HP Compaq 4000 Pro Small Form Factor Business PC
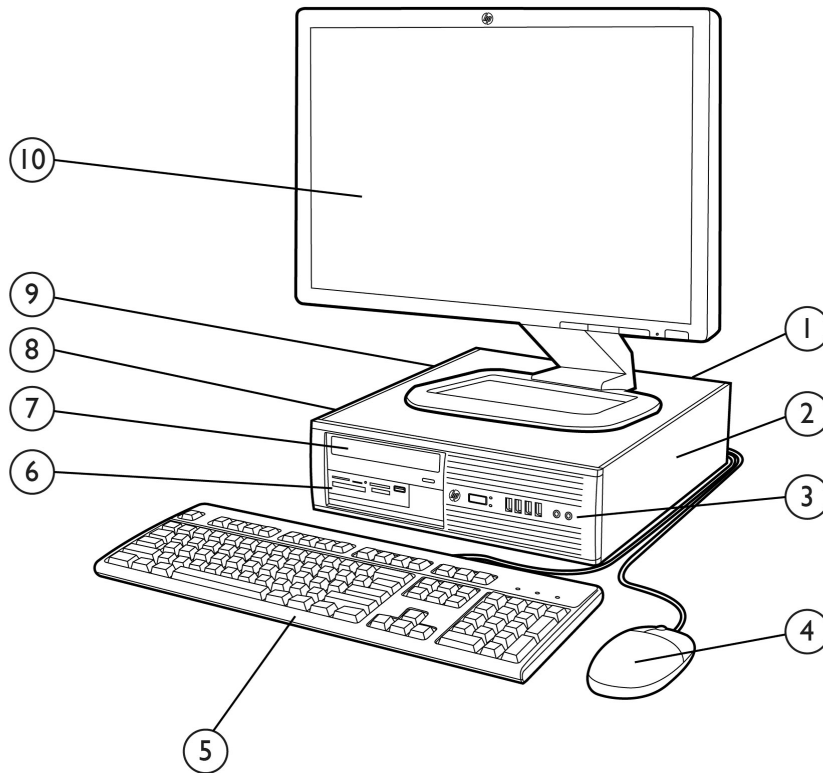

1   Rear I/O includes (4) USB 2.0 ports, serial port, PS/2 mouse and keyboard ports, RJ-45 network interface, VGA and DVI-D video interfaces, and audio in/out jacks

2   Low profile expansion slots include (2) PCI slots, (1) PCI Express x1 slot, and (1) PCI Express x16 graphics slot

3   Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and a microphone jack

4   HP Optical Mouse

5   HP Keyboard

6   3.5" external drive bay supporting a media card reader

7   5.25" external drive bay supporting an optical disk drive

8   3.5" internal drive bay supporting a hard disk drive

9   240W standard efficiency or 85% high efficiency Power Supply

10   HP Monitor (sold separately)

Overview

At A Glance

- Designed for long-term deployment within commercial and public sector organizations
- BIOS developed and engineered by HP for better security, manageability and software image stability
- Intel® B43 Express chipset featuring integrated GMA 4500 integrated graphics
- Intel® 82567V Gigabit LAN Networking Controller
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Integrated dual independent monitor support via a VGA and DVI-D video interface
- Standard efficiency, high voltage protection or 85% high efficiency energy saving power supplies available (offering will vary by geographic region)
- ENERGY STAR qualified models available (dependent upon the desired configuration and geographic region)
- Guaranteed lengthy purchase lifecycles and image stability
- Created using industry leading Design for Environment standards
- Tailored HP Factory Express deployment and lifecycle services available (http://h71028.www7.hp.com/enterprise/cache/97688-0-0-225-121.aspx)
- Protected by HP Services, including standard warranties up to 5-5-5 (terms and conditions vary by country; certain restrictions and exclusions apply)

QuickSpecs

Standard Features and Configurable Components (availability may vary by country)

Operating Systems

Preinstalled	Genuine Windows Vista Business (32-bit)[1]
	Genuine Windows Vista Home Basic[1]
	Genuine Windows 7 Starter Edition (32-bit)
	Genuine Windows 7 Home Basic Edition (32-bit)[2]
	Genuine Windows 7 Home Premium Edition (32-bit or 64-bit)[2]
	Genuine Windows 7 Professional Edition (32-bit or 64-bit)[2]
	Genuine Windows 7 Ultimate Edition (32-bit or 64-bit)[2]
	Red Flag Linux (available only in China)[3]
	FreeDOS
Supported	Genuine Windows XP Professional Edition
	Genuine Windows Vista Enterprise Edition[1]
	Genuine Windows 7 Enterprise Edition[2]

[1] Certain Windows Vista product features require advanced or additional hardware. See www.microsoft.com/windowsvista/getready/hardwarereqs.mspx and www.microsoft.com/windowsvista/getready/capable.mspx for details. Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: www.windowsvista.com/upgradeadvisor

[2] System may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://www.microsoft.com/windows/windows-7/ for details.

[3] The following features are not supported on Linux certified systems:
- HP 22-in-1 media card reader
- HP 802.11b/g/n wireless NIC
- HP Serial port adapter
- HP Parallel port adapter

Standard Features and Configurable Components (availability may vary by country)

Value Added Software (included with select models; not included when configured with FreeDOS)

Computer Setup Utility
HP Connect Solutions
Norton Internet Security 2011*
Roxio Creator Business
HP Power Assistant
PC Network Clone
PDF Complete Corporate Edition

Corel WinDVD
Microsoft Office 2010 preloaded (purchase of a Product Key required to activate a full Office 2010 suite)**
Mozilla Firefox for HP Virtual Solutions
HP Virtual Rooms
Huddle

* 60 day trial period for Norton Internet Security 2011 software. Internet access required to receive updates. First update included. Subscription required for updates thereafter.
** Microsoft Office 2010 Preloaded includes reduced functionality versions of Word and Excel. Purchase of Product Key required to activate full Office 2010 suite available at participating resellers/retailers and http://www.office.com.

HP Client Management Solutions (available for free download from the Internet)

http://www.hp.com/go/easydeploy)

HP Client Automation Starter*
HP SoftPaq Download Manager

HP Client Catalog for Microsoft SMS
HP Systems Software Manager

* Available from your HP Sales Representative or HP Channel Partner

Value Added Services and Features

HP Stable Platform Program
HP Product Change Notification Program

Factory Express Deployment and Lifecycle Services
Business-to-Business Portals

Service and Support

On-site warranty and service[1]: This limited warranty and service offering delivers parts, labor and on-site repair for terms up to 5 years. Response time is next business day[2] and includes free telephone support[3] 24 x 7. Some countries/regions do not offer one year onsite and labor.

[1] Terms and conditions may vary by country. Certain restrictions and exclusions apply.
[2] On-site services may be provided pursuant to a service contract between HP and an authorized HP third party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
[3] Technical telephone support applies only to HP configured, HP and HP qualified third party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Chipset

Intel B43 Express with Intel GMA 4500 Graphics

Standard Features and Configurable Components (availability may vary by country)

Processor

Intel Celeron Processors

Intel Celeron E3400 Processor
2.60 GHz, 1M L2 cache, 800 MHz FSB

Intel Celeron E3500 Processor
2.70 GHz, 1M L2 cache, 800 MHz FSB

Intel Pentium Processors:

Intel Pentium E5800 Processor
3.20 GHz, 2M L2 cache, 800 MHz FSB

Intel Pentium E6700 Processor
3.20 GHz, 2M L2 cache, 1066 MHz FSB

Intel Pentium E6800 Processor
3.33 GHz, 2M L2 cache, 1066 MHz FSB

Intel Core 2 Duo Processors

Intel Core 2 Duo E7500 Processor
2.93 GHz, 3M L2 cache, 1066 MHz FSB

Intel Core 2 Duo E7600 Processor
3.06 GHz, 3M L2 cache, 1066 MHz FSB

Intel Core 2 Duo E8400 Processor
3.0 GHz, 6M L2 cache, 1333 MHz FSB

Intel Core 2 Duo E8500 Processor
3.16 GHz, 6M L2 cache, 1333 MHz FSB

Intel Core 2 Duo E8600 Processor
3.33 GHz, 6M L2 cache, 1333 MHz FSB

Intel Core 2 Quad Processors

Intel Core 2 Quad Q9505s Processor
2.83 GHz, 6M L2 cache, 1333 MHz FSB, 65W TDP

Intel Core 2 Quad Q9550s Processor
2.83 GHz, 12M L2 cache, 1333 MHz FSB, 65W TDP

Standard Features and Configurable Components (availability may vary by country)

DDR3 Synchronous DRAM NON-ECC System Memory

Memory upgrades are accomplished by adding single or multiple DIMMs of the same or varied sizes. This chart does not represent all possible memory configurations. The HP Compaq 4000 Pro Series PC supports non-ECC DDR3 memory up to a maximum data rate of 1066 MHz.

CAUTION: You must shut down the computer and disconnect the power cord 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 in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

Memory Configurations

Maximum Memory — Supports up to 8 GB of DDR3 SDRAM using DIMM modules. Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.

NOTE:
For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Total Memory	Slot	
	Channel A	Channel B
	1 (black)	2 (white)
2 GB	2 GB	
4 GB	2 GB	2 GB
8 GB	4 GB	4 GB

Data Storage Drives

(Internal)
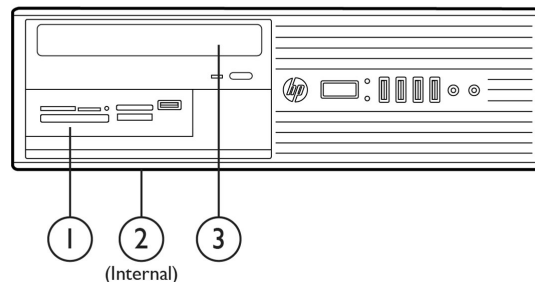
Storage Drive Support			
	Media Card Reader	ODD	Hard Disk Drive
Quantity Supported	1	1	1
Position	1	2	3

Standard Features and Configurable Components (availability may vary by country)

Hard Disk Drives

HP 250-GB Hard Disk Drive
7,200 rpm, NCQ, Smart IV

HP 320-GB Hard Disk Drive
7,200 rpm, NCQ, Smart IV

HP 500-GB Hard Disk Drive
7,200 rpm, NCQ, Smart IV

HP 1 TB Hard Disk Drive
7,200 rpm, NCQ, Smart IV

Optical Disc Drives

HP DVD-ROM Drive[1]

HP SuperMulti Writer Drive[1,2]

HP Blu-ray Writer Drive[1,2]

[1]For playing DVDs, Corel WinDVD 8
[2]For writing CDs and DVDs, Roxio Business Creator 10

Media Card Readers

HP Media Card Reader (22-in-1)

Security Solutions and Capabilities

Stringent Security (via BIOS) This setting is defaulted to disable, but when enabled, the PW jumper will not clear the BIOS pre-boot authentication passwords.

SATA Port Disablement (via BIOS)

Drive Lock

Serial, Parallel, USB enable/disable (via BIOS)

Optional USB Port Disable at factory (user configurable via BIOS)

Removable Media Write/Boot Control

Power-On Password (via BIOS)

Setup Password (via BIOS)

HP Chassis Security Kit

Support for chassis padlocks and cable lock devices

Network Interface Connections

Intel® 82567V GbE Network Connection (integrated)

HP 802.11 b/g/n Wireless NIC (PCIe x1 card)

QuickSpecs

Standard Features and Configurable Components (availability may vary by country)

Video Graphics

Intel® Graphics Media Accelerator 4500 (integrated)

NVIDIA NVS 300 512MB graphics card

ATI Radeon HD 4550 512MB graphics card

Multi-Media

High Definition Audio with Realtek ALC261 codec (all ports are stereo)

Microphone/Headphone front ports (standard)

Line-out and Line-In rear Ports (standard)

Multi-streaming capable (standard)

Internal Speaker (standard)

HP Thin USB Powered Speakers (optional)

Note: The audio ports/jacks provided by all of our systems are 3.5mm in diameter. This would include both the front jacks and rear jacks, for audio in/out, mic in and headphone out.

Input/Output Devices

HP PS/2 Standard Keyboard

HP USB Standard Keyboard

HP USB Smart Card (CCID) Keyboard

HP USB Mini Keyboard

HP USB and PS/2 Washable Keyboard

HP PS/2 Optical Mouse

HP USB Optical Mouse

HP USB Laser Mouse

HP USB and PS/2 Washable Mouse

Miscellaneous Devices and Configurations

Serial Port Adapter (RS-232 compatible)

Parallel Port Adapter

PC Tower Stand

Non-Standard HDD Disk Partitioning (50%/50%)

QuickSpecs

After-Market Options (availability may vary by region)

Communication Devices

	Part Number
HP Wireless 802.11 b/g/n NIC (PCIe x1 card)	FH971AA
Broadcom NetXtreme GbE Ethernet Plus NIC (PCIe x1 card)	FS215AA

Graphics

	Part Number
NVIDIA NVS 300 PCIe x1 512MB card	BV456AA
NVIDIA NVS 300 PCIe x16 512MB card	BV457AA
ATI Radeon HD 4550 (512MB DH) PCIe x16 Card	AT042AA
HP DMS59 DVI Dual-head Connector Cable	DL139A
HP DVI Cable Kit	DL198AT

Hard Disk Drives

	Part Number
HP 250GB Hard Disk Drive	TBA
HP 320GB Hard Disk Drive	TBA
HP 500GB Hard Disk Drive	TBA
HP 1TB Hard Disk Drive	TBA

Input/Output Devices

	Part Number
HP PS/2 Standard Keyboard	DT527A
HP USB Standard Keyboard	DT528A
HP USB Mini Keyboard	AS601AA
HP USB Gray Standard Keyboard	DT529A
HP USB Smart Card (CCID) Keyboard	BV813AA
HP USB Keyboard and Mouse Kit	RC465AA
HP USB & PS/2 Washable Keyboard	VF097AT
HP USB & PS/2 Washable Mouse	BM866AA
HP USB & PS/2 Washable Keyboard and Mouse Kit	BU207AA
HP PS/2 Optical Mouse	EY703AA
HP USB Optical Mouse	DC172AT
HP USB Laser Mouse	GW405AT
HP USB Travel Mouse	RH304AA
HP Mouse Pad	AT485AA

After-Market Options (availability may vary by region)

HP 2.4GHz Wireless Keyboard and Mouse   NB896AA

System Memory

	Part Number
HP 1 GB DDR3 DIMM	AT023AA
HP 2 GB DDR3 DIMM	AT024AA
HP 4 GB DDR3 DIMM	VH638AA

Multimedia Devices

	Part Number
HP Thin USB Powered Speakers	KK912AA
HP DVD-ROM Drive	AR629AA
HP SuperMulti DVD Writer Drive	AR630AA
HP Blu-ray Writer Drive	AR482AA

Removable Media Storage

	Part Number
HP External USB 1.44MB Floppy Drive	DC141B
HP Media Card Reader (22-in-1)	AR941AA

Security Devices

	Part Number
HP Business PC Security Lock	PV606AA
HP SFF Wall Mount/Security Sleeve	VN570AA
HP Chassis Security Kit	AR639AA
HP Keyed Security Kit	BV411AA

HP Client Automation Software

	Part Number
HP Client Automation – Standard Edition (single seat)	T3488AA
HP Client Automation – Standard Edition (10 seats)	TA599AA
HP Client Automation – Standard Edition (100 seats)	TA600AA
HP Client Automation – Standard Edition (500 seats)	TA601AA
HP Client Automation – Standard Edition (1,000 seats)	T3489AA

Stands and Accessories

	Part Number
HP SFF Tower Stand	VN569AA
HP Serial Port Adapter (RS-232 compatible)	PA716A
HP Parallel Port Adapter	KD061AA

Technical Specifications

Weights and Dimensions		Small Form Factor
Chassis (H x W x D)	3.95 x 13.30 x 14.9 in 100 x 338 x 378.5 mm	
System Volume	782.77 cu in 12.83 L	
Tower Stand (H x W x D)	1.12 x 7.01 x 7.87 in 28.5 x 178 x 200 mm	
Packaging (H x W x D)	9.00 x 19.68 x 23.38 in 228.6 x 499.9 x 593.85 mm	
System Weight	16.72 lb 7.6 kg	
Shipping Weight	17.86 lb 8.1 kg	
Max Supported Weight (desktop orientation)	77 lb 35 kg	

I/O Ports		Small Form Factor
USB 2.0	Front – four (4) ports Rear – four (4) ports	
Serial	one RS-232 compatible port standard second port available optionally	
Parallel	one port available as an option	
PS/2	color coded support for keyboard (purple) and mouse (green)	
Video	VGA and DVI-D provide integrated dual independent monitor support	
Audio	Front – microphone & headphone Rear – line in & line out	
NIC	RJ-45 port accesses the integrated Intel® network interface controller	

Slots		Small Form Factor
Type and quantity	(2) 5-volt PCI (1) PCIe x1; 10W max. power (1) PCIe x16; 25W max. power	
Slot specifications	Low profile – 2.5" Length: 6.6" 25W maximum	

Bays		Small Form Factor
3.5" external	1 bay available for optional Media Card Reader	
5.25" external	1 bay – 8.19" depth for optional optical disc drive	
Internal HDD Bay	1 bay for 3.5" hard disk drive	

QuickSpecs

Technical Specifications

Controller   Small Form Factor

Hard Drive Controller	Serial ATA (SATA) 2.0 Supports up to 3.0-GB/s
SATA Interfaces	(2) Total
Host SATA Controller	Advanced Host Controller Interface (AHCI) Revision 1.2. The specification includes a description of the hardware/software interface between system software and the host controller hardware.

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

QuickSpecs

Technical Specifications

Power Supply

		Standard	High Efficiency	High Voltage
Efficiency Rating		70% @ 100% load	82/85/82% @ 20/50/100% load	70% @ =100% load
Max Power Rating		240W		
Power Factor Correcting (PFC)		Active		
Maximum Voltage Range	115 VAC:	90 – 140 VAC		
	220VAC:		180 – 264 VAC	
Nominal Voltage Range	115 VAC:	100 – 127 VAC		
	220VAC:		200 – 240 VAC	
Rated Line Frequency		50/60 Hz		
Operating Line Frequency Range		47 – 63 Hz		
Rated Input Current		4A		
Maximum allowable leakage Current (NFPA 99)		275 μA		
Power Supply Fan		92mm variable speed		

Surge Protection	Standard/High Efficiency	High Voltage
De-Rating Factor	<95% for all continuous conditions	?100% for all continuous conditions
Test Conditions	132 Vac to 155 Vac for 500 msec and back to 132 Vac 264 Vac to 293 Vac for 500 msec and back to 264 Vac. Repeat 10 times with 10 second delay.	300Vac for 30 minutes, followed by two 410Vac/1sec surges @ 0.1Hz repetition rate

Technical Specifications

ROM BIOS Information

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Compaq 4000 Pro PC into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- Computrace agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (Flashbin), BIOS updates from within Windows (HPQFlash), HP Client Manager, and fail-safe recovery. In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website.

Additional HP BIOS Features

- Power-On password – Helps prevent an unauthorized user from powering on the system.
- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) – Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Elite models use ACPI to provide power conservation features.
- Support for Self Encrypting Hard Drives (SED)
- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W in S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

Other Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- System Management BIOS v2.6
- Intel Wired for Management support; industry wide initiative to make Intel architecture based PCs, servers and mobile computers more inherently manageable out-of-the-box and over the network
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Technical Specifications

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED explanation table:
  - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
    - 2 – processor thermal protection activated
    - 3 – processor not installed
    - 4 – power supply failure
    - 5 – memory error
    - 6 – video error
    - 7 – PCA failure (ROM detected failure prior to video)
    - 8 – invalid ROM, bootblock recovery mode
    - 9 – system not fetching code
    - 10 – system hang while loading an option ROM
- System/Emergency ROM
- Flash ROM
- CMOS battery holder for easy replacement
- Flash recovery with video configuration record software
- 5 Aux power LED on system PCA
- Processor ZIF socket for easy upgrade
- Over-temp warning on screen (requires IM agents)
- Clear password jumper
- DIMM connectors for easy upgrade
- Clear CMOS button
- NIC LEDs (integrated) (green & amber)
- Dual color power and HD LED – to indicate normal operations and fault conditions
- Color coordinated cables and connectors
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Green pull tabs, and quick release latches for easy identification

Additional Features	Description
ASF 2.0 support (Alert Standard Format)	Industry-standard specification for network alerting in operating system-absent environments
Computrace	Computrace agent support standard
Towerable Orientation	Product can be oriented as either a desktop or a tower. When oriented as a tower it is recommended to use the optional HP SFF Tower Stand.
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
	DPS Access through F10 Setup during Boot
	A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user

Technical Specifications

Drive Protection System	Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced
	The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted
SMART I – Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II – Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III – Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry
SMART IV – End-to-End CRC for hard drives	Detects errors in Read/Write buffers on HDD cache RAM
	Interface in F10 setup provides confirmation of SMART IV support.

QuickSpecs

HP Compaq 4000 Pro Series

Technical Specifications - Audio

High Definition Audio

Type	Integrated
High Definition Stereo Codec	Realtek 2-channel ALC261 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance)
	Rear Line-In (150-K ohm Input Impedance)
	Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load)
	Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load)

Internal Speaker Amplifier is for the internal speaker only. External speakers need to be powered externally. Rear Line-In audio port is re-task able as Line-In or Microphone-In.

Multistreaming Capable	Multistreaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz – 192 kHz
Wavetable Syntheses (software)	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out (mono/stereo)	Stereo (Left & Right channels)
Internal Audio Speaker Power Rating	1.5 W
Internal Speaker	Yes
External Speaker Jack (Line-Out)	Yes

HP Thin USB Powered Speakers

On/Off/Volume Controls	Right side of right speaker	
Power LED	Front of right speaker (green)	
Frequency Response	FO to 20kHz	
Watts	2/3 watt (normal/maximum)	
Dimensions/Speaker (H x W x D)	5.72 x 3.74 x 0.96 in 14.52 x 9.50 x 2.45 cm	
Net Weight	0.68 lbs 0.31 kg	
Color	Black	
Environmental (all conditions non-condensing)	Operating Temperature:	14° to 104° F −10° to 40° C
	Relative Humidity	40% to 90%
Speaker Cable Length	Input Cord:	5.91 ft 1800mm
	L-channel Cord:	3.28 ft 1000mm
	USB Cord:	5.91 ft 1800mm

Technical Specifications - Communications

Intel® 82567V GbE Network Connection (integrated)

Connector	RJ-45
Controller	Intel® 82567V Gigabit platform LAN Connect Networking Controller
Memory	24 KB FIFO packet buffer memory
Data rates supported	10/100/1000 Mbps
Compliance	IEEE 802.3, 802.3ab and 802.3u compliant
Bus architecture	GLCI, LCI interface. Intel specific MAC to PHY interface
Data transfer mode	At gigabit GLCI (Intel proprietary 802.3 series-based interface) is for Data, LCI (parallel bus) for MDIO, at 10/100 LCI for both data and MDIO, GLCI is idle.
Data rates supported	10/100/1000 Mbps
Hardware certifications	FCC B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
Power requirement	Requires 3.3V,1.9/1.8V and 1.0V or just 3.3V with integrated regulators Power consumption 1.3 Watts for 82567 whole LOM
Boot ROM support	Yes
Network transfer mode	Full-duplex Half-duplex (not supported for the 1000BASE-T transceiver)
Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
Environmental	Operating temperature 32° to 131°F (0° to 55° C) To 70° C for external regulator Operating Humidity: 85% at 131° F (55° C)
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic.

HP Wireless Network Connection 802.11 b/g/n

Dimensions (L x H)	3.3 x 4.7 in 8.5 x 12 cm
Weight	0.08 lbs 40 g
Controller	Ralink RT2790
System interface	PCIExpress x1
Network standard	802.11 b/g/n
Frequency band	2.400 - 2.497 GHz
Operating temperature	14° to 149°F, operating (-10° to 65°C, operating)
Storage temperature	-40° to 176°F, non-operating (-40° to 80°C, non-operating)
Humidity	10-90% operating 5-95% non-operating
Operating voltage	3.3V +/- 9% 12V +/- 8%

Technical Specifications - Communications

	Platform/WLAN Mode	Power Consumption
	Maximum Power Consumption	10 Watts
	Transmit Only	4 Watts maximum averaged power over 1 second
	Transmit Packet or Active Scanning	1000 mA peak current for 100 microseconds or longer
Power consumption	Receive Only Mode or Idle without IEEE PSP mode enabled	3 Watts maximum averaged over 1 second
	Idle, with IEEE PSP mode enabled	1.0 Watts maximum averaged over 1 second
	Transmit Disabled (turned off in software)	50 mW maximum, averaged over 1 second
	Platform in S3 or S4 (power removed from Low Profile PCI Express Card)	5 mW maximum, averaged over 1 second
	802.11b mode	+19 dBm +/- 1.0 dB maximum
Output power (approximately)	802.11g mode	+17 dBm +/- 1.0 dB maximum
	EWC mode	+17 dBm +/- 1.0 dB maximum (total power in all transmit chains)

	Mode	Data rate	Sensitivity
	802.11b	1 Mbps	-94 dBm
	802.11b	11 Mbps	-85 dBm
	802.11g	6 Mbps	-91 dBm
	802.11g	18 Mbps	-85 dBm
	802.11g	48 Mbps	-75 dBm
Receive Sensitivity	802.11g	54 Mbps	-72 dBm
	EWC (2.4 GHz)	6.5 Mbps	-87 dBm
	EWC (2.4 GHz)	54 Mbps	-82 dBm
	EWC (2.4 GHz)	81 Mbps	-78 dBm
	EWC (2.4 GHz)	162 Mbps	-74 dBm
	EWC (2.4 GHz)	270 Mbps	-68 dBm
	EWC (2.4 GHz)	300 Mbps	-64 dBm

Data Rate (MCS)	Minimum Throughput
1 Mbps (802.11 b)	700 kbps
2 Mbps (802.11 b)	1.4 Mbps
5.5 Mbps (802.11 b)	3.5 Mbps
11 Mbps (802.11 b)	5.9 Mbps
12 Mbps (802.11 g)	6 Mbps
18 Mbps (802.11 g)	9 Mbps
24 Mbps (802.11 g)	12 Mbps
36 Mbps (802.11 g)	18 Mbps
48 Mbps (802.11 g)	21 Mbps
54 Mbps (802.11 g)	22.5 Mbps
6.5 Mbps (20 MHz EWC)	4.5 Mbps

QuickSpecs

Technical Specifications - Communications

	13 Mbps (20 MHz EWC)	9 Mbps
	19.5 Mbps (20 MHz EWC)	13.5 Mbps
	26 Mbps (20 MHz EWC)	18 Mbps
Data transfer rate	39 Mbps (20 MHz EWC)	27 Mbps
	52 Mbps (20 MHz EWC)	36 Mbps
	58.5 Mbps (20 MHz EWC)	40 Mbps
	65 Mbps (20 MHz EWC)	45 Mbps
	78 Mbps (20 MHz EWC)	54 Mbps
	104 Mbps (20 MHz EWC)	72 Mbps
	117 Mbps (20 MHz EWC)	81 Mbps
	130 Mbps (20 MHz EWC)	91 Mbps
	13.5 Mbps (40 MHz EWC)	8 Mbps
	27 Mbps (40 MHz EWC)	16 Mbps
	40.5 Mbps (40 MHz EWC)	24 Mbps
	54 Mbps (40 MHz EWC)	32 Mbps
	81 Mbps (40 MHz EWC)	48 Mbps
	108 Mbps (40 MHz EWC)	64 Mbps
	121.5 Mbps (40 MHz EWC)	72 Mbps
	135 Mbps (40 MHz EWC)	81 Mbps

Security	IEEE and WiFi compliant 64 / 128 bit WEP encryption
	AES: CCM
	802.1x authentication
	WPA: 802.1x. WPA-PSK and TKIP
	WPA2 certification
	IEEE 802.11i
	Cisco Certified Extensions, all versions through V5
Antenna	HP part number 497792-001
Certifications	Wi-Fi certified
Certifications for use by country	United States, Canada, Peru, Taiwan

Technical Specifications - Graphics

Intel® Graphics Media Accelerator (GMA) 4500

3D/2D Controller	Microsoft DirectX® 10 based with support for Pixel Shader 3.0
VGA Controller	Integrated
DisplayPort	Integrated, Multimode capable; supports HDCP
Bus Type	PCI Express x16
RAMDAC	Integrated, 350 MHz

Graphics memory is shared with system memory. Graphics memory usage varies depending on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content.

Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.

Memory — Assumes Management Engine, VT-d enabled and other memory allocated for other BIOS usage

System Memory	PVAP	Avail System Memory (MB)	Total Avail GFX Memory (MB)	Dedicated Video Memory (MB)	System Video Memory (MB)	Shared System Memory (MB)
1 GB	Lite	952	252	32	96	124
2 GB	Lite	1976	764	32	96	636
4 GB	Lite	4024	1759	32	96	1631
6 GB	Lite	6072	1759	32	96	1631
8 GB	Lite	8120	1759	32	96	1631

HW Video Decode	Hardware Accelerated decode for MPEG2 encrypted video; support for PAVP Lite (default)
Maximum Color Depth	32 bits/pixel
Maximum Vertical Refresh Rate	85 Hz at up to 1920x1440, 75 Hz at 2048x1536. Varies with mode and configuration. See table below.
Multi-display Support	Integrated dual independent monitor support facilitated via one VGA and one single link DVI-D port integrated on the back plane of the system board and presented as part of the rear I/O set of interfaces.
Graphics/Video API Support	Microsoft DirectX® 10, OpenGL® 1.5 (OpenGL® 2.0 available in a driver update)

Resolutions Supported

Resolution	Maximum Refresh Rate (Hz)	
	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R

Technical Specifications - Graphics

1920x1440	85	N/A
2048x1536	75	N/A

* Only supported when using a DisplayPort connection

Note:
Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Note:
60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

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ATI Radeon HD 4550 (512 MB DH) PCIe x16 Graphics Card

Bus type	PCI Express x16
Maximum vertical refresh rate	85 Hz
Display support	Integrated 400 MHz RAMDAC
Display max resolution	1900 x 1200 digital, 2048 x 1536 analog
Board display options	Supports two displays via included DMS-59 to dual VGA cable or 2 DVI monitors via optional DMS-59 to dual DVI cable kit part number: DL139A. 4-pin mini-DIN S-video connector for TV output

	Specification	Description
	Graphics Chip	RV710
Board configuration	Core clock	600 MHz
	Memory clock	800 MHz
	Frame buffer	512 MB DDR3, 64 bit wide

Languages supported	24 languages: English, Arabic, Chinese Simplified, Chinese Traditional, Czechoslovakian, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish

Technical Specifications - Graphics

	EMC Emissions	EMC Immunity
Compliance standards	FCC Part 15, Subpart B – Unintentional Radiators, Class B Computing Devices for Home & Office Use CISPR22: 1997/EN 55022:1998 – Class B – Limits and methods of measurement of radio disturbance characteristics of Information Technology Equipment Canadian Standard ICES-003 is equivalent to CISPR22 Taiwanese Standard BSMI Japanese VCCI Australian C-Tick Korean (MIC)	CISPR 24:1997/EN 55024:1998 – Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement

Resolutions Supported

	Maximum Refresh Rate (Hz)	
Resolution	Analog Connection	Digital Connection
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	N/A

Note:
Other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Note:
60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

Technical Specifications - Hard Drives

Introduction:

HP Serial ATA Hard Drives maximize the performance of HP Business PCs by providing the technologies to meet your increasing storage demands with high-capacity drives offering superior reliability and performance.

Serial ATA provides faster data transfer speeds, better system cooling airflow, more bandwidth, more headroom for speed increases in future generations and better data integrity. A next-generation technology, Serial Advanced Technology Attachment (SATA) interface connects hard drives to the PC platform enabling easy aggregation of multiple hard drives into a single PC. This offers you the additional benefits of dedicated bandwidth, the ability to more easily identify device failures and scalability

HP Drive Lock

HP Serial ATA Hard Drives offer enhanced security via a new Drive Lock. When enabled, this ATA security feature set prevents software access to user data on the drive until one or two user-defined passwords are provided.

SMART IV Technology

Self Monitoring Analysis and Reporting Technology (SMART) hard drive technology is allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables the intelligent manageability or management software to generate a fault alert. While the current versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has promoted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a 2 byte parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This unique parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive.

Smart IV is also known as IOEDC: I/O Error Detection Code.

Native Command Queuing

NCQ or Native Command Queuing, is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), that allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. Enabling NCQ features in the hard drive requires AHCI support from the host system BIOS, controller, and driver.

NOTE: GB = 1 billion bytes. Actual available capacity is less.

QuickSpecs

Technical Specifications - Hard Drives

HP 250-GB 3.5" Hard Disk Drive

Capacity	250,059,350,016 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA (SATA)
Synchronous Transfer Rate (Maximum)	Up to 3 GB/s (limited by the system SATA controller)
Buffer Size	8 MB
Logical Blocks	488,397,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 1.0 ms **Average:** 8.5 ms **Full-Stroke:** 18 ms
Height (nominal)	1 in/2.54 cm
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

QuickSpecs

Technical Specifications - Input/Output Devices

HP USB Standard Keyboard

	Keys	104, 105, 106, 107, 109 layout (depending upon country)
Physical characteristics	Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in 45.8 x 16.3 x 2.5 cm
	Weight	2 lb 0.9 kg
	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
Electrical	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI – RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 – 2001	Functionally compliant
	Languages	38 available
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
Mechanical	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 –2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
Environmental	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence

Technical Specifications - Input/Output Devices

Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS

Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Standard Keyboard

Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in 45.8 x 16.3 x 2.5 cm
	Weight	2 lb 0.9 kg minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	PS/2 6-pin mini din connector
	ESD	CE level 4, 15-kV air discharge
	EMI – RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 – 2001	Functionally compliant
	Languages	38 available
	Keycaps	Low-profile design
Mechanical	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft 1.8 m
	Microsoft PC 99 –2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)

Technical Specifications - Input/Output Devices

Environmental	**Operating shock**	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP USB Smart Card (CCID) Keyboard

Introduction:

Boost your security, simplify access procedures and reduce the costs associated with managing networks by preventing unauthorized access to your computers and networks using smartcard technology with the HP Smart Card (CCID) Keyboard.

The USB Smart Card (CCID) Keyboard is a full-sized keyboard that takes advantage of digital signatures and certificates to secure the environment for transactions performed on both public and private networks. The USB Smart Card (CCID) Keyboard works with all smart cards that comply with ISO standard 7816.

Smart cards are easy-to-use credit card-sized devices which require multiple forms of information to be validated before you gain access to your accounts or resources. Used worldwide, smart cards strengthen access to a network or other resource using dual-factor authentication. Implementing a two-factor authentication (or multi-factor authentication) process reduces the risk of unauthorized access by verifying and validating your identity in one of the following ways:

- Something you know – a combination of username and password or PIN
- Something you have – a smart card or security token.

Something you have (smart card) plus something you know (PIN), improves user-access security within corporate network environments. Smart cards are used in government agencies, healthcare companies and the finance industry.

HP ProtectTools Smart Card Manager provides authentication software for the smart card. The Smart Card Reader module works with the HP ProtectTools Security Manager and enables the user to setup, use, and manage the smart card. This allows strengthened security with HP patented technology.

Key Benefits:

- Protects against unauthorized access with smart card technology
- Delivers even greater security when combined with a HP ProtectTools smart card and the HP ProtectTools Security Software
- Combination of username and password or pin with a smart card or security token
- Secures online transactions using digital signatures and certificates
- Conforms to industry standards for ease of setup and use
- Delivers long product life and quiet operation with high-impact materials and lubricated keys

Technical Specifications - Input/Output Devices

- Spill drain feature

Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Form factor	USB basic smart card keyboard
	Colors	Carbonite/Silver
	Dimensions (L x W x H)	18.2 x 6.3 x 1.3 in 46.3 x 16.1 x 3.3 cm
	Weight	2 lb 0.9 kg minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI – RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 – 2001	Functionally compliant
	Languages	30+ available
Mechanical	Keycaps	Standard design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft 1.8 m
	Microsoft PC 99 –2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration

Technical Specifications - Input/Output Devices

	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence	
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence	
	Support	All ISO 7816 smart cards	
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)	
	Chipset	SCM STCIII	
	Standard APIs supported	PC/SC, EMV2000, CT-API	
		USB Port	
	Power	Short circuit detection (protects smart card and reader)	
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)	
SmartCard Function		Supports 3-V and 5-V cards	
	Power consumption	100-mA maximum draw	
	Communication	From card	9600 bps to 330,000 bps
		From computer	12 Mbps (USB transfer speed)
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	CCID protocol	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	2004/108/EC
		USA	USAFCC part 15
Approvals		CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF	
Ergonomic compliance		ISO 9241-4, TUVGS	
Kit Contents		Keyboard, I/O Security and Documentation CD, warranty card	
	HP	HP ProtectTools Smart Card	
	American Express	Amex Blue	
	Axalto (Schlumberger)	Cryptoflex 8K Cryptoflex 16K Cryptoflex 32K Cryptoflex 32K e-gate Cyberflex Access 64K Cyberflex Access 32K Cyberflex 32K e-gate Cyberflex 64K Cyberflex Palmera Payflex-S Payflex 1K	

Technical Specifications - Input/Output Devices

		Payflex 2K
		Payflex 4K
		Payflex 8K
		Prismera
		US DoD CAC
		PrimeFlex Store 8K
		PrimeFlex Store 2K
	Cardlogix	CLXSU004KK4
		CLXSU008KK5
	Safenet, Inc.	Model 300
		Model 330
	De-La Rue	VisaCash
	Gemplus	Gem Expresso
		GKK32K
		Gemclub Memo
		GemClub Micro
		GemXplore
		GemSafe
Smart Card Compatibility	Infineon	SLE66C322P
		SLE4406
		SLE4406E
		SLE4406E SE
		SLE4418
		SLE4428
		SLE4432
		SLE4436E
		SLE4442
		SLE5536
	SafLink (Litronic)	Forte
	Shart	Java Card
	Oberthur	CosmopollIC v4
		CosmopollIC v4.1
		Cosmo ID-One
		GalatIIC v2.1
		US DoD CAC
	Memory Cards	
	Atmel	AT24C01ASC
		AT24C02SC
		AT24C04SC
		AT24C08SC
		AT24C16SC
		AT24C32SC
		AT24C64SC
		AT24C128SC
		AT24C256SC

Technical Specifications - Input/Output Devices

		AT24C512SC
		AT88SC153
		AT88SC1608
	ISSI	IS23SC4418
		IS23SC4428
	ST	14C02
	Telefonkarte	SLE4406
		SLE4436
		SLE5536
	XICOR	X24026

HP USB/PS2 Washable Keyboard

The HP USB PS2 Washable Keyboard is well-suited for environments that require keyboards to be immersed and cleaned with the following solvents: soap, washing-up liquid, non-abrasive cleaners, general purpose cleaners, bleach, disinfectant, antibacterial cleaners and surgical spirit. The HP USB PS2 Washable Keyboard provides protection against ingress of water and dust to code IP66 defined in IEC (International Electro Technical Commission) standard 60529-1 and code 4X as defined in NEMA (National Electrical Manufacturers Association) standard 250. The code IP66 defined in the IEC standard 60529 means the keyboard is protected against the ingress of dust, and that high pressure water jets from any direction will not have any harmful effects. A NEMA 4X enclosure as defined in NEMA standard 250 will provide protection against windblown dust, rain, splashing water and hose directed water. For additional information on regulatory standards consult your legal department.

NOTE: Observe the manufacturer's instructions for the preparation and use of all cleaning fluids and wear the appropriate protective clothing.

WARNING: To reduce the risk of electric shock, avoid using the keyboard with a computer in wet locations.

Key Benefits:	- SpillSeal® keyboard technology protection; provides protection from liquids and dust as defined in IEC standard 60529-1, code IP66, and NEMA standard 250, code 4X - Sealed structure able to be fully washed under running water (If the USB plug [connector] gets wet, shake dry before reconnecting.) - Waterproof exterior that protects against windblown dust, rain, splashing water and hose-directed water - USB extension cable allows the keyboard to be easily disconnected without having to access the computer - Plug and play capability when using supported Microsoft Windows operating systems. No additional software drivers are required - USB or PS2 connection - User selectable, zero degree slope for potential wrist posture improvement and associated usage comfort - Key mechanism lifecycle rated at 10 million keystrokes
Compatibility	The HP USB/PS2 Washable Keyboard is compatible with all HP Compaq Business PCs
Service and Support	Your Option Limited Warranty is a one (1) year (HP Option Limited Warranty Period) parts replacement warranty on any HP-branded or Compaq-branded options (HP Options). If your HP Option is installed in an HP Hardware Product, HP may provide warranty service either for the HP Option Limited Warranty Period or the remaining Limited Warranty Period of the HP Hardware Product in which the HP Option is being installed, whichever period is the longer but not to

Technical Specifications - Input/Output Devices

exceed three (3) years from the date you purchased the HP Option.

Physical characteristics	Keys	104 (US) layout or 105 (EU) layout (depending upon country)
	Dimensions (L x W x H)	17.67 x 6.62 x 1.38 in 449 x 168 x 35 mm
	Weight	1.7 lb 0.77 kg minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI – RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 – 2001	Functionally compliant
Mechanical	Keycaps	Stepped profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	7 ft 2.2 m
	Microsoft PC 99 –2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Approvals		UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X

Technical Specifications - Input/Output Devices

Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS
Kit Contents	Keyboard with USB cable, USB-to_PS2 adapter, Quick disconnect cable with extension to lengthen your cable, I/O Security Software & Documentation CD including the safety and comfort guide, warranty card

HP PS/2 Optical Mouse

Dimensions (H x L x W)		1.56 x 2.44 x 4.61 in 3.95 x 6.21 x 11.7 cm
Weight		4.44 oz 126 g
Environmental	Operating temperature	-32° to 104°F 0° to 40° C
	Non-operating temperature	-4° to 140°F -20° to 60° C
	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
	Resolution	400 ± 20% DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	100 in/s/s (2.54 m/s/s)
	Switch actuation	61 g nominal peak force
Mechanical	Switch life	3,000,000 operations (using Hasco modified tester)

Technical Specifications - Input/Output Devices

	Switch type	Low force micro-switches
	Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
	Cable length	6 ft (1.8 m)
	Microsoft PC99 - 2001	Mechanically compliant
	Width	8 mm
	Diameter	1.01 in (25.6 mm)
Scroll wheel	Maximum rotation speed	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory approvals	Compliant	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC

HP USB Optical Mouse

Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in 3.8 x 11.6 x 6.3 cm
Weight	0.27 lb 0.12 kg
Cable length	72.8 in 185 cm
System requirements	Microsoft Windows 95, 98, 2000, Me, XP and Vista Available USB port

HP USB Laser Mouse

Scroll Wheel	24	
Maximum Rotation Speed	48 rats/sec	
Switch Type	wheel	
Switch Life	Button – 3,000,000 Wheel – 1,000,000 times Tilt switch – 500,000 times	
Environmental	Operating Temperature	32° to 104° F 0° to 40° C
	Non-operating Temperature	-4° to 140° F -20° to 60° C

Technical Specifications - Input/Output Devices

	Operating Humidity	10% to 90% (non-condensing at ambient)
	Non-operating Humidity	20% to 80% (non-condensing at ambient)
	Operating Shock	40 g, six surfaces
	Non-operating Shock	80 g, six surfaces
	Operating Vibration	2-g peak acceleration
	Non-operating Vibration	4-g peak acceleration
Electrical	Operating Voltage	+ 5VDC ± 5%
	Power Consumption	
	MTBF	> 150,000 hrs
	ESD	IEC-61000-4-2 criteria B, Contact discharge: +/- 4kV, Air discharge: +/- 8kV
	EMI-RFI	FCC Class B
	PC98	PC 99 Compliant
Mechanical	Resolution	800dpi
	Tracking Speed	25 cm/sec
	Acceleration	0.5mm
	Switch Actuation	0.6N (60gf)
	Switch Life	Button – 3,000,000 Wheel – 1,000,000 times Tilt switch – 500,000 times
	Cable Length	1850mm
	PC98-99	PC99 compliant
Regulatory Approvals	UL60950-1, UL 94, UL 746 (A-E), UL 796 TUV/GS: EN 60950-1, EN 60825-1 FCC Class B, UL 1950, cUL, TUV GS, CE, C-tick, VCCI, BSMI, RRL	

HP USB/PS2 Washable Mouse

The HP USB PS2 Washable Mouse is a USB based mouse that is designed to be taken apart (disassembled), when it becomes soiled, or in the event that something is spilled on it. The mouse can to be immersed for cleaning with the following solvents: soap, washing-up liquid, non-abrasive cleaners, general purpose cleaners, bleach, disinfectant, antibacterial cleaners and surgical spirit. The HP USB PS2 Washable Mouse provides protection against ingress of water and dust to code IP66 defined in IEC (International Electro Technical Commission) standard 60529-1 and code 4X as defined in NEMA (National Electrical Manufacturers Association) standard 250. The code IP66 defined in the IEC standard 60529 means the mouse is protected against the ingress of dust, and that high pressure water jets from any direction will not have any harmful effects. A NEMA 4X enclosure as defined in NEMA standard 250 will provide protection against windblown dust, rain, splashing water and hose directed water. For additional

Technical Specifications - Input/Output Devices

information on regulatory standards consult your legal department.

NOTE: Observe the manufacturer's instructions for the preparation and use of all cleaning fluids and wear the appropriate protective clothing.

WARNING: To reduce the risk of electric shock, avoid using the keyboard with a computer in wet locations.

Key Benefits:	- Sealed structure able to be fully washed under running water - Waterproof exterior that protects against windblown dust, rain, splashing water, hose-directed water, and damage from external ice formation - Removable scroll wheel that clips back into place after cleaning - SpillSeal® mouse technology protection, which provides protection from liquids and dust as defined in IEC standard 60529-1, code IP66, and NEMA standard 250, code 4X - Plug and play capability when using supported Microsoft Windows operating systems. No additional software drivers are required - USB or PS2 connection - Optical tracking with two standard buttons and a third button located in the center for highlighting information or autoscrolling
Compatibility	The HP USB/PS2 Washable Mouse is compatible with all HP Compaq Business PCs
Service and Support	Your Option Limited Warranty is a one (1) year (HP Option Limited Warranty Period) parts replacement warranty on any HP-branded or Compaq-branded options (HP Options). If your HP Option is installed in an HP Hardware Product, HP may provide warranty service either for the HP Option Limited Warranty Period or the remaining Limited Warranty Period of the HP Hardware Product in which the HP Option is being installed, whichever period is the longer but not to exceed three (3) years from the date you purchased the HP Option.

Physical characteristics	**Dimensions** (H x L x W)	1.56 x 2.44 x 4.61 in 3.95 x 6.21 x 11.7 cm
	Weight	4.44 oz 126g
Electrical	Operating voltage	5VDC ±10%
	Power consumption	100mA
	System interface	PS/2 mini-din connector or USBr
	ESD	CE level 2 8 kV air discharge
	EMI – RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 – 2001	Functionally compliant
	Resolution	1000 ± 20% DPI
	Tracking speed	14 in/s (35.56 cm/s) maximum
	Acceleration	2g
	Switch actuation	70g nominal peak force
Mechanical	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches

Technical Specifications - Input/Output Devices

	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	8.8 ft total 70 cm+ 2m extension
	Microsoft PC 99 –2001	Mechanically compliant
	Operating temperature	–32° to 104°F (0° to 40° C)
	Non-operating temperature	–4° to 140°F (–20° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	10% to 90% non-condensing
Environmental	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
	Width	6mm
	Diameter	1 in (25.4 mm)
	Maximum Rotation speed	48 rats/sec
Scroll Wheel	Switch type	Light force micro-switch
	Switch life	3 million operations
	Mechanical life	Minimum 200,000 revolutions
Approvals	FCC, CE Mark, ICES-003-B, IP66/NEMA4X	
Compatibility	Windows Vista Business 64, Windows Vista Business 32, Windows Vista Home Basic 32, Windows 2000, Windows XP Professional or Windows XP Home 32 (No driver is required for this device. Native support is provided by the operating system.), xpe, ce.net, Linux, XP-64	

QuickSpecs

Technical Specifications - Optical Storage

HP Blu-ray Writer

Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA/ATAPI		
Disc capacity	50 GB DL or 25 GB standard		
Dimensions (W x H x D)	14.8 x 4.2 x 18.0 (max) cm		
Weight (max)	2.1 lb 950 g		

		Single-layer	Double-layer
	BD-R	2x, 4x CLV, 6x	2x, 4x CLV, 6X PCAV or ZCLV
	BD-RE	2x CLV	2x CLV
	DVD-R	4x CLV, 8x, 12x PCAV, 16x CAV	4x CLV, 8X PCAV or ZCLV
	DVD-RW	2x, 4x CLV, 6x CLV or ZCLV	Not supported
Write speed (max)	DVD+R	4x CLV, 8x, 12x PCAV, 16x CAV	2.4x, 4x CLV, 8X PCAV or ZCLV
	DVD+RW	2.4x, 4x, 6x CLV, 8x ZCLV	Not supported
	DVD-RAM	2x, 3x CLV, 5x PCAV or CLV	
	CD-R	16x CLV, 24x, 32x PCAV, 40x CAV or PCAV	
	CD-RW	4x, 10x, 16x CLV, 24x ZCLV	

		Single-layer	Double-layer
	BD-ROM	8x CAV	8x CAV
	BD-R	8x CAV	8x CAV
	BD-RE	6x CAV	6x CAV
	DVD-ROM	16x CAV	8x CAV
	DVD-R	12x CAV	8x CAV
	DVD-RW	10x CAV	Not support
	DVD+R	12x CAV	8x CAV
Read speeds	DVD+RW	10x CAV	Not support
	BDMV (AACS Compliant Disc)	2x CLV, 4.8x or 6x CAV	
	DVD-RAM	2x, 3x CLV, 5x PCAV or CLV	

Technical Specifications - Optical Storage

	DVD-Video (CSS Compliant Disc)	8x CAV
	CD-R/RW/ROM	40x / 40x / 40x CAV
	CD-DA (DAE)	32x CAV
	80 mm CD	16x CAV
	BD-ROM	26.97 MB/s (6x) max
Sustained Transfer rate	**DVD-ROM**	21.6 MB/s (16x) max.
	CD-ROM	6,000 KB/s (40x) max.
Burst Transfer rate	1.5Gbps bits/s (10b side) 1.2Gbps bits/s (8b side)	
Multimedia MPC-3 compliant	Yes	
Access times (typical reads, including setting)	**Random**	DVD-ROM: < 150 ms (typical), CD-ROM: < 140 ms (typical)
	Full Stroke	DVD-ROM: < 240 ms (typical), CD-ROM: < 230 ms (typical)
	Source	SATA DC power receptacle
Power	**DC Power Requirement**	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 10%-100 mV ripple p-p
	DC Current	5 VDC -1200 mA typical, 1500 mA maximum 12 VDC -1000 mA typical, 1500 mA maximum
Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity (operating)	10% to 90%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)

HP SuperMulti DVD Writer Drive

Height	5.25-inch, half-height, tray-load	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Disc capacity	8.5 GB DL or 4.7 GB standard	
Dimensions (W x H x D)	5.8 x 1.7 x 6.9 (max) in 14.8 x 4.2 x 17.5 (max) cm	
Weight (max)	2.1 lb 950g	
Write speeds (max)	**DVD-RAM**	Up to 12X

Technical Specifications - Optical Storage

	DVD+R	Up to 16X
	DVD+RW	Up to 8X
	DVD+R DL	Up to 12X
	DVD-R DL	Up to 12X
	DVD-R	Up to 16X
	DVD-RW	Up to 6X
	CD-R	Up to 40X
	CD-RW	Up to 32X
Read speeds (max)	DVD-RAM	Up to 12X
	DVD+RW, DVD-RW	Up to 8X
	DVD+R DL, DVD-R DL	Up to 12X
	DVD-ROM DL	Up to 8X
	DVD-ROM, DVD+R, DVD-R	Up to 16X
	CD-ROM, CD-R	Up to 40X
	CD-RW	Up to 32X
Access time (typical reads, including settling)	Random	DVD-ROM: < 130 ms (typical), CD-ROM: < 120 ms (typical)
	Full Stroke	DVD-ROM: < 240 ms (typical), CD-ROM: < 200 ms (typical)
Power	Source	SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
		12 VDC (< 1200 mA typical, 2000 mA maximum)
Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

HP DVD-ROM

Height	5.25-inch, half-height, tray-load
Orientation	Either horizontal or vertical

Technical Specifications - Optical Storage

Interface type	SATA/ATAPI
Disc capacity	Single layer: Up to 4.7 GB (6 times capacity of CD-ROM) Double layer: Up to 8.5 GB (12 times capacity of CD-ROM)
Dimensions (W x H x D)	5.8 x 1.7 x 6.9 (max) in 14.8 x 4.2 x 17.5 (max) cm
Weight (max)	2.1 lb 950 g

Read speeds (max)		
	DVD+RW/-RW/+R DL /-R DL /-ROM DL	Up to 8X
	DVD-ROM	Up to 16X
	DVD-RAM	Up to 12X
	CD-ROM, CD-R	Up to 40X
	CD-RW	Up to 32X

Removable Storage – Media Compatibility – DVD-ROM	Media	Read	Write
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+R	Yes	No
	DVD+R DL	Yes	No
	DVD+RW	Yes	No
	DVD-R	Yes	No
	DVD-RW	Yes	No
	DVD-R DL	Yes	No

Access times (typical reads, including setting)		
	Random	DVD-ROM: < 130 ms (typical), CD-ROM: < 120 ms (typical)
	Full Stroke	DVD-ROM: < 240 ms (typical), CD-ROM: < 200 ms (typical)
	Cache Buffer	198 KB (minimum)

Technical Specifications - Optical Storage

	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 5 (100 MB/s - default)
Power	Source	SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum 12 VDC -< 1200 mA typical, < 2000 mA maximum
Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

Technical Specifications - Removable Storage

HP 22-n-1 Media Card Reader

USB Interface	USB 2.0 High-speed interface Note: Requires the USB cable to be connected to the internal USB 2.0 port or a USB 2.0 PCI card.
1394 Interface	Two IEEE-1394a external ports; 1 IEEE-1394a internal port (connects to the pass through cable on the media card reader)
Advance protocol support	Supports hardware ECC (Error Correction Code) function Supports hardware CRC (Cyclic Redundancy Check) function Supports MS 4-bit parallel transfer mode Supports MS-PRO 4-bit parallel transfer mode Supports MS PRO-HG Duo 4-bit parallel transfer mode Supports SD 4-bit parallel transfer mode Supports high-speed 50Mhz SD 4-bit card (version 2.0) Supports high-speed 52Mhz MMC 8-bit card (version 4.2) Supports CF v4.0 with PIO mode 6 and Ultra DMA mode
Supported media type	CompactFlash Type I CompactFlash Type II Microdrive MultiMediaCard (MMC) Reduced Size MultiMediaCard (RS MMC) MultiMediaCard 4.2 (MMC Plus, including MMC Plus HC) Reduced Size MultiMediaCard 4.2 (MMC Mobile, including MMC Mobile HC) Secure Digital Card (SD) Secure Digital High Capacity (SDHC) miniSD miniSD High Capacity Micro SD (T-Flash) Micro SD HC Memory Stick Memory Stick Select Memory Stick Duo (MS Duo) Memory Stick PRO (MS PRO)

Technical Specifications - Removable Storage

Supported media type with card adapter	Memory Stick PRO Duo (MS PRO Duo)	
	Memory Stick PRO-HG Duo	
	MagicGate Memory Stick (MG)	
	MagicGate Memory Stick Duo	
	xD-Picture Card	
	Memory Stick Micro (M2)	
	MMC Micro	
Environmental	Operational Environmental Extremes	Test Parameters/Conditions - Power applied, unit operating on system ±5% nominal supply voltage. 10°C 10% R.H. = 24 hours 10°C 90% R.H. = 24 hours 20°C 90% R.H. = 24 hours 30°C 90% R.H. = 24 hours 40°C 90% R.H. = 24 hours 50°C 90% R.H. = 24 hours 50°C 10% R.H. = 24 hours
	Storage Environmental Extremes	Test Parameters/Conditions 140°F (60°C) @ 80% R.H. for 96 hours -22°F (-30°C) @ 20% R.H. for 48 hours No power applied Delta °C < 1.0°C/min Delta % R.H. < 1.5% R.H./min
Approvals	USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0	
	Compliant Intel Front Panel I/O Connectivity Design Guide V. 1.3	
	FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUV-T	

Technical Specifications - Environmental Data

| Eco-Label Certifications & declarations | This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: |

- US ENERGY STAR
- IT ECO declaration
- EPEAT Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	26.963 W	26.813 W	26.988 W
Sleep (Energy Star low power mode)	2.529 W	2.706 W	2.513 W
Off	1.347 W	1.507W	1.328 W

Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	92.21 BTU/hr	92 BTU/hr	92.2 BTU/hr
Sleep	9 BTU/hr	9.25 BTU/hr	8.5 BTU/hr
Off	5 BTU/hr	5.15 BTU/hr	4.5 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.84	28.2
Fixed Disk (random writes)	4.31	32.3

| Batteries | This battery(s) in this product comply with EU Directive 2006/66/EC |

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight

Battery size: CR2032 (coin cell)
Battery type: Lithium

| Additional formation | |

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.

Technical Specifications - Environmental Data

- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0% post consumer recycled plastic (by wt.)
- This product is 93.8% recyclable when properly disposed of at end of life.

Packaging Materials

- External:
    - Corrugated – 1966 g
- Internal:
    - Polyethylene low density foam – 154 g
- The Polyethylene low density foam packaging material is made from 100% recycled content.
- The Corrugated Packaging materials contains at least 49% recycled content.

RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at: http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Technical Specifications - Environmental Data

- Nickel finishes that release greater than 0.5 micro-grams/cm^2/week, measured according to EN 1811:1998, are not used on any product surface designed to be frequently handled or touched by users.

Packaging

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Hewlett-Packard Corporate Environmental Information

For more information about HP's commitment to the environment:
Global Citizenship Report
http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
Eco-label certifications
http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html
ISO 14001 certificates:
http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html