ESCALA

EPC and PL Series

Site Preparation Guide for Rack Systems

REFERENCE
86 A1 30PX 14

ESCALA

EPC and PL Series

Site Preparation Guide for Rack Systems

Hardware

May 2003

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About This Book

This book provides an approach to prepare a customer site for the installation of single (Escala) and multiple rack-mounted machines (Powercluster) together with their sub-systems and peripherals.

The following racks are documented:

- EPC400 rack (36U), in Chapter 2.
- EPC1200 rack (32U), in Chapter 3.
- T00 rack (36U) and T42 rack (42U), in Chapter 4.
- PL3200R rack (42U), in chapter 5.

A rack unit supports different types of EPC and PL nodes. Other drawers (e.g. DAS drawers or disk/media drawers), and other devices, such as interconnects hubs or switches and external libraries, can also be installed in a rack unit, depending on the rack dispatching rules in the marketing configurator.

Optional rack unit(s) can be required to accommodate all drawers/devices.

The following disk subsystems are documented in Chapter 6.

- DAS – DAE (Disk Array Storage / Enclosure), NDAS,
- AMDAS JDA,
- SSA.

The following tape drive subsystems are documented in Chapter 7.

- DLT,
- VDAT.

The following operator consoles are documented in Chapter 8.

- System Console (Questar 306),
- Graphics Display (Multiscan Color Display),
- Cluster Console (X-Console),
- PowerConsole (Escala S100 and S120).

The following external peripherals are documented in Chapter 9.

- Fast Ethernet Switch 3000, on page 9-2.
- 1GB Ethernet Switch 9300, on page 9-3.
- SilkWorm 2000 Brocade Switch, on page 9-4.
- FC-AL Hub, on page 9-5.
- Ethernet Hub (Administration), on page 9-6.
- Vixel Hub, on page 9-7.
- Console concentrator, on page 9-8.
- Micro-Modem, on page 9-10.

Audience

This manual is designed to assist customer site engineers plan and prepare a site for the installation of a rack-mounted system. It gives procedures for site planning and preparation, and includes site facility requirements and individual device specifications.

To help achieve an efficient system installation, the procedures, design requirements, and recommendations in this manual should be observed. A successful system installation also depends on how individual responsibilities are allocated and how overall planning and follow–up work are performed.

Document Overview

This book contains the following chapters:

Chapter 1 **Overview of Site Preparation**
Introduces the need for careful site preparation.

Chapter 2. **EPC 400 Rack (36U)**
Describes requirements for the Escala EPC400 Series of machines (EPC400, EPC430, EPC440, EPC450).

Chapter 3. **EPC 1200 Rack (32U)**
Describes requirements for the Escala EPC440/ 610/ 810/ 1200/ 1200A/ 2400 and RL470/RL470A machines.

Chapter 4. **T00 Rack (36U) and T42 Rack (42U)**
Describes requirements for the Escala EPC440/450/610/810/2450 and PL820R/800R/600R/400R/420R/240R/220R machines.

Chapter 5. **PL3200R and PL1600R Rack**
Describes requirements for the Escala PL3200R and PL1600R machines.

Chapter 6. **Disk Subsystems**
Describes requirements for site using shared disks.

Chapter 7. **Tape Subsystems**
Describes requirements for site using shared tape drives.

Chapter 8. **Operator Consoles**
Describes console requirements.

Chapter 9. **Network External Peripherals**
Taking into account other network external peripheral devices.

Chapter 10. **Site Interconnections**
Describes extended site interconnections.

Appendix A. **Conversion Tables**
Correspondence between Metric and Imperial Measures.

Appendix B. **Service Inspection**
Hardware delivery inspection guidelines.

Glossary Alphabetical list of terms and abbreviations used in this manual.

Index General index.

Terminology

The term “machine” is used to indicate the proprietary hardware, in this case Escala.

Related Publications

User Documents

- **General Guide to Data Processing Site Preparation**
  Reference: URL http://bbs.bull.net/aise
- **Escala EPC400 Setting Up the System**
  Reference: 86 A1 18PX
- **Escala EPC400 Rack Service Guide**
  Reference: 86 A1 20PX
- **Escala EPC430 and EPC450 Setup Guide**
  Reference: 86 A1 42PX
- **Escala EPC430 and EPC450 Maintenance Guide**
  Reference: 86 A1 43PX
- **Escala EPC440 Installation and Service Guide**
  Reference: 86 A1 84KX
- **T00 and T42 Racks Installation and Service Guide**
  Reference: 86 A1 94KX
- **Escala EPC610, PL400R and PL600R Installation Guide**
  Reference: 86 A1 92KX
- **Escala EPC610, PL400R and PL600R User’s Guide**
  Reference: 86 A1 28KX
- **Escala EPC610, PL400R and PL600R Service Guide**
  Reference: 86 A1 30KX
- **Escala PL420R Installation Guide**
  Reference: 86 A1 40EG
- **Escala PL420R User’s Guide**
  Reference: 86 A1 41EG
- **Escala PL420R Service Guide**
  Reference: 86 A1 42EG
- **ESCALA PL 220T and PL 220R User’s Guide**
  Reference: 86 A1 77EF
- **ESCALA PL 220T and PL 220 R Installation Guide**
  Reference: 86 A1 78EF
- **ESCALA PL 220T and PL 220R Service Guide**
  Reference: 86 A1 79EF

- **ESCALA PL 240T and PL 240R User's Guide**
  Reference: 86 A1 55EG

- **ESCALA PL 240T and PL 240 R Installation Guide**
  Reference: 86 A1 54EG

- **ESCALA PL 240T and PL 240R Service Guide**
  Reference: 86 A1 56EG

- **Escala EPC810 and PL800R Installation Guide**
  Reference: 86 A1 93KX

- **Escala EPC810 and PL800R User's Guide**
  Reference: 86 A1 36KX

- **Escala EPC810 and PL800R Service Guide**
  Reference: 86 A1 37KX

- **ESCALA PL 820R Installation Guide**
  Reference: 86 A1 19EG

- **ESCALA PL 820R User's Guide**
  Reference: 86 A1 20EG

- **ESCALA PL 820R Service Guide**
  Reference: 86 A1 21EG

- **D10 I/O Drawer Installation Guide**
  Reference: 86 A1 32EG

- **D20 I/O Drawer Installation Guide**
  Reference: 86 A1 39EG

- **D1 and D20 I/O Drawers Service Guide**
  Reference: 86 A1 38EG

- **PL1600R Installation Guide**
  Reference: 86 A1 92EF

- **PL1600R User's Guide**
  Reference: 86 A1 93EF

- **PL1600R Service Guide**
  Reference: 86 A1 94EF

- **PL3200R Installation Guide**
  Reference: 86 A1 80EF

- **PL3200R User's Guide**
  Reference: 86 A1 81EF

- **PL3200R Service Guide**
  Reference: 86 A1 82EF

- **Escala RL470 and EPC1200 Series Installation & Service Guide**
  Reference: 86 A1 14HX

- **Escala RL470/EPC1200 Installation Procedures for Drawers**
  Reference: 86 A1 29PX

- **Escala EPC2400 & EPC2450 User's Guide**
  Reference: 86 A1 18KX

- **Escala EPC2400 & EPC2450 Installation Guide**
  Reference: 86 A1 10EF

- **Escala EPC2400 & EPC2450 Service Guide**
  Reference: 86 A1 19KX

- **Escala S Series System Service Guide**
  Reference: 86 A1 91JX

- **Planning a DAS Disk–Array Storage System Installation – SCSI Environments**
  Reference: 86 A1 84GX

- **Planning a DAS Disk–Array Storage System Installation – Fibre Channel Environments**
  Reference: 86 A1 94JX

- **Installing and Maintaining a Disk–Array Storage System DAS 2900 Rackmount**
  Reference: 86 A1 76GX

- **DAS 3200 – Disk-Array Storage System Installation and Service for Rackmount Models**
  Reference: 86 A1 63HX

- **DAS 3500 – Disk-Array Storage System Installation and Service for Rackmount Models**
  Reference: 86 A1 47JX

- **DAS 4500 Series Rackmount Models Installation and Service Guide**
  Reference: 86 A1 02EF

- **DAS 4700 Configuration Planning Guide**
  Reference: 86 A1 73EF

- **DAS 4700 Rackmount Model Hardware Reference**
  Reference: 86 A1 70EF

- **DAS 5300 Series Rackmount Models Installation and Service Guide**
  Reference: 86 A1 24KX

- **DAS 5700 Rackmount Installation and Service Guide**
  Reference: 86 A1 43KX

- **DAE 5000 Rackmount Installation and Service Guide**
  Reference: 86 A1 45KX

- **AMDAS Site Preparation Guide**
  Reference: 77 A1 54UG

- **JDA/SDA Storage Subsystem Hardware Installation & Maintenance Guide**
  Reference: 00 A1 52UG

- **7133 SSA Disk Subsystems Service Guide**
  Reference: 86 A1 94GX

- **PCI Fibre Channel Adapter Installation & Configuration Guide**
  Reference: 86 A1 95HX

- **EXABYTE VDAT 8mm Mammoth – Care & Handling Guide**
  Reference: 82 A1 61HX

- **Bull Questar 306 User's Guide**
  Reference: 80 A2 AJ27

- **PowerConsole & Cluster Assistant Setup Guide**
  Reference: 86 A1 81HX

- **EPC and HA Solutions – Setup Guide**
  Reference: 86 A2 79HX

- **EPC Connecting Guide**
  Reference: 86 A1 65JX

- **Cabling Guide for Multiple Bus Systems**
  Reference: 86 A1 70JX

- **Cabling Guide for MCA Systems**
  Reference: 86 A1 87AQ

- **FDDI Adapter – Installation and Configuration Guide**
  Reference: 86 A1 53GX

- **Bull DPX/20 Escala 7133 SSA Disk Subsystems – Service Guide**
  Reference: 86 A1 94GX

Ordering Publications

To order additional copies of this book, use CEDOC Order Number 86 A1 30PX.

Standards

Standards are referenced in the Chapters to which they apply.

Communication Statements

The following statements apply to all racks described in this document.

Communication Statements

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider or the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

EC Council Directive

This product is in conformity with the protection requirements of the following EC Council Directives:

- 89/336/EEC and 92/31/EEC (for the electromagnetic compatibility)
- 73/23/EEC (for the low voltage)
- 93/68/EEC (for CE marking).

Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards not supplied by the manufacturer.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations.

VCCI Statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

The following is the translation of the VCCI Japanese statement in the box above.

This is a Class A product based on the standard of the Voluntary Control Council for Interferences by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Safety Notices

Use of Safety Notices

Definitions

Danger indicates the presence of a hazard that has the potential of causing death or serious personal injury.

Caution indicates the presence of a hazard that has the potential of causing moderate or minor personal injury.

Warning indicates an action that could cause damage to a program, device, system, or data.

Placement of Safety Notices Inside This Manual

System safety notices which do not refer to a specific situation are included in these pages. Any specific safety notices are mentioned inside this manual whenever these must be observed during system operating or handling.

What We Do to Protect the Environment

Your new computer system is implemented following some principles aimed to reduce risks and harm to the environment, considering the impact that products can have during their life cycle: production, transport, installation, use at customer site and disposal at end of life.

- Only materials free from dangerous or polluting additives are used (e.g. polybrominated free material)
- All plastic parts are marked in order to correctly address the recycling operations
- The unit is designed taking into account the requirements for disassembly, largest parts are made of homogeneous material to facilitate recycling and, where possible, sub-assemblies are designed to be reused
- Packing is designed with the intent to reduce environmental impacts
- The unit itself does not produce polluting or dangerous emissions (lubricant, solvent, or other dangerous/polluting substances are not present in the unit)
- Production processes use water-based materials (e.g. paint). For electronic sub-assemblies, either hydro-soluble fluxes (Freon free) or no clean processes are used.

Table of Contents

Chapter 1. Overview of Site Preparation

Introduces the need for careful site preparation.

Overview

Details in:

General

The extent of site preparation tasks depends upon the size and complexity of the system. This document, concerned with single and multiple rack systems, assumes preparation for complex installations, but the guidelines apply equally to small systems.

Installations must provide:

- a level of security (for both personnel and material) demanded by the Standards and the Laws in force in the country where system is to be used
- the continuity of service required by the client, in accordance with the advice of Bull engineers, for reasons of hardware reliability.

Assign a local coordinator to evaluate dependencies and compromises and to interface with the system supplier's representative.

Note: It is wise to anticipate future expansion when making provision for working space, power requirements, data connections and operating conditions.

Environmental Requirements

The data-processing environment needs to provide optimal operational conditions. General information concerning the the physical attributes of the building, air conditioning and electrical installation are described in the *General Guide to Data Processing Site Preparation* which is available on-line, via the Web.

URL address is:

`http:/bbs.bull.net/aise`

Fire Protection

The importance of fire protection for a computer installation cannot be overstated. If a fire is detected quickly enough, it can be extinguished before any serious damage is caused to the system.

To contain the continuity of service demanded, fire protection must be established to the level required by the client's fire insurance contract.

Reception / Unpacking Resources

Anticipate additional resources for unpacking and movement of racks and drawer-mounted sub-systems.

Caution

Certain hardware items exceed 50 kg in weight. Use assistance when lifting and moving equipment.

When moving racks a minimum of **three** people are required. Avoid ramps with an angle of more than 20°.

Safety & Regulatory Agency Compliance

Identification	Conformance	Certification	Comments
Electrical and Environmental Requirements			
Power			
EN 60950	Y	Y	Product ranking
IEC 555–2	Y	Y	
Safety Standards			
UL 1950	Y	Y	Underwriters Laboratories
CSA C22.2 No. 950–M89	Y	Y	
EN 60950 (1992 + A1 1993)	Y	Y	European Norm
IEC 950 Edition 1	Y	Y	International Electrotechnical Commission
European Directive 73/23/EEC	Y	Y	CE Marking
EMC/EMI			Disturbances produced by devices
FCC CFR47 Class A	Y	Y	US
CSA C108.8 Class A	Y	Y	Canada
VCCI Class A	Y		Japan
EN 55022 (1988) Class A	Y	Y	Europe
CISPR 22 Class A	Y	Y	Taiwan
European Directive 89/336/EEC	Y	Y	CE Marking
Susceptibility to External Electromagnetic Disturbance			
EN 61000 –4 –2	Y	Y	Electrostatic discharges
EN 61000 –4 –3	Y	Y	Radiated, radio frequency, electromagnetic field
EN 61000 –4 –4	Y	Y	Electrical fast transient/burst
EN 61000 –4 –5	Y	Y	Surge immunity test
EN 61000 –4 –6	Y	Y	Conducted disturbances induced by radio frequency fields
EN 61000 –4 –11	Y	Y	Voltage dips, short interruptions and voltage variations
EN 61000 –3 –2	Y	Y	Limits for harmonic current emissions
EN 61000 –3 –3	Y	Y	Limitation of voltage fluctuation and flicker
European Directive 89/336/EEC	Y	Y	CE Marking
Acoustic Noise			
ISO 7779			Reference
C012C Class 2	Y		
Mechanical Constraints			
IEC 68–2			Reference
C013C class 1	Y		Bull standard
Packing and Packaging			
ISO 780, 2234, 2248, 3676, 4180–2, 4189–2	Y		
C138C	Y		Bull standard: Packaging configuration and labels
European Directives			
73/23/EEC	Y	Y	
89/336/EEC	Y	Y	

Electrical Outlets

Branch Circuit Protection

Building installation shall be provided with a protective device for short-circuit and over-current protection. Provide a two-pole circuit breaker with a 32A current rating for this purpose.

Checking Electrical Outlets

Before installing equipment on a site or after any mains power cabling modifications, check the electrical outlets as follows.

CAUTION:
Do not touch the receptacle or the receptacle faceplate with anything other than your test probes.

Note: All measurements are made with the receptacle faceplate in the normal installed position.

Some receptacles are enclosed in metal housings. On receptacles of this type, perform the following steps:

a. Check for less than 1 V from the receptacle case to any grounded metal structure in the building, such as a raised-floor metal structure, water pipe, building steel, or similar structure.

b. Check for less than 1 V from receptacle ground pin to a grounded point in the building.

Note: If the receptacle case or faceplate is painted, be sure the probe tip penetrates the paint and makes good electrical contact with the metal.

c. Check the resistance from the ground pin of the receptacle to the receptacle case. Check resistance from ground pin to building ground. The reading should be less than 1.0 Ω, which indicates the presence of a continuous grounding conductor.

If any of the three checks made in the previous sub-step are not correct, remove the power from the electrical outlet and make the wiring corrections. Then, check the receptacle again.

Note: To measure grounding resistance use tool tester such as CGM 30 (Sefelec), SK 21 (ETL) and GT-02 (ABAG). Do not use the digital multimeter.

Check for infinite resistance between the ground pin of the receptacle and each of the phase pins. This is a check for a wiring short to ground or a wiring reversal.

Check for infinite resistance between the phase pins. This is a check for a wiring short.

CAUTION:
If the reading is other than infinity, do not proceed! Have the user make necessary wiring corrections before continuing. Do not turn on the branch circuit CB until all the above steps are satisfactorily completed.

Measure for appropriate voltages between phases. If no voltage is present on the receptacle case or grounded pin, the receptacle is safe to touch.

With an appropriate meter, verify that the voltage at the outlet is correct.

Verify that the grounding impedance is correct by using the ECOS 1020, 1023, B7106, C7106, or an appropriately approved ground impedance tester.

Note: Do not use the mains power (convenience) outlets inside a machine to power the tester.

Rack Drawer Power Consumption

Typically the first drawers in any configuration are the UPS, when requested, and the PDU. Once the UPS is inserted in a configuration, look for total power drawn from all the drawers that should not exceed UPS capability. The following table specifies power consumption of the drawers.

System Unit or Device	Power Source Loading (Typical in kVA)	Voltage range (Vac)	Power Requirement (Typical in Watts)
PL240R	0.75	100 to 127 or 200 to 240 (single phase)	350 (minimum load) 670 (maximum load)
PL220R	0.31	100 to 127 or 200 to 240 (autoranging)	300
EPC400 – CPU drawer	0.748	200 to 245	–
EPC430 – CPU drawer	0.748	200 to 245	–
EPC440 – CPU drawer	0.46	200 to 240	434
EPC450 – CPU drawer	0.748	200 to 245	–
PL400R CEC I/O drawer Disk drawer	– 0.32 0.23 0.43	– 200 to 240 200 to 240 90 to 260	– 300 220 330
PL420R Base	0.348	200 to 240	330
EPC610 CEC I/O drawer Disk drawer	– 0.32 0.23 0.43	– 200 to 240 200 to 240 90 to 260	– 300 220 330
PL600R CEC I/O drawer Disk drawer	– 0.32 0.23 0.43	– 200 to 240 200 to 240 90 to 260	– 300 220 330
EPC800 – CPU drawer	1.1	90 to 137 or 180 to 253 (autoranging)	1000
EPC810 CEC I/O drawer Disk drawer	– 0.39 0.23 0.43	– 200 to 240 200 to 240 90 to 260	– 370 220 330
PL800R CEC I/O drawer Disk drawer	– 0.39 0.23 0.43	– 200 to 240 200 to 240 90 to 260	– 370 220 330
PL820R Base I/O drawer Disk drawer	– 1.126 1.35 0.43	– 200 to 240 200 to 240 90 to 260	– 1070 135 330
EPC1200/1200A CEC rack I/O rack I/O drawer (EPC1200/1200A)	 1.887 up to 4.8 per PDU 0.52	200 to 240	 1774 900
EPC2400 CEC rack I/O rack I/O drawer	 1.887 4.8 per PDU 0.4	200 to 240	 1774 – 360
EPC2450 CEC rack I/O rack I/O drawer	 2.129 – –	 200 to 240 – –	 2023 (max) – –

System Unit or Device	Power Source Loading (Typical in kVA)	Voltage range (Vac)	Power Requirement (Typical in Watts)
PL1600R	15.4 (max)	200 to 240 380 to 415 480	–
PL3200R	15.0 (max)	200 to 240 380 to 415 480	–
DAS1300 – Rack unit	0.6 (max)	100 to 240 (autoranging)	575
DAS2900 – Rack unit	0.9 (max)	100 to 240 (autoranging)	880
DAS3200 – Rack unit	1.05 (max)	200 to 240 (autoranging)	1000
DAS3500 – Rack unit	1.2 (max)	200 to 240 (autoranging)	1150
DAS4500: DPE Enclosure rackmount	0.4 (max)	90 to 264 (autoranging)	392
DAS4700: DPE Enclosure rackmount	–	90 to 264	–
DAS5700: DPE Enclosure rackmount	0.4 (max)	90 to 264 (autoranging)	392
DAS4500: DAE Enclosure rackmount	0.4 (max)	90 to 264 (autoranging)	392
DAS5700: DAE Enclosure rackmount	0.4 (max)	90 to 264 (autoranging)	392
DAS5300: iDAE Enclosure rackmount	0.4 (max)	90 to 264 (autoranging)	392
DAS5300: DAE Enclosure rackmount	0.4 (max)	90 to 264 (autoranging)	392
DAE5000: DAE Enclosure rackmount	0.4 (max)	90 to 264 (autoranging)	392
CX600	–	90 to 264 (autoranging)	510
CX400		90 to 264 (autoranging)	618
CX200		90 to 264 (autoranging)	618
SSA – Rack unit	0.657	90 to 260 (autoranging)	657
DLT4000/DLT7000 – Rack unit	–	100 to 240 (autoranging)	50
DLT8000E – Tabletop	–	100 to 240 (autoranging)	56 (max)
Storage Plus Drawer	0.43	90 to 260	330

Plan for the Future

Make sure you have an adequate number of proper telephone plugs, grounded electrical outlets for your system, display console and any other options you intend to install.

Other factors should be considered:

- Allow for future expansion. Even if the infrastructure in place can handle the site's immediate needs, what are the future plans? It is always much easier to provide enough space, power, air conditioning capacity in advance than it is to add it later.
- Create a storage area for documents and media files.

Site Layout

It is recommended to prepare a layout plan for the site map.

The grid shown in Figure 1 is designed to help you. Each square of the grid represents a standard raised floor panel which is 60 cm square. The scale of this grid is 1/50, i.e. 2 cm = 1 meter.

The layout plan should show:

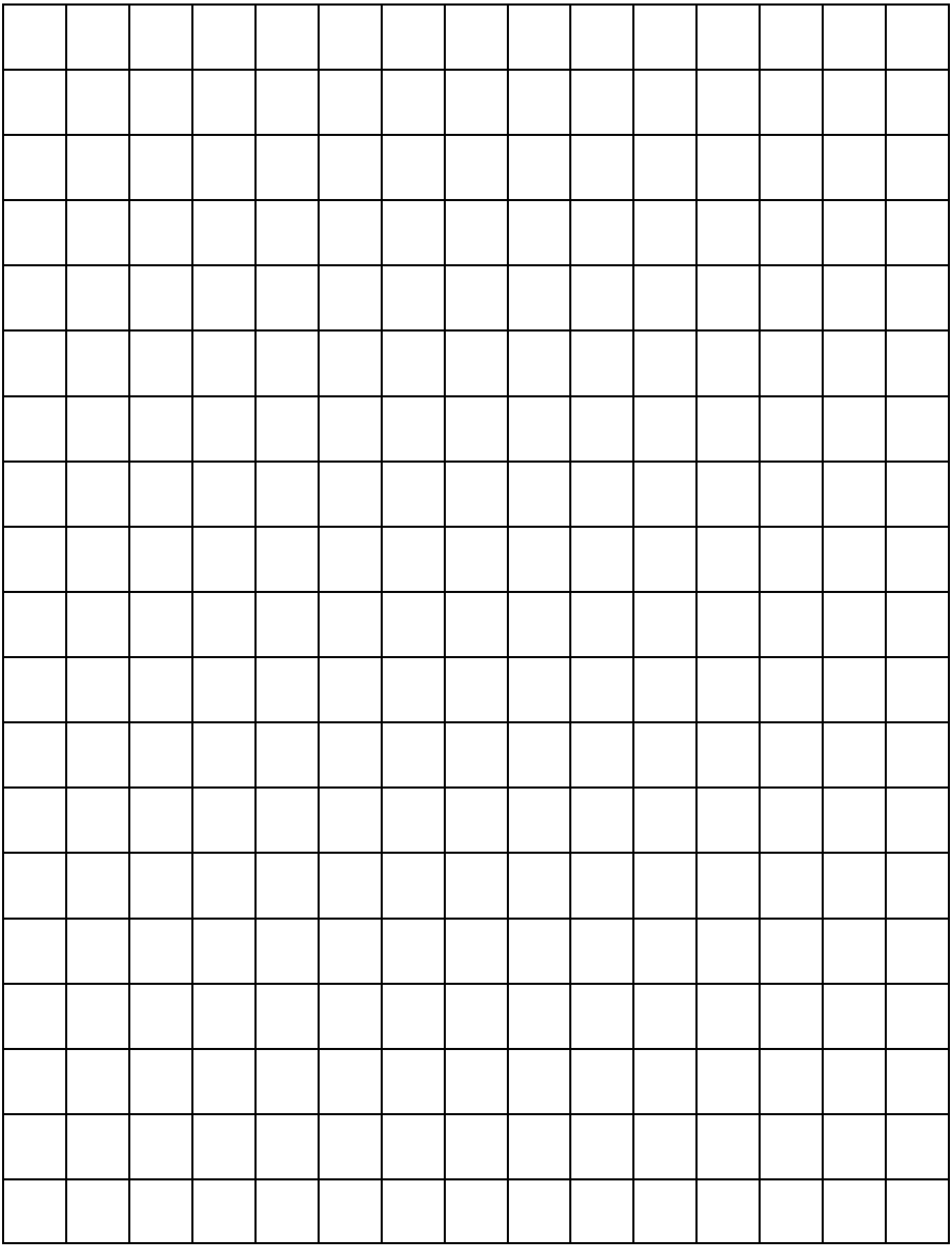
- where the system and its peripheral devices are to be located,
- the passage of cables,
- any extension cables,
- the locations of modems (if required by the configuration),
- the storage cabinets.

For the dimensions of the system and its peripheral devices, refer to Clearance Footprints (Figures), in this document.

Caution

Take care to leave at least 1.5 meters free space (3 standard raised floor panels) at the rear of system racks to facilitate installation and maintenance activities.

Note: Site layout plans will be required by the rack supplier's installation team.



Scale 1:50

Figure 1. Site Layout Plan

Chapter 2. EPC400 Rack

Describes requirements for the ESCALA EPC400, EPC430, EPC440 and EPC450 series of machines.

EPC400 Rack – Overview

- Specifications, on page 2-3.
- System Service Clearances, on page 2-6.
- Power cables (EPC400 Series), on page 2-7.

The Rack 400 configuration must respect certain rules. Rule principles are detailed in:

- Rack Configuration Rule Policy, on page 2-9.
- Rack Drawer Location, on page 2-11.
- Example Configuration, on page 2-13.
- Rack Power Distribution, on page 2-14.

Additional Powercluster Nodes

Additional nodes can be added. The node type is EPC4X0-N.

Node features are identical to that of the EPC4X0 models.

Network External Peripherals for EPC400 Series

Include:

- Fast Ethernet Switch 3000, on page 9-2.
- 1 Gigabit Ethernet Switch 9300, on page 9-3
- Brocade Switch, on page 9-4.
- FC-AL Hub, on page 9-5.
- Ethernet Hub (Administration), on page 9-6.
- Vixel Hub, on page 9-7.
- Console concentrator, on page 9-8.
- Modem, on page 9-10.

Drawers

Include:

- CPU drawer
- DAS 1300
- DAS 2900 drawer
- DAS 3200 drawer
- DAS 3500 drawer
- DAS 4500 drawer
- DAS 4700 drawer
- DAS 5300 drawer

- DAS 57x0 drawer
- SSA drawer
- Overland drawer
- VDAT Mammoth
- DAE 5000 drawer
- PCI Expansion drawer

Caution Mounting of equipment drawers requires the assistance of 2 or 3 persons and the use of a **special tool** (supplied). **Keep this tool on site.**

Escala EPC400 Series Specifications

Rack 400 Specifications

Dimensions	**Unpacked**	**Packed**
Height	177.5 cm (70.0 in)	200.5 cm (80.7 in)
Width	58.0 cm (22.8 in)	80.0 cm (31.5 in)
Depth	108.0 cm (42.5 in)	120.0 cm (47.25 in)
Weight		
Minimum (empty) without packaging)	128.0 kg (281.6 lb)	
Maximum configuration without packaging)	500 kg (1100 lb)	
Electrical	*(power supplies are auto-sensing and auto-ranging)*	
Voltage range (V ac)	200 V ac to 240 V ac, single-phase, +6%, -10%	
Frequency	50 to 60 Hz ± 3%	
Current draw	29.5 A max. at 200 V ac input	
Power consumption:		
apparent power complete rack	5980 VA	
CPU drawer	748 VA	
PCI Expansion drawer	748 VA	
Connector Type	C22 Appliance Coupler	
Operating Limits	**Operating**	
Ambient temperature	+10°C to +32°C (+50°F to +89.6°F)	
Relative humidity (noncondensing)	20 to 80%	
Gradient	10%/h	
Max. Wet Bulb Temperature:	+24° C (+75.2°F)	
Moisture Content:	0.019kg water/kg dry air	
Barometric Pressure / Elevation		
Min:	747 hPa	(altitude 2500 m)
Max:	1020 hPa	(altitude -150 m)
Heat dissipation	2550 Btu/hr per CPU drawer 2550 Btu/hr per PCI Expansion drawer	
Gradient, maximum	not stated	
Shock	not stated	
Vibration	not stated	

Acoustic Noise at room temperature +20° C (+68°F) with the following components:

Rack: 1 CPU drawer, 1 PDU

CPU: 1 CPU card, 4 memory risers, 3 PSI/ISA cards, 3 hard disk drives, 2 media drives.

Acoustic Power	**System Running**	**System Idle**
	Lw(A) 6.3 Bels	Lw(A) 6.1 Bels

EPC430 and EPC450 CPU Drawer Specifications

Dimensions		
Height	350 mm (6.8 in)	
Width	443 mm (17.4 in)	
Depth)	825 mm (32.4 in)	
Weight		
Minimum	45 kg (157 lbs)	
Electrical		
Power	748 VA	
Voltage range (V ac)	200 to 240 nominal, autoranging +6%, -10%	
Frequency	50 to 60 Hz ± 3%	
current	29.5 amps	
Thermal output (typical)	2550 Btu/hr	
Temperature Requirements	**Operating**	**Non–Operating**
Dry Bulb Temperature	10 to 32°C (50 to 89.6°F)	5 to 50°C (41 to 122°F)
Gradient	10°C/h (50°F/h)	25°C/h (77°F/h)
Humidity Requirements	**Operating**	**Non–Operating**
(noncondensing)	20 to 80%	5 to 95%
Gradient	10%/h	30%/h
Max. Wet Bulb Temperature	24°C (75.2° F)	28°C (82.4° F)
Moisture Content	0.019kg water/kg dry air	0.024kg water/kg dry air
Noise Emissions	**System Running**	**System Idle**
L_{WAd}	6.6 Bels	6.4 Bels

EPC440 CPU Drawer Specifications

Dimensions				
Height	350 mm (13.8 in)			
Width	443 mm (17.4 in)			
Depth (H50)	844 mm (33.2 in)			
Depth (H70)	875 mm (34.2 in)			
Weight				
Minimum (empty)	71 kg (157 lbs)			
Maximum configuration	89 kg (195 lbs)			
Electrical				
Power source loading typical in kVA	0.52			
Power source loading maximum in kVA	0.56			
Voltage range (V ac)	200 to 240 (autoranging)			
Frequency	50 or 60 Hz			
Thermal output (typical)	975 Btu/hr			
Thermal output (maximum)	2460 Btu/hr			
Power requirements (typical)	285 watts			
Power requirements (maximum) 26H/5	600 watts			
Power requirements (maximum) 26H/7	750 watts			
Power factor	0.8 – 0.96			
Inrush current	50 amps			
Maximum altitude	2135 m (7000ft.)			
Temperature Requirements	**Operating**	**Non–Operating**		
	10 to 40°C (50 to 104°F)	(Shipping) 1 to 52°C (34 to 125°F)	(Ambient) 10 to 43°C (50 to 110°F)	
Humidity Requirements (noncondensing)	**Operating** 8 to 80%	**Non–Operating** 8 to 80%		
Wet Bulb	23° C (73°F)	27° C (80°F)		
Noise Emissions	**System Running**	**System Idle**		
L_{wAd}	6.2 Bels	6.0 Bels		
L_{pAm}	NA	NA		
$<L_{pA}>_m$	43dBA	40dBA		
Impulsive or prominent discrete tones	No	No		
Clearances	**Front**	**Back**	**Left**	**Right**
Service	1650 mm (65 in)	1015 mm (40 in)	915 mm (36 in)	915 mm (36 in)
Install/Air Flow	Maintenance of a proper service clearance will allow proper air flow			

EPC400 Standards

The rack system complies with the following standards:

Hardware

- EMC-CISPR 22 Class A
- VDE871-2 Class A
- FCC CFR47 Class A
- VCCI Class A
- Safety: EN60950 / IEC950 - CSA950 - UL1950.

Electrical

Power International Standard
IEC 555-2 (IEC 1000-3-2).

CE Directives

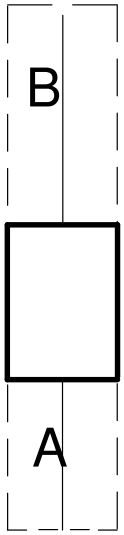
The system is also compliant with the following European directives:

- 73/23/EEC
- 89/336/EEC and 92/31/EEC
- 93/68/EEC.

System Service Clearances

The amount of space you should leave around the rack system, including the space needed for maintenance and service operations, is indicated by the broken lines.

A (front side) 39 in. (1000 mm)
B (rear side) 59 in. (1500 mm).



Power Cables (Escala EPC400 Series)

To avoid electrical shock, the manufacturer provides a power cable with a grounded attachment plug. Use only properly grounded outlets.

Two power cord levels exist:

- The first one is between each drawer and the PDU
- The second one is between the PDU and the external electrical system.

Power Cable – PDU to Drawer

The power cord connecting each drawer to the PDU presents the following characteristics:

Length:	2.5 meters
Voltage rating:	250 V
Frequency:	50/60 Hz
Standard:	IEC 320 C13 and C14
Current rating:	10 A

Male Plug Characteristics

The power cord male plug is an IEC 320-C14 10A 250 V connector.

Female Plug Characteristics

The power cord female plug is an IEC 320-C13 10A 250 V connector.

PDU Plugs

The PDU distributes the power from a male plug to 8 female plugs.

Male Plug Characteristics

Voltage rating:	250 V
Standard:	IEC 309 32 A. 250V 3 pin for a European plug NEMA HUK-2 50 A. 250 V for a North American plug

Female Plug Characteristics

The 8 female plugs on PDU have a current of 8 A for each.
The Maximum total output current capability is 29.5 A (RMS).

Voltage rating:	250 V
Standard:	IEC 320-C13 10 A. 250 V

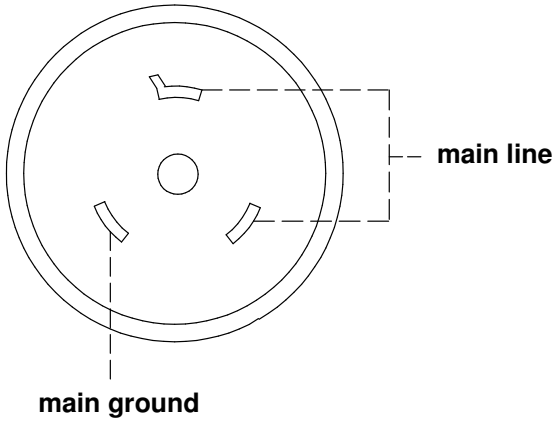
PDU-User Electrical System Cables (External Supply to PDU)

North American Power Cable

Female Plug Characteristics

The US power cord female plug is a NEMA HUK-2 250 V 50 A. plug.

Pin-Out Information

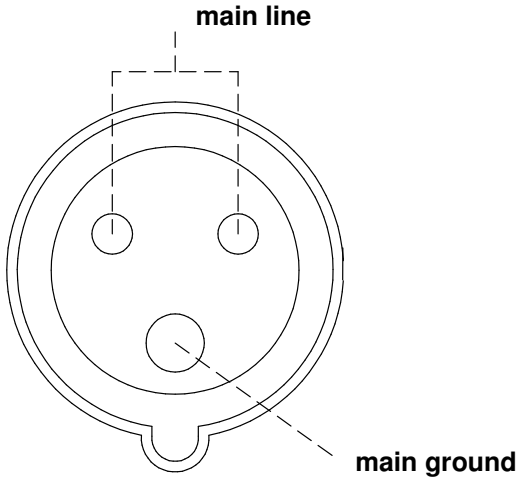


European Power Cable

Female Plug Characteristics

The power cord female plug is an IEC 309 250 V 32 A. plug.

Pin-Out Information



Configuration Rules

The following provides for the rules involved with drawer mounting inside a 19 ” 36U rack.

- The 19” Rack is divided in several areas, each of them of a predefined height expressed in U (one U is 44.45 mm).

Area Number	Area Height	Starts at U#	Ends at U#
1	2U	1	2
2	2U	3	4
3	2U	5	6
4	4U	7	10
5	4U	11	14
6	4U	15	18
7	2U	19	20
8	4U	21	24
9	4U	25	28
10	4U	29	32
11	4U	33	36

Table 1. Rack Configuration Rules (EPC400)

- Each drawer is characterized by its own U height.

Note: Each drawer is affected by a priority. This attribute is useful during the configuration phase.

- The criteria used to assign a priority to a drawer are:
  - Drawer height
  - Drawer weight. See drawer weights in Table .

  So, a 12U, 20Kg drawer will have a higher priority than a 8U, 30kg one.
- CPU drawer is an exception to this. Its priority , especially for the first CPU drawer, is based on its media accessibility: floppy, disk, tape, CD–Rom, and operator panel. Therefore a CPU drawer is always placed at a convenient height.
- An additional rack is generated when there is no room left that suits to the remaining drawers.
- 8U are reserved for the pair (CPU drawer and PCI Expansion drawer). In some cases, the expansion drawer can be above or below the CPU drawer.
- In case of more than 8 connections, an additional PDU is needed.
- For mechanical stability, it is advised to start loading from the bottom, if possible.
- The list of all available drawers that can be put inside the rack is specified in the following section.

Figure 2 depicts the rack area assignment.

Note: Area 7 is reserved for cabling.

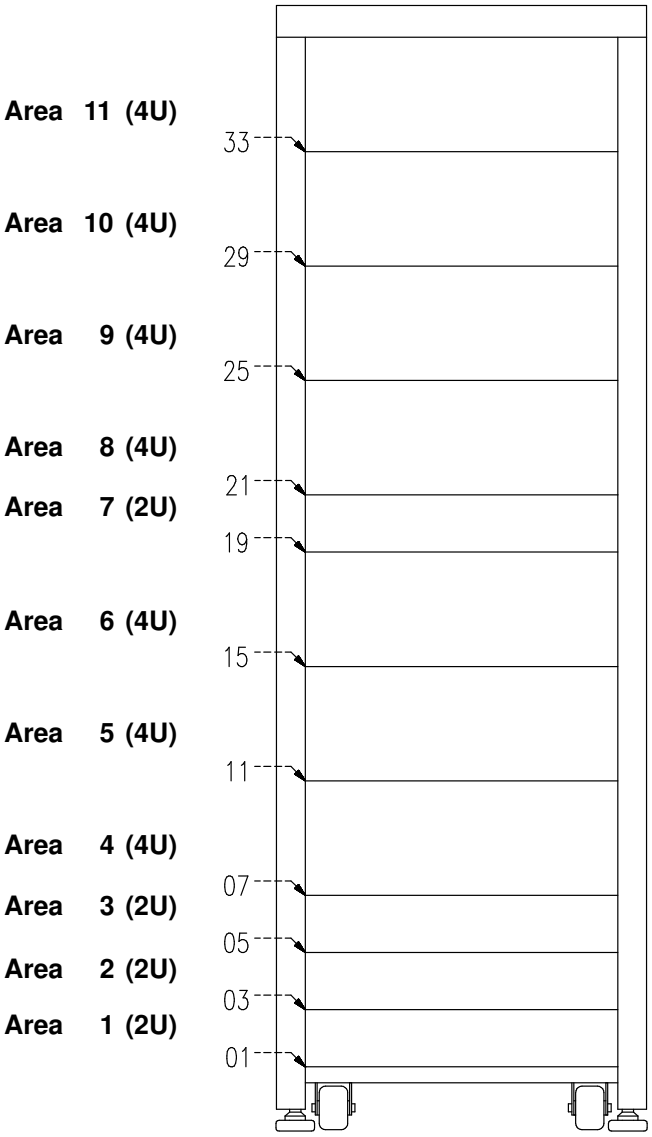


Figure 2. Rack Area Assignment

Rack Drawer Location: Rack 400

To establish location of drawers inside a rack, follow location rules given in the following table. Then, in compliance with priorities, assign for each drawer its own location. It is important to recall that more than one rack may compose a Powercluster.

Notes:

1. Two yellow mechanical parts should be put on the rear side of the rack at area U14 & on the front side of the rack at area U19.
2. Cabling may limit the number of drawers in a rack.
3. Even if an area is not fully filled, the remaining space must be kept free.

Priority	Drawer	Height	1st Pos.	2nd pos.	3rd Pos.	4th Pos.	5th pos.	6th Pos.	7th Pos.	8th Pos.	9th Pos.	10th Pos.
1	integrated PDU	2U rear	1-2									
2	Add. 'l PDU	2U rear	3-4									
3	PCI Expansion + CPU drawer	8U	21-28	11-18	3-10							
4	PCI 430/450 Expansion + CPU drawer	8U	21-28	11-18	3-10							
5	EPC 440	8U	21-28	11-18	3-10							
6	CPU 400 drawer	4U	21-24	25-28	15-18	11-14	7-10	3-6				
7	PCI 400 Exp. drawer	4U	21-24	25-28	15-18	11-14	7-10	3-6				
8	CPU 430/450 drawer	4U	21-24	25-28	15-18	11-14	7-10	3-6				
9	PCI 430/450 Exp. drawer	4U	21-24	25-28	15-18	11-14	7-10	3-6				
10	EPC 440 Add'l	8U	21-28	11-18	3-10							
11	DAS 3200 – 3500	12U	3-14	7-18	21-32	25-36						
12	DAS 2900	8U	3-10	7-14	11-18	29-36						
13	DAS 1300	6U	5-10	11-16	29-34							
14	SPS/DAS 5300/ 2DAE 5000	13U	5-17	21-33								
15	SPS/DAS 5300/ 1DAE 5000	9U	5-13	25-33	15-23							
16	SPS/DAS 5300	5U	5-9	11-15	29-33	21-25						
17	SSA	4U	3-6	7-10	11-14	15-18	25-28	29-32				
18	LXB4000/7000	4U	15-18	11-14	29-32	33-36	7-10	3-6				
19	LXB & LXG	8U	11-18	29-36								
20	DLT4000/7000	4U	3-6	7-10	11-14	15-18	25-28	29-32	33-36			
21	VDAT Mammoth	3U	3-5	7-9	11-13	15-17	25-27	29-31	33-35			
22	SPS/DPE5700/4500 6DAE5000	32U	5-36									
23	SPS/DPE5700/4500 5DAE5000	28U	5-32									
24	SPS/DPE5700/4500 4DAE5000	24U	5-28									
25	SPS/DPE5700/4500 3DAE5000	20U	5-24									
26	SPS/DPE5700/4500 2DAE5000	16U	priority #26 is the application of priorities #27 and #29									
27	SPS/DPE5700/ 1DAE5000	12U	5-16	21-32								

28	SPS/DPE5700	8U	7-14	21-28	25-32	29-36						
29	DAE5000	4U	11-14	15-18	21-24	25-28	29-32	33-36	3-6	7-10		
30	FC–AL Hub / Vixel	1U rear	15-15	29-29	33-33	5-5	7-7	11-11	21-21	25-25	3-3	
31	Console Concentr. & Cluster Hub	4U	11-14	15-18	3-6	7-10	29-32	33-36	21-24	25-28		
32	Console Concentr.	4U	11-14	15-18	3-6	7-10	29-32	33-36	21-24	25-28		
33	Switch FC 8–Port	1U	position 5–5 to 36–36 exept 19 & 20									
34	Switch FC 16–Port	2U rear	17-18	27-28	31-32	13-14	9-10	5-6				
35	Fast Eth Switch	2U rear	5-6	9-10	13-14	17-18	27-28	31-32				
36	Gigabit Eth Switch	2U rear	5-6	9-10	13-14	17-18	27-28	31-32				
37	Cluster Hub	2U rear	5-6	7-8	11-12	17-18	25-26	29-30	33-34	3-4		
38	Cons. Conc 16–Port	2U	5-6	7-8	11-12	17-18	25-26	29-30	33-34			
39	Cons. Conc & cluster Hib	2U	5-6	7-8	11-12	17-18	25-26	29-30	33-34			
40	Bridge FC	1U rear	15-15	29-29	33-33	5-5	7-7	11-11	21-21	25-25	3-3	
41	Rack Content Specify	4U	11-14	15-18	3-6	7-10	29-32	33-36	21-24	25-28		
42	Rack Content Specify	2U	5-6	7-8	11-12	17-18	25-26	29-30	33-34	3-4	3-3	
43	Rack Content Specify	1U	15-15	29-29	33-33	5-5	7-7	11-11	21-21	25-25	3-3	

Table 2. Drawer priority and positions in the rack EPC400

Example of Configuration

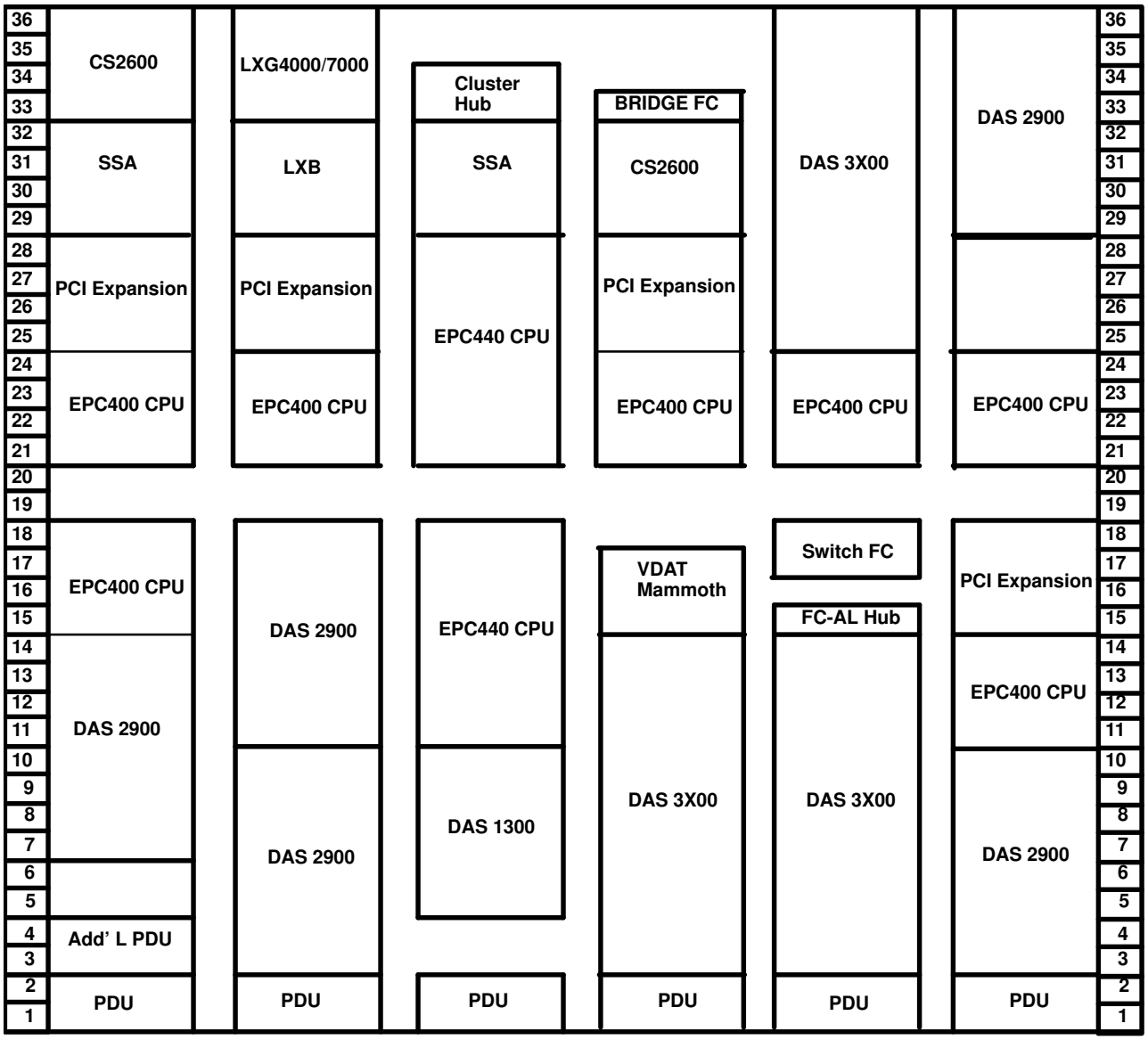


Figure 3. Rack Configuration Example: EPC400

Rack Power Distribution

Additional Power Distribution Unit

An additional PDU (Power Distribution Unit) is required in a rack:

- if the number of drawer power cords is greater than 8. See **Power Cables (Escala EPC400 Series)**, on page 2-7.
- to ensure redundant AC distribution only if drawers have redundant Power Supplies and two power cords.

How to Calculate the Number of Drawer Power Cords Per Rack

Rack per rack, take the drawers installed in the rack (only from the drawer types in table), and calculate the number of power cords. If the total number of power cords is greater than 6, configure an additional PDU for this rack or move drawers from this rack to another.

Repeat this operation for each rack.

Drawers with Redundant Power Supplies and Two Power Cords

The drawers having redundant power supplies and two power cords are: DAS5700, SSA.

Two cases are possible:

- without Power fault tolerance = 2 PDU
- with Power fault tolerance = 2 PDU + 1 UPS (1 PDU is supported by the UPS).

Un-interruptible Power Supply (UPS 3 KVA)

There is at most one UPS per rack.

An UPS 3 KVA can support a certain number of drawers. The maximum of drawers depends on the type and number of drawers. Use the table to calculate the number and type of drawers that can be supported by one UPS 3 KVA (3000 VA).

Notes:

1. All drawers being supported by the UPS should be placed in the same rack as the UPS.
2. Take care about the number of PDU ports.

Power Requirements

See **Rack Drawer Power Consumption**, on page 1-5.

Chapter 3. EPC1200 Rack

Describes requirements for the ESCALA EPC1200, EPC1200A, EPC2400 and EPC400 series of machines.

Overview

- Escala EPC1200/1200A/2400/400 & RI470/470A Model Specifications, on page 3-2.
- System Service Clearances, on page 3-7.
- Power cables, on page 3-9.

The Powercluster rack configuration must respect certain rules.

Rule principles are detailed in:

- Rack Configuration Rule Policy, on page 3-10.
- Rack Drawer Location, on page 3-12.
- Example Configuration, on page 3-16.

Network External Peripherals

Include:

- Fast Ethernet Switch 3000, on page 9-2.
- 1GB Ethernet Switch 9300, on page 9-3.
- Brocade Switch, on page 9-4.
- FC-AL Hub, on page 9-5.
- Ethernet Hub (Administration), on page 9-6.
- Vixel Hub, on page 9-7.
- Console concentrator, on page 9-8.
- Micro-Modem, on page 9-10.

Drawers

Include:

- I/O Drawer
- Overland DLT4000/7000 Library
- Storagetek Library
- DAS 2900 / 3200
- DAS 3500
- SSA
- DAS 4500
- DAS 4700
- DAS 5300
- DAS 5300
- DAS 5700
- DAE 5000

EPC1200 Rack Specifications

This section contains specifications for the Escala EPC1200/1200A/2400 and RL470/470A models.

The mechanical packaging, cooling, power supply, and environmental requirements for the System Rack are shown in the following tables:

System Rack EPC1200/1200A and RL470/470A

Dimensions		
Height	1577 mm	62.0 in.
Width	567 mm	22.3 in.
Depth	1041 mm	40.9 in.

Weight		
Minimum (Configuration dependant)	400 kg	880 lbs.

Electrical	
Power source loading (maximum in kVA)	1.887 kVA
Voltage range (V ac)	200 to 240
Frequency (hertz)	50 – 60
Voltage range (V dc)	–40 to –60
Thermal output (Maximum)	1.7 kW (5796 BTU/hr)
Power requirements (Maximum)	1698 watts
Power factor	0.9
Inrush current[3]	102 amps

Maximum altitude	2135 m (7000 ft.)

	Operating	**Non–Operating**
Temperature Range[4]	10 to 37.8°C (50 to 100°F)	1 to 60°C (34 to 140°F)

	Operating	**Non–Operating**
Humidity (Noncondensing)	8 to 80%	8 to 80%
Wet Bulb Requirements[5]	23°C (73°F)	23°C (73°F)

Noise Emissions[1,2]	**Operating**	**Idle**
L_{WAd}	7.0 bels	7.0 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	N/A	N/A
Impulsive or prominent discrete tones	No	No

Clearances	See **System Service Clearances**, on page 3-7.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Service[6]	915mm (36in)	915mm (36in)	915mm (36in)	915mm (36in)

System Rack EPC2400

Dimensions		
Height	1577 mm	62.0 in.
Width	567 mm	22.3 in.
Depth	1041 mm	40.9 in.

Weight		
Minimum (Configuration dependant)	400 kg	880 lbs.

Electrical	
Power source loading (maximum in kVA)	2.129 kVA
Voltage range (V ac)	200 to 240
Frequency (hertz)	50 – 60
Thermal output (Maximum)	6904 BTU/hr
Power requirements (Maximum)	2023 watts
Power factor	0.92 to 0.98
Inrush current[3]	43 amps

Maximum altitude	2135 m (7000 ft.)

	Operating	**Non–Operating**
Temperature Range[4]	10 to 37.8°C (50 to 100°F)	1 to 60°C (34 to 140°F)

	Operating	**Non–Operating**
Humidity (Noncondensing)	8 to 80%	8 to 80%
Wet Bulb Requirements[5]	23°C (73°F)	23°C (73°F)

Noise Emissions[1,2]	**Operating**	**Idle**
L_{WAd}	7.0 bels	7.0 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	N/A	N/A
Impulsive or prominent discrete tones	No	No

Clearances	See **System Service Clearances**, on page 3-7.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Service[6]	915mm (36in)	915mm (36in)	915mm (36in)	915mm (36in)

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Noise emissions data are based on a system with the doors closed.
3. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.
4. The upper limit of the dry bulb temperature must be derated 1 degree C per 137 m (450 ft.) above 1295 m (4250 ft.)
5. The upper limit of the wet bulb temperature must be derated 1 degree C per 274 m (882 ft.) elevation above 1370 m (4500 ft.)
6. The use of the PCI SSA Multi–Initiater/RAID EL in the I/O Drawer limits the system usage to a 28°C (82°F).

Input/Output Rack

Dimensions		
Height	1577 mm	62.0 in.
Width	650 mm	25.5 in.
Depth	1019 mm	40.1 in.

Weight		
Minimum (Configuration dependant)	159 kg	349 lbs.

Clearances	**Front**	**Back**	**Left**	**Right**

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Service[6]	915mm (36in)	915mm (36in)	915mm (36in)	915mm (36in)

10 EIA Unit I/O Drawer

Dimensions		
Height	440.0 mm	17.3 in.
Width	443.2 mm	17.5 in.
Depth	843.2 mm	33.2 in.
Weight		
Minimum Configuration	89 kg	195 lbs.
Maximum Configuration	93 kg	205 lbs.

Electrical	**AC**
Power source loading (typical in kVA)	0.4
Power source loading (maximum in kVA)	1.0
Voltage range (V ac)	200 to 240 (autoranging)
Frequency (hertz)	50 – 60
Thermal output (typical)	1228 BTU/hr
Thermal output (maximum)	3071 BTU/hr
Power requirements (typical)	360 watts
Power requirements (maximum)	900 watts
Power factor	0.9
Inrush current[3]	170 amps
Maximum altitude	2135 m (7000 ft.)

	Operating	**Non–Operating**
Temperature Range[4]	10 to 40°C (50 to 104°F)	1 to 52°C (34 to 125.6°F)

Humidity (Noncondensing)	**Operating**	**Non–Operating**
Without tape drive	8 to 80%	8 to 80%
With tape drive	20 to 80%	20 to 80%
Wet Bulb Requirements		
Without tape drive	27°C (80°F)	27°C (80°F)
With tape drive	23°C (73°F)	27°C (80°F)

Noise Emissions[1,2]	**Operating**	**Idle**
L_{WAd}	7.0 bels	7.0 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	N/A	N/A
Impulsive or prominent discrete tones	No	No

Clearances	**Front**	**Back**	**Left**	**Right**

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Service[6]	915mm (36in)	915mm (36in)	915mm (36in)	915mm (36in)

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Noise emissions data for the SCSI I/O Drawer are based on the I/O drawer mounted in a rack. See Input/Output Rack”.
3. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.

7 EIA Unit I/O Drawer

Dimensions		
Height	306.2 mm	12.1 in.
Width	442.4 mm	17.4 in.
Depth	748.2 mm	29.5 in.
Weight		
Minimum Configuration	43 kg	95 lbs.
Maximum Configuration	61 kg	135 lbs.
Electrical	**AC**	**DC**
Power source loading (typical)	0.4KVA	0.4KVA
Power source loading (maximum)	1.0KVA	1.0KVA
Voltage range	200 to 240 V ac	40 to 60 VDC
Frequency (hertz)	50 – 60	N/A
Thermal output (typical)	1288 BTU/hr	1365 BTU/hr
Thermal output (maximum)	3071 BTU/hr	3412 BTU/hr
Power requirements (typical)	360 watts	400 watts
Power requirements (maximum)	900 watts	1000 watts
Power factor	0.9	N/A
Inrush current[3]	120 amps	300 amps

Maximum altitude	2135 m (7000 ft.)

	Operating	**Non–Operating**
Temperature Range[4]	10 to 40°C (50 to 104°F)	1 to 52°C (34 to 125.6°F)

Humidity (Noncondensing)	**Operating**	**Non–Operating**
Without tape drive	8 to 80%	8 to 80%
With tape drive	20 to 80%	20 to 80%
Wet Bulb Requirements[5]		
Without tape drive	27°C (80°F)	27°C (80°F)
With tape drive	23°C (73°F)	27°C (80°F)

Noise Emissions[1,2]	**Operating**	**Idle**
L_{WAd}	5.9 bels	5.8 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	39 dBA	38 dBA
Impulsive or prominent discrete tones	No	No

Clearances	**Front**	**Back**	**Left**	**Right**

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Service[6]	915mm (36in)	915mm (36in)	915mm (36in)	915mm (36in)

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Noise emissions data for the SCSI I/O Drawer are based on the I/O drawer mounted in a rack. See ”Input/Output Rack”.
3. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.
4. The use of the PCI SSA Multi–Initiater/RAID EL in the I/O Drawer limits the system usage to a 28°C (82°F) environment maximum.

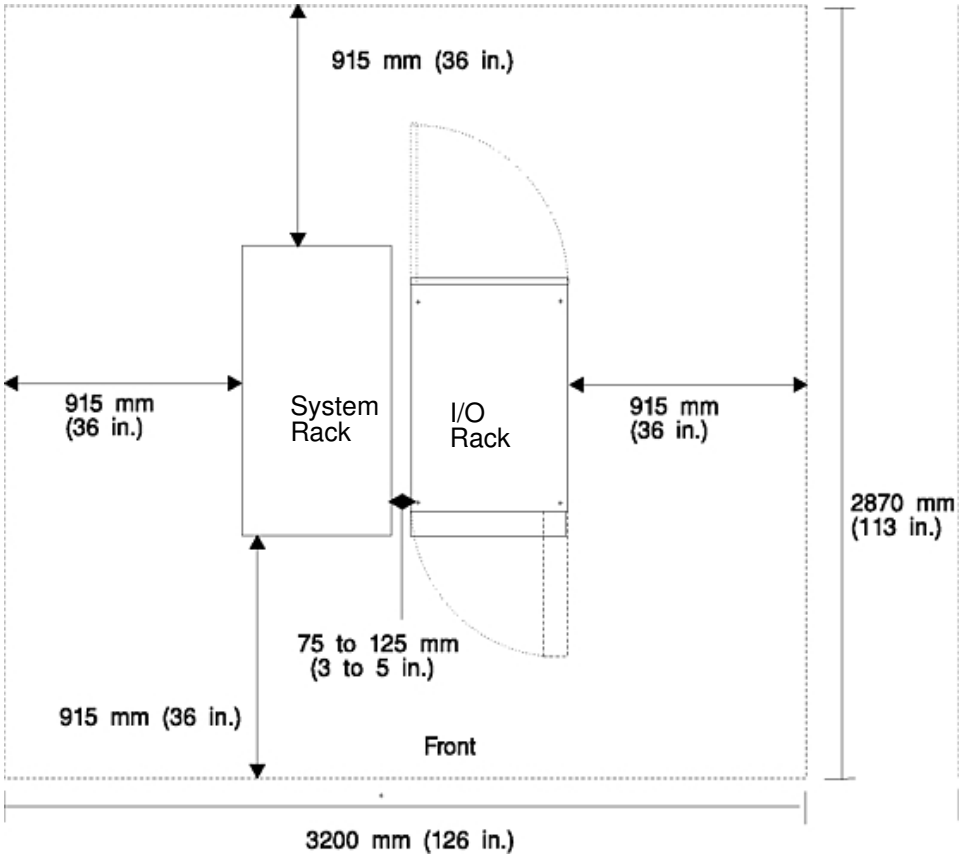
System Service Clearances

The amount of space needed by the units during service is indicated by large box of the footprint.

For multiple racks placed side by side, the left and right clearances apply only to the leftmost and rightmost rack.

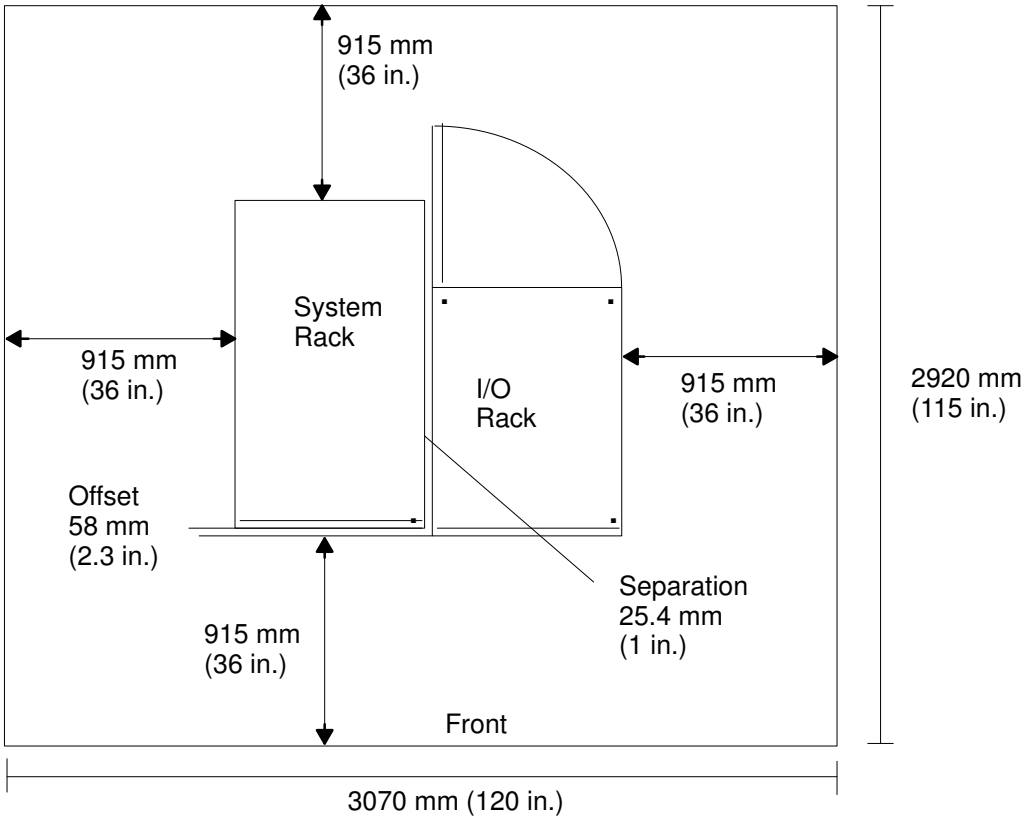
Air flow is from front to rear.

Rack Configuration (AC Systems)



Note: Maintenance activities require access at both the front and back and extra room needs to be allowed. The footprint shows the radius of the swinging doors on the I/O rack. The illustration shows the minimum space required.

Rack Configuration (DC Systems)



Note: Maintenance activities require access at both the front and back and extra room needs to be allowed. The footprint shows the radius of the swinging doors on the I/O rack. The illustration shows the minimum space required.

Noise Emission Notes

1. L_{WAd} is the declared sound power emission level for a production series of machines.
2. L_{pAm} is the mean value of the sound pressure emission levels at the operator position (if any) for a production series of machines.
3. $<L_{pA}>_m$ is the mean value of the space–averaged sound pressure emission levels at the one–meter positions for a production series of machines.
4. N/A = Not Applicable (no operator position).
5. All measurements are made in accordance with ISO DIS 779 and reported in conformance with ISO DIS 7574/4.

Power Cables (Escala EPC1200/1200A/2400 and RL470/470A)

To avoid electrical shock, a power cable with a grounded attachment plug is provided. Use only properly grounded outlets.

Power cables used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA). These power cords consist of:

- Electrical cables, type ST
- Attachment plugs complying with National Electrical Manufacturers Association (NEMA) L6–30P
- Appliance couplers complying with International Electrotechnical Commission (IEC) Standard 320, Sheet C13 and C14

Power cables used in other countries are as follows:

- Electrical cables, Type HD21 or HD22
- Attachment plugs approved by the appropriate testing organization for the specific countries where they are used
- Appliance couplers complying with the International Electrotechnical Commission (IEC) Standard 320, Sheet C13 and C14.

Refer to "Power Cords" in the *Escala Installation and Service Guide* for power cable information.

–48 V dc Power Cables

The customer is responsible for providing power cables from the customer's power source to the circuit breaker panel (CBP)

–48 V dc systems must be connected to a –48 V dc supply source which is electrically isolated from its AC power source. In addition, the –48 V dc supply source is to be reliably connected to earth (grounded).

Note: A redundant –48 V dc source may be added. This source must also be electrically isolated from its AC power source and be reliably connect to earth (grounded).

Power cables used in the United States and Canada are listed by Underwriters Laboratories (UL) and certified by the Canadian Standards Association (CSA). These power cables have the following characteristics:

- Power cables and ground cables must be a minimum of 6 AWG stranded copper (or equivalent) for lengths up to 50 feet from the power source.
- All connectors must be the copper crimp type (compression). Connector metal must be compatible with the cable metal.

Refer to "Power Cords" in the *Escala RL470 Installation and Service Guide* for power cable information.

Configuration Rules

The following provides for the rules involved with drawer mounting inside a 19 ” 32U rack.

Rack Configuration Rule Policy

The given configuration rules are constructed on the following:

- The 19” Rack is divided in several areas, each of them of a predefined height expressed in U (one U is 44.45 mm).

Area Number	Area Height	Starts at U#	Ends at U#
1	4U	1	4
2	4U	5	8
3	4U	9	12
4	4U	13	16
5	2U	17	18
6	2U	19	20
7	4U	21	24
8	1U	25	25
9	3U	26	28
10	4U	29	32

Table 3. Rack Configuration Rules

- Each drawer is characterized by its own U height.

Note: Each drawer is affected by a priority. This attribute is useful during the configuration phase.

- The criteria used to assign a priority to a drawer are:
  - Drawer height
  - Drawer weight. See drawer weights in Table .

  So, a 12U, 20Kg drawer will have a higher priority than a 8U, 30kg one.
- CPU drawer is an exception to this. Its priority , especially for the first CPU drawer, is based on its media accessibility: floppy, disk, tape, CD–Rom, and operator panel. Therefore a CPU drawer is always placed at a convenient height.
- An additional rack is provided when there is no room left that suits the remaining drawers.
- An I/O drawer cannot be put into an expansion rack.
- An additional rack can be an EPC400 rack.
- There can be 0 ,1 or 2 I/O drawers located at the top of the I/O rack.
- The list of all available drawers that can be put inside the rack is specified in the following section.

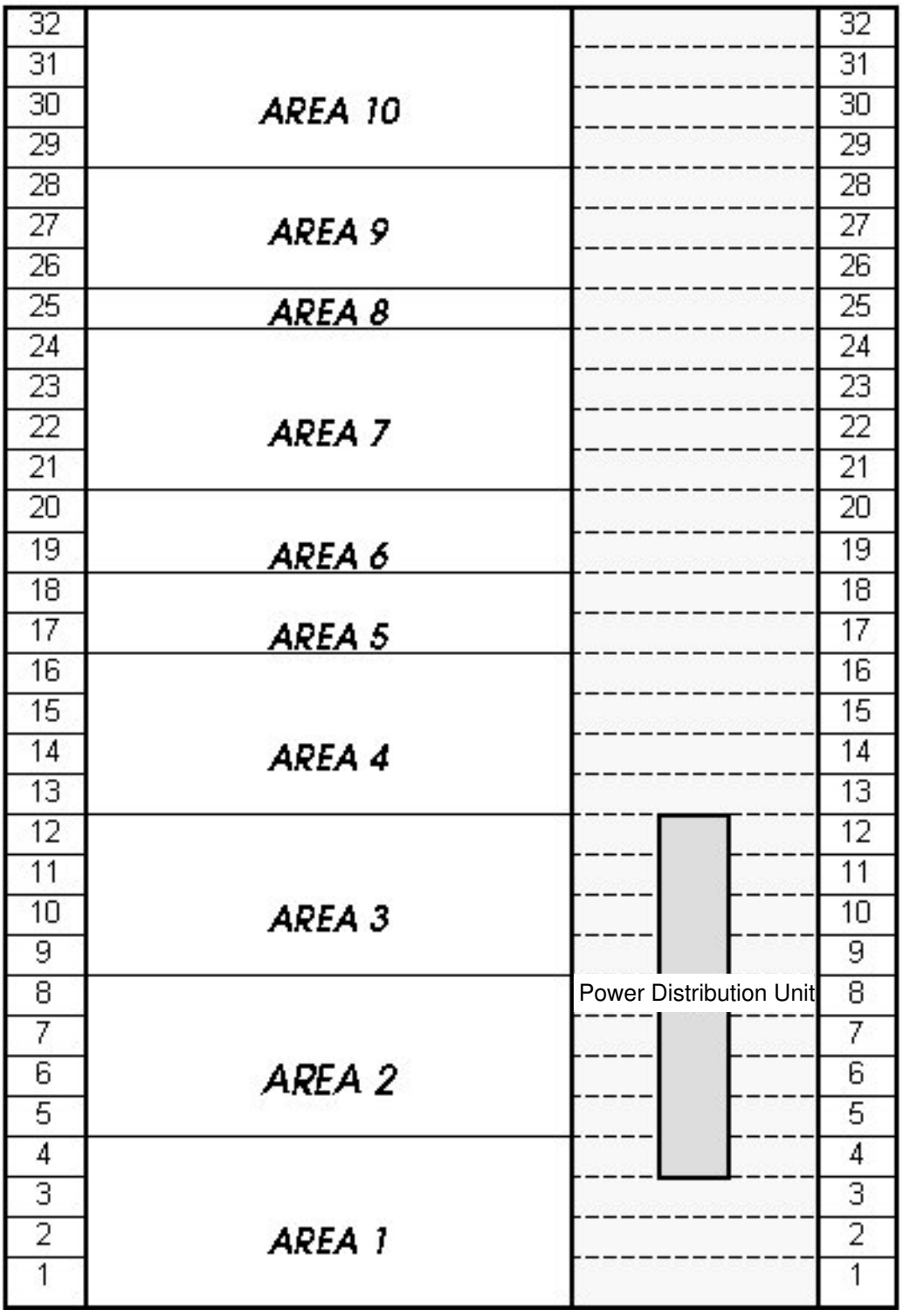


Figure 4. Rack Area Assignment

Drawer Location in EPC1200 I/O Rack

To establish location of drawers inside a rack, follow location rules given in the following table. Then, in compliance with priorities, assign for each drawer its own location. It is important to recall that more than one rack may compose a Powercluster.

Notes:

1. Even if an area is not fully filled, the remaining space must be kept free.

Prior-ity	Drawer	Height	1st Pos.	2nd pos.	3rd Pos.	4th Pos.	5th pos.	6th pos.	7th pos.	8th pos.	9th pos.	10th pos.
1	I/O Drawer 10U (2400)	10U	23-32	13-22								
2	I/O Drawer 10U (rackless)	10U	23-32	13-22								
3	I/O Drawer 10U (1200A)	10U	23-32	13-22								
4	I/O Drawer 10U (rackless)	10U	23-32	13-22								
5	I/O Drawer 7U (1200)	7U	26-32	19-25								
6	610 CEC + I/O Dr	10U	23-32	13-22	10-19							
7	810 CEC +I/O Dr	13U	20-32	10-22	7-19							
8	810 sec +I/O Dr	5U	28-32	23-27	18-22	15-19	13-17	10-14	8-12	5-9	3-7	2-6
9	Disk Drawer	3U	30-32	29-31	28-30	27-29	26-28	25-27	24-26	23-25	22-24	21-23
10	Upgrade 610 – 810	3U	20-22	19-21	18-20	17-19	16-18	15-17	14-16	13-15	12-14	11-13
11	EPC 440 add'l	8U	25-32	17-24	13-20	9-16	5-12					
12	DAS 3500	12U	1-12	13-24								
13	DAS 3200	12U	1-12	13-24								
14	DAS 2900	8U	1-8	9-16	17-24	25-32						
15	SPS/DAS 5300/ 2DAE 5000	13U	1-13	17-29								
16	SPS/DAS 5300/ 1DAE 5000	9U	1-9	13-21								
17	SPS/DAS 5300	5U	1-5	9-13	17-21	25-29						
18	SSA	4U	25-28	21-24	17-20	13-16	9-12	5-8				
19	Overland Library (LBX4000/LBX7000)	4U	1-4	5-8	9-12	13-16	17-20	21-24				
20	DLT 4000/7000	4U	9-12	5-8	1-4	13-16	17-20	21-24				
21	SPS/DPE5700/4500 5 DAE5000	28U	1-28									
22	SPS/DPE5700/4500 4 DAE5000	24U	1-24									
23	SPS/DPE5700/4500 3 DAE5000	20U	1-20									
24	SPS/DPE5700/4500 2 DAE5000	16U	priority #24 is the application of priorities #25 and #27									
25	SPS/DPE5700/4500 1 DAE5000	12U	1-12	13-24								
26	SPS/DPE5700/4500	8U	1-8	9-16	17-24	25-32						
27	DAE5000	4U	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32		
28	FC–AL Hub / vixel	1U	1-1	5-5	9-9	13-13	17-17	19-19	21-21	25-25	26-26	29-29

Prior-ity	Drawer	Height	1st Pos.	2nd pos.	3rd Pos.	4th Pos.	5th pos.	6th pos.	7th pos.	8th pos.	9th pos.	10th pos.
29	Console Concent. & ClusterHub	4U	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32		
30	Console Concent.	4U	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32		
31	Switch 8–port	1U	anywhere from 1–1 to 32–32									
32	Switch FC 16–port	2U rear	17-18	19-20	21-22	25-26	26-27	29-30	13-14	9-10	5-6	1-2
33	Switch Fast Ethernet	2U rear	1-2	5-6	9-10	13-14	17-18	19-20	21-22	25-26	26-27	29-30
34	Switch Gbit Ethernet	2U rear	1-2	5-6	9-10	13-14	17-18	19-20	21-22	25-26	26-27	29-30
35	Cluster Hub	2U rear	1-2	5-6	9-10	13-14	17-18	19-20	21-22	25-26	26-27	29-30
36	Cons Conc 16–port	2U	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11
37	Cons Conc 16–port & Cluster Hub	2U	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11
38	Bridge FC	1U rear	1-1	5-5	9-9	13-13	17-17	19-19	21-21	25-25	26-26	29-29
39	Rack Content Specify	7U	1-7	2-8	3-9	4-10	5-11	6-12	7-13	8-14	9-15	10-16
40	Rack Content Specify	4U	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32		
41	Rack Content Specify	3U	1-3	2-4	3-5	4-6	5-7	6-8	7-9	8-10	9-11	10-12
42	Rack Content Specify	2U	1-2	5-6	9-10	13-14	17-18	19-20	21-22	25-26	26-27	29-30
43	Rack Content Specify	1U	1-1	5-5	9-9	13-13	17-17	19-19	21-21	25-25	26-26	29-29

Table 4. Drawer priority and positions in the rack (positions 1 to 10)

Prior-ity	Drawer	Height	11th Pos.	12th pos.	13th Pos.	14th Pos.	15th pos.	16th pos.	17th pos.	18th pos.	19th pos.	20th pos.
1	I/O Drawer 10U (2400)	10U										
2	I/O Drawer 10U (rackless)	10U										
3	I/O Drawer 10U (1200A)	10U										
4	I/O Drawer 10U (rackless)	10U										
5	I/O Drawer 7U (1200)	7U										
6	610 CEC + I/O Dr	10U										
7	810 CEC +I/O Dr	13U										
8	810 sec +I/O Dr	5U										
9	Disk Drawer	3U	20-22	19-21	18-20	17-19	16-18	15-17	14-16	13-15	12-14	11-13
10	Upgrade 610 – 810	3U	10-12	9-11	8-10	7-9	6-8	5-7	4-6	3-5	2-4	1-3
11	EPC 440 add'l	8U										
12	DAS 3500	12U										
13	DAS 3200	12U										
14	DAS 2900	8U										
15	SPS/DAS 5300/ 2DAE 5000	13U										
16	SPS/DAS 5300/ 1DAE 5000	9U										
17	SPS/DAS 5300	5U										
18	SSA	4U										
19	Overland Library (LBX4000/LBX7000)	4U										

Prior-ity	Drawer	Height	11th Pos.	12th pos.	13th Pos.	14th Pos.	15th pos.	16th pos.	17th pos.	18th pos.	19th pos.	20th pos.
20	DLT 4000/7000	4U										
21	SPS/DPE5700/4500 5 DAE5000	28U										
22	SPS/DPE5700/4500 4 DAE5000	24U										
23	SPS/DPE5700/4500 3 DAE5000	20U										
24	SPS/DPE5700/4500 2 DAE5000	16U	priority #24 is the application of priorities #25 and #27									
25	SPS/DPE5700/4500 1 DAE5000	12U										
26	SPS/DPE5700/4500	8U										
27	DAE5000	4U										
28	FC–AL Hub / vixel	1U										
29	Console Concent. & ClusterHub	4U										
30	Console Concent.	4U										
31	Switch 8–port	1U	anywhere from 1–1 to 32–32									
32	Switch FC 16–port	2U rear										
33	Switch Fast Ethernet	2U rear										
34	Switch Gbit Ethernet	2U rear										
35	Cluster Hub	2U rear										
36	Cons Conc 16–port	2U	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21
37	Cons Conc 16–port & Cluster Hub	2U	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21
38	Bridge FC	1U rear										
39	Rack Content Specify	7U	11-17	12-18	13-19	14-20	15-21	16-22	17-23	18-24	19-25	20-26
40	Rack Content Specify	4U										
41	Rack Content Specify	3U	11-13	12-14	13-15	14-16	15-17	16-18	17-19	18-20	19-21	20-22
42	Rack Content Specify	2U										
43	Rack Content Specify	1U										

Table 5. Drawer priority and positions in the rack (positions 11 to 20)

Prior-ity	Drawer	Height	21th Pos.	22th pos.	23th Pos.	24th Pos.	25th pos.	26th pos.	27th pos.	28th pos.	29th pos.	30th pos.
1	I/O Drawer 10U (2400)	10U										
2	I/O Drawer 10U (rackless)	10U										
3	I/O Drawer 10U (1200A)	10U										
4	I/O Drawer 10U (rackless)	10U										
5	I/O Drawer 7U (1200)	7U										
6	610 CEC + I/O Dr	10U										
7	810 CEC +I/O Dr	13U										
8	810 sec +I/O Dr	5U										

Prior-ity	Drawer	Height	21th Pos.	22th pos.	23th Pos.	24th Pos.	25th pos.	26th pos.	27th pos.	28th pos.	29th pos.	30th pos.
9	Disk Drawer	3U	10-12	9-11	8-10	7-9	6-8	5-7	4-6	3-5	2-4	1-3
10	Upgrade 610 – 810	3U										
11	EPC 440 add'l	8U										
12	DAS 3500	12U										
13	DAS 3200	12U										
14	DAS 2900	8U										
15	SPS/DAS 5300/ 2DAE 5000	13U										
16	SPS/DAS 5300/ 1DAE 5000	9U										
17	SPS/DAS 5300	5U										
18	SSA	4U										
19	Overland Library (LBX4000/LBX7000)	4U										
20	DLT 4000/7000	4U										
21	SPS/DPE5700/4500 5 DAE5000	28U										
22	SPS/DPE5700/4500 4 DAE5000	24U										
23	SPS/DPE5700/4500 3 DAE5000	20U										
24	SPS/DPE5700/4500 2 DAE5000	16U	priority #24 is the application of priorities #25 and #27									
25	SPS/DPE5700/4500 1 DAE5000	12U										
26	SPS/DPE5700/4500	8U										
27	DAE5000	4U										
28	FC–AL Hub / vixel	1U										
29	Console Concent. & ClusterHub	4U										
30	Console Concent.	4U										
31	Switch 8–port	1U	anywhere from 1–1 to 32–32									
32	Switch FC 16–port	2U rear										
33	Switch Fast Ethernet	2U rear										
34	Switch Gbit Ethernet	2U rear										
35	Cluster Hub	2U rear										
36	Cons Conc 16–port	2U	21-22	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31
37	Cons Conc 16–port & Cluster Hub	2U	21-22	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31
38	Bridge FC	1U rear										
39	Rack Content Specify	7U	21-27	22-28	23-29	24-30	25-31	26-32				
40	Rack Content Specify	4U										
41	Rack Content Specify	3U	21-23	22-24	23-25	24-26	25-27	26-28	27-29	28-30	29-31	30-32
42	Rack Content Specify	2U										
43	Rack Content Specify	1U										

Table 6. Drawer priority and positions in the rack (positions 21 to 30)

Example of Configurations

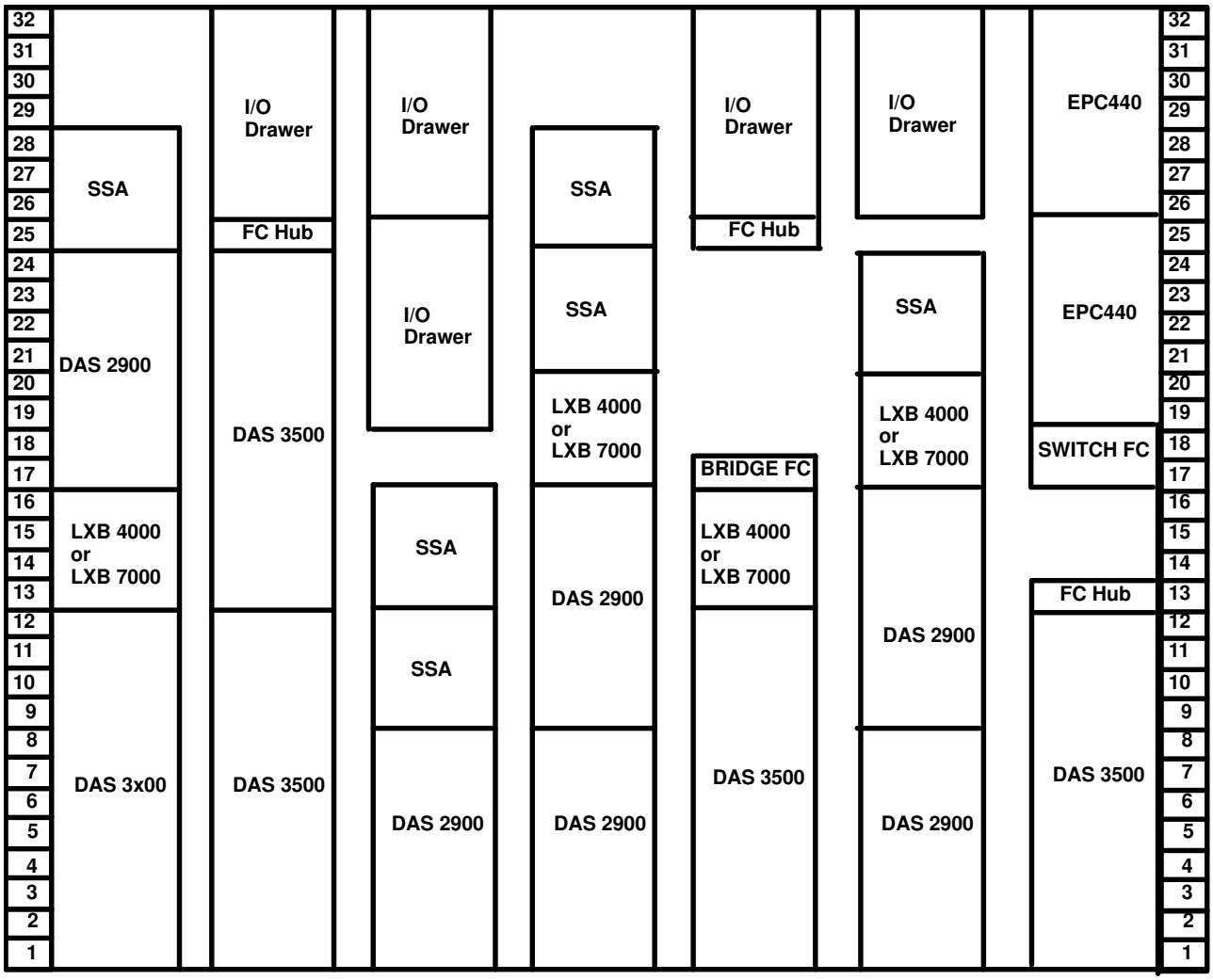


Figure 5. Rack Configuration Example: EPC1200

Power Requirements

See **Rack Drawer Power Consumption**, on page 1-5.

Chapter 4. T00 (36U) Rack & T42 (42U) Rack

Describes requirements for the ESCALA EPC440, EPC450, EPC610, EPC810, PL 400R, PL 420R, PL 600R, PL 800R, PL 820R, PL240R, PL 220R and EPC2450 .

Overview

The rack configuration must respect certain rules. Rule principles are detailed in:

T00 (36U) & T42 (42U) Rack Specifications

System Rack Specifications

Dimensions		
T00 Height	1804 mm	71.0 in.
T00 Height with power distribution panel	1926 mm	75.8 in.
T42 Height	2015 mm	79.3 in.
T00 and T42 Width without side panels	623 mm	24.5 in.
T00 and T42 Width with side panels	644 mm	25.4 in.
T00 and T42 Depth with rear door	1042 mm	41 in.
T00 and T42 Depth with rear and front door	1098 mm	43.3 in
(depending on the Escala drawer)	or 1147 mm	or 45.2 in.
T00 EIA units	36 EIA units	
T42 EIA units	42 EIA units	

Weight		
T00 Base Empty Rack	244 kg	535 lbs
T00 Full Rack[1]	816 kg	1795 lbs
T42 Base Empty Rack	261 kg	575 lbs
T42 Full Rack[1]	930 kg	2045 lbs

Electrical[2]	
Power source loading maximum (per PDB)[3]	4.8 kVA
Voltage range	200 to 240 V ac
Frequency	50 or 60 hertz

Temperature Requirements	See specifications for drawers or enclosures
Humidity Requirements	See specifications for drawers or enclosures
Noise Emissions	See specifications for drawers or enclosures
Clearances	See **System Service Clearances**, on page 4-16.
Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Service	915mm (36in)	915mm (36in)	915mm (36in)	915mm (36in)

Notes:

1. Configuration dependent, base rack weight plus the weight of the drawers mounted in the rack. The T00 rack can support up to a maximum weight of 35 lbs/EIA (Unit).
2. The total rack power should be derived from the sum of the power used by the drawers in the rack.
3. Each AC Power Distribution Bus (PDB) can supply 4.8 kVA. A rack can have up to four PDB's as required by the drawers mounted in the rack.

36U I/O Rack Specifications

Dimensions		
Height	1804 mm	71.0 in.
Width	644 mm	25.5 in.
Depth	1098 mm	43.3 in.

Weight		
Minimum (Configuration dependant)	244 kg	535 lbs.

EPC610, PL400R, PL600R CEC Drawer (5 EIA Units) Specifications

Dimensions		
Height	218 mm	8.58 in.
Width	445 mm	17.5 in.
Depth	820 mm	32.3in.

Weight		
Minimum Configuration	41 kg	90 lbs.
Maximum Configuration	52 kg	115 lbs.

Electrical	
Power source loading typical	0.32 kVA
Power source loading maximum	0.48 kVA
Voltage range (V ac)	200 to 240
Frequency (hertz)	50 or 60
Thermal output (typical)	1025 BTU/hr
Thermal output (maximum)	1536 BTU/hr
Power requirements (typical)	300 watts
Power requirements (maximum)	450 watts
Power factor	0.95
Inrush current[1]	40 amps

Maximum altitude[2]	2135 m (7000 ft.)

	Operating	**Non–Operating**
Temperature Range[2]	10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125.6°F)

	Operating	**Non–Operating**
Humidity (Noncondensing)		
Without tape drive	8 to 80%	8 to 80%
With tape drive	20 to 80%	8 to 80%
Wet Bulb Requirements		
Without tape drive	27°C (80.6°F)	27°C (80.6°F)
With tape drive	23°C (73°F)	27°C (80.6°F)

Noise Emissions[3]	**Operating**	**Idle**
With CEC drawer only		
L_{WAd}	5.8 bels	5.8 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	45 dBA	45 dBA
Impulsive or prominent discrete tones	No	No
With CEC and Primary I/O		
L_{WAd}	6.2 bels	6.2 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	48 dBA	48 dBA
Impulsive or prominent discrete tones	No	No

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Notes:

1. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.
2. For altitudes above 915 meters, the maximum temperature limit is derated by 1 degree C for every 137 meters of elevation above 915 meters.
3. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.

PL 420R Drawer (4 EIA Units) Specifications

Dimensions		
Height	172.8 mm	6.8 in.
Width	444 mm	17.5 in.
Depth	609.6 mm	24 in.

Weight		
Minimum Configuration	32 kg	70.4 lbs.
Maximum Configuration	47.3 kg	104.8 lbs.

Electrical	
Power source loading (typical)	1-way, 2–way processors: 0.348 kVA, 4–way processor: 0.522
Power source loading (maximum)	1-way, 2–way processors: 0.522 kVA, 4–way processor: 0.783
Voltage range (V ac)	200 to 240 (autoranging)
Frequency (hertz)	50 or 60 Hz
Thermal output (typical)	1-way, 2–way processors: 1129 Btu/hr, 4–way processor: 1693 Btu/hr
Thermal output (maximum)	1-way, 2–way processors: 1693 Btu/hr, 4–way processor: 2540 Btu/hr
Power requirements (typical)	1-way, 2–way processors: 330 Watts, 4–way processor: 500 Watts
Power requirements (maximum)	-way, 2–way processors: 500 Watts, 4–way processor: 750 Watts
Power factor	0.96
Inrush current[2]	50 amps

Maximum altitude[3, 4]	2135 m (7000 ft.)

Temperature Range[3]	**Operating**	**Non–Operating**
	5 to 35°C (41 to 95°F)	10 to 52°C (50 to 126°F)

Humidity	**Operating**	**Non–Operating**
(Noncondensing) [4]	8 to 80%	8 to 80%
Wet Bulb Requirements	27°C (80°F)	27°C (80°F)

Noise Emissions[1, 5]	**Operating**	**Idle**
L_{WAd}	6.1 bels[5]	6.0 bels[5]
$<L_{pA>m}$	44 dBA[6]	43 dBA[6]

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.
3. The upper limit of the dry bulb temperature must be derated 1 degree C per 137 m (450 ft.) above 915 m. (3000 ft.)

4. The upper limit of the wet bulb temperature must be derated 1 degree C per 274 m (900 ft.) above 305 m. (1000 ft.)
5. Levels are for a single system installed in a T00 32 EIA rack with the center of the unit approximately 1500 mm (59 in.) off the floor.
6. All measurements made in accordance with ISO 7779, and declared in conformance with ISO 9296.

EPC810 and PL800R CEC Drawer (8 EIA Units) Specifications

Dimensions		
Height	355.6 mm	14.0 in.
Width	445 mm	17.5 in.
Depth	825.5 mm	32.5 in.

Weight		
Minimum Configuration	69.7 kg	158 lbs.
Maximum Configuration	74.6 kg	169 lbs.

Electrical	
Power source loading typical	0.39 kVA
Power source loading maximum	0.6 kVA
Voltage range (V ac)	200 to 240 (autoranging)
Frequency (hertz)	50 – 60
Thermal output (typical)	EPC810: 1265 BTU/hr PL800R: 772 BTU/hr
Thermal output (maximum)	EPC810: 1877 BTU/hr PL800R: 1378 BTU/hr
Power requirements (typical)	EPC810: 370 watts PL800R: 226 watts
Power requirements (maximum)	EPC810: 550 watts PL800R: 406 watts
Power factor	0.95
Inrush current[3]	34 amps

Maximum altitude	2135 m (7000 ft.)

	Operating	**Non–Operating**
Temperature Range	10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125.6°F)

	Operating	**Non–Operating**
Humidity (Noncondensing)	8 to 80%	8 to 80%
Wet Bulb Requirements	27°C (80.6°F)	27°C (80.6°F)

Noise Emissions[1,2]	**Operating**	**Idle**
With EPC810 drawer only		
L_{WAd}	6.4 bels	6.4 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	48 dBA	48 dBA
Impulsive or prominent discrete tones	No	No
With EPC810 drawer and Primary I/O drawer		
L_{WAd}	6.5 bels	6.5 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	49 dBA	49 dBA
Impulsive or prominent discrete tones	No	No

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Noise emissions data for the following configuration: the drawer is mounted in a T00 rack, a power distribution unit is installed in the rack, and the system is operating in a normal environment of 25°C (78°F).
3. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.

PL820R Drawer (8 EIA Units) Specifications

Dimensions		
Height	350 mm	13.8 in.
Width	444 mm	17.5 in.
Depth	744 mm	29.3 in.

Weight	93 kg	205 lbs.

Electrical	
Power source loading maximum	8-way processor: 1.424 kVA
Voltage range (V ac)	200 to 240 (autoranging)
Frequency (hertz)	50 or 60 Hz
Thermal output (maximum)	8-way processor: 4635 BTU/hr
Power requirements (maximum)	8-way processor: 1358 watts
Power factor	0.95
Inrush current[2]	100 amps

Maximum altitude[3, 4]	3048 m (10000 ft.)

Temperature Range[3]	**Operating**	**Non–Operating**	**Storage**
	10 to 38°C (50 to 100°F)	1 to 43°C (34 to 109°F)	1 to 60°C (34 to 140°F)

Humidity (Noncondensing) [4]	**Operating**	**Non–Operating**	**Storage**
	8 to 80%	8 to 80%	5 to 80%
Wet Bulb Requirements	23°C (73°F)	27°C (81°F)	29°C (84.2°F)

Noise Emissions[1, 5, 6]	**Operating**	**Idle**
L_{WAd}	6.1 bels[5]	6.1 bels[5]
$<L_{pA>m}$	44 dBA[6]	44 dBA[6]

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.
3. The upper limit of the dry bulb temperature must be derated 1 degree C per 137 m (450 ft.) above 915 m. (3000 ft.)
4. The upper limit of the wet bulb temperature must be derated 1 degree C per 274 m (900 ft.) above 305 m. (1000 ft.)
5. The LWAd emission increases to 6.5 bels with a configuration of one PL820R and four I/O drawers.
6. The $<L_{pA>m}$ emission increases to 48 dBA with a configuration of one PL820R and four I/O drawers.

PL240R Drawer (4 EIA Units) Specifications

Dimensions		
Height	173 mm	6.8 in.
Width	444 mm	17.5 in.
Depth	610 mm	24 in.

Weight		
Minimum Configuration	32.0 kg	70.4 lbs.
Maximum Configuration	47.3 kg	104.0 lbs.

Electrical	
Power source loading typical	0.75 kVA
Power source loading maximum	1.20 kVA
Voltage range (V ac)	100 to 127 or 200 to 240 (single phase)
Frequency (hertz)	50 – 60
Thermal output (maximum)	2540 BTU/hr
Power requirements (min. load)	350 watts
Power requirements (max. load)	670 watts
Power factor	0.95
Inrush current[1]	75 /amps (max. at <10ms) 25 /amps (max. at 10ms – 150ms)

Note: The above amps are held for the full input range of 180 V/ac to 259 V/ac and 47 to 63Hz.

Maximum altitude[2,3]	2135 m (7000 ft.)

	Operating	**Storage**
Temperature Range[3]	5 to 35°C (41 to 95°F)	1 to 60°C (34 to 140°F)

Humidity Requirements	**Operating**	**Storage**
(Noncondensing)	8 to 80%	5 to 80%
Wet Bulb	27°C (80°F)	27°C (80°F)

Noise Emissions[4]	**Operating**	**Idle**
L_{WAd}	6.1 bels	6.0 bels
$<L_{pA}>_m$	44 dBA	43 dBA

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air-flow

Notes:

1. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.
2. The upper limit of the dry bulb temperature must be derated 1 degree C per 137 m (450 ft.) above 915 m. (3000 ft.)
3. The upper limit of the wet bulb temperature must be derated 1 degree C per 274 m (900 ft.) above 305 m. (1000 ft.)
4. Levels are for a single system installed on a T00 32 EIA rack with the center of the unit approximately 1500 mm (59 in.) off the floor.

PL220R Drawer (5 EIA Units) Specifications

Dimensions		
Height	215 mm	8.5 in.
Width	426 mm	16.8 in.
Depth	617 mm	24 in.

Weight		
Minimum Configuration	35.5 kg	78 lbs.
Maximum Configuration	43.1 kg	94.8 lbs.

Electrical	
Power source loading typical	0.31 kVA
Power source loading maximum	0.46 kVA
Voltage range (V ac)	100 to 127 or 200 to 240 (autoranging)
Frequency (hertz)	50 – 60
Thermal output (typical)	1024 BTU/hr
Thermal output (maximum)	1536 BTU/hr
Power requirements (typical)	300 watts
Power requirements (maximum)	450 watts
Power factor	0.98
Inrush current[1]	34 amps

Maximum altitude[2,3]	2135 m (7000 ft.)

	Operating	**Non–Operating**
Temperature Range[3]	10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125.6°F)

Humidity Requirements	**Operating**	**Non–Operating**
(Noncondensing)	8 to 80%	8 to 80%
Wet Bulb	27°C (80°F)	27°C (80°F)

Noise Emissions[4]	**Operating**	**Idle**
L_{WAd}	6.4 bels	6.1 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	44 dBA	41 dBA

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Notes:

1. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.
2. The upper limit of the dry bulb temperature must be derated 1 degree C per 137 m (450 ft.) above 915 m. (3000 ft.)
3. The upper limit of the wet bulb temperature must be derated 1 degree C per 274 m (900 ft.) above 305 m. (1000 ft.)
4. Levels are for a single system installed on a T00 32 EIA rack with the center of the unit approximately 1500 mm (59 in.) off the floor.

I/O Drawer (5 EIA Units) EPC610, PL400R, PL600R, EPC810, PL800R

Dimensions		
Height	218 mm	8.6 in.
Width	445 mm	17.5 in.
Depth	820 mm	32.3 in.

Weight		
Minimum Configuration	41 kg	90 lbs.
Maximum Configuration	52 kg	115 lbs.

Electrical	
Power source loading typical	0.23 kVA
Power source loading maximum	0.54 kVA
Voltage range (V ac)	200 to 240
Frequency (hertz)	50 – 60
Thermal output (typical)	750 BTU/hr
Thermal output (maximum)	1750 BTU/hr
Power requirements (typical)	220 watts
Power requirements (maximum)	515 watts
Power factor	0.95
Inrush current[3]	41 amps

Maximum altitude	2135 m (7000 ft.)

Temperature Requirements	**Operating**	**Non–Operating**
	10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125.6°F)

Humidity (Noncondensing)	**Operating**	**Non–Operating**
Without tape drive	8 to 80%	8 to 80%
With tape drive	20 to 80%	20 to 80%
Wet Bulb		
Without tape drive	27°C (80°F)	27°C (80°F)
With tape drive	23°C (73°F)	27°C (80°F)

Noise Emissions[1,2]	**Operating**	**Idle**
L_{WAd}	5.8 bels	5.8 bels
L_{pAm}	N/A	N/A
$<L_{pA}>_m$	45 dBA	45 dBA
Impulsive or prominent discrete tones	No	No

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Noise emissions data for the SCSI I/O Drawer are based on the I/O drawer mounted in a rack. See “Input/Output Rack”.
3. Inrush currents occur only at initial application of power, no inrush occurs during normal power off–on cycle.

D10 I/O Drawer (4 EIA Units)

Dimensions	D10	Two D10s with Enclosure
Height	170 mm (6.6 in)	178 mm (7 in)
Width	220 mm (8.7 in)	445 mm (17.5 in)
Depth	711 mm (28 in)	711 mm (28.0 in)

Weight		
Maximum	16.8 kg (37 lbs)	39.1 kg (86 lbs)

Electrical	
Power source loading typical	0.21 kVA
Voltage range (V ac)	200 to 240
Frequency (hertz)	50 – 60
Thermal output per D10 (typical)	461 BTU/hr
Thermal output per D10 (max.)	683 BTU/hr
Power requirements (typical)	135 watts
Power requirements (max.)	200 watts
Power factor	0.91
Inrush current per D10 [2]	64 amps

Maximum altitude[3, 4]	3048 m (10000 ft.)

Temperature Range[3]	Operating	Non–Operating	Storage
	10 to 38°C (50 to 100°F)	1 to 60°C (34 to 140°F)	1 to 60°C (34 to 140°F)

Humidity	Operating	Non–Operating	Storage
(Noncondensing) [4]	8 to 80%	8 to 80%	8 to 80%
Wet Bulb Requirements	23°C (73°F)	27°C (81°F)	29°C (84.2°F)

Noise Emissions[1, 4]	Operating	Idle
L_{WAd} one D10	5.6 bels	5.6 bels
L_{WAd} two D10	5.9 bels	5.9 bels
L_{WAd} four D10	6.2 bels	6.2 bels
$<L_{pA}>_m$ one D10	40 dBA	40 dBA
$<L_{pA}>_m$ two D10	43 dBA	43 dBA
$<L_{pA}>_m$ four D10	46 dBA	46 dBA

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Inrush currents occur only at initial application of power, no inrush occurs during normal power–off cycle.
3. The upper limit of the dry bulb temperature must be derated 1 degree C per 137 m (450 ft.) above 915 m. (3000 ft.)
4. The upper limit of the wet bulb temperature must be derated 1 degree C per 274 m (900 ft.) above 305 m. (1000 ft.)

D20 I/O Drawer (4 EIA Units)

Dimensions	
Height	178 mm (7.0 in)
Width	445 mm (17.5 in)
Depth	610 mm (24.0 in)

Weight	
Maximum	45.9 kg (101 lbs)

Electrical	
Power source loading typical	0.358 kVA
Voltage range (V ac)	200 to 240
Frequency (hertz)	50 – 60
Thermal output (typical)	774 BTU/hr
Thermal output (max.)	1161 BTU/hr
Power requirements (typical)	227 watts
Power requirements (max.)	340 watts
Power factor	0.91
Inrush current [2]	60 amps

Maximum altitude[3, 4]	3048 m (10000 ft.)

Temperature Range[3]	**Operating**	**Non–Operating**	**Storage**
	5 to 35°C (41 to 95°F)	1 to 60°C (34 to 140°F)	1 to 60°C (34 to 140°F)

Humidity	**Operating**	**Non–Operating**	**Storage**
(Noncondensing) [4]	8 to 80%	8 to 80%	8 to 80%
Wet Bulb Requirements	23°C (73°F)	27°C (81°F)	29°C (84.2°F)

Noise Emissions[1, 4]	**Operating**	**Idle**
L_{WAd}	6.1 bels	6.0 bels
$<L_{pA}>_m$	44 dBA	43 dBA

Clearances	See **System Service Clearances**, on page 4-16.

Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow

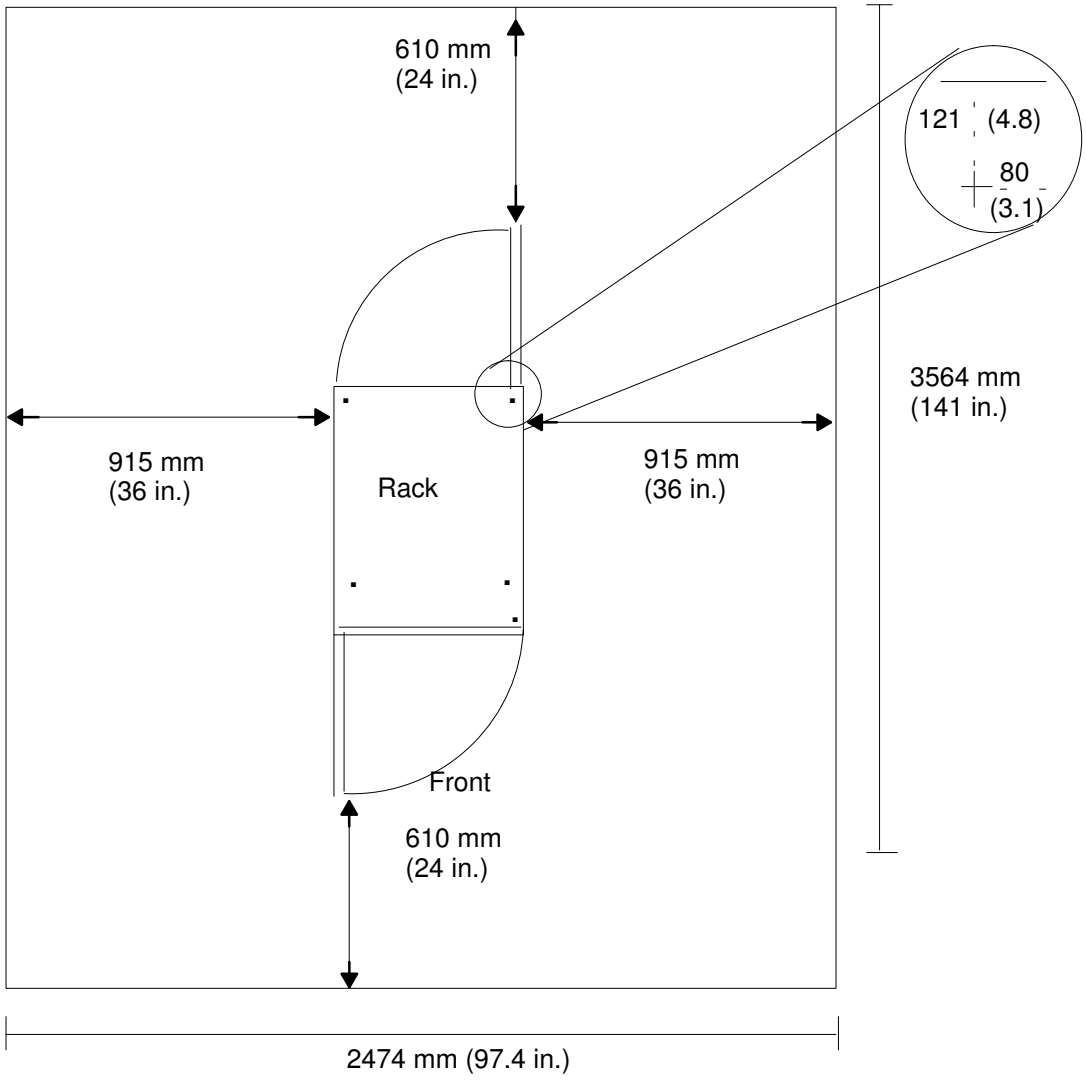
Notes:

1. See ”Noise Emission Notes” on page 4-17 for definitions of noise emissions positions.
2. Inrush currents occur only at initial application of power, no inrush occurs during normal power–off cycle.
3. The upper limit of the dry bulb temperature must be derated 1 degree C per 137 m (450 ft.) above 915 m. (3000 ft.)
4. The upper limit of the wet bulb temperature must be derated 1 degree C per 274 m (900 ft.) above 305 m. (1000 ft.)

System Service Clearances

The amount of space needed by the units during service is indicated by the dotted line in the figure below

For multiple racks placed side by side, the left and right clearances apply only to the leftmost and rightmost rack.



Note: Rack units are large and heavy and are not easily moved. Because maintenance activities require access at both the front and the back, allow for extra room. The footprint shows the radius of the swinging doors on the I/O rack. The figure shows the minimum space required.

Noise Emission Notes

1. L_{WAd} is the declared (upper limit) sound power emission level for a production series of machines.
2. L_{pAm} is the mean value of the A–weighted sound pressure emission levels at the operator position (if any) for a production series of machines.
3. $<L_{pA}>_m$ is the mean value of the space–averaged A–weighted sound pressure emission levels at the one–meter positions for a production series of machines.
4. N/A = Not Applicable (no operator position).
5. All measurements are made in accordance with ISO DIS 7779 and reported in conformance with ISO DIS 7574/4.

Rack Drawer Power Consumption

See **Rack Drawer Power Consumption**, on page 1-5.

Configuration Rules

The following provides you with the rules involved with drawer mounting inside a 19 ” 36U T00 rack and 42U T42 rack.

- Each drawer is characterized by its own U height.

Note: Each drawer is affected by a priority. This attribute is useful during the configuration phase.

- The criteria used to assign a priority to a drawer are:
  - Drawer height
  - Drawer weight

  So, a 12U, 20Kg drawer will have a higher priority than a 8U, 30kg one.
- CPU drawer is an exception to this. Its priority, especially for the first CPU drawer, is based on its media accessibility: floppy, disk, tape, CD–Rom, and operator panel. Therefore a CPU drawer is always placed at a convenient height.
- An additional rack is generated when there is no room left that suits to the remaining drawers.
- For mechanical stability, it is advised to start loading from the bottom, if possible.
- The list of all available drawers that can be put inside the rack is specified in the following section.

To establish location of drawers inside a rack, follow location rules given in the following table. Then, in compliance with priorities, assign for each drawer its own location. It is important to recall that more than one rack may compose a Powercluster.

Note: Even if an area is not fully filled, the remaining space must be kept free.

Drawer Location in T00 Rack

Note: 1 : RPS : Redondant Power Supply , 2 : For DAS : RPS = Dual –SP

Table 7. Rack 36U – Positions 1 to 9

Prty	Drawer	Power–Cord		Height	Position 1		Position 2		Position 3		Position 4		Position 5		Position 6		Position 7		Position 8		Position 9	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U	27	36	26	35	25	34	24	33	23	32	22	31	21	30	20	29	19	28
2	PL800R CEC+I/O	N/A	4[1]	13U	24	36	23	35	22	34	21	33	20	32	19	31	18	30	17	29	16	28
3	Secondary I/O Drawer	1	2[1]	5U	32	36	31	35	30	34	29	33	28	32	27	31	26	30	25	29	24	28
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	34	36	33	35	32	34	31	33	30	32	29	31	28	30	27	29	26	28
5	PL220R	2	3[1]	5U	32	36	31	35	30	34	29	33	28	32	27	31	26	30	25	29	24	28
6	CX600 & 9DAE2	20[2]		35U	1	35	2	36														
7	CX600 & 8DAE2	18[2]		32U	1	32	2	33	3	34	4	35	5	36								
8	CX600 & 7DAE2	16[2]		29U	1	29	2	30	3	31	4	32	5	33	6	34	7	35	8	36		
9	CX600 & 6DAE2	14[2]		26U	1	26	2	27	3	28	4	29	5	30	6	31	7	32	8	33	9	34
10	CX600 & 5DAE2	12[2]		23U	1	23	2	24	3	25	4	26	5	27	6	28	7	29	8	30	9	31
11	CX600 & 4DAE2	10[2]		20U	1	20	2	21	3	22	4	23	5	24	6	25	7	26	8	27	9	28
12	CX600 & 3DAE2	8[2]		17U	1	17	2	18	3	19	4	20	5	21	6	22	7	23	8	24	9	25
13	CX600 & 2DAE2	6[2]		14U	1	14	2	15	3	16	4	17	5	18	6	19	7	20	8	21	9	22
14	CX600 & 1DAE2	4[2]		11U	1	11	2	12	3	13	4	14	5	15	6	16	7	17	8	18	9	19
15	CX600 BASE	2[2]		8U	1	8	2	9	3	10	4	11	5	12	6	13	7	14	8	15	9	16
16	CX400 & 3DAE2	8[2]		13U	1	13	2	14	3	15	4	16	5	17	6	18	7	19	8	20	9	21

Prty	Drawer	Power–Cord		Height	Position 1		Position 2		Position 3		Position 4		Position 5		Position 6		Position 7		Position 8		Position 9	
17	CX400 & 2DAE2	6^2		10U	1	10	2	11	3	12	4	13	5	14	6	15	7	16	8	17	9	18
18	CX400 & 1DAE2	4^2		7U	1	7	2	8	3	9	4	10	5	11	6	12	7	13	8	14	9	15
19	CX400 BASE	2^2		4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
20	CX200 & 1DAE2	1	N/A	7U	1	7	2	8	3	9	4	10	5	11	6	12	7	13	8	14	9	15
		1																				
21	CX200 BASE	1	N/A	4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
22	CX200 MONO–SP	1	N/A	3U	1	3	2	4	3	5	4	6	5	7	6	8	7	9	8	10	9	11
23	PL820R	N/A	2^1	8U	16	9	15	8	14	7	13	6	12	5	11	4	10	3	9	2	8	1
24	I/O drawer (PCI)	N/A	2^1	4U	8	5	7	4	6	3	5	2	4	1	36	33	35	32	34	31	33	30
25	PL420R	1	2	4U	12	9	11	8	10	7	9	6	8	5	7	4	6	3	5	2	4	1
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	8	5	7	4	6	3	5	2	4	1	36	33	35	32	34	31	33	30
27	NDAE2	2^2		3U	1	3	2	4	3	5	4	6	5	7	6	8	7	9	8	10	9	11
28	SPS / 4700 2Gbps & 7DAE	8	16^2	36U	1	36																
29	SPS / 4700 2Gbps & 6DAE	7	14^2	32U	1	32																
30	SPS / 4700 2Gbps & 5DAE	6	12^2	28U	1	28																
31	SPS / 4700 2Gbps & 4DAE	5	10^2	24U	1	24	3	26														
32	SPS / 4700 2Gbps & 3DAE	4	8^2	20U	1	20	3	22	21	40												
33	SPS / 4700 2Gbps & 2DAE	3	6^2	16U	1	16	3	18	17	32	19	34										
34	SPS / 4700 2Gbps & 1DAE	2	4^2	12U	1	12	3	14	13	24	15	26	25	36								
35	SPS / 4700 2Gbps	1	2^2	8U	1	8	3	10	9	16	11	18	17	24	19	26	25	32	27	34		
36	DAE5000	1	2^2	4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
37	Switch FC 16–p. 2Gb/s	2		2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10

Prty	Drawer	Power–Cord	Height	Position 1		Position 2		Position 3		Position 4		Position 5		Position 6		Position 7		Position 8		Position 9	
38	Switch FC 8–port 2Gbps	1	1U	Positions 1–1 à 36–36																	
39	Switch Fast Eth	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
40	Switch Gbit Eth	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
41	DLT4000/7000/8000	1	4U	33	36	32	35	31	34	30	33	29	32	28	31	27	30	26	29	25	28
42	Cons Conc 16–port	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
43	Cons conc 16–port & Switch Admin	2	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
44	Switch Admin	1	1U	Positions 1–1 à 36–36																	
45	Switch Fast Eth	1	1U	Positions 1–1 à 36–36																	
46	Rack Cont Spec 7EIA	1	7U	1	7	2	8	3	9	4	10	5	11	6	12	7	13	8	14	9	15
47	Rack Cont Spec 4EIA	1	4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
48	Rack Cont Spec 3EIA	1	3U	1	3	2	4	3	5	4	6	5	7	6	8	7	9	8	10	9	11
49	Rack Cont Spec 2EIA	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
50	Rack Cont Spec 1EIA	1	1U	Positions 1–1 à 36–36																	

Table 8. Rack 36U – Positions 10 to 18

Prty	Drawer	Power–Cord		Height	Position 10		Position 11		Position 12		Position 13		Position 14		Position 15		Position 16		Position 17		Position 18	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U	18	27	17	26	16	25	15	24	14	23	13	22	12	21	11	20	10	19
2	PL800R CEC+I/O	N/A	4[1]	13U	15	27	14	26	13	25	12	24	11	23	10	22	9	21	8	20	7	19
3	Secondary I/O Drawer	1	2[1]	5U	23	27	22	26	21	25	20	24	19	23	18	22	17	21	16	20	15	19
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	25	27	24	26	23	25	22	24	21	23	20	22	19	21	18	20	17	19
5	PL220R	2	3[1]	5U	23	27	22	26	21	25	20	24	19	23	18	22	17	21	16	20	15	19
6	CX600 & 9DAE2	20[2]		35U																		
7	CX600 & 8DAE2	18[2]		32U																		
8	CX600 & 7DAE2	16[2]		29U																		
9	CX600 & 6DAE2	14[2]		26U	10	35	11	36														
10	CX600 & 5DAE2	12[2]		23U	10	32	11	33	12	34	13	35	14	36								
11	CX600 & 4DAE2	10[2]		20U	10	29	11	30	12	31	13	32	14	33	15	34	16	35	17	36		
12	CX600 & 3DAE2	8[2]		17U	10	26	11	27	12	28	13	29	14	30	15	31	16	32	17	33	18	34
13	CX600 & 2DAE2	6[2]		14U	10	23	11	24	12	25	13	26	14	27	15	28	16	29	17	30	18	31
14	CX600 & 1DAE2	4[2]		11U	10	20	11	21	12	22	13	23	14	24	15	25	16	26	17	27	18	28
15	CX600 BASE	2[2]		8U	10	17	11	18	12	19	13	20	14	21	15	22	16	23	17	24	18	25
16	CX400 & 3DAE2	8[2]		13U	10	22	11	23	12	24	13	25	14	26	15	27	16	28	17	29	18	30
17	CX400 & 2DAE2	6[2]		10U	10	19	11	20	12	21	13	22	14	23	15	24	16	25	17	26	18	27
18	CX400 & 1DAE2	4[2]		7U	10	16	11	17	12	18	13	19	14	20	15	21	16	22	17	23	18	24
19	CX400 BASE	2[2]		4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21

Prty	Drawer	Power–Cord		Height	Position 10		Position 11		Position 12		Position 13		Position 14		Position 15		Position 16		Position 17		Position 18	
20	CX200 & 1DAE2	1	N/A	7U	10	16	11	17	12	18	13	19	14	20	15	21	16	22	17	23	18	24
		1																				
21	CX200 BASE	1	N/A	4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21
22	CX200 MONO–SP	1	N/A	3U	10	12	11	13	12	14	13	15	14	16	15	17	16	18	17	19	18	20
23	PL820R	N/A	2[1]	8U	36	29	35	28	34	27	33	26	32	25	31	24	30	23	29	22	28	21
24	I/O drawer (PCI)	N/A	2[1]	4U	32	29	31	28	30	27	29	26	28	25	27	24	26	23	25	22	24	21
25	PL420R	1	2	4U	36	33	35	32	34	31	33	30	32	29	31	28	30	27	29	26	28	25
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	32	29	31	28	30	27	29	26	28	25	27	24	26	23	25	22	24	21
27	NDAE2	2[2]		3U	10	12	11	13	12	14	13	15	14	16	15	17	16	18	17	19	18	20
28	SPS / 4700 2Gbps & 7DAE	8	16[2]	36U																		
29	SPS / 4700 2Gbps & 6DAE	7	14[2]	32U																		
30	SPS / 4700 2Gbps & 5DAE	6	12[2]	28U																		
31	SPS / 4700 2Gbps & 4DAE	5	10[2]	24U																		
32	SPS / 4700 2Gbps & 3DAE	4	8[2]	20U																		
33	SPS / 4700 2Gbps & 2DAE	3	6[2]	16U																		
34	SPS / 4700 2Gbps & 1DAE	2	4[2]	12U																		
35	SPS / 4700 2Gbps	1	2[2]	8U																		
36	DAE5000	1	2[2]	4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21
37	Switch FC 16–p. 2Gb/s	2		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
38	Switch FC 8–port 2Gbps	1		1U	Positions 1–1 à 36–36																	
39	Switch Fast Eth	1		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
40	Switch Gbit Eth	1		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
41	DLT4000/7000/8000	1		4U	24	27	23	26	22	25	21	24	20	23	19	22	18	21	17	20	16	19
42	Cons Conc 16–port	1		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19

Prty	Drawer	Power–Cord	Height	Position 10		Position 11		Position 12		Position 13		Position 14		Position 15		Position 16		Position 17		Position 18	
43	Cons conc 16–port & Switch Admin	2	2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
44	Switch Admin	1	1U	Positions 1–1 à 36–36																	
45	Switch Fast Eth	1	1U	Positions 1–1 à 36–36																	
46	Rack Cont Spec 7EIA	1	7U	10	16	11	17	12	18	13	19	14	20	15	21	16	22	17	23	18	24
47	Rack Cont Spec 4EIA	1	4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21
48	Rack Cont Spec 3EIA	1	3U	10	12	11	13	12	14	13	15	14	16	15	17	16	18	17	19	18	20
49	Rack Cont Spec 2EIA	1	2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
50	Rack Cont Spec 1EIA	1	1U	Positions 1–1 à 36–36																	

Table 9. Rack 36U – Positions 19 to 27

Prty	Drawer	Power–Cord		Height	Position 19		Position 20		Position 21		Position 22		Position 23		Position 24		Position 25		Position 26		Position 27	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U	9	18	8	17	7	16	6	15	5	14	4	13	3	12	2	11	1	10
2	PL800R CEC+I/O	N/A	4[1]	13U	6	18	5	17	4	16	3	15	2	14	1	13						
3	Secondary I/O Drawer	1	2[1]	5U	14	18	13	17	12	16	11	15	10	14	9	13	8	12	7	11	6	10
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	16	18	15	17	14	16	13	15	12	14	11	13	10	12	9	11	8	10
5	PL220R	2	3[1]	5U	14	18	13	17	12	16	11	15	10	14	9	13	8	12	7	11	6	10
6	CX600 & 9DAE2	20[2]		35U																		
7	CX600 & 8DAE2	18[2]		32U																		
8	CX600 & 7DAE2	16[2]		29U																		
9	CX600 & 6DAE2	14[2]		26U																		
10	CX600 & 5DAE2	12[2]		23U																		
11	CX600 & 4DAE2	10[2]		20U																		
12	CX600 & 3DAE2	8[2]		17U	19	35	20	36														
13	CX600 & 2DAE2	6[2]		14U	19	32	20	33	21	34	22	35	23	36								
14	CX600 & 1DAE2	4[2]		11U	19	29	20	30	21	31	22	32	23	33	24	34	25	35	26	36		
15	CX600 BASE	2[2]		8U	19	26	20	27	21	28	22	29	23	30	24	31	25	32	26	33	27	34
16	CX400 & 3DAE2	8[2]		13U	19	31	20	32	21	33	22	34	23	35	24	36						
17	CX400 & 2DAE2	6[2]		10U	19	28	20	29	21	30	22	31	23	32	24	33	25	34	26	35	27	36
18	CX400 & 1DAE2	4[2]		7U	19	25	20	26	21	27	22	28	23	29	24	30	25	31	26	32	27	33
19	CX400 BASE	2[2]		4U	19	22	20	23	21	24	22	25	23	26	24	27	25	28	26	29	27	30

Prty	Drawer	Power–Cord		Height	Position 19		Position 20		Position 21		Position 22		Position 23		Position 24		Position 25		Position 26		Position 27	
20	CX200 & 1DAE2	1	N/A	7U	19	25	20	26	21	27	22	28	23	29	24	30	25	31	26	32	27	33
		1																				
21	CX200 BASE	1	N/A	4U	19	22	20	23	21	24	22	25	23	26	24	27	25	28	26	29	27	30
22	CX200 MONO–SP	1	N/A	3U	19	21	20	22	21	23	22	24	23	25	24	26	25	27	26	28	27	29
23	PL820R	N/A	2[1]	8U	27	20	26	19	25	18	24	17	23	16	22	15	21	14	20	13	19	12
24	I/O drawer (PCI)	N/A	2[1]	4U	23	20	22	19	21	18	20	17	19	16	18	15	17	14	16	13	15	12
25	PL420R	1	2	4U	27	24	26	23	25	22	24	21	23	20	22	19	21	18	20	17	19	16
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	23	20	22	19	21	18	20	17	19	16	18	15	17	14	16	13	15	12
27	NDAE2	2[2]		3U	19	21	20	22	21	23	22	24	23	25	24	26	25	27	26	28	27	29
28	SPS / 4700 2Gbps & 7DAE																					
29	SPS / 4700 2Gbps & 6DAE	8	16[2]	36U																		
30	SPS / 4700 2Gbps & 5DAE	7	14[2]	32U																		
31	SPS / 4700 2Gbps & 4DAE	6	12[2]	28U																		
32	SPS / 4700 2Gbps & 3DAE	5	10[2]	24U																		
33	SPS / 4700 2Gbps & 2DAE	4	8[2]	20U																		
34	SPS / 4700 2Gbps & 1DAE	3	6[2]	16U																		
35	SPS / 4700 2Gbps	2	4[2]	12U																		
36	DAE5000	1	2[2]	8U																		
37	Switch FC 16–p. 2Gb/s	1	2[2]	4U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
38	Switch FC 8–port 2Gbps	1 / 2		1U	Positions 1–1 à 36–36																	
39	Switch Fast Eth	1		1U	Positions 1–1 à 36–36																	
40	Switch Gbit Eth	1		2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
41	DLT4000/7000/8000	1		4U	15	18	14	17	13	16	12	15	11	14	10	13	9	12	8	11	7	10
42	Cons Conc 16–port	1		2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28

Prty	Drawer	Power–Cord	Height	Position 19		Position 20		Position 21		Position 22		Position 23		Position 24		Position 25		Position 26		Position 27	
43	Cons conc 16–port & Switch Admin	1	2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
44	Switch Admin	2	2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
45	Switch Fast Eth	1	1U	Positions 1–1 à 36–36																	
46	Rack Cont Spec 7EIA	1	1U	Positions 1–1 à 36–36																	
47	Rack Cont Spec 4EIA	1	7U	19	25	20	26	21	27	22	28	23	29	24	30	25	31	26	32	27	33
48	Rack Cont Spec 3EIA	1	4U	19	22	20	23	21	24	22	25	23	26	24	27	25	28	26	29	27	30
49	Rack Cont Spec 2EIA	1	3U	19	21	20	22	21	23	22	24	23	25	24	26	25	27	26	28	27	29
50	Rack Cont Spec 1EIA	1	2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28

Table 10. Rack 36U – Positions 28 to 36

Prty	Drawer	Power–Cord		Height	Position 28		Position 29		Position 30		Position 31		Position 32		Position 33		Position 34		Position 35		Position 36	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U																		
2	PL800R CEC+I/O	N/A	4[1]	13U																		
3	Secondary I/O Drawer	1	2[1]	5U	5	9	4	8	3	7	2	6	1	5								
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	7	9	6	8	5	7	4	6	3	5	2	4	1	3				
5	PL220R	2	3[1]	5U	5	9	4	8	3	7	2	6	1	5								
6	CX600 & 9DAE2	20[2]		35U																		
7	CX600 & 8DAE2	18[2]		32U																		
8	CX600 & 7DAE2	16[2]		29U																		
9	CX600 & 6DAE2	14[2]		26U																		
10	CX600 & 5DAE2	12[2]		23U																		
11	CX600 & 4DAE2	10[2]		20U																		
12	CX600 & 3DAE2	8[2]		17U																		
13	CX600 & 2DAE2	6[2]		14U																		
14	CX600 & 1DAE2	4[2]		11U																		
15	CX600 BASE	2[2]		8U	28	35	29	36														
16	CX400 & 3DAE2	8[2]		13U																		
17	CX400 & 2DAE2	6[2]		10U																		
18	CX400 & 1DAE2	4[2]		7U	28	34	29	35	30	36												
19	CX400 BASE	2[2]		4U	28	31	29	32	30	33	31	34	32	35	33	36						

Prty	Drawer	Power–Cord		Height	Position 28		Position 29		Position 30		Position 31		Position 32		Position 33		Position 34		Position 35		Position 36	
20	CX200 & 1DAE2	1	N/A	7U	28	34	29	35	30	36												
		1																				
21	CX200 BASE	1	N/A	4U	28	31	29	32	30	33	31	34	32	35	33	36						
22	CX200 MONO–SP	1	N/A	3U	28	30	29	31	30	32	31	33	32	34	33	35	34	36				
23	PL820R	N/A	2[1]	8U	18	11	17	10														
24	I/O drawer (PCI)	N/A	2[1]	4U	28	31	29	32	30	33	31	34	32	35	33	36						
25	PL420R	1	2	4U	18	15	17	14	16	13	15	12	14	11	13	10						
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	14	11	13	10	12	9	11	8	10	7	9	6						
27	NDAE2	2[2]		3U	28	30	29	31	30	32	31	33	32	34	33	35	34	36				
28	SPS / 4700 2Gbps & 7DAE	8	16[2]	36U																		
29	SPS / 4700 2Gbps & 6DAE	7	14[2]	32U																		
30	SPS / 4700 2Gbps & 5DAE	6	12[2]	28U																		
31	SPS / 4700 2Gbps & 4DAE	5	10[2]	24U																		
32	SPS / 4700 2Gbps & 3DAE	4	8[2]	20U																		
33	SPS / 4700 2Gbps & 2DAE	3	6[2]	16U																		
34	SPS / 4700 2Gbps & 1DAE	2	4[2]	12U																		
35	SPS / 4700 2Gbps	1	2[2]	8U																		
36	DAE5000	1	2[2]	4U	28	31	29	32	30	33	31	34	32	35	33	36						
37	Switch FC 16–p. 2Gb/s	2		2U	28	29	29	30	30	31	31	32	32	33	33	34						
38	Switch FC 8–port 2Gbps	1		1U	Positions 1–1 à 36–36																	
39	Switch Fast Eth	1		2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36		
40	Switch Gbit Eth	1		2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36		
41	DLT4000/7000/8000	1		4U	6	9	5	8	4	7	3	6	2	5	1	4						
42	Cons Conc 16–port	1		2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36		

Prty	Drawer	Power–Cord	Height	Position 28		Position 29		Position 30		Position 31		Position 32		Position 33		Position 34		Position 35		Position 36	
43	Cons conc 16–port & Switch Admin	2	2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36		
44	Switch Admin	1	1U	Positions 1–1 à 36–36																	
45	Switch Fast Eth	1	1U	Positions 1–1 à 36–36																	
46	Rack Cont Spec 7EIA	1	7U	28	34	29	35	30	36												
47	Rack Cont Spec 4EIA	1	4U	28	31	29	32	30	33	31	34	32	35	33	36						
48	Rack Cont Spec 3EIA	1	3U	28	30	29	31	30	32	31	33	32	34	33	35	34	36				
49	Rack Cont Spec 2EIA	1	2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36		
50	Rack Cont Spec 1EIA	1	1U	Positions 1–1 à 36–36																	

Drawer Location in T42 Rack

Note: 1 : RPS : Redondant Power Supply , 2 : For DAS : RPS = Dual –SP

Table 11. Rack 42U – Positions 1 to 9

Prty	Drawer	Power–Cord		Height	Position 1		Position 2		Position 3		Position 4		Position 5		Position 6		Position 7		Position 8		Position 9	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U	33	42	32	41	31	40	30	39	29	38	28	37	27	36	26	35	25	34
2	PL800R CEC+I/O	N/A	4[1]	13U	30	42	29	41	28	40	27	39	26	38	25	37	24	36	23	35	22	34
3	Secondary I/O Drawer	1	2[1]	5U	38	42	37	41	36	40	35	39	34	38	33	37	32	36	31	35	30	34
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	40	42	39	41	38	40	37	39	36	38	35	37	34	36	33	35	32	34
5	PL220R	2	3[1]	5U	38	42	37	41	36	40	35	39	34	38	33	37	32	36	31	35	30	34
6	CX600 & 9DAE2	20[2]		35U	1	35	2	36	3	37	4	38	5	39	6	40	7	41	8	42		
7	CX600 & 8DAE2	18[2]		32U	1	32	2	33	3	34	4	35	5	36	6	37	7	38	8	39	9	40
8	CX600 & 7DAE2	16[2]		29U	1	29	2	30	3	31	4	32	5	33	6	34	7	35	8	36	9	37
9	CX600 & 6DAE2	14[2]		26U	1	26	2	27	3	28	4	29	5	30	6	31	7	32	8	33	9	34
10	CX600 & 5DAE2	12[2]		23U	1	23	2	24	3	25	4	26	5	27	6	28	7	29	8	30	9	31
11	CX600 & 4DAE2	10[2]		20U	1	20	2	21	3	22	4	23	5	24	6	25	7	26	8	27	9	28
12	CX600 & 3DAE2	8[2]		17U	1	17	2	18	3	19	4	20	5	21	6	22	7	23	8	24	9	25
13	CX600 & 2DAE2	6[2]		14U	1	14	2	15	3	16	4	17	5	18	6	19	7	20	8	21	9	22
14	CX600 & 1DAE2	4[2]		11U	1	11	2	12	3	13	4	14	5	15	6	16	7	17	8	18	9	19
15	CX600 BASE	2[2]		8U	1	8	2	9	3	10	4	11	5	12	6	13	7	14	8	15	9	16
16	CX400 & 3DAE2	8[2]		13U	1	13	2	14	3	15	4	16	5	17	6	18	7	19	8	20	9	21

Prty	Drawer	Power–Cord		Height	Position 1		Position 2		Position 3		Position 4		Position 5		Position 6		Position 7		Position 8		Position 9	
17	CX400 & 2DAE2	6[2]		10U	1	10	2	11	3	12	4	13	5	14	6	15	7	16	8	17	9	18
18	CX400 & 1DAE2	4[2]		7U	1	7	2	8	3	9	4	10	5	11	6	12	7	13	8	14	9	15
19	CX400 BASE	2[2]		4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
20	CX200 & 1DAE2	1	N/A	7U	1	7	2	8	3	9	4	10	5	11	6	12	7	13	8	14	9	15
		1																				
21	CX200 BASE	1	N/A	4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
22	CX200 MONO–SP	1	N/A	3U	1	3	2	4	3	5	4	6	5	7	6	8	7	9	8	10	9	11
23	PL820R	N/A	2[1]	8U	16	9	15	8	14	7	13	6	12	5	11	4	10	3	9	2	8	1
24	I/O drawer (PCI)	N/A	2[1]	4U	8	5	7	4	6	3	5	2	4	1	42	39	41	38	40	37	39	36
25	PL420R	1	2	4U	12	9	11	8	10	7	9	6	8	5	7	4	6	3	5	2	4	1
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	8	5	7	4	6	3	5	2	4	1	42	39	41	38	40	37	39	36
27	NDAE2	2[2]		3U	1	3	2	4	3	5	4	6	5	7	6	8	7	9	8	10	9	11
28	SPS / 4700 2Gbps & 7DAE	8	16[2]	36U	1	36																
29	SPS / 4700 2Gbps & 6DAE	7	14[2]	32U	1	32																
30	SPS / 4700 2Gbps & 5DAE	6	12[2]	28U	1	28																
31	SPS / 4700 2Gbps & 4DAE	5	10[2]	24U	1	24	3	26														
32	SPS / 4700 2Gbps & 3DAE	4	8[2]	20U	1	20	3	22	21	40												
33	SPS / 4700 2Gbps & 2DAE	3	6[2]	16U	1	16	3	18	17	32	19	34										
34	SPS / 4700 2Gbps & 1DAE	2	4[2]	12U	1	12	3	14	13	24	15	26	25	36								
35	SPS / 4700 2Gbps	1	2[2]	8U	1	8	3	10	9	16	11	18	17	24	19	26	25	32	27	34		
36	DAE5000	1	2[2]	4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
37	Switch FC 16–p. 2Gb/s	2		2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10

Prty	Drawer	Power–Cord	Height	Position 1		Position 2		Position 3		Position 4		Position 5		Position 6		Position 7		Position 8		Position 9	
38	Switch FC 8–port 2Gbps	1	1U	Positions 1–1 à 42–42																	
39	Switch Fast Eth	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
40	Switch Gbit Eth	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
41	DLT4000/7000/8000	1	4U	33	36	32	35	31	34	30	33	29	32	28	31	27	30	26	29	25	28
42	Cons Conc 16–port	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
43	Cons conc 16–port & Switch Admin	2	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
44	Switch Admin	1	1U	Positions 1–1 à 36–36																	
45	Switch Fast Eth	1	1U	Positions 1–1 à 42–42																	
46	Rack Cont Spec 7EIA	1	7U	1	7	2	8	3	9	4	10	5	11	6	12	7	13	8	14	9	15
47	Rack Cont Spec 4EIA	1	4U	1	4	2	5	3	6	4	7	5	8	6	9	7	10	8	11	9	12
48	Rack Cont Spec 3EIA	1	3U	1	3	2	4	3	5	4	6	5	7	6	8	7	9	8	10	9	11
49	Rack Cont Spec 2EIA	1	2U	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10
50	Rack Cont Spec 1EIA	1	1U	Positions 1–1 à 42–42																	

Table 12. Rack 42U – Positions 10 to 18

Prty	Drawer	Power–Cord		Height	Position 10		Position 11		Position 12		Position 13		Position 14		Position 15		Position 16		Position 17		Position 18	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U	24	33	23	32	22	31	21	30	20	29	19	28	18	27	17	26	16	25
2	PL800R CEC+I/O	N/A	4[1]	13U	21	33	20	32	19	31	18	30	17	29	16	28	15	27	14	26	13	25
3	Secondary I/O Drawer	1	2[1]	5U	29	33	28	32	27	31	26	30	25	29	24	28	23	27	22	26	21	25
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	31	33	30	32	29	31	28	30	27	29	26	28	25	27	24	26	23	25
5	PL220R	2	3[1]	5U	29	33	28	32	27	31	26	30	25	29	24	28	23	27	22	26	21	25
6	CX600 & 9DAE2	20[2]		35U																		
7	CX600 & 8DAE2	18[2]		32U	10	41	11	42														
8	CX600 & 7DAE2	16[2]		29U	10	38	11	39	12	40	13	41	14	42								
9	CX600 & 6DAE2	14[2]		26U	10	35	11	36	12	37	13	38	14	39	15	40	16	41	17	42		
10	CX600 & 5DAE2	12[2]		23U	10	32	11	33	12	34	13	35	14	36	15	37	16	38	17	39	18	40
11	CX600 & 4DAE2	10[2]		20U	10	29	11	30	12	31	13	32	14	33	15	34	16	35	17	36	18	37
12	CX600 & 3DAE2	8[2]		17U	10	26	11	27	12	28	13	29	14	30	15	31	16	32	17	33	18	34
13	CX600 & 2DAE2	6[2]		14U	10	23	11	24	12	25	13	26	14	27	15	28	16	29	17	30	18	31
14	CX600 & 1DAE2	4[2]		11U	10	20	11	21	12	22	13	23	14	24	15	25	16	26	17	27	18	28
15	CX600 BASE	2[2]		8U	10	17	11	18	12	19	13	20	14	21	15	22	16	23	17	24	18	25
16	CX400 & 3DAE2	8[2]		13U	10	22	11	23	12	24	13	25	14	26	15	27	16	28	17	29	18	30
17	CX400 & 2DAE2	6[2]		10U	10	19	11	20	12	21	13	22	14	23	15	24	16	25	17	26	18	27
18	CX400 & 1DAE2	4[2]		7U	10	16	11	17	12	18	13	19	14	20	15	21	16	22	17	23	18	24
19	CX400 BASE	2[2]		4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21

Prty	Drawer	Power–Cord		Height	Position 10		Position 11		Position 12		Position 13		Position 14		Position 15		Position 16		Position 17		Position 18	
20	CX200 & 1DAE2	1	N/A	7U	10	16	11	17	12	18	13	19	14	20	15	21	16	22	17	23	18	24
		1																				
21	CX200 BASE	1	N/A	4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21
22	CX200 MONO–SP	1	N/A	3U	10	12	11	13	12	14	13	15	14	16	15	17	16	18	17	19	18	20
23	PL820R	N/A	2[1]	8U	42	35	41	34	40	33	39	32	38	31	37	30	36	29	35	28	34	27
24	I/O drawer (PCI)	N/A	2[1]	4U	38	35	37	34	36	33	35	32	34	31	33	30	32	29	31	28	30	27
25	PL420R	1	2	4U	42	39	41	38	40	37	39	36	38	35	37	34	36	33	35	32	34	31
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	38	35	37	34	36	33	35	32	34	31	33	30	32	29	31	28	30	27
27	NDAE2	2[2]		3U	10	12	11	13	12	14	13	15	14	16	15	17	16	18	17	19	18	20
28	SPS / 4700 2Gbps & 7DAE	8	16[2]	36U																		
29	SPS / 4700 2Gbps & 6DAE	7	14[2]	32U																		
30	SPS / 4700 2Gbps & 5DAE	6	12[2]	28U																		
31	SPS / 4700 2Gbps & 4DAE	5	10[2]	24U																		
32	SPS / 4700 2Gbps & 3DAE	4	8[2]	20U																		
33	SPS / 4700 2Gbps & 2DAE	3	6[2]	16U																		
34	SPS / 4700 2Gbps & 1DAE	2	4[2]	12U																		
35	SPS / 4700 2Gbps	1	2[2]	8U																		
36	DAE5000	1	2[2]	4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21
37	Switch FC 16–p. 2Gb/s	2		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
38	Switch FC 8–port 2Gbps	1		1U	Positions 1–1 à 42–42																	
39	Switch Fast Eth	1		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
40	Switch Gbit Eth	1		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
41	DLT4000/7000/8000	1		4U	24	27	23	26	22	25	21	24	20	23	19	22	18	21	17	20	16	19
42	Cons Conc 16–port	1		2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19

Prty	Drawer	Power–Cord	Height	Position 10		Position 11		Position 12		Position 13		Position 14		Position 15		Position 16		Position 17		Position 18	
43	Cons conc 16–port & Switch Admin	2	2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
44	Switch Admin	1	1U	Positions 1–1 à 36–36																	
45	Switch Fast Eth	1	1U	Positions 1–1 à 42–42																	
46	Rack Cont Spec 7EIA	1	7U	10	16	11	17	12	18	13	19	14	20	15	21	16	22	17	23	18	24
47	Rack Cont Spec 4EIA	1	4U	10	13	11	14	12	15	13	16	14	17	15	18	16	19	17	20	18	21
48	Rack Cont Spec 3EIA	1	3U	10	12	11	13	12	14	13	15	14	16	15	17	16	18	17	19	18	20
49	Rack Cont Spec 2EIA	1	2U	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19
50	Rack Cont Spec 1EIA	1	1U	Positions 1–1 à 42–42																	

Table 13. Rack 42U – Positions 19 to 27

Prty	Drawer	Power–Cord		Height	Position 19		Position 20		Position 21		Position 22		Position 23		Position 24		Position 25		Position 26		Position 27	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U	15	24	14	23	13	22	12	21	11	20	10	19	9	18	8	17	7	16
2	PL800R CEC+I/O	N/A	4[1]	13U	12	24	11	23	10	22	9	21	8	20	7	19	6	18	5	17	4	16
3	Secondary I/O Drawer	1	2[1]	5U	20	24	19	23	18	22	17	21	16	20	15	19	14	18	13	17	12	16
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	22	24	21	23	20	22	19	21	18	20	17	19	16	18	15	17	14	16
5	PL220R	2	3[1]	5U	20	24	19	23	18	22	17	21	16	20	15	19	14	18	13	17	12	16
6	CX600 & 9DAE2	20[2]		35U																		
7	CX600 & 8DAE2	18[2]		32U																		
8	CX600 & 7DAE2	16[2]		29U																		
9	CX600 & 6DAE2	14[2]		26U																		
10	CX600 & 5DAE2	12[2]		23U	19	41	20	42														
11	CX600 & 4DAE2	10[2]		20U	19	38	20	39	21	40	22	41	23	42								
12	CX600 & 3DAE2	8[2]		17U	19	35	20	36	21	37	22	38	23	39	24	40	25	41	26	42		
13	CX600 & 2DAE2	6[2]		14U	19	32	20	33	21	34	22	35	23	36	24	37	25	38	26	39	27	40
14	CX600 & 1DAE2	4[2]		11U	19	29	20	30	21	31	22	32	23	33	24	34	25	35	26	36	27	37
15	CX600 BASE	2[2]		8U	19	26	20	27	21	28	22	29	23	30	24	31	25	32	26	33	27	34
16	CX400 & 3DAE2	8[2]		13U	19	31	20	32	21	33	22	34	23	35	24	36	25	37	26	38	27	39
17	CX400 & 2DAE2	6[2]		10U	19	28	20	29	21	30	22	31	23	32	24	33	25	34	26	35	27	36
18	CX400 & 1DAE2	4[2]		7U	19	25	20	26	21	27	22	28	23	29	24	30	25	31	26	32	27	33
19	CX400 BASE	2[2]		4U	19	22	20	23	21	24	22	25	23	26	24	27	25	28	26	29	27	30

Prty	Drawer	Power–Cord		Height	Position 19		Position 20		Position 21		Position 22		Position 23		Position 24		Position 25		Position 26		Position 27	
20	CX200 & 1DAE2	1	N/A	7U	19	25	20	26	21	27	22	28	23	29	24	30	25	31	26	32	27	33
		1																				
21	CX200 BASE	1	N/A	4U	19	22	20	23	21	24	22	25	23	26	24	27	25	28	26	29	27	30
22	CX200 MONO–SP	1	N/A	3U	19	21	20	22	21	23	22	24	23	25	24	26	25	27	26	28	27	29
23	PL820R	N/A	2[1]	8U	33	26	32	25	31	24	30	23	29	22	28	21	27	20	26	19	25	18
24	I/O drawer (PCI)	N/A	2[1]	4U	29	26	28	25	27	24	26	23	25	22	24	21	23	20	22	19	21	18
25	PL420R	1	2	4U	33	30	32	29	31	28	30	27	29	26	28	25	27	24	26	23	25	22
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	29	26	28	25	27	24	26	23	25	22	24	21	23	20	22	19	21	18
27	NDAE2	2[2]		3U	19	21	20	22	21	23	22	24	23	25	24	26	25	27	26	28	27	29
28	SPS / 4700 2Gbps & 7DAE																					
29	SPS / 4700 2Gbps & 6DAE	8	16[2]	36U																		
30	SPS / 4700 2Gbps & 5DAE	7	14[2]	32U																		
31	SPS / 4700 2Gbps & 4DAE	6	12[2]	28U																		
32	SPS / 4700 2Gbps & 3DAE	5	10[2]	24U																		
33	SPS / 4700 2Gbps & 2DAE	4	8[2]	20U																		
34	SPS / 4700 2Gbps & 1DAE	3	6[2]	16U																		
35	SPS / 4700 2Gbps	2	4[2]	12U																		
36	DAE5000	1	2[2]	8U																		
37	Switch FC 16–p. 2Gb/s	1	2[2]	4U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
38	Switch FC 8–port 2Gbps	1 / 2		1U	Positions 1–1 à 42–42																	
39	Switch Fast Eth	1		1U	Positions 1–1 à 42–42																	
40	Switch Gbit Eth	1		2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
41	DLT4000/7000/8000	1		4U	15	18	14	17	13	16	12	15	11	14	10	13	9	12	8	11	7	10
42	Cons Conc 16–port	1		2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28

Prty	Drawer	Power–Cord	Height	Position 19		Position 20		Position 21		Position 22		Position 23		Position 24		Position 25		Position 26		Position 27	
43	Cons conc 16–port & Switch Admin	1	2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
44	Switch Admin	2	2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28
45	Switch Fast Eth	1	1U	Positions 1–1 à 36–36																	
46	Rack Cont Spec 7EIA	1	1U	Positions 1–1 à 42–42																	
47	Rack Cont Spec 4EIA	1	7U	19	25	20	26	21	27	22	28	23	29	24	30	25	31	26	32	27	33
48	Rack Cont Spec 3EIA	1	4U	19	22	20	23	21	24	22	25	23	26	24	27	25	28	26	29	27	30
49	Rack Cont Spec 2EIA	1	3U	19	21	20	22	21	23	22	24	23	25	24	26	25	27	26	28	27	29
50	Rack Cont Spec 1EIA	1	2U	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28

Table 14. Rack 42U – Positions 28 to 36

Prty	Drawer	Power–Cord		Height	Position 28		Position 29		Position 30		Position 31		Position 32		Position 33		Position 34		Position 35		Position 36	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U	6	15	5	14	4	13	3	12	2	11	1	10						
2	PL800R CEC+I/O	N/A	4[1]	13U	3	15	2	14	1	13												
3	Secondary I/O Drawer	1	2[1]	5U	11	15	10	14	9	13	8	12	7	11	6	10	5	9	4	8	3	7
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	13	15	12	14	11	13	10	12	9	11	8	10	7	9	6	8	5	7
5	PL220R	2	3[1]	5U	11	15	10	14	9	13	8	12	7	11	6	10	5	9	4	8	3	7
6	CX600 & 9DAE2	20[2]		35U																		
7	CX600 & 8DAE2	18[2]		32U																		
8	CX600 & 7DAE2	16[2]		29U																		
9	CX600 & 6DAE2	14[2]		26U																		
10	CX600 & 5DAE2	12[2]		23U																		
11	CX600 & 4DAE2	10[2]		20U																		
12	CX600 & 3DAE2	8[2]		17U																		
13	CX600 & 2DAE2	6[2]		14U	28	41	29	42														
14	CX600 & 1DAE2	4[2]		11U	28	38	29	39	30	40	31	41	32	42								
15	CX600 BASE	2[2]		8U	28	35	29	36	30	37	31	38	32	39	33	40	34	41	35	42		
16	CX400 & 3DAE2	8[2]		13U	28	40	29	41	30	42												
17	CX400 & 2DAE2	6[2]		10U	28	37	29	38	30	39	31	40	32	41	33	42						
18	CX400 & 1DAE2	4[2]		7U	28	34	29	35	30	36	31	37	32	38	33	39	34	40	35	41	36	42
19	CX400 BASE	2[2]		4U	28	31	29	32	30	33	31	34	32	35	33	36	34	37	35	38	36	39

Prty	Drawer	Power–Cord		Height	Position 28		Position 29		Position 30		Position 31		Position 32		Position 33		Position 34		Position 35		Position 36	
20	CX200 & 1DAE2	1	N/A	7U	28	34	29	35	30	36	31	37	32	38	33	39	34	40	35	41	36	42
		1																				
21	CX200 BASE	1	N/A	4U	28	31	29	32	30	33	31	34	32	35	33	36	34	37	35	38	36	39
22	CX200 MONO–SP	1	N/A	3U	28	30	29	31	30	32	31	33	32	34	33	35	34	36	35	37	36	38
20	PL820R	N/A	2[1]	8U	24	17	23	16	22	15	21	14	20	13	19	12	18	11	17	10		
21	I/O drawer (PCI)	N/A	2[1]	4U	20	17	19	16	18	15	17	14	16	13	15	12	14	11	13	10	12	9
22	PL420R	1	2	4U	24	21	23	20	22	19	21	18	20	17	19	16	18	15	17	14	16	13
23	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	20	17	19	16	18	15	17	14	16	13	15	12	14	11	13	10	12	9
22	NDAE2	2[2]		3U	28	30	29	31	30	32	31	33	32	34	33	35	34	36	35	37	36	38
23	SPS / 4700 2Gbps & 7DAE	8	16[2]	36U																		
24	SPS / 4700 2Gbps & 6DAE	7	14[2]	32U																		
25	SPS / 4700 2Gbps & 5DAE	6	12[2]	28U																		
26	SPS / 4700 2Gbps & 4DAE	5	10[2]	24U																		
27	SPS / 4700 2Gbps & 3DAE	4	8[2]	20U																		
28	SPS / 4700 2Gbps & 2DAE	3	6[2]	16U																		
29	SPS / 4700 2Gbps & 1DAE	2	4[2]	12U																		
30	SPS / 4700 2Gbps	1	2[2]	8U																		
31	DAE5000	1	2[2]	4U	28	31	29	32	30	33	31	34	32	35	33	36	34	37	35	38	36	39
32	Switch FC 16–p. 2Gb/s	2		2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37
33	Switch FC 8–port 2Gbps	1		1U	Positions 1–1 à 42–42																	
34	Switch Fast Eth	1		2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37
35	Switch Gbit Eth	1		2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37
36	DLT4000/7000/8000	1		4U	6	9	5	8	4	7	3	6	2	5	1	4	34	37	35	38	36	39
37	Cons Conc 16–port	1		2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37

Prty	Drawer	Power–Cord	Height	Position 28		Position 29		Position 30		Position 31		Position 32		Position 33		Position 34		Position 35		Position 36	
38	Cons conc 16–port & Switch Admin	2	2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37
39	Switch Admin	1	1U	Positions 1–1 à 36–36																	
40	Switch Fast Eth	1	1U	Positions 1–1 à 42–42																	
41	Rack Cont Spec 7EIA	1	7U	28	34	29	35	30	36	31	37	32	38	33	39	34	40	35	41	36	42
42	Rack Cont Spec 4EIA	1	4U	28	31	29	32	30	33	31	34	32	35	33	36	34	37	35	38	36	39
43	Rack Cont Spec 3EIA	1	3U	28	30	29	31	30	32	31	33	32	34	33	35	34	36	35	37	36	38
44	Rack Cont Spec 2EIA	1	2U	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36	37
45	Rack Cont Spec 1EIA	1	1U	Positions 1–1 à 42–42																	

Table 15. Rack 42U – Positions 37 to 42

Prty	Drawer	Power–Cord		Height	Position 37		Position 38		Position 39		Position 40		Position 41		Position 42	
		1PS	RPS[1]		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
1	PL600/400R CEC+I/O	2	4[1]	10U												
2	PL800R CEC+I/O	N/A	4[1]	13U												
3	Secondary I/O Drawer	1	2[1]	5U	2	6	1	5								
4	Disk Drawer (2104 / DU3)	1	2[1]	3U	4	6	3	5	2	4	1	3				
5	PL220R	2	3[1]	5U	2	6	1	5								
6	CX600 & 9DAE2	20[2]		35U												
7	CX600 & 8DAE2	18[2]		32U												
8	CX600 & 7DAE2	16[2]		29U												
9	CX600 & 6DAE2	14[2]		26U												
10	CX600 & 5DAE2	12[2]		23U												
11	CX600 & 4DAE2	10[2]		20U												
12	CX600 & 3DAE2	8[2]		17U												
13	CX600 & 2DAE2	6[2]		14U												
14	CX600 & 1DAE2	4[2]		11U												
15	CX600 BASE	2[2]		8U												
16	CX400 & 3DAE2	8[2]		13U												
17	CX400 & 2DAE2	6[2]		10U												
18	CX400 & 1DAE2	4[2]		7U												
19	CX400 BASE	2[2]		4U	37	40	38	41	39	42						

Prty	Drawer	Power–Cord		Height	Position 37		Position 38		Position 39		Position 40		Position 41		Position 42	
20	CX200 & 1DAE2	1	N/A	7U												
		1														
21	CX200 BASE	1	N/A	4U	37	40	38	41	39	42						
22	CX200 MONO–SP	1	N/A	3U	37	39	38	40	39	41	40	42				
23	PL820R	N/A	2[1]	8U												
24	I/O drawer (PCI)	N/A	2[1]	4U	11	8	10	7	9	6						
25	PL420R	1	2	4U	15	12	14	11	13	10						
26	BASE EXPANSION DRAWER (PCI&DISKS)	1	2	4U	11	8	10	7	9	6						
27	NDAE2	2[2]		3U	37	39	38	40	39	41	40	42				
28	SPS / 4700 2Gbps & 7DAE	8	16[2]	36U												
29	SPS / 4700 2Gbps & 6DAE	7	14[2]	32U												
30	SPS / 4700 2Gbps & 5DAE	6	12[2]	28U												
31	SPS / 4700 2Gbps & 4DAE	5	10[2]	24U												
32	SPS / 4700 2Gbps & 3DAE	4	8[2]	20U												
33	SPS / 4700 2Gbps & 2DAE	3	6[2]	16U												
34	SPS / 4700 2Gbps & 1DAE	2	4[2]	12U												
35	SPS / 4700 2Gbps	1	2[2]	8U												
36	DAE5000	1	2[2]	4U	37	40	38	41	39	42						
37	Switch FC 16–p. 2Gb/s	2		2U	37	38	38	39	39	40	40	41	41	42		
38	Switch FC 8–port 2Gbps	1		1U	Positions 1–1 à 42–42											
39	Switch Fast Eth	1		2U	37	38	38	39	39	40	40	41	41	42		
40	Switch Gbit Eth	1		2U	37	38	38	39	39	40	40	41	41	42		
41	DLT4000/7000/8000	1		4U	37	40	38	41	39	42						
42	Cons Conc 16–port	1		2U	37	38	38	39	39	40	40	41	41	42		

Prty	Drawer	Power–Cord	Height	Position 37		Position 38		Position 39		Position 40		Position 41		Position 42	
43	Cons conc 16–port & Switch Admin	2	2U	37	38	38	39	39	40	40	41	41	42		
44	Switch Admin	1	1U	Positions 1–1 à 36–36											
45	Switch Fast Eth	1	1U	Positions 1–1 à 42–42											
46	Rack Cont Spec 7EIA	1	7U												
47	Rack Cont Spec 4EIA	1	4U		40	38	41	39	42						
48	Rack Cont Spec 3EIA	1	3U		39	38	40	39	41	40	42				
49	Rack Cont Spec 2EIA	1	2U		38	38	39	39	40	40	41	41	42		
50	Rack Cont Spec 1EIA	1	1U	Positions 1–1 à 42–42											

1 : RPS : Redondant Power Supply ,
2 : For DAS : RPS = Dual –SP

Chapter 5. Escala PL3200R and PL1600R

Describes requirements for the Escala PL3200R and PL1600R machines.

PL3200R Components

The Escala PL3200R system consists of multiple components, as summarized in the following table.

Description	Minimum per System	Maximum per System
Base Frame (Redundant power supplies as feature codes)	1	1
Optional Expansion Frame	0	1
Base Frame Universal Front Door	1	1
Expanson Frame Universal Front Door[2]	0	1
Base/Expansion Frame Slimline Rear Door[2]	1[1]	2[1]
Base/Expansion Frame Acoustical Rear Door[2]	1[1]	2[1]
Optional Integrated Battery Feature (IBF)	0	6
Managed Server (up to 32 processors, 8 GB to 256 GB memory)	1	1
Hardware Management Console (HMC)	0	2
Media Subsystem (Operation panel, 3.5–inch floppy drive, optional media devices)	1	1
IO Subsystem (20 PCI cards maximum, 16 DASD maximum)	1	6

Notes:

1. Either slimline doors or acoustical doors must be selected by the customer during the order process. Thin doors will not meet acoustic limits for Category 1A.

2. Door options determine which doors are included with your Escala PL3200R. See “Doors and Covers” below.

PL1600R Components

The Escala PL1600R system consists of multiple components, as summarized in the following table.

Description	Minimum per System	Maximum per System
Base Frame (Redundant power supplies as feature codes)	1	1
Base Frame Universal Front Door	1	1
Base Frame Slimline Rear Door[2]	1[1]	1[1]
Base Frame Acoustical Rear Door[2]	1[1]	1[1]
Optional Integrated Battery Feature (IBF)	0	2
Managed Server (up to 16 processors, 4 GB to 128 GB memory)	1	1
Hardware Management Console (HMC)	0	2
Media Subsystem (Operation panel, 3.5–inch floppy drive, optional media devices)	1	1
IO Subsystem (20 PCI cards maximum, 16 DASD maximum)	1	3
Notes: 1. Either slimline doors or acoustical doors must be selected by the customer during the order process. Thin doors will not meet acoustic limits for Category 1A. 2. Door options determine which doors are included with your Escala PL1600R. See “Doors and Covers” below.		

Doors and Covers

Covers are an integral part of the Escala PL3200R and PL1600R and are *required* for product safety and EMC compliance. The following rear door options are available for the Escala PL3200R and PL1600R:

- “Enhanced Acoustical” Cover Option

  This feature provides a low–noise option for customers or sites with stringent acoustical requirements and where a minimal system footprint is not critical . The Acoustical cover option consists of a special rear door which is approximately 200–mm (8”) in depth and contains acoustical treatment that lowers the noise level of the machine by approximately 6 dB compared to the non–acoustical rear door. With this option, the PL3200R and the PL1600R meet the acoustical *Specifications for Category 1A for Data Processing Areas*, with a declared A–weighted sound power level, L_{WAd} of 7.5 bels (B) for the most common system configuration.

- “Slimline” Cover Option

  This feature provides a smaller–footprint and lower–cost option for customers or sites where space is more critical than acoustical noise levels. The Slimline cover option consists of rear door which is about 50–mm (2”) in depth with no acoustical treatment. With this option, for the most common system configuration, the PL3200R has a declared A–weighted sound power level, L_{WAd}, of 8.1 bels (B) and the PL1600R has a declared A–weighted sound power level, L_{WAd}, of 7.9 bels (B).

Note: For declared levels of acoustical noise emissions, refer to “Acoustical Noise Emissions” on page 5-13.

System Movement to the Installation Site

The customer should determine the path that the system must take to be moved from the delivery location to the installation site. The customer should verify that the height of all doorways, elevators, and so on are sufficient to allow movement of the system to the installation site. The customer should also determine that the weight limitation of elevators, ramps, and so on are sufficient to allow movement of the system to the installation site. If it is determined that the height or weight of the system can cause a problem in movement to the installation site, contact your local site planning, marketing, or sales representative.

Power and Electrical Requirements

Redundant power and line cords are standard on PL3200R and PL1600R. The system uses dual A/C power cords. For maximum availability, each of the line cords should be fed from independent power grids.

The following table illustrates electrical and thermal characteristics.

Electrical/Thermal Characteristic			
Rated Voltage (V ac, 3 phase)	200 to 240	380 to 415	480
Rated Current (A, per phase)	45	25	20
Frequency (Hertz)	50 to 60	50 to 60	50 to 60
Power (Maximum in kVA) PL3200R PL1600R	 15.7 6.7	 15.7 6.7	 15.7 6.7
Typical, full load power factor (pf)	0.99	0.97	0.93
Inrush current (Amps)	162 max (see note 1 below)		
Thermal output (Maximum kBtu/hr) PL3200R PL1600R	 53.3 22.8	 53.3 22.8	 53.3 22.8

Notes:

1. Inrush currents occur only at initial applicatoin of power (very short duration for charging capacitors). No inrush currents occur during the normal power off–on cycle.

2. System will function normally with a nominal input voltage in the range of 200–480 V, AC, three phase.

The following table illustrates the line cord options for the PL3200R and PL1600R with their geographic, breaker rating, and cord information.

3–Phase Supply Voltage (50/60 Hz)	200–240 V	380–415 V	480 V
Geography	United States, Canada, Japan	Europe, Middle East, Africa, Asia Pacific	United States, Canada
Customer Circuit Breaker Rating (see Note 1 below)	60 A	30 A	30 A
Cord Information	6 and 14 foot, 6 AWG line cord	14 foot, 6 or 8 AWG line cord, (electrician installed)	6 and 14 foot, 10 AWG line cord
Recommended Receptacle	IEC309, 60 A, type 460R9W (not provided)	Not specified, electrician installed	IEC309, 30 A, type 430R7W (not provided)

Notes:

1. The exact circuit breaker ratings may not be available in all countries. Where the specified circuit breaker ratings are not acceptable, use the nearest available rating.

2. In two–frame systems, frame B receives its power from frame A. The power to frame B is 350 V DC fed from the BPD through UPIC cables.

PL3200R Phase Imbalance and BPR Configuration

Depending on the number of Bulk Power Regulators (BPRs) in your system, phase imbalance can occur in line currents. All systems are provided with 2 bulk power assemblies (BPAs), with seperate line cords. The following table illustrates phase imbalance as a function of BPR configuration.

Number of BPRs per BPA	Phase A Line Current	Phase B Line Current	Phase C Line Current
1	Power / Vline	Power / Vline	0
2	0.5 Power / Vline	0.866 Power / Vline	0.5 Power / Vline
3	0.577 Power / Vline	0.577 Power / Vline	0.577 Power / Vline

Note: Power is calculated from “Total System Power Consumption” on page 5-20. Vline is line–to–line nominal input voltage.

PL1600R Phase Imbalance and BPR Configuration

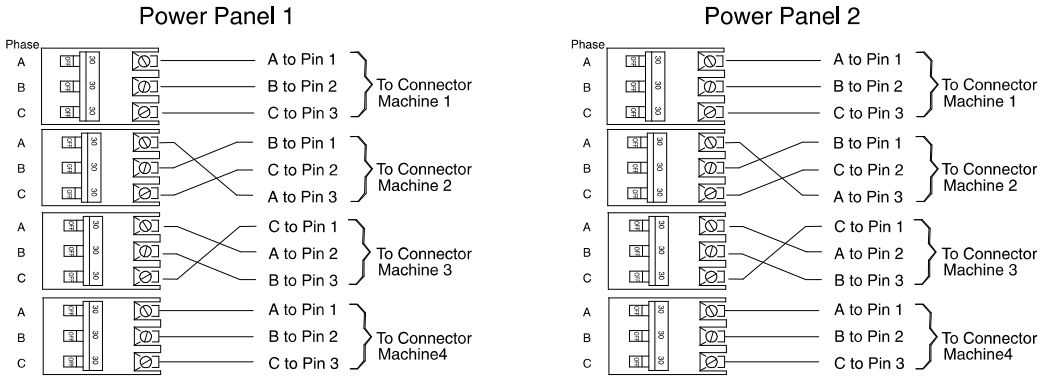
All systems are provided with 2 bulk power assemblies (BPAs), with seperate line cords. Each BPA will use only 2 phases of a 3-phase power system, causing phase imbalance. Phase currents will be divided between 2 line cord in normal operation.

The PL1600R has one Bulk Power Regulator (BPR) per BPA, with its Phase A and Phase B Line Currents determined by Power/Vline, and a Phase C Line Current of 0.

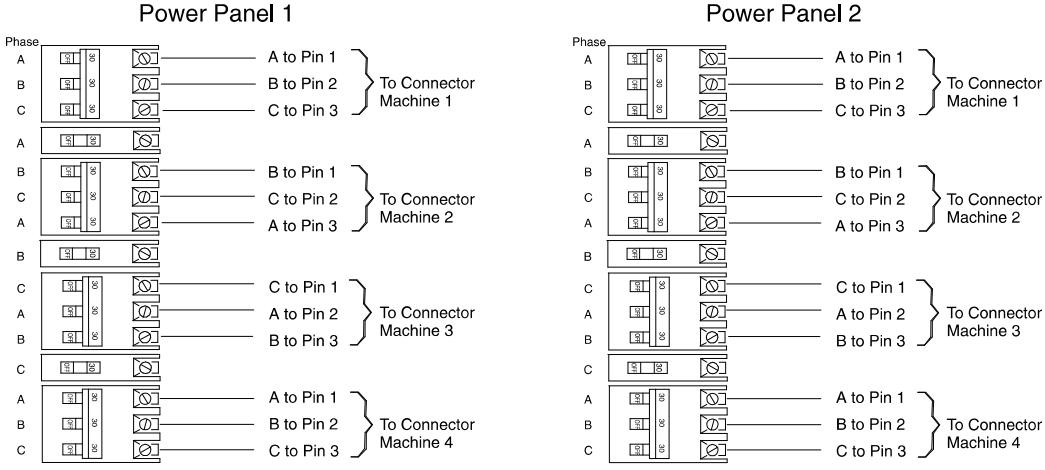
Note: Power is calculated from “Total System Power Consumption” on page 5-20. Vline is line–to–line nominal input voltage.

Balancing Power Panel Loads

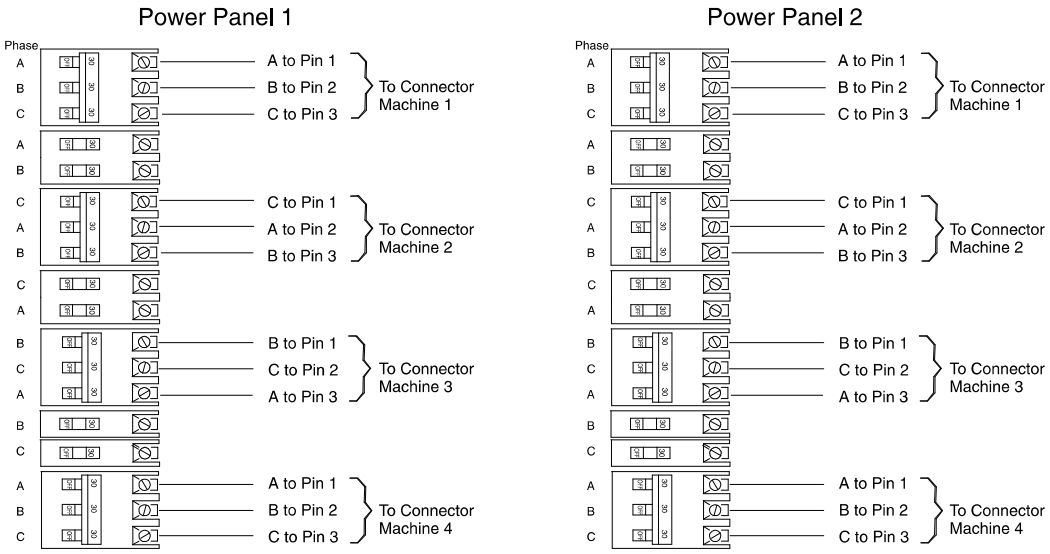
The Escala PL3200R and PL1600R require three phase power. Depending on the system configuration, the phase currents can be fully balanced or unbalanced. System configurations with three BPRs per BPA have balanced power panel loads, while configurations with only one or two have unbalanced loads. With two BPRs per BPA, two of the three phases will draw an equal amount of current, and will be, nominally, 57.8% of the current on the third phase. With one BPR per BPA, two of three phases will carry an equal amount of current, with no current drawn on the third phase. The following figure is an example of feeding several loads of this type from two power panels in a way that balances the load among the three phases.



The method illustrated in the above figure requires that the connection from the three poles of each breaker to the three phase pins of a connector be varied. Some electricians may prefer to maintain a consistent wiring sequence from the breakers to the connectors. The following figure shows a way to balance the load without changing the wiring on the output of any breakers. The three–pole breakers are alternated with single–pole breakers. This way the three–pole breakers do not all begin on Phase A.

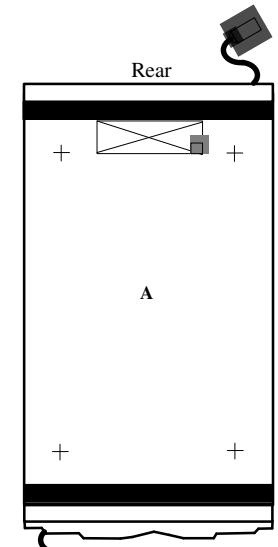


The following figure shows another way of distributing the unbalanced load evenly. In this case, the three–pole breakers are alternated with two–pole breakers.

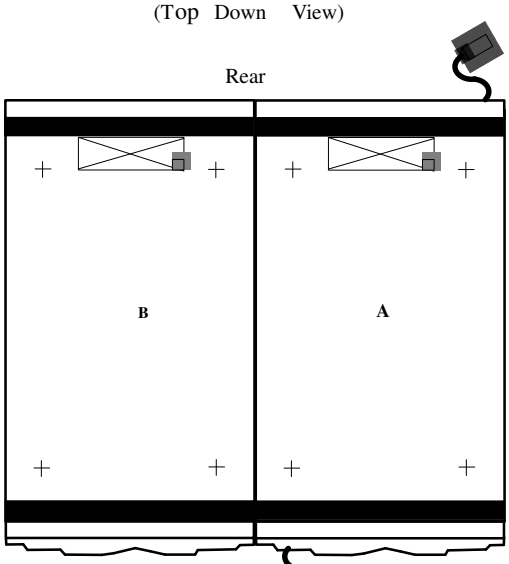


Power Cord Configuration

The power cords exit the system from different points of the frame as indicated in the following illustration.



All Single–Frame Systems
(Top Down View)



All Double–Frame Systems
(Top Down View)

Checking the Facility Outlets and Power Source

CAUTION:
Do not touch the receptacle or the receptacle faceplate with anything other than your test probes before you have met the requirements in* "Checking the Facility Outlets and Power Source" *below.

Performing the following will ensure that appropriate power will be used by the system. The following checklist is for reference purposes, and will likely be performed by a service engineer prior to installation.

1. The Escala PL3200R and PL1600R are equipped to use 200–240V / 380–415V / 480V AC, three–phase. Check that the correct power source is available.

2. Before system installation, locate and turn off the branch circuit CB (circuit breaker). Attach tag S229–0237, which reads ”Do Not Operate.”

Note: All measurements are made with the receptacle faceplate in the normally installed position.

3. Some receptacles are enclosed in metal housings. On receptacles of this type, perform the following steps:

   a. Check for less than 1 volt from the receptacle case to any grounded metal structure in the building, such as a raised–floor metal structure, water pipe, building steel, or similar structure.

   b. Check for less than 1 volt from receptacle ground pin to a grounded point in the building.

Note: If the receptacle case or faceplate is painted, be sure the probe tip penetrates the paint and makes good electrical contact with the metal.

4. Check the resistance from the ground pin of the receptacle to the receptacle case. Check resistance from the ground pin to building ground. The reading should be less than 1.0 ohm, which indicates the presence of a continuous grounding conductor.

5. If any of the checks made in substeps 2 and 3 are not correct, remove the power from the branch circuit and make the wiring corrections; then check the receptacle again.

Note: Do not use the digital multimeter to measure grounding resistance.

6. Check for infinite resistance between the phase pins. This is a check for a wiring short.

CAUTION:
If the reading is other than infinity, do not proceed! You must make the necessary wiring corrections to satisfy the above criteria before continuing. Do not turn on the branch circuit CB until all the above steps are satisfactorily completed.

7. Remove tag S229–0237, which reads ”Do Not Operate.”

8. Turn on the branch circuit CB. Measure for appropriate voltages between phases. If no voltage is present on the receptacle case or grounded pin, the receptacle is safe to touch.

9. With an appropriate meter, verify that the voltage at the outlet is correct.

10. Verify that the grounding impedance is correct by using the ECOS 1020, 1023, B7106, or an appropriately approved ground impedance tester.

11. Turn off the branch circuit CB

12. Attach tag S229–0237, which reads ”Do Not Operate.”

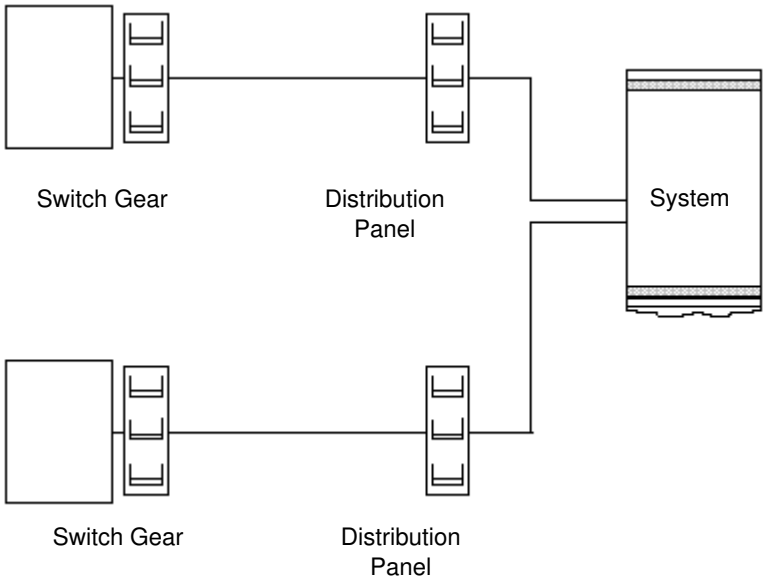
13. You are now ready to install and connect the power cables to the Escala PL3200R or PL1600R. Please refer to Chapter 1 of the “*Escala PL3200R Installation Guide*”, order number 86 A1 80EF, or “*Escala PL1600R Installation Guide*”, order number 86 A1 92EF, for this procedure.

Dual Power Installation

The PL3200R and PL1600R are designed with a fully redundant power system. Each system has two line cords attached to two power input ports which, in turn, power a fully redundant power distribution system within the system. To take full advantage of the redundancy/reliability that is built into the computer system, the system must be powered from two distribution panels. The possible power installation configurations are described as follows.

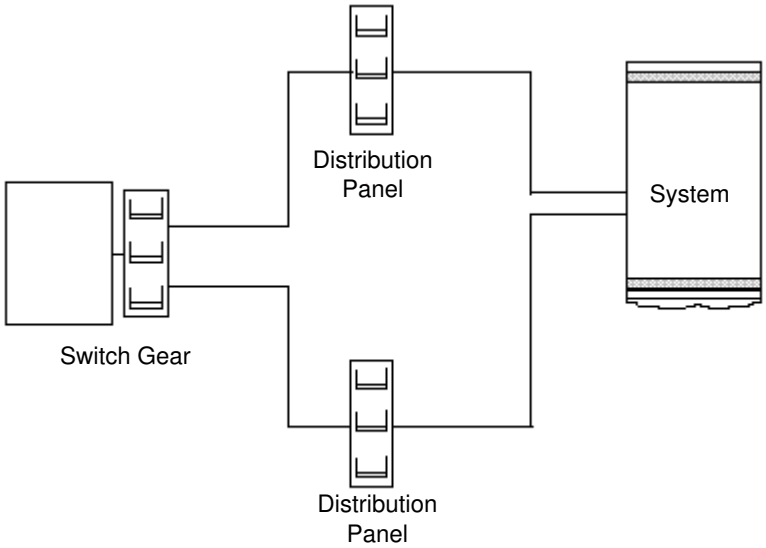
Dual Power Installation – Redundant Distribution Panel and Switch

This configuration requires that the system receives power from two separate power distribution panels. Each distribution panel receives power from a separate piece of building switch gear. This level of redundancy is not available in most facilities.



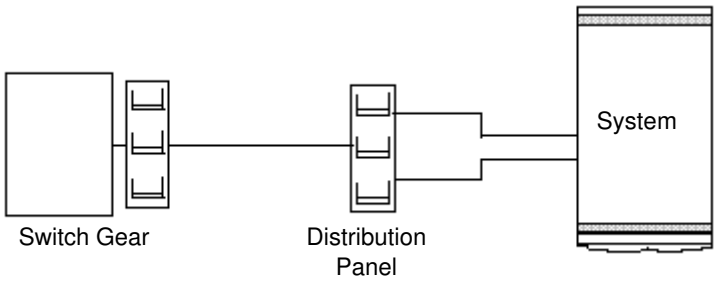
Dual Power Installation – Redundant Distribution Panel

This configuration requires that the system receives power from two separate power distribution panels. The two distribution panels receive power from the same piece of building switch gear. Most facilities should be able to achieve this level of redundancy.



Single Distribution Panel – Dual Circuit Breakers

This configuration requires that the system receives power from two separate circuit breakers in a single power panel. This configuration does not make full use of the redundancy provided by the processor. It is, however, acceptable if a second power distribution panel is not available.



Addtional Installation Considerations

In the United States, installation must be made in accordance with Article 645 of the National Electric Code (NEC). In Canada, installation must be in accordance with Article 12–020 of the Canadian Electrical Code (CEC).

Physical Specifications and Loads

The following tables illustrate the physical, electrical and thermal, acoustical, and environmental characteristics of various system configurations.

PL3200R Dimensions and Weight

Physical Characteristic	**Slimline Doors**		**Acoustical Doors**	
	1 Frame	2 Frames	1 Frame	2 Frames
Height	2025 mm (79.72 in.)	2025 mm (79.72 in.)	2025 mm (79.72 in.)	2025 mm (79.72 in.)
Width	785 mm (30.91 in.)	1575 mm (62.00 in.)	785 mm (30.91 in.)	1575 mm (62.00 in.)
Depth	1342 mm (52.83 in.)	1342 mm (52.83 in.)	1494 mm (58.83 in.)	1494 mm (58.83 in.)
Weight (maximum configuration)	1170 kg (2580 lbs.)	1973 kg (4349 lbs.)	1184 kg (2610 lbs.)	2000 kg (4409 lbs.)

Notes:

1. Doors are not installed during product shipment to the customer. A maximum configured system with batteries may exceed 1134 kg (2500 lbs.).

2. When moving or relocating certain configurations of the system, the Bulk Power Regulators (BPR's) must be removed from the top of the rack (front and rear) to ensure product stability. Specifically, removal of BPR's from frame A and B in the front and rear is required in systems that have a single I/O drawer, and more than 2 BPR's installed per BPA in the primary rack.

PL1600R Dimensions and Weight

Physical Characteristic	Slimline Doors	Acoustical Doors
Height	2025 mm (79.72 in.)	2025 mm (79.72 in.)
Width	785 mm (30.91 in.)	785 mm (30.91 in.)
Depth	1342 mm (52.83 in.)	1494 mm (58.83 in.)
Weight (maximum configuration)	1085 kg (2392 lbs.)	1099 kg (2422 lbs.)

Note: When moving or relocating certain configurations of the system, the Bulk Power Regulators (BPR's) must be removed from the top of the rack (front and rear) to ensure product stability. Specifically, removal of BPR's from frame A and B in the front and rear is required in systems that have a single I/O drawer.

PL3200R System Weights by Configuration

Total System Weight (Pounds)								
Number of I/O Subsystem	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Slimline Doors With IBF	2250	2415	2580	3633	3854	4019	4184	4349
Slimline Doors Without IBF	1865	2030	2195	2418	3266	3431	3596	3761
Acoustical Doors With IBF	2280	2445	2610	3693	3914	4079	4244	4409
Acoustical Doors Without IBF	1923	2088	2253	2506	3326	3491	3656	3821
No Doors With IBF	2192	2357	2522	3517	3738	3903	4068	4233
No Doors Without IBF	1807	1972	2137	2302	3150	3315	3480	3645

Note: Italicized numbers indicate single–frame systems.

Total System Weight (Kilograms)								
Number of I/O Subsystem	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Slimline Doors With IBF	1021	1095	1170	1648	1748	1823	1898	1973
Slimline Doors Without IBF	846	921	996	1097	1481	1556	1631	1706
Acoustical Doors With IBF	1034	1109	1184	1675	1775	1850	1925	2000
Acoustical Doors Without IBF	872	947	1022	1137	1509	1583	1658	1733
No Doors With IBF	994	1069	1144	1595	1696	1770	1845	1920
No Doors Without IBF	820	894	969	1044	1429	1504	1579	1653

Note: Italicized numbers indicate single–frame systems.

PL1600R System Weights by Configuration

Total System Weight (Pounds)			
Number of I/O Subsystem	**1**	**2**	**3**
Slimline Doors With IBF	2062	2227	2392
Slimline Doors Without IBF	1865	2030	2195
Acoustical Doors With IBF	2092	2257	2422
Acoustical Doors Without IBF	1923	2088	2253
No Doors With IBF	2004	2169	2334
No Doors Without IBF	1807	1972	2137

Total System Weight (Kilograms)			
Number of I/O Subsystem	**1**	**2**	**3**
Slimline Doors With IBF	935	1010	1085
Slimline Doors Without IBF	846	921	996
Acoustical Doors With IBF	949	1024	1099
Acoustical Doors Without IBF	872	947	1022
No Doors With IBF	909	984	1059
No Doors Without IBF	820	894	969

PL3200R and PL1600R Acoustical Noise Emissions

	Acoustical Characteristic			
Product Configuration	**Declared A–Weighted Sound Power Level,L_{WAd} (B)**		**Declared A–Weighted Sound Pressure Level, LpAm (dB)**	
	Operating	Idle	Operating	Idle
A–Frame (Acoustical Doors)	7.5	7.5	57	57
A–Frame (Slimline Doors)	7.9	7.9	62	62

Notes:

1. Noise levels cited are for the typical configuration of each frame (A–Frame: Bulk Power, CEC cage, battery option, media drawer, and two I/O drawers).

2. The 0.6–B (6–dB) reduction in noise emission levels with the acoustical rear door corresponds to a factor of 4 reduction. That is, the noise level of a single A–Frame with thin covers is about the same as the noise level of four A–Frames with acoustical covers.

3. L_{WAd} is the upper–limit A–weighted sound power level; LpAm is the mean A–weighted sound pressure level at the 1–meter bystander positions; 1 B = 10 dB.

4. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.

PL3200R and PL1600R Environmental Specifications

Environmental Specification	Operating	Non–Operating	Storage	Shipping
Temperature	10 to 32°C (50 to 90°F) Max. of 24°C (75.2° F) with 4mm tape or DVD RAM in rear positions of the Media Subsystem	10 to 43°C (50 to 109°F)	1 to 60°C (34 to 140°F)	–40 to 60°C (–40 to 140°F)
Relative Humidity (Noncondensing)	8 to 80 %	8 to 80 %	5 to 80 %	5 to 100 %
Maximum Wet Bulb	23°C (73°F)	27°C (73°F)	29°C (84°F)	29°C (84°F)

Notes:

1. Storage and shipping specifications are valid for a maximum duration of two weeks each.

2. The upper limit of the dry bulb temperature must be derated 1 degree C per 189 m (619 ft.) above 1295 m (4250 ft.). Maximum altitude for 1.1 GHz modules is 3048 m (10,000 ft.) and for 1.3 GHz modules is 2134 m (7000 ft)

PL3200R Weight Distribution

The following table shows dimensions and wrights used to calculate floor loading for the system. All floor–loading calculations are intended for a raised–floor environment.

	1 Frame with Slimline Covers	2 Frames with Slimline Covers	1 Frame with Acoustical Covers	2 Frames with Acoustical Covers
Weight	1170 kg (2580 lbs.)	1973 kg (4349 lbs.)	1184 kg (2610 lbs.)	2000 kg (4409 lbs.)
Width	750 mm (29.5 in.)	1539 mm (60.6 in.)	750 mm (29.5 in.)	1539 mm (60.6 in.)
Depth	1173 mm (46.2 in.)	1173 mm (46.2 in.)	1173 mm (46.2 in.)	1173 mm (46.2 in.)

Notes:

1. For 2 frame systems, widths of Frame A and Frame B were added (the depth remains 1069 mm (42.1 in.), not including frame extenders).

2. For 2 frame systems, weights are based on maximum configuration (less than addition of maximum weights for each frame).

3. The values in the table may be used with the Floor Loading Calculation Program available on the IP Website.

4. All floor–loading calculations are intended for a raised–floor environment.

The following table shows floor–loading specifications for systems with slimline covers. The values contained in the Condition column are described following the table.

Condition	**a (sides) (mm, in.)**	**b (front) (mm, in.)**	**c (back) (mm, in.)**	**1 Framekg/m^2 (lb./$ft.^2$)**	**2 Frameskg/ m^2 (lb./$ft.^2$)**
1	25 (1.0)	135 (5.3)	135 (5.3)	1080.1(221.2)	924.4 (189.3)
2	25 (1.0)	554 (21.8)	655 (25.8)	702.2 (143.8)	607.9 (124.5)
3	25 (1.0)	762 (30.0)	762 (30.0)	634.5 (129.9)	551.2(112.9)
4	254 (10.0)	554 (21.8)	655 (25.8)	491.2 (100.6)	499.4(102.3)
5	254 (10.0)	762 (30.0)	762 (30.0)	448.1 (91.8)	455.3(93.3)
6	508 (20.0)	554 (21.8)	655 (25.8)	385.0(78.9)	424.4(86.9)
7	508 (20.0)	762 (30.0)	762 (30.0)	354.3 (72.6)	389.1(79.7)
8	554 (21.8)	554 (21.8)	655 (25.8)	372.1 (76.2)	413.9 (84.8)
9	559 (22)	762 (30.0)	762 (30.0)	341.7 (70.0)	378.9(77.6)
10	762 (30.0)	521 (20.5)	521 (20.5)	341.7 (70.0)	393.3 (80.6)
11	762 (30.0)	762 (30.0)	762 (30.0)	302.4 (61.9)	344.8 (70.6)

Definition of Conditions:

- Condition 1 indicates maximum floor loading when systems are stored cover–to–cover on all four sides with covers installed.
- Conditions 2 and 3 indicate floor loading when the system has no side clearance (beyond side covers) on both sides while front/back distances varied.
- Conditions 4 through 8 indicate floor loading at various points below the maximum weight–distribution distance of 762 mm (30.0 in.) from each edge of the frame.
- Conditions 9 through 10 indicate floor–loading options when the installation is limited to 342.0 kg/m^2 (70.0 $lb/ft^{2)}$.
- Condition 11 is the minimum floor loading required, based on the maximum weight–distribution area (30.0 in. from each side of the base frame).

Notes:

1. Service clearance is independent from weight distribution distance and must be at least 45 in. for the front of the frame and 36 in. for the rear of the frame (measured from the base frame).
2. Weight–distribution areas should not be overlapped.
3. Floor–loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.

The following table shows floor–loading specifications for systems with acoustical covers. The values contained in the Condition column are described following the table.

Condition	a (sides) (mm, in.)	b (front) (mm, in.)	c (back) (mm, in.)	1 Framekg/m^2 (lb./$ft.^2$)	2 Frameskg/ m^2 (lb./$ft.^2$)
1	25 (1.0)	135 (5.3)	135 (5.3)	1091.9 (223.6)	936.2 (197.7)
2	25 (1.0)	554(21.8)	757 (29.8)	685.3 (140.4)	594.9 (121.8)
3	25 (1.0)	762 (30.0)	762 (30.0)	640.8 (131.2)	557.5(114.2)
4	254 (10.0)	554(21.8)	757 (29.8)	480.5 (98.4)	489.3 (100.2)
5	254 (10.0)	762 (30.0)	762 (30.0)	452.2 (92.6)	460.3 (94.3)
6	508 (20.0)	554(21.8)	757 (29.8)	377.4 (77.3)	416.3 (85.3)
7	508 (20.0)	762 (30.0)	762 (30.0)	357.2 (73.2)	393.0 (80.5)
8	569 (22.4)	762 (30.0)	762 (30.0)	342.0 (70.0)	380.7 (78.0)
9	762 (30.0)	554(21.8)	757 (29.8)	320.3 (65.6)	367.5 (75.3)
10	762 (30.0)	533 (21.0)	533 (21.0)	342.0 (70.0)	394.2 (80.7)
11	762 (30.0)	762 (30.0)	762 (30.0)	304.6 (62.4)	348.1 (71.3)

Definition of Conditions:

- Condition 1 indicates maximum floor loading when systems are stored cover–to–cover on all four sides with covers installed.
- Conditions 2 and 3 indicate floor loading when the system has no side clearance (beyond side covers) on both sides while front/back distances varied.
- Conditions 4 through 8 indicate floor loading at various points below the maximum weight–distribution distance of 762 mm (30.0 in.) from each edge of the frame.
- Conditions 9 through 10 indicate floor–loading options when the installation is limited to 342.0 kg/m^2 (70.0 $lb/ft^{2)}$.
- Condition 11 is the minimum floor loading required, based on the maximum weight–distribution area (30.0 in. from each side of the base frame).

Notes:

1. Service clearance is independent from weight–distribution distance and must be at least 45 in. at the front of the frame and 36 in. at the rear of the frame (measured from the base frame).
2. Weight–distribution areas should not be overlapped.
3. Floor–loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.

Floor loading for the system is illustrated in the Proposed Floor Layout for Multiple Systems in “Considerations for Multiple System Installations” on page 5-36.

PL1600R Weight Distribution

The following table shows dimensions and wrights used to calculate floor loading for the system. All floor–loading calculations are intended for a raised–floor environment.

	1 Frame with Slimline Covers	1 Frame with Acoustical Covers
Weight	1085 kg (2392lbs.)	1099 kg (2422lbs.)
Width	750 mm (29.5 in.)	750 mm (29.5 in.)
Depth	1173 mm (46.2 in.)	1173 mm (46.2 in.)

Notes:

1. The values in the table may be used with the Floor Loading Calculation Program available on the IP Website.

2. All floor–loading calculations are intended for a raised–floor environment.

The following table shows floor–loading specifications for systems with slimline covers. The values contained in the Condition column are described following the table.

Condition	a (sides) (mm, in.)	b (front) (mm, in.)	c (back) (mm, in.)	1 Framekg/m^2 (lb./$ft.^2$)
1	25 (1.0)	135 (5.3)	135 (5.3)	1006.2 (206.1)
2	25 (1.0)	554 (21.8)	655 (25.8)	657.5 (134.7)
3	25 (1.0)	762 (30.0)	762 (30.0)	595.0 (121.9)
4	254 (10.0)	554 (21.8)	655 (25.8)	462.8 (94.8)
5	254 (10.0)	762 (30.0)	762 (30.0)	423.0 (86.6)
6	508 (20.0)	554 (21.8)	655 (25.8)	364.7 (74.7)
7	508 (20.0)	762 (30.0)	762 (30.0)	336.4 (68.9)
8	554 (21.8)	762 (30.0)	655 (25.8)	352.8 (72.3)
9	486 (19.1)	554 (21.8)	762 (30.0)	342.0 (70.0)
10	762 (30.0)	434 (17.1)	434 (17.1)	342.0 (70.0)
11	762 (30.0)	762 (30.0)	762 (30.0)	288.5 (59.1)

Definition of Conditions:

- Condition 1 indicates maximum floor loading when systems are stored cover–to–cover on all four sides with covers installed.
- Conditions 2 and 3 indicate floor loading when the system has no side clearance (beyond side covers) on both sides while front/back distances varied.
- Conditions 4 through 8 indicate floor loading at various points below the maximum weight–distribution distance of 762 mm (30.0 in.) from each edge of the frame.
- Conditions 9 through 10 indicate floor–loading options when the installation is limited to 342.0 kg/m^2 (70.0 lb/ft^2).
- Condition 11 is the minimum floor loading required, based on the maximum weight–distribution area (30.0 in. from each side of the base frame).

Notes:

1. Service clearance is independent from weight distribution distance and must be at least 45 in. for the front of the frame and 36 in. for the rear of the frame (measured from the base frame).

2. Weight–distribution areas should not be overlapped.

3. Floor–loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.

The following table shows floor–loading specifications for systems with acoustical covers. The values contained in the Condition column are described following the table.

Condition	a (sides) (mm, in.)	b (front) (mm, in.)	c (back) (mm, in.)	1 Framekg/m^2 (lb./$ft.^2$)
1	25 (1.0)	135 (5.3)	135 (5.3)	1019.7 (208.9)
2	25 (1.0)	554(21.8)	757 (29.8)	643.0 (131.7)
3	25 (1.0)	762 (30.0)	762 (30.0)	601.8 (123.3)
4	254 (10.0)	554(21.8)	757 (29.8)	453.6 (92.9)
5	254 (10.0)	762 (30.0)	762 (30.0)	427.3 (87.5)
6	508 (20.0)	554(21.8)	757 (29.8)	358.2 (73.4)
7	508 (20.0)	762 (30.0)	762 (30.0)	339.5 (69.5)
8	498 (19.6)	762 (30.0)	762 (30.0)	342.0 (70.0)
9	762 (30.0)	554(21.8)	757 (29.8)	305.4 (62.6)
10	762 (30.0)	450 (17.7)	450 (17.7)	341.9 (70.0)
11	762 (30.0)	762 (30.0)	762 (30.0)	290.9 (59.6)

Definition of Conditions:

- Condition 1 indicates maximum floor loading when systems are stored cover–to–cover on all four sides with covers installed.
- Conditions 2 and 3 indicate floor loading when the system has no side clearance (beyond side covers) on both sides while front/back distances varied.
- Conditions 4 through 8 indicate floor loading at various points below the maximum weight–distribution distance of 762 mm (30.0 in.) from each edge of the frame.
- Conditions 9 through 10 indicate floor–loading options when the installation is limited to 342.0 kg/m^2 (70.0 lb/$ft^{2)}$.
- Condition 11 is the minimum floor loading required, based on the maximum weight–distribution area (30.0 in. from each side of the base frame).

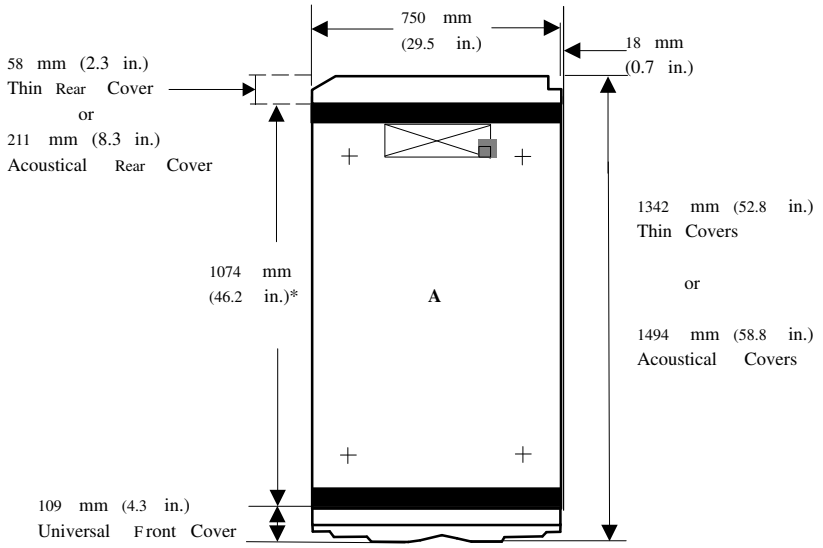
Notes:

1. Service clearance is independent from weight–distribution distance and must be at least 45 in. at the front of the frame and 36 in. at the rear of the frame (measured from the base frame).
2. Weight–distribution areas should not be overlapped.
3. Floor–loading weight distribution distances should not exceed 762 mm (30 in.) in any direction when measured from the base frame.

Floor loading for the system is illustrated in the Proposed Floor Layout for Multiple Systems in “Considerations for Multiple System Installations” on page 5-36.

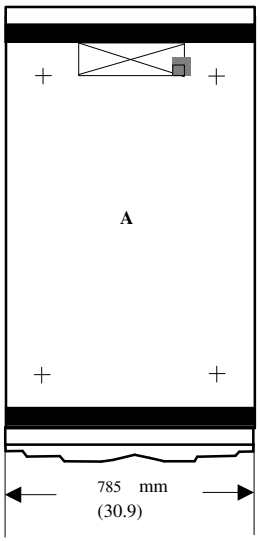
Plan Views

The following illustration shows dimensional planning information for single–frame systems and double–frame systems.

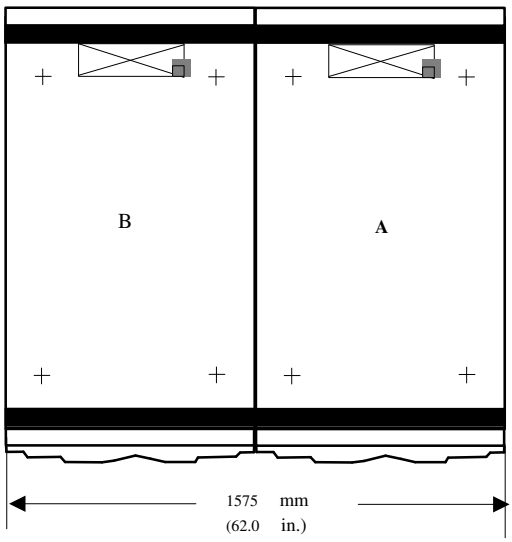


* Includes frame extender dimensions

FRAME ENTRY/EXIT	DIMENSION (mm)	(in.)
FRONT	117 by 403	4.6 by 15.9
REAR	117 by 403	4.6 by 15.9



Single–Frame Systems



Double–Frame Systems

Total System Power Consumption

The following tables contain minimum and maximum power consumption for the 1.1 and 1.3 GHz PL3200R and for the 1.1 GHz PL1600R. Minimum power consumption is based on a configuration consisting of a single 4 GB memory card, 1 PCI card per I/O subsystem, and 1 DASD device per I/O subsystem.

Maximum power consumption is based on a configuration consisting of a two 32 GB memory cards per MCM module, maximum PCI cards (20 per I/O drawer), and maximum DASD (16 per I/O drawer).

Power consumption calculations are estimates. Actual values may vary.

Calculate heat load (Btu per hour) by multiplying the power (in watts) for the configuration by a factor of 3.4.

PL3200R Power Consumption

Number of I/O Drawers	1.1 GHz 8–way Modules (minimum power consumption, in watts)				1.1 GHz 8–way Modules (maximum power consumption, in watts)			
	8–way	16–way	24–way	32–way	8–way	16–way	24–way	32–way
1	1911	2867	3823	4779	3042	4586	6130	7674
2	2279	3235	4191	5147	4090	5634	7178	8722
3	N/A	3603	4559	5515	N/A	6682	8226	9770
4	N/A	3971	4927	5883	N/A	7730	9274	10818
5	N/A	N/A	5295	6251	N/A	N/A	10322	11866
6	N/A	N/A	5663	6619	N/A	N/A	11370	12914
7	N/A	N/A	N/A	6987	N/A	N/A	N/A	13962
8	N/A	N/A	N/A	7355	N/A	N/A	N/A	15010

Number of I/O Drawers	1.3 GHz 4–way Modules (minimum power consumption, in watts)		1.3 GHz 4–way Modules (maximum power consumption, in watts)	
	8–way	16–way	8–way	16–way
1	3213	5471	4932	8366
2	3581	5839	5980	9414
3	3949	6207	7028	10462
4	4317	6575	8076	11510
5	N/A	6943	N/A	12558
6	N/A	7311	N/A	13606
7	N/A	7679	N/A	14654
8	N/A	8047	N/A	15702

Number of I/O Drawers	1.3 GHz 8–way Modules (minimum power consumption, in watts)				1.3 GHz 8–way Modules (maximum power consumption, in watts)			
	8–way	16–way	24–way	32–way	8–way	16–way	24–way	32–way
1	2084	3213	4342	5471	3215	4932	6649	8366
2	2452	3581	4710	5839	4263	5980	7697	9414
3	N/A	3949	5078	6207	N/A	7028	8745	10462
4	N/A	4317	5446	6575	N/A	8076	9793	11510
5	N/A	N/A	5814	6943	N/A	N/A	10841	12558
6	N/A	N/A	6182	7311	N/A	N/A	11889	13606
7	N/A	N/A	N/A	7679	N/A	N/A	N/A	14654
8	N/A	N/A	N/A	8047	N/A	N/A	N/A	15702

Number of I/O Drawers	1.5 GHz 4–way Modules (minimum power consumption, in watts)				1.5 GHz 4–way Modules (maximum power consumption, in watts)			
	4–way	8–way	12–way	16–way	4–way	8–way	12–way	16–way
1	1714	2473	3232	4946	2931	4364	5797	7230
2	2082	2841	3600	5314	3979	5412	6845	8278
3	N/A	3209	3968	5682	N/A	6460	7893	9326
4	N/A	3577	4336	6050	N/A	7508	8941	10374
5	N/A	N/A	4704	6418	N/A	N/A	9989	11422
6	N/A	N/A	5072	6786	N/A	N/A	11037	12470
7	N/A	N/A	N/A	7154	N/A	N/A	N/A	13518
8	N/A	N/A	N/A	7522	N/A	N/A	N/A	14566

Number of I/O Drawers	1.5 GHz 8–way Modules (minimum power consumption, in watts)				1.5 GHz 8–way Modules (maximum power consumption, in watts)			
	8–way	16–way	24–way	32–way	8–way	16–way	24–way	32–way
1	1839	2723	3607	4491	3056	4614	6172	7730
2	2207	3091	3975	4859	4104	5662	7220	8778
3	N/A	3459	4343	5227	N/A	6710	8268	9826
4	N/A	3827	4711	5595	N/A	7758	9316	10874
5	N/A	N/A	5079	5963	N/A	N/A	10364	11922
6	N/A	N/A	5447	6331	N/A	N/A	11412	12970
7	N/A	N/A	N/A	6699	N/A	N/A	N/A	14018
8	N/A	N/A	N/A	7067	N/A	N/A	N/A	15066

Number of I/O Drawers	1.7 GHz 8–way Modules (minimum power consumption, in watts)				1.7 GHz 8–way Modules (maximum power consumption, in watts)			
	8–way	16–way	24–way	32–way	8–way	16–way	24–way	32–way
1	2017	3079	4141	5203	3234	4970	6706	8442
2	2385	3447	4509	5571	4282	6018	7754	9490
3	N/A	3815	4877	5939	N/A	7066	8802	10538
4	N/A	4183	5245	6307	N/A	8114	9850	11586
5	N/A	N/A	5613	6675	N/A	N/A	10898	12634
6	N/A	N/A	5981	7043	N/A	N/A	11946	13682
7	N/A	N/A	N/A	7411	N/A	N/A	N/A	14730
8	N/A	N/A	N/A	7779	N/A	N/A	N/A	15778

PL1600R Power Consumption

Number of I/O Drawers	1.1 GHz 4–way Modules (minimum power consumption, in watts)	1.1 GHz 4–way Modules (maximum power consumption, in watts)
1	1835	2966
2	2203	4014
3	2571	5062

Number of I/O Drawers	1.1 GHz 8–way Modules (minimum power consumption, in watts)		1.1 GHz 8–way Modules (maximum power consumption, in watts)	
	8–way	16–way	8–way	16–way
1	1911	2867	3042	4586
2	2279	3235	4090	5634
3	2647	3603	5138	6682

Number of I/O Drawers	1.5 GHz 4–way Modules (minimum power consumption, in watts)	1.5GHz 4–way Modules (maximum power consumption, in watts)
	4–way	4–way
1	1714	2931
2	2082	3979
3	N/A	N/A

Number of I/O Drawers	1.5 GHz 8–way Modules (minimum power consumption, in watts)		1.5 GHz 8–way Modules (maximum power consumption, in watts)	
	8–way	16–way	8–way	16–way
1	1839	2723	3056	4614
2	2207	3091	4104	5662
3	N/A	3459	N/A	6710

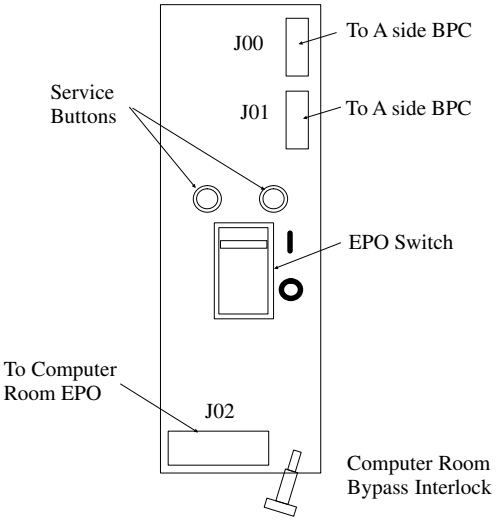
Wattage Addition/Subtraction for Minimum and Maximum Configurations

Minimum configurations are based on a single 4GB memory card and a single DASD/PCI card in each I/O subsytem. Maximum configurations are based on two 32GB memory cards per MCM module, sixteen DASD per I/O subsystem and twenty PCI cards per I/O subsystem. To determine the typical power consumption for a specific configuration, use the following typical power values:

- 4GB memory card – 137 Watts
- 8GB memory card – 151 Watts
- 16GB memory card – 235 Watts
- 32GB memory card – 294 Watts
- Each PCI card – 20 Watts Each
- DASD – 20 Watts

Unit Emergency Power Off

The server has a unit emergency power off (UEPO) switch on the front of the first frame (A Frame). Refer to the following illustration, which shows a simplified UEPO panel.



When the switch is tripped, the utility power is confined to the system power compartment. All volatile data will be lost.

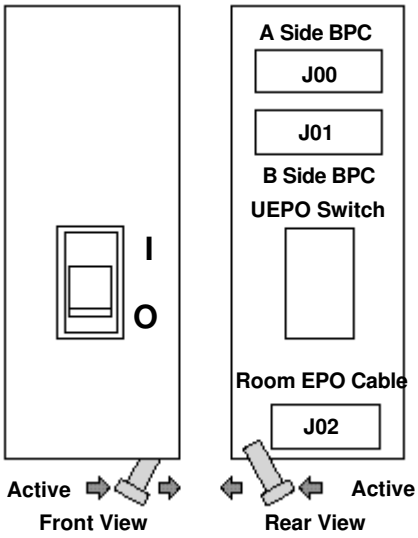
It is possible to attach the computer room emergency power off (EPO) system to the system UEPO. When this is done, tripping the computer room EPO disconnects all power from the line cords and the internal battery backup unit, if it is provided. All volatile data will be lost in this case also.

If the room EPO is not connected to the UEPO, tripping the computer room EPO removes ac power from the system. If the interlock bypass feature is used, the system remains powered for a short time based on system configuration.

Computer Room Emergency Power Off (EPO)

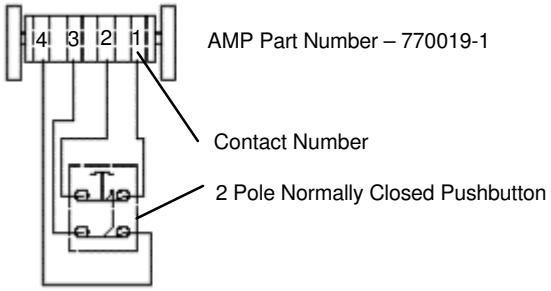
When the internal battery backup feature (IBF) is installed and the room EPO is tripped, the batteries will engage and the computer will continue to run. It is possible to attach the computer room EPO system to the machine EPO. When this is done, tripping the room EPO will disconnect all power from the line cords and the internal battery backup unit. In this event all volatile data will be lost.

To incorporate the IBF into the room Emergency Power Off systems (EPO), a cable must be made to connect to the back of the system EPO panel. The following diagrams illustrate how this connection is made.



The preceding figure illustrates the back of the machine UEPO panel with the room EPO cable plugging into the machine. Notice the switch actuator. After it is moved to make the cable connection possible, the room EPO cable must be installed for the machine to power on.

In the following figure, an AMP connector 770019–1 is needed to connect to the system EPO panel. For room EPO cables using wire sizes #20 AWG to #24 AWG use AMP pins part number 770010–4.



Battery Holdup Times

The following tables illustrate typical machine holdup time vs load in minutes for fresh and aged batteries. All times listed are in minutes. Machine load is listed in total AC input power (power for both line cords combined). A fresh battery is defined as 2.5 years old or less, while an aged battery as 6.5 years old. Capacity will gradually decay from fresh battery value to the aged battery value, with the amount of decay shown being worst case. The system will diagnose a ”failed battery” if the capacity falls below the aged battery level.

Typical Machine Holdup Time vs. Load in Minutes (Fresh Battery)

Machine Load	3 kW		6 kW		9 kW		12 kW		15 kW		18 kW		19.5 kW	
IBF Configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	7.0	21	2.1	7.0										
2 BPR	21	50	7.0	21	4.0	11	2.1	7.0						
3 BPR	32	68	12	32	7.0	21	4.9	12	3.2	9.5	2.1	7.0	1.7	6.5

N = non–redundant, R = redundant

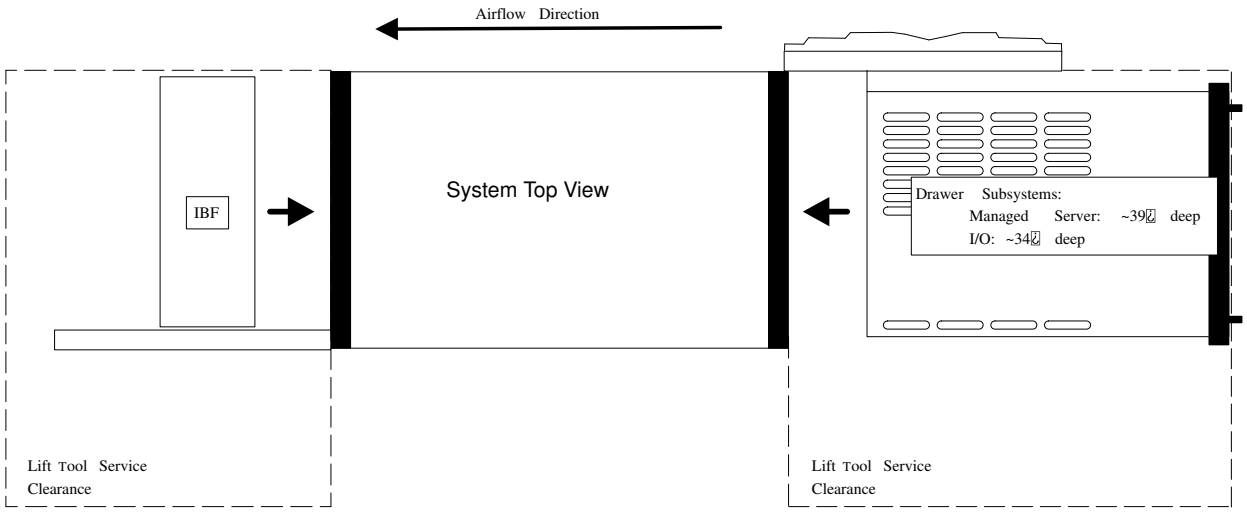
Typical Machine Holdup Time vs. Load in Minutes (Aged Battery)

Machine Load	3 kW		6 kW		9 kW		12 kW		15 kW		18 kW		19.5 kW	
IBF Configuration	N	R	N	R	N	R	N	R	N	R	N	R	N	R
1 BPR	4.2	12.6	1.3	4.2										
2 BPR	12.6	30	4.2	12.6	2.4	6.6	1.3	4.2						
3 BPR	19.2	41	7.2	19.2	4.2	12.6	2.9	7.2	1.9	5.7	1.3	4.2	1.0	3.9

N = non–redundant, R = redundant

Guide for Raised–Floor Preparation

A raised floor is not required for the PL3200R and PL1600R (except in Canada), however, it is recommended for optimum system cooling and cable management. Raised floor cutouts should be protected by electrically nonconductive molding, appropriately sized, with edges treated to prevent cable damage and to prevent casters from rolling into the floor cutouts.



Floor Plan Considerations for Single Units

Front–service access is necessary on the PL3200R and PL1600R to accommodate a lift tool for the servicing of large drawers (the managed server, IO drawer, and media subsystems). Front and rear service access is necessary to accomodate the a lift tool for servicing of the optional integrated battery feature (IBF).

Cutting and Placement of Floor Panels

This section provides recommendations for making the necessary openings in the raised floor for installing the PL3200R and PL1600R.

Note: The following illustration is intended only to show relative positions and accurate dimensions of floor cutouts. The illustration is not intended to be a machine template and is not drawn to scale.

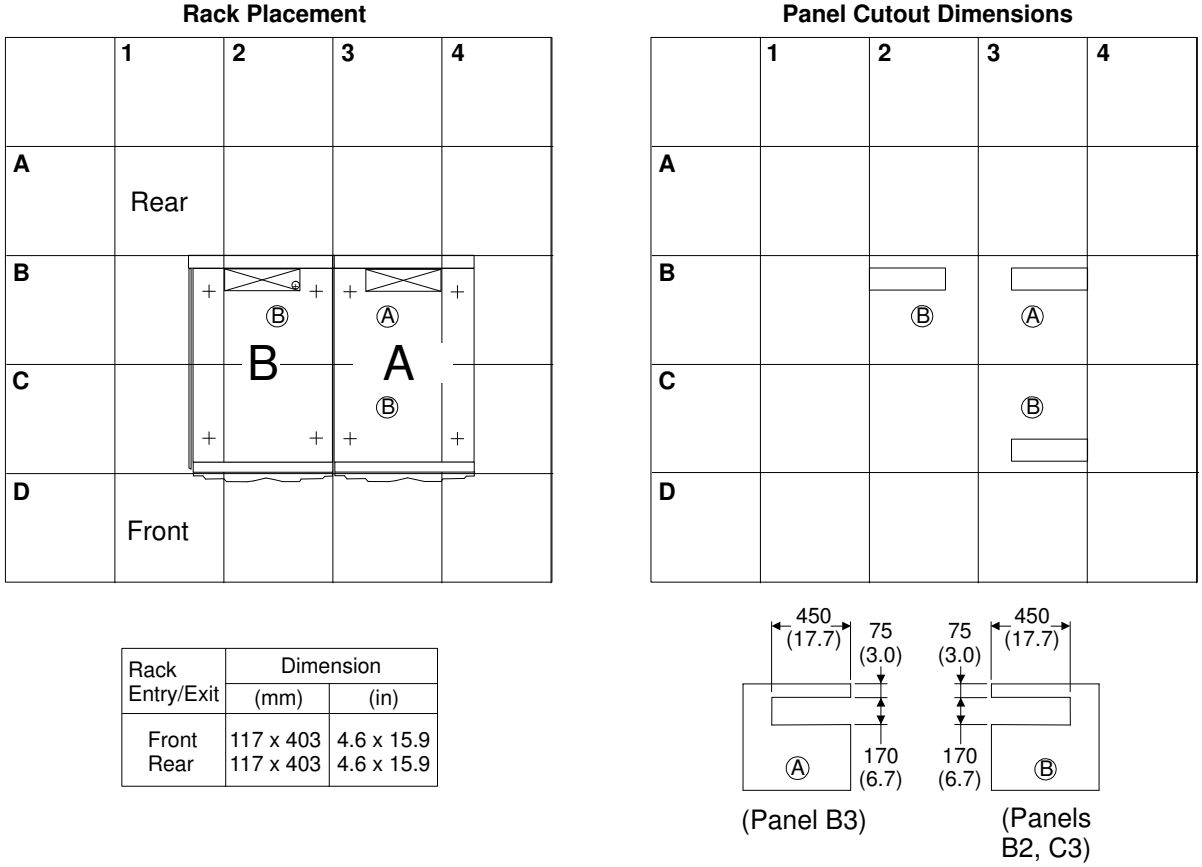
The x–y alphanumeric grid positions are used to identify relative positions of cutout floor panels that may be cut in advance.

1. For a PL3200R, determine whether the system you will be installing has one or two frames.
2. Measure the panel size of the raised floor.
3. Verify the floor panel size. The floor panel size illustrated is 600 mm (23.6 in.) and 610 mm (24 in.) panels.
4. Ensure adequate floor space is available to place the frames over the floor panels exactly as shown in the illustration. Refer to “Considerations for Multiple System Installations” on page 5-36 for front–to–back and side–to–side clearances. Use the plan view if necessary. Consider all obstructions above and below the floor.
5. Identify the panels needed, and list the total quantity of each panel required for the installation.
6. Cut the required quantity of panels. When cutting the panels, you must adjust the size of the cut for the thickness of the edge molding you are using. The dimensions shown in the illustrations are finished dimensions. For ease of installation, number each panel as it is cut, as shown in the following illustrations.

Note: Depending on the panel type, additional panel support (pedestals) may be required to restore structural integrity of the panel. Consult the panel manufacturer to insure that the panel can sustain a concentrated load of 900 lbs. For multiple frame installation it is possible that two casters will produce concentrated loads as high as 1800 lbs.

7. Use the raised floor diagram on the next page to install the panels in the proper positions.

Note: Panel cutout sizes are optimized for parallel–channel external cables.



Rack Entry/Exit	Dimension	
	(mm)	(in)
Front	117 x 403	4.6 x 15.9
Rear	117 x 403	4.6 x 15.9

Raised Floor with 610–mm (24–inch) Floor Panels

Securing the Rack

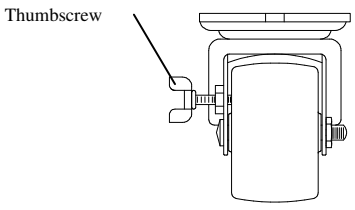
The customer can order:

- RPQ 8A1183 for attaching the rack mounting plates to the concrete floor (non raised floor)
- RPQ8A1185 to attach the rack to a concrete floor when on a rasied floor (9 1/2” to 11 3/4” high)
- RPQ 8A1186 to attach the rack to a concrete floor when on a raised floor (11 3/4” to 16” high)

Positioning the Rack

Note: The customer should unpack the rack and position it in the room. If this has not been done, consult the customer and the marketing representative as necessary.

1. If the customer has not unpacked and positioned the rack, remove all packing and tape from the rack.
2. Position the rack according to the customer floor plan.
3. Lock each caster wheel by tightening the screw on the caster.



Installing the Frame Kit

The following tables show the parts required for each of the tie down kits (a non–raised floor, short–raised floor, and a long raised floor).

Rack Tie–Down Kits

11P4759 Frame Tie Down Kit (Non – Raised Floor) (RPQ 8A1183)			
Item	Part Number	QTY	Description
Item 3 in illustration on page 5-30.	11P3527	2	Shipping bar (low)
Item 5 in illustration on page 5-30.	11P3529	4	Hinge plate
Item 8 in illustration on page 5-30.	11P3530	2	Latch plate
Item 6 in illustration on page 5-30.	11P3531	2	EQ support
Item 2 in illustration on page 5-30.	11P3532	2	Shipping bar (upper)
Item 7 in illustration on page 5-30.	76X4687	2	Latch bolt
Item 1 in illustration on page 5-30.	1624804	20	Screw (hex flange, 20mm, long)
Item 9 in illustration on page 5-30.	1621546	8	Screw (hex, 25mm, long, hinge)
Item 10 in illustration on page 5-30.	1622307	8	Washer (M8, hinge)
Item 1 in illustration on page 5-31.	11P3528	2	Plate lock down
Item 2 in illustration on page 5-31.	05N6345	4	Spacer
Item 4 in illustration on page 5-31.	05N6344	4	Bushing
Item 5 in illustration on page 5-31.	21L4309	4	Washer
Item 3 in illustration on page 5-31.	0130985	4	Washer
Item 6 in illustration on page 5-31.	05N6346	4	Bolt

11P4757 Frame Tie Down Kit (Short – Raised Floor) (RPQ 8A1185)			
Item	Part Number	QTY	Description
Illustration on page 5-35.	44P0673	4	Turnbuckle ASM (short)
Item 3 in illustration on page 5-30.	11P3527	2	Shipping bar (low)
Item 5 in illustration on page 5-30.	11P3529	4	Hinge plate
Item 8 in illustration on page 5-30.	11P3530	2	Latch plate
Item 6 in illustration on page 5-30.	11P3531	2	EQ support
Item 2 in illustration on page 5-30.	11P3532	2	Shipping bar (upper)
Item 7 in illustration on page 5-30.	76X4687	2	Latch bolt
Item 1 in illustration on page 5-30.	1624804	20	Screw (hex flange, 20mm, long)
Item 9 in illustration on page 5-30.	1621546	8	Screw (hex, 25mm, long, hinge)
Item 10 in illustration on page 5-30.	1622307	8	Washer (M8, hinge)

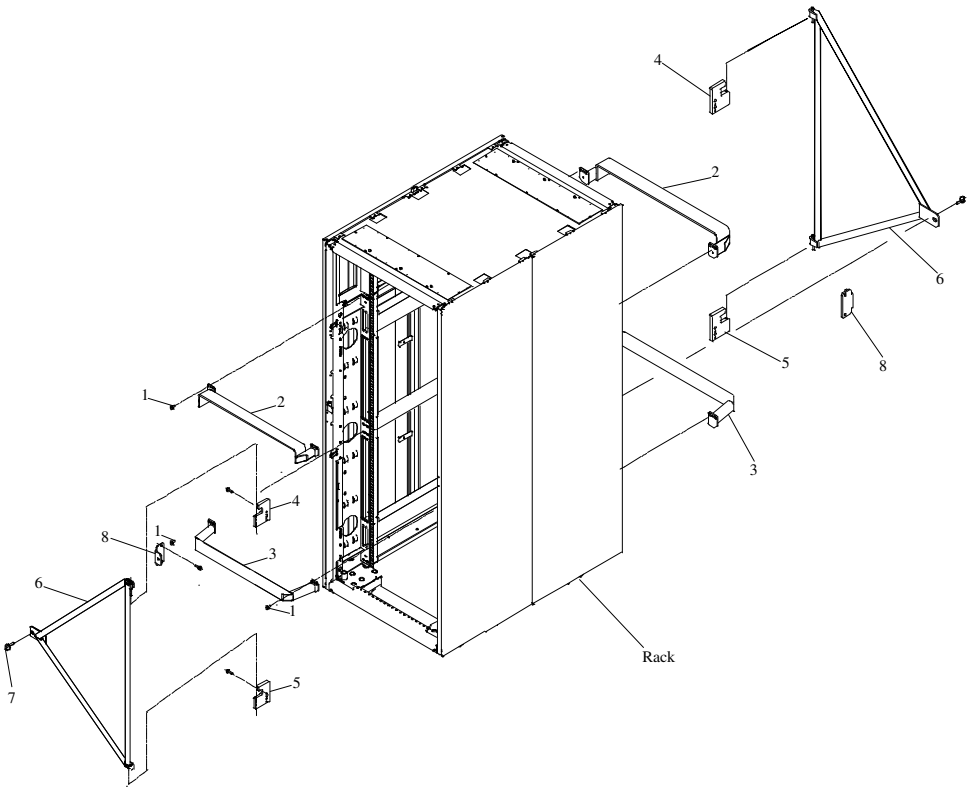
11P4758 Frame Tie Down Kit (Long – Raised Floor) (RPQ 8A1186)			
Item	Part Number	QTY	Description
Illustration on page 5-35.	44P0673	4	Turnbuckle ASM (long)
Item 3 in illustration on page 5-30.	11P3527	2	Shipping bar (low)
Item 5 in illustration on page 5-30.	11P3529	4	Hinge plate
Item 8 in illustration on page 5-30.	11P3530	2	Latch plate

Item 6 in illustration on page 5-30.	11P3531	2	EQ support
Item 2 in illustration on page 5-30.	11P3532	2	Shipping bar (upper)
Item 7 in illustration on page 5-30.	76X4687	2	Latch bolt
Item 1 in illustration on page 5-30.	1624804	20	Screw (hex flange, 20mm, long)
Item 9 in illustration on page 5-30.	1621546	8	Screw (hex, 25mm, long, hinge)
Item 10 in illustration on page 5-30.	1622307	8	Washer (M8, hinge)

Mounting Internal Rack Parts

Attention: This procedure is performed by the service representative.

1. Using four M–8 (20 mm) screws (item 1 in illustration on page 5-30), install the top shipping bracket (item 2 in illustration on page 5-30). The top shipping bar is installed at EIA unit location 32.
2. Using four M–8 screws (item 1 in illustration on page 5-30) install the bottom shipping bracket (item 3 in illustration on page 5-30). The top shipping bar is installed at EIA unit location 18.
3. Repeat steps 1–2 to install shipping bars in the rear of the rack.
4. Attach the top hinge (item 5 in illustration on page 5-30) on the vertical rail (it is approximately on EIA unit 29–30 on the vertical rail) with two 25 mm screws (item 9 in illustration on page 5-30) and two washers (item 10 in illustration on page 5-30).
5. Attach the bottom hinge (item 5 in illustration on page 5-30) on the vertical rail (it is approximately on EIA unit 6–7 on the vertical rail) with two 25 mm screws (item 9 in illustration on page 5-30) and two washers (item 10 in illustration on page 5-30).
6. Repeat steps 4 and 5 to install the hinges on the rear rail.
7. Attach the latch plate (item 8 in illustration on page 5-30) with two M–8 (20 mm) screws (item 1 in illustration on page 5-30).
8. Repeat step 7 in the rear of the rack.
9. Attach the triangular braces (item 6 in illustration on page 5-30) in both the front and rear of the rack.
10. Install the brace latch bolts (item 7 in illustration on page 5-30).



Determine Your Next Step

Use the following to determine your next step:

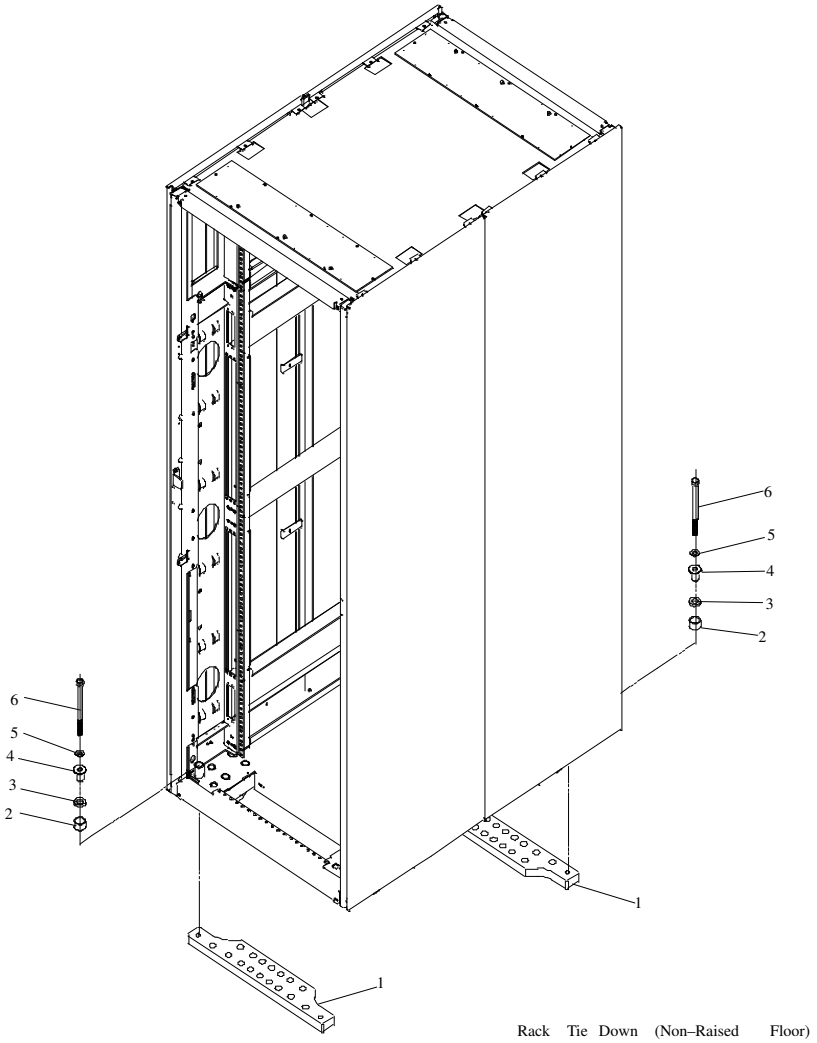
- If the rack is being attached to a concrete (non–raised) floor, proceed to “Attach the Rack to a Concrete (Non–Raised) Floor” on page 5-31.
- If the rack is being attached to a raised floor, proceed to “Attaching the Rack to a Short or Long Raised Floor” on page 5-33.

Attach the Rack to a Concrete (Non–Raised) Floor

Attention: It is the customer's responsibility to ensure the following steps are completed before the service representative performs the tie down procedure.

The mounting plates should be able to withstand 2700 pounds pulling force on each end. The customer should obtain the service of a qualified consultant or structural engineer to determine the appropriate anchoring method for these mounting plates.

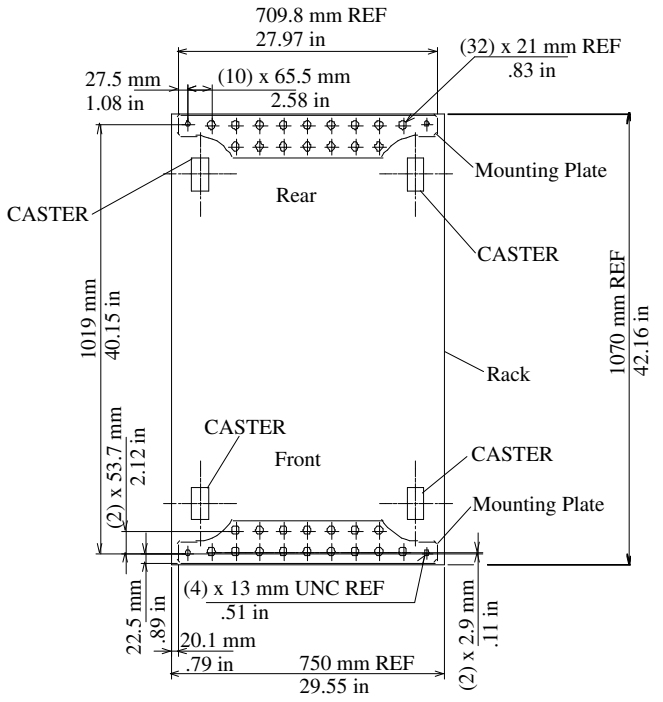
1. Be sure the rack is in the correct location.



Rack Tie Down (Non–Raised Floor)

2. Place the mounting plates (item 1 in illustration on page 5-31), front and rear, in the approximate mounting position under the system rack.
3. To align the mounting plates to the system rack, do the following:
   a. Place the four rack–mounting bolts (item 6 in illustration on page 5-31) through the plate assembly holes at the bottom of the rack (install the bushings and washers (item 4 and 5 in illustration on page 5-31) to ensure bolt positioning).
   b. Position the mounting plates (item 1 in illustration on page 5-31) under the four rack–mounting bolts (item 6 in illustration on page 5-31) so that the mounting bolts are centered directly over the tapped holes.
   c. Insert the rack–mounting bolts (item 6 in illustration on page 5-31) three or four rotations into the tapped holes.

4. Mark the floor around the edge of the mounting plates.



Mounting Plate
Bolt Locations

5. Remove the mounting bolts from the threaded holes.
6. Move the rack away from the mounting plates.
7. Mark the floor at the center of each hole in the mounting plate (including tapped holes).
8. Remove the mounting plates from the marked locations.
9. At the marked location of the tapped mounting holes, drill two holes approximately 1 inch to allow clearance for the ends of the two rack–mounting bolts. The ends of the rack–mounting bolts may protrude past the thickness of the mounting plate.

Note: The customer should obtain the service of a qualified structural engineer to determine appropriate anchoring of the mounting plates. A minimum of three anchor bolts for each mounting plate must be used to secure the plates to the concrete floor. Because some of the drilled holes may be aligned with concrete reinforcement rods below the surface of the concrete floor, additional holes must be drilled. Each mounting plate must have at least three usable holes, two that are on opposite sides and opposite ends of each other, and one hole at the center.

Drill one hole in each group of anchor bolt location marks as indicated on the marked floor.

10. Using at least three bolts for each mounting plate, mount the mounting plates to the concrete floor.

Attention: It is the service representative's responsibility to complete the following steps.

1. Reposition the system rack over the mounting plates.
2. Place the four rack–mounting bolts through the plate assemblies with the D–washer positioned so that the straight side of the washer is facing inward toward the system rack.
3. Place the isolator bushing (item 4 in illustration on page 5-31) inside the leveling foot with a washer between the isolator bushing and the floor plate.

4. Insert the rack–mounting bolts three or four rotations into the tapped holes.
5. Turn the leveling foot of the plate assembly down until it contacts the mounting plate, and then level the rack using the four leveling feet.
6. Lock the leveling feet by tightening the lock nut.
7. Tighten the four rack–mounting bolts into the mounting plates.

Attaching the Rack to a Short or Long Raised Floor

Attention: It is the customer's responsibility to ensure the following steps are completed before the service representative performs the tie down procedure.

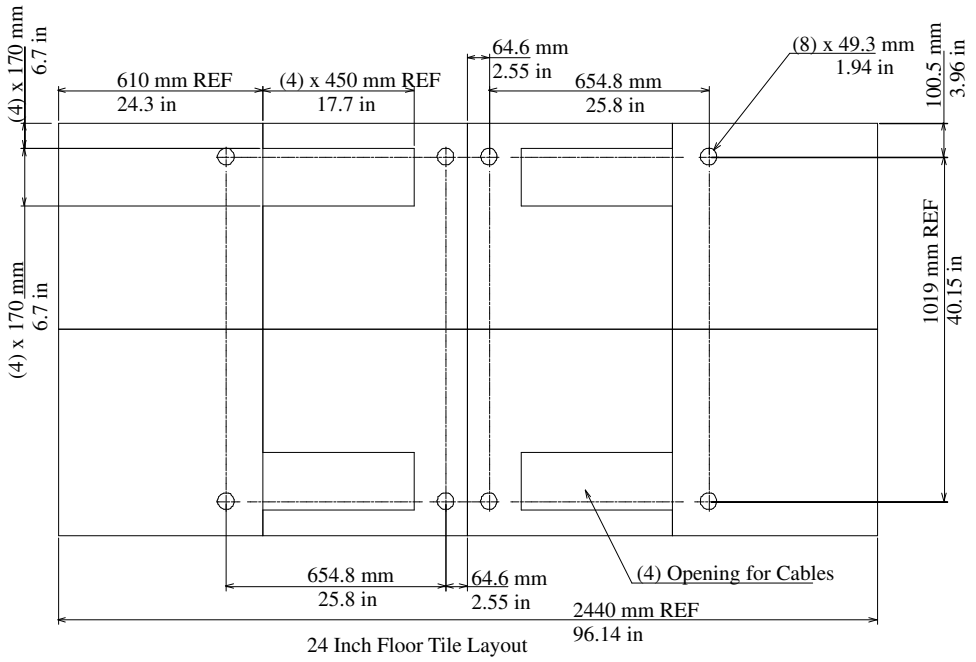
Note: A steel beam or a steel channel adapter for mounting the sub floor eyebolts are required in order to accommodate a floor with a depth more than 16". The floor eyebolts must be supplied by the customer.

Consider the following when preparing the floor for tie–down.

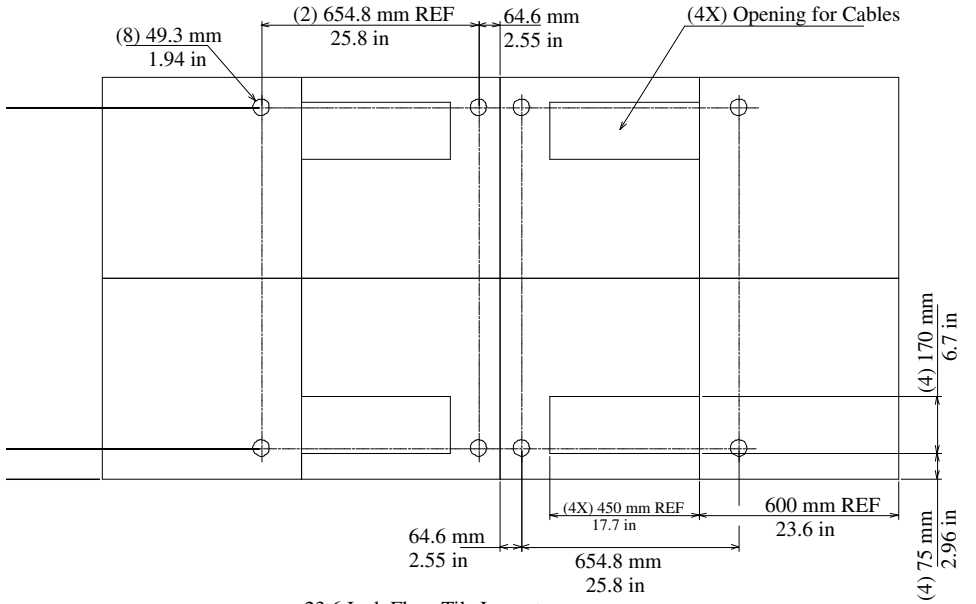
- The hardware is designed to support a frame weighing no more than 2636 lbs.
- The estimated maximum concentrated load on one caster for 2636 lbs system is 900 lbs. For a multiple system installation it is possible that one floor tile will bear a total concentrated load of 1800 lbs. Please contact the raised floor tile manufacturer to insure the floor tile with cable).

1. Obtain the service of a qualified structural engineer to determine appropriate anchoring of the eyebolts.
2. Considering the following before installing the eyebolts:
   - Floor eyebolts should be securely anchored to the concrete floor.
   - The minimum height of the center of the internal diameter is 1" above the concrete floor surface.
   - The maximum is 2.5" above the concrete floor surface. Higher than 2.5" can cause excessive lateral deflection to the tie down hardware.
   - The eyebolts internal diameter should be 1 3/16" and each eyebolt should be able to withstand 2700 pounds. The customer should obtain the service of a qualified consultant or structural engineer to determine the appropriate anchoring method for these eyebolts and to insure that the raised floor can support the required floor loading.
   - A steel beam or a steel channel adapter for mounting the floor eyebolts is needed in order to accommodate a floor with more than 16" in height.

3. Plan for installing four eyebolts positioned to match the dimensions given in the following illustrations. (For a one-frame system consider only the right part of the illustrations.)



24 Inch Floor Tile Layout



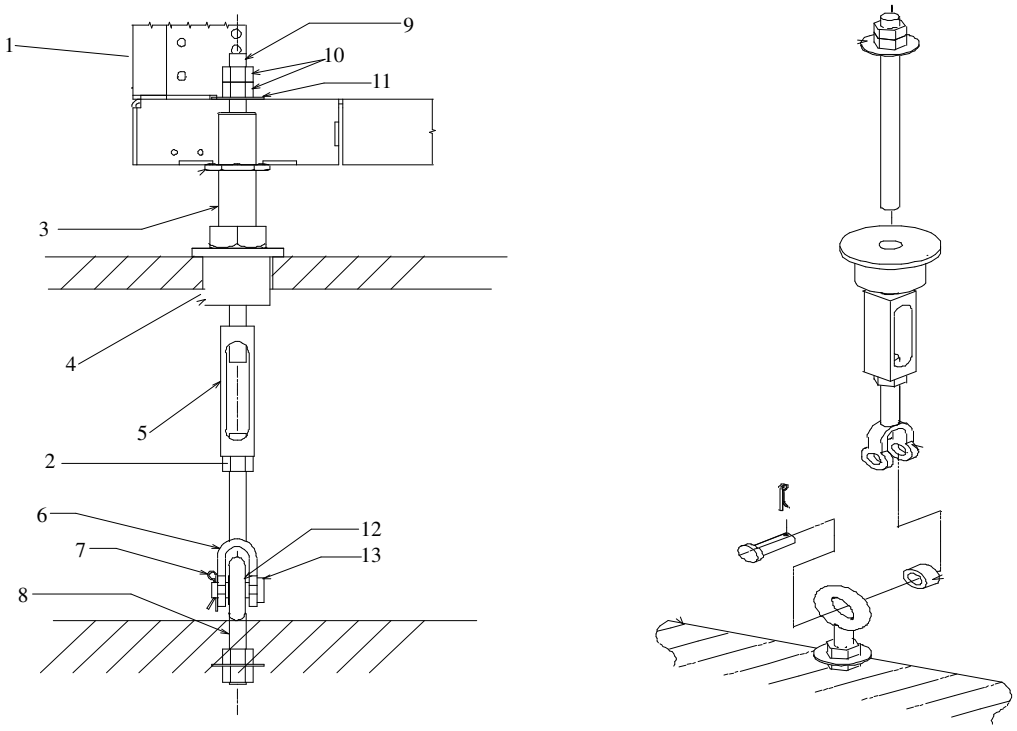
23.6 Inch Floor Tile Layout

4. Install the eyebolts to the floor.

Attention: It is the service representative's responsibility to complete the following steps.

1. Before starting the installation, all cable openings in the floor panel and location of the rubber bushing holes should also be checked and match the dimensions given in the following illustrations.
2. The system should be powered off and all cables and connectors should not be connected or dangling around the frame. The frame should be free to roll.
3. The floor eyebolts should be already secured to the concrete floor. The height of the center of the floor eyebolt to the concrete floor or the steel beam/channel adapter mounted to the concrete floor should be checked and verified so that the turnbuckles can accommodate the total height of the raised floor.
4. Remove the floor tiles around the area where the frame(s) will be installed.

5. Remove the pin and the spacer from the lower jaw (see the following illustrations).



Note: The difference between the two turnbuckle assemblies is the length of the turnbuckle.

The Short Turnbuckle Assembly (P/N is 11P4755) is used for a 9 1/2”–11 3/4” raised floor. The Long Turnbuckle Assembly (P/N 11P4756) is used for an 11 3/4”–16” raised floor.

1	Frame	8	Floor Eyebolt (customer supplied)
2	Jam Nut	9	Threaded Rod
3	Rack Leveler	10	Nut
4	Rubber Bushing	11	Washer
5	Turnbuckle (Short or Long)	12	Spacer
6	Jaw	13	Shaft
7	Pin		

6. Place the spacer inside the floor eyebolt and put the floor eyebolt between the lower jaw. Install the shaft, pin and spacer back.
7. Take the threaded rod and rubber bushing out of the turnbuckle assembly.
8. Install the floor tile that has the rubber bushing holes that aligned with the eyebolt locations
9. Install the rubber bushings in the floor tiles.
10. Move the frame so that the frame leveler is located over the rubber bushings.

Attention: To avoid a tipping hazard, make sure that the frame casters do not roll into the cable opening.

11. Insert the threaded rod into the inner hole of the leveler and the rubber bushing.
12. Thread down the threaded rod until the tip of the rod is approximately 1inch inside the turnbuckle.
13. Insert the nuts and tighten the nuts (hand tight).

14. Repeat the previous three steps so that all assemblies are completely installed as shown in the previous illustration.
15. Tighten all the nuts to 40 ft–lbs.
16. Securing the frame is now complete.

Considerations for Multiple System Installations

In a multi–frame installation it is possible that a floor tile with cable cutouts (refer to “Cutting and Placement of Floor Panels” on page 5-26) will bear two concentrated static loads up to 900 lbs (per caster/leveler). Thus, the total concentrated load can be as high as 1800 lbs. Please contact the floor tile manufacturer or consult a structural engineer to insure that the raised floor assembly can support this load.

When you are integrating an Escala PL3200R or PL1600R into an existing multiple–system environment, or when adding additional systems to an installed Escala PL3200R or PL1600R, consider the following factors:

- Minimum aisle width

  For multiple rows of systems containing one or more Escala PL3200R or PL1600R, the minimum aisle width in the front of the system is 1041 mm (41 in.) and 838 mm (33 in.) in the rear of the system to allow room to perform service operations. The minimium aisle width is in addition to the front and rear service clearances of 1143 mm (45 in.) and 914 mm (36 in.) respectively. Service clearances are measured from the edges of the frame (with doors open) to the nearest obstacle.

- Thermal interactions

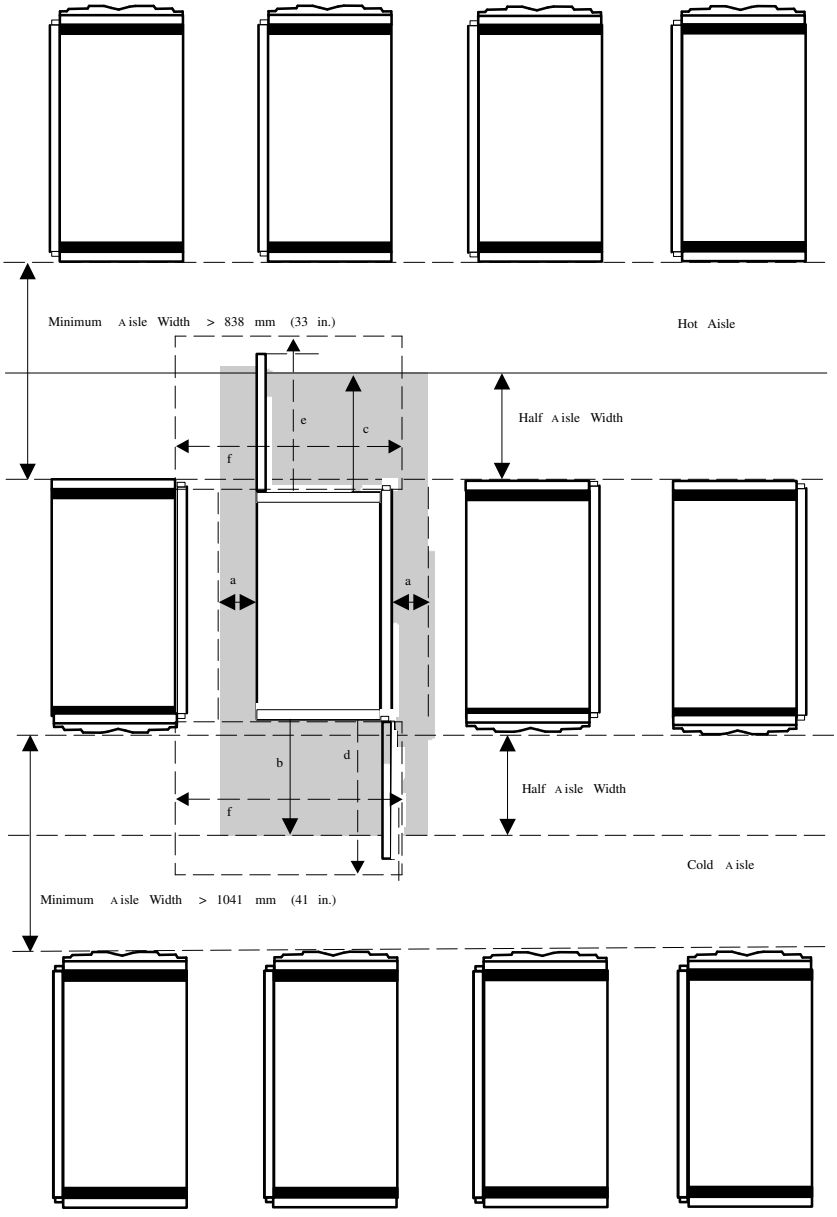
  The minimum aisle width between rows on the computer room floor is 33 or 41 inches for optimal cooling. Aisle width is independent of which door or cover set is used. In addition, systems should be faced front–to–front and rear–to–rear to create ”cool” and ”hot” aisles to maintain effective system thermal conditions, as shown in the following illustration.

  Cool aisles need to be of sufficient width to support the airflow requirements of the installed systems as indicated in Cooling Requirements on Page 90. The airflow per tile will be dependent on the underfloor pressure and perforations in the tile. A typical underfloor pressure of 0.025” of water will supply 300–400 cfm through a 25% open 2’x2’ floor tile.

- Floor loading

  The system can induce a concentrated load of 900 lbs per caster. It is possible that a panel structure has to sustain a total load as high as 1800 lbs. Consult the panel manufacturer and obtain the services of a qualified consultant or structural engineer to insure the concrete floor and the structure panel can support these loads.

Proposed Floor Layout for Multiple Systems



Wall

Load Shedding Area
(Weight Distribution)

Service Clearance Area

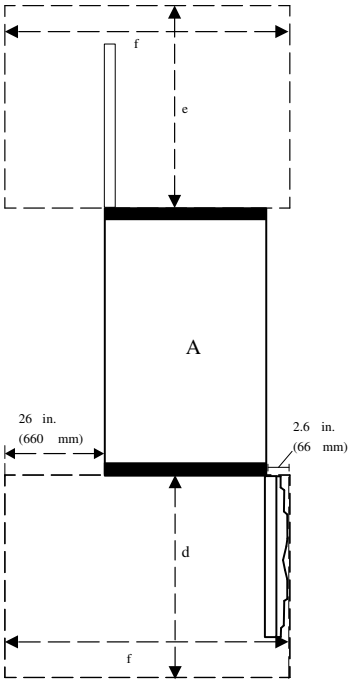
Weight Distribution Areas
a=side weight distribution difference
b=front weight distribution difference
c=rear weight distribution difference

Service Clearance Areas
d=front service clearance
e=rear service clearance
f=side service clearance

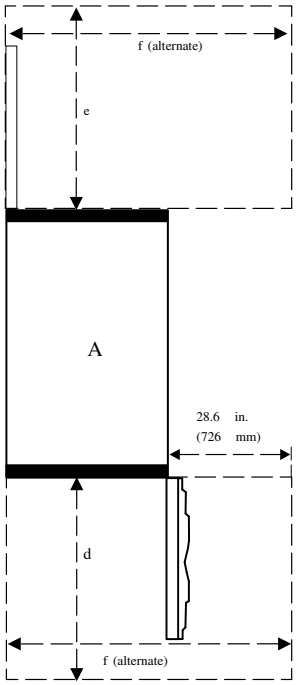
g=side service clearance
(two frame configuration, not shown)

Service Clearance

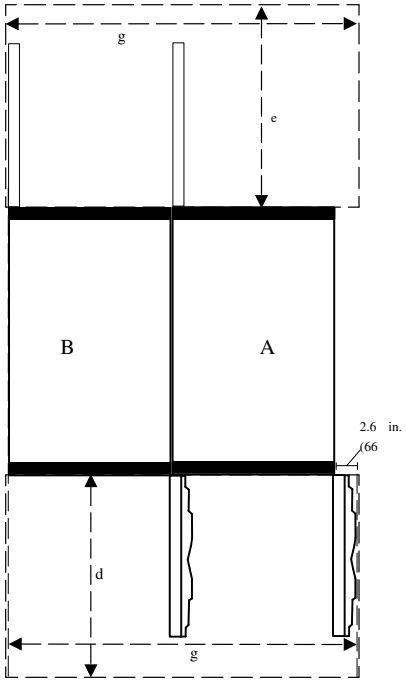
The minimum service clearance for single–frame and double–frame systems with thin doors is shown in the following illustration.



Single–Frame System with Slimline Doors



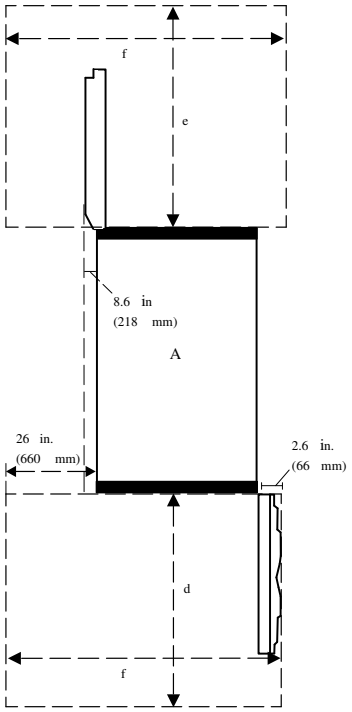
Single–Frame System with Slimline Doors (with alternative right–side service clearance)



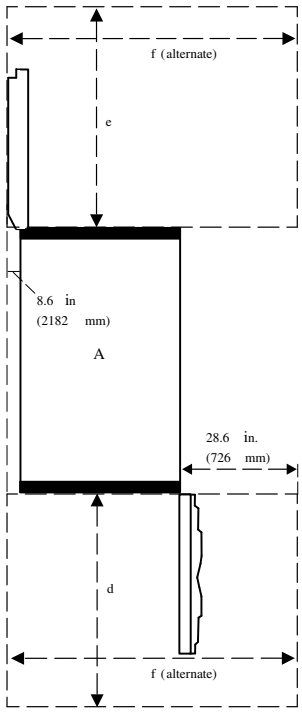
Double–Frame System with Slimline Doors

d=1143 mm (45.0 in.)
e=914 mm (36.0 in.)
f=1511 mm (59.5 in.)
f (alternate)=1577 mm (62.1 in.)
g=1640 mm (64.6 in.)

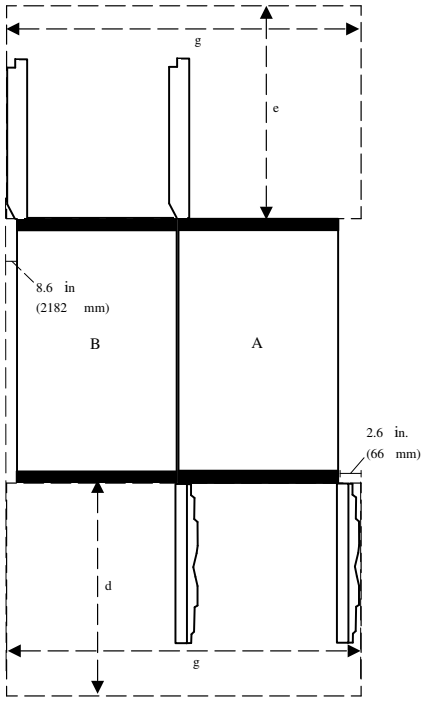
The minimum service clearance for single–frame and double–frame systems with acoustical doors is shown in the following illustration.



Single–Frame System with Acoustical Doors



Single–Frame System with Acoustical Doors (alternative right–side service clearance)



Double–Frame System with Acoustical Doors

d=1143 mm (45.0 in.)
e=914 mm (36.0 in.)
f=1511 mm (59.5 in.)
f (alternate)=1796 mm (70.7 in.)
g=1859 mm (73.2 in.)

Refer to the illustration in “Guide for Raised–Floor Preparation” on page 5-25 for service clearances shown in a raised–floor installation.

Cooling Requirements

The PL3200R and PL1600R require air for cooling. As shown in ”Proposed Floor Layout for Multiple Systems” on page 5-37, rows of PL3200R and PL1600R systems must face front–to–front. The use of a raised floor is recommended to provide air through perforated floor panels placed in rows between the fronts of systems (the cold aisles shown in the figure on page 5-37).

Note: Do not place perforated tiles in the hot aisles. Heated exhaust air must exit the computer room through the ceiling air–return system.

The following table provides system cooling requirements based on system configuration. The letter designations in the table correspond to the letter designations in the graph shown in “Cooling Requirements Graph” on page 5-42.

PL3200R Cooling Requirements

Number of I/O Drawers	**1.1 GHz 8–way Modules (Cooling Chart Reference)**			
	8–way	16–way	24–way	32–way
1	A	B	B	C
2	B	B	C	C
3	N/A	C	C	D
4	N/A	C	D	E
5	N/A	N/A	D	E
6	N/A	N/A	D	E
7	N/A	N/A	N/A	E
8	N/A	N/A	N/A	F

Number of I/O Drawers	**1.3 GHz 4–way Modules (Cooling Chart Reference)**	
	8–way	16–way
1	B	C
2	B	D
3	C	D
4	C	D
5	N/A	E
6	N/A	E
7	N/A	F
8	N/A	F

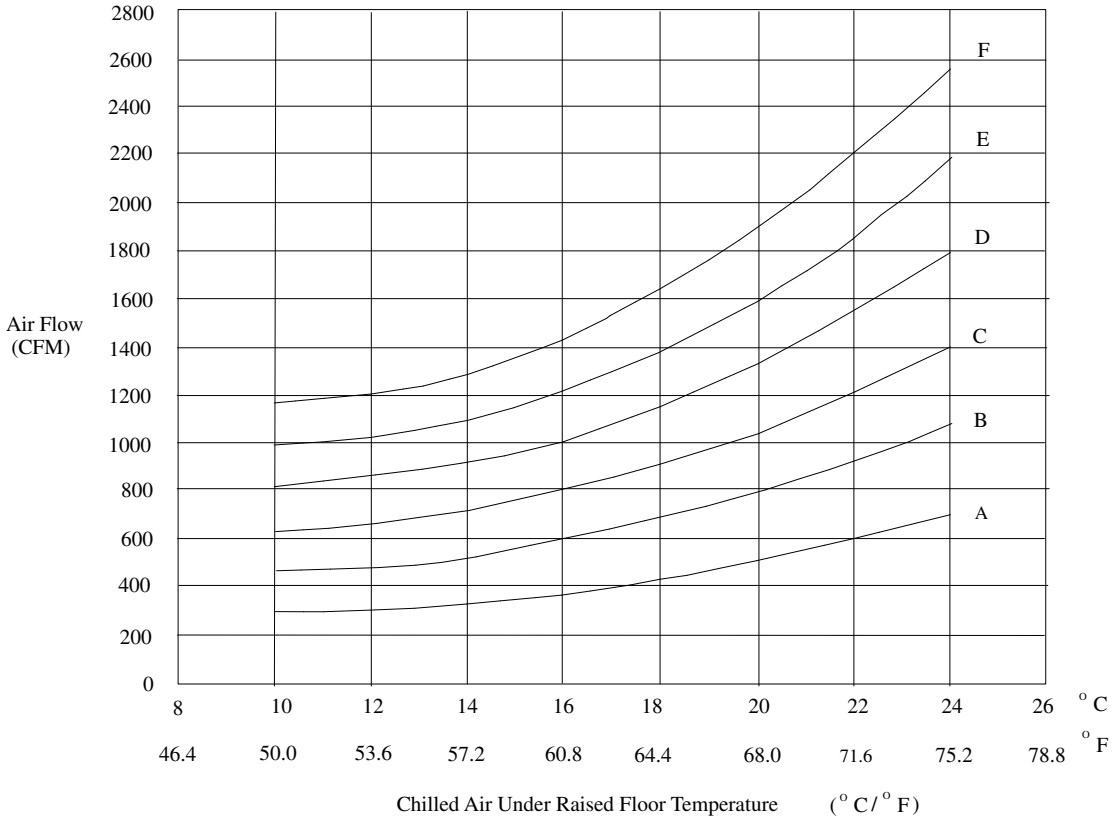
Number of I/O Drawers	1.3 GHz 8–way Modules (Cooling Chart Reference)			
	8–way	16–way	24–way	32–way
1	A	B	C	C
2	B	B	C	D
3	N/A	C	C	D
4	N/A	C	D	D
5	N/A	N/A	D	E
6	N/A	N/A	D	E
7	N/A	N/A	N/A	F
8	N/A	N/A	N/A	F

PL1600R Cooling Requirements

Number of I/O Drawers	1.1 GHz 4–way Modules (Cooling Chart Reference)
1	A
2	A
3	B

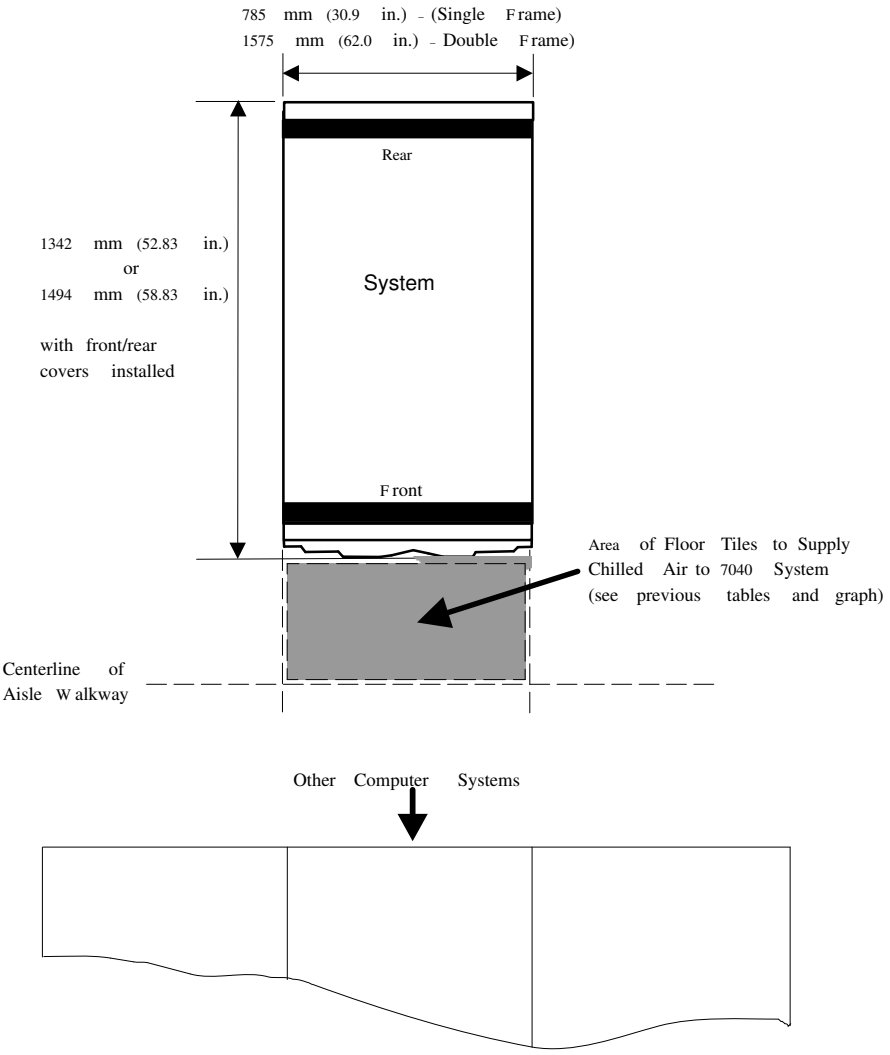
Number of I/O Drawers	1.1 GHz 8–way Modules (Cooling Chart Reference)	
	8–way	16–way
1	A	A
2	A	B
3	B	C

Cooling Requirements Graph



Requirements for the Chilled Air Flow Area

The following illustration shows the chilled air flow area required for a system. Use the system cooling requirements tables and the preceding graph to determine the area of floor tiles to supply chilled air to the system.



Hardware Management Console (HMC)

The Hardware Management Console (HMC) is a user interface that provides the functions needed to create and maintain a multiple–partitioned environment. The HMC is a feature of the Escala models that support partitioning (typically PL3200R and PL1600R, but also PL820R and PL420R). The interface allows you to directly manipulate HMC–defined objects and learn more about detected changes in hardware conditions. The HMC also provides service technicians with diagnostic information.

Dimensions		
Height	140 mm	5.5 in.
Width	425 mm	16.7 in.
Depth	425 mm	16.7 in.
Weight		
Minimum	9.4 kg (20 lbs.)	
Maximum	11.3 kg (25 lbs.)	
Electrical		
Power source loading (typical in kVA)	0.08 kVA to 0.30 kVA (as shipped)	
Frequency (sine–wave)	47 to 63 Hz	
Input Voltage (V ac)	90 V to 265 V ac	
Frequency (hertz)	47 to 63 Hz	
Thermal output (minimum)	240 Btu/hr. (75 watts)	
Thermal output (maximum)	705 Btu/hr. (207 watts)	
Maximum altitude	2134 m (7,000 ft.)	
Air Temperature Requirements	Operating	Non–Operating
	10 to 35°C (50 to 95°F)	10 to 43°C (50 to 110°F)
Humidity Requirements	Operating	Non–Operating
(Noncondensing)	8% – 80%	8% – 80%
Noise Emissions[1]	Operating	Idle
L_{WAd}	5.1 bels	4.8 bels
L_{pAm}	4.3 bels	3.8 bels
$<L_{pA>m}$	3.7 bels	3.3 bels
Impulsive or prominent discrete tones	No	No

Chapter 6. Disk Subsystems

Describes requirements for site using shared disks.

Disk Subsystems – Overview

Disk subsystems include:

- DAS – DAE (Disk Array Storage / Enclosure).

  Characteristics are provided for the following rack-mounted DAS and DAE units:

  – DAS 1300, on page 6-2.
  – DAS 2300, on page 6-3.
  – DAS 2900, on page 6-3.
  – DAS 3200, on page 6-4.
  – DAS 3500, on page 6-5.
  – DAS 4500, on page 6-6.
  – DAS 4700, on page 6-7
  – DAS 5300, on page 6-8.
  – DAS 57x0, on page 6-9.
  – NDAS CX600, on page 6-11.
  – NDAS CX400 and CX200, on page 6-12.
  – DAE 5000, on page 6-10.
- AMDAS JBOD, on page 6-13.
- SSA (Serial Storage Architecture), on page 6-15.

Warning: After delivery, remove the transport packaging, leaving the equipment in its plastic environmental bag **unopened** at room temperature for at least 12 hours. Disk drives can be damaged by severe temperature and humidity changes.

Disk Array Storage / Enclosures (DAS – DAE)

DAS 1300 Rackmount

Dimensions		
Height	26.7 cm (10.5 in)	
Width	48.3 cm (19.0 in)	
Depth	76.2 cm (30.0 in)	
Weight		
Minimum (chassis with 5 disk modules, 1 SP, 1 VSC, without packaging)	49.5 kg	110 lb
Maximum (chassis with10 disk modules, 2 SPs, 2 VSCs, BBU, without packaging)	63 kg	140 lb
Add-on modules:		
Disk-drive module	1.6 kg	3.5 lb
Second VSC	3.0 kg	6.7 lb
Second SP	1.1 kg	2.5 lb
BBU	5.9 kg	13.0 lb
Electrical	*(power supplies are auto-sensing and auto-ranging)*	
Voltage range (V ac)	90 V ac to 264 V ac, single-phase,	
Frequency	47 to 63 Hz	
Current draw	6.0 A max. at 100 V ac input	
Power consumption:		
apparent power	600 VA max	
true power	575 W max	
Connector Type	C22 Appliance Coupler	

Operating / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 38°C (50 to 100°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2439 m (8000 ft)	7625 m (25000 ft)
Heat dissipation	$2070x10^3$ J/hr (1963 Btu/hr) max	
Gradient, maximum		24°C/hr (43.2°F/hr)
Shock	3 g @ 11ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	

Service clearance		
Front	81.3 cm (32.0 in)	
Back	81.3 cm (32.0 in)	
Miscellaneous		
External host bus	Differential SCSI-2 (synchronous)	
Internal storage-system buses	Two single-ended SCSI buses	

DAS 2300/2900 Rackmount (20-Slot RAID Disk Array)

Dimensions		
Height	356 mm	14.0 in (8 EIA units)
Width	483 mm	19.0 in
Depth	762 mm	30.0 in
Weight		
Minimum (chassis with 5 disk modules, 1SP, 2 VSCs, without packaging):	45.8 kg	100.8 lb
Maximum (chassis with 20 disk modules, 2 SPs, 3 VSCs, BBU, without packaging):	78 kg	173.2 lb
Add-on modules:		
Disk-drive module	1.6 kg	3.5 lb
Third VSC module	2.4 kg	5.3 lb
Second SP	1.2 kg	2.6 lb
BBU	5.4 kg	12.0 lb
Electrical	*(power supplies are auto-sensing and auto-ranging)*	
Voltage range (V ac)	90 V ac to 264 V ac	
Frequency	47 to 63 Hz	
Current draw	9.0 A max. at 100 V ac input	
Power consumption:		
apparent power	900 VA max	
true power	880 W max	

Operating / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 38°C (50 to 100°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2439 m (8000 ft)	7625 m (25000 ft)
Heat dissipation	$3168x10^3$ J/hr (3000 Btu/hr) max	
Gradient, maximum		24°C/hr (43.2°F/hr)

Service clearance	
Front	81.3 cm (32.0 in)
Back	81.3 cm (32.0 in)

DAS 3200 Rackmount

Dimensions		
Height	46.74 cm	18.4 in
Width	48.2 cm	19 in
Depth	76.2 cm	30 in
Weight		
Maximum (chassis with 30 disk modules, 2 SPs, 3 VSCs, BBU, without packaging)):	106.6 kg	235 lb
Add-on modules:		
Disk-drive module	1.6 kg	3.5 lb
Second SP	1.2 kg	2.6 lb
BBU	5.9 kg	13 lb
Electrical	*(power supplies are auto-ranging)*	
Voltage range (V ac) single-phase	200 V ac to 240 V ac –10%/+15%,	
Frequency	47 to 63 Hz	
Current draw	5.0 A max. at 200 V ac input	
Power consumption:		
Input power	950 W max	
Power factor	.95 (min at full power)	
Phase	1	
Power cables:		
USA primary power	1.8 m (6.0 ft): NEMA 5-15P connection, L5-15R mating connection	
Other locations	Local standard ac connection	

Operating / Non-operating Limits

	Operating	**Non-operating**
Ambient temperature	10 to 38°C (50 to 100°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2439 m (8000 ft)	7625 m (25000 ft)
Heat dissipation	3300 Btu/hr max	

IMPORTANT: The operating limits listed above for temperature and humidity must not be exceeded inside the closed cabinet in which the 30-slot chassis is mounted. Mounting equipment in a cabinet directly above or below a storage system does not restrict air flow to the storage system because air flows through the storage system from front to back. Cabinet doors must not impede the front-to-back air flow.

Gradient, maximum		24°C/hr (43.2°F/hr)
Shock	3 g @ 11ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	

Service clearance	
Front	8.13 cm (32.0 in)
Back	8.13 cm (32.0 in)
Miscellaneous	
External host bus	Differential SCSI-2 (synchronous)
Internal storage-system buses	Five single-ended SCSI buses

DAS 3500 Rackmount

Dimensions		
Height	46.74 cm	18.4 in
Width	48.2 cm	19 in
Depth	76.2 cm	30 in
Weight		
Maximum (chassis with 30 disk modules, 2 SPs, 3 VSCs,BBU, without packaging)):	98.2 kg	216.5 lb
Add-on modules:		
Disk-drive module	1.4 kg	3.0 lb
Second SP	1.2 kg	2.6 lb
BBU	5.9 kg	13 lb
Electrical	*(power supplies are auto-ranging)*	
Voltage range (V ac)	200 V ac to 240 V ac –10%/+15%, single-phase,	
Frequency	47 to 63 Hz	
Current draw	5.0 A max. at 200 V ac input	
Power consumption:		
apparent power	1000 VA max	
Input power	950 W max	
power factor	.95 (min at full power)	
Phase	1	
Chassis power inlet	IEC 320–C14 Appliance Connector	
Power cables:		
USA primary power	1.8 m (6.0 ft): NEMA 6-15P connector, (requires NEMA 6–15R receptacle)	
Other locations	Local standard ac connection	

Operating / Non-operating Limits

	Operating	**Non-operating**
Ambient temperature	10 to 38°C (50 to 100°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2439 m (8000 ft)	7625 m (25000 ft)
Heat dissipation	3300 Btu/hr max	

IMPORTANT: The operating limits listed above for temperature and humidity must not be exceeded inside the closed cabinet in which the 30-slot chassis is mounted. Mounting equipment in a cabinet directly above or below a storage system does not restrict air flow to the storage system because air flows through the storage system from front to back. Cabinet doors must not impede the front-to-back air flow.

Gradient, maximum		24°C/hr (43.2°F/hr)
Shock	3 g @ 11ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	

Service clearance		
Front	81.3 cm (32.0 in)	
Back	81.3 cm (32.0 in)	
Miscellaneous		
External host bus	Copper fibre channel or optional fiber optic	
Performance	100 MBytes per second	
Internal storage-system buses	Five single-ended SCSI buses	

DAS 4500 Rackmount

Dimensions		
Height	28.59 cm (11.25 in**)**	
	6.5 NEMA units including mounting hardware	
Width	44.5 cm (17.5 in); mounting bars fit standard 19–inch NEMA cabinets	
Depth	70.02 cm (27.57 in) front door to back of drive fan pack	
	67.10 cm (26.42 in) enclosure front to back of drive fan pack	
	64.12 cm (25.24 in) rail front to back of drive fan pack	
Weight		
Maximum	52.0 kg (114.4 lbs) highly available max	
	1.0 kg (2.3 lbs) disk-drive module	
	1.8 kg (4.0 lbs) disk fan pack	
	1.8 kg (4.0 lbs) SP	
	1.8 kg (4.0 lbs) SP fan pack	
	0.8 kg (1.7 lbs) LCC (Link Control Card)	
	5.4 kg (12 lbs) power supply	
Electrical	*(power supplies are auto-ranging)*	
Voltage range (V ac)	100 V ac to 240 V ac –10%/+10%, single-phase,	
Frequency	47 to 63 Hz	
Current draw	8.0 A max. at 100 V ac (fully configured)	
Power consumption:		
apparent power	800 VA max estimate (fully configured)	
dissipation	700 W max estimate (fully configured)	
power factor	0.87 (min at full power, low voltage)	
Chassis power inlet	IEC 320–C14 Appliance coupler	
ac protection	12 A thermal circuit breaker on each power supply	
In–rush current	50 A max estimate for 1/2 line cycle, per power supply	
Hold–up time	10 ms min at 50 Hz	
Current sharing	60% max, 40% min	
Power cables:		
USA primary power	1.8 m (6.0 ft): NEMA 6-15P connector, (requires NEMA 6–15R receptacle)	
Other locations	Local standard ac connection	
Operating Limits / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 40°C (50 to 104°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2439 m (8000 ft) at 40°C	7625 m (25,000 ft)
	3077 m (10000 ft) at 37°C	
Gradient, maximum	10°C/hr (18°F/hr)	
Shock	3 g @ 11ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	
Service clearance		
Front	81.3 cm (32.0 in)	
Back	81.3 cm (32.0 in)	

DAS 4700 Rackmount

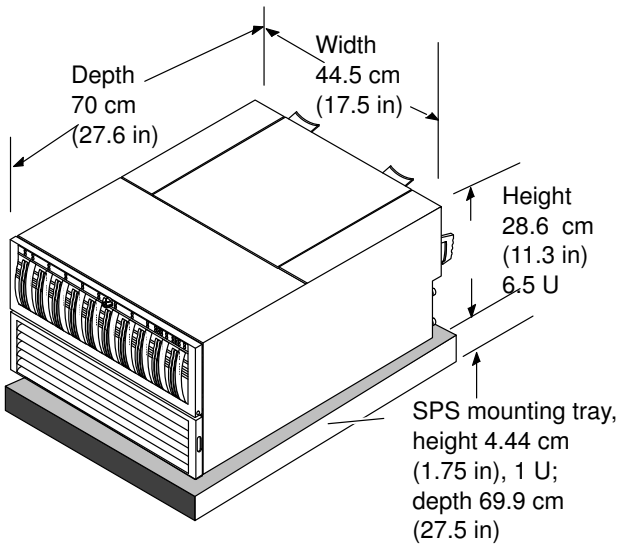
Dimensions		
Height	28.59 cm (11.25 in**)** 6.5 NEMA units including mounting hardware	
Width	44.5 cm (17.5 in); mounting bars fit standard 19–inch NEMA cabinets	
Depth	70.02 cm (27.57 in) front door to back of drive fan pack 67.10 cm (26.42 in) enclosure front to back of drive fan pack 64.12 cm (25.24 in) rail front to back of drive fan pack	
Weight		
Maximum	55.0 kg (114.4 lbs) DPE with 2 SPs, 2 LCCs, 2 power supplies, and 10 disk modules 1.0 kg (2.3 lbs) disk-drive module 1.8 kg (4.0 lbs) disk fan pack 3.3 kg (7.3 lbs) SP 1.8 kg (4.0 lbs) SP fan pack 0.8 kg (1.7 lbs) LCC (Link Control Card) 5.4 kg (12 lbs) power supply	
Electrical	*(power supplies are auto-ranging)*	
Voltage range (V ac)	100 V ac to 240 V ac –10%/+10%, single-phase,	
Current ac line	8.0 A max. at 100 V ac (fully configured)	
Power consumption:	800 VA max estimate (fully configured)	
Power dissipation	792 W max estimate (fully configured)	
Power factor	0.99 (min at full load, low voltage)	
Heat dissipation	2851×10^3 J/hr (2703 TU/hr) max estimate	
In–rush current	50 A max estimate for 1/2 line cycle, per power supply	
ac protection	12 A thermal circuit breaker on each power supply	
ac inlet time	IEC 320–C14 Appliance couple	
Hold–up time	10 ms min at 50 Hz	
Current sharing	60% max, 40% min	
Power cables:		
USA primary power	1.8 m (6.0 ft): NEMA 6-15P connector, (requires NEMA 6–15R receptacle)	
Other locations	Local standard ac connection	
Operating limits / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 40°C (50 to 104°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2438 m (8000 ft) at 40°C 3077 m (10000 ft) at 37°C	7625 m (25,000 ft)
Temperature Gradient	10°C/hr (18°F/hr)	
Shock	3 g @ 11ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	
Service clearance		
Front	30.3 cm (1 ft)	
Back	60.6 cm (2 ft)	

DAS 5300 Rackmount

Dimensions		
Height	15.41 cm (6.07 in**)**	
	3.5 NEMA units including mounting hardware	
Width	44.5 cm (17.5 in)	
Depth	63.27 cm (24.91 in) front door to back of drive fan pack	
	60.43 cm (23.79 in) chassis front to back of drive fan pack	
	57.25 cm (22.54 in) rail front to back of drive fan pack	
Weight		
Maximum	36.0 kg (80.0 lbs) highly available max	
	1.05 kg (2.3 lbs) disk-drive module	
	0.68 kg (1.5 lbs) storage processor	
	3.8 kg (8.5 lbs) power supply	
	1.8 kg (4.0 lbs) drive fan pack	
Electrical	*(power supplies are auto-ranging)*	
Voltage range (V ac)	100 V ac to 240 V ac –10%/+10%, single-phase,	
Frequency	47 to 63 Hz	
Current draw	4.0 A max. at 100 V ac (fully configured)	
Power consumption:		
apparent power	400 VA max estimate (fully configured)	
dissipation	392 W max estimate (fully configured)	
power factor	0.98 (min at full power, low voltage)	
Chassis power inlet	IEC 320–C14 Appliance coupler	
ac protection	8 A thermal circuit breaker on each power supply	
In–rush current	25 A max estimate for 1/2 line cycle, per power supply	
Hold–up time	20 ms min at 50 Hz	
Current sharing	60% max, 40% min	
Power cables:		
USA primary power	1.8 m (6.0 ft): NEMA 6-15P connector, (requires NEMA 6–15R receptacle)	
Other locations	Local standard ac connection	
Operating Limits / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 40°C (50 to 104°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2439 m (8000 ft) at 40°C 3077 m (10000 ft) at 37°C	7625 m (25,000 ft)
Gradient, maximum	10°C/hr (18°F/hr)	
Shock	3 g @ 11ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	
Service clearance		
Front	81.3 cm (32.0 in)	
Back	81.3 cm (32.0 in)	

DAS 57x0 Rackmount

Rackmount model



Weight (without packaging)	**Rackmount**
Maximum (max disks, SPs, LCCs, PSs)	52 kg (115 lb) with 2 SPSs 74 kg (163 lb)

Power requirements	
Voltage rating	100 V ac to 240 V ac –10%/+15%, single-phase, 47 Hz to 63 Hz; power supplies are auto-ranging
Current draw	At 100 v ac input – Rackmount DPE: 8.0 A max SPS: 1.0 A max per unit during charge
Power consumption	Rackmount DPE: 800 VA max SPS: 100 VA per unit during charge

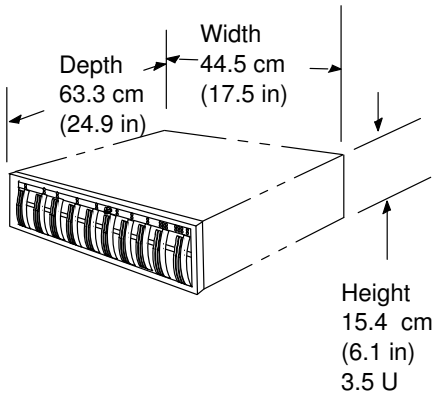
Power cables (single or dual)		
ac inlet connector	IEC 320-C14 power inlet	
Deskside power cord	USA	1.8 m (6.0 ft): NEMA 6-15P plug
	Outside USA	Specific to country

Operating environment	
Temperature	10ºC to 40ºC (50º F to 104º F)
Relative humidity	Noncondensing, 20% to 80%
Altitude	40ºC to 2,438 m (8,000 ft); 37ºC to 3,050 m (10,000 ft)
Heat dissipation (max)	Rackmount DPE: 2520×10^3 J/hr (2390 BTU/hr) max estimated
Air flow	Front to back

Service clearances	Front: 30.3 cm (1 ft) Back: 60.6 cm (2 ft)

DAE 5000 Rackmount

Rackmount model



Weight (without packaging)	**Rackmount**
Maximum configuration	35.4 kg (78 lb)
Power requirements	
Voltage rating	100 V ac to 240 V ac –10%/+15%, single-phase, 47 Hz to 63 Hz; power supplies are auto-ranging
Current draw	At 100 V: 30-slot: 12 A; 10-slot 4 A max
Power consumption	30-slot: 1200 VA; 10-slot 400 VA per supply max
Power cables (single or dual)	
ac inlet connector	IEC 320-C14 power inlet
Deskside power cord	USA 1.8 m (6.0 ft): NEMA 6-15P plug Outside USA Specific to country
Operating environment	
Temperature	10°C to 40°C (50° F to 104° F)
Relative humidity	Noncondensing, 20% to 80%
Altitude	40°C to 2,438 m (8,000 ft); 37°C to 3,050 m (10,000 ft)
Heat dissipation (max)	30-slot: 4,233 KJ/hr (4,020 BTU/hr) 10-slot: 1,411 KJ/hr (1,340 BTU/hr)
Air flow	Front to back
Service clearances	Front: 30.3 cm (1 ft) Back: 60.6 cm (2 ft)

NDAS CX600

Dimensions		
Height	28.59 cm (7.00 in**)** 4 NEMA units including mounting hardware	
Width	44.5 cm (17.5 in); mounting bars fit standard 19–inch NEMA cabinets	
Depth	70.02 cm (27.57 in) front door to rear 67.10 cm (26.42 in) chassis to rear 64.12 cm (25.24 in) rail front to back	
Weight		
Maximum	52.2 kg (115 lbs) (fully configured)	
Electrical		
Voltage range (V ac)	100 V ac to 240 V ac –10%/+10%, single-phase,	
Frequency	47 to 63 Hz	
Current ac line	5.2 A max. at 100 V ac (fully configured) 2.6 A max. at 200 V ac (fully configured)	
Power consumption	520 VA (510 W) max (fully configured)	
Power factor	0.98 (min at full load, 100 Vac)	
Heat dissipation	$1840x10^3$ J/hr (1740 BTU/hr) max estimate	
In–rush current	25 A max for 1/2 line cycle, per power supply at 240Vac 15 A max for 1/2 line cycle, per power supply at 120Vac	
ac protection	10 A internal fuse (non-serviceable)	
ac inlet time	IEC 320–C14 Appliance couple	
Ride-through	30 ms min at full load	
Current sharing	60% max, 40% min between power supplies	
Operating limits / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 40°C (50 to 104°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2438 m (8000 ft) at 40°C 3077 m (10000 ft) at 37°C	7625 m (25,000 ft)
Temperature Gradient	10°C/hr (50°F/hr)	25°C/hr (77°F/hr)

NDAS CX400 and CX200

Dimensions		
Height	13.34 cm (5.25 in**)**	
	3 NEMA units including mounting hardware	
Width	45 cm (17.72 in)	
Depth	60.33 cm (23.75 in) front door to rear	
Weight		
Maximum	40 kg (88 lbs) (fully configured)	
Electrical		
Frequency	47 – 63 Hz	
Voltage range (V ac)	100 V ac to 240 V ac –10%/+10%, single-phase,	
Current ac line	5.9 A max. at 100 V ac (fully configured *)	
	2.9 A max. at 200 V ac (fully configured *)	
Power consumption	590 VA (578 W) max (fully configured *)	
Power factor	0.98 (min at full load, 100 Vac)	
Heat dissipation	$2080x10^3$ J/hr (1975 BTU/hr) max (*)	
In–rush current	25 A max for 1/2 line cycle, per power supply at 240Vac	
	15 A max for 1/2 line cycle, per power supply at 120Vac	
ac protection	10 A fuse in each power supply, both phases	
ac receptacle type	IEC 320–C14 Appliance coupler, per power supply	
Hold-up time	20 ms min at full load	
Current sharing	60% max, 40% min between power supplies	
Operating limits / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 40°C (50 to 104°F)	-40 to 65°C(-40 to 149°F)
Relative humidity (noncondensing)	20 to 80%	10 to 90%
Elevation	2438 m (8000 ft) at 40°C 3077 m (10000 ft) at 37°C	7625 m (25,000 ft)
Temperature Gradient	10°C/hr (50°F/hr)	25°C/hr (77°F/hr)
* A fully configured CX includes 2 Power Supplies, 2SPs and 15 disk drives		

AMDAS JBOD

Just a Bunch of Disks Subsystem rack mount model comprises:

- 1 Disk array adapter
- Up to 4 disk trays
- Up to 24 disk-drive modules
- 1 DAS power supply
- 1 fan assembly (or optional 2nd DAS power supply)
- RS232 interface.

Dimensions	Highboy (19” rack)	
Height		2010 mm
Width		1180 mm
Depth		780 mm
Dimensions	Rack mount	
Height		900 mm
Width		1060 mm
Depth		650 mm
Weight	Highboy (19” rack)	
Maximum:		180 kg (empty cabinet)
Weight	Highboy (Rack mount)	
Maximum:		100 kg
Electrical		*(power supplies are auto-ranging)*
Voltage range (V ac)		187 V ac to 254 V ac –19%/+10%,
Frequency		50/60 Hz (± 2%)
Current draw		
Power consumption:		
apparent power		1009 VA max (max. config. 2 RAID storage processors + 30 disk-drive modules)
Phase		1
Chassis power inlet		
Power cables:		
USA primary power		
Other locations		

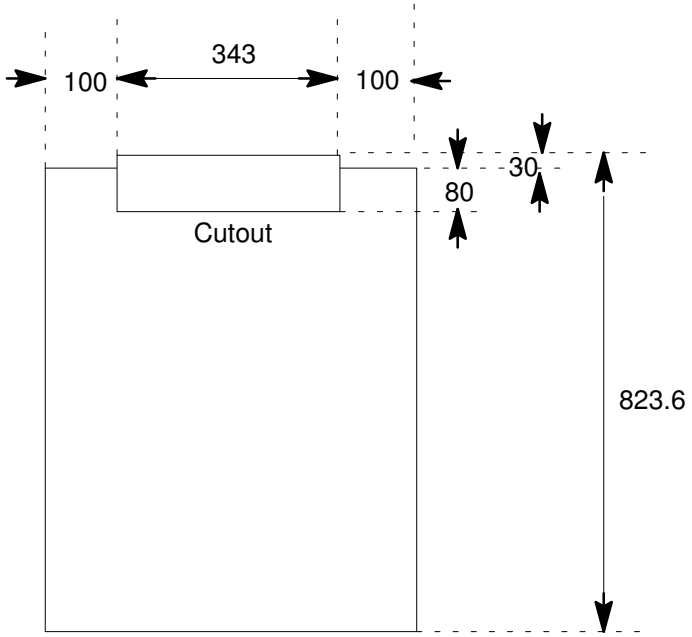
Operating / Non-operating Limits	**Operating**	**Non-operating**
Ambient temperature	10 to 40°C	-40 to 50°C
Relative humidity (noncondensing)	20 to 80%	5 to 95%
Elevation	0 to 2000 m	0 to 7620 m
Heat dissipation	Btu/hr max	
Gradient, maximum		24°C/hr (43.2°F/hr)
Shock	30 g @ 11ms	20 g @ 11ms
Vibration	not quoted	

Service clearance	
Front	1560 mm

Note: If the chosen Disk Array has two power supplies, two power cables are needed. For High Availability purposes, they must be connected to two different power sources.

Footprint

The following figure shows the Disk Array rack floor space requirements:



Measurements in mm

Note: When cutting a false floor to pass the Disk Array Cables, remember that each rack can contain up to 4 Disk Array units, each with up to 4 cables. A maximum number of 16 cables must be anticipated.

SSA 7133 Model 020

Dimensions		
Height		171 mm (6.7 in.)
Width		444 mm (17.5 in.)
Depth		665 mm (26.2 in.)
Weight		
Maximum:		50 kg (110 lb)
Minimum:		36 kg (79 lb)
Add-on modules:		
Base Model		
2 Fan & Power Supply		
1 Dummy Fan & Power Supply		
4 Disk Drive Modules		
Maximum:		36 kg (79 lb)
Minimum:		37.5 kg (83 lb)
Expanded Model		
2-3 Fan & Power Supply		
0-1 Dummy Fan & Power Supply		
5-8 Disk Drive Modules		
Maximum:		37 kg (81 lb)
Minimum:		43 kg (95 lb)
Maximum Model		
3 Fan & Power Supply		
0 Dummy Fan & Power Supply		
9-16 Disk Drive Modules		
Maximum:		44 kg (96 lb)
Minimum:		50 kg (110 lb)
Electrical		
AC Voltage range (V ac)		90 V ac to 260 V ac
Frequency		47 to 64Hz
Current draw		Not quoted
Power consumption:		
apparent power		VA max
Input power		W max
power factor		
Phase		1
DC Voltage range (V dc)		– 43 to – 60V DC
Chassis power inlet		Not quoted
Power cables:		
USA primary power		Not quoted
Other locations		Not quoted
Operating / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 40°C (50 to °F)	40 to 52°C(to °F)
Relative humidity (noncondensing)	8 to 80%	8 to 80%
Elevation		
Heat dissipation (base config.)		140 watts (478 Btu/hr)
Heat dissipation (expanded config.)		275 watts (938 Btu/hr)
Heat dissipation (max. config.)		480 watts (1638 Btu/hr)
Gradient, maximum		not quoted
Shock	not quoted	
Vibration	not quoted	
Service clearance		
Front		81.3 cm (32.0 in)
Back		81.3 cm (32.0 in)

Operational Considerations

Each 7133 rack-mounted unit requires an airflow of 1.56 m^3/min. (55 CFM). When racks containing many 7133 units are to be installed together, the following requirements must be met to ensure that the 7133 units are adequately cooled:

- The airflow enters at the front of the rack and leaves at the back. To prevent the air that is leaving the rack from entering the intake of another piece of equipment, racks should be positioned in alternate rows, back-to-back and front-to-front.
- The front of racks should be positioned on floor-tile seams, with a full line of perforated tiles immediately in front of the racks. Each perforated tile should have an air flow of at least 11.34 m/min. (400 CFM). The underfloor temperature must be at most 15°C (60°F).
- Where racks are in rows front-to-front or back-to-back, there should be a gap of at least 1220 mm (48 in.) separating the rows.
- To ensure proper air flow within each rack, the rack filler plates must be installed in unused positions. also, all the gaps in the front of the racks must be sealed, including the gaps between the 7133 units.

The recommended operating temperature is 22°C (72°F) or lower. At lower temperatures, the risk of failure in the unit is reduced. If the operating temperature is above 22°C (72°F) for long periods, the unit is exposed to a greater risk of failure.

Use of SSA for Disaster Recovery Solutions

Using a Fibre Optic Extender with STII Fibre-Optic Connectors, Figure 6, an SSA loop can be extended to up to 600 meters (between buildings, for example). See **Site Interconnection Examples**, on page 10-1.

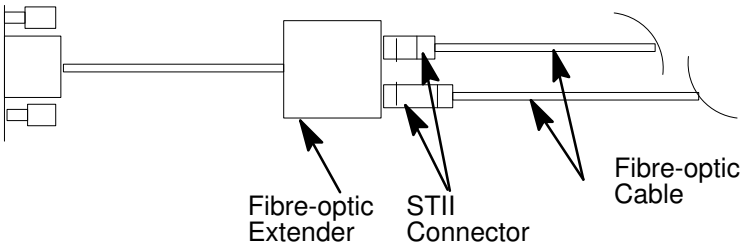


Figure 6. Fibre-Optic Extender with STII Connectors

Chapter 7. Tape Subsystems

Describes requirements for site using shared tape drives.

Tape Subsystems – Overview

Tape subsystems include:

- Overland libraries with DLT 4000 & DLT 7000 drives
- Storagetek libraries with DLT 4000 & DLT 7000 drives
- VDAT Mammoth External 8mm tape drive.

Specifications:

- DLT 4000, on page 7-2.
- DLT 7000, on page 7-3.
- VDAT Mammoth External 8mm tape drive, on page 7-4.

DLT 4000

General Parameters

Dimensions		
Height	123.5 mm ± 1 mm	
Width	229.0 mm ± 1 mm	
Depth	320.0 mm ± 1 mm	
Weight		
Maximum:	6.63 kg	
Electrical	*(power supplies are auto-sensing and auto-ranging)*	
Voltage range (V ac)	100 V ac to 240 V ac	
Frequency	47 to 63 Hz	
Current draw		
Power consumption:		
apparent power	50 W max	
Phase	1	
Chassis power inlet	IEC 320–C14 Appliance Connector	
Power cables:		
Operating / Non-operating Limits		
	Operating	**Storage**
Ambient temperature	10 to 40°C (50 -104°F)	-40 to 66°C(-40 - 150.8°F)
Relative humidity (noncondensing)	20 to 80%	10 to 95%
Humidity gradient	10%/hour	
Elevation	18 m to +9000 m	18 m to +9000 m
Heat dissipation	Btu/hr max	
Gradient, maximum	11°C/hr (°F/hr) over 2 min.	11°C/hr (°F/hr) with 5°C margin over 2 min.
Shock	10 g @ 10ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	
Acoustic noise levels	35.0 dB (LPAc) at idle 40.0 dB (LPAc) streaming	

Power Cord

Warning: Do not attempt to modify or use and external 100 - 115 VAC power cord for 220 - 240 VAC input power. Modifying the power cord can cause personal injury and severe equipment damage.

The AC power cord used with this equipment must meet the following criteria:

- UL and CSA Certified cordage rate for use at 250 VAV with a current rating that is at least 125% of the current rating of the product. In Europe, the cordage must have the <HAR> mark.
- The AC plug must be terminated in a grounding-type male plug designed for operation in the country of use. It must also have marks showing certification by an agency acceptable in the country.
- The connector at the product end must be an IEC type CEE-22 female connector.
- The cord must be no longer than 14.5 feet (4.5 meters).

Note: the power cord should be a minimum of 18/3 AWG, 60°C, Type SJT or SVT.

Dimensions		
Height	123.5 mm ± 1 mm	
Width	229.0 mm ± 1 mm	
Depth	320.0 mm ± 1 mm	
Weight		
Maximum:	6.63 kg	
Electrical	*(power supplies are auto-sensing and auto-ranging)*	
Voltage range (V ac)	100 V ac to 240 V ac	
Frequency	47 to 63 Hz	
Current draw		
Power consumption:		
apparent power	50 W max	
Phase	1	
Chassis power inlet	IEC 320–C14 Appliance Connector	
Power cables:		
Operating / Non-operating Limits		
	Operating	**Storage**
Ambient temperature	10 to 40°C (50 -104°F)	-40 to 66°C(-40 - 150.8°F)
Relative humidity (noncondensing)	20 to 80%	10 to 95%
Humidity gradient	10%/hour	
Elevation	18 m to +9000 m	18 m to +9000 m
Heat dissipation	Btu/hr max	
Gradient, maximum	11°C/hr (°F/hr) over 2 min.	11°C/hr (°F/hr) with 5°C margin over 2 min.
Shock	10 g @ 10ms	
Vibration	0.25 g peak @ 5 Hz to 500 Hz	
Acoustic noise levels	35.0 dB (LPAc) at idle 40.0 dB (LPAc) streaming	

VDAT Mammoth 8mm Tape Drive

General Parameters

Dimensions	
Height	250 mm (9.8 in.)
Width	275 mm (10.8 in.)
Depth	55 mm (2.2 in.)
Weight	
Maximum:	5.0 kg
Electrical	
Voltage range (V ac)	100 – 125 V ac or 200 – 240 V ac
Frequency	50 to 60 Hz
Current draw	0.041 kVA
Power consumption:	
apparent power	20 W
Phase	1
Chassis power inlet	See manufacturer's documentation
Power cables:	See manufacturer's documentation

Operating / Non-operating Limits

	Operating	**Storage**
Ambient temperature	16 to 32°C (60 - 90°F)	1 to 60°C(34 - 140°F)
Relative humidity (noncondensing)	20 to 80%	10 to 80%
Humidity gradient	not quoted	
Max. Wet Bulb	23 °C (73°F)	29 °C (84°F)
Elevation	3048 m (10,000 ft) maximum	
Heat dissipation	67 Btu/hr max	
Gradient, maximum	not quoted	
Shock	not quoted	
Vibration	not quoted	
Acoustic noise levels	not quoted	

Note: Operating limits include media.

Media Storage Parameters

	Storage
Ambient temperature	5 to 32°C(41 - 90°F)
Relative humidity (noncondensing)	20 to 60%
Humidity gradient	not quoted
Max. Wet Bulb	26 °C (79°F)

Cleaning Procedures

This product demands stringent cleaning operations. The user must be familiar with cleaning procedures which are detailed in the vendor's documentation:

- *7208 20GB External 8mm Tape drive Model 341 – Setup & Operator Guide*
- *7208 20GB External 8mm Tape drive Model 341 – Service Guide.*

See also, *EXABYTE VDAT 8mm Mammoth – Care & Handling Guide*.

Chapter 8. Operator Consoles

Describes various console specifications.

Operator Consoles – Overview

The following consoles can be used with rack systems:

- System Console (Bull Questar 306), on page 8-2.
- Graphics Display, on page 8-5.
- Cluster Console (X-terminal ”Explora”), on page 8-6.
- PowerConsole, on page 8-11.

System Console (BQ306)

The System Console is in three separate modules: the monitor, keyboard and mouse.

Specifications

Dimensions		
Height		320 mm (12.5 in.)
Width		340 mm (13.4 in.)
Depth		310 mm (12.2 in.)
Weight		
Maximum (Display Console with Keyboard):		11.4 kg (25.0 lb)
Keyboard:		2.3 kg (5.0 lbs)
Electrical		*(power supplies are auto-ranging)*
Voltage range (V ac)		120 V ac to 240 V ac
	120 V ac	90 – 132 V ac
	240 V ac	180 – 240 V ac
Frequency		47 – 63 Hz
Current draw	120 V ac	1.0 A
	240 V ac	0.5 A
Power consumption:		45 W (maximum)
Phase		1
Chassis power inlet		IEC 320–C14 Appliance Connector
Power cables:		
USA primary power		1.8 m (6.0 ft): NEMA 6-15P connector, (requires NEMA 6–15R receptacle)
Other locations		Local standard ac connection

Operating / Non-operating Limits

	Operating
Ambient temperature	10 to 40°C (50 to 104°F)
Relative humidity	Not quoted
Gradient, maximum	Not quoted
Shock	Not quoted
Vibration	Not quoted

Standards

CISPR, IEC. EN Statements

CISPR 22 and EN 55022 Class B.

IEC 950 and EN 60950.

Electro-Magnetic Interference

FCC-A and Canadian Department of Communications – Class A.

Working Clearances

Console to be placed on a flat, hard surface, allowing 76.2 mm (3 in.) on all sides for ventilation and external cabling.

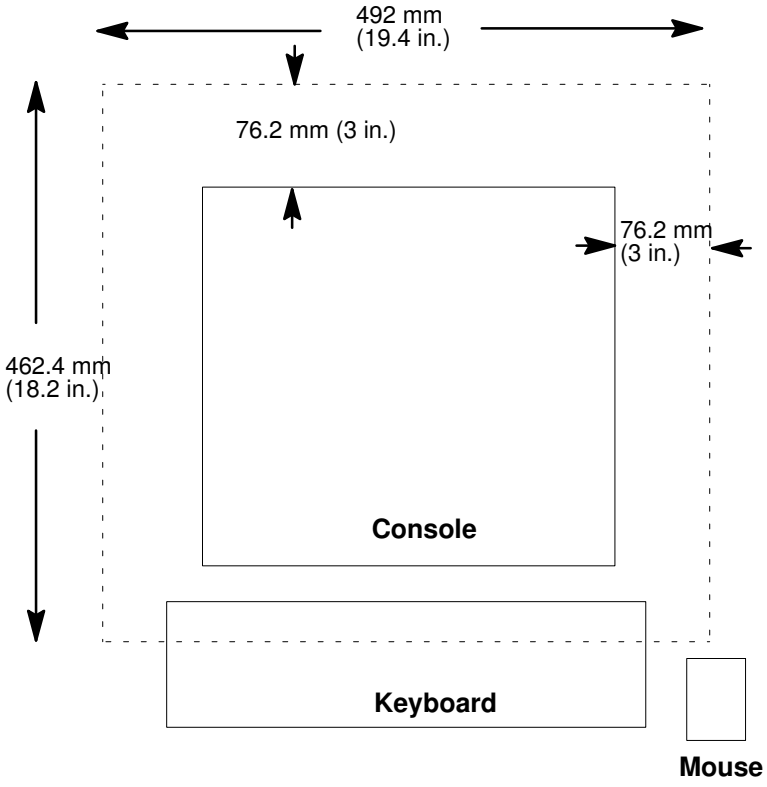


Figure 7. Clearance Footprint – System Console

Power Connection

Grounded power outlet accommodating a 3-pronged plug.

Three-core power cord suited to local regulations.

Signal Connections

Console can be connected directly to a host computer or indirectly to a remote system via a terminal server or modem. A serial printer can also be connected directly, for use with application which support it.

Host Port (RS-232C / RS-422)

RS-232C or RS-422 shielded serial cable with a 25-pin male connector on the console end.

Printer Port (RS-232C)

RS-232C shielded serial cable with a 25-pin male connector on the console end.

Typical Configuration

The System Console is offered in the following cluster configurations:

- Uni–node Powercluster: the System Console is connected to a node's S1 port.
- Two–node Powercluster: the System Console can be used alone. In this case the System Console is connected to a node's S1 port.
- Powercluster with 3 to 8 nodes: the System Console can be used with a Cluster Console or a Cluster Powerconsole. In this case, the System Console is connected to a console concentrator.

Note: A 9M/25M RS232 cable (CBL1912) shipped with any Escala node, is connected to the node's S1 plug (9F)

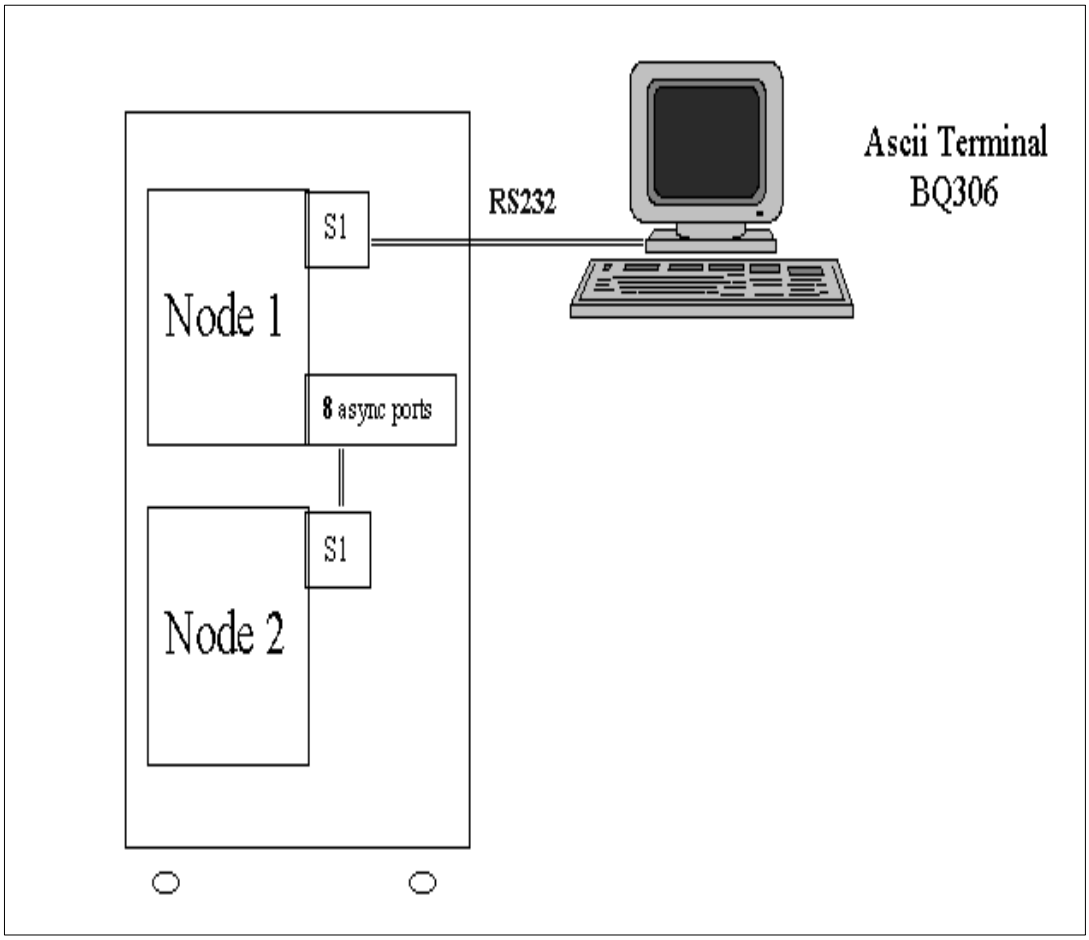


Figure 8. System Console Connected With a 2-Node Powercluster

Graphics Display

The Graphics Display is in three separate modules: the monitor, keyboard and mouse.

Specifications

The display can be one of the following:

- 15” or 17” Color display.
- 17” or 20” Multiscan Color Display.

For details, see Vendor’s Publications.

Typical Configuration

The Graphics Display is offered in the following cluster configurations:

- Uni-node Powercluster: the Graphics Display can be ordered in lieu of a System Console (an ASCII terminal)
- Two–node Powercluster: there can be a System Console attached to a first node and a Graphics Display attached to a second node.
- The latter applies to an EPC400 or anEPC1200 node. There is no Graphics Display on EPC800 nodes.

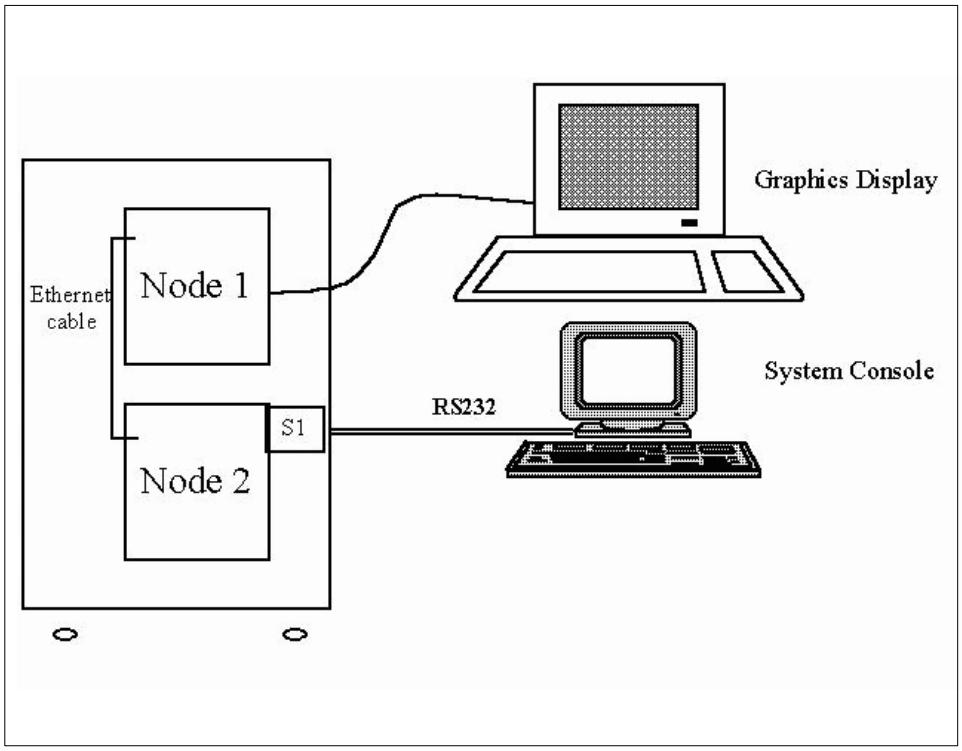


Figure 9. Graphics Display and System Console and Connected With a 2–node Powercluster.

Cluster Console (X-terminal ”Explora”)

The Cluster Console is in four separate modules: the Explora Base, base power supply, Monitor WY-917P and keyboard.

Base & Power Supply

Note: The Explora Base module may be mounted vertically. An optional bracket, with screws is available.

Dimensions: Base only - Table-top		
Height		41.3 mm (1.625 in.)
Width		184.2 mm (7.25 in.)
Depth		254.0 mm (10.0 in.)
Weight		
Maximum:		0.686 kg (1.51 lbs)
Electrical: Power Supply		
Voltage range (V ac)	Europe/Australia	180 V ac to 265 V ac
Frequency		50 Hz (± 3 Hz)
	North America	90 V ac to 132 V ac
Frequency		60 Hz (± 3 Hz)
	Japan	85 V ac to 110 V ac
Frequency		47 – 63 Hz
Current draw		Not quoted
Power consumption:		19 W
Phase		1
Chassis power inlet		IEC 320–C14 Appliance Connector
Power cables:		
USA primary power		1.8 m (6.0 ft): NEMA 6-15P connector, (requires NEMA 6–15R receptacle)
Other locations		Local standard ac connection

Operating / Non-operating Limits	
	Operating
Ambient temperature	10 to 40°C (50 to 104°F)
Relative humidity (noncondensing)	10 to 90%
Elevation	up to 3,050 meters (10,000 ft)
Gradient, maximum	Not quoted
Shock	Not quoted
Vibration	Not quoted

Standards

Safety

EN 55022, EN 50082-1, EN 60950.

Application of Council Directives

89/336/EEC, 73/23/EEC.

Electro-Magnetic Interference

FCC-A.

X-terminal (17-inch)

Dimensions:	
Height	425mm (16.73 in.)
Width	408 mm (16.06 in.)
Depth	435 mm (17.13 in.)
Weight	
Maximum	22 kg (48.4 lbs)
Electrical	*(power supplies are auto-ranging)*
Voltage range (V ac)	180 V ac to 264 V ac 88 V ac to 132 V ac
Frequency	48 to 62 Hz
Current draw	Not quoted
Power consumption:	130 W (maximum **ON**) 6 W (power-saving mode **OFF**)
Phase	1
Chassis power inlet	IEC 320–C14 Appliance Connector
Power cables:	
USA primary power	1.8 m (6.0 ft): NEMA 6-15P connector, (requires NEMA 6–15R receptacle)
Other locations	Local standard ac connection
Operating / Non-operating Limits	
	Operating
Ambient temperature	0 to 40°C (32 to 104°F)
Relative humidity (noncondensing)	10 to 85%
Elevation	up to 3,050 meters (10,000 ft)
Gradient, maximum	Not quoted
Shock	Not quoted
Vibration	Not quoted
Video Signals	
Video	Anaog: RGB, 0.7 V p–p / 75 Ohms
Synch	separate, Composite or Synch. on Green Positive or Negative TTL
Display Data Channel	
Compatibility	VESA DDC 1/2B

For US market a 21-inch X-terminal is available).

Standards

Safety

UL, CSA, GS, CE, NEMKO, SEMKO, DEMKO, FIMKO, TUN/GS.

Electro-Magnetic Interference

FCC-B, BZT-B, CISPR 22-B, VCCI.

Ergonomics

ISO 9241-3

Emissions

MPR II (MPR 1990:10), TC092 (Option, identified by label on monitor's rear cover).

Ionizing Radiation (X-Rays)

DHHS, PTB (Self Certificated)

Energy Saving

EPA Energy Star, VESA DPMS.

Working Clearances

Console to be placed on a flat, hard surface, allowing 76.2 mm (3 in.) on all sides for ventilation and external cabling.

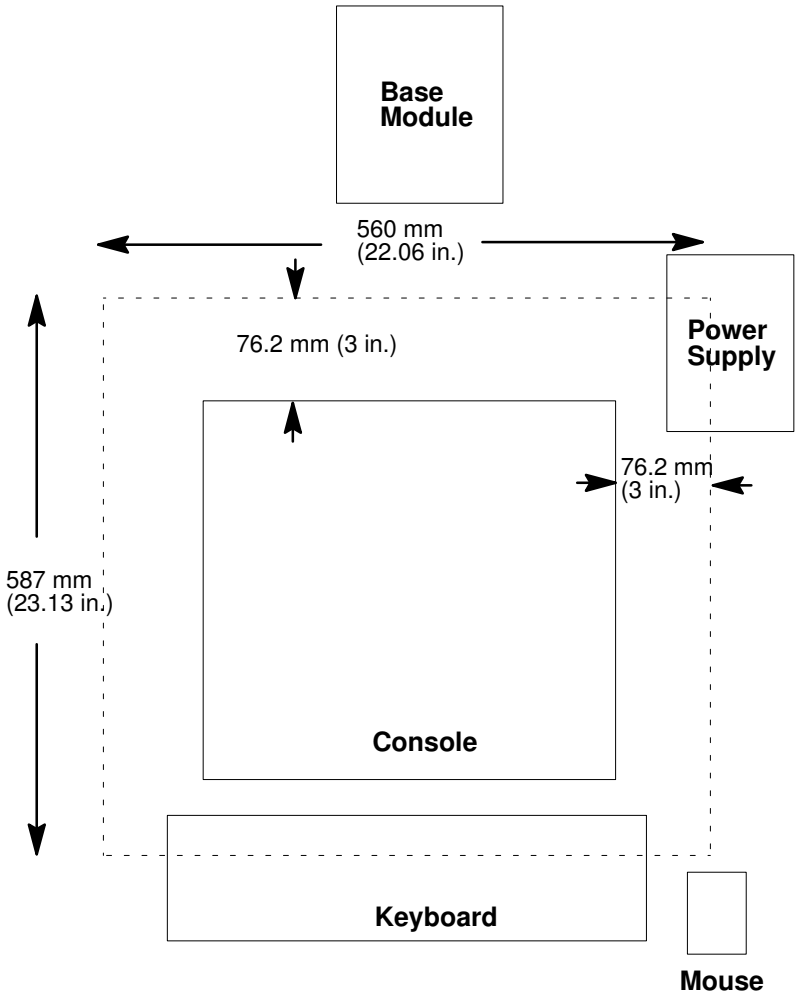


Figure 10. Clearance Footprint – Cluster Console

Power Connection

Grounded power outlet accommodating a 3-pronged plug.

Three-core power cord suited to local regulations.

Signal Connections

Video Connector

15-pin mini D-sub.

Host Port (RS-232C / RS-422)

RS-232C or RS-422 shielded serial cable with a 25-pin male connector on the console end.

Typical Configuration

The Cluster Console needs a Console Concentrator with the option of dedicated administration network.

If there is no Cluster Administration Hub, that is to say no dedicated administration network, the Console Concentrator and the Cluster Console will be connected to the customer's LAN network (an Ethernet network) in customer's premises.

In this case, if the customer's network is COAXIAL THICK or COAXIAL THIN then the Customer is in charge of connecting the Console Concentrator and the Powerconsole to his network with his own cables (As usual for all the Escala platforms).

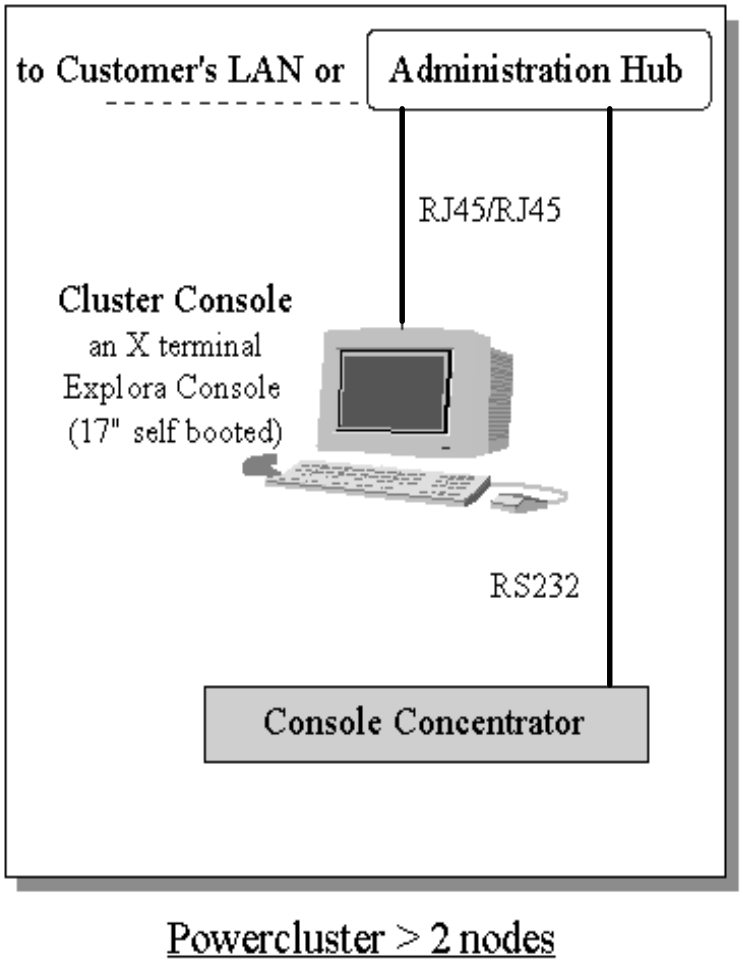


Figure 11. Cluster Console Connected with > 2-Nodes

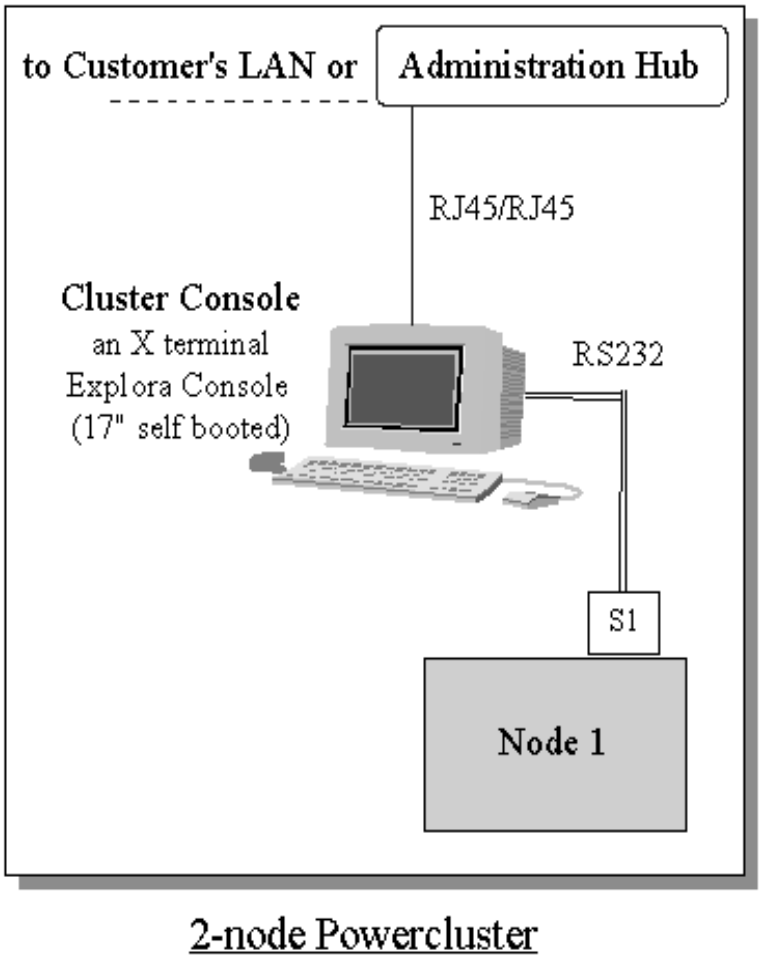


Figure 12. Cluster Console Connected with 2-Nodes

PowerConsole

PowerConsole (Escala S Series)

Specifications

Dimensions		
In horizontal orientation		
Height	165 mm (6.5 in.)	
Depth	460 mm (18.1 in.)	
Width	420 mm (16.5 in.)	
In vertical orientation (support foot included)		
Height	450 mm (17.7 in.)	
Depth	460 mm (18.1 in.)	
Width	235 mm (9.25 in.)	
Weight		
minimum:	14.5 kg (29 lbs)	
maximum:	18.2 kg (40 lbs)	
Maximum weight supportable on top of System Unit (Horizontal Position):	27.3 kg (40 lbs)	
Electrical	*(selectable power supplies)*	
Voltage range (V ac)	100 to 125 V ac / 200 to 240 V ac	
Frequency	50 to 60 Hz	
Current draw	Not quoted	
Power source loading:	0.3k VA typical	
Power source loading:	0.5k VA maximum	
Power supply	250 watts	
Operating / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	16˚ to 32˚ C (60˚ to 90˚°F)	
Relative humidity (noncondensing)	8 to 80%	
Elevation	2135 m (7,000 ft)	
Heat output (maximum)	796 BTUs per hour	597 BTUs per hour
Gradient, maximum	Not quoted	
Shock	0.5 g @ 11ms	15 g @ 11ms
Vibration	Not quoted	
Acoustics:		
Average sound-pressure levels:		
At operator position:	43 dB	38 dB
At bystander position (1 m.)	38 dB	36 dB
Upper limit sound power levels:		
	5.3 Bels	5.0 Bels
Acoustics		
	Operating	**Non-operating**
Average sound-pressure levels:		
At operator position:	43 dB	38 dB
At bystander position (1 meter)	38 dB	36 dB
Declared (upper limit) sound power levels:		
	5.3 Bels	5.0 Bels

Monitor

The monitor is a 17” color display.

Working Clearances

Console to be placed on a flat, hard surface, allowing 762 mm (3 in.) on all sides for ventilation and external cabling.

Power Connection

Grounded power outlet accommodating a 3-pronged plug.

Three-core power cord suited to local regulations.

Signal Connections

For details, see the *Powercluster Cabling Guide*.

Host Port (RS-232C / RS-422)

RS-232C or RS-422 shielded serial cable with a 25-pin male connector on the machine end.

Typical Configuration

The Cluster PowerConsole needs a Cluster Administration Hub for setting up a dedicated–administration network. A Console Concentrator is used per default in any configuration.

RS232 cables can also be used on the one hand to connect a modem for remote maintenance purpose, and on the other hand to establish a remote asynchronous connection via the switched telephone network.

An LSA board is used to connect a node to the administration Ethernet hub.

The PowerConsole is connected onto the administration hub from its integrated ethernet plug.

There is an optional extra communication board that can be ordered to allow the PowerConsole to be connected to the customer’s LAN network. With that option, an X–Terminal attached to the customer’s network can remotely access to the PowerConsole, provided that it is configured to run with the CDE windows manager of the PowerConsole.

If there is no Cluster Administration Hub, that is to say no dedicated administration network, the Console Concentrator and the PowerConsole will be connected to the customer’s LAN network (it must be an Ethernet network) in customer’s premises. An Ethernet cable (VCW3630) is provided for doing this. If the customer’s network is COAXIAL THICK or COAXIAL THIN then the Customer is in charge of connecting the Console Concentrator and the PowerConsole to his network with his own cables (As usual for all the Escala platforms).

Figures 13 and 14 illustrate the two possible implementations – with or without dedicated administration network. In the former case, the nodes, the PowerConsole and the Console concentrator are linked to the Administration Hub to make an independent Ethernet network, said the dedicated–administration network. In the second case, the PowerConsole and the Console Concentrator are directly connected to the customer’s Ethernet network.

Note: In both cases, the Powercluster nodes are connected to the customer’s LAN network.

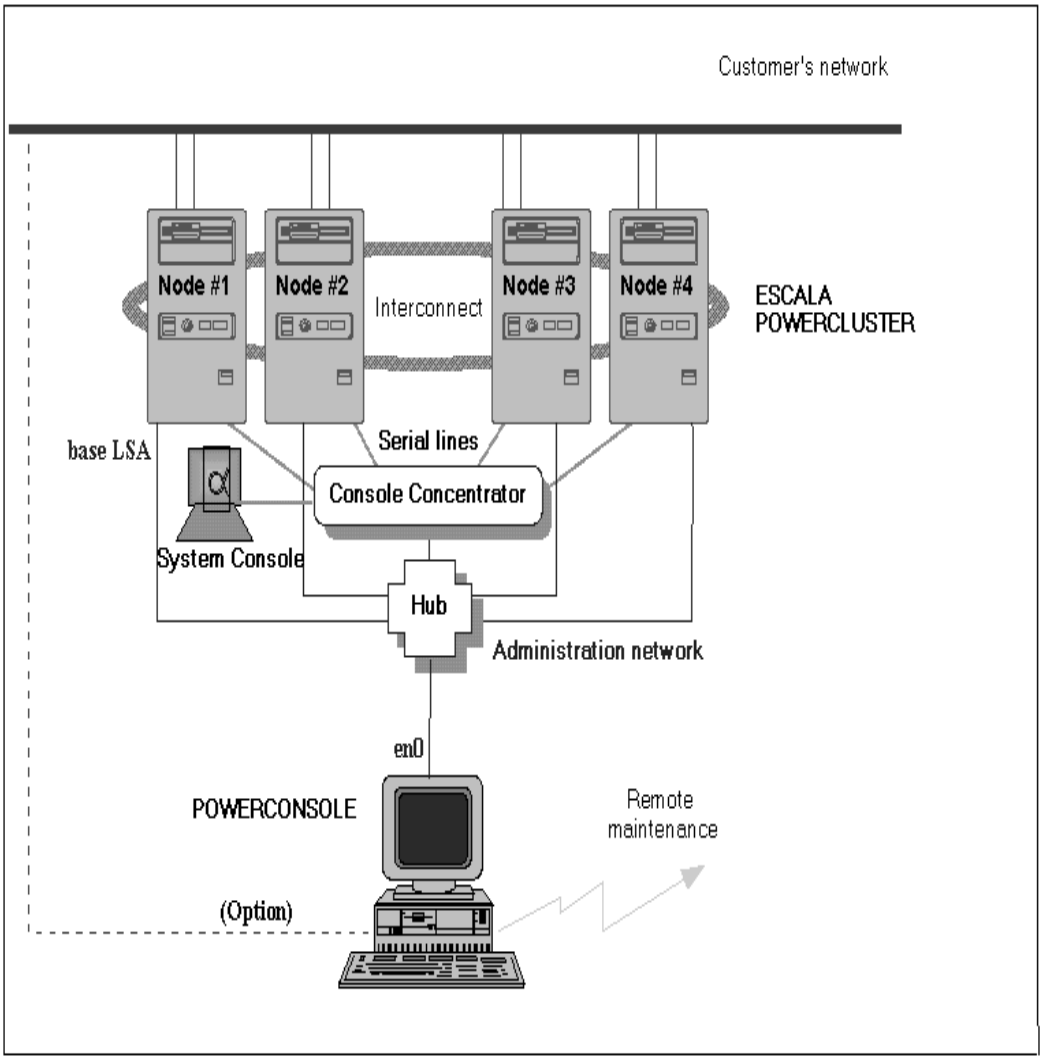


Figure 13. PowerConsole Connected with a Dedicated Administration Network

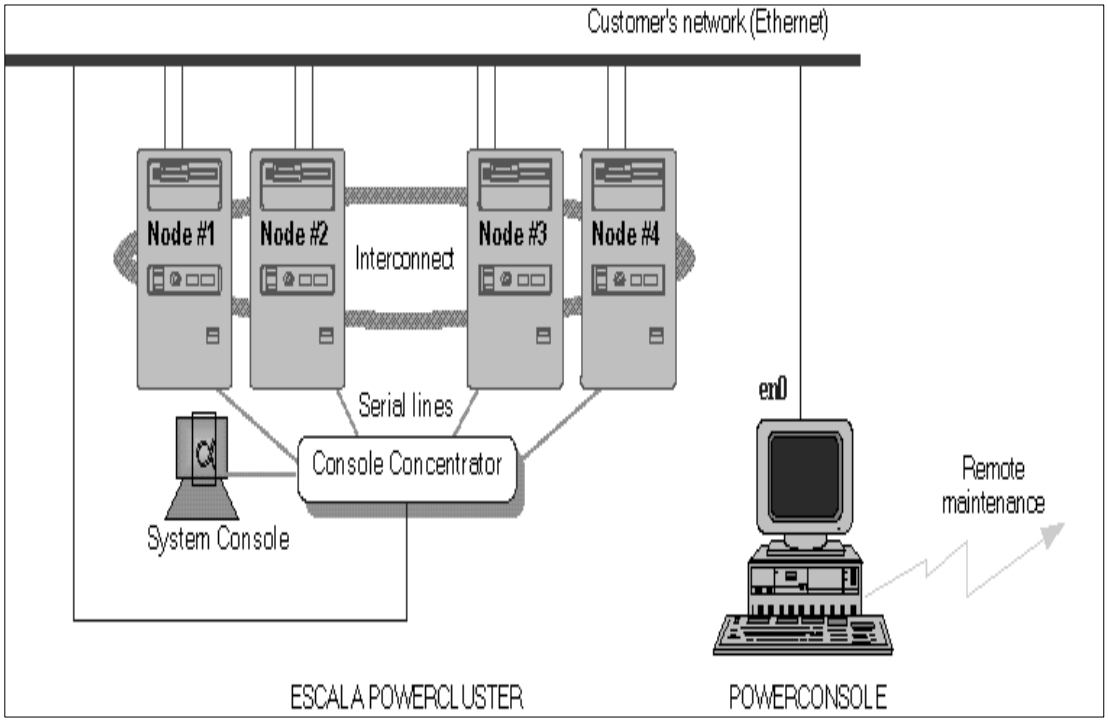


Figure 14. PowerConsole Connected without a Dedicated Administration Network

Standards

Safety

UL1950, CSA C22.2/950, VDE 0805, EN 60 950/IEC 950.

Electro-Magnetic Interference

FCC-B

CE Notices

CE, EN 55022, EN 50082-1 (IEC 801-2, IEC 801-3, IEC 801-4), EN 60950, EN 60555-2, EN 60555-2.

Chapter 9. Network External Peripherals

Taking into account network external peripheral requirements.

Network External Peripherals – Overview

Includes:

Fast Ethernet Switch 3000

The Fast Ethernet Switch is a high performance switch for Local Area Networks (Type: 3Com® SuperStack® II Switch 3000 10/100, Part No. 3C16942A).

This switch has 12 auto-negotiating 10BASE-T 100BASE-TX RJ45 ports. These ports can be set to 10BASE-T, 100BASE-TX or they can automatically detect the speed of a link.

It allows connection to Ethernet or Fast Ethernet devices over a maximum length of 100m using data grade category 5 twisted pair cable.

Note: If this switch is not used, it is recommended to not leave it in auto–negotiating mode. Automatic speed detection consumes too much CPU time. Either disconnect the switch or set it to one or other of the speed settings.

This equipment is described in the 3Com® *SuperStack II Switch 3000 10/100 (3C16942A) User Guide*.

A rack mount kit allows the server to be installed in a 19” rack.

Specifications

Dimensions				
Height	7.6 cm (3.0 in)			
Width	48.3 cm (19.0 in)			
Depth	30.0 cm (12.0 in)			
Weight	4.4	kg	(9.7	lb)
Electrical	*(power supplies are auto-sensing and auto-ranging)*			
Voltage range (V ac)	100 V ac to 120 V ac, single-phase, 200 to 240 V ac			
Frequency	50 to 60 Hz			
Current draw	3A (max. at 100 Vac 2A (max. at 240 Vac			
Power consumption: apparent power	not quoted			

Operating / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	0 to 50°C (32 to 122°F)	–10 to 70°C (14 to 158°F)
Relative humidity (noncondensing)	10 to 95%	
Elevation	not quoted	
Heat dissipation	100 W (max.), 341.2 Btu/hr (max.)	

Manufacturer’s Specifications

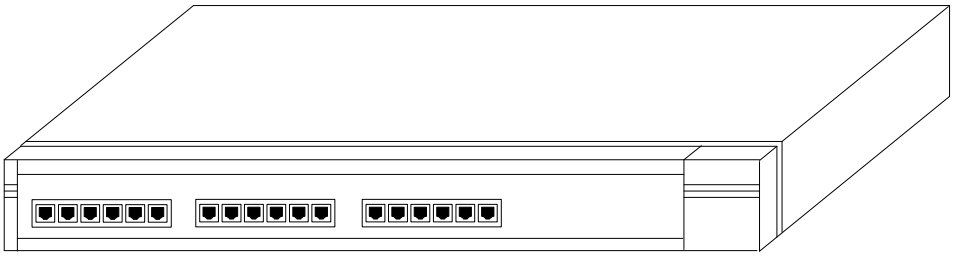


Figure 15. Fast Ethernet Switch – Front View.

1GB Ethernet Switch 9300

The 1GB Ethernet Switch 9300 is a high performance switch for Local Area Networks (Type: 3Com® SuperStack® II Switch 9300, Part No. 3C93012).

The switch 9300 delivers full line rate, nonbocking switching among all 12 Gigabit Ethernet ports. It supports full-duplex mode on all ports

This equipment is described in the 3Com® *SuperStack II Switch 9300* CDROM documentation.

A rack mount kit allows the server to be installed in a 19” rack.

Specifications

Dimensions				
Height	6.5 cm (2.59 in)			
Width	44 cm (17.32 in)			
Depth	30.5 cm (12.0 in)			
Weight				
	4.1	kg	(12	lb)
Electrical	*(power supplies are auto-sensing and auto-ranging)*			
Voltage range (V ac)	100 V ac to 120 V ac, single-phase, 200 to 240 V ac			
Frequency	47 to 63 Hz			
Current draw	1.3A (max. at 120 Vac			
Power consumption: apparent power	not quoted			
Operating / Non-operating Limits				
	Operating		**Non-operating**	
Ambient temperature	0 to 50°C (32 to 122°F)		–20 to 85°C (–4 to 185°F)	
Relative humidity (noncondensing)	10 to 95%			
Elevation	not quoted			
Heat dissipation	175 W (max.), 547 Btu/hr (max.)			

Manufacturer’s Specifications

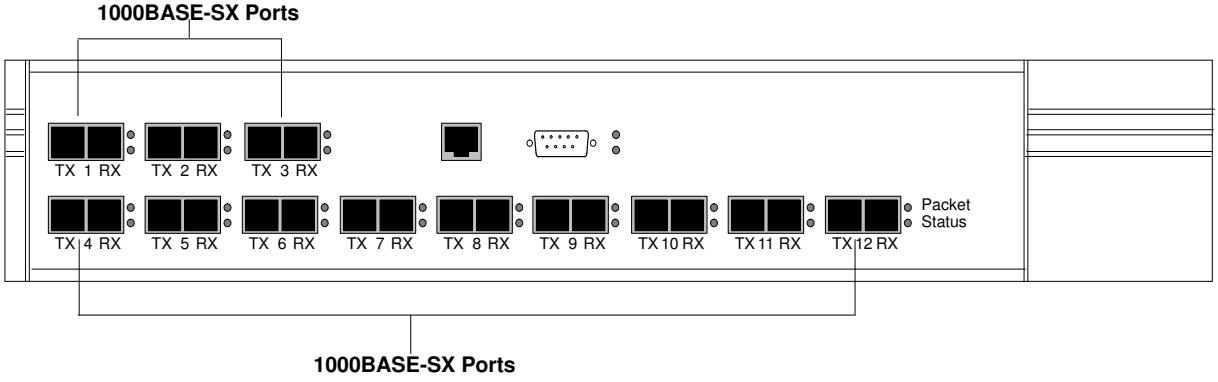


Figure 16. 1 GB Ethernet Switch 9300 – Front View.

SilkWorm 2000 Brocade Switch

This equipment is described in the Brocade® *SilkWorm 2000 Entry Family Hardware Reference Guide*.

This swith has 8 ports (7 fixed optical and 1 GBIC).

This equipment fits Dual SC connectors.

A rack mount kit allows the server to be installed in a 19” rack.

SilkWorm 2010/2040/2050 Switch Specifications

Dimensions			
Height	4.4 cm (1.7 in) or 1U for the rack		
Width	44.0 cm (17.3 in)		
Depth	22.4 cm (8.8 in)		
Weight			
	4.1	kg	(9 lb)
Electrical	*(power supplies are auto-sensing and auto-ranging)*		
Voltage range (V ac)	85 V ac to 264 V ac		
Frequency	47 Hz to 63 Hz		
Current draw	not quoted		
Power consumption:	75 watts max.		
Operating / Non-operating Limits			
	Operating		**Non-operating**
Ambient temperature	10 to 40°C		–35 to 65°C
Relative humidity (noncondensing)	5 to 85%		95%
Elevation	0 to 3000m		0 to 12000
Heat dissipation	J/hr (375 Btu/hr)		

Manufacturer’s Specifications.

FC-AL Hub

The Fibre Channel Arbitrated Loop Hub is an active hub providing the same functions as a 10 Base-T hub while supporting 100 times the bandwidth. (Type: Gadzoox FCL1063TW, Part No. 110903 Rev 2).

This equipment is described in the *Gadzoox FCL1063TW – 1.0625 Gigabit/second Fibre Channel Arbritrated Loop Hub Product Manual*.

A rack mount kit allows the hub to be installed in a19” rack.

Specifications

Dimensions			
Height	4.4 cm (1.7 in) or 1U for the rack		
Width	44.0 cm (17.3 in)		
Depth	22.4 cm (8.8 in)		
Weight			
	2.6	kg	(5.7 lb)
Electrical	*(power supplies are auto-sensing and auto-ranging)*		
Voltage range (V ac)	110 V ac to 240 V ac, single-phase,		
Frequency	50 to 60 Hz		
Current draw	not quoted		
Power consumption:			
apparent power	100 VA		
Operating / Non-operating Limits			
	Operating		**Non-operating**
Ambient temperature	0 to 40°C (32 to 104°F)		–40 to 70°C (–40 to 158°F)
Relative humidity (noncondensing)	95% max.		
Elevation	not quoted		
Heat dissipation	J/hr (73 Btu/hr)		

Manufacturer’s Specifications

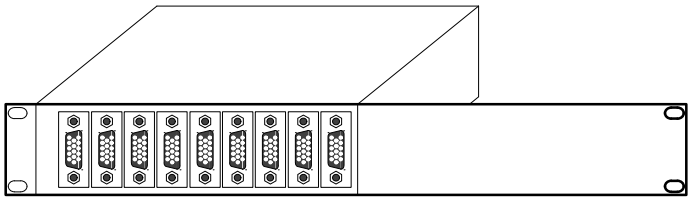


Figure 17. FC-AL Hub (fitted with Rack mounting brackets) – Front View.

Ethernet Hub

The Ethernet Hub is an IEEE 802.3 Standard repeater for Local Area Networks (Type: 3Com® SuperStack® II HUb 10 12-Port TP, Part No. 3C16670A).

This hub has 12 RJ45 twisted pair ports, and an AUI port, allowing connections over a maximum length of 100m using data grade category 5 twisted pair cable.

This equipment fits a 25F (female) micro-modem.

Hub expansion connectors allow the stacking of several hubs, using hub expansion cables.

This equipment is described in the 3Com® *SuperStack II Hub 10 12-Port TP (3C16670A) User Guide*.

A rack mount kit allows the server to be installed in a 19” rack.

Specifications

Dimensions				
Height		4.4 cm (1.7 in) or 1U for the rack		
Width		44.0 cm (17.3 in)		
Depth		22.4 cm (8.8 in)		
Weight				
		2.6	kg (5.7	lb)
Electrical	*(power supplies are auto-sensing and auto-ranging)*			
Voltage range (V ac)		110 V ac, single-phase,		
	or	220 V ac to 240 V ac		
Frequency		not quoted		
Current draw		not quoted		
Power consumption:				
apparent power		22 VA		
Operating / Non-operating Limits				
	Operating		**Non-operating**	
Ambient temperature	0 to 50°C (32 to 122°F)			
Relative humidity (noncondensing)	0 to 90%			
Elevation	not quoted			
Heat dissipation	J/hr (73 Btu/hr)			

Manufacturer’s Specifications

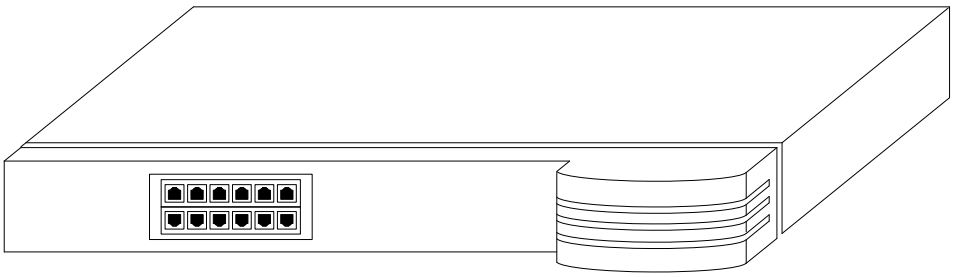


Figure 18. Ethernet Hub – Front View.

Vixel 1000 Hub

The VIXEL 1000 Hub is an unmanaged 7–port Fibre Channel–Arbitrated Loop (FC–AL) device.

This equipment fits Dual SC connectors.

A rack mount kit allows the server to be installed in a 19” rack.

Specifications

Dimensions		
Height		4.4 cm (1.7 in) or 1U for the rack
Width		22.0 cm (8.6 in)
Depth		36.6 cm (14.4 in)
Weight		
		not quoted
Electrical	*(power supplies are auto-sensing and auto-ranging)*	
Voltage range (V ac)		100 V ac to 240 V ac
Frequency		50 Hz to 60 Hz
Current draw		not quoted
Power consumption:		30 watts max.
Operating / Non-operating Limits		
	Operating	**Non-operating**
Ambient temperature	10 to 50°C	–40 to 85°C
Relative humidity (noncondensing)	5 to 95%	
Elevation	not quoted	
Heat dissipation	not quoted	

Manufacturer’s Specifications.

Figure 19. Vixel 1000 Hub – Front View.

Console Concentrator

The Console Concentrator is a communications server (Type: 3Com® CS/2600 or Type: Digi® Portserver).

CS/2600 Specifications

This equipment is described in the 3Com® *CS/2500 Series Communications Server Installation Guide* and the release notes delivered with the hardware.

This equipment fits a 25M (male) micro-modem.

Dimensions				
Height	9.6 cm (3.8 in)			
Width	41.1 cm (16.2 in)			
Depth	32.3 cm (12.6 in)			
Weight				
	5.5	kg	(12.0	lb)
Electrical	*(power supplies are auto-sensing and auto-ranging)*			
Voltage range (V ac)	90 V ac to 132 V ac, single-phase,			
	or 180 V ac to 264 V ac			
	Overall: 115 V ac to 230 V ac			
Frequency	47 to 63 Hz			
Current draw	1.8 A max.			
Power consumption:				
apparent power	not quoted			
true power	161 W			
Operating / Non-operating Limits				
	Operating		**Non-operating**	
Ambient temperature	5 to 40°C (41 to 104°F)		-20 to 60°C(-4 to 140°F)	
Relative humidity (noncondensing)	20 to 80%		10 to 90%	
Elevation	4572 m (15,000 ft)		12191 m (40000 ft)	
Heat dissipation	J/hr (550 Btu/hr)			

Manufacturer's Specifications

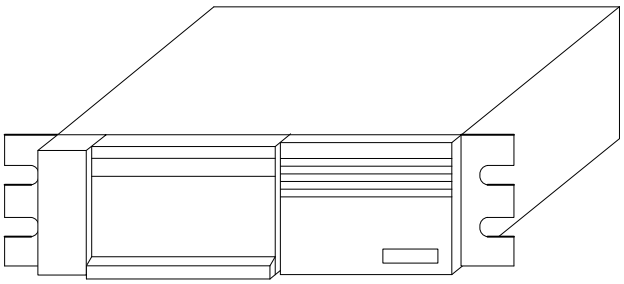


Figure 20. Console Concentrator (fitted with Rack mounting brackets) – Front View.

PortServer Specifications

This equipment is described in the Digi® *PortServer User's Guide* delivered with the hardware.

This equipment fits a 10 pin RJ45 female (RJ48).

Dimensions		
Height		6.1 cm (2.4 in)
Width		30.4 cm (12 in)
Depth		17.6 cm (6.9 in)
Weight		
		0.98 kg (2.2 lb) 3 kg (6.6 lb) with rack mount kit
Electrical	*(power supplies are auto-sensing and auto-ranging)*	
Voltage range (V ac)		90 V ac to 132 V ac, single-phase,
	or	180 V ac to 264 V ac
	Overall:	115 V ac to 230 V ac
Frequency		47 to 63 Hz
Current draw		0.9 A max.
Power consumption:		
apparent power		not quoted
true power		12 W
Operating / Non-operating Limits		
	Operating	
Ambient temperature	16.6 to 29.4°C (60 to 85°F)	
Relative humidity (noncondensing)	20 to 80%	
Altitude	0 to 2135 m (0 to 7,000 ft)	

Manufacturer's Specifications

Micro-Modem

The HACMP facility requires the use of two micro-modems to extend the RS232 cabling required for the ”Heartbeat” disaster recovery solution.

Micro-modems can be used to connect S1 or COM1 system console port of an EPC node to a CS2600 concentrator port when distance is too long.

The micro-modem referenced ME762A–F is an example of what you can purchase to extend RS232 lines.

CAUTION:
Both 25M (male) and 25F (female) micro-modems are available.
– a ME762A–F micro-modem fits the serial port of an EPC node
– a ME762A–M micro-modem fits Console Concentrator CS/2600 .

Specifications (typical)

Protocol	Asynchronous
Speed	Up to 19.2 Kbps
Operation	Unconditioned 4-wire line (two twisted pairs), full- or half-duplex, point to point
Interface	RS-232/CCITT V.24
Connectors DTE/DCE	DB25 female
Transmission Level	– 6 dBm
Power	From RS-232 interface (+6 VDC on pins 2, 4 or 20)
Size	H = 2.3 cm x W = 5.3 cm x D = 10.9 cm H = 0.9 inch x W = 2.1 inch x D = 4.3 inch
Weight	0.1 kg (0.2 lb.)
Distance	See table below

The table below shows the relationship between expected data rate and wire gauge.

Speed	**Wire Gauge**		
	0.9 mm / 19-AWG	**0.5 mm / 24-AWG**	**0.4 mm / 26-AWG**
1200 pbs	10.5 km / 5.5 mi	8.0 km / 5.0 mi	5.6 km / 3.5 mi
2400 pbs	10.5 km / 5.5 mi	8.0 km / 5.0 mi	5.6 km / 3.5 mi
4800 pbs	10.5 km / 5.5 mi	8.0 km / 5.0 mi	5.6 km / 3.5 mi
9600 pbs	8.0 km / 5.0 mi	6.4 km / 4.0 mi	4.0 km / 2.5 mi
19200 pbs	3.2 km / 2.0 mi	2.5 km / 1.5 mi	1.6 km / 1.0 mi

Chapter 10. Site Interconnections

Describes extended site interconnections.

Site Interconnections

A site installation can extend beyond the limits of a building requiring particular disaster recovery solutions. These make use of extended RS232 ”Heartbeat” connections using a micro-modem and/or fibre optic links.

Site Interconnection Examples

The Escala Powercluster offer only contains the optic fibre extender. The cabling (in double optic fibre) between separate building or inside a building, is out of scope of Powercluster product and must be performed by external professional services. This applies equally to external RS232 cabling.

Use of RS232 Lines

RS232 lines can be used between the nodes for exchanging ”keep–alive” messages and the RS232 line used between two possible Console Concentrators. Since some nodes can be 600m distant from other nodes, it is necessary to provide a means to extend an RS232 line to such a length capability. The solution is to use a pair of micro-modems for each RS232 link to be extended. See **Micro-Modem**, on page 9-10.

Use of Fibre Channel (FC–AL)

With the introduction of Fibre Channel Arbitrated Loop, an FC–AL loop can be extended enabling the construction of an architecture for disaster recovery where the Powercluster configuration is spread over two sites. The maximum length of a fibre link between two sites is 10 kilometers. It is assumed that there is a customer’s public network, and also a customer’s private network for implementing a HA/CRM solution, which link all the nodes. The public network and the private network must be separate subnets, and at least one of them must provide an ethernet LAN segment in order to connect the Powerconsole or Cluster Console and associated equipments.

See figure 21 an example of configuration with 2 nodes, Dual Loop, 4 Hubs and 2 DAS.

Use of Optic Fibre Extender

With the introduction of Optic Fibre Extender, an SSA loop can be extended enabling the construction of an architecture for disaster recovery where the Powercluster configuration is spread over two buildings within a campus. The maximum length of a fibre link between two optic fibre extenders is 600 meters. It is assumed that there is a customer’s public network, and also a customer’s private network for implementing a HA/CRM solution, which link all the nodes. The public network and the private network must be separate subnets, and at least one of them must provide an ethernet LAN segment in order to connect the Powerconsole or Cluster Console and associated equipments.

Figures 22 to 25 illustrate disaster recovery solutions which differ in terms of number of nodes and shared SSA cabinets. They are extensions of basic configurations. In these extended configurations two physical loops are implemented. Figure 24 shows an implementation with one SSA cabinet per loop with an extended optic fibre link between each node and the distant cabinet. Figure 25 illustrates two cabinets per loop with is an extended optic fibre link between the two distant cabinets of each loop.

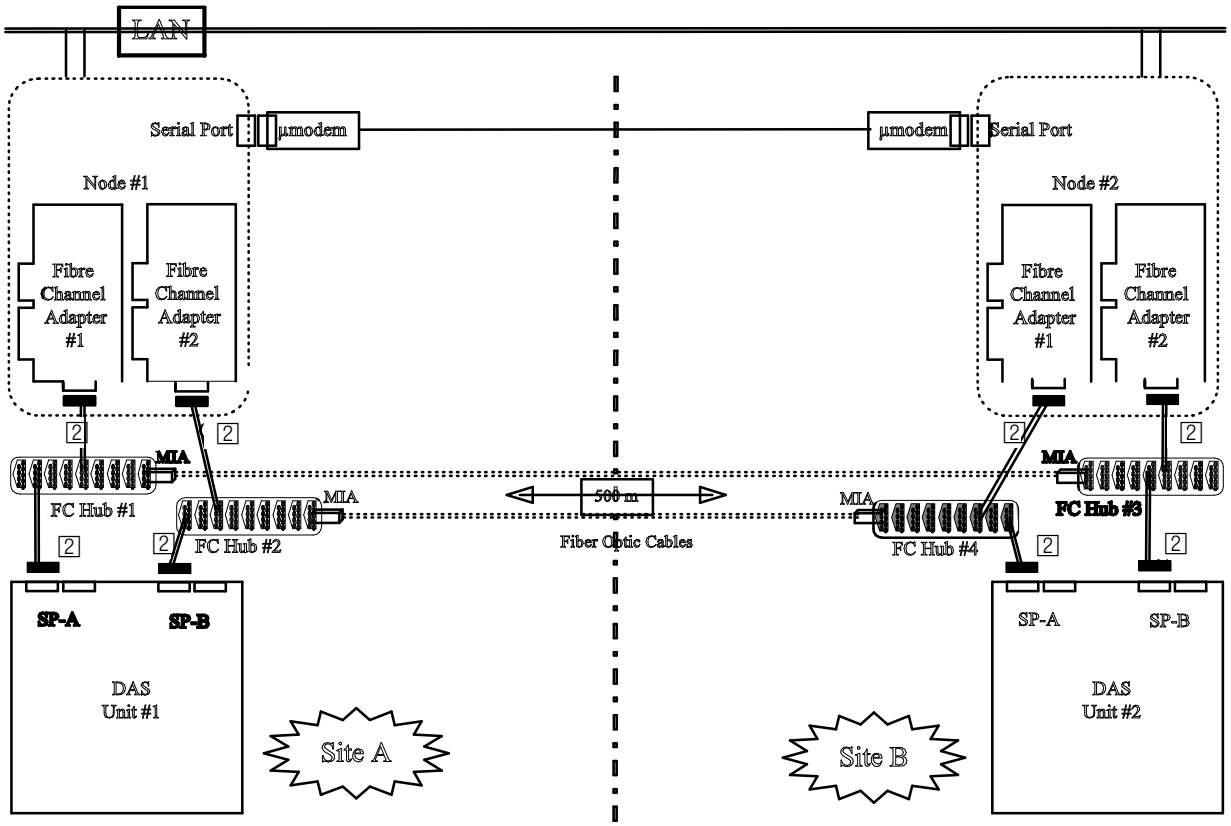


Figure 21. Configuration with 2 Nodes, Dual Loop, 4 Hubs, 2 DAS.

Cabling Schema with 1 Node and 1 SSA Cabinet on Each Side

Note: The schema shows a configuration with 2 loops and 1 adapter per node. For High Availability it is better to have 2 adapters, one per loop.

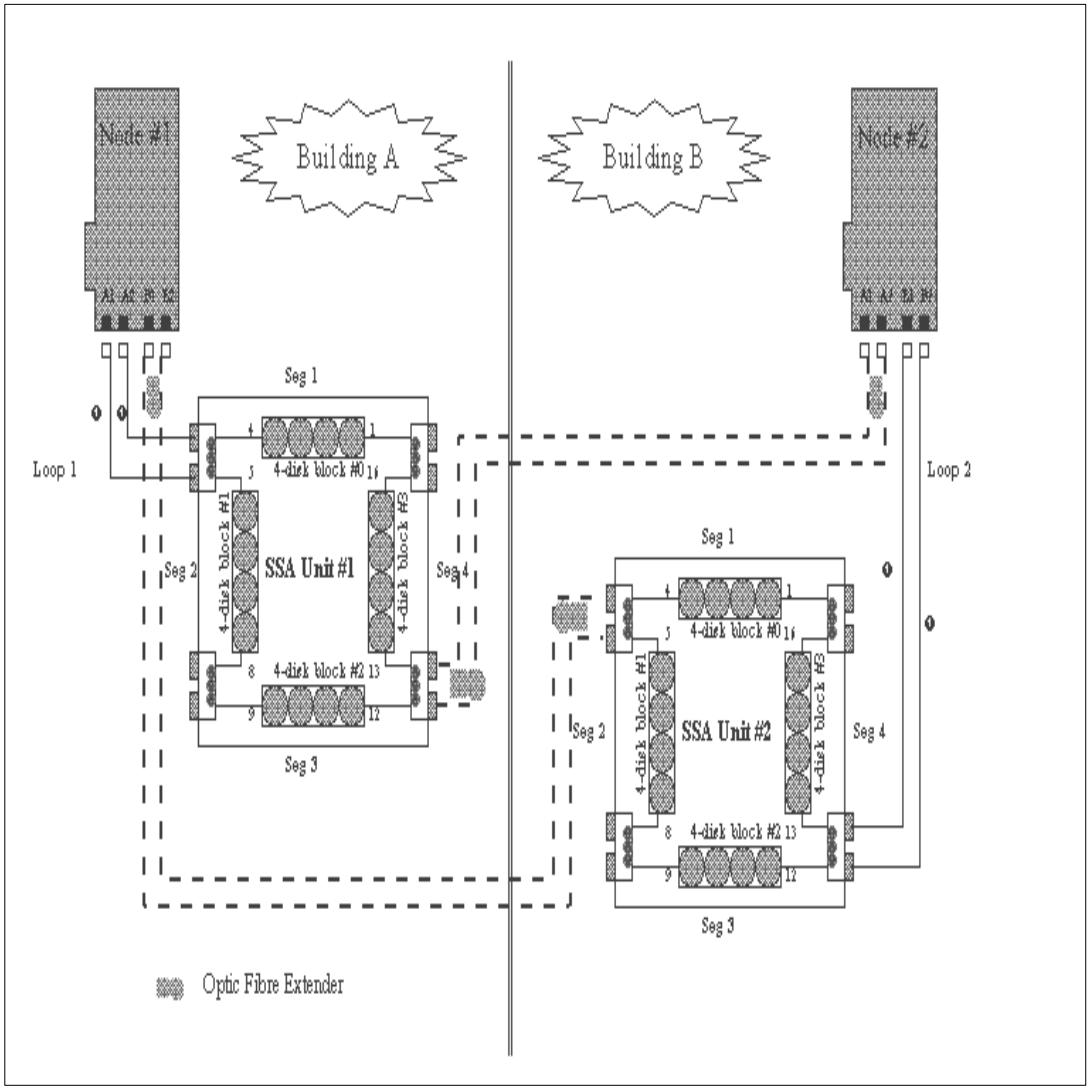


Figure 22. Configuration with 2 Loops and Fibre Optic Extenders.

Cabling Schema with 1 Node and 2 SSA Cabinets on Each Side

Note: The schema shows a configuration with 2 loops and 1 adapter per node. For High Availability it is better to have 2 adapters, one per loop.

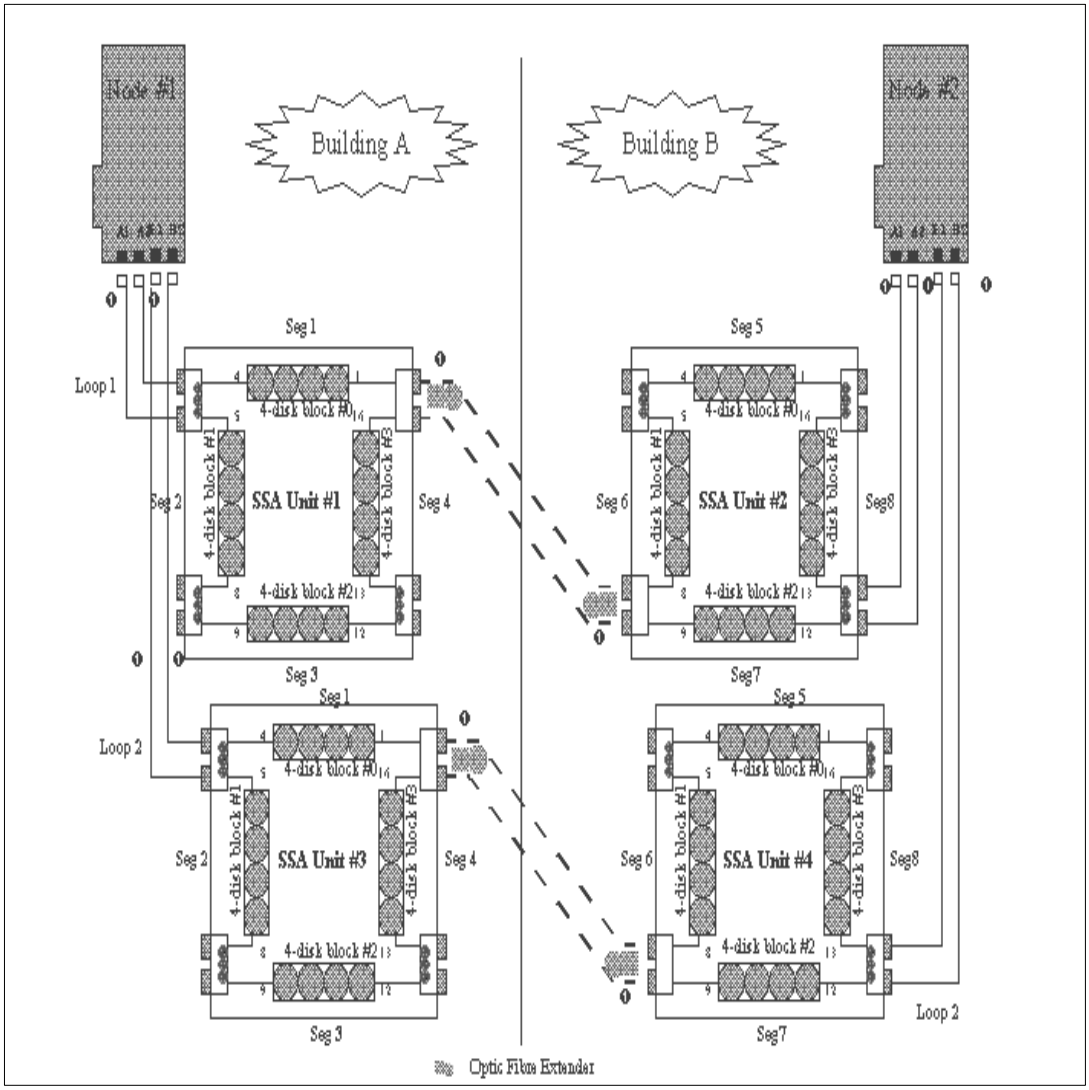


Figure 23. Configuration with 2 Loops and Fibre Optic Extenders.

Cabling Schema with a Pair of Nodes and 1 SSA Cabinet

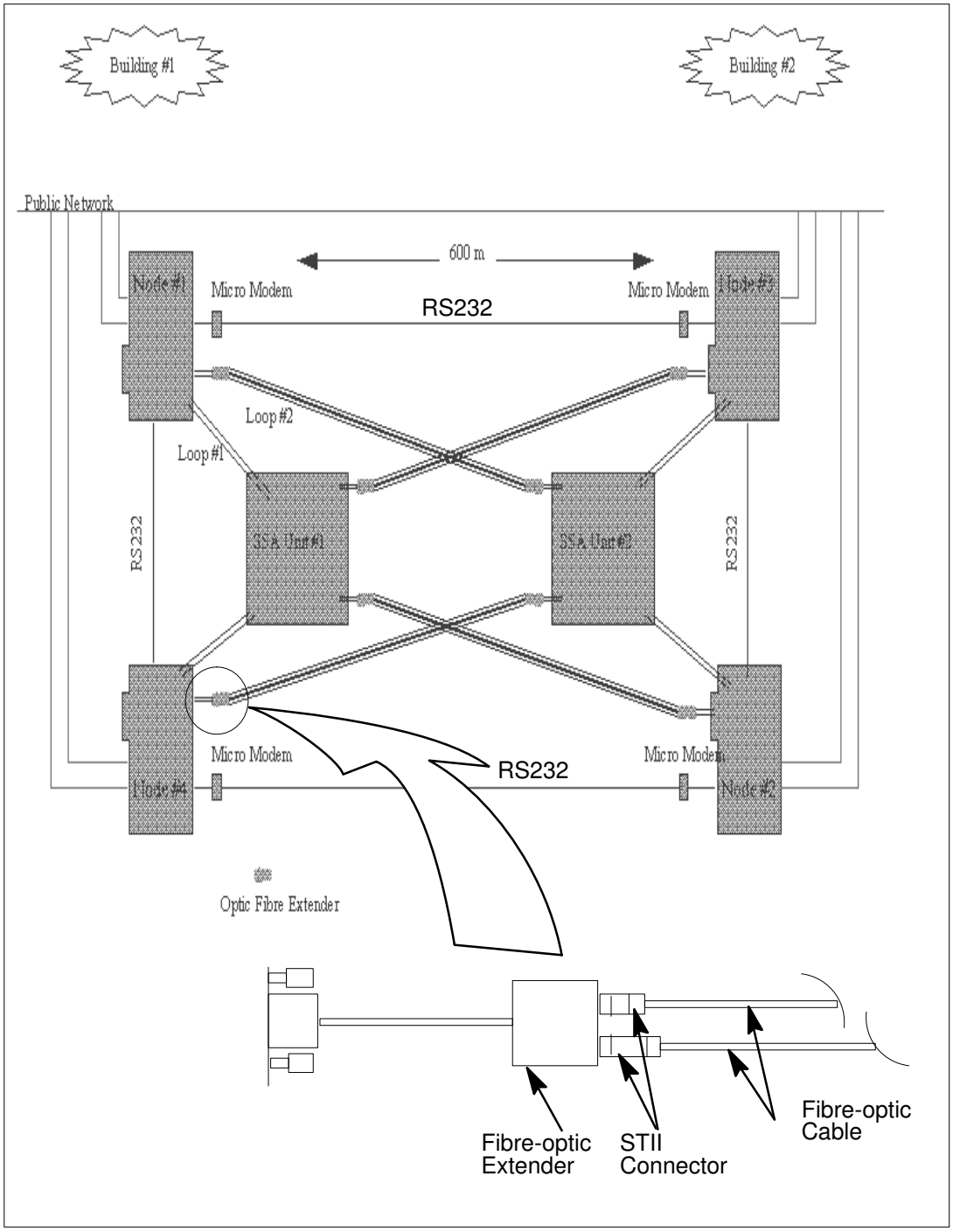


Figure 24. Example with a Pair of Nodes and 1 SSA Cabinet

Cabling Schema with a Pair of Nodes and 2 SSA Cabinets on Each Side

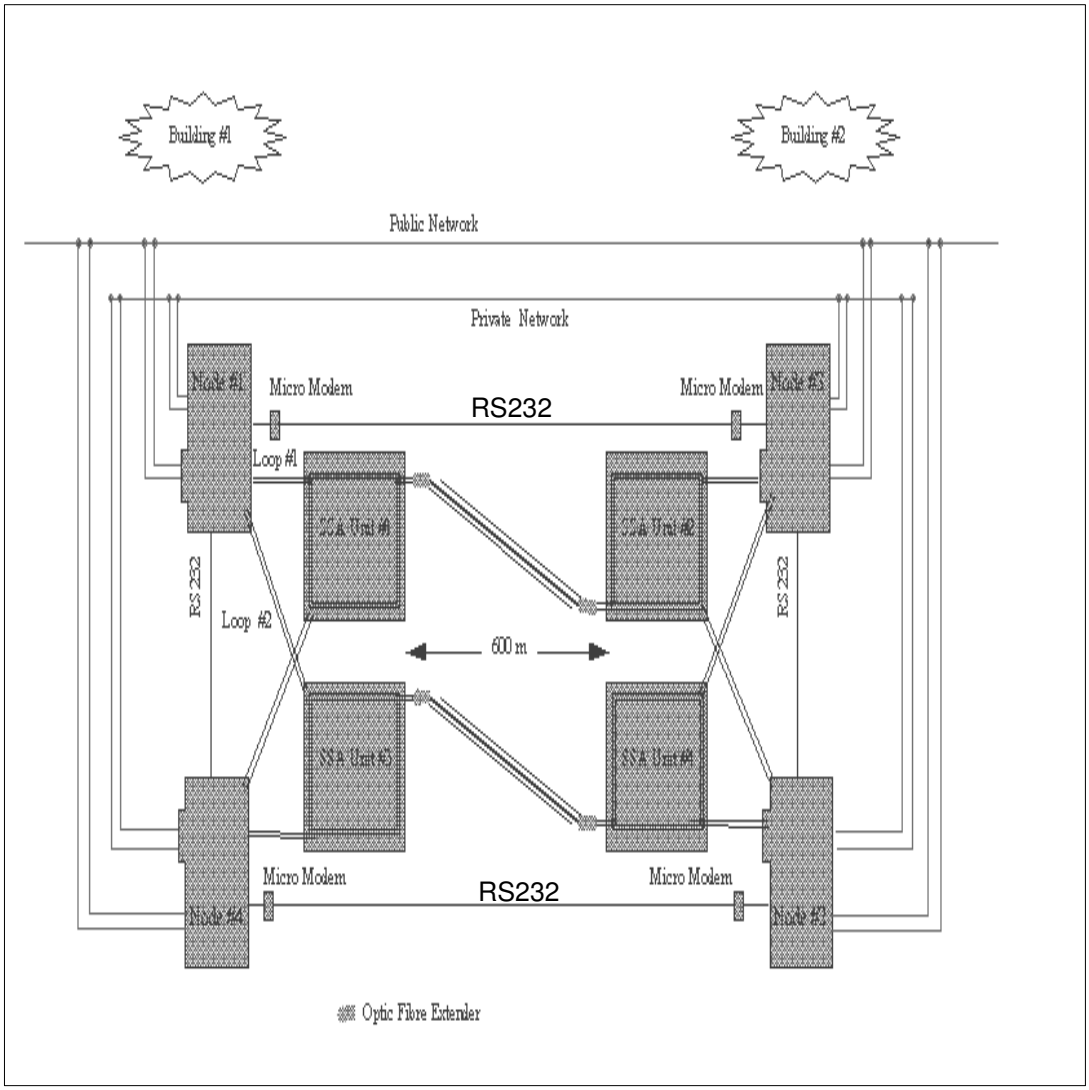


Figure 25. Example with a Pair of Nodes and 2 SSA Cabinets.

Appendix A. Conversion Tables

Correspondence between Metric and Imperial Measures.

Conversion Tables – Overview

Conversions between Metric Measure and Imperial Measure (length, area, volume, mass and temperature) are provided below.

English to Metric

1 inch (”)	2.54 cm (centimeters)
1 foot (’)	30.48 cm
1 yards (yd)	0.91 m (meters)
1 mile (mi)	1.6093 km (kilometers)
1 pound (avdp) (lb)	0.5 kg (Kilograms)
1 ounce (avdp) (oz)	28.4 g (grams)
1 square foot (ft^2)	0.093 m^2 (square meters)
1 square inch (in^2)	6.5 cm^2 (square centimeters)
1 square yard (yd^2)	0.8 m^2 (square meters)
1 acre	0.4 ha (hectares)
1 cubic foot (ft^3)	0.03 m^3 (cubic meters)
1 horsepower (hp)	0.7 kw (kilowatts)
1 lb/ft^2	4.88 kg/m^2

Note: 12 inches = 1 foot, 36 inches or 3 feet =1 yard, 1760 yards or 5280 feet = 1 mile.

Metric to English

1 meter (meter)	3.3’ (feet)
1 meter (meter)	1.09 yd (yards)
1 centimeter (cm)	0.3937”
1 kilometer (km)	0.62 mi (miles)
1 gram (g)	0.04 oz (ounces (avdp))
1 kilogram (kg)	2.2 lbs (pounds (avdp))
1 sq. centimeter (cm^2)	0.15 in^2 (square inches)
1 square meter (m^2)	10.76 ft^2 (square feet)
1 square meter (m^2)	1.2 yd^2 (square yards)
1 hectare (ha)	2.5 acres
1 cubic meters (m^3)	35.3 ft^3 (cubic feet)
1 kilowatts (kW)	1.3 hp (horsepower)
1 kg/m^2	0.205 lb/ft^2

1 kW hour	3412 Btu (British thermal units)

Celsius to Fahrenheit Conversion

Multiply the temperature in Celsius by 9, divide by 5, and add 32:
(C° x 9/5) + 32 = F°

Fahrenheit to Celsius Conversion

Subtract 32 degrees from the temperature in Fahrenheit, multiply by 5, and divide by 9:
(F° – 32) x 5/9 = C°

Appendix B. Service Inspection

Hardware delivery inspection guidelines.

Service Inspection – Overview

A service inspection should be made upon receipt of a new system from the supplier. In addition perform a service inspection on the system when the following conditions occur:

- The system is inspected for a maintenance agreement.
- Service is requested and service has not recently been performed.
- An alterations-and-attachments review is performed.
- Changes have been made to the equipment that might affect the safe operation of the equipment.
- External devices with an attached power cord are connected to the system unit.

If the inspection indicates an unacceptable safety condition, the condition must be corrected before representatives service the machine.

Note: The correction of any unsafe condition is the responsibility of the owner of the system.

Do the following checks:

1. Check the covers for sharp edges and for damages or alterations that expose the internal parts of the system unit.
2. Check the covers for a proper fit to the system unit. They should be in place and secure.
3. Open the back cover.
4. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
5. Check the internal cables for damage.
6. Check for dirt, water, and any other contamination within the system unit.
7. Check the voltage label on the back of the system unit to ensure that it matches the voltage at the outlet.
8. Check the external power cable for damage.
9. With the external power cable connected to the system unit, check for 0.1 ohm or less resistance between the ground lug on the external power cable plug and the metal frame.
10. Using the appropriate probe, check for 0.1 ohm or less resistance between the metal frame and the grounding pin on each of the power outlets on the power distribution bus.
11. Check the following conditions for each external device that has an attached power cord:
    a. Damage to the power cord.
    b. The correct grounded power cord.
    c. With the external power cord connected to the device, check for 0.1 ohm or less resistance between the ground lug on the external power cord plug and the metal frame of the device.
12. Close the rear cover of the rack.

Glossary

This glossary contains abbreviations, key–words and phrases that can be found in this document.

A
Ampere.

AC or **ac**
Alternating Current.

ANSI:
American National Standards Institute.

AWG
American Wire Gauge.

CBP
Circuit Breaker Panel.

CSA
Canadian Standards Association.

DAS:
Disk Array Storage System. A RAID disk drawer, available in different models.

DAE:
Disk–Array Enclosure.

DC or **dc:**
Direct Current generated by the power supply.

device areas:
See media and disk device areas.

disk cage:
A metallic box which can host two or three disk carriers.

disk carrier:
A sled used to install hard disk drives into the system.

DPE:
Disk–Array Processor Enclosure.

drawer:
Each system or subsystem installed in a rack is a drawer. There are several types of drawers, such as CPU drawers, expansion drawers, DAS drawers.

ECMA:
European Computer Manufacturers Association.

EIA:
Electronic Industries Association.

EMI:
Electromagnetic Interference.

EPO:
Emergency Power Off.

ESD:
Electrostatic Discharge. An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.

FAST-10 WIDE-16:
A standard SCSI interface, 16 bits, providing synchronous transfer rate of up to 10 MHz, with a data transfer speed of 20M bytes per second.

FAST-20 WIDE-16:
An enhanced standard SCSI interface, 16 bits, providing synchronous transfer rate of up to 20 MHz, with a data transfer speed of up to 40M bytes per second. It is also called ULTRA WIDE.

FC-AL
Fibre Channel Arbritrated Loop. Fibre channel stations arranged such that messages pass from one to the next in a ring.

GUI:
Graphical User Interface.

high availability:
A particular configuration which shares resources between two CPU drawers, so that if one CPU drawer fails, the other one takes the control without interrupting any activity.

hot swapping:
The operation of removing a faulty hard disk drive and replacing it with a good one without interrupting the system activity.

IEC:
International Electrotechnical Commission.

I/O:
Input/Output.

ISA:
Industry Standard Architecture.

JBOD
Just a Bunch Of Disks.

JDA
Just Disk Array.

MCA
Micro Channel Architecture.

media and disk device areas:
Areas which house the media drives and the hard disk drives.

NEMA
National Electrical Manufacturers Association.

PCI:
Peripheral Component Interface. A bus architecture that supports high-performance peripherals such as graphic boards, multimedia video cards and high-speed network adapters.

PDB:
Power Distribution Box.

PDU:
Power Distribution Unit. The rack power distribution system for the installed drawers.

Power Supply:
The CPU drawer is equipped with one power supply module. See Redundant Power Supply.

rack:
The metallic structure which houses the drawers and provides them power through its Power Distribution Unit (PDU).

RAID:
Redundant Array of Inexpensive Disks. A method of combining hard disk drives into one logical storage unit which offers disk-fault tolerance.

Redundant Power Supply:
The power supply composed by two modules in redundant configuration. They are the same and work in parallel. In case of a power supply fault, the second module takes over automatically providing the needed power.

RS-232:
An EIA interface standard that defines the physical, electronic and functional characteristics of an interface line.

RS-485:
A line for drawer interconnection. It is used for the connection of expansion drawers.

RSF:
Remote Services Facilities.

SCSI:
Small Computer System Interface. An input and output bus that provides a standard interface used to connect peripherals such as disks or tape drives in a daisy chain.

SID:
System Identifier.

SYSID:
System Identification.

system console:
A console, usually equipped with a keyboard and display screen, that is used by an operator to control and communicate with a system.

U:
Unit of measure. Racks and drawers are measured in Units. Each U corresponds to 44.45 mm (1.75 inches).

ULTRA SCSI:
See Fast-20 WIDE-16.

UPS:
Uninterruptible Power Supply. A device which provides continuous power and sustains the system it is connected to, in case of outages.

V:
Volt.

VCC:
Voltage Continuous Current.

VCCI:
Voluntary Control Council for Interference.

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