



# Hardware Reference Guide

HP Thin Clients

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### **Hardware Reference Guide**


HP t520 Flexible Series Thin Client


First Edition: June 2014

Document Part Number: 759673-001

## About This Book

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 **WARNING!** Text set off in this manner indicates that failure to follow directions could result in bodily harm or loss of life.

 **CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

 **NOTE:** Text set off in this manner provides important supplemental information.

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# 1 Product features

## Standard features




Thank you for purchasing an HP thin client. We hope you have years of use from our thin clients. Our goal is to provide you with award-winning clients that are easy to deploy and manage with the power and reliability you expect.

The next sections describe the features of the thin client. For a complete list of the hardware and software installed on a specific model, visit <http://www.hp.com> and search for your specific thin client model.

The following features are common to all HP thin clients:

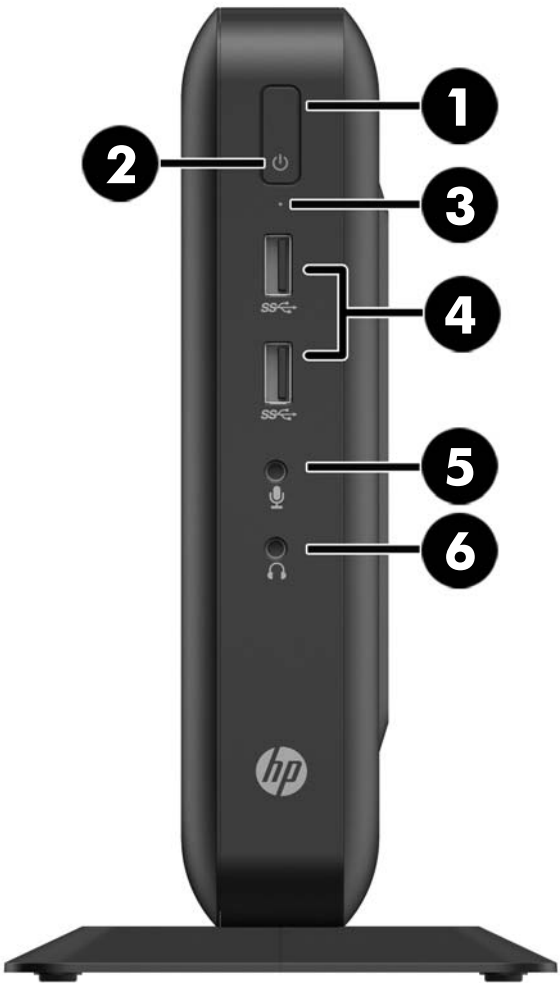
- no hard drives or diskette drives
- 5 minutes or less hardware setup time
- central deployment and management using HP management solutions

Various options are available for your thin client. For more information about available options, visit the HP website at <http://www.hp.com> and search for your specific thin client model.

 **NOTE:** Your thin client model may look different than the model in the following illustrations.

## Front panel components

For more information, go to <http://www.hp.com> and search for your specific thin client model to find the model-specific QuickSpecs.

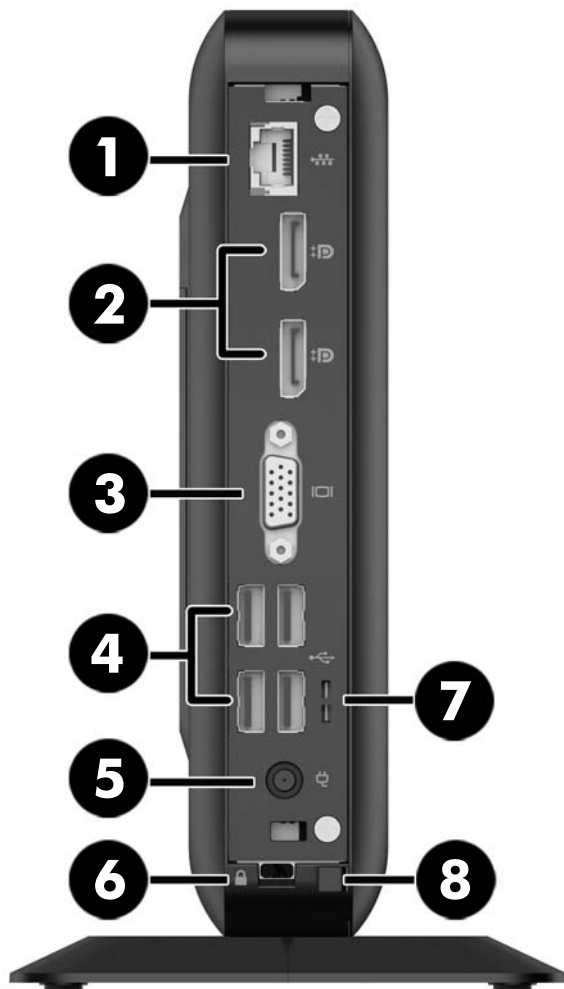


|     |                    |     |                   |
|-----|--------------------|-----|-------------------|
| (1) | Power button       | (4) | USB 3.0 ports (2) |
| (2) | Power LED          | (5) | Microphone port   |
| (3) | Drive activity LED | (6) | Headphone port    |



## Rear panel components

For more information, go to <http://www.hp.com> and search for your specific thin client model to find the model-specific QuickSpecs.



|     |                                     |     |  |
|-----|-------------------------------------|-----|--|
| (1) | Ethernet RJ-45 port                 | (5) | External power adapter input             |
| (2) | Dual-mode DisplayPort 1.2 ports (2) | (6) | Cable lock slot                          |
| (3) | VGA port                            | (7) | HP USB Legacy Port Module retention slot |
| (4) | USB 2.0 ports (4)                   | (8) | Power cord retention hook                |

The devices connected at boot up or subsequently disconnected determine which video ports are enabled and which is disabled.

- If a VGA device is connected at boot up, then only one DisplayPort port may be used. If the VGA device is subsequently disconnected, then both DisplayPort ports are enabled.
- If a VGA device and one DisplayPort device are connected at boot up, then the other DisplayPort port is disabled. If the VGA device is subsequently disconnected, then that DisplayPort port is enabled.
- If two DisplayPort devices are connected at boot up, then the VGA port is disabled. If one or both DisplayPort devices are subsequently disconnected, the VGA port is enabled.

## Serial number location

Every thin client includes a unique serial number located as shown in the following illustration. Have this number available when contacting HP customer service for assistance.




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## 2 Hardware changes

### Warnings and cautions

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

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 **WARNING!** To reduce the risk of personal injury or equipment damage from electric shock, hot surfaces, or fire:


Disconnect the power cord from the power 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, posture, and health and work habits for computer users, and provides important electrical and mechanical safety information. The *Safety & Comfort Guide* is located on the HP website at <http://www.hp.com/ergo>.

 **WARNING!** Energized parts inside.

Disconnect power to the equipment before removing the enclosure.

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

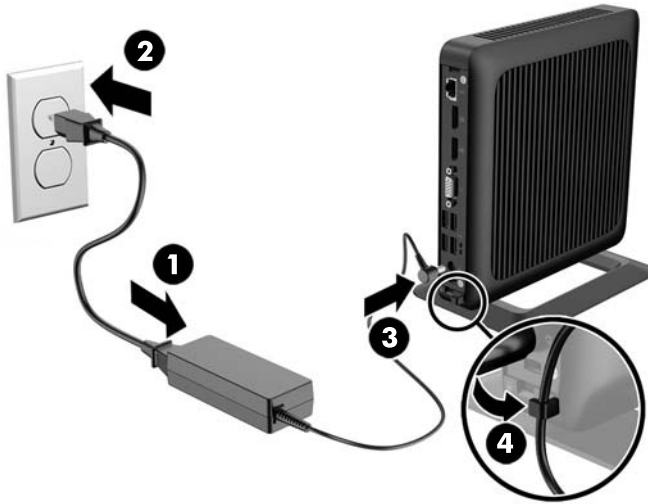
 **CAUTION:** Static electricity can damage the electrical components of the thin client or optional equipment. Before beginning the following procedures, be sure that you are discharged of static electricity by briefly touching a grounded metal object. See [Electrostatic discharge on page 26](#) for more information.

When the thin client 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 thin client.

---

## Connecting the power cord

1. Plug the female end of the power cord into the power supply brick (1).



2. Connect the other end of the power cord to an electrical outlet (2).
3. Connect the round end of the power supply cord to the power supply connector on the rear of the thin client (3).
4. Press the power cord into the retention hook (4) and bundle any excess power cord.

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**CAUTION:** Failure to secure the power cable with the retention hook may result in the power cord becoming disconnected, causing loss of data.

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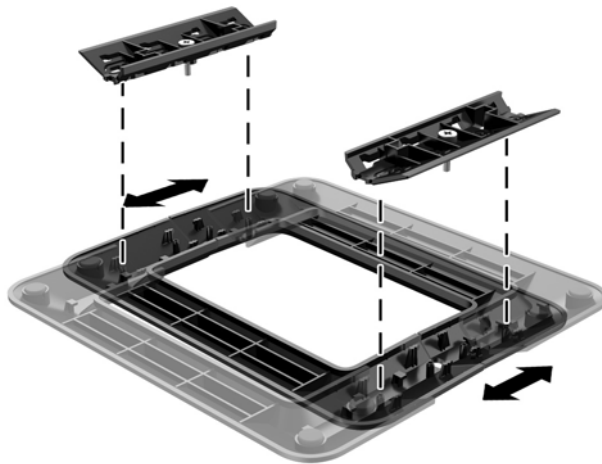
## Attaching the stand

**⚠ CAUTION:** Unless the thin client is mounted with the HP Quick Release, it must be operated with the stand attached to ensure proper airflow around the thin client.

### Adjusting the stand

The stand can be adjusted into two configurations: square for the horizontal position and rectangular for the vertical position.

Take the stand apart by removing the two short pieces connecting the two sides. Snap the sides to the outer connection points on the short pieces for a square configuration or to the inner connection points for the narrow configuration.



### Installing the stand

The thin client can be used in either a tower or horizontal orientation with the stand included with the thin client.

1. Remove/disengage any security devices that prohibit opening the thin client.
2. Remove all removable media, such as USB flash drives, from the thin client.
3. Turn off the thin client properly through the operating system, and then turn off any external devices.
4. Disconnect the power cord from the power outlet and disconnect any external devices.
5. Adjust the stand, if necessary.

For instructions, go to [Adjusting the stand on page 7](#).

6. Attach the stand to the thin client.
  - Attach the stand to the bottom of the thin client to use the thin client in the tower orientation.


- a. Turn the thin client upside down and locate the two screw holes in the grid on the bottom of the thin client.
- b. Position the stand (1) over the bottom of the thin client and line up the captive screws in the stand with the screw holes in the thin client.
- c. Tighten the captive screws (2) securely.




- Attach the stand to the right side of the thin client to use it in the horizontal orientation.
  - a. Lay the thin client down with the right side up and locate the two screw holes in the grid on the right side of the thin client.
  - b. Position the stand (1) over the side of the thin client and line up the captive screws in the stand with the screw holes in the thin client.
  - c. Tighten the captive screws (2) securely.




7. Reconnect the external equipment, plug the power cord into a power outlet, and then turn the thin client on.

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

 **NOTE:** An optional Quick Release mounting bracket is available from HP for mounting the thin client to a wall, desk, or swing arm. When the mounting bracket is used, do not install the thin client with the I/O ports oriented towards the ground.

## Removing and replacing the access panel


### Removing the access panel

 **WARNING!** To reduce the risk of personal injury or equipment damage from electric shock, hot surfaces, or fire, ALWAYS operate the thin client with the access panel in place. In addition to enhancing safety, the access panel may provide important instructions and identification information, which may be lost if the access panel is not used. DO NOT use any access panel except the one that is provided by HP for use with this thin client.

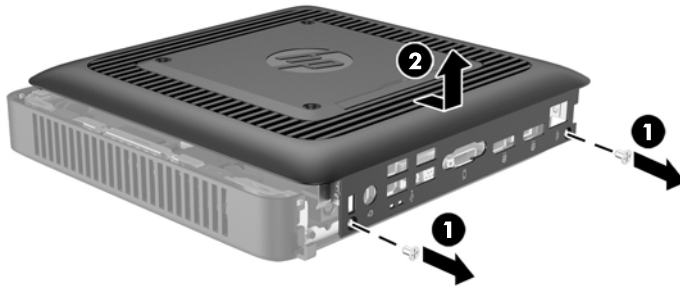
Before removing the access panel, be sure that the thin client is turned off and the power cord is disconnected from the electrical outlet.

To remove the access panel:

1. Remove/disengage any security devices that prohibit opening the thin client.
2. Remove all removable media, such as USB flash drives, from the thin client.
3. Turn off the thin client properly through the operating system, and then turn off any external devices.
4. Disconnect the power cord from the power outlet, and disconnect any external devices.

 **CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the thin client.

5. Remove the thin client from the stand.
6. Lay the unit flat on a stable surface with the right side up.
7. Remove the two screws from the back I/O panel (1).
8. Slide the access panel approximately 6 mm (.24 in) toward the back of the chassis, and then lift the panel off of the thin client (2).





## Replacing the access panel

To replace the access panel:

1. Align the three tabs on each side of the access panel with the slots in the chassis. Set the access panel on the chassis, approximately 6 mm (.24 in) inside the edge of the chassis, and then slide the panel toward the front of the chassis (1) into place.
2. Fasten the two screws into the ends of the back I/O panel to secure the access panel (2).

## Replacing the memory module

The thin client comes with one double data rate 3 synchronous dynamic random access memory (DDR3L-SDRAM) small outline dual inline memory module (SODIMM).

### SODIMM

The memory socket is populated with one industry-standard SODIMM.

### DDR3-SDRAM SODIMM

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

- industry-standard 204-pin
- unbuffered non-ECC PC3-12800 DDR3-1600 MHz-compliant or non-ECC PC3L-12800 DDR3L-1600 MHz-compliant
- DDR3-SDRAM SODIMM
  - 1.35 volt DDR3L-SDRAM (preferred)
  - 1.5 volt DDR3-SDRAM
- support CAS latency 9 DDR3 1333 MHz (9-9-9 timing)
- contain the mandatory Joint Electronic Device Engineering Council (JEDEC) specification

The thin client supports the following:

- 2 Gb, 4 Gb, and 8 Gb non-ECC memory technologies
- single-sided and double-sided SODIMMS
- SODIMMs constructed with x8 and x16 devices; SODIMMs constructed with x4 SDRAM are not supported



**NOTE:** The system does not operate properly when unsupported SODIMMs are installed.

## Populating the SODIMM socket

There is one SODIMM socket on the system board. The socket is labeled DIMM1.

## Installing SODIMM

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

The memory module socket has gold-plated metal contacts. When upgrading the memory, it is important to use a memory module 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 thin client. Before beginning the following procedures, be sure that you are discharged of static electricity by briefly touching a grounded metal object. For more information, refer to [Electrostatic discharge on page 26](#).

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

- 
1. Remove/disengage any security devices that prohibit opening the thin client.
  2. Remove all removable media, such as USB flash drives, from the thin client.
  3. Turn off the thin client properly through the operating system, and then turn off any external devices.
  4. Disconnect the power cord from the power outlet, and disconnect any external devices.

---

**⚠ CAUTION:** 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 thin client 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.

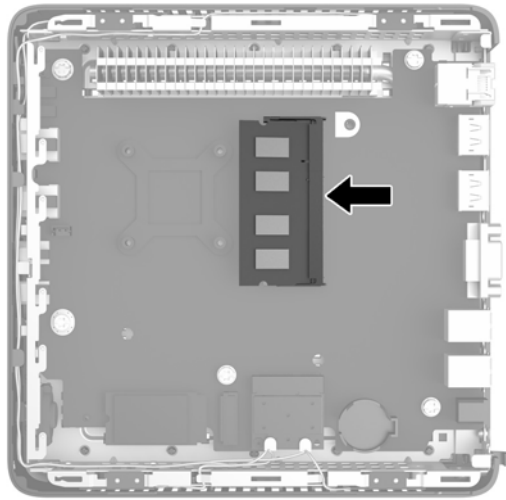
- 
5. Remove the thin client from the stand and lay the thin client down with the right side up.
  6. Remove the thin client access panel. See [Removing and replacing the access panel on page 9](#).

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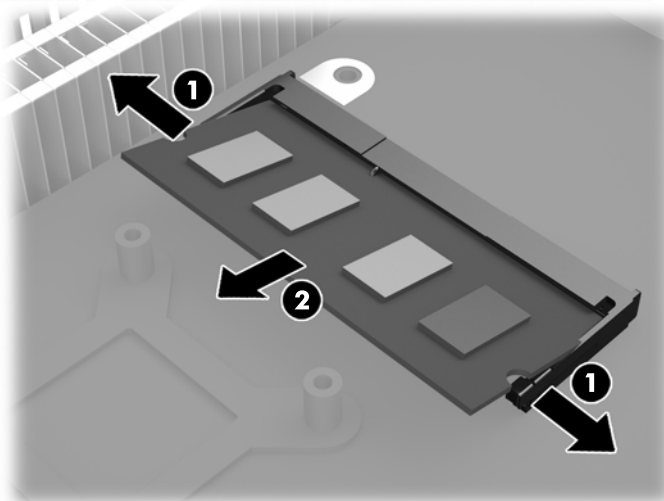
**⚠ WARNING!** To reduce risk of personal injury from hot surfaces, allow the internal system components to cool before you touch them.

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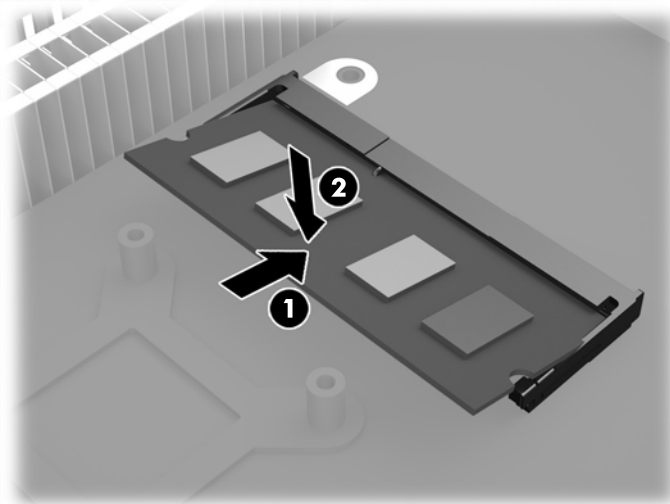
7. Locate the memory compartment on the system board.




8. To remove the SODIMM, press outward on the two latches (1) on each side of the SODIMM.
9. Rotate the SODIMM up, and then pull the SODIMM out of the socket (2).



10. Slide the new SODIMM (1) into the socket at approximately a 30° angle, and then press the SODIMM into the socket (2) so that the latches lock it in place.



---

 **NOTE:** A memory module can be installed in only one way. Match the notch on the module with the tab on the memory socket.

---

11. Replace and secure the access panel. See [Removing and replacing the access panel on page 9](#).
12. Replace the thin client stand.
13. Reconnect the power cord and turn on the thin client.
14. Lock any security devices that were disengaged when the thin client cover or access panel was removed.

The thin client automatically recognizes the additional memory when you turn on the thin client.

## Security

These thin clients are designed to accept a security cable lock. The cable lock prevents unauthorized removal of the thin client.

You may also purchase a port cover to help secure the rear ports.

To order either option, visit the HP website at <http://www.hp.com> and search for your specific thin client model.

### Cable lock

1. Locate the cable lock slot on the back panel.
2. Insert the cable lock into the slot, and then use the key to lock it.



## Mounting the thin client

HP recommends mounting the thin client in the vertical (tower) orientation, with the HP logo right-side up. Mounting in other orientations may result in decreased performance under certain conditions; operating the thin client with limited power to prevent overheating is one such condition.

This thin client incorporates four mounting points on the right side of the unit. These mounting points follow the Video Electronics Standards Association (VESA) standard, which provides industry-standard mounting interfaces for Flat Displays (FDs), such as flat-panel monitors, flat displays, and flat TVs. The HP Quick Release connects to the VESA-standard mounting points, allowing you to mount the thin client in a variety of orientations.

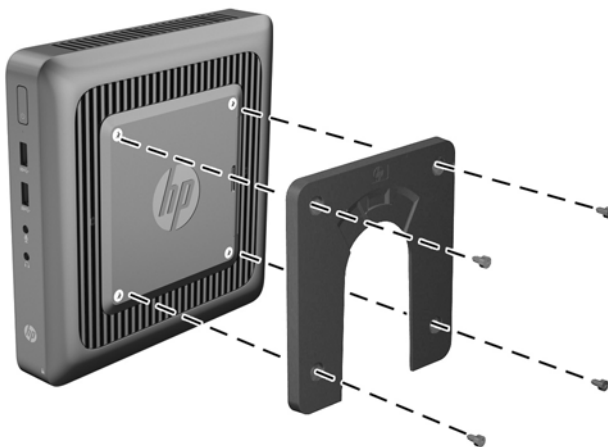


**NOTE:** When mounting to a thin client, use the 15 mm screws supplied with the HP Quick Release.

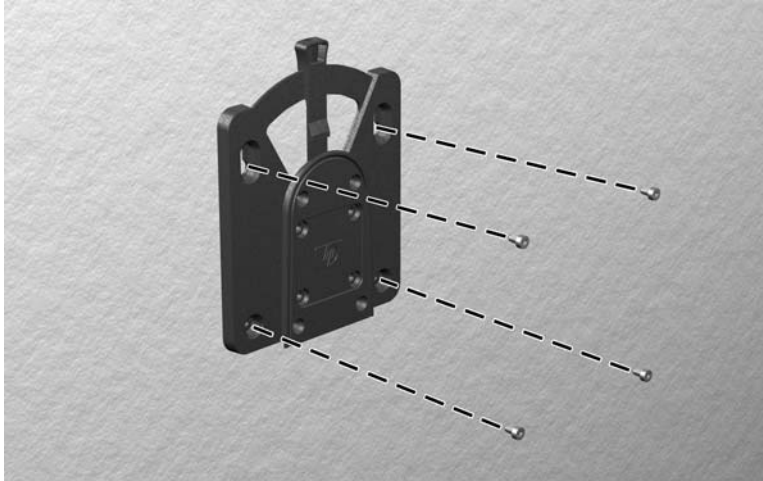


To use the HP Quick Release:

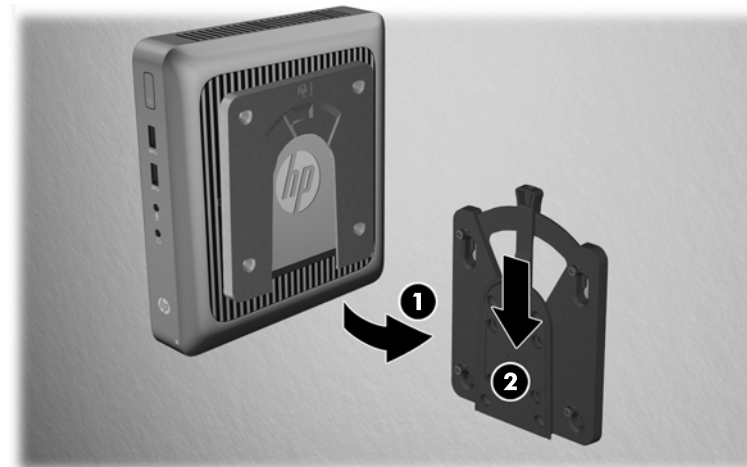
1. Remove four screws from the right side of the thin client.
2. Using four 15 mm screws included in the mounting device kit, attach one side of the HP Quick Release to the thin client as shown in the following illustration.



3. Using four screws included in the mounting device kit, attach the other side of the HP Quick Release to the device to which you will mount the thin client. Make sure the release lever points upward.



4. Slide the side of the mounting device attached to the thin client (1) over the other side of the mounting device (2) on the device on which you want to mount the thin client. An audible 'click' indicates a secure connection.



When attached, the HP Quick Release automatically locks in position. You only need to slide the lever to one side to remove the thin client.

---

**⚠ CAUTION:** For proper function of the HP Quick Release and a secure connection of all components, both the release lever on one side of the mounting device and the rounded opening on the other side must face upward.

---

## Supported mounting options

The following illustrations demonstrate some of the supported mounting options for the mounting bracket.





# A Specifications

For the latest specifications or additional specifications on the thin client, go to <http://www.hp.com/go/quickspecs/> and search for your specific model to find the model-specific QuickSpecs.


|  |               |  |
|--|---------------|--|
| <b>Dimensions</b>  |               |  |
| Width  | 45.1 mm       | 1.78 in.   |
| Depth  | 200 mm        | 7.87 in.   |
| Height (without stand)   | 200.1 mm      | 7.88 in.   |
| Height (with stand)  | 210.5 mm      | 8.29 in.   |
| Approximate Weight   | 1,037.1 g     | 36.59 oz   |
| <b>Temperature Range</b> (fanless design)*   |               |  |
| Operating**  | 10°C to 40°C  | 50°F to 104°F  |
| (max. rate of change is 10°C per hour or 18°F per hour)  |               |  |
| Nonoperating   | -30°C to 60°C | -22°F to 140°F   |
| (max. rate of change is 20°C per hour or 36°F per hour)  |               |  |
| *Specifications are at sea level with altitude derating of 1°C/300 m (1.8°F/1000 ft) to a maximum of 3 Km (10,000 ft), with no direct, sustained sunlight. Upper limit may be limited by the type and number of options installed. |               | ** The operating temperature range when the thin client is attached to a flat panel using the HP Quick Release is 10°C to 35°C (50°F to 95°F). |
| <b>Relative Humidity</b> (non-condensing)  |               |  |
| Operating  |               | 10% to 90%   |
| (max. wet bulb temperature is 28°C or 84.2°F)  |               |  |
| Nonoperating   |               | 5% to 95%  |
| (max. wet bulb temperature is 38.7°C or 101.6°F)   |               |  |
| <b>Maximum Altitude</b> (unpressurized)  |               |  |
| Operating  | 3048 m        | 10,000 ft  |
| (max. allowed rate of change is 457m per minute or 1500 ft per minute)   |               |  |
| Nonoperating   | 9144 m        | 30,000 ft  |
| (max. allowed rate of change is 457m per minute or 1500 ft per minute)   |               |  |

|                                       |                    |
|---------------------------------------|--------------------|
| <b>Power Supply</b>                   |                    |
| Operating Voltage Range               | 100 VAC to 240 VAC |
| Rated Line Frequency                  | 50 Hz to 60 Hz     |
| <b>Power Output</b> (maximum)         | 65 W               |
| <b>Rated Output Current</b> (maximum) | 3.33 A             |
| <b>Output Voltage</b>                 | +19.5 V dc         |

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## B Removing and replacing the battery

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 **WARNING!** Before removing the access panel, be sure that the thin client is turned off and the power cord is disconnected from the electrical outlet.

---

To remove and replace the battery:

1. Remove/disengage any security devices that prohibit opening the thin client.
2. Remove all removable media, such as USB flash drives, from the thin client.
3. Turn off the thin client properly through the operating system, and then turn off any external devices.
4. Disconnect the power cord from the power outlet, and disconnect any external devices.

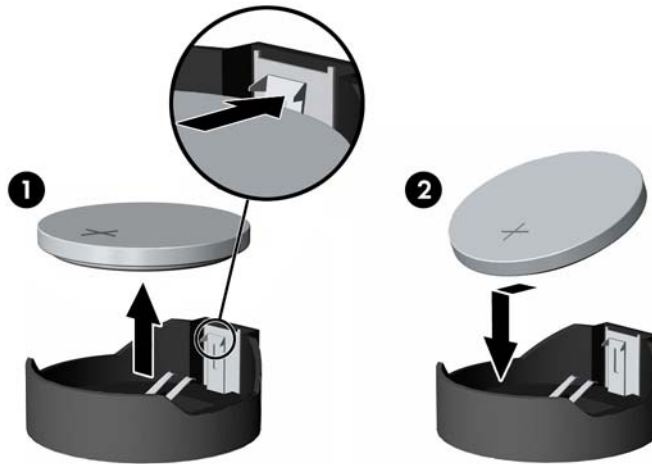
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 **CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the thin client.

---

5. Remove the thin client from the stand and lay the thin client down with the right side up.
6. Remove the thin client access panel. See [Removing and replacing the access panel on page 9](#).
7. Locate the battery and battery holder on the system board.
8. To release the battery from its holder, squeeze the metal clamp that extends above one edge of the battery. When the battery pops up, lift it out (1).

9. To insert the new battery, slide one edge of the replacement battery under the holder's lip with the positive side up. Push the other edge down until the clamp snaps over the other edge of the battery (2).



10. Replace and secure the access panel. See [Removing and replacing the access panel on page 9](#).
11. Replace the thin client stand.
12. Reconnect the power cord and turn on the thin client.
13. Lock any security devices that were disengaged when the thin client cover or access panel was removed.

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, go to <http://www.hp.com> and search for “recycle”.



Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, an authorized HP partner, or their agents.



廢電池請回收

The Taiwan EPA requires dry battery manufacturing or importing firms, in accordance with Article 15 of the Waste Disposal Act, to indicate the recovery marks on the batteries used in sales, giveaways, or promotions. Contact a qualified Taiwanese recycler for proper battery disposal.

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## C Thin client operation

### Routine thin client care

Use the following information to properly care for your thin client:

- Never operate the thin client with the outside panel removed.
- Keep the thin client away from excessive moisture, direct sunlight, and extreme heat and cold. For information about the recommended temperature and humidity ranges for the thin client, see [Specifications on page 19](#).
- Keep liquids away from the thin client and keyboard.
- Turn off the thin client and wipe the exterior with a soft, damp cloth as needed. Using cleaning products may discolor or damage the finish.

## Supported orientations

HP supports the following orientations for the thin client.



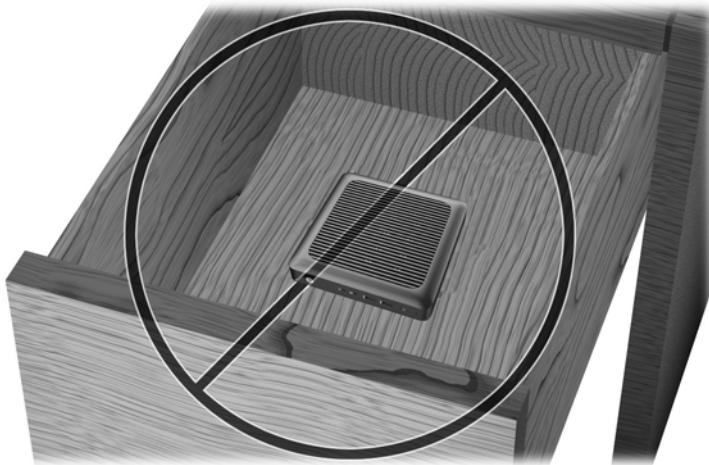
## Non-supported orientations

HP does not support the following orientations for the thin client.

**⚠ CAUTION:** Non-supported placement of thin clients could result in operation failure and/or damage to the devices.

**CAUTION:** Thin clients require proper ventilation to maintain operating temperature. Do not block the vents.

Do not put thin clients in drawers or other sealed enclosures. Do not place a monitor or other object on top of the thin client. Thin clients require proper ventilation to maintain operating temperatures.



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## D Electrostatic discharge

A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

### Preventing electrostatic damage

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

### Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded Thin Client chassis. Wrist straps are flexible straps of 1 megohm +/- 10 percent resistance in the ground cords. To provide proper grounding, wear the strap snug against the skin.
- Use heelstraps, toestraps, or bootstraps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, contact an HP authorized dealer, reseller, or service provider.



**NOTE:** For more information about static electricity, contact an HP authorized dealer, reseller, or service provider.

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# E Shipping information

## Shipping preparation

Follow these suggestions when preparing to ship the thin client:

1. Turn off the thin client and external devices.
2. Disconnect the power cord from the electrical outlet, and then from the thin client.
3. Disconnect the system components and external devices from their power sources, and then from the thin client.
4. Pack the system components and external devices in their original packing boxes or similar packaging with sufficient packing material to protect them.



**NOTE:** For environmental nonoperating ranges, see [Specifications on page 19](#)

## Important service repair information

In all cases, remove and safeguard all external options before returning the thin client to HP for repair or exchange.

In countries that support customer mail-in repair by returning the same unit to the customer, HP makes every effort to return the repaired unit with the same internal memory and flash modules that were sent.

In countries that do not support customer mail-in repair by returning the same unit to the customer, all internal options should be removed and safeguarded in addition to the external options. The thin client should be restored to the **original configuration** before returning it to HP for repair.

# Removing and replacing the solid state drive (flash memory)

## Removing the solid state drive (flash memory)

The solid state drive should be removed before returning the thin client to HP for repair or exchange.

To remove the solid state drive (SSD), perform the following steps:

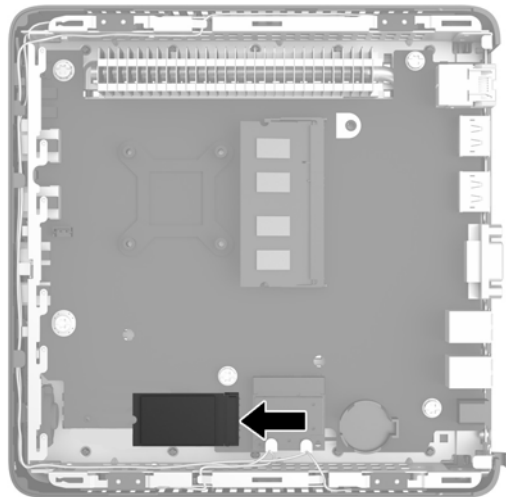
1. Remove/disengage any security devices that prohibit opening the thin client.
2. Remove all removable media, such as USB flash drives, from the thin client.
3. Turn off the thin client properly through the operating system, and then turn off any external devices.
4. Disconnect the power cord from the power outlet, and disconnect any external devices.

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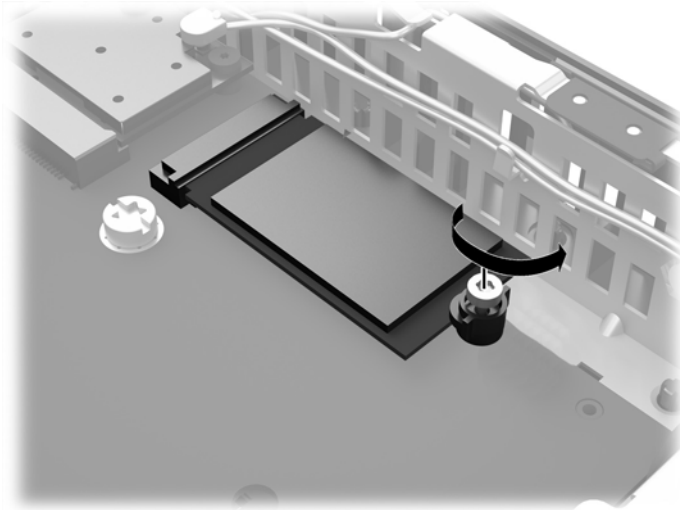
**CAUTION:** Regardless of the power-on state, voltage is always present on the system board as long as the system is plugged into an active AC outlet. You must disconnect the power cord to avoid damage to the internal components of the thin client.

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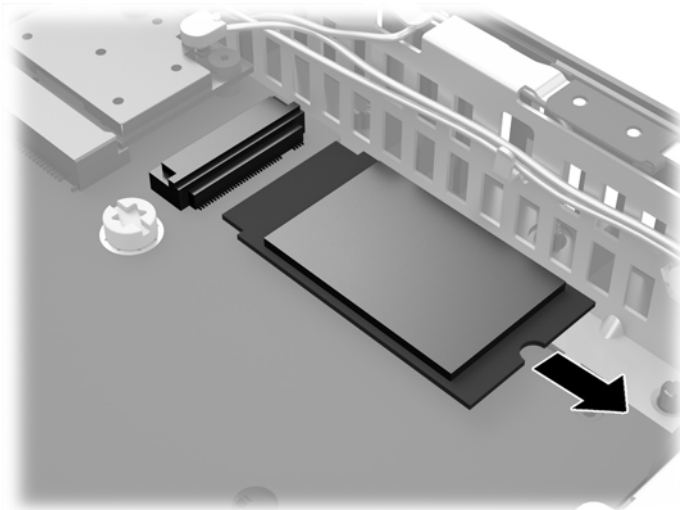
5. Remove the thin client from the stand and lay the thin client down with the right side up.
6. Remove the thin client access panel. See [Removing and replacing the access panel on page 9](#).
7. Locate the SSD on the system board



8. Use a Torx 8 screwdriver to unscrew the post securing the SSD to the system board.



9. Carefully pull the SSD out of the socket.



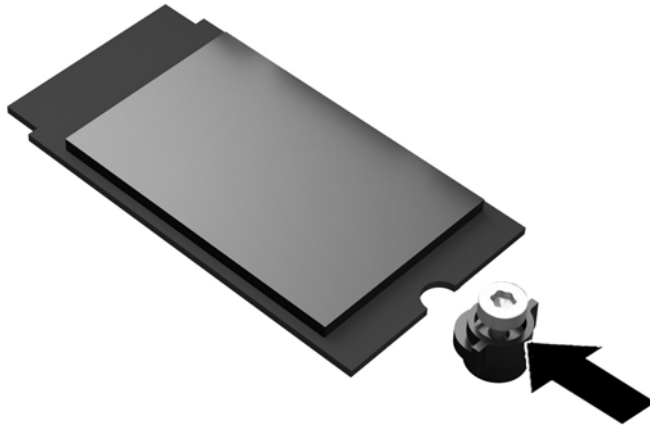
Store the SSD carefully until it can be installed in the returned thin client.

10. Replace and secure the access panel. See [Removing and replacing the access panel on page 9](#).

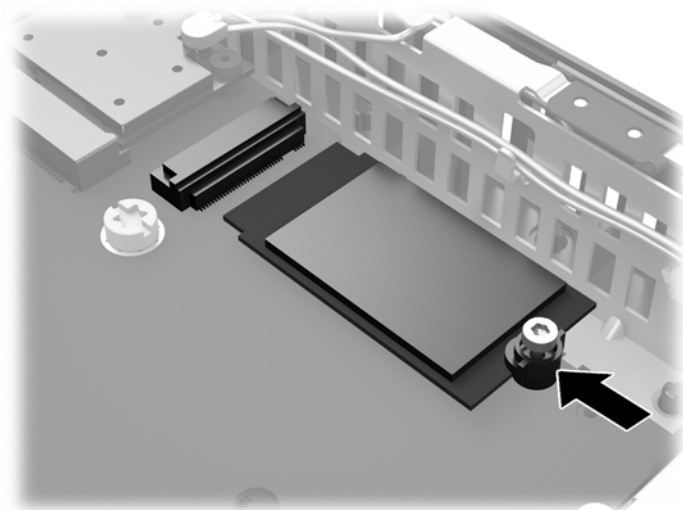
## Installing the solid state drive (flash memory)

To Install the solid state drive (SSD), perform the following steps:

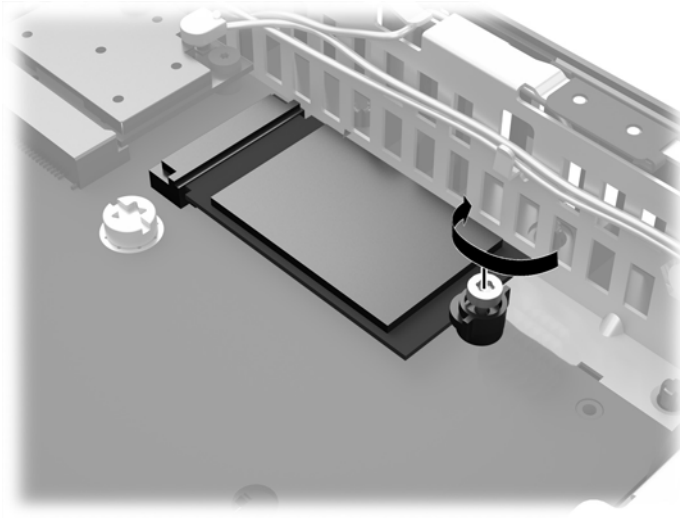
1. Position the post in the notch in the SSD.



2. Hold the post in place and slide the SSD into the socket.



3. Use a Torx 8 screwdriver to fasten the screw and secure the SSD to the system board.



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