as x8); includes an additional dual 6+2 auxiliary power cable
8. Power supply bays
9. 3.5” drive bay
10. Two 2.5” drive bays
11. Four DIMM slots; DDR4- 2933 ECC Reg RAM
12. Intel® Xeon® Processors: W-2200 family
13. Two PCIe G3 x4 M.2 for SSDs

*Dual slot riser. DSR is optional but required for double wide graphics cards and configurations with more than one PCI card. DSR includes and additional dual 6+2 pin auxiliary power cable



Rear view

14. Primary power supply cable connector
15. Secondary power supply cable connector
16. Rear power button
17. Padlock loop
18. 1GbE RJ-45 (AMT)
19. 1/2.5/5/10GbE RJ-45
20. 4x USB 3.1 G1 Type-A
21. Single Slot Riser (1 PCIe G3 x16)
22. Dual Slot Riser* (1 PCIe G3 x16; 1 PCIe G3 x16 wired as x8)

Overview

*Dual slot riser. DSR is optional but required for double wide graphics cards and configurations with more than one PCI card. DSR includes and additional dual 6+2 pin auxiliary power cable

Overview

Form Factor

1U Rackable Workstation

Operating Systems

Preinstalled:

- Windows 11 Pro for Workstations*
- Windows 10 Pro for Workstations*,**
- Ubuntu Linux® 20.04***
- HP Linux-ready (minimal OS ready for customer OS installation)****

Supported:

- Red Hat® Enterprise Linux® Desktop 7.4 (Paper license with 1 year support)
- Red Hat® Enterprise Linux® Desktop 8.0 (Paper license with 1 year support)
- Ubuntu 18.04 LTS
- Ubuntu 20.04 LTS

Supported Version:

- HP tested Windows 10, version 1809 on this platform. For testing information on newer versions of Windows 10, please see: https://support.hp.com/document/c05195282.

For detailed Linux® OS/hardware support information, see:
http://www.hp.com/support/linux_hardware_matrix

* 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, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.windows.com.

** Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).

***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.

****For detailed Linux® OS/hardware support information, see:
http://www.hp.com/support/linux_hardware_matrix.

Note: 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

Supported Components

Available Processors

Name	Cores	Clock Speed (GHz)	Cache (MB)	Memory Speed (MT/s)	ECC memory support	Max memory support	Hyper-Threading	Featuring Intel® vPro™ Technology	Intel® Turbo Boost Technology 2.0 (GHz)[1]	Intel® Turbo Boost Max Technology 3.0 (GHz)[1]	TDP (W)
Intel® Xeon® W Processors											
Intel® Xeon® W-2295 processor	18	3.0	24.75	2933	YES	512GB	YES	YES	3.8, 4.6	4.8	165
Intel® Xeon® W-2275 processor	14	3.3	19.25	2933	YES	512GB	YES	YES	4.1, 4.6	4.8	165
Intel® Xeon® W-2265 processor	12	3.5	19.25	2933	YES	512GB	YES	YES	4.3, 4.6	4.8	165
Intel® Xeon® W-2255 processor	10	3.7	19.25	2933	YES	512GB	YES	YES	4.3, 4.5	4.7	165
Intel® Xeon® W-2245 processor	8	3.9	16.5	2933	YES	512GB	YES	YES	4.5, 4.5	4.7	155
Intel® Xeon® W-2235 processor	6	3.8	8.25	2933	YES	512GB	YES	YES	4.3, 4.6	N/A	130
Intel® Xeon® W-2225 processor	4	4.1	8.25	2933	YES	512GB	YES	YES	4.5, 4.6	N/A	105
Intel® Xeon® W-2223 processor	4	3.6	8.25	2666	YES	512GB	YES	YES	3.7, 3.9	N/A	120

[1]Intel Turbo Boost Max Technology 3.0 identifies the best performing core(s) on a processor and provides increased performance on those cores by taking advantage of power and thermal headroom. Intel® Turbo Boost Max Technology 3.0 frequency is the clock frequency of the CPU when running in this mode.

NOTE: Processors that do not have certain turbo functionality are denoted as N/A.

Available Processors

Disclaimers

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.

Supported Components

Expansion Slots (see system board section for more details)	**Slot 1 (SSR*):** PCI Express Gen3 x16 from CPU **Slot 2 (DSR*):** PCI Express Gen3 x16 from CPU - operates as x8 if Slot 3 is loaded **Slot 3 (DSR*):** PCI Express Gen3 x16 (wired as x8) from CPU **M.2 Slot 1:** PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, 2280-D5-M, 22110-D5-M **M.2 Slot 2:** PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, 2280-D5-M, 22110-D5-M *SSR = Single slot riser. Includes single 6+2 pin auxiliary power cable *DSR = Dual slot riser. DSR is optional but required for double wide graphics cards and configurations with more than one PCI card. DSR includes and additional dual 6+2 pin auxiliary power cable
Expansion Bays (see storage section for more details)	2 external 2.5” bays 1 external 3.5" bay (can be configured with 1 x 3.5” drive or 2 x 2.5” drives)
Front I/O	• Base: Power button with power/fault LED, Drive activity LED,1 Headset audio port, 4 USB 3.1 G1 Type A (1 charging, provides 1.5A at 5V) • Premium (optional): Power button with power/fault LED, Drive activity LED, 1 Headset audio port, 2 USB 3.1 G1 Type-A (1 charging, provides 1.5A at 5V), 2 USB 3.1 G2 Type-C® (each provides 3A at 5V) • SD Card Reader is not supported
Internal I/O	1 USB 2.0 dual-port header
Rear I/O	4x USB 3.1 G1 Type-A* 1x 1/2.5/5/10GbE LAN port 1x 1GbE LAN port (supporting Intel AMT) *All rear I/O motherboard USB-A ports are 0.9A at 5V
Interfaces Supported	4-channel SATA interface (6 @ 6.0 Gb/s) USB 2.0, USB 3.1 G1 (aka USB 3.0), USB 3.1 G2 (optional)
On-board RAID Support	SATA RAID 0 Striped Array Configuration SATA RAID 1 Mirrored Array Configuration SATA RAID 10 Striped/Mirrored Configuration
Chassis Dimensions	
Base footprint without front bezel and rack brackets (H x W x D)	H: 1.685" (42.8mm) W: 17.25" (438.15mm) D: 24.61" (625mm)
With front bezel and rack brackets (H x W x D)	H: 1.685" (42.8mm) W: 19.17" (486.81mm) D: 25.42" (645.70mm)
Packaged Dimensions	H: 7.28” (185mm) W: 23.22” (590mm) D: 32.48” (825mm)
Palletization Profile	2 units per layer x 10 layers = 20 units per pallet 1200x1000x1980mm(included pallet)
Rack Dimensions	1U
Weight	Exact weights depend upon configuration (System weight only). Minimum: 10.7 kg (23.7 lbs.) Standard: 11.7 kg (25.9 lbs) Maximum: 13.6 kg (30 lbs)
Temperature	Non-operating: -40° to 60° C (-40° to 140° F) Operating: 5° to 35° C (40° to 95° F)

Supported Components

	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 Maximum rate of change: 10 °C/hr No direct sustained sunlight
Humidity	Operating: 10% to 85% relative humidity, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% relative humidity, non-condensing, 35° C maximum wet bulb
Maximum Altitude (non-pressurized)	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See Temperature for details.
Power Supply	The ZCentral 4R 675W power supply efficiency report can be found at this link: https://clearesult5.sharepoint.com/:b:/s/PLS/EavZwv9yq51Jnd6LV-D9ayoBFKnzPUpASiqKGy2B-My6Ng?e=cPfbnt **ENTRY** Contains one (1) PSU 675W power supply. **ENTRY REDUNDANT** Contains two (2) 675W PSUs operating in redundant mode for a maximum system power of 675W. **HIGH-END** Contains two (2) 675W PSUs operating in aggregate mode for a total system power of 1350W (2x675W).
Workstation ISV Certifications	See the latest list of certifications at http://www8.hp.com/us/en/campaigns/workstations/industries-and-partners.html

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® Xeon® W-Series CPU				
Intel® Xeon® W-2295 3.0 2933 18C CPU	Y	N		
Intel® Xeon® W-2275 3.3 2933 14C CPU	Y	N		
Intel® Xeon® W-2265 3.5 2933 12C CPU	Y	N		
Intel® Xeon® W-2255 3.7 2933 10C CPU	Y	N		
Intel® Xeon® W-2245 3.9 2933 8C CPU	Y	N		
Intel® Xeon® W-2235 3.8 2933 6C CPU	Y	N		
Intel® Xeon® W-2225 4.1 2933 4C CPU	Y	N		
Intel® Xeon® W-2223 3.6 2933 4C CPU	Y	N		

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.

Supported Components

Storage / Hard Drives*

SATA Hard Drives	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
SATA (Serial ATA) Hard Drives for HP Workstations				
1TB SATA 7200RPM Ent 3.5" HDD	Y	Y	W0R10AA	
2TB SATA 7200RPM Ent 3.5" HDD	Y	Y	QB576AA	
4TB SATA 7200RPM Ent 3.5" HDD	Y	Y	K4T76AA	

*For storage drives, GB = 1 billion bytes. TB = one trillion bytes. Actual formatted capacity is less. Up to 35GB of disk space is reserved for system recovery software.

SATA Solid State Drives	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Solid State Drives (SSDs) for Workstations				
HP 256GB SATA SSD	Y	Y	A3D26AA	
HP 512GB SATA SSD	Y	Y	D8F30AA	
HP 1TB SATA SSD	Y	Y	F3C96AA	
HP 2TB SATA SSD	N	Y	Y6P08AA	
HP 240GB SATA Ent SSD	Y	Y	T3U07AA	
HP 480GB SATA Ent SSD	Y	Y	T3U08AA	
HP 960GB SATA Ent SSD	Y	Y	1W6P8AA	
HP 1920GB SATA Ent SSD	Y	Y	1W6P9AA	
HP 512GB SATA SED OPAL2 SSD	N	Y	N8T26AA	
HP 1TB SATA SSD	Y	Y	F3C96AA	

PCIe Solid State Drives	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Z Turbo Drive Dual Pro				
HP Z Turbo Drive Dual Pro 512GB TLC SSD	Y	Y	4YF61AA	
HP Z Turbo Drive Dual Pro 1TB TLC SSD	Y	Y	4YF62AA	
HP Z Turbo Drive Dual Pro 2TB TLC SSD	Y	Y	4YF63AA	
HP Z Turbo 256GB TLC 4R Kit SSD	Y	Y	2E3R0AA	
HP Z Turbo 512GB TLC 4R Kit SSD	Y	Y	2E3R1AA	
HP Z Turbo 1TB TLC 4R Kit SSD	Y	Y	2E3R2AA	
HP Z Turbo 2TB TLC 4R Kit SSD	Y	Y	2E3R3AA	
HP Z Turbo 512GB SED TLC 4R Kit SSD	Y	Y	2E3R4AA	
HP Z Turbo 256GB SED TLC 4R Kit SSD	Y	Y	2E3R5AA	

Supported Components

Intel® Virtual RAID on CPU (Intel® VROC) for NVMe	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Intel® VROC NVMe SSD Standard Controller Module	N	Y	3FJ80AA	1

NOTE 1: Enables RAID 0, 1 & 10

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP miniDP-to-DP Adapter	Y	Y	2MY05AA	
HP miniDP-to-DP Adapter (12-pack)	Y	N	2KW87A6	
Entry 3D				
NVIDIA® Quadro® P400 2GB Graphics	Y	Y	1ME43AA	1
NVIDIA T400 2 GB Graphics	Y	Y	340K8AA	2
Mid-range 3D				
NVIDIA® Quadro® P1000 4GB Graphics	Y	Y	1ME01AA	1
NVIDIA® T1000 4GB Graphics	Y	Y	20X22AA/AT	2
NVIDIA® Quadro® P2200 5GB Graphics	Y	Y	6YT67AA	1
NVIDIA® RTX A2000 6GB Graphics	Y	Y	340L0AA	4
High-End 3D				
NVIDIA® Quadro® RTX 4000 8GB Graphics	Y	Y	5JV89AA	1
NVIDIA® RTX A4000 16GB Graphics	Y	Y	20X24AA/AT	1
NVIDIA® RTX A4500 20GB Graphics	Y	Y	5S458AA/AT	2
Ultra High-End 3D				
NVIDIA® Quadro® RTX 5000 16GB Graphics	Y	Y	5JH81AA	2,3
NVIDIA® RTX A5000 24 GB Graphics	Y	Y	20X23AA	2
NVIDIA® Quadro® RTX 6000 24GB Graphics	Y	Y	5JH80AA	2
NVIDIA® RTX A6000 48GB Graphics	Y	Y	2S6U3AA/AT	2
NVIDIA® Quadro® RTX 8000 48GB Graphics	Y	Y	6NB51AA	2

NOTE 1: Dual graphics configuration requires addition of Dual Slot Riser and High End Chassis with 1350W PSU; Single Slot Riser includes single 6+2 pin auxiliary power cable. Dual Slot riser includes an additional dual 6+2 pin auxiliary power cable.
NOTE 2: Dual Graphics not Supported. Requires addition of Dual Slot Riser and High End Chassis with 1350W PSU. Dual Slot riser includes an additional dual 6+2 pin auxiliary power cable.
NOTE 3: The RTX 5000 can be configured with Redundant Power Supplies only when configured with processors with TDP ≤ 130W.
NOTE 4: The RTX A2000 does not support dual configurations. It requires the addition of the Dual Slot Riser. It is supported with the Entry Chassis, Entry Redundant Chassis, or the High End Chassis.

Supported Components

Memory

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
8GB (1x8GB) DDR4- 2933 ECC Reg RAM	Y	Y	5YZ56AA/AT	1
16GB (1x16GB) DDR4- 2933 ECC Reg RAM	Y	Y	5YZ54AA/AT	1
32GB (1x32GB) DDR4- 2933 ECC Reg RAM	Y	Y	5YZ55AA/AT	1
64GB (1x64GB) DDR4- 2933 ECC Reg RAM	Y	Y	5YZ57AA/AT	1

Factory Configured System Memory Solutions

8GB (1x8GB) DDR4
16GB (1x16GB) DDR4
16GB (2x8GB) DDR4
24GB (3x8GB) DDR4
32GB (2x16GB) DDR4
32GB (4x8GB) DDR4
64GB (2x32GB) DDR4
64GB (4x16GB) DDR4
128GB (2x64GB) DDR4
128GB (4x32GB) DDR4
256GB (4x64GB) DDR4

NOTE 1: ONLY DDR4 RDIMMs are supported.

NOTE: Factory-configured CTO (xxxxxAV) and aftermarket AMO (xxxxxAA, xxxxxAT) HP memory part numbers designated as “2933” will be transitioned to use "3200" speed memory components. This does not affect HP part number availability, nor does it affect system performance or operation. All hardware configurations currently supporting HP memory part numbers designated as “2933” have been tested to work with "3200" memory and are fully-supported by HP under standard support terms.

Multimedia and Audio Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Realtek HD ALC3601 Audio	Y	N		

Supported Components

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Intel® Ethernet I219-LM Single Port 1Gb NIC	Y	N		
Integrated Marvell® AQC-107 Single Port 1/2.5/5/10GbE NIC	Y	N		
Intel® I210-T1 Single Port 1GbE	Y	Y	E0X95AA	
Intel® X550-T2 Dual Port 10GbE NIC	Y	Y	1QL46AA	
Allied Telesis AT-2914SX/LC-901 1GB LC Fiber NIC	Y	Y	1C7Q2AA	

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP ZCentral 4R Front Bezel/Security	Y	Y	16G58AA	
HP ZCentral 4R Rail Rack Kit	Y	Y	16G60AA	
HP Rack Cable Management Arm	N	Y	35Z34AA	

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Wireless Business Slim Keyboard and Mouse	Y	Y	N3R88AA	
USB Business Slim Wired Keyboard	Y	Y	N3R87AA	
USB Premium Wired Keyboard	Y	Y	Z9N40AA	

Supported Components

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP ENERGY STAR® Certified Configuration	Y	N		
HP ZCentral 4R 2nd 675W Power Supply	Y	Y	1C9J6AA	
HP ZCentral 4R Dual PCIe Slot Riser Kit	Y	Y	16G54AA	
HP ZCentral 4R Power Cord Kit	Y	Y	1N1D4AA	
HP Z Premium Front I/O 2xUSB-A 2xUSB-C	Y	Y	16G59AA	
HP Serial Port and PS/2 Port	N	Y	141K9AA	
HP Internal USB Port Kit		Y	EM165AA	1
HP ZCentral 4R 2.5" Dual Drive Cage Adapter		Y	16G55AA	
HP ZCentral 4R 2.5" Drive Carrier		Y	16G56AA	
HP ZCentral 4R 3.5" Drive Carrier		Y	16G57AA	

NOTE 1: The HP Internal USB Port Kit has a single USB 2.0 type A connector

Application Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Sobey Video Editing SW	N	Y		1
HP ZCentral Remote Boost	Y	N		2
Data Science Stack	Y	N		3,4
WSL2/Ubuntu Data Science Stack	Y	N		3,5

*Not all Application Software for Z Desktop Workstations is included with purchase.
NOTE 1: China Only
NOTE 2: HP ZCentral Remote Boost Sender does not come preinstalled on Z Workstations but can be downloaded and run on all Z desktop and laptops without license purchase through 2022. With non-Z sender devices, purchase of perpetual individual license or perpetual floating license per simultaneously executing versions and purchase of ZCentral Remote Boost Software Support is required. ZCentral Remote Boost Sender for non-Z Hardware requires a license and Windows 10, RHEL/CentOS (7 or 8), or UBUNTU 18.04 or 20.04 LTS operating systems. macOS (10.14 or newer) operating system and ThinPro 7.2 are only supported on the receiver side. Requires network access. The software is available for download at hp.com/ZCentralRemoteBoost.
NOTE 3: Only available with NVIDIA graphics cards selections.
NOTE 4: Only available with Ubuntu 20.04 LTS preinstall.
NOTE 5: Only available with Windows 10 Pro/Pro for Workstations or Windows 11 Pro/Pro for Workstations.

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP ZCentral Remote Boost	Y	N		5
HP Sure Start Gen6	Y	N		1
HP Sure Sense	Y	N		2
HP Sure Click	Y	N		
HP PC Hardware Diagnostics UEFI	Y	N		
HP PC Hardware Diagnostics Windows	Y	N		6
HP Performance Advisor	Y	N		4
HP Client Security Manager Gen5	N	Y		3
HP Manageability Integration Kit Gen4	N	Y		5

Supported Components

Sobey Video Editing SW	N	Y	1

NOTE 1: HP Sure Sense requires Windows 10 Pro or Enterprise. See product specifications for availability.
NOTE 2: HP Sure Click requires Windows 10. See https://bit.ly/2PrLT6A_SureClick for complete details.
NOTE 3: HP Manageability Integration Kit can be downloaded from http://www.hp.com/go/clientmanagement.
NOTE 4: HP Client Security Manager Gen5 requires Windows and is available on the select HP Elite and Pro PCs.
NOTE 5: HP Sure Start Gen6 is available on select HP PCs and requires Windows 10.
NOTE 6: HP Performance Advisor Software - HP Performance Advisor is ready and waiting to help you get the most out of your HP Workstation from day one—and every day after. Learn more or download at: https://www8.hp.com/us/en/workstations/performance-advisor.html

Operating Systems

	Support Notes
Windows 11 Pro for Workstations	1
Windows 10 Pro for Workstations	2
Red Hat® Enterprise Linux® Desktop 7.4	3, 4
Red Hat® Enterprise Linux® Desktop 8.0	3, 4
Ubuntu 18.04 LTS	4
Ubuntu 20.04 LTS	4

NOTE 1: 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.

NOTE 2: Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).

NOTE 3: Paper license with 1 year support

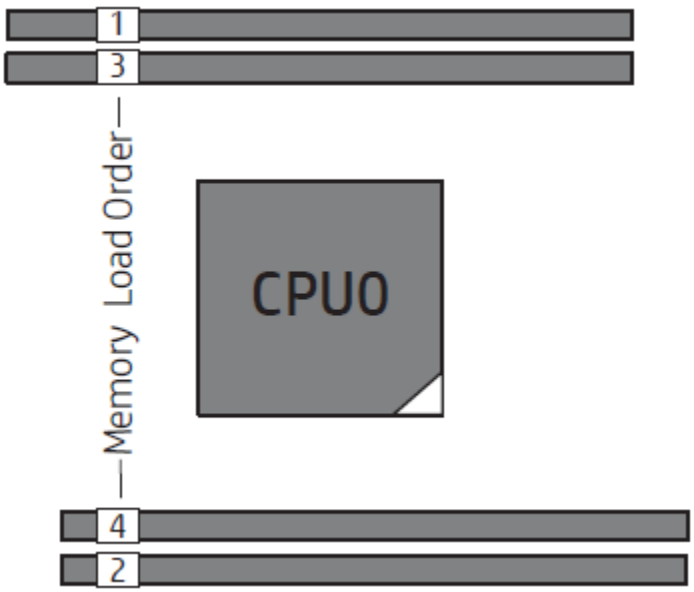
NOTE 4: For detailed Linux® OS/hardware support information, see: http://www.hp.com/support/linux_hardware_matrix

System Technical Specifications

System Board

System Board Form Factor	L-Shaped 11.71 x 12.15 inches
Processor Socket	Single LGA2066 R4
Chipset	**Intel® Xeon® W Processor Family** Intel® C422 Chipset
Super I/O Controller	Nuvoton NPCD315HA0DX (SIO-15)
Memory Expansion Slots	4 DDR4 memory slots
Memory Type Supported	DDR4, RDIMM (Registered), ECC
Memory Modes	Channel Interleaved
Memory Speed Supported	2933MT/s, 2666MT/s and 2400MT/s
Memory Protection	ECC available on data, parity on address and command
Maximum Memory	Supports up to 256GB
Memory Configuration (Supported)	Only Registered DIMMs are supported.

Memory Load Order



Note on Maximum Memory	Maximum memory capacities assume 64-bit operating systems such as Windows 10 Pro 64-bit, Windows 7 Professional 64-bit. For systems installed with Microsoft Windows 7 (Ultimate, Enterprise or Pro), the maximum accessible system memory is 192GB

System Technical Specifications

PCI Express Connectors	**Slot 1 (SSR*):**	PCI Express Gen3 x16 supplied by CPU
	Slot 2 (DSR*):	PCI Express Gen3 x16 supplied by CPU (operates as x8 if Slot 3 is loaded)
	Slot 3 (DSR*):	PCI Express Gen3 x16 (wired as x8) supplied by CPU
	M.2 Slot 1:	PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, 2280-D5-M, 22110-D5-M
	M.2 Slot 2:	PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, 2280-D5-M, 22110-D5-M
	*SSR = Single slot riser. Includes single 6+2 pin auxiliary power cable *DSR = Dual slot riser. DSR is optional but required for double wide graphics cards and configurations with more than one PCI card. DSR includes and additional dual 6+2 pin auxiliary power cable	
Supported Drive Interfaces		
SATA	4 SATA @ 6GB/s, supports RAID 0,1, and 10 Factory integrated Intel® SATA RAID is Microsoft Windows only	
Serial Attached SCSI	Not supported	
Factory Configured RAID	• RAID 0 striped array • RAID 1 mirrored array • RAID 10 striped and mirrored array *HW RAID functionality not supported by Linux®. Use SW RAID functionality provided in the Red Hat® Operating system instead.	
Integrated Graphics	No	
Network Controller	Marvell AQtion AQC107 PCIe 1/2.5/5/10GBASE-T LAN Intel® I219-LM PCIe GbE LAN supports the following management functionalities: Intel AMT11.12, TXT, DASH 1.1, WOL, VLAN, Teaming and PXE 2.1	
External SATA (eSATA)	No	
IDE connector	No	
Floppy connector	No	
Serial and PS2	1 internal header	
2nd Serial	No	
Parallel	No	
AUX IN (audio)	No	
IEEE 1394 Connector(s)	No	
USB Connector(s)		
Front	Front USB depends on which FIO module is selected: - Standard: 4 USB 3.1 G1 Type A (1 charging) - Premium: 2 USB 3.1 G2 Type C®, 2 USB 3.1 G1 Type A (1 charging)	
Rear	4 USB 3.1 G1 Type A 1 USB 2.0 single-port header 1x USB 2.0 dual-port header	
HD Integrated Audio	Realtek ALC3601-CG	
Flash ROM	Yes	

System Technical Specifications

Fan Headers	Yes
Front Control Panel/Speaker Header	Yes
CMOS Battery Holder - Lithium	Yes
Integrated Trusted Platform Module	Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) Common Criteria EAL4+ Certified Convertible to FIPS 140-2 Certified mode through firmware v7.85 TPM Certified products list: https://trustedcomputinggroup.org/membership/certification/tpm-certified-products/
Power Supply Headers	Yes
Power Switch, Power LED & Hard Drive LED Header	Yes
Clear Password Jumper	Yes
Serial Port	1 internal header
Parallel Port	No
Keyboard/Mouse	USB (PS/2 supported via AMO kit)
Hood Lock Header	No
Hood Sensor Header	Yes
AUX OUT (audio)	(Front Audio) Headset

System Technical Specifications

Power Supply

The HP ZCentral 4R Workstation contains up to two (2) 675 watt wide-ranging, active Power Factor Correction, 90% Efficient PSUs.

The 675W power supply efficiency report can be found at this link: https://clearesult5.sharepoint.com/:b:/s/PLS/EavZwv9yq51Jnd6LV-D9ayoBFKnzPUpASiqKGy2B-My6Ng?e=cPfbnt

ENTRY
Contains one (1) PSU 675W power supply.

ENTRY REDUNDANT

Contains two (2) 675W PSUs operating in redundant mode for a maximum system power of 675W.

HIGH END

Contains two (2) 675W PSUs operating in aggregate mode for a total system power of 1350W (2x675W).

Power Supply	675W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)	
Operating Voltage Range	90–269 VAC	
Rated Voltage Range	100-240 VAC	118 VAC
Rated Line Frequency	50–60 Hz	400 Hz
Operating Line Frequency Range	47–66 Hz	393–407 Hz
Rated Input Current	9A @100-127 VAC 4.5A @ 200-240 VAC	7A @ 118VAC
Heat Dissipation (Configuration and software dependent)	Typical = 1832 btu/hr Max = 2647 btu/hr	
Power Supply Fan	40x40 mm variable speed	
ENERGY STAR® Certified (Configuration dependent)	Yes	
80 PLUS® Compliant	90% Efficient The power supply efficiency report can be found at this link: https://clearesult5.sharepoint.com/:b:/s/PLS/EavZwv9yq51Jnd6LV-D9ayoBFKnzPUpASiqKGy2B-My6Ng?e=cPfbnt	
FEMP Standby Power Compliant @115V <1W in S5 – Power Off)	Yes, 1 PSU only	Yes, 1 PSU only
EuP Compliant @ 230V (<0.5 W in S5 – Power Off)	N/A for EMC Class A Equipment	N/A for EMC Class A Equipment
Power Consumption in sleep mode (as defined by ENERGY STAR®) – Suspend to RAM (S3) (Instantly Available PC)	<10W	<10W
Built-in Self Test LED	No	No
Surge Tolerant Full Ranging Power Supply	Yes	Yes

(withstands power surges up to 2000V)

System Technical Specifications

System Configuration

Example ZCentral 4R Workstation Configuration #1 ENERGY STAR® Certified	Processor	Intel Xeon W-2223 4C 3.6GHz						
	Memory	1x 8GB DDR4 2933 (Registered DIMM)						
	Graphics	1x NVIDIA Quadro P400						
	Disks / Optical	1x HP Zturbo M.2 512GB TLC SSD						
	Power Supply	1x 675W						
	Other	N/A						
Energy Consumption		115 VAC		230 VAC		100 VAC		
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	
	Windows Idle (S0)	45.219		45.379		45.143		
	Windows Busy Typ(S0)	144.871		142.362		140.95		
	Windows Busy Max (S0)	150.762		149.580		148.992		
	Sleep (S3)	5.540	5.321	5.548	5.322	5.535	5.322	
	Off (S5)	2.945	2.524	3.13	3.005	3.112	2.998	
	Zero Power Mode (ErP)	0.300		0.314		0.301		
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC		
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled	
	Windows Idle (S0)	154.287		154.833		154.027		
	Windows Busy Typ(S0)	494.299		485.732		480.92		
	Windows Busy Max (S0)	514.399		510.366		508.36		
	Sleep (S3)	18.902	18.155	18.929	18.129	18.885	18.158	
	Off (S5)	10.631	10.239	10.679	10.653	10.618	10.229	
	Zero Power Mode (ErP)	1.023		1.071		1.027		

System Technical Specifications

Example ZCentral 4R Workstation Configuration #2 ENERGY STAR® Certified	Processor	1x Intel Xeon W-2245 8C 3.9GHz					
	Memory	2x16GB DDR4-2933 (Registered DIMM)					
	Graphics	1x NVIDIA Quadro P2200					
	Disks / Optical	1x ZTurbo 256GB M.2 SSD; 1x 2TB 7200 SATA Enterprise 3.5in HDD					
	Power Supply	1x 675W					
	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 Idle (S0)	53.157		53.368		52.983	
	Windows Busy Typ(S0)	272.91		270.65		267.35	
	Windows Busy Max (S0)	279.43		280.36		279.37	
	Sleep (S3)	5.314	5.375	5.328	5.371	5.321	5.381
	Off (S5)	2.945	2.908	2.943	2.9	2.963	2.902
	Zero Power Mode (ErP)	0.301		0.312		0.303	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	181.371		182.091		184.374	
	Windows Busy Typ(S0)	931.168		923.457		912.198	
	Windows Busy Max (S0)	953.415		956.58		953.21	
	Sleep (S3)	18.131	18.339	18.179	18.325	18.155	18.359
	Off (S5)	10.048	9.922	10.041	9.894	10.017	9.901
	Zero Power Mode (ErP)	1.027		1.065		1.034	

System Technical Specifications

Example ZCentral 4R Workstation Configuration #3	Processor	1x Intel Xeon W-2255 10C 3.7GHz					
	Memory	4x 16GB DDR4-2933 (Registered DIMM)					
	Graphics	1x NVIDIA Quadro RTX4000					
	Disks/Optical	1x Zturbo 512GB M.2 SSD; 1x 4TB 7200 Enterprise SATA HDD					
	Power Supply	1x 675W					
	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 Idle (S0)	56.77		57.035		56.763	
	Windows Busy Typ(S0)	335.24		333.25		330.97	
	Windows Busy Max (S0)	345.36		344.89		344.67	
	Sleep (S3)	5.883	5.829	5.883	5.842	5.88	5.835
	Off (S5)	2.949	2.915	2.948	2.918	2.945	2.912
	Zero Power Mode (ErP)	0.303		0.316		0.306	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	193.699		194.603		193.583	
	Windows Busy Typ(S0)	1143.839		1137.049		1129.27	
	Windows Busy Max (S0)	1178.36		1176.76		1176.01	
	Sleep (S3)	20.072	19.888	20.072	19.932	20.062	20.072
	Off (S5)	10.061	9.945	10.058	9.956	10.048	10.061
	Zero Power Mode (ErP)	1.034		1.078		1.044	

System Technical Specifications

Example ZCentral 4R Workstation Configuration #4	Processor	1x Intel Xeon W-2295 18C 3.0GHz					
	Memory	4x 32GB DDR4-2933 (Registered DIMM)					
	Graphics	1x NVIDIA RTX8000					
	Disks / Optical	2x ZTurbo 2TB M.2 SSD; 2x ZTurbo 2TB Z Dual Pro PCIe SSD; 4x 1TB 2.5in SATA SSD					
	Power Supply	2x 675W PSU					
	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 Idle (S0)	60.489		60.889		60.413	
	Windows Busy Typ(S0)	464.213		458.512		461. 441	
	Windows Busy Max (S0)	495.789		487.213		491.220	
	Sleep (S3)	5.893	5.819	5.990	5.831	5.887	5.412
	Off (S5)	3.312	3.012	3.418	3.111	3.303	3.045
	Zero Power Mode (ErP)	0.523		0.774		0.517	
Heat Dissipation (Btu/hr)		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	206.388		207.753		206.129	
	Windows Busy Typ(S0)	1583.894		1563.984		1574.4367	
	Windows Busy Max (S0)	1691.632		1662.370		1676.043	
	Sleep (S3)	20.107	19.854	20.437	19.895	20.086	18.465
	Off (S5)	11.301	10.277	11.662	10.615	11.269	10.389
	Zero Power Mode (ErP)	1.7844		2.6411		1.7641	

NOTE: Power consumption measurements do not take advantage of the Intel Turbo Boost Technology. As a result, power consumption measurements may be higher.

System Technical Specifications

DECLARED NOISE EMISSIONS

Declared Noise Emissions (Entry-level and High-end configurations)			
System Configuration (Entry level)	**Processor Info**	Intel® Xeon® W-2255 3.7GHz 2933MHz 10C CPU	
	Memory Info	256GB (4x64GB) DDR4-2933 ECC Reg RAM	
	Graphics Info	1-NVIDIA® Quadro® RTX 4000	
	Disks/Optical	1-4TB SATA 7200RPM 3.5" HDD / 2-1TB 2.5" SSD / 2-2TB PCIe M.2 SSD	
	Power Supply	Single 675W	
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		**Sound Power** (LWAd, bels)	**Deskside Sound Pressure** (LpAm, decibels)
	Idle	4.9	34
	Hard drive Operating (random reads)	4.9	34

NOTE: Higher noise levels may be experienced with non-HP approved graphic card(s). Some consumer graphics cards have side blowing fans that may heat up thermal sensor(s) on the mother board causing fans to ramp.

System Technical Specifications

ENVIRONMENTAL DATA

Environmental Requirements	**Temperature**	Non-operating: -40° to 60° C (-40° to 140° F) Operating: 5° to 35° C (40° to 95° F) 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 Maximum rate of change: 10 °C/hr No direct sustained sunlight
	Humidity	Operating: 10% to 85% RH, non-condensing, 35° C maximum wet bulb Non-operating: 10% to 90% RH, non-condensing, 35° C maximum wet bulb
	Maximum Altitude	Operating (with Rotational Hard Drives): 3,048 m (10,000 feet) Operating (with only Solid-State Drives): 5,000 m (16,404 feet) Non-operating: 12,192 m (40,000 feet) Maximum operating temperature is reduced as altitude increases. See Temperature for details.
	Shock (non-repetitive)	Operating: ½-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g) Non-operating square: 422 cm/s, 20g
	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

Physical Security and Serviceability

Access Panel	Tool-less Includes system board and memory information.
Hard Drives	Screw-mounted
Expansion Cards	Expansion card cage removal/insertion into system is tool-less Expansion card access requires removal of screw-mounted retainer bracket
Processor Socket	Tool-less
Blue User Touch Points	Yes, on primary serviceable components.
Color-coordinated Cables and Connectors	Yes
Memory DIMM Connectors	Tool-less
System Board	Screw-mounted
Dual Color Power/Failure LED	Yes
HDD Activity LED	Yes Note: HDD Activity LED is not dual-color
Configuration Record SW	Yes
Over-Temp Warning on Screen	Yes, at POST screen on reboot
Restore CD/DVD Set	Restores the computer to its original factory shipping image; can be obtained via HP Support.
Dual Function Front Power Switch	Yes, causes a fail-safe power off when held for 4 seconds
Padlock Support	Yes (optional): Locks top cover and secures chassis from theft 7.0 mm (0.2756 in) diameter padlock loop at rear of system
Cable Lock Support	Yes, Kensington Cable Lock (optional): Secures chassis from theft 3 mm x 7 mm slot at rear of system

System Technical Specifications

Universal Chassis Clamp Lock Support	No
Chassis Interlock Sensor	Yes Sensor detects when the access panel has been removed. The access panel must be installed for the system to power ON.
Serial, USB, Audio, Network, Enable/Disable Port Control	Yes, enables or disables serial, USB, audio, and network ports
Removable Media Write/Boot Control	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
Power-On Password	Yes, prevents an unauthorized person from booting up the workstation
Setup Password	Yes, prevents an unauthorized person from changing the workstation configuration
3.3V Aux Power LED on System PCA	Yes
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Power Supply Diagnostic LED	Yes Solid Green (OK); Blinking Green (Standby); Red (Fault); Off (No AC Power/PSU Failure)
Front Power Button	Yes, ACPI multi-function
Rear Power Button	Yes
System Locator LED	Yes, blue
Front Power LED	Yes, white (normal), red (fault)
Front Hard Drive Activity LED	Yes, white
Internal Speaker	Yes
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection heatsinks
Power Supply Fan	40 mm x 40 mm x 28 mm (non-serviceable)
Chassis Fans	40 mm x 40 mm x 56 mm (serviceable)
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 ESC then F2 upon the PC reboot and is available as a download from HP Support.
Access Panel Key Lock	No
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). • 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
Trusted Platform Module Chip	Infineon TPM 2.0 Certified
Integrated Chassis Handles	No
Power Supply	Tool-less
PCIe Card Retention	Yes, rear (all), middle (all), front (full-length cards with extender)
Flash ROM	Yes
Diagnostic Power Switch LED on board	Yes

System Technical Specifications

Clear Password Jumper	Yes
Clear CMOS Button	Yes
CMOS Battery Holder	Yes

BIOS

BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal v0.4
PCI 3.0 Support	Full BIOS support for PCI Express through industry standard interfaces.
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.
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 Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
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). BiosConfigUtility.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS 3.2, for system management information.
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: • 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 5.0 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.

System Technical Specifications

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 14 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, bus latency) to be configured individually.
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.
Industry Standard Specification Support	
Industry Standard	Revision Supported by the BIOS
UEFI Specification Revision	2.6
ACPI	Advanced Configuration and Power Management Interface, Version 5.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
EHCI	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
PCI	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0, Draft .7
PCI Express	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
PMM	POST Memory Manager Specification, Version 1.01
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	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) Common Criteria EAL4+ Certified FIPS 140-2 Certified 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 G1 Specification Universal Serial Bus Revision 3.1 G2 Specification
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:

- ENERGY STAR® (energy-saving features available on selected configurations-Windows only)
- US Federal Energy Management Program (FEMP)
- China Energy Conservation Program (CECP)
- The ECO declaration (TED)
- The ZCentral 4R is registered EPEAT® Gold in the US and Canada. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit www.epeat.net for more information.

Batteries

The battery in this product complies with EU Directive 2006/66/EC
Battery mass: 3g
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 40ppm by weight

Restricted Material Usage

This product meets the material restrictions specified in HP's General Specification for the Environment. HP Inc. is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis.

Low Halogen Statement

This product contains low halogen printed circuit boards.
(Note: optional low halogen power cables are available for some countries in Europe)

End-of-Life Management and Recycling

HP Inc. 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/recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This product is greater than 90% recyclable by weight when properly disposed of at end of life.

HP Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:
Sustainable Impact Report
Eco-label certifications ISO 14001 certificates

Additional Information

- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC. Product Disassembly Instructions
- Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.

Packaging

HP Workstation product packaging meets the HP's General Specification for the Environment

- Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment
- Does not contain ozone-depleting substances (ODS)
- Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed
- Maximizes the use of post-consumer recycled content materials in packaging materials
- All packaging material is recyclable
- All packaging material is designed for ease of disassembly
- Reduced size and weight of packages to improve transportation fuel efficiency

System Technical Specifications

- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting
- A multi-unit eco packaging option is available to institutional customers that uses less packaging material or has a lower volume footprint than conventional single-unit packaging. Please contact your sales representative for additional details.

Packaging Materials	
Internal	Cushions and plastic bags made of low density polyethylene (LDPE).
External	Outer carton, accessories carton, and insert made of corrugated paper board.

System Technical Specifications

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) 11.12

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 11.12 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)
- **NEW: Hardware Alerting (with special enablement for RPSU 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 1.1 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

The HP ZCentral 4R Workstation supports Intel® vPro™ technology when configured as outlined below:

- Intel® Xeon® processor W-2200 product family featuring Intel® vPro™ Technology
- Intel® C422 chipset

Intel® I219LM GbE LAN

Remote Manageability Software Solutions

The HP ZCentral 4R Workstation is supported on the following optional remote manageability software consoles:

- HP ZCentral Connect
- Ivanti Management Suite
- Microsoft System Center Configuration Manager

For questions or support for manageability needs, please visit

http://www.hp.com/go/easydeploy

System Technical Specifications

System Software Manager

For easy deploy questions or support for SSM, please visit: http://www.hp.com/go/ssm

Service, Support, and Warranty

On-site Warranty and Service (Note 1): Three-years, limited warranty and service offering delivers on-site, next business-day (Note 2) service for parts and labor and includes free telephone support (Note 3) 8am - 5pm. Global coverage (Note 2) 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.

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.

Product Change Notification

- Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.
- PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.
- Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.

Stable & Consistent Offerings

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 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.

HP Stable & Consistent Offerings are available worldwide to all HP Workstation customers-no special programs, no additional cost-no kidding. Simply select your hardware 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	Intel® Xeon® W-2223 3.6 2666 4C CPU Intel® Xeon® W-2225 4.1 2933 4C CPU Intel® Xeon® W-2245 3.9 2933 8C CPU
Hard Drives	1TB SATA 7200RPM Ent 3.5" HDD 1TB HP Z Turbo M.2 TLC 4R Kit SSD
Graphics	N/A

Technical Specifications - Processors

Name	Cores	Clock Speed (GHz)	Cache (MB)	Memory Speed (MT/s)	ECC memory support	Max memory support	Hyper-Threading	Featuring Intel® vPro™ Technology	Intel® Turbo Boost Technology 2.0 (GHz)[1]	Intel® Turbo Boost Max Technology 3.0 (GHz)[1]	TDP (W)
Intel® Xeon® W Processors											
Intel® Xeon® W-2295 processor	18	3.0	24.75	2933	YES	512GB	YES	YES	3.8, 4.6	4.8	165
Intel® Xeon® W-2275 processor	14	3.3	19.25	2933	YES	512GB	YES	YES	4.1, 4.6	4.8	165
Intel® Xeon® W-2265 processor	12	3.5	19.25	2933	YES	512GB	YES	YES	4.3, 4.6	4.8	165
Intel® Xeon® W-2255 processor	10	3.7	19.25	2933	YES	512GB	YES	YES	4.3, 4.5	4.7	165
Intel® Xeon® W-2245 processor	8	3.9	16.5	2933	YES	512GB	YES	YES	4.5, 4.5	4.7	155
Intel® Xeon® W-2235 processor	6	3.8	8.25	2933	YES	512GB	YES	YES	4.3, 4.6	N/A	130
Intel® Xeon® W-2225 processor	4	4.1	8.25	2933	YES	512GB	YES	YES	4.5, 4.6	N/A	105
Intel® Xeon® W-2223 processor	4	3.6	8.25	2666	YES	512GB	YES	YES	3.7, 3.9	N/A	120

[1]Intel Turbo Boost Max Technology 3.0 identifies the best performing core(s) on a processor and provides increased performance on those cores by taking advantage of power and thermal headroom. Intel® Turbo Boost Max Technology 3.0 frequency is the clock frequency of the CPU when running in this mode.

NOTE: Processors that do not have certain turbo functionality are denoted as N/A.

Technical Specifications - Hard Drives

STORAGE/HARD DRIVES

SATA Hard Drives for HP Workstations	**1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)**	**Capacity**	1TB	
		Protocol	SATA	
		Form Factor	3.5"	
		Controller	AHCI	
		Reliability (MTBF)	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	
		Physical Size (Height)	1 in; 2.54 cm	
		Physical Size (Width)	4 in; 10.17 cm	
		Media Diameter	3.5 in; 8.9 cm	
		Interface	Serial ATA (6Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
		Buffer	128MB	
		Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.32ms*
			Average	7.45ms*
			Full Stroke	14.2ms*
		Operating Temperature	41° to 140° F (5° to 60° C)	
		Performance	**Sequential Read**	up to 226MB/s*
			Sequential Write	up to 226MB/s*
		Enterprise Class Features	High Reliability	

*Actual performance may vary.

Technical Specifications - Hard Drives

2TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	2TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability (MTBF)	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	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.48ms*
		Average	7.7ms*
		Full Stroke	14.2ms*
	Operating Temperature	41° to 140° F (5° to 60° C)	
	Performance	**Sequential Read**	up to 226MB/s*
		Sequential Write	up to 226MB/s*
	Enterprise Class Features	High Reliability	

*Actual performance may vary.

4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	**Capacity**	4TB	
	Height	0.275 in; 0.7 cm	
	Width	**Media Diameter**	2.5 in; 6.36 cm
		Physical Size	2.75 in; 6.99 cm
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	**Single Track**	0.7ms*
		Average	8.5ms*
		Full Stroke	15.7ms*
	Rotational Speed	7,200 rpm	
	Operating Temperature	32° to 140° F (0° to 60° C)	

*Actual performance may vary.

Technical Specifications - Hard Drives

SATA SSDs for HP Workstations	**HP 256GB SATA 6Gb/s SSD**	**Capacity**	256GB	
		Protocol	SATA	
		Form Factor	2.5"	
		Controller	AHCI	
		NAND Type	3D TLC	
		Endurance	192TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Physical Size (Height)	0.28 in; 0.7 cm	
		Physical Size (Width)	2.5 in; 6.36 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	530MB/s (max)*
			Sequential Write	500MB/s (max)*
			Random Read	55K IOPS (max)*
			Random Write	83K IOPS (max)*
		*Actual performance may vary.		
	HP 512GB SATA 6Gb/s SSD	**Capacity**	512GB	
		Protocol	SATA	
		Form Factor	2.5"	
		Controller	AHCI	
		NAND Type	3D TLC	
		Endurance	388TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Physical Size (Height)	0.28 in; 0.7 cm	
		Physical Size (Width)	2.5 in; 6.36 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	530 MB/s*
			Sequential Write	500 MB/s*
			Random Read	95K IOPS*
			Random Write	83K IOPS*
		*Actual performance may vary.		

Technical Specifications - Hard Drives

HP 1TB SATA 6Gb/s SSD	**Capacity**	1TB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	530 MB/s*
		Sequential Write	500 MB/s*
		Random Read	95K IOPS*
		Random Write	83K IOPS*
	*Actual performance may vary.		
HP 1920GB SATA 6Gb/s SSD	**Capacity**	1920GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	4,400TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s (Sequential Read)*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	5340MB/s*
		Sequential Write	460 MB/s*
		Random Read	93K IOPS*
		Random Write	74K IOPS*
	Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	
	*Actual performance may vary.		

Technical Specifications - Hard Drives

HP Enterprise Class 240GB SATA SSD	**Capacity**	240GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	2,190TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	540 MB/s*
		Sequential Write	310 MB/s*
		Random Read	93K IOPS*
		Random Write	48K IOPS*
	Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	
	*Actual performance may vary.		
HP Enterprise Class 480GB SATA SSD	**Capacity**	480GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	4,380TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	540 MB/s*
		Sequential Write	460 MB/s*
		Random Read	93K IOPS*
		Random Write	74K IOPS*
	Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	
	*Actual performance may vary.		
	Capacity	960GB	

Technical Specifications - Hard Drives

HP Enterprise Class 960GB SATA SSD	**Protocol**	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Endurance	8,760TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s*	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	540 MB/s*
		Sequential Write	460 MB/s*
		Random Read	93K IOPS*
		Random Write	74K IOPS*
	Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	

*Actual performance may vary.

Technical Specifications - Hard Drives

Performance PCIe SSDs for HP Workstations	**HP Z Turbo Drive G2 256GB TLC SSD and 256GB SED TLC SSD**	**Capacity**	256GB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		Endurance	200TB	
		Reliability (MTBF)	1.5M hours	
		Interface	M.2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, D5	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	3400 MB/s*
			Sequential Write	2500 MB/s*
			Random Read	500K IOPS*
			Random Write	440K IOPS*
		*Actual performance may vary.		
	HP Z Turbo Drive G2 512GB TLC SSD and 512GB SED TLC SSD	**Capacity**	512GB	
		Protocol	PCIe	
		Form Factor	M.2	
		Controller	NVMe	
		NAND Type	3D TLC	
		SED Support	Opal 2	
		Endurance	300TBW (TB Written)	
		Reliability (MTBF)	1.5M hours	
		Interface	M.2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, D5	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	3500 MB/s*
			Sequential Write	2900 MB/s*
			Random Read	460 K IOPS*
			Random Write	500K IOPS*
		*Actual performance may vary.		

Technical Specifications - Hard Drives

HP Z Turbo Drive G2 1TB TLC SSD	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	M.2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, D5	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	3000 MB/s*
		Random Read	580K IOPS*
		Random Write	500K IOPS*
	*Actual performance may vary.		
HP Z Turbo Drive G2 2TB TLC SSD	**Capacity**	2TB	
	Protocol	PCIe	
	Form Factor	M.2	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	M.2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, D5	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	3000 MB/s *
		Random Read	600K IOPS*
		Random Write	500K IOPS*
	*Actual performance may vary.		

Technical Specifications - Hard Drives

HP Z Turbo Drive Dual Pro 512GB SSD	**Capacity**	512GB (one M.2 PCIe NVMe module)	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x8 electrical x8 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	2900 MB/s*
		Random Read	460 K IOPS*
		Random Write	500K IOPS*
	*Actual performance may vary.		
HP Z Turbo Drive Dual Pro 1TB SSD	**Capacity**	1TB (one M.2 PCIe NVMe module)	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x8 electrical x8 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	3000 MB/s*
		Random Read	580K IOPS*
		Random Write	500K IOPS*
	*Actual performance may vary.		
HP Z Turbo Drive Dual Pro 2TB SSD	**Capacity**	2TB (one M.2 PCIe NVMe module)	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	500TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x8 electrical x8 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3500 MB/s*
		Sequential Write	3000 MB/s *
		Random Read	600K IOPS*
		Random Write	500K IOPS*
	*Actual performance may vary.		

GRAPHICS

NVIDIA® Quadro® P400 2GB Graphics	**Form Factor**	Dimensions: 2.713" H x 5.7" L Single Slot, Low Profile Weight: 129 grams
	Graphics Controller	NVIDIA® Quadro® P400 Graphics Card GPU: 256 CUDA cores Power: 30 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 64-bit Memory Bandwidth: 32 GB/s
	Connectors	3mDP 1.4 Outputs*
	Maximum Resolution	DisplayPort™ 1.4: - up to 3x 4096 x 2160 x 24 bpp @ 60Hz - up to 1x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	3 mDP 1.4 Connectors
	Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
	Available Graphics Drivers	Microsoft Windows 10 Linux® HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	*P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports. Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit:Two mDP-to-DP Adapters included Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories: - 2MY05AA - HP miniDP-to-DP Adapter Cables - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Technical Specifications - Graphics

NVIDIA® T400 2GB Graphics	**Form Factor**	Dimensions: 2.713" H x 6.137" L Single Slot, Low Profile Weight: 124g
	Graphics Controller	NVIDIA® T400 Graphics Card GPU: 384 CUDA cores Power: 30 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 2 GB GDDR6 Memory Interface: 64-bit Memory Bandwidth: 80 GB/s
	Connectors	3x mDP
	Maximum Resolution	3x 5120 x 2880 x 24 bpp @ 60Hz
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA, OpenCL 1.x
	Available Graphics Drivers	Windows 10 Linux HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® Quadro® P1000 4GB Graphics	**Form Factor**	Dimensions:2.713" H x 5.7" L Single Slot, Low Profile Weight: 129 grams
	Graphics Controller	NVIDIA® Quadro® P1000 Graphics Card GPU: 640 CUDA cores Power: 47 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4 GB GDDR5, 2500 MHz Memory Interface: 128-bit memory interface Memory Bandwidth: 80 GB/s memory bandwidth
	Connectors	4mDP 1.4 Outputs*
	Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	Image Quality Features	10-bit internal display processing pipeline 10-bit scan-out support
	Display Output	4 mDP 1.4 Connectors
	Shading Architecture	Full Microsoft DirectX 12 Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes:

Technical Specifications - Graphics

	CUDA C, CUDA C++, DirectCompute , OpenCL
Available Graphics Drivers	Microsoft Windows 10 Linux®
	HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	*P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports.
	Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit:Two mDP-to-DP Adapters included
	Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories: - 2MY05AA - HP miniDP-to-DP Adapter Cables - 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables

Technical Specifications - Graphics

NVIDIA® T1000 4GB Graphics	**Form Factor**	Dimensions: 2.713" H x 6.137" L Single Slot Weight: xx
	Graphics Controller	NVIDIA® T1000 Graphics Card Power: 50W Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 4GB GDDR6 Memory Bandwidth: Up to 160 GB/s Memory Width: 128-bit
	Connectors	4x mini DisplayPort™ 1.4a
	Maximum Resolution	7680 x 4320 @ 120Hz
	Display Output	Maximum number of displays: 4 displays
	Architecture	NVIDIA® Turing™
	Supported Graphics APIs	xx
	Available Graphics Drivers	Microsoft Windows 10 Windows 8.1 Microsoft Windows 7 Professional 64bit Linux® - Full OpenGL® implementation, complete with NVIDIA® Quadro® and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® Quadro® P2200 5GB Graphics	**Form Factor**	Dimensions: 4.4"H x 7.9"L Single Slot Weight: 260 grams
	Graphics Controller	NVIDIA® Quadro® P2200 Graphics Card Power: 75 Watts Cooling: Active
	Bus Type	PCI Express 3.0 x16
	Memory	Size: 5GB GDDR5x Memory Bandwidth: 200 GB/s Memory Width: 160-bit
	Connectors	4x DisplayPort™ 1.4 Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included Additional DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - up to 4x 4096 x 2160 x 24 bpp @ 120Hz - supports High Bit Rate 3 (HBR3) and Multi-Stream Transport (MST) HDMI 2.0 (requires DP to HDMI adapter):

Technical Specifications - Graphics

		- up to 4096 x 2160 x 24 bpp @ 60Hz
	Image Quality Features	12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection) Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, NVIDIA® Mosaic and nView.
	Display Output	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available outputs is 4
	Shading Architecture	Shader Model 5.1
	Supported Graphics APIs	OpenGL® 4.6 DirectX® 12.0 Vulkan 1.1 API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran software
	Available Graphics Drivers	Microsoft Windows 10 Linux® - Full OpenGL® implementation, complete with NVIDIA® Quadro® and ARB extensions HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. Quadro P2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately. 2. Quadro P2000 offered as an After Market Option does not include video cables. Video cable adapters must be ordered separately.
NVIDIA® RTX A2000 6GB Graphics	**Form Factor**	Dimensions: 2.713" H x 6.6" L Dual slot, half-height Weight: 295 grams (without extender)
	Graphics Controller	NVIDIA® RTX A2000 Graphics Card Power: 70W Cooling: Active
	Bus Type	PCI Express 4.0 x16
	Memory	Size: 6GB GDDR6 Memory Bandwidth: Up to 288 GB/s Memory Width: 192-bit
	Connectors	4x mini-DisplayPort™ 1.4a
	Maximum Resolution	Up to 4x 5120 x 2880 x 24bpp @ 60Hz
	Architecture	NVIDIA® Ampere™
	Supported Graphics APIs	CUDA, OpenCL™ 1.x

Technical Specifications - Graphics

	Available Graphics Drivers	Microsoft Windows 11 Microsoft Windows 10 Linux® 64-bit (selected Enterprise distributions) HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1. RTX A2000 offered as Factory Configured Option does not include a video cable adapter. Video cable adapters must be ordered separately as AMO: a. 2MY05AA - HP Single miniDP-to-DP Adapter Cable b. 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables Two mDP-to-DP adapters are included with the RTX A2000 when it is ordered as an AMO kit.
NVIDIA® Quadro® RTX 4000 8GB Graphics	**Form Factor**	Full-Height Single Slot (4.4” Height x 9.5” Length) Weight: 550 grams / 1.21 lbs
	Graphics Controller	NVIDIA® Quadro® RTX 4000 Graphics GPU: 2304 NVIDIA® CUDA® Parallel Processing Cores Power: 160 Watts (125W graphics + 35W USB-C® PD) Cooling: Active
	Memory	8GB GDDR6 Memory Bandwidth: Up to 416 GB/s Memory Width: 256-bit
	Connectors	3x DisplayPort™ 1.4 and 1x VirtualLink Quadro Sync connector (compatible with Quadro II Sync) One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4: - up to 2x 7680 x 4320 x 24 bpp @ 60Hz with DSC or 2 cable solution[2] - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - up to 4x 3840 x 2160 x 24 bpp @ 120Hz - supports High Bit Rate 3 (HBR3) and Multi-Stream Transport (MST) HDMI 2.0 (requires DP to HDMI adapter): - up to 4096 x 2160 x 24 bpp @ 60Hz
	Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™, and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA® Mosaic and nView

Technical Specifications - Graphics

	Display Outputs[1]	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available outputs is 4
	Supported Graphics APIs	DirectX®12, OpenGL® 4.6, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
	Notes	1- Supports up to a total of 4 displays 2- Display must be capable of DSC or 2-cabled solution to obtain this resolution
NVIDIA® RTX A4000 16GB Graphics	**Form Factor**	Full-Height Single Slot (4.4” Height x 9.5” Length)
	Graphics Controller	NVIDIA® RTX A4000 Graphics GPU: 6144 NVIDIA® CUDA® Parallel Processing Cores Power: 140 Watts Cooling: Active
	Memory	16GB GDDR6 memory Memory Bandwidth: Up to 448 GB/s Memory Width: 256 bit
	Connectors	4x DP One 6-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	7680x4320 @ 60Hz
	Display Outputs[1]	4x DP
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran

Technical Specifications - Graphics

	Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® RTX A4500 20GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4” Height x 10.5” Length)
	Graphics Controller	NVIDIA® RTX A4500 Graphics GPU: 7168 NVIDIA® CUDA® Parallel Processing Cores Power: 200 Watts Cooling: Active
	Memory	20GB GDDR6 memory Memory Bandwidth: Up to 640 GB/s Memory Width: 320 bit
	Connectors	4x DP One 8-pin auxiliary power connector Factory configured option: No video cable adapter included with card. After market option Kit: No video cable adaptor included with card. DVI to VGA, DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories.
	Maximum Resolution	7680x4320 @ 60Hz
	Display Outputs[1]	4x DP
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows 11 Windows 10 Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® Quadro® RTX 5000 16GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4” Height x 10.5” Length) Weight: 975 grams + 75 grams extender

Technical Specifications - Graphics

Graphics Controller	NVIDIA® QUADRO® RTX 5000 GPU: 3072 CUDA cores, 384 Tensor Cores, 48 RT Cores Power: 265 Watts (230W graphics + 35W USB-C® PD) Cooling: Active
Memory	16GB GDDR6 Memory Bandwidth: Up to 448 GB/s ECC Memory (disabled by default)
Connectors	4x DisplayPort™ 1.4 with HDR support and 1x VirtualLink 1x 8-pin and 1x 6-pin auxiliary power connectors 1x NVLink Quadro Sync connector (compatible with Quadro II Sync) 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
Maximum Resolution	DisplayPort™ 1.4: - up to 2x 7680 x 4320 x 24 bpp @ 60Hz with DSC or 2 cable solution[2] - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - up to 4x 4096 x 2160 x 24 bpp @ 120Hz - supports High Bit Rate 3 (HBR3) and Multi-Stream Transport (MST) HDMI 2.0 (requires DP to HDMI adapter): - up to 4096 x 2160 x 24 bpp @ 60Hz
Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
Display Outputs	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available outputs is 4
GPU Architecture	NVIDIA® Turing
Supported Graphics APIs	DirectX®12, OpenGL® 4.6 Developer API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL™, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit

		HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured (Z4/Z6/Z8 G4 Workstation): No adapters included After market option kit: No adapters included
NVIDIA® RTX A5000 24GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4” Height x 10.5” Length) Weight: 1049 grams + 80 grams extender
	Graphics Controller	NVIDIA® RTX A5000 GPU: 8192 CUDA Cores Power: 230W Cooling: Active
	Memory	24GB GDDR6 Memory Bandwidth: Up to 768GB/s ECC Memory (disabled by default)
	Connectors	DP (x4) with HDR support One 8-pin auxiliary power connector After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4a: 7680x4320 @ 120Hz
	Display Outputs	4x DP1.4a HDR2 outputs (up to 7680x4320 @ 120Hz)
	GPU Architecture	NVIDIA® Ampere™
	Supported Graphics APIs	DirectX®12, OpenGL® 4.5 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran
	Available Graphics Drivers	Windows® 10 64-bit Windows® 7 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured (Z4/Z6/Z8 G4 Workstation): No adapters included After market option kit: No adapters included

Technical Specifications - Graphics

NVIDIA® Quadro® RTX 6000 24GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 995 grams + 75 grams extender
	Graphics Controller	NVIDIA® QUADRO® RTX 6000 GPU: 4608 CUDA Cores, 576 Tensor Cores, 72 RT Cores Power: 295 Watts (260W graphics + 35W USB-C® PD) Cooling: Active
	Memory	24GB GDDR6 Memory Bandwidth: Up to 672 GB/s ECC Memory (disabled by default)
	Connectors	4x DisplayPort™ 1.4 with HDR support and 1x VirtualLink 1x 8-pin and 1x 6-pin auxiliary power connectors 1x NVLink Quadro Sync connector (compatible with Quadro II Sync) 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI (single-link and dual-link), and DisplayPort™ to HDMI adapters available as accessories.
	Maximum Resolution	DisplayPort™ 1.4: - up to 2x 7680 x 4320 x 24 bpp @ 60Hz with DSC or 2 cable solution[2] - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - up to 4x 4096 x 2160 x 24 bpp @ 120Hz - supports High Bit Rate 3 (HBR3) and Multi-Stream Transport (MST) HDMI 2.0 (requires DP to HDMI adapter): - up to 4096 x 2160 x 24 bpp @ 60Hz
	Image Quality Features	HDR support over DisplayPort™ 1.4 (SMPTE 2084/2086, BT. 2020) (4K @ 60 Hz 10b/12b HEVC Decode, 4K @ 60 Hz 10b HEVC Encode) HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA 3D Vision™ technology NVIDIA Mosaic and nView Desktop Management
	Display Outputs	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available outputs is 4
	GPU Architecture	NVIDIA® Turing
	Supported Graphics APIs	DirectX®12, OpenGL® 4.6 Developer API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL™, Java, Python, and Fortran

Technical Specifications - Graphics

Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html Factory Configured (Z4/Z6/Z8 G4 Workstation): No adapters included After market option kit: No adapters included

Technical Specifications - Graphics

NVIDIA® RTX™ A6000 48GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1230 grams / 2.71 lbs (with extender)
	Graphics Controller	NVIDIA® RTX™ A6000 Graphics GPU: 10752 NVIDIA® CUDA® Parallel Processing Cores Power: 300 Watts Cooling: Active
	Memory	48GB GDDR6 memory ECC optional Memory Bandwidth: Up to 768 GB/s Memory Width: 384 bit
	Connectors	4x DP 1.4a Quadro Sync II connector Ampere NVLink® Stereo Sync Requires 8-pin CPU auxiliary power
	Maximum Resolution	5120x2880 @ 60Hz (up to 4 displays)
	Display Outputs	4x DP 1.4 (7680x4320 @ 60Hz)
	Supported Graphics APIs	DirectX®12, OpenGL® 4.6, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute 5.0, OpenCL™, Java, Python, and Fortran™
	Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
NVIDIA® Quadro® RTX 8000 48GB Graphics	**Form Factor**	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1070 grams / 2.35 lbs
	Graphics Controller	NVIDIA® Quadro® RTX 8000 Graphics GPU: 4608 CUDA Cores, 576 Tensor Cores, 72 RT Cores Power: 295 Watts Cooling: Active
	Memory	48GB GDDR6 memory Memory Bandwidth: Up to 672 GB/s Memory Width: 384-bit

Technical Specifications - Graphics

Connectors	4x DisplayPort™ 1.4 with HDR support and 1x VirtualLink 1x 8-pin and 1x 6-pin auxiliary power connectors 1x NVLink Quadro Sync connector (compatible with Quadro II Sync) 3-pin mini-DIN connector via optional bracket 4-pin header for stereo signal After market option Kit: no power adapter included with card. DisplayPort™ to VGA, DisplayPort™ to DVI and DisplayPort™ to HDMI adapters available as accessories.
Maximum Resolution	DisplayPort™ 1.4: - up to 2x 7680 x 4320 x 24 bpp @ 60Hz with DSC or 2 cable solution[2] - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - up to 4x 4096 x 2160 x 24 bpp @ 120Hz - supports High Bit Rate 3 (HBR3) and Multi-Stream Transport (MST) HDMI 2.0 (requires DP to HDMI adapter): - up to 4096 x 2160 x 24 bpp @ 60Hz
Image Quality Features	Advanced support for 8-bit, 10-bit, and 12-bit per RGB color component. HDCP 2.2 support over DisplayPort™ and HDMI connectors NVIDIA® 3D Vision™ and other 3D stereo technologies NVIDIA® Mosaic and nView
Display Outputs[1]	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available outputs is 4
Supported Graphics APIs	DirectX®12, OpenGL® 4.6, OpenCL™ 1.0, Vulkan™ 1.0 Developer API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL™, Java, Python, and Fortran
Available Graphics Drivers	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: http://welcome.hp.com/country/us/en/support.html
Notes	1- Supports up to a total of 4 displays

NETWORKING AND COMMUNICATIONS

Integrated Intel I219 PCIe GbE Controller	**Connector**	RJ-45
	Controller	Intel I219 GbE platform LAN connect networking controller
	Data Rates Supported	10/100/1000 Mbps
	Boot ROM Support	PXE, UEFI, iSCSI Boot
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Amber = 100Mbps • Green = 1000Mbps
	Management Capabilities	Wake-On-LAN, Intel ® Active Management Technology™ (AMT) 11.12
Integrated Marvell AQC-107	**Connector**	RJ-45
	Controller	Marvell AQtion AQC-107
	Data Rates Supported	10/100/1000 Mbps, 2.5/5/10 Gbps
	Boot ROM Support	PXE, UEFI
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Amber = < 10 Gbps • Green = 10Gbps
	Management Capabilities	Wake-On-LAN
Intel® I210-T1	**Networking Interface**	RJ-45
	System Interface	PCI Express 2.1 x1
	Networking Speeds Supported	10Mbps, 100Mbps, 1Gbps
	Cabling (up to 100m)	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	Power Consumption (active-typical)	0.81W
	Physical Dimensions	Length: 6.7cm (2.64 inches) (Bracket) Width: 1.8cm (0.709 inches) Full-height end bracket: 12.07cm (4.755 inches) Low-profile end bracket: 8cm (3.15 inches)

Technical Specifications - Networking and Communications

	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = 10Mbps • Green = 100Mbps • Amber = 1Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003
Intel® X550-T2	**Networking Interface**	2 x RJ-45
	System Interface	PCI Express 3 x4
	Networking Speeds Supported	100Mbps, 1Gbps, 2.5Gbps, 5Gbps, 10Gbps
	Cabling (up to 100m)	Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps, 2.5Gbps, or 5Gbps Cat6a (or higher) for 10Gbps
	Power Consumption (active-typical)	3.9W at 100Mbps 5.5W at 1Gbps 11.2W at 10Gbps
	Physical Dimensions	5.2 in x 2.7 in (without bracket)
	Connect Speed LED Indicators	Link/Activity LED • Off = No link • Blinking = Activity Speed LED • Off = No link • Amber = <10Gbps • Green = 10Gbps
	Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
	Hardware Certifications	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

Technical Specifications - Networking and Communications

Allied Telesis AT-2914SX/LC-901 1GB LC Fiber NIC	**Networking Interface**	1Gb LC Fiber 850 nm
	System Interface	PCIeG2 x1, Half Height, Half Length
	Networking Speeds Supported	1000Base-X (1Gbps)
	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
	Power Consumption (active-typical)	1.5 Watts
	Physical Dimensions	8.8 cm x 6.9 cm (3.5 in x 2.7 in)
	Connect Speed LED Indicators	ON: 1Gbps Link OFF: Link down
	Operating Temperature	-25°C to 70°C (-13°F to 158°F)
	Hardware Certifications	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

Date of change:	Version History:		Description of change:
December 17, 2020	From v1 to v2	Changed	Storage / Hard Drives and Graphics sections
February 1, 2021	From v2 to v3	Changed	Processors and NETWORKING AND COMMUNICATIONS sections
March 1, 2021	From v3 to v4	Changed	Overview and Other Hardware sections
April 13, 2021	From v4 to v5	Changed	Racking and Physical Security sections
April 21, 2021	From v5 to v6	Changed	Format page 2 and 3
June 1, 2021	From v6 to v7	Changed	Graphics section
September 1, 2021	From v7 to v8	Changed	Graphics section
December 3, 2021	From v8 to v9	Changed	SOFTWARE AND SECURITY section
February 1, 2022	From v9 to v10	Changed	Operating Systems, Graphics, Application Software and Input Devices sections
March 1, 2022	From v10 to v11	Changed	Social and Environmental Responsibility section