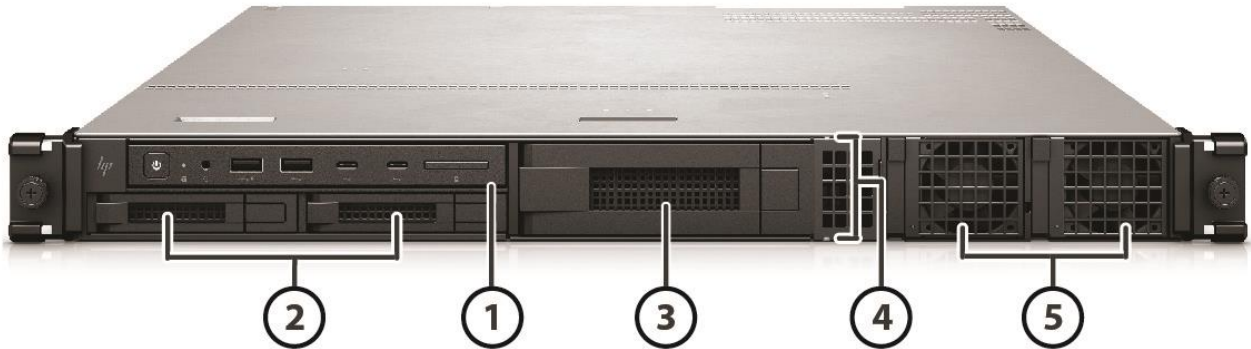


### Overview

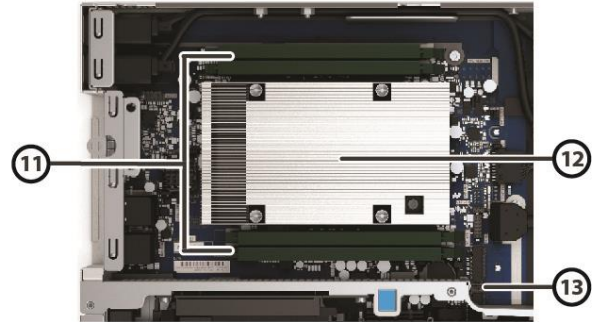
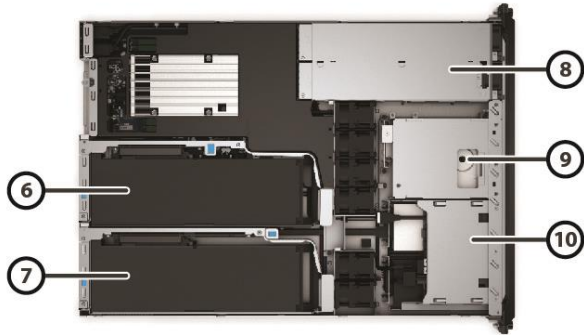
### HP ZCentral 4R Workstation



### Front view

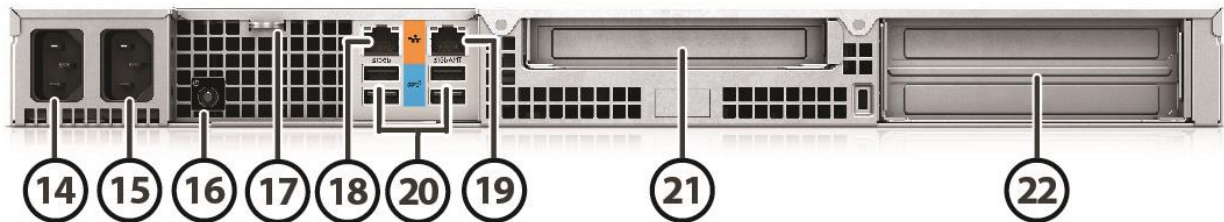
1. Front I/O module options
  - Premium (optional - shown here): power button, 2 USB 3.1 G1 Type-A, 2 USB 3.1 G2 Type-C®, Headset audio, (Left-most Type-A port has charging capability), Smart Card not supported
  - Standard (optional): power button, 4 USB 3.1 G1 Type-A (left-most Type-A port has charging 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                                    | 11. Four DIMM slots; DDR4- 2933 ECC Reg RAM |
| 7. Dual Slot Riser (1 PCIe G3 x16; 1 PCIe G3 x16 wired as x8); includes an additional dual 6+2 auxiliary power cable | 12. Intel® Xeon® Processors: W-2200 family  |
| 8. Power supply bays   | 13. Two PCIe G3 x4 M.2 for SSDs             |
| 9. 3.5" drive bay  |   |
| 10. Two 2.5" drive bays  |   |



### Rear view

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

### Overview

---

## Overview

### Form Factor Operating Systems

1U Rackable Workstation

Preinstalled:

- Windows 10 Pro 64 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](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 10 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>.

\*\*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](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) <sup>1</sup>	Intel® Turbo Boost Max Technology 3.0 (GHz) <sup>1</sup>	TDP (W)
<b>Intel® Xeon® W Processors</b>											
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-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

<sup>1</sup>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

TBD

#### 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)

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

### Supported Components

<b>Humidity</b>	No direct sustained sunlight 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
<b>Maximum Altitude (non-pressurized)</b>	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.
<b>Power Supply</b>	<p><b>ENTRY</b> Contains one (1) PSU 675W power supply. The ZCentral 4R 675W power supply efficiency report can be found at this link: <a href="#">TBD</a></p> <p><b>ENTRY REDUNDANT</b> Contains two (2) 675W PSUs operating in redundant mode for a maximum system power of 675W. The ZCentral 4R 675W power supply efficiency report can be found at this link: <a href="#">TBD</a></p> <p><b>HIGH-END</b> Contains two (2) 675W PSUs operating in aggregate mode for a total system power of 1350W (2x675W). The ZCentral 4R two 675W (1350W) aggregate power supply efficiency report can be found at this link: <a href="#">TBD</a></p>

**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
<b>Intel® Xeon® W-Series CPU</b>				
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-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
<b>SATA (Serial ATA) Hard Drives for HP Workstations</b>				
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

SATA Solid State Drives	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
<b>HP Solid State Drives (SSDs) for Workstations</b>				
HP 1TB SATA SSD	Y	Y	F3C96AA/AT	
HP 2TB SATA SSD	N	Y	Y6P08AT	
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 256GB SATA SED OPAL2 SSD	Y	Y	G7U67AA	
HP 512GB SATA SED OPAL2 SSD	Y	Y	N8T26AA	

#### PCIe Solid State Drives

PCIe Solid State Drives	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
<b>HP Z Turbo Drive Dual Pro</b>				
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	

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

### Supported Components

**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	
<b>Entry 3D</b>				
NVIDIA® Quadro® P400 2GB Graphics	Y	Y	1ME43AA	1
<b>Mid-range 3D</b>				
NVIDIA® Quadro® P1000 4GB Graphics	Y	Y	1ME01AA	1
NVIDIA® Quadro® P2200 5GB Graphics	Y	Y	6YT67AA	1
<b>High-End 3D</b>				
NVIDIA® Quadro® RTX 4000 8GB Graphics	Y	Y	5JV89AA	1, 2, 3
<b>Ultra High-End 3D</b>				
NVIDIA® Quadro® RTX 5000 16GB Graphics	Y	Y	5JH81AA	1, 2, 3
NVIDIA® Quadro® RTX 6000 24GB Graphics	Y	Y	5JH80AA	1, 2, 3
NVIDIA® Quadro® RTX 8000 48GB Graphics	Y	Y	6NB51AA	1, 2, 3

**NOTE 1:** Dual graphics configuration requires addition of Dual Slot Riser and High End Chassis with 1350W PSU;

**NOTE 2:** Requires addition of Dual Slot Riser and High End Chassis with 1350W PSU.

**NOTE 3:** Single Slot Riser includes single 6+2 pin auxiliary power cable. Dual Slot riser includes an additional dual 6+2 pin auxiliary power cable



### 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	

#### 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	

#### 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 2 <sup>nd</sup> 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" 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

#### Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP ZCentral Remote Boost	Y	N		2
HP Sure Start Gen6	Y	N		7
HP Sure Sense	Y	N		3
HP Sure Click	Y	N		4
HP PC Hardware Diagnostics UEFI	Y	N		
HP PC Hardware Diagnostics Windows	Y	N		
HP Performance Advisor	Y	N		8
HP Client Security Manager Gen5	N	Y		6
HP Manageability Integration Kit Gen4	N	Y		5
Sobey Video Editing SW	N	Y		1

**NOTE 1:** China Only

**NOTE 2:** HP ZCentral Remote Boost does not come preinstalled on Z Workstations but can be downloaded and run on all Z desktop and laptops without license purchase. 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. RGS requires Windows, RHEL (7 or 8), UBUNTU 18.04 LTS, or HP ThinPro 7 operating systems. MacOS (10.13 or newer) operating system is only supported on the receiver side. Requires network access. The software is available for download at [hp.com/ZCentralRemoteBoost](http://hp.com/ZCentralRemoteBoost).

**NOTE 3:** HP Sure Sense requires Windows 10 Pro or Enterprise. See product specifications for availability.

**NOTE 4:** HP Sure Click requires Windows 10. See [https://bit.ly/2PrLT6A\\_SureClick](https://bit.ly/2PrLT6A_SureClick) for complete details.

**NOTE 5:** HP Manageability Integration Kit can be downloaded from

<http://www.hp.com/go/clientmanagement>.

**NOTE 6:** HP Client Security Manager Gen5 requires Windows and is available on the select HP Elite and Pro PCs.

**NOTE 7:** HP Sure Start Gen6 is available on select HP PCs and requires Windows 10.

**NOTE 8:** 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

Windows 10 Pro 64 for Workstations

#### Support Notes

### Supported Components

Red Hat® Enterprise Linux® Desktop 7.4	1, 2
Red Hat® Enterprise Linux® Desktop 8.0	1, 2
Ubuntu 18.04 LTS	2
Ubuntu 20.04 LTS	2

**NOTE 1:** Paper license with 1 year support

**NOTE 2:** For detailed Linux® OS/hardware support information, see:  
[http://www.hp.com/support/linux\\_hardware\\_matrix](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 Chipset

Single LGA2066 R4  
**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

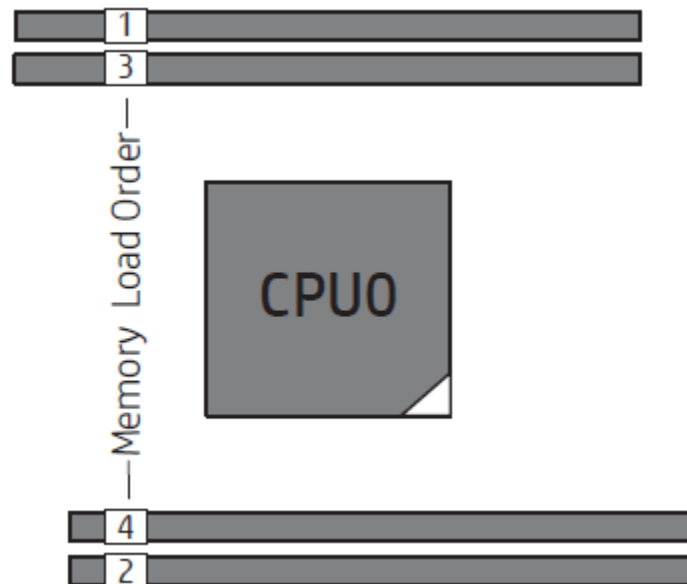
##### Maximum Memory

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

<b>PCI Express Connectors</b>	<b>Slot 1 (SSR*):</b>	PCI Express Gen3 x16 supplied by CPU
	<b>Slot 2 (DSR*):</b>	PCI Express Gen3 x16 supplied by CPU (operates as x8 if Slot 3 is loaded)
	<b>Slot 3 (DSR*):</b>	PCI Express Gen3 x16 (wired as x8) supplied by CPU
	<b>M.2 Slot 1:</b>	PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, 2280-D5-M, 22110-D5-M
	<b>M.2 Slot 2:</b>	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
<b>Supported Drive Interfaces</b>		
<b>SATA</b>		4 SATA @ 6GB/s, supports RAID 0,1, and 10 Factory integrated Intel® SATA RAID is Microsoft Windows only
<b>Serial Attached SCSI</b>		Not supported
<b>Factory Configured RAID</b>		<ul style="list-style-type: none"> <li>• RAID 0 striped array</li> <li>• RAID 1 mirrored array</li> <li>• RAID 10 striped and mirrored array</li> </ul> *HW RAID functionality not supported by Linux®. Use SW RAID functionality provided in the Red Hat® Operating system instead.
<b>Integrated Graphics</b>		No
<b>Network Controller</b>		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
<b>External SATA (eSATA)</b>		No
<b>IDE connector</b>		No
<b>Floppy connector</b>		No
<b>Serial and PS2</b>		1 internal header
<b>2nd Serial</b>		No
<b>Parallel</b>		No
<b>AUX IN (audio)</b>		No
<b>IEEE 1394 Connector(s)</b>		No
<b>USB Connector(s)</b>		
<b>Front</b>		Front USB depends on which FIO module is selected: <ul style="list-style-type: none"> <li>- Standard: 4 USB 3.1 G1 Type A (1 charging)</li> <li>- Premium: 2 USB 3.1 G2 Type C®, 2 USB 3.1 G1 Type A (1 charging)</li> </ul>
<b>Rear</b>		4 USB 3.1 G1 Type A 1 USB 2.0 single-port header 1x USB 2.0 dual-port header
<b>HD Integrated Audio</b>		Realtek ALC3601-CG
<b>Flash ROM</b>		Yes

### System Technical Specifications

<b>Fan Headers</b>	Yes
<b>Front Control Panel/Speaker Header</b>	Yes
<b>CMOS Battery Holder - Lithium</b>	Yes
<b>Integrated Trusted Platform Module</b>	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: <a href="https://trustedcomputinggroup.org/membership/certification/tpm-certified-products/">https://trustedcomputinggroup.org/membership/certification/tpm-certified-products/</a>
<b>Power Supply Headers</b>	Yes
<b>Power Switch, Power LED &amp; Hard Drive LED Header</b>	Yes
<b>Clear Password Jumper</b>	Yes
<b>Serial Port</b>	1 internal header
<b>Parallel Port</b>	No
<b>Keyboard/Mouse</b>	USB (PS/2 supported via AMO kit)
<b>Hood Lock Header</b>	No
<b>Hood Sensor Header</b>	Yes
<b>AUX OUT (audio)</b>	(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: [TBD](#)

**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).

<b>Power Supply</b>	675W 90% Efficient, Custom PSU (Wide-Ranging, Active PFC)	
<b>Operating Voltage Range</b>	90–269 VAC	
<b>Rated Voltage Range</b>	100–240 VAC	118 VAC
<b>Rated Line Frequency</b>	50–60 Hz	400 Hz
<b>Operating Line Frequency Range</b>	47–66 Hz	393–407 Hz
<b>Rated Input Current</b>	9A @100-127 VAC 4.5A @ 200-240 VAC	7A @ 118VAC
<b>Heat Dissipation (Configuration and software dependent)</b>	Typical = TBD btu/hr Max = TBD btu/hr	
<b>Power Supply Fan</b>	40x40 mm variable speed	
<b>ENERGY STAR® Certified (Configuration dependent)</b>	Yes	
<b>80 PLUS® Compliant</b>	90% Efficient The power supply efficiency report can be found at this link: <a href="#">TBD</a>	
<b>FEMP Standby Power Compliant @115V &lt;1W in S5 – Power Off)</b>	Yes, 1 PSU only	N/A
<b>EuP Compliant @ 230V (&lt;0.5 W in S5 – Power Off)</b>	N/A for EMC Class A Equipment	N/A for EMC Class A Equipment
<b>Power Consumption in sleep mode (as defined by ENERGY STAR®) – Suspend to RAM (S3) (Instantly Available PC)</b>	TBD	TBD
<b>Built-in Self Test LED</b>	No	No
<b>Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)</b>	Yes	Yes



### System Technical Specifications

### System Configuration

<b>Example ZCentral 4R Workstation Configuration #1</b>  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					
<b>Energy Consumption</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	45.2		45.3		45.1	
	Windows Busy Typ(S0)	144.8		142.3		140.9	
	Windows Busy Max (S0)	150.7		149.58		148.9	
	Sleep (S3)	5.54	5.32	5.54	5.54	5.32	5.54
	Off (S5)	2.94	2.52	3.13	2.94	2.52	3.13
	Zero Power Mode (ErP)	0.255		0.2584		0.2583	
<b>Heat Dissipation (Btu/hr)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	154.3		154.8		154.0	
	Windows Busy Typ(S0)	494.3		485.7		480.9	
	Windows Busy Max (S0)	514.4		510.3		508.3	
	Sleep (S3)	18.9	18.1	18.9	18.9	18.1	18.9
	Off (S5)	10.6	10.2	10.6	10.6	10.2	10.6
	Zero Power Mode (ErP)	0.870		0.881		0.881	

### System Technical Specifications

<b>Example ZCentral 4R Workstation Configuration #2</b>  <b>ENERGY STAR® Certified</b>	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					
<b>Energy Consumption (Watts)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	53.1		53.3		52.98	
	Windows Busy Typ(S0)	272.9		270.6		267.3	
	Windows Busy Max (S0)	279.4		280.3		279.3	
	Sleep (S3)	5.31	5.37	5.32	5.31	5.37	5.32
	Off (S5)	2.94	2.90	2.94	2.94	2.90	2.94
	Zero Power Mode (ErP)	0.255		0.2584		0.2583	
<b>Heat Dissipation (Btu/hr)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	181.3		182.0		184.3	
	Windows Busy Typ(S0)	931.1		923.4		912.1	
	Windows Busy Max (S0)	953.4		956.5		953.2	
	Sleep (S3)	18.1	18.3	18.1	18.1	18.3	18.1
	Off (S5)	10.0	9.9	10.0	10.0	9.9	10.0
	Zero Power Mode (ErP)	0.870		0.881		0.881	

### System Technical Specifications

<b>Example ZCentral 4R Workstation Configuration #3</b>	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					
<b>Energy Consumption (Watts)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	56.7		57.0		56.7	
	Windows Busy Typ(S0)	335.2		333.2		330.9	
	Windows Busy Max (S0)	345.3		344.8		344.6	
	Sleep (S3)	5.88	5.82	5.88	5.88	5.82	5.88
	Off (S5)	2.94	2.91	2.94	2.94	2.91	2.94
	Zero Power Mode (ErP)	0.255		0.2584		0.2583	
<b>Heat Dissipation (Btu/hr)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	193.6		194.6		193.5	
	Windows Busy Typ(S0)	1143.8		1137.0		1129.2	
	Windows Busy Max (S0)	1178.3		1176.7		1176.0	
	Sleep (S3)	20.07	19.88	20.07	20.07	19.88	20.07
	Off (S5)	10.06	9.94	10.05	10.06	9.94	10.05
	Zero Power Mode (ErP)	0.870		0.881		0.881	

### System Technical Specifications

<b>Example ZCentral 4R Workstation Configuration #4</b>	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					
<b>Energy Consumption (Watts)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
	Windows Idle (S0)	60.4		60.8		60.4	
	Windows Busy Typ(S0)	464.2		458.5		461.4	
	Windows Busy Max (S0)	495.7		487.2		491.2	
	Sleep (S3)	5.89	5.81	5.99	5.89	5.81	5.99
	Off (S5)	2.95	2.91	2.95	2.95	2.91	2.95
	Zero Power Mode (ErP)	0.255		0.2584		0.2583	
<b>Heat Dissipation (Btu/hr)</b>		115 VAC		230 VAC		100 VAC	
		LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
	Windows Idle (S0)	206.3		207.7		206.1	
	Windows Busy Typ(S0)	1583.8		1563.9		1574.4	
	Windows Busy Max (S0)	1691.6		1662.3		1676.0	
	Sleep (S3)	20.10	19.85	20.43	20.10	19.85	20.43
	Off (S5)	10.06	9.95	10.08	10.06	9.95	10.08
	Zero Power Mode (ErP)	0.870		0.881		0.881	

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

<b>Environmental Requirements</b>	<b>Temperature</b>	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
	<b>Humidity</b>	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
	<b>Maximum Altitude</b>	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.
	<b>Shock (non-repetitive)</b>	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
	<b>Vibration</b>	Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025g <sup>2</sup> /Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g <sup>2</sup> /Hz

#### Physical Security and Serviceability

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

### System Technical Specifications

<b>Universal Chassis Clamp Lock Support</b>	No
<b>Chassis Interlock Sensor</b>	Yes Sensor detects when the access panel has been removed. The access panel must be installed for the system to power ON.
<b>Serial, USB, Audio, Network, Enable/Disable Port Control</b>	Yes, enables or disables serial, USB, audio, and network ports
<b>Removable Media Write/Boot Control</b>	Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)
<b>Power-On Password Setup Password</b>	Yes, prevents an unauthorized person from booting up the workstation Yes, prevents an unauthorized person from changing the workstation configuration
<b>3.3V Aux Power LED on System PCA</b>	Yes
<b>NIC LEDs (integrated) (Green &amp; Amber)</b>	Yes
<b>CPUs and Heatsinks</b>	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
<b>Power Supply Diagnostic LED</b>	Yes Solid Green (OK); Blinking Green (Standby); Red (Fault); Off (No AC Power/PSU Failure)
<b>Front Power Button</b>	Yes, ACPI multi-function
<b>Rear Power Button</b>	Yes
<b>System Locator LED</b>	Yes, blue
<b>Front Power LED</b>	Yes, white (normal), red (fault)
<b>Front Hard Drive Activity LED</b>	Yes, white
<b>Internal Speaker</b>	Yes
<b>System/Emergency ROM Flash Recovery</b>	Recovers corrupted system BIOS.
<b>Cooling Solutions</b>	Air cooled forced convection heatsinks
<b>Power Supply Fan</b>	40 mm x 40 mm x 28 mm (non-serviceable)
<b>Chassis Fans</b>	40 mm x 40 mm x 56 mm (serviceable)
<b>HP PC Hardware Diagnostics UEFI</b>	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.
<b>Access Panel Key Lock</b>	No
<b>ACPI-Ready Hardware</b>	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none"> <li>• Allows the system to wake from a low-power mode.</li> <li>• 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</li> </ul>
<b>Trusted Platform Module Chip</b>	Infineon TPM 2.0 Certified
<b>Integrated Chassis Handles</b>	No
<b>Power Supply</b>	Tool-less
<b>PCIe Card Retention</b>	Yes, rear (all), middle (all), front (full-length cards with extender)
<b>Flash ROM</b>	Yes
<b>Diagnostic Power Switch LED on board</b>	Yes

### System Technical Specifications

<b>Clear Password Jumper</b>	Yes
<b>Clear CMOS Button</b>	Yes
<b>CMOS Battery Holder</b>	Yes

### BIOS

<b>BIOS 32-bit Services</b>	Standard BIOS 32-bit Service Directory Proposal v0.4
<b>PCI 3.0 Support</b>	Full BIOS support for PCI Express through industry standard interfaces.
<b>ATAPI</b>	ATAPI Removable Media Device BIOS Specification Version 1.0.
<b>BBS</b>	BIOS Boot Specification v1.01.
<b>WMI Support</b>	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.
<b>BIOS Boot Spec 1.01+</b>	Provides more control over how and from what devices the workstation will boot.
<b>BIOS Power On</b>	Users can define a specific date and time for the system to power on.
<b>ROM Based Computer Setup Utility (F10)</b>	Review and customize system configuration settings controlled by the BIOS.
<b>System/Emergency ROM Flash Recovery with Video</b>	Recovers system BIOS in corrupted Flash ROM.
<b>Replicated Setup</b>	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).
<b>SMBIOS</b>	System Management BIOS 3.2, for system management information.
<b>Boot Control</b>	Disables the ability to boot from removable media on supported devices.
<b>Memory Change Alert</b>	Alerts management console if memory is removed or changed.
<b>Thermal Alert</b>	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> <li>• NORMAL - normal temperature ranges.</li> <li>• ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown.</li> <li>• SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.</li> </ul>
<b>Remote ROM Flash</b>	Provides secure, fail-safe ROM image management from a central network console.
<b>ACPI (Advanced Configuration and Power Management Interface)</b>	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.
<b>Ownership Tag</b>	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
<b>Remote Wakeup/Remote Shutdown</b>	System administrators can power on, restart, and power off a client computer from a remote location.
<b>Instantly Available PC (Suspend to RAM - ACPI sleep state S3)</b>	Allows for very low power consumption with quick resume time.
<b>Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)</b>	Allows a new or existing system to boot over the network and download software, including the operating system.
<b>ROM revision levels</b>	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 Technical Specifications

<b>System board revision level</b>	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
<b>Start-up Diagnostics (Power-on Self-Test)</b>	Assesses system health at boot time with selectable levels of testing.
<b>Auto Setup when new hardware installed</b>	System automatically detects addition of new hardware.
<b>Keyboard-less Operation</b>	The system can be booted without a keyboard.
<b>Localized ROM Setup</b>	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 14 languages with local keyboard mappings.
<b>Asset Tag</b>	The user or MIS to set a unique tag string in non-volatile memory.
<b>Per-slot Control</b>	Allows I/O slot parameters (option ROM enable/disable, bus latency) to be configured individually.
<b>Adaptive Cooling</b>	Control parameters are set according to detected hardware configuration for optimal acoustics.
<b>Pre-boot Diagnostics</b>	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
<b>Industry Standard Specification Support</b>	
<b>Industry Standard UEFI Specification Revision</b>	Revision Supported by the BIOS 2.6
<b>ACPI</b>	Advanced Configuration and Power Management Interface, Version 5.0
<b>ATA (IDE)</b>	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
<b>CD Boot</b>	"El Torito" Bootable CD-ROM Format Specification Version 1.0
<b>EDD</b>	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
<b>EHCI</b>	Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0
<b>PCI</b>	PCI Local Bus Specification, Revision 2.3 PCI Power Management Specification, Revision 1.1 PCI Firmware Specification, Revision 3.0, Draft .7
<b>PCI Express</b>	PCI Express Base Specification, Revision 2.0 PCI Express Base Specification, Revision 3.0
<b>PMM</b>	POST Memory Manager Specification, Version 1.01
<b>SATA</b>	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
<b>SPD</b>	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
<b>TPM</b>	Trusted Platform Module (TPM) 2.0 (Infineon SLB 9670) Common Criteria EAL4+ Certified FIPS 140-2 Certified TCG TPM Certified products list: <a href="http://www.trustedcomputinggroup.org/certification/tpm-certified-products/">http://www.trustedcomputinggroup.org/certification/tpm-certified-products/</a>
<b>UHCI</b>	Universal Host Controller Interface Design Guide, Revision 1.1
<b>USB</b>	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
<b>SMBIOS</b>	System Management BIOS Reference Specification, Version 3.2

### System Technical Specifications

## 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](http://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.

### 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

### System Technical Specifications

- 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
- 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) <sup>1</sup>	Intel® Turbo Boost Max Technology 3.0 (GHz) <sup>1</sup>	TDP (W)
<b>Intel® Xeon® W Processors</b>											
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-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

<sup>1</sup>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

<b>SATA Hard Drives for HP Workstations</b>	<b>1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)</b>	<b>Capacity</b>	1TB
		<b>Protocol</b>	SATA
		<b>Form Factor</b>	3.5"
		<b>Controller</b>	AHCI
		<b>Reliability (MTBF)</b>	2.0M hours
		<b>Rated Power On Hours</b>	8760/yr
		<b>Annualized Failure Rate (based on Rated POH)</b>	<0.62%
		<b>Rated for 24/7/365 operation</b>	YES
		<b>Physical Size (Height)</b>	1 in; 2.54 cm
		<b>Physical Size (Width)</b>	4 in; 10.17 cm
		<b>Media Diameter</b>	3.5 in; 8.9 cm
		<b>Interface</b>	Serial ATA (6Gb/s), NCQ enabled
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s*
		<b>Buffer</b>	128MB
		<b>Seek Time (typical reads, includes controller overhead, including settling)</b>	<b>Single Track</b> 0.32ms* <b>Average</b> 7.45ms* <b>Full Stroke</b> 14.2ms*
		<b>Operating Temperature</b>	41° to 140° F (5° to 60° C)
		<b>Performance</b>	<b>Sequential Read</b> up to 226MB/s* <b>Sequential Write</b> up to 226MB/s*
	<b>Enterprise Class Features</b>	High Reliability	

\*Actual performance may vary.



### Technical Specifications - Hard Drives

#### 2TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)

<b>Capacity</b>	2TB						
<b>Protocol</b>	SATA						
<b>Form Factor</b>	3.5"						
<b>Controller</b>	AHCI						
<b>Reliability (MTBF)</b>	2.0M hours						
<b>Rated Power On Hours</b>	8760/yr						
<b>Annualized Failure Rate</b> (based on Rated POH)	<0.62%						
<b>Rated for 24/7/365 operation</b>	YES						
<b>Physical Size (Height)</b>	1 in; 2.54 cm						
<b>Physical Size (Width)</b>	4 in; 10.17 cm						
<b>Media Diameter</b>	3.5 in; 8.9 cm						
<b>Interface</b>	Serial ATA (6Gb/s), NCQ enabled						
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s*						
<b>Buffer</b>	128MB						
<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<table> <tr> <td><b>Single Track</b></td> <td>0.48ms*</td> </tr> <tr> <td><b>Average</b></td> <td>7.7ms*</td> </tr> <tr> <td><b>Full Stroke</b></td> <td>14.2ms*</td> </tr> </table>	<b>Single Track</b>	0.48ms*	<b>Average</b>	7.7ms*	<b>Full Stroke</b>	14.2ms*
<b>Single Track</b>	0.48ms*						
<b>Average</b>	7.7ms*						
<b>Full Stroke</b>	14.2ms*						
<b>Operating Temperature</b>	41° to 140° F (5° to 60° C)						
<b>Performance</b>	<table> <tr> <td><b>Sequential Read</b></td> <td>up to 226MB/s*</td> </tr> <tr> <td><b>Sequential Write</b></td> <td>up to 226MB/s*</td> </tr> </table>	<b>Sequential Read</b>	up to 226MB/s*	<b>Sequential Write</b>	up to 226MB/s*		
<b>Sequential Read</b>	up to 226MB/s*						
<b>Sequential Write</b>	up to 226MB/s*						
<b>Enterprise Class Features</b>	High Reliability						

\*Actual performance may vary.

#### 4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)

<b>Capacity</b>	4TB						
<b>Height</b>	0.275 in; 0.7 cm						
<b>Width</b>	<table> <tr> <td><b>Media Diameter</b></td> <td>2.5 in; 6.36 cm</td> </tr> <tr> <td><b>Physical Size</b></td> <td>2.75 in; 6.99 cm</td> </tr> </table>	<b>Media Diameter</b>	2.5 in; 6.36 cm	<b>Physical Size</b>	2.75 in; 6.99 cm		
<b>Media Diameter</b>	2.5 in; 6.36 cm						
<b>Physical Size</b>	2.75 in; 6.99 cm						
<b>Interface</b>	Serial ATA (6Gb/s), NCQ enabled						
<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s*						
<b>Buffer</b>	128MB						
<b>Seek Time</b> (typical reads, includes controller overhead, including settling)	<table> <tr> <td><b>Single Track</b></td> <td>0.7ms*</td> </tr> <tr> <td><b>Average</b></td> <td>8.5ms*</td> </tr> <tr> <td><b>Full Stroke</b></td> <td>15.7ms*</td> </tr> </table>	<b>Single Track</b>	0.7ms*	<b>Average</b>	8.5ms*	<b>Full Stroke</b>	15.7ms*
<b>Single Track</b>	0.7ms*						
<b>Average</b>	8.5ms*						
<b>Full Stroke</b>	15.7ms*						
<b>Rotational Speed</b>	7,200 rpm						
<b>Operating Temperature</b>	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

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

\*Actual performance may vary.

#### HP 512GB SATA 6Gb/s SSD

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

\*Actual performance may vary.

### Technical Specifications - Hard Drives

<b>HP 1TB SATA 6Gb/s SSD</b>	<b>Capacity</b>	1TB	
	<b>Protocol</b>	SATA	
	<b>Form Factor</b>	2.5"	
	<b>Controller</b>	AHCI	
	<b>NAND Type</b>	3D TLC	
	<b>Endurance</b>	400TBW (TB Written)	
	<b>Reliability (MTTF)</b>	1.5M hours	
	<b>Physical Size (Height)</b>	0.28 in; 0.7 cm	
	<b>Physical Size (Width)</b>	2.5 in; 6.36 cm	
	<b>Interface</b>	SATA 6Gb/s	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 550MB/s (Sequential Read)*	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
	<b>Performance</b>	<b>Sequential Read</b>	530 MB/s*
		<b>Sequential Write</b>	500 MB/s*
<b>Random Read</b>		95K IOPS*	
<b>Random Write</b>		83K IOPS*	

\*Actual performance may vary.

<b>HP 1920GB SATA 6Gb/s SSD</b>	<b>Capacity</b>	1920GB	
	<b>Protocol</b>	SATA	
	<b>Form Factor</b>	2.5"	
	<b>Controller</b>	AHCI	
	<b>NAND Type</b>	3D TLC	
	<b>Endurance</b>	4,400TBW (TB Written)	
	<b>Reliability (MTTF)</b>	2.0M hours	
	<b>Physical Size (Height)</b>	0.28 in; 0.7 cm	
	<b>Physical Size (Width)</b>	2.5 in; 6.36 cm	
	<b>Interface</b>	SATA 6Gb/s	
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s (Sequential Read)*	
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
	<b>Performance</b>	<b>Sequential Read</b>	5340MB/s*
		<b>Sequential Write</b>	460 MB/s*
<b>Random Read</b>		93K IOPS*	
<b>Random Write</b>		74K IOPS*	
<b>Enterprise Class Features</b>	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

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

\*Actual performance may vary.

#### HP Enterprise Class 480GB SATA SSD

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

\*Actual performance may vary.

<b>Capacity</b>	960GB
-----------------	-------

### Technical Specifications - Hard Drives

#### HP Enterprise Class 960GB SATA SSD

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

<b>Capacity</b>	256GB	
<b>Protocol</b>	PCIe	
<b>Form Factor</b>	M.2	
<b>Controller</b>	NVMe	
<b>NAND Type</b>	3D TLC	
<b>Endurance</b>	200TB	
<b>Reliability (MTBF)</b>	1.5M hours	
<b>Interface</b>	M.2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, D5	
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>Performance</b>	<b>Sequential Read</b>	3400 MB/s*
	<b>Sequential Write</b>	2500 MB/s*
	<b>Random Read</b>	500K IOPS*
	<b>Random Write</b>	440K IOPS*

\*Actual performance may vary.

**HP Z Turbo Drive G2  
512GB TLC SSD and  
512GB SED TLC SSD**

<b>Capacity</b>	512GB	
<b>Protocol</b>	PCIe	
<b>Form Factor</b>	M.2	
<b>Controller</b>	NVMe	
<b>NAND Type</b>	3D TLC	
<b>SED Support</b>	Opal 2	
<b>Endurance</b>	300TBW (TB Written)	
<b>Reliability (MTBF)</b>	1.5M hours	
<b>Interface</b>	M.2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, D5	
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>Performance</b>	<b>Sequential Read</b>	3500 MB/s*
	<b>Sequential Write</b>	2900 MB/s*
	<b>Random Read</b>	460 K IOPS*
	<b>Random Write</b>	500K IOPS*

\*Actual performance may vary.

### Technical Specifications - Hard Drives

#### HP Z Turbo Drive G2 1TB TLC SSD

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

\*Actual performance may vary.

#### HP Z Turbo Drive G2 2TB TLC SSD

<b>Capacity</b>	2TB	
<b>Protocol</b>	PCIe	
<b>Form Factor</b>	M.2	
<b>Controller</b>	NVMe	
<b>NAND Type</b>	3D TLC	
<b>Endurance</b>	500TBW (TB Written)	
<b>Reliability (MTBF)</b>	1.5M hours	
<b>Interface</b>	M.2: PCI Express Gen3 x4 supplied by CPU Socket Type 3, Key M, D5	
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>Performance</b>	<b>Sequential Read</b>	3500 MB/s*
	<b>Sequential Write</b>	3000 MB/s *
	<b>Random Read</b>	600K IOPS*
	<b>Random Write</b>	500K IOPS*

\*Actual performance may vary.

### Technical Specifications - Hard Drives

#### HP Z Turbo Drive Dual Pro 512GB SSD

<b>Capacity</b>	512GB (one M.2 PCIe NVMe module)	
<b>Protocol</b>	PCIe	
<b>Form Factor</b>	M.2 in Half-height, half-length card	
<b>Controller</b>	NVMe	
<b>NAND Type</b>	3D TLC	
<b>Endurance</b>	300TBW (TB Written)	
<b>Reliability (MTBF)</b>	1.5M hours	
<b>Interface</b>	PCI Express 3.0 x8 electrical x8 physical	
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>Performance</b>	<b>Sequential Read</b>	3500 MB/s*
	<b>Sequential Write</b>	2900 MB/s*
	<b>Random Read</b>	460 K IOPS*
	<b>Random Write</b>	500K IOPS*

\*Actual performance may vary.

#### HP Z Turbo Drive Dual Pro 1TB SSD

<b>Capacity</b>	1TB (one M.2 PCIe NVMe module)	
<b>Protocol</b>	PCIe	
<b>Form Factor</b>	M.2 in Half-height, half-length card	
<b>Controller</b>	NVMe	
<b>NAND Type</b>	3D TLC	
<b>Endurance</b>	400TBW (TB Written)	
<b>Reliability (MTBF)</b>	1.5M hours	
<b>Interface</b>	PCI Express 3.0 x8 electrical x8 physical	
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>Performance</b>	<b>Sequential Read</b>	3500 MB/s*
	<b>Sequential Write</b>	3000 MB/s*
	<b>Random Read</b>	580K IOPS*
	<b>Random Write</b>	500K IOPS*

\*Actual performance may vary.

#### HP Z Turbo Drive Dual Pro 2TB SSD

<b>Capacity</b>	2TB (one M.2 PCIe NVMe module)	
<b>Protocol</b>	PCIe	
<b>Form Factor</b>	M.2 in Half-height, half-length card	
<b>Controller</b>	NVMe	
<b>NAND Type</b>	3D TLC	
<b>Endurance</b>	500TBW (TB Written)	
<b>Reliability (MTBF)</b>	1.5M hours	
<b>Interface</b>	PCI Express 3.0 x8 electrical x8 physical	
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)	
<b>Performance</b>	<b>Sequential Read</b>	3500 MB/s*
	<b>Sequential Write</b>	3000 MB/s*
	<b>Random Read</b>	600K IOPS*
	<b>Random Write</b>	500K IOPS*

\*Actual performance may vary.



### Technical Specifications - Graphics

#### GRAPHICS

**NVIDIA® Quadro® P400  
2GB Graphics**

<b>Form Factor</b>	Dimensions: 2.713” H x 5.7” L Single Slot, Low Profile Weight: 129 grams
<b>Graphics Controller</b>	NVIDIA® Quadro® P400 Graphics Card GPU: 256 CUDA cores Power: 30 Watts Cooling: Active
<b>Bus Type</b>	PCI Express 3.0 x16
<b>Memory</b>	Size: 2 GB GDDR5, 2000 MHz Memory Interface: 64-bit Memory Bandwidth: 32 GB/s
<b>Connectors</b>	3mDP 1.4 Outputs*
<b>Maximum Resolution</b>	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)
<b>Image Quality Features</b>	10-bit internal display processing pipeline 10-bit scan-out support
<b>Display Output</b>	3 mDP 1.4 Connectors
<b>Shading Architecture</b>	Full Microsoft DirectX 12 Shader Model 5.1
<b>Supported Graphics APIs</b>	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute , OpenCL
<b>Available Graphics Drivers</b>	Microsoft Windows 10 Linux®
<b>Notes</b>	<p>HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a></p> <p>*P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports.</p> <p>Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit:Two mDP-to-DP Adapters included</p> <p>Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories:</p> <ul style="list-style-type: none"> <li>- 2MY05AA - HP miniDP-to-DP Adapter Cables</li> <li>- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables</li> </ul>

### Technical Specifications - Graphics

<b>NVIDIA® Quadro® P1000 4GB Graphics</b>	<b>Form Factor</b>	Dimensions: 2.713" H x 5.7" L Single Slot, Low Profile Weight: 129 grams
	<b>Graphics Controller</b>	NVIDIA® Quadro® P1000 Graphics Card GPU: 640 CUDA cores Power: 47 Watts Cooling: Active
	<b>Bus Type</b>	PCI Express 3.0 x16
	<b>Memory</b>	Size: 4 GB GDDR5, 2500 MHz Memory Interface: 128-bit memory interface Memory Bandwidth: 80 GB/s memory bandwidth
	<b>Connectors</b>	4mDP 1.4 Outputs*
	<b>Maximum Resolution</b>	DisplayPort™ 1.4: - up to 4x 5120 x 2880 x 24 bpp @ 60Hz - supports Multi-Stream Transport (MST)
	<b>Image Quality Features</b>	10-bit internal display processing pipeline 10-bit scan-out support
	<b>Display Output</b>	4 mDP 1.4 Connectors
	<b>Shading Architecture</b>	Full Microsoft DirectX 12 Shader Model 5.1
	<b>Supported Graphics APIs</b>	OpenGL 4.5 DirectX 12 Vulkan 1.0 API support includes: CUDA C, CUDA C++, DirectCompute, OpenCL
	<b>Available Graphics Drivers</b>	Microsoft Windows 10 Linux®
	<b>Notes</b>	<p>HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a></p> <p>*P400, P600 and P1000 only have mini-DisplayPort™ (mDP) video ports.</p> <p>Factory Configured (Z4 G4/ Z6 G4/ Z8 G4 Workstations): No adapters included After market option kit: Two mDP-to-DP Adapters included</p> <p>Additional mDP-to-DP Adapters are available as Factory Configuration or Option Kit accessories:</p> <ul style="list-style-type: none"> <li>- 2MY05AA - HP miniDP-to-DP Adapter Cables</li> <li>- 2KW87A6 - HP (Bulk 12) miniDP-to-DP Adapter Cables</li> </ul>

### Technical Specifications - Graphics

<b>NVIDIA® Quadro® P2200 5GB Graphics</b>	<b>Form Factor</b>	Dimensions: 4.4”H x 7.9”L Single Slot Weight: 260 grams
	<b>Graphics Controller</b>	NVIDIA® Quadro® P2200 Graphics Card Power: 75 Watts Cooling: Active
	<b>Bus Type</b>	PCI Express 3.0 x16
	<b>Memory</b>	Size: 5GB GDDR5x Memory Bandwidth: 200 GB/s Memory Width: 160-bit
	<b>Connectors</b>	4x DisplayPort™ 1.4  Factory Configured Option: No adapter included with card After Market Option: No video cable adapter included
	<b>Maximum Resolution</b>	Additional DisplayPort™ to VGA, DisplayPort™ to DVI, and DisplayPort™ to Dual-Link DVI adapters available as accessories. 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)
	<b>Image Quality Features</b>	HDMI 2.0 (requires DP to HDMI adapter): - up to 4096 x 2160 x 24 bpp @ 60Hz 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)
	<b>Display Output</b>	Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, NVIDIA® Mosaic and nView. Maximum number of displays - 4 direct attached monitors  Maximum number of monitors across all available outputs is 4
	<b>Shading Architecture</b>	Shader Model 5.1
	<b>Supported Graphics APIs</b>	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
	<b>Available Graphics Drivers</b>	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: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>

### Technical Specifications - Graphics

#### 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® 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<sup>2</sup>  
- 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

#### Display Outputs<sup>1</sup>

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

### 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>

**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® Quadro® RTX 5000 16GB Graphics**

**Form Factor**

Full-Height Dual Slot (4.4" Height x 10.5" Length)  
Weight: 975 grams + 75 grams extender

**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<sup>2</sup>  
- 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

### Technical Specifications - Graphics

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® 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<sup>2</sup>  
- 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**

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

### Technical Specifications - Graphics

<b>NVIDIA® Quadro® RTX 8000 48GB Graphics</b>	<b>Form Factor</b>	Full-Height Dual Slot (4.4" Height x 10.5" Length) Weight: 1070 grams / 2.35 lbs
	<b>Graphics Controller</b>	NVIDIA® Quadro® RTX 8000 Graphics GPU: 4608 CUDA Cores, 576 Tensor Cores, 72 RT Cores Power: 295 Watts Cooling: Active
	<b>Memory</b>	48GB GDDR6 memory Memory Bandwidth: Up to 672 GB/s Memory Width: 384-bit
	<b>Connectors</b>	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.
	<b>Maximum Resolution</b>	DisplayPort™ 1.4: - up to 2x 7680 x 4320 x 24 bpp @ 60Hz with DSC or 2 cable solution <sup>2</sup> - 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
	<b>Image Quality Features</b>	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
	<b>Display Outputs<sup>1</sup></b>	Maximum number of displays - 4 direct attached monitors Maximum number of monitors across all available outputs is 4
	<b>Supported Graphics APIs</b>	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
	<b>Available Graphics Drivers</b>	Windows® 10 64-bit Linux® 64-bit HP qualified drivers may be preloaded or available from the HP support Web site: <a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>
	<b>Notes</b>	1- Supports up to a total of 4 displays



### Technical Specifications - Networking and Communications

#### NETWORKING AND COMMUNICATIONS

<b>Integrated Intel I219 PCIe GbE Controller</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Intel I219 GbE platform LAN connect networking controller
	<b>Data Rates Supported</b>	10/100/1000 Mbps
	<b>Boot ROM Support</b>	PXE, UEFI, iSCSI Boot
	<b>Connect Speed LED Indicators</b>	Link/Activity LED <ul style="list-style-type: none"> <li>• Off = No link</li> <li>• Blinking = Activity</li> </ul>
		Speed LED <ul style="list-style-type: none"> <li>• Off = 10Mbps</li> <li>• Amber = 100Mbps</li> <li>• Green = 1000Mbps</li> </ul>

**Management Capabilities** Wake-On-LAN, Intel® Active Management Technology™ (AMT) 11.12

<b>Integrated Marvell AQC-107</b>	<b>Connector</b>	RJ-45
	<b>Controller</b>	Marvell AQtion AQC-107
	<b>Data Rates Supported</b>	10/100/1000 Mbps, 2.5/5/10 Gbps
	<b>Boot ROM Support</b>	PXE, UEFI
	<b>Connect Speed LED Indicators</b>	Link/Activity LED <ul style="list-style-type: none"> <li>• Off = No link</li> <li>• Blinking = Activity</li> </ul>
		Speed LED <ul style="list-style-type: none"> <li>• Amber = &lt; 10 Gbps</li> <li>• Green = 10Gbps</li> </ul>

**Management Capabilities** Wake-On-LAN

<b>Intel® I210-T1</b>	<b>Networking Interface</b>	RJ-45
	<b>System Interface</b>	PCI Express 2.1 x1
	<b>Networking Speeds Supported</b>	10Mbps, 100Mbps, 1Gbps
	<b>Cabling (up to 100m)</b>	Cat3 (or higher) for 10Mbps Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps
	<b>Power Consumption (active-typical)</b>	0.81W
	<b>Physical Dimensions</b>	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

<b>Connect Speed LED Indicators</b>	<p>Link/Activity LED</p> <ul style="list-style-type: none"> <li>• Off = No link</li> <li>• Blinking = Activity</li> </ul> <p>Speed LED</p> <ul style="list-style-type: none"> <li>• Off = 10Mbps</li> <li>• Green = 100Mbps</li> <li>• Amber = 1Gbps</li> </ul>
-------------------------------------	---

<b>Operating Temperature</b>	0 °C to 55 °C (32 °F to 131 °F)
<b>Hardware Certifications</b>	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

#### Intel® X550-T2

<b>Networking Interface</b>	2 x RJ-45
<b>System Interface</b>	PCI Express 3 x4
<b>Networking Speeds Supported</b>	100Mbps, 1Gbps, 2.5Gbps, 5Gbps, 10Gbps
<b>Cabling (up to 100m)</b>	Cat5 (or higher) for 100Mbps Cat5e (or higher) for 1Gbps, 2.5Gbps, or 5Gbps Cat6a (or higher) for 10Gbps
<b>Power Consumption (active-typical)</b>	3.9W at 100Mbps 5.5W at 1Gbps 11.2W at 10Gbps
<b>Physical Dimensions</b>	5.2 in x 2.7 in (without bracket)
<b>Connect Speed LED Indicators</b>	<p>Link/Activity LED</p> <ul style="list-style-type: none"> <li>• Off = No link</li> <li>• Blinking = Activity</li> </ul> <p>Speed LED</p> <ul style="list-style-type: none"> <li>• Off = No link</li> <li>• Amber = &lt;10Gbps</li> <li>• Green = 10Gbps</li> </ul>
<b>Operating Temperature</b>	0 °C to 55 °C (32 °F to 131 °F)
<b>Hardware Certifications</b>	USA: FCC B, EU: UL CE, Japan: VCCI, Taiwan: BSMI, Australia/New Zealand: CTICK, Korea: KCC, Canada: ICES-003/NMB-003

© 2020 HP Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein. Intel, Xeon, and Thunderbolt are trademarks of Intel Corporation in the U.S. and other countries. Microsoft and Windows are U.S. registered trademarks of Microsoft Corporation. Red Hat is a registered trademark of Red Hat, Inc. in the United States and other countries. Firewire is a trademark of Apple Inc. Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries. ENERGY STAR® is a registered trademark of the U.S. Environmental Protection Agency. USB Type-C® and USB-C® are trademarks of USB Implementers Forum. AMD and Radeon are trademarks of Advanced Micro Devices, Inc. Bluetooth is a trademark of its proprietor and used by HP Inc. under license. NVIDIA, Cuda, Pascal, and Quadro are trademarks and/or registered trademarks of NVIDIA Corporation in the U.S. and other countries. DisplayPort™ and the DisplayPort™ logo are trademarks owned by the Video Electronics Standards Association (VESA®) in the United States and other countries.