



## Site preparation guide

HP Z800 Workstation 1110 W power supply

HP Z820 Workstation 1125 W power supply

HP Z840 Workstation 1125 W power supply

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# Power consumption and cooling

## Introduction

If your power load is over 800 watts, and your power source is between 90 to 115 volts, the HP Z800 Workstation 1110 W power supply, the HP Z820 Workstation 1125 W power supply, or the HP Z840 Workstation 1125 W power supply are designed for your applications, and this site preparation guide is important. The 1110 W power supply has an efficiency rating that qualifies it for 80 PLUS SILVER status\*. The 1125 W power supplies have an efficiency rating that qualifies it for 80 PLUS GOLD status\*\*.

For loads over 800 watts, observe the considerations and limitations presented in the following sections.

\* The 80 PLUS specification states that all SILVER power supplies are at least 85%/89%/85% efficient at 20%, 50% and 100% of rated output, respectively.

\*\* The 80 PLUS specification states that all GOLD power supplies are at least 87%/90%/87% efficient at 115V at 20%, 50% and 100% of rated output, respectively.

## Power consumption and cooling considerations

An HP workstation with a 1110 W 80 PLUS SILVER or 1125 W 80 PLUS GOLD power supply might require more power than the typical office environment can supply. Consider the following issues:

- A fully loaded configuration might draw up to 15 amps of 110V power, leaving no power for other accessories. A typical office has several 15 amp circuits.
- An office air conditioning system must accommodate the extra heat generated by fully loaded workstation configurations.
- Some environments might have power conditioning problems that prevent the reliable use of high-end workstation configurations.
- If your workstation is powered from a 220V source and you meet HP configuration guidelines, you do not need an uninterruptible power supply (UPS) for a maximum output of 1250 watts with the HP Z800 Workstation 1110 W power supply or 1450 watts with the Z820 Workstation 1125 W power supply or 1450 watts with the Z840 Workstation 1125 W power supply.

## Power consumption limitations

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 **IMPORTANT:** The HP Z800 Workstation power supply is capable of continuously supplying 1110 watts output power when the input voltage is greater than 90 volts. If the input voltage is less than 90 volts for any reason (for example, brownout or a line sag), the maximum output power is limited to 890 watts.

The HP Z800 Workstation power supply is capable of continuously supplying 1250 watts of output power when the input voltage is greater than 105 volts. If the input voltage is less than 105 volts, but greater than 90 volts for any reason, the maximum output power is limited to 1110 watts. To take advantage of providing 1250 watts, a UPS is highly recommended.

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 **IMPORTANT:** The HP Z820 Workstation power supply is capable of continuously supplying 1125 watts output power when the input voltage is greater than 90 volts. If the input voltage is less than 90 volts for any reason (for example, brownout or a line sag), the maximum output power is limited to 890 watts.

The HP Z820 Workstation power supply is capable of continuously supplying 1275 watts of output power when the input voltage is greater than 105 volts. If the input voltage is less than 105 volts, but greater than 90 volts for any reason, the maximum output power is limited to 1125 watts. To take advantage of providing 1275 watts, a UPS is highly recommended.

The HP Z820 Workstation power supply is also capable of 1450 watts of output power when the input voltage is greater than 180V. If the input voltage is less than 180V but greater than 105V, the maximum output power is limited to 1275 watts. If the input voltage is less than 105V but greater than 90V, the maximum input power is limited to 1125 watts.

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 **IMPORTANT:** The HP Z840 Workstation power supply is capable of continuously supplying 1125 watts output power when the input voltage is greater than 90 volts. If the input voltage is less than 90 volts for any reason (for example, brownout or a line sag), the maximum output power is limited to 890 watts.

The HP Z840 Workstation power supply is capable of continuously supplying 1275 watts of output power when the input voltage is greater than 105 volts. If the input voltage is less than 105 volts, but greater than 90 volts for any reason, the maximum output power is limited to 1125 watts. To take advantage of providing 1275 watts, a UPS is highly recommended.

The HP Z840 Workstation power supply is also capable of 1450 watts of output power when the input voltage is greater than 180V. If the input voltage is less than 180V but greater than 105V, the maximum output power is limited to 1275 watts. If the input voltage is less than 105V but greater than 90V, the maximum input power is limited to 1125 watts.

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- **What is a power interruption?**

A power interruption can take the form of a power failure, voltage sag, voltage spike, brownout, over-voltage, line noise, frequency variation, switching transient, and harmonic distortion.

- **What is an uninterruptible power supply (UPS) battery?**

A UPS battery provides power when the primary power source is unavailable or insufficient. It keeps the computer powered on and operational in the event of a power interruption.

There are three types of UPS—Standby/Offline, Line Interactive, and Online Continuous. A *Standby/Offline* UPS enables the computer to draw power from the main AC power source until there is a power interruption. It protects against power surges, drops, and blackouts.

A *Line Interactive* UPS protects against power problems, power failure, sags, surges, brownouts, and line noise. This supply offers voltage regulation by bumping the mains voltage up or down.

This feature improves the quality of AC power to the supported load, reduces the number of transfers to and from battery mode, reduces the number of brief power interruptions to the load when switching to and from battery mode, and improves battery life.

An *Online Continuous* UPS is the most dependable solution. It is also referred to as a Double-Conversion UPS. It provides protection against power failures, sags, surges, brownouts, line noise, spikes, frequency variations, switching transients, and harmonic distortion. The inverter is always on and supplies the supported load with clean, regulated power and the incoming power is always fully conditioned. Constant voltage and frequency regulation means far less switching to and from the battery which increases the life and reliability of the UPS.

- **Why use a UPS?**

Use a UPS for a fully loaded workstation configuration that operates in a poor power grid area. The UPS must be rated for at least 2 kVA. A UPS is necessary because without line conditioning to guarantee greater than 90 volts for the 1110 watt or 1125 watt output and 105 volts for 1250 watt or 1275 watt output, the maximum output power is limited to 890 watts with either the 1110 or 1125 watt power supplies. See [Power dissipation for the HP Z800 Workstation on page 5](#) for configurations and maximum power estimates.

HP recommends an online continuous UPS that provides a layer of insulation from quality problems. This type of supply also allows control of output voltage and frequency regardless of input voltage and frequency. To reach 1250 or 1275 watts of output power, you must maintain 115 volts, ideally.

- **To reduce the risk of overload:**

- Do not exceed the rated load of any single power distribution unit (PDU).
- Do not load a single National Electrical Manufacturers Association (NEMA) 5 to 15 receptacle with more than 15 amps.
- Do not load a single International Electrotechnical Commission (IEC) 320-1/C13 receptacle with more than 10 amps.
- In general, verify that each power source circuit can safely provide the current required by equipment drawing power from it.

## Input current calculation

The 1110W power supply can provide 1110 watts in a 15A circuit by using this input current calculation:

**Input Current = Output Power / (Voltage x Power Factor x Efficiency)**

Workstation	HP Z800	HP Z820	HP Z840
Output Power =	1110 watts	1125 watts	1125 watts
Voltage =	90 volts	90 volts	90 volts
Power Factor =	0.998	0.998	0.998
Efficiency =	0.820	0.835	0.835

In this formula, the voltage (90 volts) includes all power line variations—line voltage sag, brownout conditions, power grid characteristics, and so on.

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 **CAUTION:** Check with your power provider to see if your facility is exposed to 90V power. If 90 volts cannot be guaranteed to your workstation, the input voltage source might blow the fuse in the power supply or trip the breaker.

For reliable workstation operation under heavy loading, use a UPS because it provides reliable voltage levels.

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# Power dissipation for the HP Z800 Workstation

The following table contains typical system configurations for an HP Z800 Workstation.

2x CPU Power	2x Midrange graphics 50-75 W each (4)	2x High-end graphics 75-150 W each (4) (5)	2x High-end graphics >150 W each (4) (5)
80W	630-675 W*	675-810 W*	810-950 W*
95W	715-760 W*	760-900 W*	900-1030 W**
130W	800-845 W*	845-980 W**	930-1110 W***
Low risk = *	May not need to reference details of the Site Preparation Guide.		
Medium risk = **	May need to reference details of the Site Preparation Guide.		
High risk = ***	Site Preparation Guide reference required.		

- Asterisks refer to risk when using the workstation configured with a 1110 W power supply.
- The workstation with an 850 W power supply should be configured to be <850 W maximum power.

**NOTE:** All configurations have two CPUs (1), 16 DIMMs (2), five hard disk drives (3), two optical disk drives, and typical additional expansion cards. Configuring fewer hard disk drives or optical drives has some impact on system power.

Power consumption is highly dependent on software use. The table values represent examples of maximum power consumption per configuration and may not represent actual usage.

<sup>1</sup> For maximum power consumed per CPU, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

<sup>2</sup> 4- or 8-GB DDR3-1333 MHz Registered DIMMs. Estimation does not extend to 16-GB DIMMs.

<sup>3</sup> Five SAS 15K HDDs.

<sup>4</sup> For maximum power consumed per graphics card, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

<sup>5</sup> Maximum graphics power supported with an 850 W power supply is one 175 W graphics card, or two 100 W graphics cards. For maximum graphics power, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

# Power dissipation for the HP Z820 Workstation

The following table contains typical system configurations for an HP Z820 Workstation.

2x CPU Power	2x Midrange graphics 50-75 W each (4) (5)	2x High-end graphics 75-150 W each (4) (5)	2x High-end graphics 150 W-225 W each (4) (5)
80 W, 95 W	795-883 W*	839-980 W*	980-1125 W***
115 W	884-928 W*	928-1025 W**	1025-1164 W***
130W,135 W	910-963 W*	954-1060 W**	1060-1209 W***
150 W	955-999 W*	999-1096 W**	1096-1245 W***
<b>Low risk = *</b>	May not need to reference details of the Site Preparation Guide.		
<b>Medium risk = **</b>	May need to reference details of the Site Preparation Guide.		
<b>High risk = ***</b>	Site Preparation Guide reference is required.		

- Asterisks refer to risk when using the workstation configured with a 1125 W power supply.
- The workstation with an 850 W power supply should be configured to be <850 W maximum power.

**NOTE:** All configurations have two CPUs (1), 16 DIMMs (2), five hard disk drives (3), two optical disk drives, and typical additional expansion cards. Configuring fewer hard disk drives or optical drives has some impact on system power.

Power consumption is highly dependent on software use. The table values represent examples of maximum power consumption per configuration and may not represent actual usage.

A 1450 W output allows configurations such as 2x150 W CPU, 16x32GB LRDIMM, five SAS hard drives, two optical drives, and two High-end graphics (150 W-225 W) without any configuration restrictions.

<sup>1</sup> For maximum power consumed per CPU, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

<sup>2</sup> 4-, 8-, or 16-GB DDR3-1600 MHz Registered DIMMs. Estimation does not extend to 32-GB DIMMs.

<sup>3</sup> Five SAS 15K HDDs.

<sup>4</sup> For maximum power consumed per graphics card, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

<sup>5</sup> Maximum graphics power supported with an 850W power supply is one 150W graphics card, or two 75W graphics cards. For maximum graphics power, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

# Power dissipation for the HP Z840 Workstation

The following table contains typical system configurations for an HP Z840 Workstation.

2x CPU Power	2x Midrange graphics 50-75 W each (4) (5)	2x High-end graphics 75-150 W each (4) (5)	2x High-end graphics 150 W-225 W each (4) (5)
85 W, 90 W, 105 W	760-855 W*	800-950 W**	890-1075 W***
120 W	850-895 W*	895-990 W**	990-1115 W***
135W,145 W	890-960 W**	930-1050 W***	1025-1175 W***
160 W	955-999 W**	999-1096 W***	1096-1245 W***
<b>Low risk = *</b>	May not need to reference details of the Site Preparation Guide.		
<b>Medium risk = **</b>	May need to reference details of the Site Preparation Guide.		
<b>High risk = ***</b>	Site Preparation Guide reference is required.		

- Asterisks refer to risk when using the workstation configured with a 1125 W power supply.
- The workstation with an 850 W power supply should be configured to be <850 W maximum power.

**NOTE:** All configurations have two CPUs (1), 16 DIMMs (2), five hard disk drives (3), two optical disk drives, and typical additional expansion cards. Configuring fewer hard disk drives or optical drives has some impact on system power.

Power consumption is highly dependent on software use. The table values represent examples of maximum power consumption per configuration and may not represent actual usage.

A 1450 W output allows configurations such as 2x160 W CPU, 16x32GB LRDIMM, five SAS hard drives, two optical drives, and two High-end graphics (150 W-225 W) without any configuration restrictions.

<sup>1</sup> For maximum power consumed per CPU, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

<sup>2</sup> 4-, 8-, or 16-GB DDR4-2133 MHz Registered DIMMs. Estimation does not extend to 32-GB DIMMs.

<sup>3</sup> Five SAS 15K HDDs.

<sup>4</sup> For maximum power consumed per graphics card, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

<sup>5</sup> Maximum graphics power supported with an 850W power supply is one 150W graphics card, or two 75W graphics cards. For maximum graphics power, see product *QuickSpecs* at <http://www.hp.com/go/productbulletin/>.

## Cooling considerations

To ensure proper ventilation and cooling for your workstation, observe the following guidelines.

- Keep your workstation in an area where the airflow is not obstructed.
- Keep the workstation off from surfaces where dust can gather.
- Remove dust on the front panel bottom (vent area) and the rear fans with a small vacuum, compressed air, or dust rag.
- Keep the front and back of the workstation at least 0.15 meters (6 inches) away from a wall or other obstruction, as shown:

