User Guide

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Product notice

This guide describes features that are common to most products. Some features may not be available on your computer.

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. See http://www.microsoft.com.

To access the latest user guides, go to http://www.hp.com/support, and follow the instructions to find your product. Then select **User Guides**.

Software terms

By installing, copying, downloading, or otherwise using any software product preinstalled on this computer, you agree to be bound by the terms of the HP End User License Agreement (EULA). If you do not accept these license terms, your sole remedy is to return the entire unused product (hardware and software) within 14 days for a full refund subject to the refund policy of your seller.

For any further information or to request a full refund of the price of the computer, please contact your seller.

About this guide

This guide provides information on computer features, setting up the computer, using the software, and technical specifications.

WARNING! Indicates a hazardous situation that, if not avoided, **could** result in death or serious injury.

CAUTION: Indicates a hazardous situation that, if not avoided, **could** result in minor or moderate injury.

IMPORTANT: Indicates information considered important but not hazard-related (for example, messages related to property damage). A notice alerts the user that failure to follow a procedure exactly as described could result in loss of data or in damage to hardware or software. Also contains essential information to explain a concept or to complete a task.

NOTE: Contains additional information to emphasize or supplement important points of the main text.

TIP: Provides helpful hints for completing a task.

TIP:

- Find technical details in the *Maintenance and Service Guide* at http://www.hp.com/support.
- View removal and replacement videos at http://www.hp.com/go/sml.
- Go to http://www.hp.com/go/workstations for additional information on your computer.

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1 Locating HP resources

Read this chapter to learn about where to find additional HP resources.

Product information

Topic	Location
Technical specifications	To find the QuickSpecs for your product, go to http://www.hp.com/go/quickspecs. Click the link for the HP Inc. QuickSpecs experience. Click **Search all QuickSpecs**, type your model name in the search box, and then click **Go**.
Regulatory, Safety and Environmental Notices	Refer to the *Regulatory, Safety and Environmental Notices* for product regulatory information. You can also refer to the Agency/Environmental label on the computer chassis.
Accessories	For complete and current information on supported accessories and components, go to http://www.hp.com/go/workstations.
System board	A diagram of the system board is located on the inside of the chassis (all-in-one configuration). Additional information is located in the computer *Maintenance and Service Guide* on the Web at http://www.hp.com/support/.
Serial number, Agency/ Environmental, and operating system labels	The serial number, Agency/Environmental, and operating system labels are on the rear panel of the computer.

Support

Topic	Location
Product support	For HP support, go to http://www.hp.com/support. Here you can access the following types of support: • Online chat with an HP technician • Support telephone numbers • HP service center locations
Warranty information	To locate warranty information, go to http://h20565.www2.hp.com/hpsc/wc/public/home and make your selection from the **Related Links**. HP Care Pack Services offer upgraded service levels to extend and expand a standard product warranty. You can find your HP Limited Warranty located with the user guides on your product and/or on the CD or DVD provided in the box. In some countries or regions, HP may provide a printed warranty in the box. For countries or regions where the warranty is not provided in printed format, you can request a copy from http://www.hp.com/go/orderdocuments. For products purchased in Asia Pacific, you can write to HP at POD, P.O. Box 161, Kitchener Road Post Office, Singapore 912006. Include your product name, and your name, phone number, and postal address.

Product documentation

Topic	Location
HP user documentation, white papers, and third-party documentation	User documentation is located on your hard drive. On Windows® 10, select **Start**, select **All Apps**, select **HP**, and then select **HP Documentation**. On Windows 7, select **Start**, select **HP Help and Support**, and then select **HP Documentation**. For the latest online documentation, go to http://www.hp.com/support. The documentation incudes this user guide and the *Maintenance and Service Guide*.
Removal and replacement videos	To learn how to remove and replace computer components, go to http://www.hp.com/go/sml.
Product notifications	Subscriber's Choice is an HP program that allows you to sign up to receive driver and software alerts, proactive change notifications (PCNs), the HP newsletter, customer advisories, and more. Sign up at https://h41369.www4.hp.com/alerts-signup.php.
Technical specifications	The Product Bulletin contains QuickSpecs for HP computers. QuickSpecs include information about the operating system, power supply, memory, processor, and many other system components. To access the QuickSpecs, go to http://www.hp.com/go/quickspecs/.
Advisories, Bulletins, and Notices	To find advisories, bulletins, and notices: 1. Go to https://support.hp.com/us-en/products/workstations-thin-clients/. 2. Select your product. 3. Select **Advisories** or **Bulletins and Notices**.

Product diagnostics

Topic	Location
Windows diagnostics tools	The UEFI Diagnostics utility is preinstalled on select Windows computers. See Using HP PC Hardware Diagnostics (UEFI) on page 36. For additional information, see the computer *Maintenance and Service Guide* at http://www.hp.com/support.
Audible beep and light code definitions	See Maintenance, diagnostics, and minor troubleshooting on page 31. For additional information, see the computer *Maintenance and Service Guide* at http://www.hp.com/support.
POST error codes	See Maintenance, diagnostics, and minor troubleshooting on page 31. For additional information, see the computer *Maintenance and Service Guide* at http://www.hp.com/support.

Product updates

Topic	Location
Driver and BIOS updates	Go to https://support.hp.com/us-en/products/workstations-thin-clients/ to verify that you have the latest drivers for the computer.

Topic	Location
	For more information on updating the drivers and BIOS, see Updating the computer on page 29.
Operating systems	For information, go to the following locations: • Windows operating systems, go to http://www.support.microsoft.com. • Linux® operating systems, go to http://www.linux.com.

2 Computer features

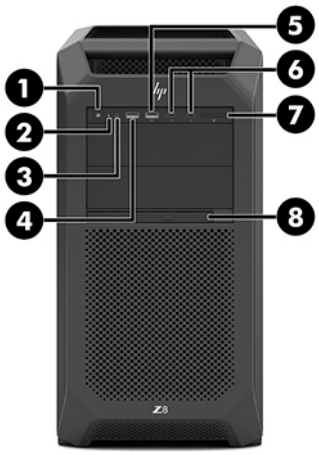
For complete and current information on supported accessories and components for the computer, go to http://partsurfer.hp.com.

Components

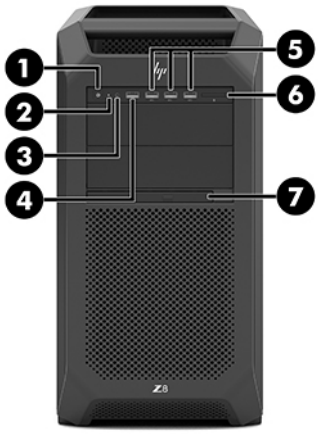
HP Z8 G4 Workstation

Front

NOTE: Refer to the illustration that most closely matches your computer.



Item	Icon	Component
1		Power button
2		Drive light
3		Audio-out (headphone)/Audio-in (microphone) combo jack
4		USB 3.x SuperSpeed port with HP Sleep and Charge
5		USB 3.x SuperSpeed port
6		USB Type-C ports (2)
7		Memory card reader
8		Optical drive

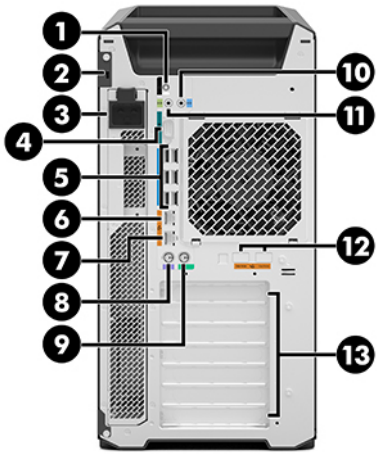


Item	Icon	Component
1		Power button
2		Drive light
3		Audio-out (headphone)/Audio-in (microphone) combo jack
4		USB 3.x SuperSpeed port with HP Sleep and Charge
5		USB 3.x SuperSpeed ports (3)
6		Memory card reader
7		Optical drive

Left

Item	Component
1	Side access panel handle
2	Side access panel lock

Rear

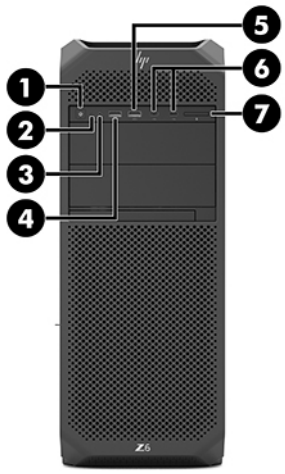


Item	Icon	Component	Item	Icon	Component
1		Power button	8		PS/2 keyboard port
2		Security cable slot	9		PS/2 mouse port
3		Power connector	10		Audio-in (microphone) jack
4		Serial port	11		Audio-out (headphone) jack
5		USB 3.x SuperSpeed ports (6)	12		Ethernet ports (select products only) (2)
6		RJ-45 (network) jack	13		PCIe card slots (7)
7		RJ-45 (network) jack (AMT enabled)			

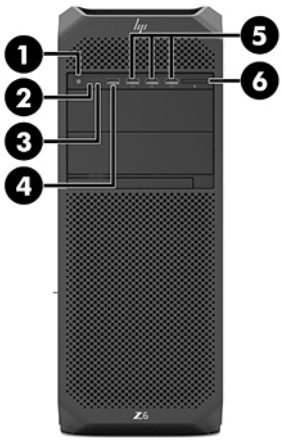
HP Z6 G4 Workstation

Front

NOTE: Refer to the illustration that most closely matches your computer.



Item	Icon	Component
1		Power button
2		Drive light
3		Audio-out (headphone)/Audio-in (microphone) combo jack
4		USB 3.x SuperSpeed port with HP Sleep and Charge
5		USB 3.x SuperSpeed port
6		USB Type-C ports (2)
7		Memory card reader

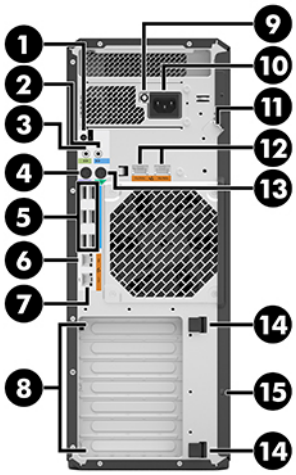


Item	Icon	Component
1		Power button
2		Drive light
3		Audio-out (headphone)/Audio-in (microphone) combo jack
4		USB 3.x SuperSpeed port with HP Sleep and Charge
5		USB 3.x SuperSpeed ports (3)
6		Memory card reader

Left

Item	Component
1	Side access panel handle
2	Side access panel lock (select products only)

Rear



Item	Icon	Component	Item	Icon	Component
1		Power button On: The computer is on. Blinking white: The hard drive is being accessed.	9		Power supply Built-In Self-Test (BIST) light
2		Audio-in (microphone) jack	10		Power connector
3		Audio-out (headphone) jack	11		Security lock loop
4		PS/2 keyboard port	12		Ethernet ports (select products only) (2)
5	SS	USB 3.x SuperSpeed ports (6)	13		PS/2 mouse port
6		RJ-45 (network) jack	14		PCIe card release latches
7		RJ-45 (network) jack (AMT enabled)	15		Security cable slot
8		PCIe card slots (7)			

Product specifications

To find the QuickSpecs for your product, go to http://www.hp.com/go/quickspecs. Click the link for the HP Inc. QuickSpecs experience. Click **Search all QuickSpecs**, type your model name in the search field, and then click **Go**.

– or –

Go to http://www.hp.com/support and follow the on-screen instructions to find your product. On the product page, select **Product Information** and then select **Specifications**.

3 Setting up the computer

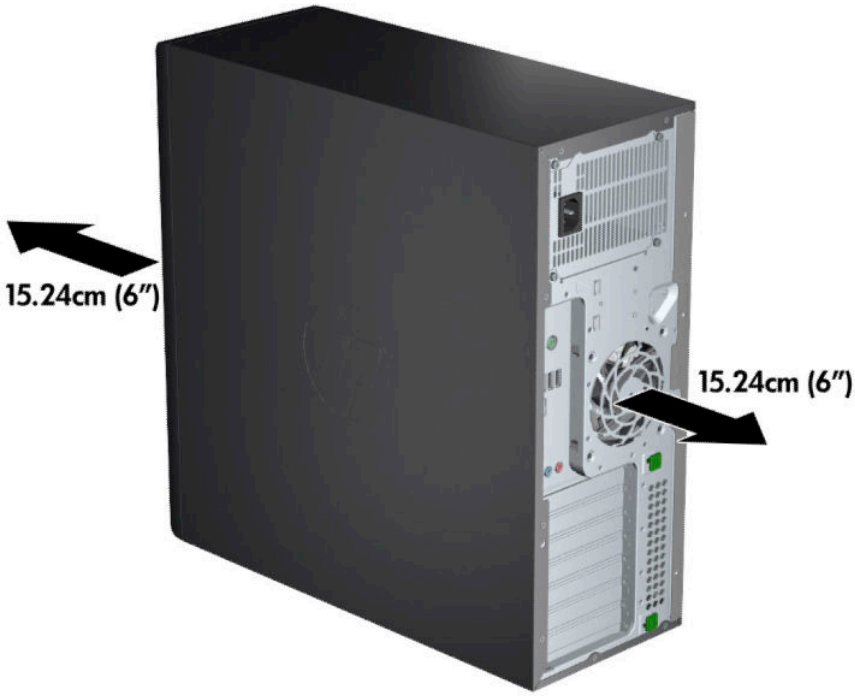
This chapter describes how to set up your computer.

Ensuring proper ventilation

Proper ventilation for the system is important for computer operation. Follow these guidelines:

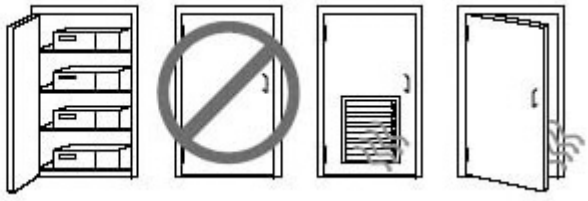
- Operate the computer on a sturdy, level surface.
- Provide at least 15.24 cm (6.00 in) of clearance at the front and back of the computer. (This is the *minimum* distance for all computer models.)

NOTE: Your computer may look slightly different from the illustration in this section.



- Ensure that the ambient air temperature is within specified limits (see Product specifications on page 12).
- For cabinet installation, ensure adequate cabinet ventilation and ensure that the ambient temperature within the cabinet does not exceed specified limits.

- Never restrict the incoming or outgoing airflow of the computer by blocking any vents or air intakes, as shown in the following figure.



Setup procedures

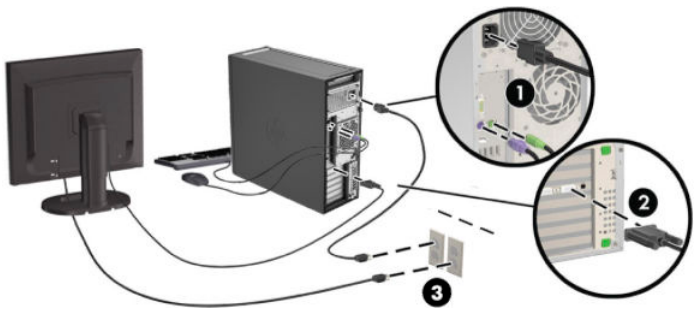
WARNING! To reduce the risk of electric shock or damage to your equipment, observe these practices:

- Plug the power cord into an AC outlet that is easily accessible at all times.
- Disconnect power from the computer by unplugging the power cord from the AC outlet (not by unplugging the power cord from the computer).
- Plug the cord into a grounded (earthed) three-pin outlet. Do not disable the power cord grounding pin (for example, by attaching a two-pin adapter). The grounding pin is an important safety feature.

NOTE: A computer with a 1125 W power supply might require more power than the typical office environment can supply. For details, see the *Site Preparation Guide* for the computer at http://www.hp.com/support.

To set up the computer:

1. Connect the mouse, keyboard, and power cord to the computer (1).
2. Connect the monitor to the computer (2).
3. Connect other peripheral components (such as a printer) according to the instructions included with the device.
4. Connect a network cable to the computer and to a network router or LAN device.
5. Plug the computer power cord and monitor power cord into an AC outlet (3).



Adding monitors

Planning for additional monitors

All graphics cards provided with HP Z series computers support two simultaneous-display monitors (see Connecting and configuring monitors on page 18). Cards that support more than two monitors are available. The process for adding monitors depends on your graphics card(s) and the type and number of monitors you add.

Use this process to plan for adding more monitors.

1. Assess your monitor needs.
   - Determine how many monitors you require.
   - Determine the kind of graphics performance you want.
   - Note the type of graphics connector used by each monitor. HP provides graphics cards with DisplayPort (DP) and DVI interfaces, but you can use adapters and third-party cards to interface to other graphics formats, including DVI-I, HDMI, or VGA.

     TIP: Some adapters for older legacy hardware may cost more than others. You may want to compare the cost of acquiring adapters with the cost of getting a newer monitor that doesn't need adapters.

2. Determine whether you need additional graphics cards.
   - Consult the graphics card documentation to determine how many monitors you can connect to the card.

     You may need to acquire adapters to match the card output to the monitor connector. (See Matching graphics cards to monitor connectors on page 17.)
   - If necessary, plan to acquire a new graphics card to support additional monitors.
   - The maximum number of monitors that a graphics card supports depends on the card. Most cards provide outputs for two monitors. Some provide three or four outputs.

NOTE: Monitors with resolutions above 1920 x 1200 pixels at 60 Hz require a graphics card with either Dual Link DVI (DL-DVI) or DisplayPort output. To get native resolution with DVI, you must use a DL-DVI cable, not standard DVI-I or DVI-D cables.

HP computers do not support all graphics cards. Be sure that a new graphics card is supported before purchasing it. See Finding supported graphics cards on page 17.

Many graphics cards provide more than two monitor outputs but limit you to using only two at a time. Consult the graphics card documentation or look up information on the card according to the procedure in Finding supported graphics cards on page 17.

Some graphics cards support multiple monitors by multiplexing the monitor signal across multiple outputs. This might reduce graphics performance. Consult the graphics card documentation or look up information on the card according to the procedure in Finding supported graphics cards on page 17.

Make sure the card outputs match the input required by the monitors. (See Identifying monitor connection requirements on page 17.)

The different models of HP Z series computers have different limits on the mechanical size, data speed, and power available for additional graphics cards. Note that the usual practical limit for graphics cards is two per computer. See the *Maintenance and Service Guide* for expansion card slot identification to make sure a new graphics card will work for your computer.

3. If you want to add a new graphics card or cards:

   a. Determine which supported graphics card best fits your needs in terms of number of monitors, compatibility with the monitors you plan to use, and performance. See Finding supported graphics cards on page 17.

   b. Make sure you have the correct drivers for the card. See http://www.hp.com for HP-qualified drivers.

   c. Install the graphics card according to the video instructions for your computer at http://www.hp.com/go/sml.

   d. Configure the monitor. For details, refer to Microsoft® Help or to http://www.microsoft.com.

      For monitor setup in Linux, you can often use the settings tool for the graphics cards (e.g., NVIDIA nvidia-settings or AMD Catalyst Control Center). In some recent Linux releases, the window manager system (e.g., Gnome 3) preferences must also be modified.

TIP: To simplify troubleshooting of possible problems, enable the monitors one at a time: enable the first monitor and make sure it works properly before enabling the next monitor.

Finding supported graphics cards

To find information about graphics cards supported for your computer:

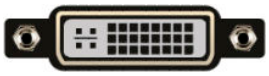
1. Go to http://www.hp.com/go/quickspecs.
2. Select **Search active QuickSpecs**, and then select **Desktops & Workstations**.
3. Choose your model to view the specifications.
4. Click the link for **Technical Specifications-Graphics** to display expanded technical information for supported graphics cards, including how many monitors the card supports, connectors, power consumption, drivers, and other details.

NOTE: Not all graphics cards are compatible with all video transceivers and adapters. See the graphics card documentation for specific details.

Matching graphics cards to monitor connectors

The following table describes monitor configuration scenarios.

NOTE: Refer to the illustration that most closely matches your computer.

Graphics card interface connector	Monitor connector				
	VGA	DVI	Dual Link DVI	DisplayPort (DP)	HDMI
DisplayPort	DisplayPort-to-VGA adapter (sold separately)	DP-to-DVI adapter	DP-to-DL DVI adapter	DP cable	DP-to-HDMI adapter
DVI—I (white) 	DVI-to-VGA adapter	DVI cable	DL DVI cable	N/A	N/A
VGA (blue)	No adapter required	DVI-I–to–VGA adapter	N/A	N/A	N/A
DMS-59*	DMS-59–to–VGA adapter	DMS-59–to–DVI adapter	N/A	DMS-59–to–DP adapter	N/A

* This interface is a dual-monitor graphics interface card that supports two VGA, two DVI, or two DP monitors.

NOTE: HP graphics cards include monitor cable adapters unless otherwise indicated.

DisplayPort connections have the highest performance; VGA connections have the lowest.

Identifying monitor connection requirements

The following are various scenarios for connecting monitors. See Matching graphics cards to monitor connectors on page 17 for more information about the different graphics cards.

- Graphics card with DisplayPort output—If the graphics card has four DisplayPort connectors, you can connect a monitor to each connector. Use the proper adapters if required.
- Graphics card with DVI output—If you have a graphics card with two DVI connectors, you can connect a monitor to each connector. Use the proper adapters if required.

NOTE: Models that have only one DVI port always have a second graphics output option (DisplayPort or VGA).

Many graphics cards provide more than two monitor outputs but limit you to using only two at a time. Consult the graphics card documentation or look up information on the card according to the procedure in Matching graphics cards to monitor connectors on page 17.

On a system with two DVI connections, port number 1 provides the primary display, which is where the BIOS POST screen appears after a system boot. (Only one card is used during BIOS POST unless you change the BIOS setting.)

- Graphics card with VGA and DL-DVI output—If the computer does not have a PCIe graphics card, but has one or more SVGA *and/or* DL-DVI connectors, you can connect a monitor to each output.
- Graphics card with DMS-59 output—If the computer has a PCIe graphics card with a DMS-59 connector, use the appropriate adapter to connect your monitor.

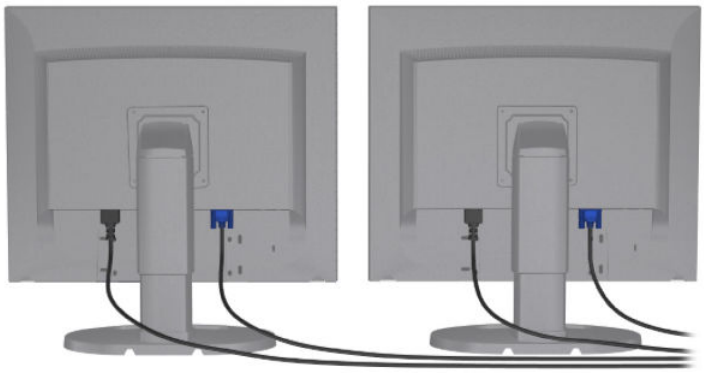
  Adapters are available to connect the DMS-59 output to two DVI or two VGA monitors.

Connecting and configuring monitors

NOTE: The supported graphics cards typically allow at least two monitors, as shown in this section; some supported cards allow more monitors. Refer to the graphics card documentation for details.

1. Connect the monitor cable adapters (1) (if required) to the computer, then connect the appropriate monitor cables (2) to the adapters or directly to the graphics card.

2. Connect the other ends of the monitor cables to the monitors.



3. Connect one end of the monitor power cord to the monitor and the other end to an AC outlet.
4. Configure the monitor. For details, refer to Microsoft Help or to http://www.microsoft.com.

   For monitor setup in Linux, you can often use the settings tool for the graphics cards (e.g., NVIDIA nvidia-settings or AMD Catalyst Control Center). In some recent Linux releases, the window manager system (e.g., Gnome 3) preferences must also be modified.

Using a third-party graphics configuration utility

Third-party graphics cards may include a monitor configuration utility. Upon installation, this utility is integrated into Windows. You can select the utility and use it to configure multiple monitors with your computer.

Refer to your graphics card documentation for details.

NOTE: Some third-party configuration utilities require that you enable the monitors in Windows before using the configuration tool. Refer to your graphics card documentation for more information.

NOTE: Monitor configuration utilities are also often available on the HP support website.

Customizing the monitor display (Windows)

You can manually select or change the monitor model, refresh rates, screen resolution, color settings, font sizes, and power management settings.

- To change display settings in Windows 7, right-click a blank area on the desktop, and then click **Screen Resolution**.
- To change display settings in Windows 10, type `control panel` in the taskbar search box, and then select **Control Panel**. Select **Appearance and Personalization**, and then select **Display**.

For more information about customizing your monitor display, see the following resources:

- Online documentation provided with the graphics controller utility
- Documentation included with your monitor

Installing optional components

Depending on the computer model, additional components (such as memory, hard drives, optical drives, PCIe cards, or a second processor) can be installed on your computer.

- To view component installation videos, go to http://www.hp.com/go/sml.
- For installation guidelines and technical information, see the *Maintenance and Service Guide* for your computer at http://www.hp.com/support.

Security

Some HP computers have a lock on the side access panel. The key for this lock is shipped attached to the back panel of the computer chassis.

Additional security features reduce the risk of theft and alert you when there has been a chassis intrusion. For information about additional hardware and software security features available for your system, see *Maintenance and Service Guide* for your computer at http://www.hp.com/support.

Product recycling

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries.

For information about recycling HP components or products, go to http://www.hp.com/go/recycle.

4 Backing up, restoring, and recovering

This chapter provides information about the following processes. The information in the chapter is standard procedure for most products.

- Creating recovery media and backups
- Restoring and recovering your system

For additional information, refer to the HP Support Assistant app.

▲ Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

– or –

Select the question mark icon in the taskbar.

IMPORTANT: If you will be performing recovery procedures on a tablet, the tablet battery must be at least 70% charged before you start the recovery process.

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning any recovery process.

Creating recovery media and backups

The following methods of creating recovery media and backups are available on select products only. Choose the available method according to your computer model.

- Use HP Recovery Manager to create HP Recovery media after you successfully set up the computer. This step creates a backup of the HP Recovery partition on the computer. The backup can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. For information on creating recovery media, see Using HP Recovery media (select products only) on page 21. For information on the recovery options that are available using the recovery media, see Using Windows tools on page 22.
- Use Windows tools to create system restore points and create backups of personal information. See Using Windows tools on page 22.

NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

- On select products, use the HP Cloud Recovery Download Tool to create a bootable USB flash drive for your HP recovery media. For more information, see Using the HP Cloud Recovery Download Tool (select products only) on page 23.

Using HP Recovery media (select products only)

If possible, check for the presence of the Recovery partition and the Windows partition. Right-click the **Start** button, select **File Explorer**, and then select **This PC**.

- If your computer does not list the Windows partition and the Recovery partition, you can obtain recovery media for your system from support. You can find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.
- If your computer does list the Recovery partition and the Windows partition, you can use HP Recovery Manager to create recovery media after you successfully set up the computer. HP Recovery media can be

used to perform system recovery if the hard drive becomes corrupted. System recovery reinstalls the original operating system and software programs that were installed at the factory and then configures the settings for the programs. HP Recovery media can also be used to customize the system or restore the factory image if you replace the hard drive.

- Only one set of recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.
- HP Recovery Manager examines the computer and determines the required storage capacity for the media that will be required.
- To create recovery discs, your computer must have an optical drive with DVD writer capability, and you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. Or, instead, you can use a high-quality blank USB flash drive.
- If your computer does not include an integrated optical drive with DVD writer capability, but you would like to create DVD recovery media, you can use an external optical drive (purchased separately) to create recovery discs. If you use an external optical drive, it must be connected directly to a USB port on the computer; the drive cannot be connected to a USB port on an external device, such as a USB hub. If you cannot create DVD media yourself, you can obtain recovery discs for your computer from HP. You can find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.
- Be sure that the computer is connected to AC power before you begin creating the recovery media.
- The creation process can take an hour or more. Do not interrupt the creation process.
- If necessary, you can exit the program before you have finished creating all of the recovery DVDs. HP Recovery Manager will finish burning the current DVD. The next time you start HP Recovery Manager, you will be prompted to continue.

To create HP Recovery media using HP recovery manager:

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps.

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.
2. Select **Create recovery media**, and then follow the on-screen instructions.

If you ever need to recover the system, see Recovering using HP Recovery Manager on page 23.

Using Windows tools

You can create recovery media, system restore points, and backups of personal information using Windows tools.

NOTE: If storage is 32 GB or less, Microsoft System Restore is disabled by default.

For more information and steps, see the Get Help app.

- Select the **Start** button, and then select the **Get Help** app.

NOTE: You must be connected to the Internet to access the Get Help app.

Using the HP Cloud Recovery Download Tool (select products only)

To create HP Recovery media using the HP Cloud Recovery Download Tool:

1. Go to http://www.hp.com/support.
2. Select **Software and Drivers**, and then follow the on-screen instructions.

Restore and recovery

There are several options for recovering your system. Choose the method that best matches your situation and level of expertise:

IMPORTANT: Not all methods are available on all products.

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information see the Get Help app.

  ▲ Select the **Start** button, and then select the **Get Help** app.

  NOTE: You must be connected to the Internet to access the Get Help app.

- If you need to correct a problem with a preinstalled application or driver, use the Reinstall drivers and/or applications option (select products only) of HP Recovery Manager to reinstall the individual application or driver.

  ▲ Type `recovery` in the taskbar search box, select **HP Recovery Manager**, select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.

- If you want to recover the Windows partition to original factory content, you can choose the System Recovery option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 23. If you have not already created recovery media, see Using HP Recovery media (select products only) on page 21.
- On select products, if you want to recover the computer's original factory partition and content, or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 23.
- On select products, if you want to remove the Recovery partition to reclaim hard drive space, HP Recovery Manager offers the Remove Recovery Partition option.

  For more information, see Removing the HP Recovery partition (select products only) on page 25.

Recovering using HP Recovery Manager

HP Recovery Manager software allows you to recover the computer to its original factory state by using the HP Recovery media that you either created or that you obtained from HP, or by using the HP Recovery partition (select products only). If you have not already created recovery media, see Using HP Recovery media (select products only) on page 21.

What you need to know before you get started

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.

IMPORTANT: Recovery through HP Recovery Manager should be used as a final attempt to correct computer issues.

- HP Recovery media must be used if the computer hard drive fails. If you have not already created recovery media, see Using HP Recovery media (select products only) on page 21.
- To use the Factory Reset option (select products only), you must use HP Recovery media. If you have not already created recovery media, see Using HP Recovery media (select products only) on page 21.
- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, you can obtain recovery media for your system from support. You can find contact information from the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

IMPORTANT: HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data you want to retain.

Using HP Recovery media, you can choose from one of the following recovery options:

NOTE: Only the options available for your computer display when you start the recovery process.

- System Recovery—Reinstalls the original operating system, and then configures the settings for the programs that were installed at the factory.
- Factory Reset—Restores the computer to its original factory state by deleting all information from the hard drive and re-creating the partitions. Then it reinstalls the operating system and the software that was installed at the factory.

The HP Recovery partition (select products only) allows System Recovery only.

Using the HP Recovery partition (select products only)

The HP Recovery partition allows you to perform a system recovery without the need for recovery discs or a recovery USB flash drive. This type of recovery can be used only if the hard drive is still working.

To start HP Recovery Manager from the HP Recovery partition:

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps (select products only).

1. Type `recovery` in the taskbar search box, select **HP Recovery Manager**, and then select **Windows Recovery Environment**.

   – or –

   For computers or tablets with keyboards attached, press f11 while the computer boots, or press and hold f11 as you press the power button.

   For tablets without keyboards:

   - Turn on or restart the tablet, and then quickly hold down the volume up button; then select **f11**.

   – or –

   - Turn on or restart the tablet, and then quickly hold down the volume down button; then select **f11**.
2. Select **Troubleshoot** from the boot options menu.
3. Select **Recovery Manager**, and then follow the on-screen instructions.

Using HP Recovery media to recover

You can use HP Recovery media to recover the original system. This method can be used if your system does not have an HP Recovery partition or if the hard drive is not working properly.

1. If possible, back up all personal files.
2. Insert the HP Recovery media, and then restart the computer.

NOTE: If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See Changing the computer boot order on page 25.

3. Follow the on-screen instructions.

Changing the computer boot order

If your computer does not restart in HP Recovery Manager, you can change the computer boot order, which is the order of devices listed in BIOS where the computer looks for startup information. You can change the selection to an optical drive or a USB flash drive.

To change the boot order:

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps.

1. Insert the HP Recovery media.
2. Access the system **Startup** menu.

   For computers or tablets with keyboards attached:

   ▲ Turn on or restart the computer or tablet, quickly press esc, and then press f9 for boot options.

   For tablets without keyboards:

   ▲ Turn on or restart the tablet, and then quickly hold down the volume up button; then select **f9**.

   – or –

   Turn on or restart the tablet, and then quickly hold down the volume down button; then select **f9**.
3. Select the optical drive or USB flash drive from which you want to boot.
4. Follow the on-screen instructions.

Removing the HP Recovery partition (select products only)

HP Recovery Manager software allows you to remove the HP Recovery partition to free up hard drive space.

IMPORTANT: After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP Recovery media from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see Using HP Recovery media (select products only) on page 21.

NOTE: The Remove Recovery Partition option is only available on products that support this function.

Follow these steps to remove the HP Recovery partition:

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.
2. Select **Remove Recovery Partition**, and then follow the on-screen instructions.

5 Setting up Linux

This chapter describes how to set up and restore the Linux operating system.

HP offers a variety of Linux solutions for HP computer customers:

- HP certifies and supports Red Hat® Enterprise Linux® (RHEL) on HP computers.
- HP certifies and supports SUSE Linux Enterprise Desktop (SLED) on HP computers.
- HP certifies and supports Canonical Ubuntu on some HP computers.
- HP offers a SLED 11 preload on some Z series computers.
- HP offers an Ubuntu preload on some Z series computers.

⚠ **CAUTION:** Do not add optional hardware or third-party devices to the computer until the operating system is successfully installed. Adding hardware might cause errors and prevent the operating system from installing correctly.

NOTE: After you set up the operating system, be sure that the latest BIOS, drivers, and software updates are installed. See Updating the computer on page 29.

NOTE: To create recovery media, you must have either a high-quality blank USB flash drive or an external optical drive with DVD writer capability. If you use an optical drive, you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. A compatible external optical drive may be purchased from HP.

Linux-ready systems

The Linux-ready option provides a system with a minimally-functional OS preload (for example, FreeDOS). It is intended for situations where the customer is going to install an OS when the system arrives. The option does not include a license for any operating system.

The Linux-ready option does not include the Linux operating system, which the user must supply. Commercial Linux distributions are available for purchase from vendors such as Red Hat and SUSE. A variety of other Linux distributions are available for free (e.g., Ubuntu). To view supported configurations and operating systems, go to http://www.hp.com/support/linux_hardware_matrix.

HP Linux driver discs

Driver ISO images that support proper use and behavior of some Linux OSes on HP computers may be available on the HP website. Such images include tested drivers that augment and/or replace those found in RHEL, SLED, Ubuntu, or other OSes. Each image is specific to a particular Linux OS release.

These images also can be downloaded using the following steps:

1. Go to http://www.hp.com/support/workstation_swdrivers.
2. Select your computer model.
3. Select the desired operating system.
4. Select the **Obtain Software** link for the appropriate package (typically the most recent revision).

5. Click **I Accept** to accept the terms of the license agreement.
6. Download the software ISO image and burn it to a high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD +R DL disc using an external optical drive with DVD writer capability. This disc is your *HP driver disc*.

NOTE: Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. A compatible external optical drive may be purchased from HP.

Setting up Red Hat Enterprise Linux (RHEL)

HP Z series computers are certified and supported on RHEL streams appropriate to the hardware technology.

- For details of RHEL support for a particular platform, see the *Linux Hardware Matrix for HP Workstations* at http://www.hp.com/support/linux_hardware_matrix.
- For information about Red Hat certifications on HP computers, go to https://access.redhat.com/ecosystem, select **Certified Hardware**, and then follow the on-screen instructions.

HP driver disc

Recent versions of Red Hat Linux typically require only driver updates with minor fixes to support HP computers. These releases can usually be supported with the appropriate driver USB flash drive or optical disc from the HP website, which can be used as a post-installation utility for the standard Red Hat Linux install. For more information, see HP Linux driver discs on page 26.

After you complete the standard Red Hat install and restart the system, a Red Hat first-boot utility runs. After you specify a number of settings (such as the security level, time and date, 'root' password, and user accounts), the utility lets you load an additional USB flash drive or optical disc.

The driver media is used during this phase. All content added by HP is in the /HP directory on the media. You can use it to build your own image or to browse the HP content.

Please see the /HP directory on the media for any last-minute README pointers for elements on the disc.

Installing with the HP Red Hat Linux driver media

1. If you do not have the appropriate HP driver media for a supported stream, create one (see HP Linux driver discs on page 26.)
2. Install the operating system using the media included in the Red Hat Linux box set.
3. If you have a Red Hat driver USB flash drive or optical disc for the OS version you are installing, type `linux dd` when the initial install splash screen appears, and then press **Enter**.
4. When asked if you have a driver disc, select **Yes**. Place the Red Hat driver USB flash drive or optical disc in the drive, and select the appropriate `drive:hd[abcd]`. Continue the normal installation.
5. After successfully installing the operating system, reboot the computer.
   - RHEL 6 or RHEL 7: Insert your HP driver USB flash drive or optical disc. The driver installation software automatically starts. Follow the on-screen instructions to install the contents.

Setting up SUSE Linux Enterprise Desktop (SLED)

HP supports 64-bit SLED on some computers.

Various versions of SLED are certified and supported by SUSE on HP computers. For more information, go to the SUSE certification bulletin search page at https://www.suse.com/yessearch/Search.jsp.

Installing SLED with the HP driver disc

1. If an HP driver disc did not come with your computer, create one (see HP Linux driver discs on page 26).
2. Install the operating system using the discs included in the SUSE box set.
3. After successfully installing the operating system, reboot the computer.
4. Insert your HP driver disc. The driver installation software automatically starts. Follow the on-screen instructions to install the contents.

Setting up Ubuntu

HP offers a 64-bit Ubuntu 14.04 LTS preload on some Z series computers and supports 64-bit Ubuntu 14.04 on other computers.

Various versions of Ubuntu are certified and supported by Canonical on HP computers. For more information, go to the Ubuntu Desktop certified hardware search page at http://www.ubuntu.com/certification/desktop and search for your computer product.

Using the HP driver disc

Ubuntu does not require registration to obtain software package updates. Updates can be obtained from various repositories on the web using a variety of tools built into the OS. An Internet connection and proxy may be all that are required.

The HP-provided Linux driver disc for Ubuntu relies on the same mechanisms in order to satisfy dependencies during installation. So the same Internet access is needed, as well as capability to elevate from the current user session to administrator privileges.

In some cases, HP-tested proprietary graphics drivers may be the only “payload” delivered by the driver disc.

1. Install the operating system from your own installation media.

   Ubuntu is available at no cost from http://www.ubuntu.com.
2. Restart the computer.
3. Insert your HP driver disc. The driver installation software automatically starts.
4. When prompted for the administrator password, type the password in the field.
5. Follow the on-screen instructions to install the drivers appropriate to your hardware configuration.

Proprietary graphics drivers

Most HP computers can be ordered with graphics cards that have been through extensive verification by HP. For a list of supported cards, see *Linux Hardware Matrix for HP Workstations* at http://www.hp.com/support/linux_hardware_matrix.

NOTE: Not all graphics cards are available on every computer. Limitations generally occur for cards that consume large amounts of power in lower-power computers.

Third-party proprietary graphics drivers supported by HP, and the list of graphics vendors is available with the SLED 11 and Ubuntu preloads on Z series computers, and from HP support at https://support.hp.com/us-en/products/workstations-thin-clients/.

These proprietary drivers are not a standard part of the RHEL, SLED, or Ubuntu distributions because they are not open source. Driver revisions more recent than those at the HP support website are supported directly by the vendor.

6 Updating the computer

HP is constantly working on improving your total computer experience. To ensure that the computer leverages the latest enhancements, HP recommends that you install the latest BIOS, driver, and software updates on a regular basis.

Updating the computer after first boot

After successfully booting the computer for the first time, follow these guidelines to be sure that the computer is up-to-date:

- Be sure that you have the latest system BIOS version loaded. See Updating the BIOS on page 29.
- Be sure that you have the latest drivers for your system. See Upgrading device drivers on page 30.
- Become familiar with your available HP resources.
- Consider a subscription to Driver Alerts at https://h41369.www4.hp.com/alerts-signup.php.

Updating the BIOS

For optimum performance, determine the BIOS version on the computer, and upgrade it if necessary.

Determining the current BIOS version

To determine the current BIOS version:

1. Press Esc during startup (boot).
2. Press F10 to enter Computer Setup (F10).
3. Select **Main**, and then select **System Information**. Note the Computer System BIOS version.

NOTE: For procedures for upgrading the BIOS as well as the Computer Setup (F10) BIOS Menu settings, see the *Maintenance and Service Guide* at http://www.hp.com/support.

Upgrading BIOS

To find and download the latest available BIOS version, which includes the latest enhancements:

1. Go to https://support.hp.com/us-en/products/workstations-thin-clients/.
2. Select your product.
3. Select **Software and Drivers**.
4. Follow the instructions to locate the latest BIOS version available for the computer.
5. Compare the BIOS version on your computer to the BIOS versions on the website (see Determining the current BIOS version on page 29). If the BIOS version on the website is the same as the version on your system, no further action is required.
6. If the BIOS version on the website is a version later than the one on your system, download the appropriate version for the computer. Follow the instructions in the release notes to complete the installation.

Upgrading device drivers

If you install a peripheral device (such as a printer, display adapter, or network adapter), confirm that you have the latest device drivers loaded. If you purchased your device through HP, go to the HP website to download the latest drivers for your device. These drivers have been tested to ensure the best compatibility between your device and your HP computer.

If you did not purchase your device from HP, HP recommends that you go to the HP website first to see if your device and its drivers have been tested for HP computer compatibility. If no driver is available, go to the device manufacturer's website to download the latest drivers.

To upgrade device drivers:

1. Go to https://support.hp.com/us-en/products/workstations-thin-clients/ and select your product.
2. Follow the instructions to find the latest drivers available for the computer.

If a required driver is not found, see the website of the manufacturer of the peripheral device.

7 Maintenance, diagnostics, and minor troubleshooting

Turning off the computer

To properly turn off the computer, shut down the operating system software.

⚠ **CAUTION:** HP does not recommend holding down the power button to shut off the system. Doing so can cause loss of user data and may damage the storage device. If the system becomes unstable and no other alternative is available, please give the system sufficient time to wake up completely after you reboot the computer. This may take up to several minutes, especially on larger-capacity or solid-state devices. For more information, see *Risks of unexpected power loss on solid state drives* at http://www8.hp.com/h20195/v2/GetPDF.aspx/4AA6-1470ENW.pdf. HP computer white papers may also be accessed through HP Performance Advisor.

Windows 10

- Click the **Start** icon, click the **Power** icon, and then select **Shut down**.

  – or –

  From the taskbar, type `settings`, select **Settings**, type `shut`, and then click **Turn off your PC**.

Windows 7

- Click **Start**, and then click **Shut down**.

If you encounter issues

To diagnose and resolve issues, HP recommends a sequential troubleshooting approach:

- Visual inspection
- Blink or beep codes
- Basic troubleshooting, including HP PC Hardware Diagnostics
- HP support
- System restore and recovery

  For more information, see Creating recovery media and backups on page 21.

These troubleshooting strategies are explained in the following sections.

For more information

You can find more troubleshooting information in the comprehensive *Maintenance and Service Guide* (English only) available under the reference library at http://www.hp.com/support. Select your country and language, select **Product Support & Troubleshooting**, enter the model number of the computer, and click Search.

Visual inspection

If you encounter a problem with the computer, monitor, or software, the following general suggestions might help you isolate and focus on the problem before taking further action.

At startup

- Verify that the computer is plugged into a functional AC outlet.
- Remove all optical discs and USB flash drives before starting the computer.
- Verify that the computer is on and the power light is on.
- If you have installed an operating system other than the factory-installed operating system, confirm that it is supported on your system by going to http://www.hp.com/go/quickspecs.
- Verify that the display panel is lit.
- If you have an optional external monitor:
  - Verify that the monitor is plugged into a functional AC outlet.
  - Verify that the monitor is on and the green monitor light is on.
  - If the monitor is dim, turn up the brightness and contrast controls.

During operation

- Beeps and blinking lights on the computer are error codes that can help you diagnose problems. For more information on interpreting these codes, see the *Diagnostic LED and audible (beep) codes* section in the *Maintenance and Service Guide* for your computer.
- Press and hold any key. If the system beeps, your keyboard is operating correctly.
- Check all cables for loose or incorrect connections.
- Wake the computer by pressing the power button or any key on the keyboard. If the system remains in standby, shut down the system by pressing and holding the power button for at least four seconds. Then press the power button again to restart the system.

  If the system does not shut down, unplug the power cord, wait a few seconds, and then plug it in again. If the system does not restart, press the power button.
- Be sure that all required device drivers have been installed. For example, if you have connected a printer, you must install a printer driver.
- If you are working on a network, use another cable to plug your computer into the network connection. If you still cannot connect, there might be a problem with the network plug.
- If you recently added new hardware, remove the hardware to see whether the computer functions properly.
- If you recently installed new software, uninstall the software to see whether the computer functions properly.
- If the display panel on an all-in-one computer is blank, open the computer and be sure that both ends of the cable between the system board and the display panel are connected. If you are using a graphics card, verify that the card is properly installed.

- Upgrade the BIOS. A new release of the BIOS might have been released that supports new features or fixes your problem.
- For more detailed information, see the troubleshooting chapter in the *Maintenance and Service Guide* at http://www.hp.com/support.

Customer Self Repair

Under the Customer Self Repair programs, you can order a replacement part and install the part without on-site HP technical assistance. Customer Self Repair might be required for some components. For more information, go to http://www.hp.com/go/selfrepair and select your product.

NOTE: Some components are not eligible for Customer Self Repair and must be returned to HP for service. Call support for further instructions before attempting to remove or repair these components.

Blink or beep codes: interpreting POST diagnostic LEDs and audible codes

If the power LED on the computer is flashing or if you hear beeps, see the *Maintenance and Service Guide* (English only) for interpretation and recommended action.

Basic troubleshooting

WARNING! When the computer is plugged into an AC power source, voltage is always applied to the system board. To reduce the risk of personal injury from electrical shock and/or hot surfaces, be sure to disconnect the power cord from the wall outlet and allow the internal system components to cool before you touch them.

If you are having problems with the computer, try the appropriate solutions as described in the previous sections and summarized below to try to isolate the exact problem before calling for technical support.

- If the screen is blank, plug the monitor into a different video port on the computer if one is available. Or, replace the monitor with a monitor that you know is functioning properly.
- If you are working on a network:
  - Use a different network cable to connect your computer to the network.
  - Connect a different computer with a different cable to the network.

  If your problem is not resolved, the network jack on your computer or the network wall jack might be faulty.
- If you recently added new hardware, remove the hardware.
- If you recently installed new software, uninstall the software.
- If the computer will turn on but will not boot into the operating system, run the “pre-boot” diagnostics utility, HP PC Hardware Diagnostics. See Using HP PC Hardware Diagnostics (UEFI) on page 36.
- If the computer will boot into the operating system and Internet access is available, you may access HP Instant Support Professional Edition at http://www.hp.com/go/ispe.

HP Support

Online support

Online support resources include web-based troubleshooting tools, technical knowledge databases, driver and patch downloads, online communities, and product change notification services.

The following websites are also available to you:

- http://www.hp.com—Provides useful product information.
- http://www.hp.com/support—Provides the latest online documentation and worldwide technical support.
- https://support.hp.com/us-en/products/workstations-thin-clients/—Provides technical support information for computers.
- http://www.hp.com/support/workstation_swdrivers—Provides access to software and drivers for computers.

Customer support for workstations and thin clients

1. Go to https://support.hp.com/us-en/products/workstations-thin-clients/.
2. Search for your product.
3. Select **Troubleshooting**.
4. Select the problem that you are troubleshooting.

Advisories and Bulletins and Notices

To find advisories and bulletins and notices:

1. Go to https://support.hp.com/us-en/products/workstations-thin-clients/.
2. Select your product.
3. Select **Advisories** or **Bulletins and Notices**.
4. Select an item for viewing.

Product Change Notifications

Product Change Notifications (PCNs) are proactive notifications for product changes occurring within a 30- to 60-day window of the effective date of the change in the manufacturing process. PCNs give you advance notice of changes to your product, such as an updated BIOS version that you might decide to download before the product change is required. To view a list of PCNs, go to the **Bulletins and Notices** page for your product.

Calling support

At times you might encounter an issue that requires support. Before you call support:

- Have the computer readily accessible.
- Write down the computer serial numbers, product numbers, model names, and model numbers and have them in front of you. This information is provided on labels. For label locations, see Product information on page 1.
- Note any applicable error messages.
- Note any add-on options.
- Note the operating system.
- Note any third-party hardware or software.
- Note the details of any blinking lights on the front of the computer (tower and desktop configurations) or on the side of the computer (all-in-one configurations).
- Note the applications you were using when you encountered the problem.

NOTE: When calling in for service or support, you might be asked for the product number (example: PS988AV) of the computer. If the computer has a product number, it is generally located next to the 10- or 12-digit serial number of the computer.

NOTE: The serial number and product number labels can be found on the rear panel of the computer.

For a support phone number, go to http://www.hp.com/support, select your region, and then, under **Customer Support**, select **Contact Support**.

Locating warranty information

To locate warranty information, go to http://h20565.www2.hp.com/hpsc/wc/public/home. HP Care Pack Services offer upgraded service levels to extend and expand a standard product warranty.

NOTE: For sales information and warranty upgrades (HP Care Packs), call your local authorized service provider or dealer.

8 Using HP PC Hardware Diagnostics (UEFI)

HP PC Hardware Diagnostics is a Unified Extensible Firmware Interface (UEFI) that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs outside the operating system so that it can isolate hardware failures from issues that are caused by the operating system or other software components.

When HP PC Hardware Diagnostics (UEFI) detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. This ID code can then be provided to support to help determine how to correct the problem.

NOTE: To start diagnostics on a convertible computer, your computer must be in notebook mode and you must use the keyboard attached.

To start HP PC Hardware Diagnostics (UEFI), follow these steps:

1. Turn on or restart the computer, and quickly press esc.
2. Press f2.

   The BIOS searches three places for the diagnostic tools, in the following order:

   a. Connected USB drive

      NOTE: To download the HP PC Hardware Diagnostics (UEFI) tool to a USB drive, see Downloading HP PC Hardware Diagnostics (UEFI) to a USB device on page 37.

   b. Hard drive

   c. BIOS
3. When the diagnostic tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.

NOTE: If you need to stop a diagnostic test, press esc.

Downloading HP PC Hardware Diagnostics (UEFI) to a USB device

NOTE: The HP PC Hardware Diagnostics (UEFI) download instructions are provided in English only, and you must use a Windows computer to download and create the HP UEFI support environment because only .exe files are offered.

There are two options to download HP PC Hardware Diagnostics to a USB device.

Download the latest UEFI version

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.
2. In the HP PC Hardware Diagnostics section, select the **Download** link, and then select **Run**.

Download any version of UEFI for a specific product

1. Go to http://www.hp.com/support.
2. Select **Get software and drivers**.
3. Enter the product name or number.
4. Select your computer, and then select your operating system.
5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

9 Routine care

General cleaning safety precautions

- Never use solvents or flammable solutions to clean the computer.
- Never immerse any component in water or cleaning solutions; apply any liquids to a clean cloth and then use the cloth on the component.
- Always unplug the computer before cleaning the keyboard, mouse, or air vents.
- Always disconnect the keyboard before cleaning it.
- Wear safety glasses equipped with side shields when cleaning the keyboard.

Cleaning the chassis

- Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the computer.
- To remove light stains or dirt, use plain water with a clean, lint-free cloth or swab.
- For stronger stains, use a mild dishwashing liquid diluted with water. Rinse well by wiping the computer with a cloth or swab dampened with clear water.
- For stubborn stains, use isopropyl (rubbing) alcohol. No rinsing is required because the alcohol evaporates quickly and does not leave a residue.
- After cleaning, always wipe the computer with a clean, lint-free cloth.
- Occasionally, clean the air vents on the computer. Lint and other foreign matter can block the vents and limit the airflow.

Cleaning the keyboard

⚠ **CAUTION:** Use safety glasses equipped with side shields before attempting to clean debris from under the keys.

- If the keyboard has an on/off switch, turn it off.
- Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the computer.
- Visible debris underneath or between the keys can be removed by vacuuming or shaking.
- Canned, pressurized air can be used to clean debris from under the keys. Use caution because too much air pressure can dislodge lubricants applied under the wide keys.
- To remove a key, use a specially designed key remover to prevent damage to the keys. This tool is available from many electronics supply outlets.

⚠ **CAUTION:** Never remove a wide key (like the space bar key) from the keyboard. If these keys are improperly removed or installed, the keyboard might not function properly.

- Clean under a key with a swab moistened with isopropyl alcohol and squeezed out. Be careful not to wipe away lubricants necessary for proper key functions. Allow the parts to air dry before reassembly.
- Use tweezers to remove any fibers or dirt in confined areas.

Cleaning the monitor

- Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the monitor.
- To clean the monitor, wipe the monitor screen with a towelette designed for cleaning monitors or a clean cloth moistened with water.

CAUTION: Do not use sprays or aerosols directly on the screen—the liquid might seep into the housing and damage a component.

Never use solvents or flammable liquids on the monitor because display or housing damage may result.

Cleaning the mouse

1. Follow the safety precautions in the *Maintenance and Service Guide* for your computer before cleaning the mouse.
2. If the mouse has an on/off switch, turn it off.
3. Wipe the body of the mouse with a damp cloth.
4. Clean the following components as directed:
   - Laser or LED—Use a cotton swab dampened with cleaning solution to gently brush out any dust around the laser or LED, and then wipe again with a dry swab. Do not wipe the laser or LED directly with the swab.
   - Scroll wheel—Spray canned, pressurized air into the gap between the scroll wheel and the click buttons. Do not blow air directly on one spot for very long or condensation can form.
   - Roller ball—Remove and clean the roller ball, remove any debris from the ball socket, wipe out the socket with a dry cloth, and reassemble the mouse.

10 Accessibility

HP designs, produces, and markets products and services that can be used by everyone, including people with disabilities, either on a stand-alone basis or with appropriate assistive devices. To access the latest information on HP accessibility, go to http://www.hp.com/accessibility.

Supported assistive technologies

HP products support a wide variety of operating system assistive technologies and can be configured to work with additional assistive technologies. Use the Search feature on your device to locate more information about assistive features.

NOTE: For additional information about a particular assistive technology product, contact customer support for that product.

Contacting support

We are constantly refining the accessibility of our products and services and welcome feedback from users. If you have an issue with a product or would like to tell us about accessibility features that have helped you, please contact us at +1 (888) 259-5707, Monday through Friday, 6 a.m. to 9 p.m. North American Mountain Time. If you are deaf or hard-of-hearing and use TRS/VRS/WebCapTel, contact us if you require technical support or have accessibility questions by calling +1 (877) 656-7058, Monday through Friday, 6 a.m. to 9 p.m. North American Mountain Time.

NOTE: Support is in English only.

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