User Guide

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 Manuals.

Software terms

Safety warning notice

> **⚠ WARNING!**   To reduce the possibility of heat-related injuries or of overheating the computer, do not place the computer directly on your lap or obstruct the computer air vents. Use the computer only on a hard, flat surface. Do not allow another hard surface, such as an adjoining optional printer, or a soft surface, such as pillows or rugs or clothing, to block airflow. Also, do not allow the AC adapter to come into contact with the skin or a soft surface, such as pillows or rugs or clothing, during operation. The computer and the AC adapter comply with the user-accessible surface temperature limits defined by applicable safety standards.

About this guide

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

⚠ 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). Warns 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.

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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, and then click the link. Click **Search all QuickSpecs**, type your model name in the search box, and then click **Go**.
Regulatory, Safety, and Environmental Notices	See the *Regulatory, Safety, and Environmental Notices* for product regulatory information. You can also see the Agency/Environmental label. To access this guide: ▲ Type `HP Documentation` in the taskbar search box, and then select **HP Documentation**.
System board	A diagram of the system board is located on the inside of the chassis. Additional information is located in the computer *Maintenance and Service Guide* on the Web at http://www.hp.com/support. Follow the instructions to find your product, and then select **User Guides**.
Serial number, Agency/Environmental, and operating system labels	The serial number, Agency/Environmental, and operating system labels might be on the bottom of the computer, on the rear panel of the computer, or under the service door.

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 access this document: ▲ Type `HP Documentation` in the taskbar search box, and then select **HP Documentation**. – or – ▲ Go to http://www.hp.com/go/orderdocuments. **IMPORTANT:** You must be connected to the Internet to access the latest version of the warranty.

Table 1-2 Where to find support information (continued)

Topic	Location
	You can find your HP Limited Warranty located with the user guides on your product. The warranty might be provided on a CD or DVD provided in the box. In some countries or regions, HP might 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, PO Box 161, Kitchener Road Post Office, Singapore 912006. Include your name, phone number, address, and product name.

Product documentation

Table 1-3 Where to find product documentation

Topic	Location
HP user documentation, white papers, and third-party documentation	User documentation is located on your hard drive. Type `HP Documentation` in the taskbar search box, and then select **HP Documentation**. For the latest online documentation, go to http://www.hp.com/support and follow the instructions to find your product. Then select **User Guides**. 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 application 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/.
Bulletins and Notices	To find advisories, bulletins, and notices: 1. Go to http://www.hp.com/support. 2. Follow the instructions to find your product. 3. Select **Advisories** or **Bulletins and Notices**.

Product diagnostics

Table 1-4 Where to find diagnostics tools

Topic	Location
Diagnostics tools	For additional information, see the computer *Maintenance and Service Guide* at http://www.hp.com/support. Follow the instructions to find your product, and then select **User Guides**.
Audible beep and light code definitions	See the computer *Maintenance and Service Guide* at http://www.hp.com/support. Follow the instructions to find your product, and then select **User Guides**.
POST error codes	See the computer *Maintenance and Service Guide* at http://www.hp.com/support. Follow the instructions to find your product, and then select **User Guides**.

Product updates

Topic	Location
Driver and BIOS updates	Go to http://www.hp.com/support and select **Get software and drivers** to verify that you have the latest drivers for the computer.
Operating systems	For information about Windows operating systems, go to http://www.support.microsoft.com.

2 Computer features

Standard configuration features

Features vary depending on the model. For support assistance and to learn more about the hardware and software installed on your computer model, run the HP Support Assistant utility.

NOTE: You can use this computer model in a tower orientation or a desktop orientation. In a tower orientation, you must use a stand for support.

Front panel components

Drive configuration varies by model. Some models have a bezel blank that covers one or more drive bays.
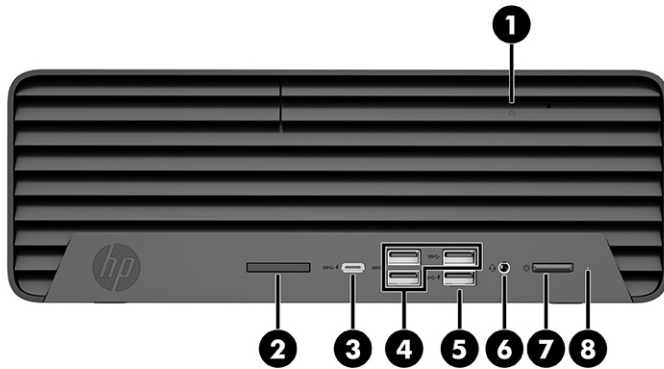
Table 2-1 Identifying the front panel components

Front panel components					
1		Slim optical drive (select products only)	5	⚡ SS⟋	USB port with HP Sleep and Charge
2	▲	Memory card reader (select products only)	6	🎧	Audio-out (headphone)/Audio-in (microphone) combo jack
3	⚡ SS⟋	USB Type-C charging port	7	⏻	Power button
4	SS⟋	USB SuperSpeed ports (3)	8	⬱	Hard drive activity light

NOTE: The combo jack supports headphones, line output devices, microphones, line input devices, or CTIA style headsets.

NOTE: The light on the power button is normally white when the power is on. If the light flashes red, the computer displays a diagnostic code to indicate a problem. See the *Maintenance and Service Guide* to interpret the code.

Rear panel components
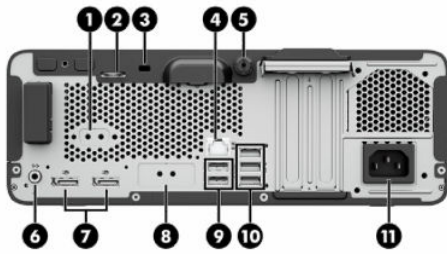
Table 2-2 Identifying the rear panel components

Rear panel components

1	IOIOI A	Serial port (optional)	7	‡▷	DisplayPort™ monitor connectors (2)
2		Cable lock tab	8		Optional port
3	🔒	Security lock	9	↜	USB ports (2)
4	⎕⎕	RJ-45 (network) jack	10	SS↜	USB SuperSpeed ports (3)
5		Thumbscrew	11		Power cord connector
6	((•↦	Audio-out jack for powered audio devices			

NOTE: Your model might have additional optional ports available from HP.

When a graphics card is installed in one of the system board slots, you can use the video connectors on the graphics card or the integrated graphics on the system board. The specific graphics card installed and software configuration determines the behavior.

You can disable the system board graphics by changing settings in BIOS F10 Setup.

Serial number location

Each computer has a unique serial number and a product ID number that are located on the exterior of the computer. Keep these numbers available when contacting customer service for assistance.
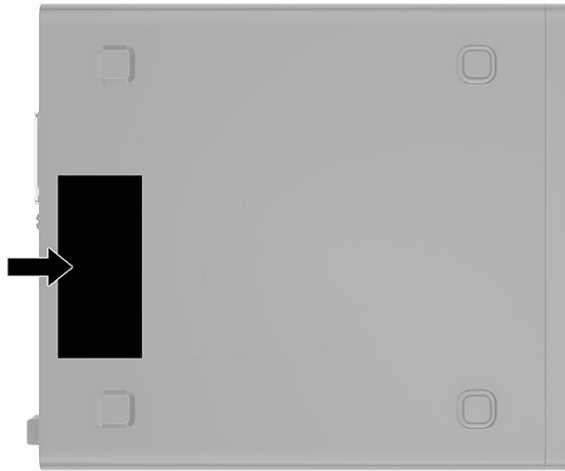
3 Hardware upgrades

Serviceability features

The computer includes features that make it easy to upgrade and service. A Torx T15 or flat-bladed screwdriver is needed for some of the installation procedures described in this chapter.

Warnings and cautions

Before performing upgrades, be sure to carefully read all of the applicable instructions, cautions, and warnings in this guide.

⚠ **WARNING!**   To reduce the risk of personal injury from electrical shock, hot surfaces, or fire:

Disconnect the power cord from the AC outlet, and allow the internal system components to cool before you touch them.

Do not plug telecommunications or telephone connectors into the network interface controller (NIC) receptacles.

Do not disable the power cord grounding plug. The grounding plug is an important safety feature.

Plug the power cord into a grounded (earthed) outlet that is easily accessible at all times.

To reduce the risk of serious injury, read the *Safety & Comfort Guide*. It describes proper workstation setup, and proper posture, health, and work habits for computer users. The *Safety & Comfort Guide* also provides important electrical and mechanical safety information. The *Safety & Comfort Guide* is available on the web at http://www.hp.com/ergo.

⚠ **WARNING!**   There are energized and moving parts inside.

Disconnect power to the equipment before removing the enclosure.

Replace and secure the enclosure before re-energizing the equipment.

📝 **IMPORTANT:**   Static electricity can damage the electrical components of the computer or optional equipment. Before beginning these procedures, be sure that you are discharged of static electricity by briefly touching a grounded metal object.

When the computer is plugged into an AC power source, voltage is always applied to the system board. To prevent damage to internal components, you must disconnect the power cord from the power source before opening the computer.

Preparing for disassembly

1. Remove or disengage any security devices that prohibit opening the computer.

2. Remove all removable media, such as compact discs and USB flash drives, from the computer.

3. Turn off the computer properly through the operating system, and turn off any external devices.

4. Disconnect the power cord from the AC outlet and disconnect any external devices.

    IMPORTANT: Regardless of the power state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. To prevent damage to internal components, you must disconnect the AC power cord from the power source before opening the computer.

Removing the computer access panel

To access internal components, you must remove the access panel.

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. Loosen the access panel screw (1), pull the access panel toward the back side of the computer and lift it off the computer (2).
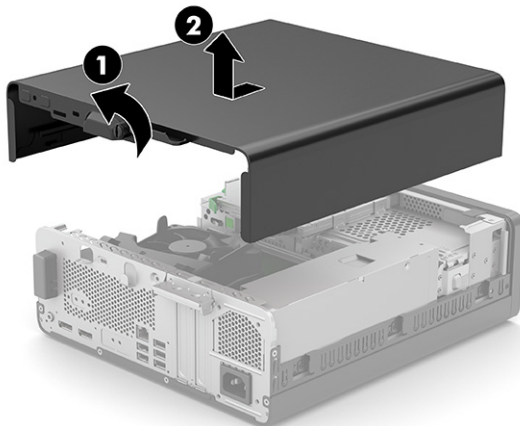
Replacing the computer access panel

Slide the panel down, and towards the front of the computer (1). Tighten the access panel screw to secure the access panel (2).
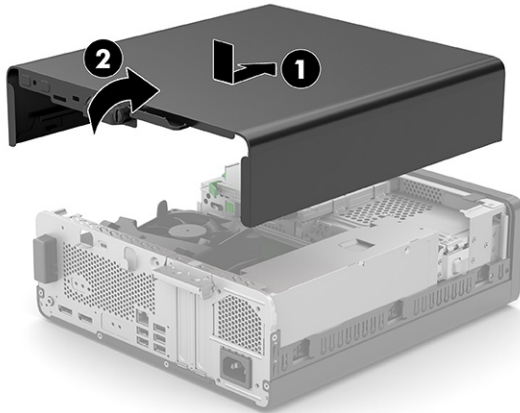
Removing a slim optical drive bezel blank

On some models, a bezel blank covers the slim optical drive bay. Remove the bezel blank before installing an optical drive. To remove the bezel blank:

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. Remove the computer access panel. See Removing the computer access panel on page 9.

3. Remove the data cable (1),, and then remove the serial port cable (2). Press the tab on the left side of the blank (3), and then rotate the blank off the front bezel (2).

4. Disconnect the date cable and the power cable. Press the lever (3), and remove the slim optical drive bezel blank (4).
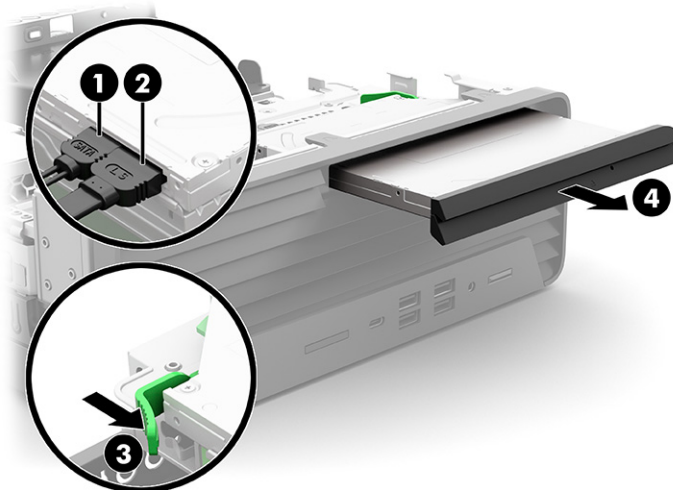
Removing the front bezel

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. Remove the computer access panel. See Removing the computer access panel on page 9.

3. Lift up the three tabs on the top of the bezel (1), and then rotate the bezel off the chassis (2).
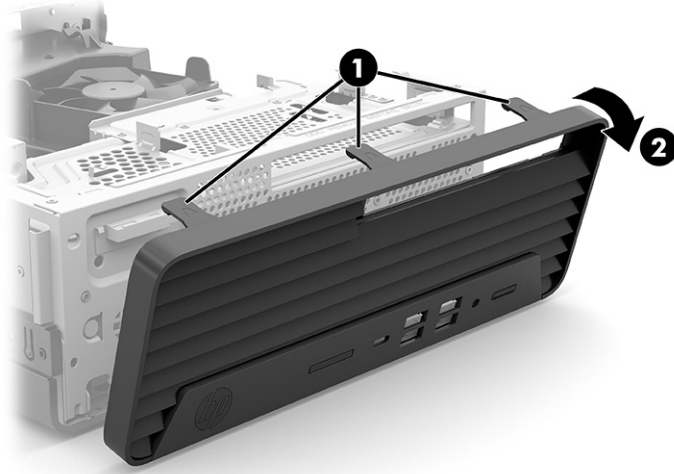
Replacing the front bezel

Insert the three hooks on the bottom of the bezel into the rectangular holes on the chassis (1), and then rotate the top of the bezel onto the chassis (2) and snap it in place.
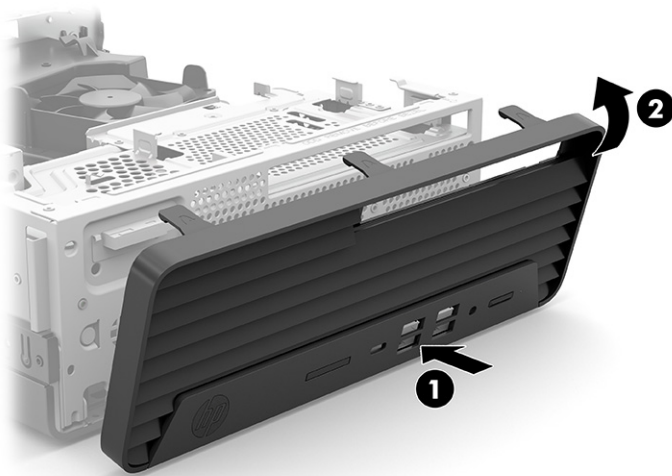
Removing and installing the optional front bezel dust filter

Some models are equipped with an optional front bezel dust filter. You must periodically clean the dust filter so that the dust collected on the filter does not impede air flow through the computer.

NOTE: The optional front bezel dust filter is available from HP.

To remove, clean, and replace the dust filter:

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. To remove the dust filter, use your fingers to separate the filter from the front bezel as shown in the following illustration.
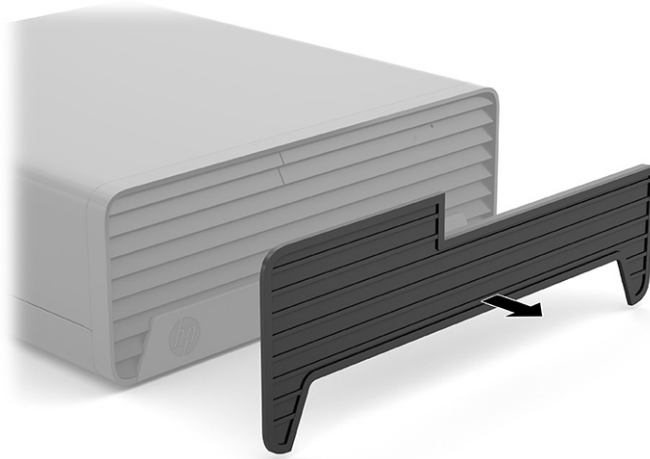
3. Use a soft brush or cloth to clean dust from the filter. If the computer is heavily soiled, rinse the filter clean with water.

4. To replace the dust filter, press the filter firmly onto the front bezel as shown in the following illustration.
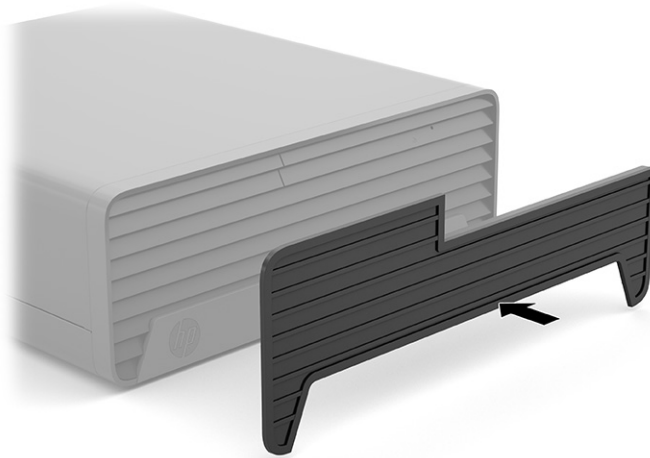
5. Reconnect the power cord and any external devices, and then turn on the computer.

Changing from desktop to tower orientation

The Small Form Factor computer can be used in a tower orientation with an optional tower stand that can be purchased from HP.

NOTE: To stabilize the computer in a tower orientation, HP recommends the use of the optional tower stand.

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. Orient the computer so that its right side is facing down and place the computer in the optional stand.

3. Reconnect the power cord and any external devices, and then turn on the computer.

NOTE: Be sure that at least 10.2 centimeters (4 inches) of space on all sides of the computer remains clear and free of obstructions.

4. Lock any security devices that were disengaged before the computer was moved.

System board connections

Refer to the following illustration and table to identify the system board connectors for your model.
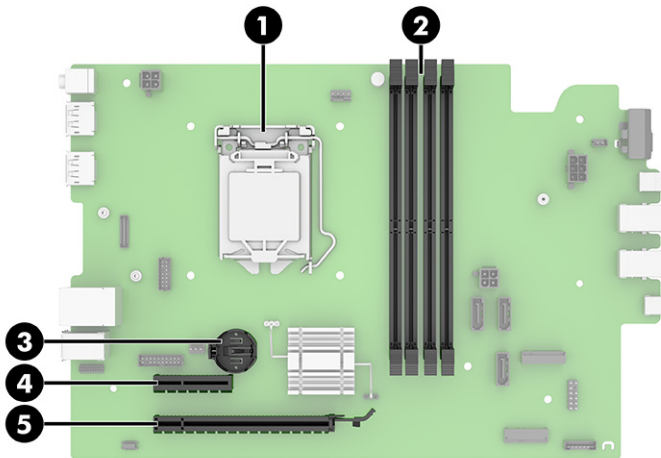
Table 3-1 System board connectors

Item	System board connector	System board label	Color	Component
1	Computer processing unit		Black	Computer processing unit
2	DIMM3 (Channel A)	DIMM3	Black	Memory modules
3	Battery	BAT	Black	Battery
4	PCI Express ×1	X1PCIEXP	Black	Expansion card
5	PCI Express ×16	X16PCIEXP	Black	Expansion card

Upgrading system memory

The computer comes with double data rate 4 synchronous dynamic random access memory (DDR4-SDRAM) dual inline memory modules (DIMMs).

The memory sockets on the system board are populated with at least one preinstalled memory module. To achieve the maximum memory support, you can populate the system board with up to 64 GB of memory configured in a high-performing dual-channel mode.

For proper system operation, the DIMMs must adhere to the following specifications:

● Industry-standard 288-pin

● Unbuffered non-ECC PC4-19200 DDR4-2400/2666 MHz-compliant

● 1.2 volt DDR4-SDRAM memory modules

● CAS latency 17 DDR4 2400/2666 MHz (17-17-17 timing)

● Mandatory JEDEC SPD information

The computer supports the following:

● 512 Mb, 1 Gb, 2 Gb, and 4 Gb non-ECC memory technologies

● Single-sided and double-sided memory modules

● Memory modules constructed with ×8 and ×16 DDR devices; memory modules constructed with ×4 SDRAM are not supported

NOTE: The system does not operate properly if you install unsupported memory modules.

Installing a memory module

There are four memory sockets on the system board, with two sockets per channel. The sockets are labeled DIMM1, DIMM2, DIMM3, and DIMM4. Sockets DIMM1 and DIMM2 operate in memory channel B. Sockets DIMM3 and DIMM4 operate in memory channel A.

The system will automatically operate in single-channel mode, dual-channel mode, or flex mode, depending on how the DIMMs are installed.

NOTE: Single-channel and unbalanced dual-channel memory configurations will result in inferior graphics performance.

● The system will operate in single-channel mode if the DIMM sockets are populated in one channel only.

● The system will operate in a higher-performing dual-channel mode if the total memory capacity of the DIMMs in Channel A is equal to the total memory capacity of the DIMMs in Channel B. The technology and device width can vary between the channels. For example, if Channel A is populated with two 1 GB DIMMs and Channel B is populated with one 2 GB DIMM, the system will operate in dual-channel mode.

● The system will operate in flex mode if the total memory capacity of the DIMMs in Channel A is not equal to the total memory capacity of the DIMMs in Channel B. In flex mode, the channel populated with the least amount of memory describes the total amount of memory assigned to dual channel and the remainder is assigned to single channel. For optimal speed, the channels should be balanced so that the largest amount of memory is spread between the two channels. If one channel will have more memory than the other, the larger amount should be assigned to Channel A. For example, if you are populating the sockets with one 2 GB DIMM, and three 1 GB DIMMs, Channel A should be populated with the 2 GB

DIMM and one 1 GB DIMM, and Channel B should be populated with the other two 1 GB DIMMs. With this configuration, 4 GB will run as dual-channel and 1 GB will run as single-channel.

● In any mode, the maximum operational speed is determined by the slowest DIMM in the system.

IMPORTANT: You must disconnect the power cord and wait approximately 30 seconds for the power to drain before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged into an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

The memory module sockets have gold-plated metal contacts. When upgrading the memory, it is important to use memory modules with gold-plated metal contacts to prevent corrosion and/or oxidation resulting from having incompatible metals in contact with each other.

Static electricity can damage the electronic components of the computer or optional cards. Before beginning these procedures, ensure that you are discharged of static electricity by briefly touching a grounded metal object.

When handling a memory module, be careful not to touch any of the contacts. Doing so may damage the module.

1. Prepare for disassembly. See Prephering for disassembly on page 9.

2. Remove the computer access panel. See Removing the computer access panel on page 9.

⚠ **WARNING!** To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before you touch them.

3. Open both latches of the memory module socket (1), and insert the memory module into the socket (2). Press the module down into the socket, ensuring that the module is fully inserted and properly seated. Make sure the latches are in the closed position (3).
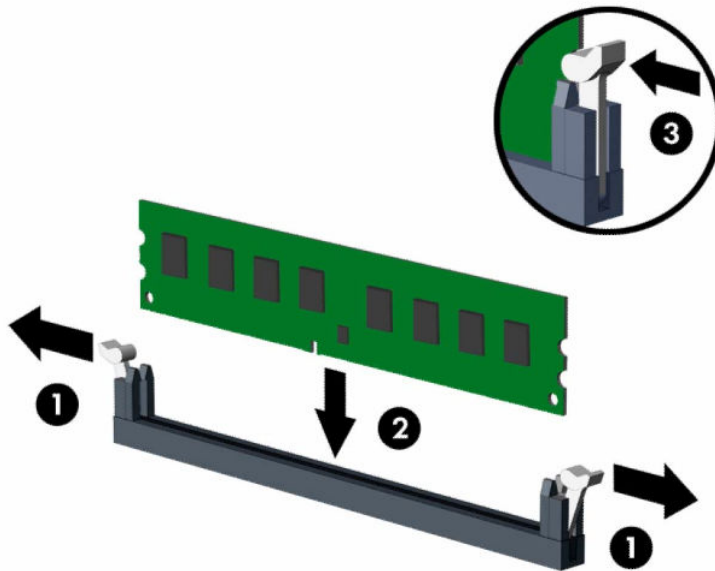
> **NOTE:** A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.
>
> Populate the black DIMM sockets before the white DIMM sockets.
>
> For maximum performance, populate the sockets so that the memory capacity is spread as equally as possible between Channel A and Channel B.

4. Repeat step 3 to install any additional modules.

5. Replace the computer access panel.

6. Reconnect the power cord and any external devices, and then turn on the computer. The computer should automatically recognize the additional memory.

7. Lock any security devices that were disengaged when the access panel was removed.

Removing or installing an expansion card

The computer has one PCI Express ×4 expansion socket and one PCI Express ×16 expansion socket.

NOTE: The PCI Express sockets support only low profile cards.

You can install a PCI Express ×1, ×4, ×8, or ×16 expansion card in the PCI Express ×16 socket.

For dual graphics card configurations, the first (primary) card must be installed in the PCI Express ×16 socket.

To remove, replace, or add an expansion card:

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. If the computer is on a stand, remove the computer from the stand.

3. Remove the computer access panel. See Removing the computer access panel on page 9.

4. Locate the correct vacant expansion socket on the system board and the corresponding expansion slot on the back of the computer chassis.

5. Rotate the slot cover release latch to the open position (1). Release the slot cover (2), and then remove the expansion card (3).
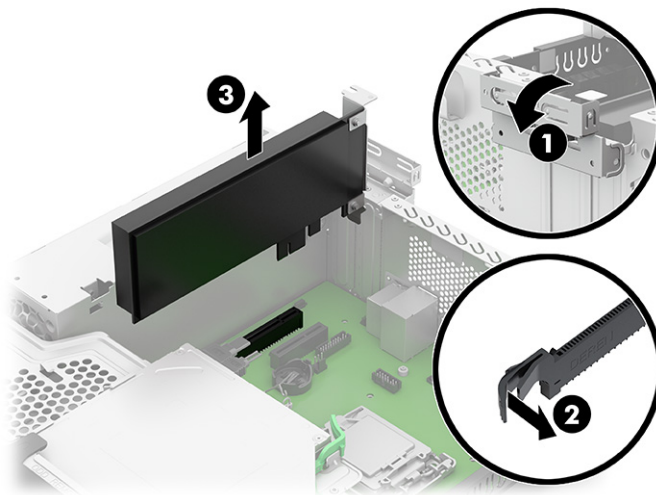
6. Before installing an expansion card, remove the expansion slot cover or the existing expansion card.

    NOTE: Before removing an installed expansion card, disconnect any cables that may be attached to the expansion card.

    a. If you are installing an expansion card in a vacant socket, remove the appropriate expansion slot cover on the back of the chassis. Insert a flat-bladed screwdriver into the slots on the rear of expansion slot cover (1) and then gently rock the screwdriver back and forth to remove it (2).
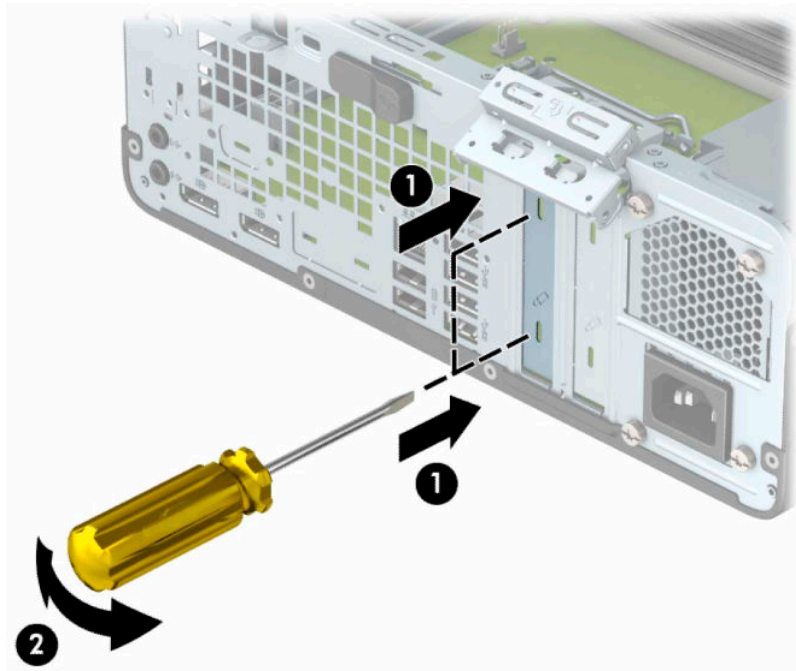
b. If you are removing a PCI Express ×4 card, hold the card at each end and carefully rock it back and forth until the connectors pull free from the socket. Lift the card straight up from the chassis (1) then away from the inside of the chassis (2) to remove it. Be sure not to scrape the card against other components.
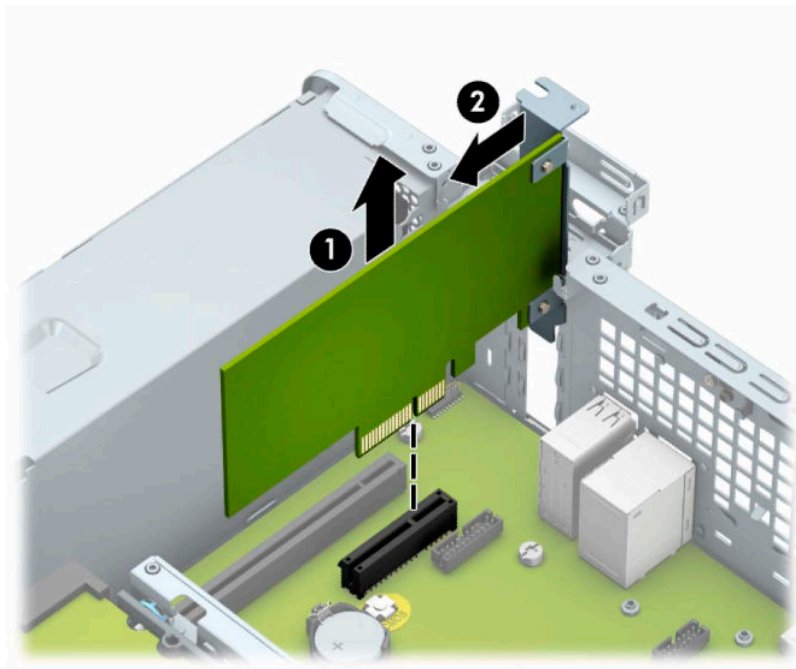
c. If you are removing a PCI Express ×16 card, pull the retention arm on the back of the expansion socket away from the card (1), and carefully rock the card back and forth until the connectors pull free from the socket. Lift the card straight up from the chassis (2) and then away from the inside of the chassis (3) to remove it. Be sure not to scrape the card against other components.
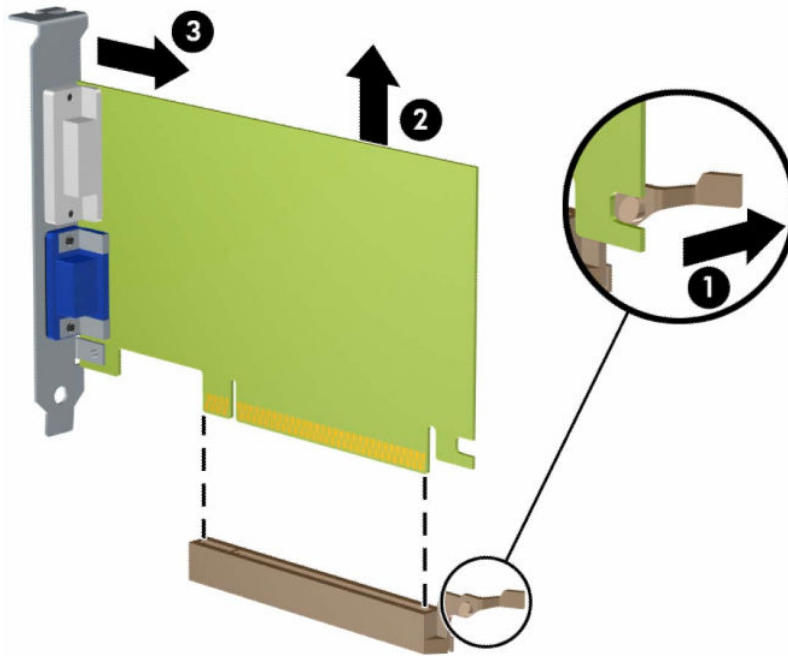
7. Store the removed card in antistatic packaging.

8. If you are not installing a new expansion card, install an expansion slot cover to close the open slot.

IMPORTANT: After removing an expansion card, you must replace it with a new card or expansion slot cover.

9. To install a new expansion card, hold the card just above the expansion socket on the system board then move the card toward the rear of the chassis so that the bottom of the bracket on the card slides into the small slot on the chassis. Press the card straight down into the expansion socket on the system board (1) so that the slot cover retention latch moves into place (2) to secure the expansion card.
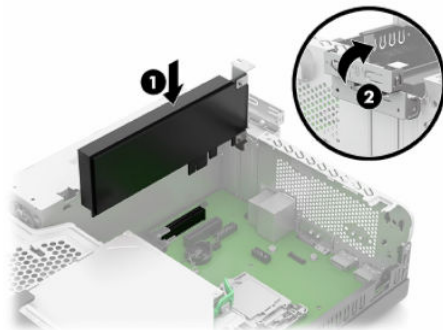
NOTE: When installing an expansion card, press firmly on the card so that the whole connector is seated properly in the expansion card socket.

10. Connect external cables to the installed card, if needed. Connect internal cables to the system board, if needed.

11. Replace the computer access panel.

12. If the computer is on a stand, remove the computer from the stand.

13. Reconnect the power cord and any external devices, and then turn on the computer.

14. Lock any security devices that were disengaged when the access panel was removed.

15. Reconfigure the computer, if necessary.
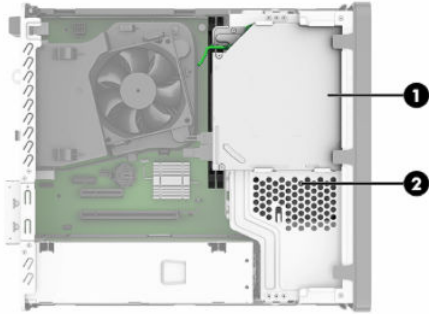
Drive positions

Drive positions	
1	9.5 mm slim optical drive bay
2	3.5 inch hard drive bay

NOTE: The drive configuration on your computer may be different than the drive configuration as shown in the previous illustration.

Removing and installing drives

When installing drives, follow these guidelines:

- The primary Serial ATA (SATA) hard drive must be connected to the dark blue primary SATA connector on the system board labeled SATA0.

- Connect an optical drive to the light blue SATA connector on the system board labeled SATA1.

IMPORTANT: To prevent loss of work and damage to the computer or drive:

If you are inserting or removing a drive, shut down the operating system properly, turn off the computer, and unplug the power cord. Do not remove a drive while the computer is on or in standby mode.

Before handling a drive, be sure that you are discharged of static electricity. While handling a drive, avoid touching the connector.

Handle a drive carefully; do not drop it.

Do not use excessive force when inserting a drive.

Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

If a drive must be mailed, place the drive in a bubble-pack mailer or other protective packaging and label the package "Fragile: Handle With Care."

Removing a 9.5 mm slim optical drive

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. If the computer is on a stand, remove the computer from the stand.

3. Remove the computer access panel. See Removing the computer access panel on page 9.

4. Disconnect the power cable (1) and data cable (2) to the rear of the drive. Push the green release latch on the right rear side of the drive toward the center of the drive (3), and then slide the drive forward and out of the bay (4).

IMPORTANT: When removing the cables, pull the tab or connector instead of the cable itself to avoid damaging the cable.
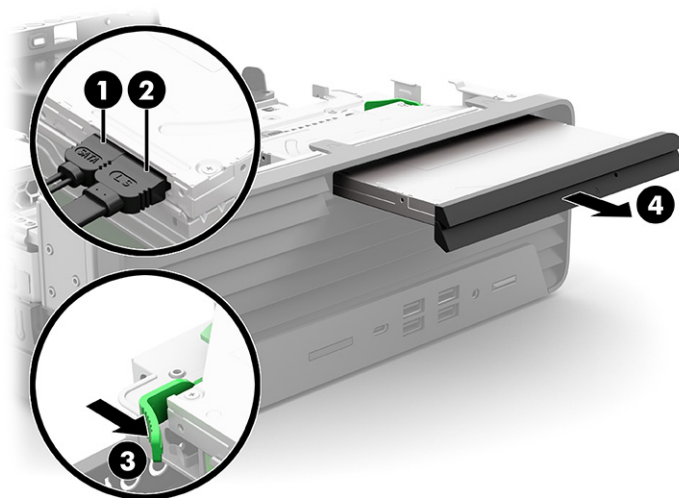
Installing a 9.5 mm slim optical drive

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. If the computer is on a stand, remove the computer from the stand.

3. Remove the computer access panel. See Removing the computer access panel on page 9.

4. If you are installing a slim optical drive in a bay covered by a bezel blank, remove the front bezel and then remove the bezel blank. See Removing a slim optical drive bezel blank on page 10 for more information.

5. Align the small pin on the release latch with the small hole on the side of the drive and press the latch firmly onto the drive.
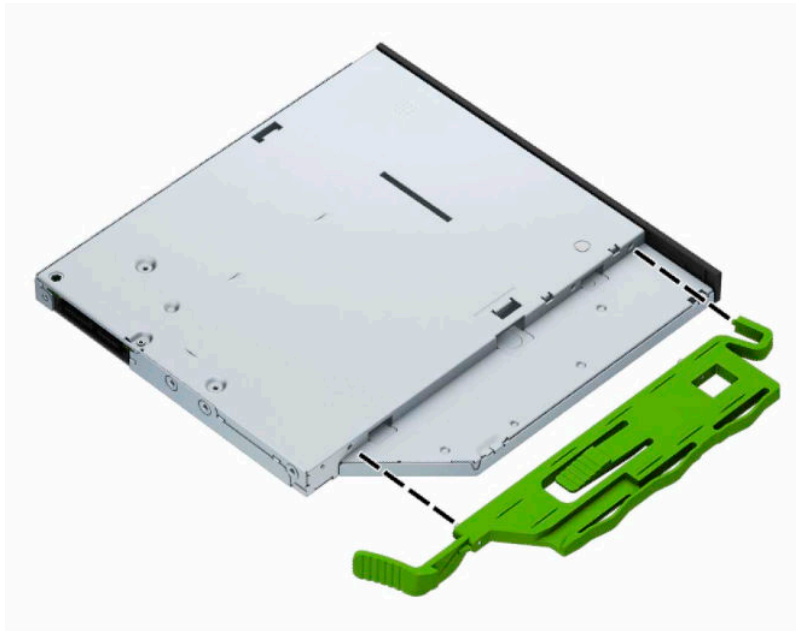
6. Slide the optical drive through the front bezel all the way into the bay so that the latch on the rear of the drive locks into place (1). Connect the power cable (2) and data cable (3) to the rear of the drive.
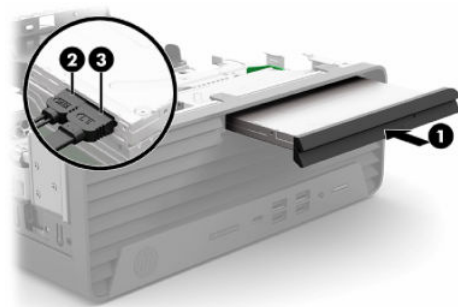
7. Connect the opposite end of the data cable to the light blue SATA connector on the system board labeled SATA1.

   📝 **NOTE:** Refer to System board connections on page 14 for an illustration of the system board drive connectors.

8. Replace the front bezel if it was removed.

9. If the computer is on a stand, remove the computer from the stand.

10. Replace the computer access panel.

11. Reconnect the power cord and any external devices, and then turn on the computer.

12. Lock any security devices that were disengaged when the access panel was removed.

Removing and replacing a 3.5 inch hard drive

📝 **NOTE:**   Before you remove the old hard drive, be sure to back up the data from the old hard drive so that you can transfer the data to the new hard drive.

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. If the computer is on a stand, remove the computer from the stand.

3. Remove the computer access panel. See Removing the computer access panel on page 9.

4. Disconnect the power cable (1) and the data cable (2) from the rear of the hard drive.

📝 **IMPORTANT:**   When removing the cables, pull the tab or connector instead of the cable itself to avoid damaging the cable.
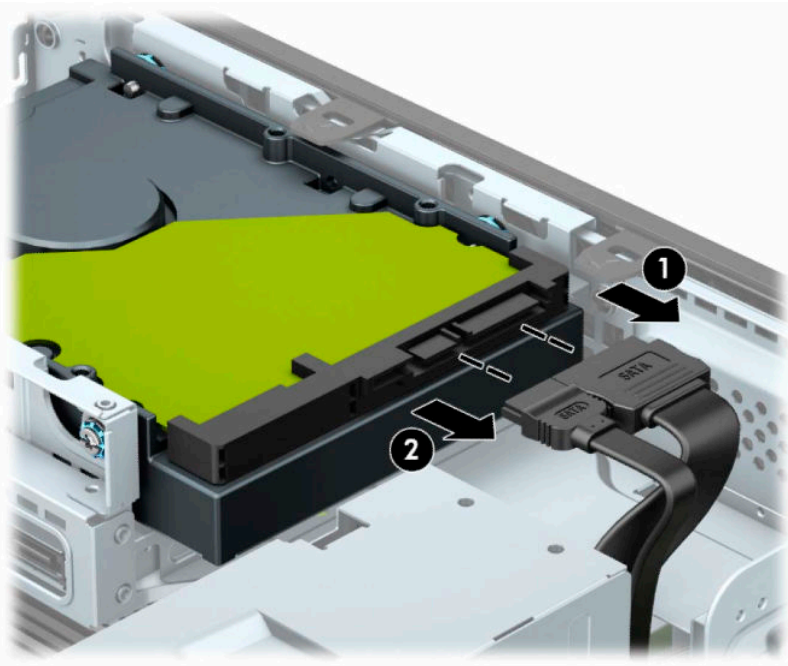
5. Pull the release lever next to the rear of the hard drive away from the drive (1). While pulling the release lever out, slide the drive forward until it stops, and then lift the drive up and out of the bay (2).
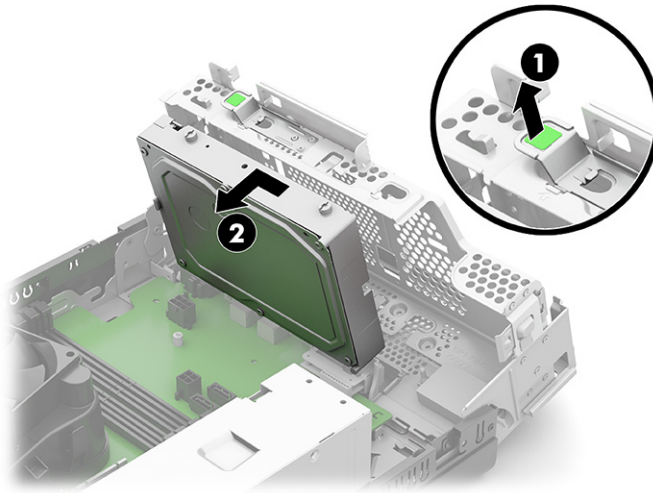
6. Install mounting screws on the sides of the hard drive using standard 6-32 silver-and-blue mounting screws.

📝 **NOTE:** If replacing a 3.5 inch hard drive, transfer the mounting screws from the old hard drive to the new hard drive.

You can purchase extra mounting screws from HP.

● Install four silver-and-blue 6-32 mounting screws (two on each side of the drive).
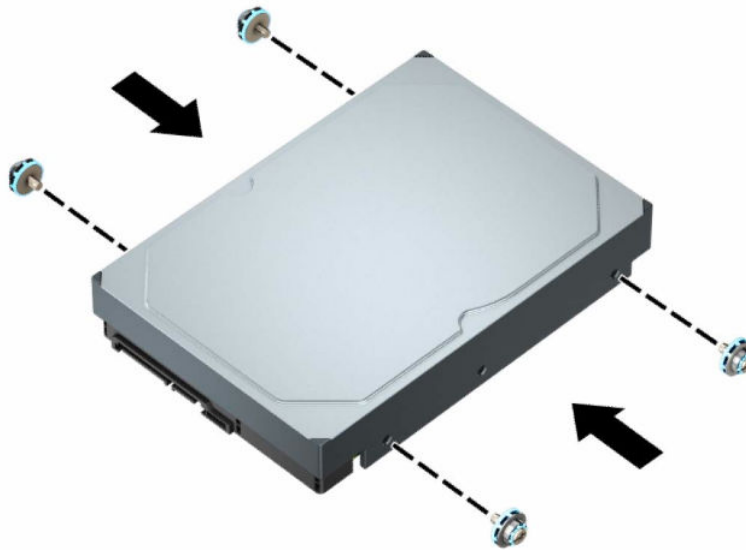
● You can also install a 2.5 inch hard drive into a 3.5 inch drive bay using an adapter bracket similar to the example shown in the following illustration.

— Slide the 2.5 inch drive into the 3.5 inch adapter bracket.
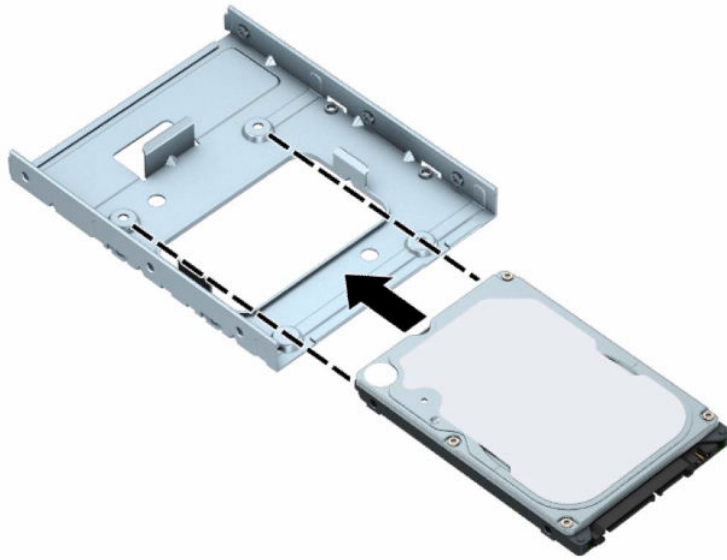
— Secure the drive to the bay adapter bracket by installing four black M3 adapter bracket screws through the underside of the bracket and into the drive.
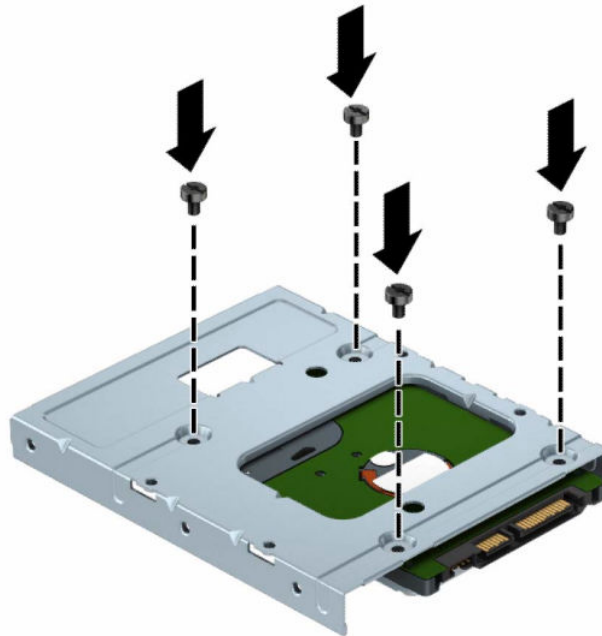
— Install four 6-32 silver-and-blue mounting screws in the adapter bracket (two on each side of the bracket).
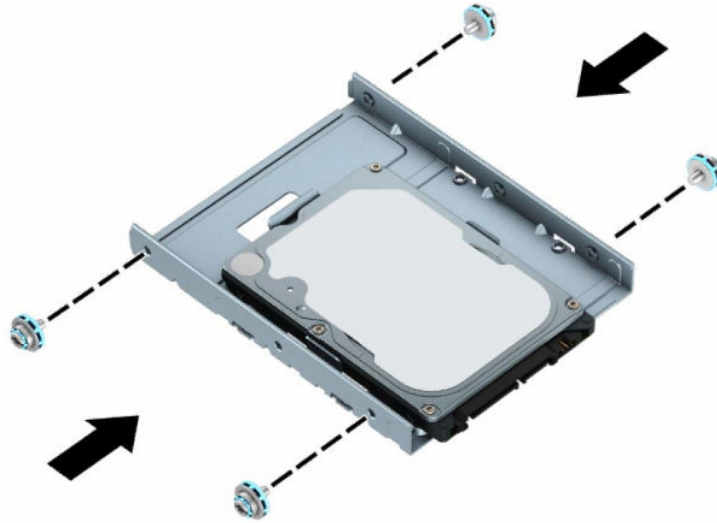
7. Align the mounting screws with the slots on the chassis drive cage, press the hard drive down into the bay, and then slide the drive back until it stops and locks in place.
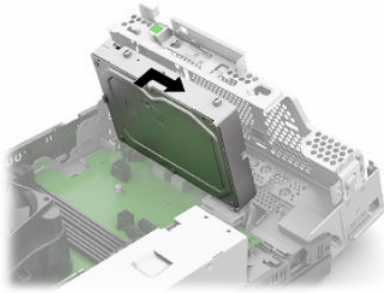
8. Connect the power cable (1) and the data cable (2) to the rear of the hard drive.

📝 **NOTE:** The data cable for the primary hard drive must be connected to the dark blue connector on the system board labeled SATA0 to avoid any hard drive performance problems.
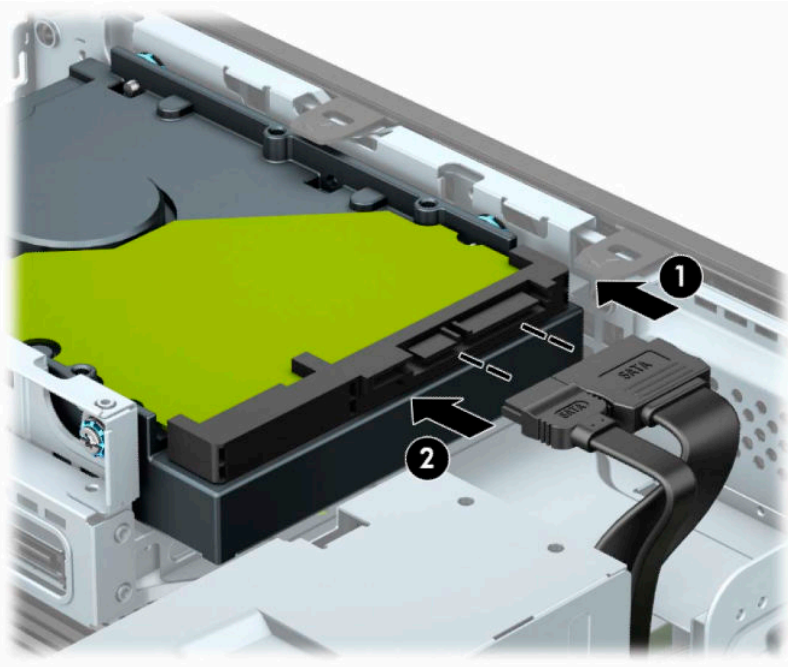

9. If the computer is on a stand, remove the computer from the stand.

10. Replace the computer access panel.

11. Reconnect the power cord and any external devices, and then turn on the computer.

12. Lock any security devices that were disengaged when the access panel was removed.

Removing and installing an M.2 SSD storage card

📝 **NOTE:** The computer supports 2230 and 2280 M.2 SSD cards.

1. Prepare for disassembly. See Preparing for disassembly on page 9.

2. If the computer is on a stand, remove the computer from the stand.

3. Remove the computer access panel. See Removing the computer access panel on page 9.

4. Remove the front bezel.

5. Disconnect the power and data cables from the rear of all drives in the drive cage.

6. Remove the drive cage. Push the release lever on the left side of the cage toward the cage (1), lift the left side of the cage away from the chassis, and then slide the right side of the cage out of the chassis (2).
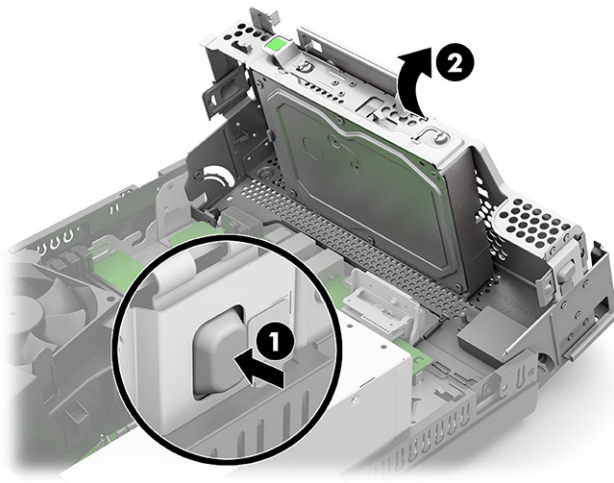
7. To remove an M.2 SSD card, remove the screw that secures the card (1), lift the end of the card away from the chassis (2), and then slide the card out of the system board connector (3).
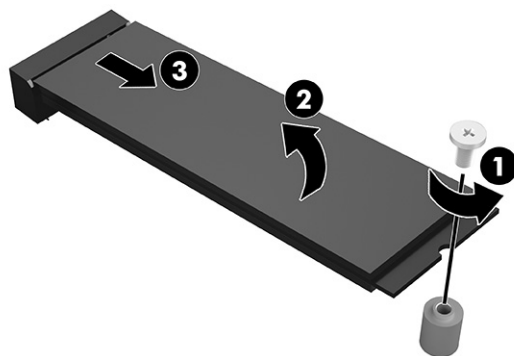
8. To install an M.2 SSD card, slide the pins on the card into the system board connector while holding the card at approximately a 30° angle (1). Press the other end of the card toward the chassis (2), and secure the card with the screw (3).
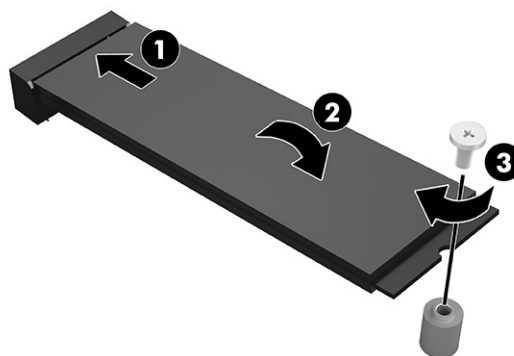
9. Replace the drive cage. Press the left side of the drive cage down onto the chassis.
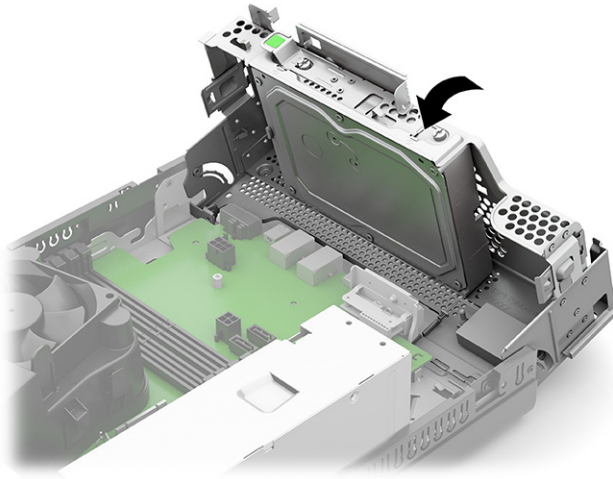
10. Reconnect the power and data cables to all drives in the drive cage.

11. Replace the front bezel.

12. Replace the computer access panel.

13. If the computer was on a stand, replace the stand.

14. Reconnect the power cord and any external devices, and then turn on the computer.

15. Lock any security devices that were disengaged when the access panel was removed.

Installing a security lock

You can use the security locks shown in the following examples.

Cable lock

To install the cable lock:

▲ Pull out the cable lock tab (1), and then install the cable lock (2).
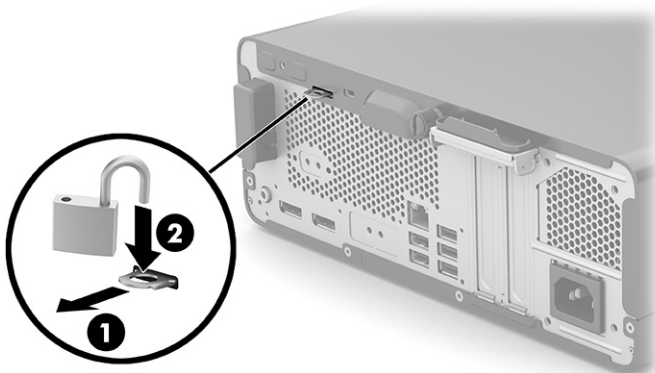
Security cable lock
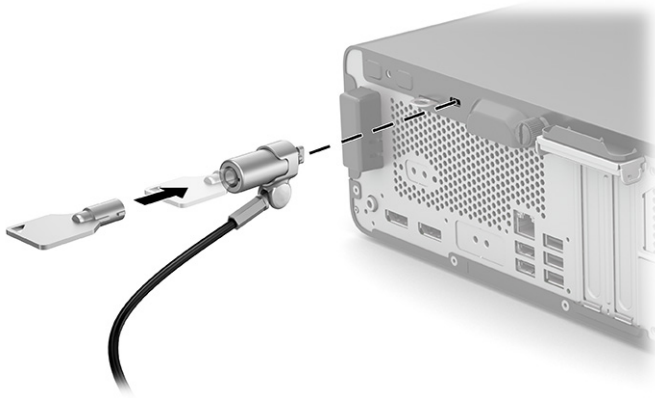
4 Backing up, restoring, and recovering

This chapter provides information about the following processes, which are standard procedure for most products:

- **Backing up your personal information**—You can use Windows tools to back up your personal information (see Using Windows tools on page 32).

- **Creating a restore point**—You can use Windows tools to create a restore point (see Using Windows tools on page 32).

- **Creating recovery media** (select products only)—You can use the HP Cloud Recovery Download Tool (select products only) to create recovery media (see Using the HP Cloud Recovery Download Tool to create recovery media (select products only) on page 32).

- **Restoring and recovery**—Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state (see Using Windows tools on page 32).

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.

Backing up information and creating recovery media

Using Windows tools

IMPORTANT: Windows is the only option that allows you to back up your personal information. Schedule regular backups to avoid information loss.

You can use Windows tools to back up personal information and create system restore points and recovery media.

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

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

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

2. Enter the task you want to perform.

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

Using the HP Cloud Recovery Download Tool to create recovery media (select products only)

You can use the HP Cloud Recovery Download Tool to create HP Recovery media on a bootable USB flash drive.

For details:

▲ Go to http://www.hp.com/support, search for HP Cloud Recovery, and then select the result that matches the type of computer that you have.

NOTE: If you cannot create recovery media yourself, contact support to obtain recovery discs. Go to http://www.hp.com/support, select your country or region, and then follow the on-screen instructions.

Restoring and recovery

Restoring, resetting, and refreshing using Windows tools

Windows offers several options for restoring, resetting, and refreshing the computer. For details, see Using Windows tools on page 32.

Recovering using HP Recovery media

You can use HP Recovery media to recover the original operating system and software programs that were installed at the factory. On select products, it can be created on a bootable USB flash drive using the HP Cloud Recovery Download Tool. For details, see Using the HP Cloud Recovery Download Tool to create recovery media (select products only) on page 32.

NOTE: If you cannot create recovery media yourself, contact support to obtain recovery discs. Go to http://www.hp.com/support, select your country or region, and then follow the on-screen instructions.

To recover your system:

▲ Insert the HP Recovery media, and then restart the computer.

Changing the computer boot order

If your computer does not restart using the HP Recovery media, you can change the computer boot order. This 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, depending on the location of your HP Recovery media.

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, quickly hold down the volume up button, and then select **f9**.

   – or –

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

3. Select the optical drive or USB flash drive from which you want to boot, and then follow the on-screen instructions.

Using HP Sure Recover (select products only)

Select computer models are configured with HP Sure Recover, a PC OS recovery solution built into the hardware and firmware. HP Sure Recover can fully restore the HP OS image without installed recovery software.

Using HP Sure Recover, an administrator or user can restore the system and install:

- Latest version of the operating system
- Platform-specific device drivers
- Software applications, in the case of a custom image

To access the latest documentation for HP Sure Recover, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.

5   Using HP PC Hardware Diagnostics

Using HP PC Hardware Diagnostics Windows (select products only)

HP PC Hardware Diagnostics Windows is a Windows-based utility that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs within the Windows operating system to diagnose hardware failures.

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see Downloading HP PC Hardware Diagnostics Windows on page 35.

After HP PC Hardware Diagnostics Windows is installed, follow these steps to access it from HP Help and Support or HP Support Assistant.

1. To access HP PC Hardware Diagnostics Windows from HP Help and Support:

   a. Select the **Start** button, and then select **HP Help and Support**.

   b. Select **HP PC Hardware Diagnostics Windows**.

   – or –

   To access HP PC Hardware Diagnostics Windows from HP Support Assistant:

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

      – or –

      Select the question mark icon in the taskbar.

   b. Select **Troubleshooting and fixes**.

   c. Select **Diagnostics**, and then select **HP PC Hardware Diagnostics Windows**.

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

   > **NOTE:** To stop a diagnostic test, select **Cancel**.

When HP PC Hardware Diagnostics Windows detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. The screen displays one of the following options:

- A Failure ID link is displayed. Select the link and follow the on-screen instructions.

- Instructions for calling support are displayed. Follow those instructions.

Downloading HP PC Hardware Diagnostics Windows

- The HP PC Hardware Diagnostics Windows downloading instructions are provided in English only.

- You must use a Windows computer to download this tool because only .exe files are provided.

Downloading the latest HP PC Hardware Diagnostics Windows version

To download HP PC Hardware Diagnostics Windows, follow these steps:

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. Select **Download HP Diagnostics Windows**, and then select a location on your computer or a USB flash drive.

The tool downloads to the selected location.

– or –

You can use the following steps to download the HP PC Hardware Diagnostics Windows from the Microsoft Store:

1. Select the Microsoft app on your desktop or enter `Microsoft Store` in the taskbar search box.

2. Enter `HP PC Hardware Diagnostics Windows` in the **Microsoft Store** search box.

3. Follow the on-screen directions.

The tool downloads to the selected location.

Downloading HP Hardware Diagnostics Windows by product name or number (select products only)

📝 **NOTE:** For some products, you might have to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics Windows by product name or number, follow these steps:

1. Go to http://www.hp.com/support.

2. Select **Get software and drivers**, select your type of product, and then enter the product name or number in the search box that is displayed.

3. In the **Diagnostics** section, select **Download**, and then follow the on-screen instructions to select the specific Windows diagnostics version to be downloaded to your computer or USB flash drive.

The tool downloads to the selected location.

Installing HP PC Hardware Diagnostics Windows

To install HP PC Hardware Diagnostics Windows, follow these steps:

▲ Navigate to the folder on your computer or the USB flash drive where the .exe file downloaded, double-click the .exe file, and then follow the on-screen instructions.

Using HP PC Hardware Diagnostics UEFI

📝 **NOTE:** For Windows 10 S computers, you must use a Windows computer and a USB flash drive to download and create the HP UEFI support environment because only .exe files are provided. For more information, see Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive on page 37.

HP PC Hardware Diagnostics UEFI (Unified Extensible Firmware Interface) 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.

If your PC does not start in Windows, you can use HP PC Hardware Diagnostics UEFI to diagnose hardware issues.

When HP PC Hardware Diagnostics UEFI detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. For assistance in solving the problem:

▲ Select **Contact HP**, accept the HP privacy disclaimer, and then use a mobile device to scan the Failure ID code that appears on the next screen. The HP Customer Support - Service Center page appears with your Failure ID and product number automatically filled in. Follow the on-screen instructions.

– or –

Contact support, and provide the Failure ID code.

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

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

Starting HP PC Hardware Diagnostics UEFI

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 flash drive

      📝 **NOTE:** To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see Downloading the latest HP PC Hardware Diagnostics UEFI version on page 37.

   b. Hard drive

   c. BIOS

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

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive can be useful in the following situations:

● HP PC Hardware Diagnostics UEFI is not included in the preinstallation image.

● HP PC Hardware Diagnostics UEFI is not included in the HP Tool partition.

● The hard drive is damaged.

📝 **NOTE:** The HP PC Hardware Diagnostics UEFI downloading 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 provided.

Downloading the latest HP PC Hardware Diagnostics UEFI version

To download the latest HP PC Hardware Diagnostics UEFI version to a USB flash drive:

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. Select **Download HP Diagnostics UEFI**, and then select **Run**.

Downloading HP PC Hardware Diagnostics UEFI by product name or number (select products only)

📝 **NOTE:** For some products, you might have to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics UEFI by product name or number (select products only) to a USB flash drive:

1. Go to http://www.hp.com/support.

2. Enter the product name or number, select your computer, and then select your operating system.

3. In the **Diagnostics** section, follow the on-screen instructions to select and download the specific UEFI Diagnostics version for your computer.

Using Remote HP PC Hardware Diagnostics UEFI settings (select products only)

Remote HP PC Hardware Diagnostics UEFI is a firmware (BIOS) feature that downloads HP PC Hardware Diagnostics UEFI to your computer. It can then execute the diagnostics on your computer, and it might upload results to a preconfigured server. For more information about Remote HP PC Hardware Diagnostics UEFI, go to http://www.hp.com/go/techcenter/pcdiags, and then select **Find out more**.

Downloading Remote HP PC Hardware Diagnostics UEFI

📝 **NOTE:** HP Remote PC Hardware Diagnostics UEFI is also available as a SoftPaq that you can download to a server.

Downloading the latest Remote HP PC Hardware Diagnostics UEFI version

To download the latest Remote HP PC Hardware Diagnostics UEFI version, follow these steps:

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. Select **Download Remote Diagnostics**, and then select **Run**.

Downloading Remote HP PC Hardware Diagnostics UEFI by product name or number

📝 **NOTE:** For some products, you might have to download the software by using the product name or number.

To download HP Remote PC Hardware Diagnostics UEFI by product name or number, follow these steps:

1. Go to http://www.hp.com/support.

2. Select **Get software and drivers**, select your type of product, enter the product name or number in the search box that is displayed, select your computer, and then select your operating system.

3. In the **Diagnostics** section, follow the on-screen instructions to select and download the **Remote UEFI** version for the product.

Customizing Remote HP PC Hardware Diagnostics UEFI settings

Using the Remote HP PC Hardware Diagnostics setting in Computer Setup (BIOS), you can perform the following customizations:

- Set a schedule for running diagnostics unattended. You can also start diagnostics immediately in interactive mode by selecting **Execute Remote HP PC Hardware Diagnostics**.

- Set the location for downloading the diagnostic tools. This feature provides access to the tools from the HP website or from a server that has been preconfigured for use. Your computer does not require the traditional local storage (such as a hard drive or USB flash drive) to run remote diagnostics.

- Set a location for storing the test results. You can also set the user name and password that you use for uploads.

- Display status information about the diagnostics run previously.

To customize Remote HP PC Hardware Diagnostics UEFI settings, follow these steps:

1. Turn on or restart the computer, and when the HP logo appears, press f10 to enter Computer Setup.

2. Select **Advanced**, and then select **Settings**.

3. Make your customization selections.

4. Select **Main**, and then **Save Changes and Exit** to save your settings.

Your changes take effect when the computer restarts.

6 Computer operating guidelines, routine care, and shipping preparation

Computer operating guidelines and routine care

Follow these guidelines to properly set up and care for the computer and monitor:

- Keep the computer away from excessive moisture, direct sunlight, and extreme heat and cold.

- Operate the computer on a sturdy, level surface. Leave a 10.2 cm (4 inch) clearance on all vented sides of the computer and above the monitor to permit the required airflow.

- Never restrict the airflow into the computer by blocking any vents or air intakes. Do not place the keyboard, with the keyboard feet down, directly against the front of the desktop unit as this also restricts airflow.

- Never operate the computer with the access panel or any of the expansion card slot covers removed.

- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's recirculated or preheated air.

- To operate a computer within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the previous operating guidelines still apply.

- Keep liquids away from the computer and keyboard.

- Never cover the ventilation slots on the monitor with any type of material.

- Install or enable power management functions of the operating system or other software, including sleep states.

- Turn off the computer before you do either of the following tasks:

    - Wipe the exterior of the computer with a soft, damp cloth as needed. Cleaning products might discolor or damage the finish.

    - Occasionally clean the air vents on all vented sides of the computer. Lint, dust, and other foreign matter can block the vents and limit the airflow.

Shipping preparation

Follow these suggestions when preparing to ship the computer:

1. Back up the hard drive files to an external storage device. Be sure that the backup media is not exposed to electrical or magnetic impulses while stored or in transit.

    NOTE: The hard drive locks automatically when the system power is turned off.

2. Remove and store all removable media.

3. Turn off the computer and external devices.

4. Disconnect the power cord from the AC outlet, and then from the computer.

5. Disconnect the system components and external devices from their power sources and then from the computer.

    NOTE: Make sure that all boards are seated properly and secured in the board slots before shipping the computer.

6. Pack the system components and external devices in their original packing boxes or similar packaging with sufficient packing material to protect them.

7 Electrostatic discharge

Electrostatic discharge is the release of static electricity when two objects come into contact—for example, the shock you receive when you walk across the carpet and touch a metal door knob.

A discharge of static electricity from fingers or other electrostatic conductors may damage electronic components.

IMPORTANT: To prevent damage to the computer, damage to a drive, or loss of information, observe these precautions:

- If removal or installation instructions direct you to unplug the computer, first be sure that it is properly grounded.

- Keep components in their electrostatic-safe containers until you are ready to install them.

- Avoid touching pins, leads, and circuitry. Handle electronic components as little as possible.

- Use nonmagnetic tools.

- Before handling components, discharge static electricity by touching an unpainted metal surface.

- If you remove a component, place it in an electrostatic-safe container.

8 Accessibility

HP and accessibility

Because HP works to weave diversity, inclusion, and work/life into the fabric of the company, it is reflected in everything HP does. HP strives to create an inclusive environment focused on connecting people to the power of technology throughout the world.

Finding the technology tools you need

Technology can unleash your human potential. Assistive technology removes barriers and helps you create independence at home, at work, and in the community. Assistive technology helps increase, maintain, and improve the functional capabilities of electronic and information technology. For more information, see .

The HP commitment

HP is committed to providing products and services that are accessible for people with disabilities. This commitment supports the company's diversity objectives and helps ensure that the benefits of technology are available to all.

The HP accessibility goal is to design, produce, and market products and services that can be effectively used by everyone, including people with disabilities, either on a stand-alone basis or with appropriate assistive devices.

To achieve that goal, this Accessibility Policy establishes seven key objectives to guide HP actions. All HP managers and employees are expected to support these objectives and their implementation in accordance with their roles and responsibilities:

- Raise the level of awareness of accessibility issues within HP, and provide employees with the training they need to design, produce, market, and deliver accessible products and services.

- Develop accessibility guidelines for products and services, and hold product development groups accountable for implementing these guidelines where competitively, technically, and economically feasible.

- Involve people with disabilities in the development of accessibility guidelines and in the design and testing of products and services.

- Document accessibility features, and make information about HP products and services publicly available in an accessible form.

- Establish relationships with leading assistive technology and solution providers.

- Support internal and external research and development that improves assistive technology relevant to HP products and services.

- Support and contribute to industry standards and guidelines for accessibility.

International Association of Accessibility Professionals (IAAP)

IAAP is a not-for-profit association focused on advancing the accessibility profession through networking, education, and certification. The objective is to help accessibility professionals develop and advance their careers and to better enable organizations to integrate accessibility into their products and infrastructure.

As a founding member, HP joined to participate with other organizations to advance the field of accessibility. This commitment supports HP's accessibility goal of designing, producing, and marketing products and services that people with disabilities can effectively use.

IAAP will make the profession strong by globally connecting individuals, students, and organizations to learn from one another. If you are interested in learning more, go to http://www.accessibilityassociation.org to join the online community, sign up for newsletters, and learn about membership options.

Finding the best assistive technology

Everyone, including people with disabilities or age-related limitations, should be able to communicate, express themselves, and connect with the world using technology. HP is committed to increasing accessibility awareness within HP and with our customers and partners. Whether it's large fonts that are easy on the eyes, voice recognition that lets you give your hands a rest, or any other assistive technology to help with your specific situation—a variety of assistive technologies make HP products easier to use. How do you choose?

Assessing your needs

Technology can unleash your potential. Assistive technology removes barriers and helps you create independence at home, at work, and in the community. Assistive technology (AT) helps increase, maintain, and improve the functional capabilities of electronic and information technology.

You can choose from many AT products. Your AT assessment should allow you to evaluate several products, answer your questions, and facilitate your selection of the best solution for your situation. You will find that professionals qualified to do AT assessments come from many fields, including those licensed or certified in physical therapy, occupational therapy, speech/language pathology, and other areas of expertise. Others, while not certified or licensed, can also provide evaluation information. You will want to ask about the individual's experience, expertise, and fees to determine if they are appropriate for your needs.

Accessibility for HP products

The following links provide information about accessibility features and assistive technology, if applicable, included in various HP products. These resources will help you select the specific assistive technology features and product(s) most appropriate for your situation.

- HP Elite x3–Accessibility Options (Windows 10 Mobile)
- HP PCs–Windows 7 Accessibility Options
- HP PCs–Windows 8 Accessibility Options
- HP PC's–Windows 10 Accessibility Options
- HP Slate 7 Tablets–Enabling Accessibility Features on Your HP Tablet (Android 4.1/Jelly Bean)
- HP SlateBook PCs–Enabling Accessibility Features (Android 4.3, 4.2/Jelly Bean)
- HP Chromebook PCs–Enabling Accessibility Features on Your HP Chromebook or Chromebox (Chrome OS)
- HP Shopping–peripherals for HP products

If you need additional support with the accessibility features on your HP product, see .

Additional links to external partners and suppliers that may provide additional assistance:

- Microsoft Accessibility information (Windows 7, Windows 8, Windows 10, Microsoft Office)
- Google Products accessibility information (Android, Chrome, Google Apps)

- [Assistive Technologies sorted by impairment type](#)

- [Assistive Technology Industry Association (ATIA)](#)

Standards and legislation

Standards

Section 508 of the Federal Acquisition Regulation (FAR) standards was created by the US Access Board to address access to information and communication technology (ICT) for people with physical, sensory, or cognitive disabilities. The standards contain technical criteria specific to various types of technologies, as well as performance-based requirements which focus on functional capabilities of covered products. Specific criteria cover software applications and operating systems, web-based information and applications, computers, telecommunications products, video and multimedia, and self-contained closed products.

Mandate 376 – EN 301 549

The EN 301 549 standard was created by the European Union within Mandate 376 as the basis for an online toolkit for public procurement of ICT products. The standard specifies the functional accessibility requirements applicable to ICT products and services, together with a description of the test procedures and evaluation methodology for each accessibility requirement.

Web Content Accessibility Guidelines (WCAG)

Web Content Accessibility Guidelines (WCAG) from the W3C's Web Accessibility Initiative (WAI) helps web designers and developers create sites that better meet the needs of people with disabilities or age-related limitations. WCAG advances accessibility across the full range of web content (text, images, audio, and video) and web applications. WCAG can be precisely tested, is easy to understand and use, and allows web developers flexibility for innovation. WCAG 2.0 has also been approved as [ISO/IEC 40500:2012](#).

WCAG specifically addresses barriers to accessing the web experienced by people with visual, auditory, physical, cognitive, and neurological disabilities, and by older web users with accessibility needs. WCAG 2.0 provides characteristics of accessible content:

- **Perceivable** (for instance, by addressing text alternatives for images, captions for audio, adaptability of presentation, and color contrast)

- **Operable** (by addressing keyboard access, color contrast, timing of input, seizure avoidance, and navigability)

- **Understandable** (by addressing readability, predictability, and input assistance)

- **Robust** (for instance, by addressing compatibility with assistive technologies)

Legislation and regulations

Accessibility of IT and information has become an area of increasing legislative importance. The following links provide information about key legislation, regulations, and standards.

- [United States](#)

- [Canada](#)

- [Europe](#)

- [Australia](#)

- [Worldwide](#)

Useful accessibility resources and links

The following organizations might be good resources for information about disabilities and age-related limitations.

NOTE: This is not an exhaustive list. These organizations are provided for informational purposes only. HP assumes no responsibility for information or contacts you encounter on the Internet. Listing on this page does not imply endorsement by HP.

Organizations

- American Association of People with Disabilities (AAPD)
- The Association of Assistive Technology Act Programs (ATAP)
- Hearing Loss Association of America (HLAA)
- Information Technology Technical Assistance and Training Center (ITTATC)
- Lighthouse International
- National Association of the Deaf
- National Federation of the Blind
- Rehabilitation Engineering & Assistive Technology Society of North America (RESNA)
- Telecommunications for the Deaf and Hard of Hearing, Inc. (TDI)
- W3C Web Accessibility Initiative (WAI)

Educational institutions

- California State University, Northridge, Center on Disabilities (CSUN)
- University of Wisconsin - Madison, Trace Center
- University of Minnesota computer accommodations program

Other disability resources

- ADA (Americans with Disabilities Act) Technical Assistance Program
- ILO Global Business and Disability network
- EnableMart
- European Disability Forum
- Job Accommodation Network
- Microsoft Enable

HP links

Our contact webform

HP comfort and safety guide

HP public sector sales

Contacting support

- Customers who are deaf or hard of hearing who have questions about technical support or accessibility of HP products:

  – Use TRS/VRS/WebCapTel to call (877) 656-7058 Monday through Friday, 6 a.m. to 9 p.m. Mountain Time.

- Customers with other disabilities or age-related limitations who have questions about technical support or accessibility of HP products, choose one of the following options:

  – Call (888) 259-5707 Monday through Friday, 6 a.m. to 9 p.m. Mountain Time.

  – Complete the Contact form for people with disabilities or age-related limitations.

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