HP NetServer Rack
configuration guide

HP's flexible approach to rack mounting your HP NetServer

This configuration guide is intended to allow you to:

1. Determine the number of racks required to house your equipment.

2. Generate a complete list of equipment needed to rack mount your HP NetServers and related equipment.

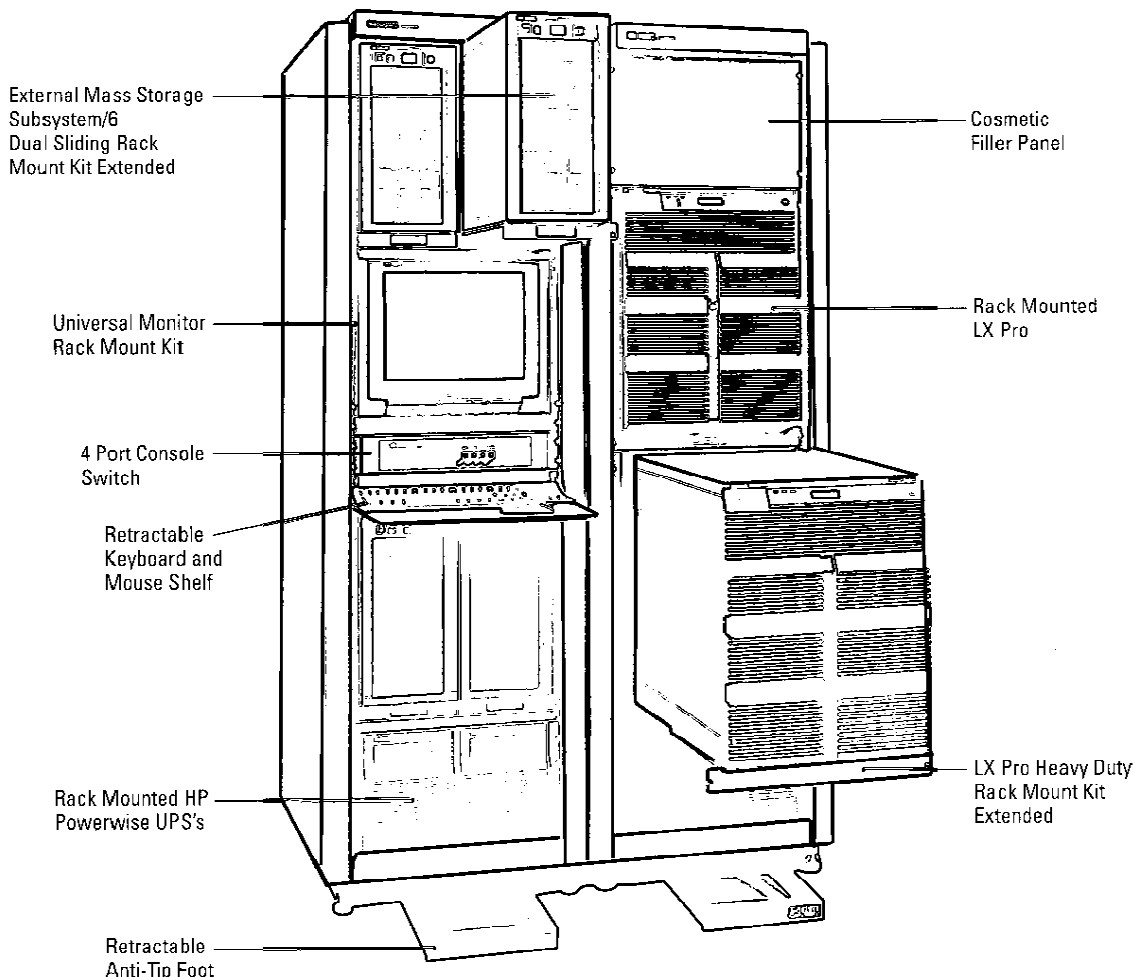3. Calculate the power requirements, weight and stability of the system.

To determine the amount of rack space required, add up the vertical height of all equipment to be mounted in the rack. The common measure for racks is the Electronic Industry Association (EIA) "Unit" or "U", which is equal to 1.75 inches or 44.5mm of vertical space within the rack. The facing page lists the "U" or height for many devices.

The guide also helps you calculate power and weight requirements. The power consumption is important for selecting a UPS, and for determining the number of power distribution units (PDU) power strips. If you're not buying UPS's or HP PDU's, you may not need to calculate the power requirements.

The weights are important for determining the overall stability of the rack, and for the total load

that your floor will have to bear to support the rack. The stability is important since heavy, slide mounted products could cause the rack to tip forward when devices are extended from the rack. HP racks include an anti-tip foot which should always be pulled out before devices are extended from the rack on slides. The weights are also used to calculate the number of ballasts that can be added to the rack if you want permanent anti-tip capability in the rack.

External Mass Storage Subsystem/6 Dual Sliding Rack Mount Kit Extended

Universal Monitor Rack Mount Kit

4 Port Console Switch

Retractable Keyboard and Mouse Shelf

Rack Mounted HP Powerwise UPS's

Retractable Anti-Tip Foot

Cosmetic Filler Panel

Rack Mounted LX Pro

LX Pro Heavy Duty Rack Mount Kit Extended

NetServer Rack Quick Configuration Guide

Equipment Mounted	Mounting Kit Color		Qty	U/Total	Wt(lbs)/total	Power(VA)/Total
	Parchment White	Quartz				
HP NetServer LX	N/A	J1455A	___ x	14/____	187/____	1750/____
HP NetServer LF/LH/LM/LS	J1451B	N/A	___ x	11/____	70/____	715/715/800/1050/____
HP NetServer LH+/LHPro	N/A	J1491A	___ x	11/____	70/____	1050/____
HP NetServer LC	J1452B	N/A	___ x	11/____	46/____	430/____
HP NetServer E	N/A	J1496A	Kit Available January '97			
External Mass Storage Kit	J1454A	J1492A	___ x	11/____	36/____	480/____
D2806A/B 15" Monitor	E4475A	N/A	___ x	8/____	31/____	120/____
HP 14"–15" Monitor	E5922A	E7709A	___ x	9/____	30/____	120/____
HP 16"–21" Monitor	E5922A	E7709A	___ x	11/____	40/____	185/____
HP Disk Arrays (2 per shelf max.)	E3666A	N/A	___ x	9/____	56/____	170/____
Vectra 386S,486S/U/XU	E3904A	N/A	___ x	4/____	25/____	240/____
Vectra 386N,486N/NI/SN/SNI/N2	E3906A	N/A	___ x	3/____	18/____	160/____
Vectra VL/VL2/VL2e/XM/XM2/M2/VE	E3909A	E7707A	___ x	3/____	22/____	215/____
Vectra VL4 Tower	N/A	J1496A	Kit Available January '97			

Equipment w/Rack Mount Kit	Parchment White	Quartz	Qty	U/Total	Wt(lbs)/total	Power(VA)/Total
8 port console switch	J1460A	J1495A	___ x	2/____	12/____	170/____
4 port console switch	J1461A	J1494A	___ x	2/____	12/____	170/____
7 ft switch/server cables	J1462A	N/A	___	0	0	0
12 ft switch/server cables	J1463A	N/A	___	0	0	0
100 VG Hub-15	J2410A	N/A	___ x	2/____	9/____	163/____
10 Base-T Hub-16U	J2611B	N/A	___ x	1/____	5/____	60/____
10 Base Hub-12	J2600A	N/A	___ x	2/____	9/____	110/____
Switch 2000	J3100A	N/A	___ x	4/____	20/____	450/____
10 Base Hub-24	J2601A	N/A	___ x	2/____	9/____	110/____
10 Base Hub-48	J2602A	N/A	___ x	3/____	11/____	145/____
Advance Stack Router	27287A	N/A	___ x	2/____	6/____	170/____
Router 230	J2540A/B	N/A	___ x	1/____	6/____	150/____
Router 240	27289A/B	N/A	___ x	1/____	6/____	150/____
Router 245	J2543A	N/A	___ x	1/____	6/____	150/____
Router 430	27288A	N/A	___ x	1/____	6/____	150/____
Router 440	27285A	N/A	___ x	1/____	6/____	150/____
Router 445	27286A	N/A	___ x	1/____	6/____	150/____
Router 650	J2430A	N/A	___ x	5/____	47/____	685/____
Router OV UX Bundle	27290A	N/A	___ x	2/____	6/____	170/____

Rack Accessories	Parchment White	Quartz	Qty	U/Total	Wt(lbs)/total	Power(VA)/Total
Fixed Keyboard Shelf	E3900A	E7714A	___ x	1/____	5/____	0
Retractable Keyboard/Mouse Shelf	E4079A	E7713A	___ x	2/____	10/____	0
Cable management Accessory	J1459A	N/A	___	0	0	0
Mounting Hardware	46298R	E7797A	___	0	0	0
Plexiglas Front Door	E4463A	E7777A	___ x	0	20/____	0
100-120 volt Fan	E4470A	N/A	___ x	0	4/____	170/____
200-240 volt Fan	E4471A	N/A	___ x	0	4/____	170/____
120 volt Power Dist. Unit	E4455A	N/A	___ x	0	5/____	0

| Rack Accessories | Mounting Kit Color | | | | | |
	Parchment White	Quartz	Qty	U/Total	Wt(lbs)/total	Power(VA)/Total
240 volt (North American) PDU	E4456A	N/A	___ x	0	5/____	0
240 volt (International) PDU	E4457A	N/A	___ x	0	5/____	0
PDU Installation Kit (one per rack)	E4472A	E7685A	___	0	3/____	0
240v IEC power cables-36 inch	8120-1575	N/A	___	0	0	0
240v IEC power cables-60 inch	8120-1860	N/A	___	0	0	0
100-120V U.S. power cable–90 inch	8120-1751	N/A	___	0	0	0
Plain Shelf	E3666A	N/A	___ x	1 min/____	13/____	0
30 lb Ballast	C2790A	N/A	___	0	30	0

Add total Power(VA) of devices to calculate size of UPS needed ————————————➔ _____VA total

Uninterruptible Power Supply	Parchment White	Quartz	Qty	U/Total	Wt(lbs)/total	Power(VA)/Total
1000 VA UPS (C4275A)	C4631A	N/A	___ x	0	48/____	0
2100 VA UPS and battery (C4276A)	C4631A	N/A	___ x	0	87/____	0
Kit for 2-C4275A or 1-C4276A	C4631A Rack Kit		___ x	6/____	10/____	0
1250 VA UPS (C5225B)	C5233A	N/A	___ x	6/____	48/____	0
900 VA UPS (C4777B)	C5233A	N/A	___ x	6/____	48/____	0

Add total U to calculate space required in rack ————————————➔ ____U or EIA units total

Racks	Parchment White	Quartz	Qty	U/Total	Wt(lbs)/total	Power(VA)/Total
2 meter, 41U high rack	J1450A	J1487A	___ x	41	255/____	0
Rack w/o side panels or rear door	J1450A/opt AXH	J1487A/opt AXH	___ x	41	165/____	0
Tie-together kit for multiple racks	E4469A	E7792A	___ x	0	15/____	0
Rear Door for opt AXH rack	E4478A	E7766A	___ x	0	33/____	0
Extra Side Panel	E4459A	E7749A	___ x	0	41/____	0
Filler Panels	40101A-40107A	E7731A-E7737A	___ x	1 to 7	1/____	0

Rack Cabinet Features and Options

Designed to Protect Your HP NetServer Investment

Now you can consolidate your Hewlett-Packard NetServers and other desktop HP network components in an attractive, professional-looking cabinet *and* conserve valuable floor space—with HP's new rack system.

HP's 30 years of racked systems design experience results in an approach that allows more *flexibility*—you can use the same HP NetServer in either a standalone or rack-mounted configuration, depending on your needs. Our rack systems also *protect your investment* by letting you rack mount your *existing* HP NetServers. Simply remove your HP NetServer's feet and install it in the rack using our rack mount kits—there's no need to purchase a more expensive server designed only for rack mounting. Our racks also can accommodate your existing HP monitors and uninterruptible power supplies. We even provide standard shelves for mounting most any device.

Economical, Easy to Configure, Fully Equipped

HP racks save you time and money in a number of ways: they come pre-assembled, are competitively priced, and have many standard features. Our basic, two-meter rack cabinets come with easy-to-remove side panels; a locking rear door; a vented top with concealed lifting hooks; three-inch, heavy-duty, smooth-rolling casters; sturdy screw levelers; and a retractable, anti-tip foot. And because they're made of heavy-gauge, welded steel construction and built to HP's high quality standards, they can easily be moved without damaging their contents—even when fully loaded. We've designed our rack system with enough flexibility, options, and accessories to enable you to tailor a solution for your particular system configuration. Our two-meter rack cabinet provides a generous 41 (EIA) units or "U" of vertical space for system components, an additional ten centimeters of internal space at the rear of the cabinet for power distribution units, and space for cable routing out the bottom of the rack.

A variety of optional components and accessories that work together and fit neatly into our

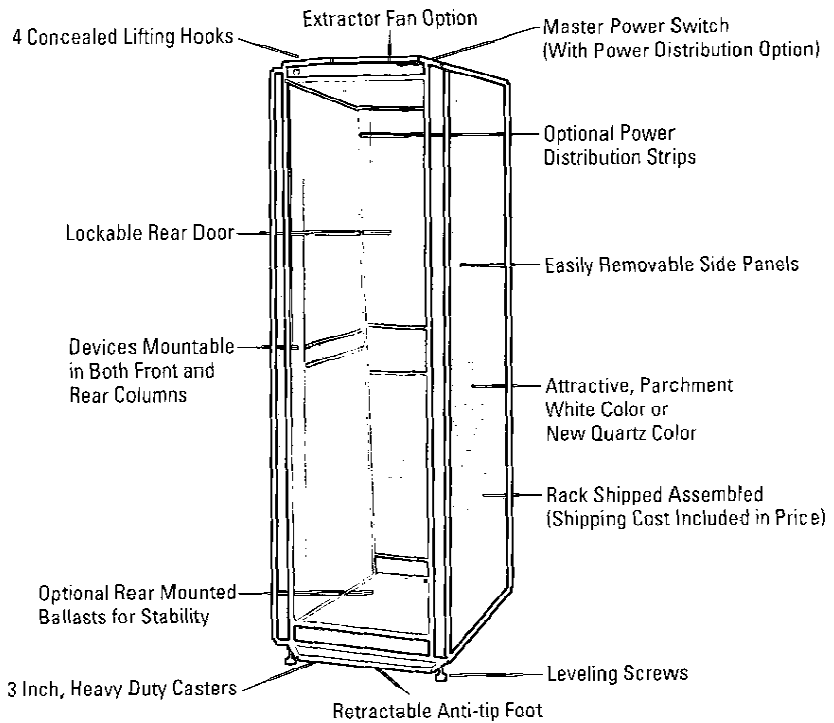racks are available from authorized HP resellers. These include:

- Four- and eight-port console switches that let you use a single monitor, mouse, and keyboard to control up to four or eight servers—saving you time and space. You can even cascade console switches to control up to 64 servers from one location.

- HP 1000 VA and 2100 VA UPS's and UPS rack-mounting kits

- A variety of HP power distribution units (PDUs)

- Fixed or retractable keyboard/ mouse shelves

- HP 200-cfm (342-cmh) cooling fan

- Plexiglas front door with lock

- Filler panels for a neat, finished appearance

- Light duty, fixed-support shelf to hold components of odd shapes and sizes

Single or Multiple Racks Not Connected

Add EIA units of equipment mounted in the rack to determine total vertical space, and number of racks required. If total EIA units is less than or equal to 41 units, order one J1487A rack. For multiple racks not connected together, order all racks as J1487A.

Multiple Racks, Connected

If total EIA units is greater than 41 units, identify which units will go into each rack, and assure that there are not more than 41 units in each rack. For multiple racks connected together, order first rack as J1487A, and additional racks as J1487A option AXH and one HP E7792A tie-together for each option AXH rack.

4 Concealed Lifting Hooks

Extractor Fan Option

Master Power Switch (With Power Distribution Option)

Optional Power Distribution Strips

Lockable Rear Door

Easily Removable Side Panels

Devices Mountable in Both Front and Rear Columns

Attractive, Parchment White Color or New Quartz Color

Rack Shipped Assembled (Shipping Cost Included in Price)

Optional Rear Mounted Ballasts for Stability

3 Inch, Heavy Duty Casters

Leveling Screws

Retractable Anti-tip Foot

1. Order one rear door, HP E7766A for each HP J1487A opt AXH.

2. Order one HP E7792A tie-together kit for each J1487A opt AXH rack connected to an adjacent rack.

3. Extra side panels, E7749A are available, but are generally not needed if at least one HP J1487A rack, which includes side panel, is ordered.
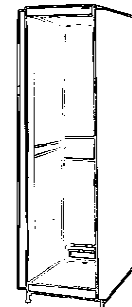

J1487A rack shown with optional E7685A PDU installation kit and power switch.

Rack Dimensions

Front Rack View

Side Rack View
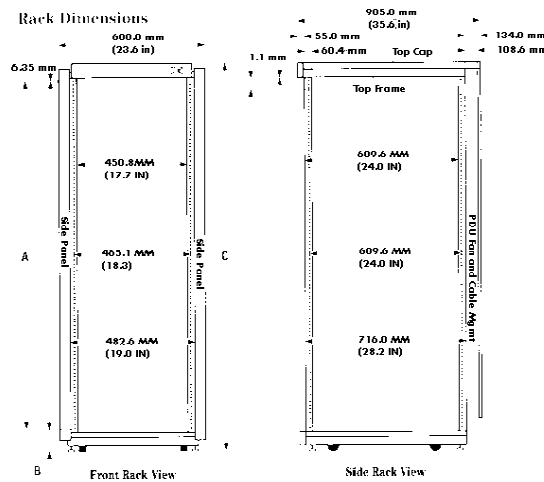
Rack	Dimensions		
	A	B	C
J1487A	71.75 inches (1,822.45 mm) (41 EIA)	5.19 inches (131.81 mm)	79.53 inches (2,020 mm)

Rack Weight

| Description (Part Number)	Weight Empty (Without Packaging)	Weight Empty (With Packaging)	Caster Rating Lift	Hook Rating
Two-meter rack (J1487A)	255 lbs (116 kg)	378 lbs (172 kg)	700 lbs (318 kg) each	500 lbs (227 kg) each
Two-meter rack without side panels or rear door (J1487A Option AXH)	165 lbs (75 kg)	288 lbs (131 kg)	700 lbs (318 kg) each	500 lbs (227 kg) each
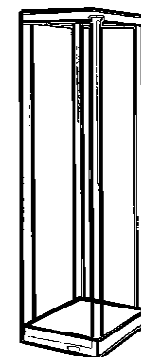
J1487A option AXH 2M bare rack.

Rack Mounting Specifications
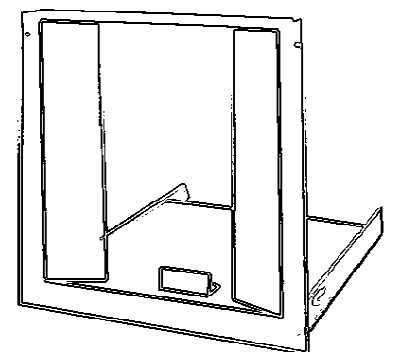
HP NetServer Rack Mount Kits
1. Order one NetServer rack mount kit for each NetServer. The NetServer Rack Mount Kits include a cable management arm or cable bracket to prevent cables from binding when NetServers are slid in and out of the rack.

2. The NetServer Rack Kit front bezel hole pattern matches standard 19-inch rack standards. However, the slide rails may not fit in some non-HP racks, since the EIA 19-inch rack stan-dard does not specify the distance from the front of the rack to the rear column. HP racks use a 24-inch spacing from front column to rear column, and all HP rack mount kits are designed for this spacing.

3. Average power consumption for fully loaded NetServers can range from 430 VA (Low End) to 1750 VA (High End). For peak power consumption consult NetServer documentation.
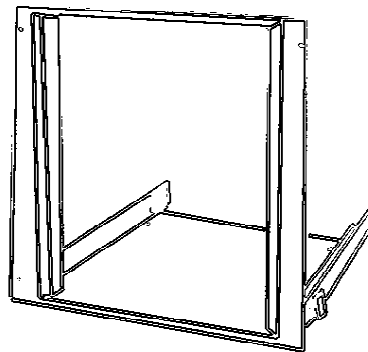
J1491A rack mount kit for NetServer LF, LH, LM, or LS.

J1452A rack mount kit for NetServer LC.

HP Universal Monitor Rack Mount Kit

HP monitor rack mount kits may not fit non-HP racks. See Note 2 above. For other monitors not listed above, mount on a plain shelf, HP E3666A, and allow at least 8-11 EIA units of space.

Includes mounting hardware.

17 mm
0.67 in

700 mm
27.56 in

455 mm
17.91 in

447 mm
17.6 in
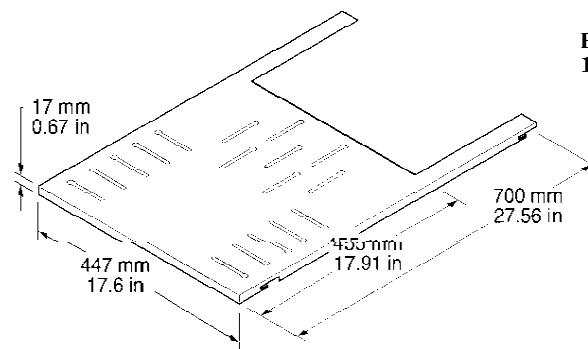
HP E7709A rack mount kit for 14"-21" monitors.

External Mass Storage Rack Mount Kit
The NetServer Storage System/6, HP D3604A and D3604B can be rack mounted with your J1454A or J1492A respectively. Up to two units can be mounted side by side on separate sliding shelves. Each fully loaded array weighs 36 pounds, and consumes a maximum of 480 VA.

HP Vectra PC Rack Mount Kits
HP Vectra PC's can be easily rack mounted by using one of three rack mount kits. Vectras 6.6 inches high, such as the U and XU models, fit in the E3904A. Vectras 4 inches high, such as the N2, fit in the E3906A. Vectras 4.9 inches high, such as the M2 and VE fit in the E7707A.
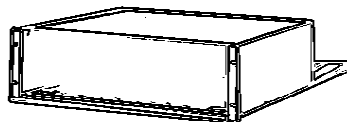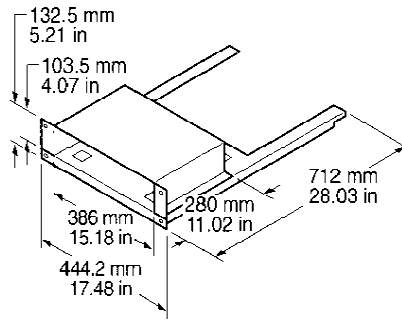
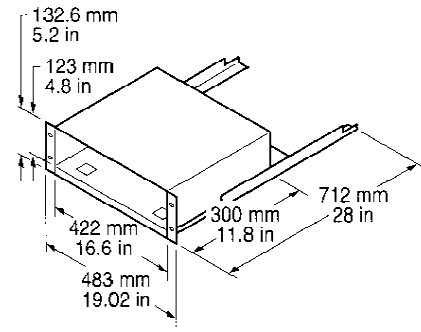HP E3904A rack mount kit for Vectra U, XU PC's.

Includes mounting hardware.
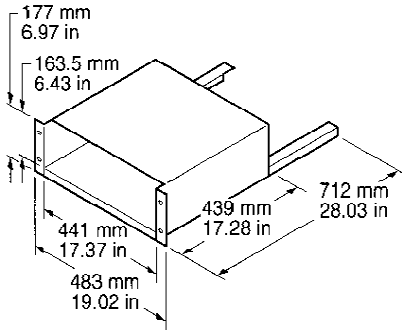
177 mm
6.97 in
163.5 mm
6.43 in
712 mm
28.03 in
439 mm
17.28 in
441 mm
17.37 in
483 mm
19.02 in

HP E3904A rack mount kit for Vectra U, XU PC's.

132.5 mm
5.21 in
103.5 mm
4.07 in
712 mm
28.03 in
280 mm
11.02 in
386 mm
15.18 in
444.2 mm
17.48 in

HP E3906A rack mount kit for Vectra NI/SN/SNI/N2.

132.6 mm
5.2 in
123 mm
4.8 in
712 mm
28 in
300 mm
11.8 in
422 mm
16.6 in
483 mm
19.02 in

HP E7707A rack mount kit for Vectra VL/VL2/VL2e/XM/XM2/M2/VE.

HP Console Switch

HP console switch allows control of multiple HP Netservers and Vectra PC's from a single keyboard, monitor and mouse. Each switch can control up to 4 or 8 servers. Up to 64 servers can be controlled by cascading switches. J1462A or J1463A switch-to-server cable kits must be ordered for each server or PC. Rack mount kit included with J1495A and J1494A. U.S. AC power cord and IEC-320 cord included. Other international power cords must be ordered separately.

If switch is mounted in the middle of a rack, J1462A 7-foot cable kits can be used for each server or PC in the rack. If switch is in top or bottom of rack, order one J1463A 12-foot cable kit to allow sufficient cable for the server farthest away from the switch to fully extend on its slides.

For each Net Server located in an adjacent rack, order one J1463A 12-foot cable. See HP data sheet 5963-7433EUS for more information.

HP J1495A switch.

Hubs and Routers

HP hubs and routers include rack mount kits; no additional hardware is required to rack mount them.
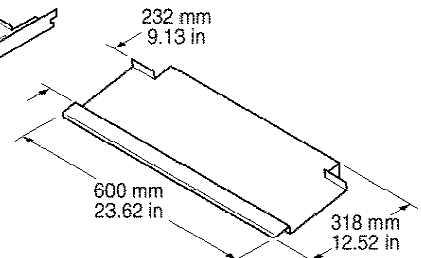
Keyboard Shelves

Select fixed or retractable keyboard/mouse kits to mount the keyboard that comes with HP NetServers and HP Vectra PC's. The retractable keyboard shelf is recommended for use with the HP front door, since the door cannot close over the fixed keyboard shelf.

Note: These mounting kits do not include a keyboard.

685 mm
26.97 in
208.7 mm
8.22 in
480 mm
18.9 in
191.6 mm
7.54 in

232 mm
9.13 in
600 mm
23.62 in
318 mm
12.52 in

HP E7713A retractable keyboard and mouse shelf.

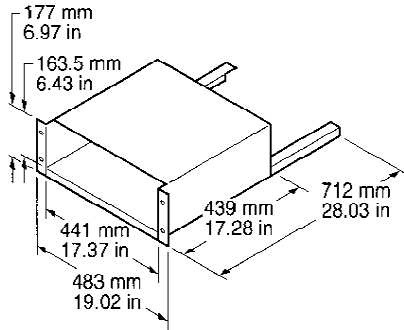**HP E7714A fixed keyboard shelf.**

Plexiglas® Front Door

The HP E7777A is a vented, plexiglas front door that can be locked. The HP E4470A or E4471A fan is recommended when using the front door to improve cooling. The door can not be used with the HP E7714A fixed keyboard shelf; use the HP E7713A retractable keyboard and mouse shelf with the door.
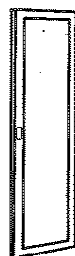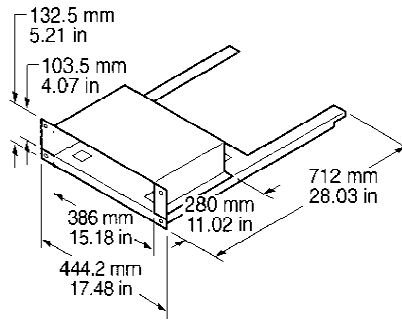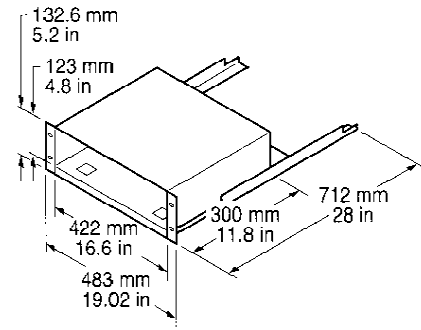
HP E7777A Plexiglas front door

Includes mounting hardware.

HP E3904A rack mount kit for Vectra U, XU PC's.

177 mm / 6.97 in
163.5 mm / 6.43 in
439 mm / 17.28 in
712 mm / 28.03 in
441 mm / 17.37 in
483 mm / 19.02 in

HP E3906A rack mount kit for Vectra NI/SN/SNI/N2.

132.5 mm / 5.21 in
103.5 mm / 4.07 in
280 mm / 11.02 in
712 mm / 28.03 in
386 mm / 15.18 in
444.2 mm / 17.48 in

HP E7707A rack mount kit for Vectra VL/VL2/VL2e/XM/XM2/M2/VE.

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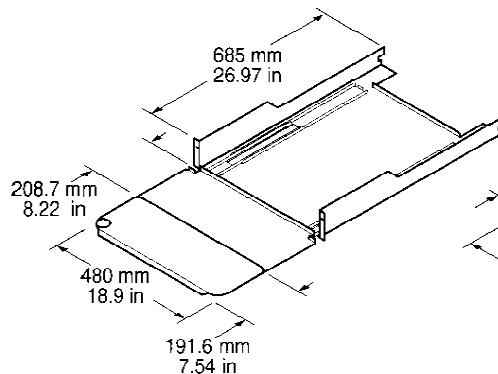

Hubs and Routers

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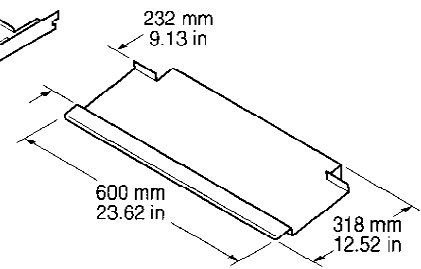

Keyboard Shelves

Select fixed or retractable keyboard/mouse kits to mount the keyboard that comes with HP NetServers and HP Vectra PC's. The retractable keyboard shelf is recommended for use with the HP front door, since the door cannot close over the fixed keyboard shelf.

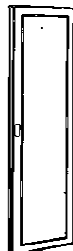Note: These mounting kits do not include a keyboard.

685 mm / 26.97 in
208.7 mm / 8.22 in
480 mm / 18.9 in
191.6 mm / 7.54 in

HP E7713A retractable keyboard and mouse shelf.

232 mm / 9.13 in
600 mm / 23.62 in
318 mm / 12.52 in

HP E7714A fixed keyboard shelf.

Plexiglas® Front Door

The HP E7777A is a vented, plexiglas front door that can be locked. The HP E4470A or E4471A fan is recommended when using the front door to improve cooling. The door can not be used with the HP E7714A fixed keyboard shelf; use the HP E7713A retractable keyboard and mouse shelf with the door.


HP E7777A Plexiglas front door.

Cooling Fan

A fan is generally not required to cool the rack, unless the front door is used. Select fan for your local AC voltage. Maximum one fan per rack. Fan mounts in the top of the rack, and doesn't reduce the space available for rackmounting devices. PDU

accessory recommended for supplying power to fan, if not using UPS. If using a UPS but not a PDU, order a power cord to connect fan to UPS. U.S. power cord is 8120-1751. In Europe, use 92199E power strip and two 8120-1860 IEC-320 power cables.

HP E4470A fan.

56 mm / 2.2 in
447 mm / 17.6 in
150 mm / 5.91 in
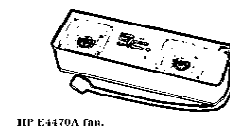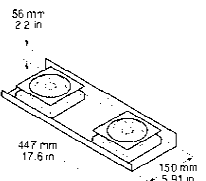
Power Distribution Units (PDU)

Each PDU has 10 outlets, and a maximum of 2 PDU's can be installed in a rack. Each PDU is rated for a maximum of 16 amps (approximately 2750 VA for E4455A and 5500 VA for E4456A and E4457A). If total load in rack exceeds this value, order a second PDU.

1. Order one PDU Installation Kit for each rack with a PDU (maximum one installation kit per rack).

2. PDU's not needed when using UPS; plug power cords directly into UPS. If using both UPS and PDU's customer must supply AC power plug for PDU input cord.

3. No IEC-320 cables needed for E4455A (N. America, 120 volt).

4. For E4456A and E4457A, order IEC-320 power cables to connect each electrical device (except fan) in rack to the PDU. 60-inch

IEC-320 cable recommended for HP Net Servers, to allow sufficient cable to extend them from the rack. Other devices are fixed in rack, and can use 36-inch cables.

Description	Model	Receptacle Style	Power Cord Plug Type
100-120 Volt PDU (N. America)	E4455A	9 NEMA 5-15; 1 IEC-320 for fan	NEMA 5-20P
200-240 Volt PDU (N. America)	E4456A	10 IEC-320	NEMAL6-20P (locking)
200-240 Volt PDU (International)	E4457A	10 IEC-320	Unterminated

Plain Shelf

The plain shelf mounts devices measuring up to 444mm wide by 678mm deep (17.5 x 26.7 inches), and can support up to 100 lbs. (45 kg.)
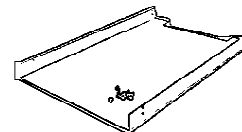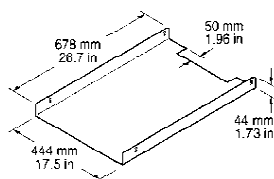
HP E3666A plain shelf.

HP UPS

Add total VA requirements of servers, monitor, mass storage, console switch, hubs, routers, fan and other electrical equipment in the rack. Choose UPS to provide total VA. Rack mount kit holds two C4275A or one C4276A and its external battery. Consult HP NetServer Configuration Guide or UPS data sheet for full range of options available for HP UPS's.

Note: All power consumption figures in this configuration guide were calculated by multiplying device voltage by current consumption, and dividing by 0.7 to derive approximate VA figures.

Filler Panels

Order Filler Panels to cover unused EIA units in rack. For example, to cover empty space for 39 units of equipment in a J1487A 41U rack, order one HP E7732A 2 EIA unit filler panel.

Calculate Ballast

HP racks include a pull out anti-tip foot, which is pulled out to prevent the rack from tipping whenever slide-mounted products (like the HP NetServers) are extended from the rack. The anti-tip foot is intended to be used temporarily for servicing, and is not extended during normal operations.

To further increase stability, ballasts can be added to the rear of the rack. These should prevent the rack from tipping even if someone forgets to extend the anti-tip foot when the NetServers are extended. The calculations below recommend the number of ballasts to buy to prevent tipping when all slide-mounted products are extended at the same time.
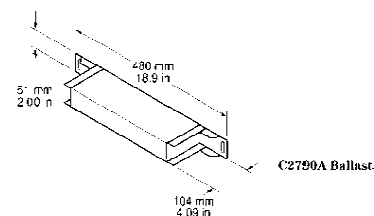
C2790A Ballast

Rack Mounting Specifications (continued)

Step 1: Add total weight of NetServers and multiply by 1.25.

> _____lbs total x 1.25 ft. = _____ft-lbs (M1)

Step 2: Add total weight of all other equipment in the rack.

> _____lbs total – 48.6 =_____ft-lbs (M2)

Note: A quick short-cut is to order 2 ballasts for every NetServer in the rack. This will prevent tipping, even if there is no other equipment mounted in the rack. When other equipment is fixed in the rack, such as the monitors, fewer ballasts may be required, since fixed equipment counteracts tipping forces exerted by devices extended from the rack.

Step 3: If M1 (from Step 1) is less than M2 (from Step 2) no ballast is required. If M1 is greater than M2, subtract M2 from M1 and divide by 60. Round up to the next number (i.e. from 2.3 to 3) and order that number of C2790A ballasts.

> (M1)_____ – (M2)_____ / 60 = _____minimum # of ballasts required (round up)

System Integration Layout

The following diagrams are included to help plan the layout of your system. They are marked to show each vertical unit of EIA space available and to show standard product widths. Use the diagrams to indicate placement of devices and accessories, and to determine the number of filler panels needed. The extractor fan mounts in the top cover of the rack, and does not affect the space available for mounting devices.
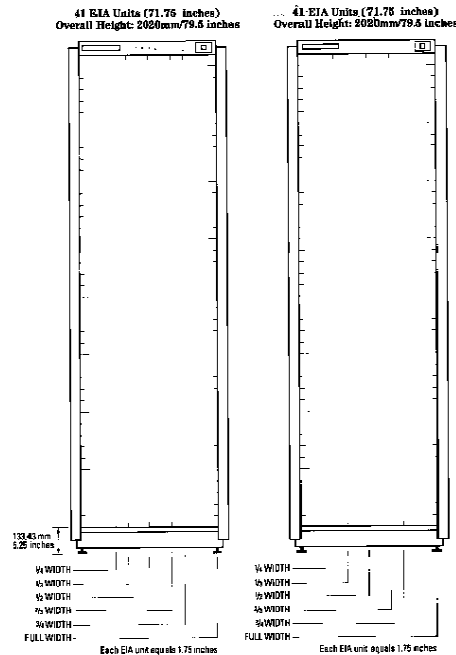
Technical information in this document is subject to change without notice.

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