HITACHI
DATA SYSTEMS

Hitachi Data Systems Global 19-Inch Rack Reference

MK-96HW101-01

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Document Revision Level

Revision	Date	Description
MK-96HW101-00	May 2006	Initial Release; replaces MK-96RD296
MK-96HW101-01	October 2006	Revision 1, supersedes and replaces MK-96HW101-00

Source Documents for this Revision

- Input from HDS technical personnel

Changes in this Revision

- In section 2.1, revised the rack dimensions, added the length of the power cords (12 feet), added U markings, and revised the rack BOM information in Table 2.1.
- Replaced Figure 2.1.

Preface

This document describes the features, setup, and technical reference information for the Hitachi Data Systems 19-inch Global Rack enclosure, which is designed for use with Hitachi storage systems.

Note: The HDS global 19-inch rack is available for all geographies.

This document is intended for use by Hitachi Data Systems personnel, distributors, and Value-Added Resellers. This document assumes that the user is familiar with the applicable Hitachi storage system(s) being installed into the rack. For information about installing a specific Hitachi storage system subsystem into the 19-inch rack, refer to the appropriate Hitachi Data Systems installation documentation.

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N/A

Comments

Please send us your comments on this document. Make sure to include the document title, number, and revision. Please refer to specific section(s) and paragraph(s) whenever possible.

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Chapter 1 Safety Information

This chapter contains safety information regarding the installation of a Hitachi Data Systems 19-inch Global Rack and the installation of equipment into the rack.

Topics include:

- General safety (section 1.1)
- Emergency precautions (section 1.2)
- Safety precautions when using the equipment (section 1.3)
- Power precautions (section 1.4)
- Preventing electrostatic discharge (section 1.5)
- Environmental specifications (section 1.6)

1.1 General Safety

Before starting any installation:

- Read and follow the safety guidelines and procedures in this manual as well as in the manuals for any products you install in the rack.
- Understand the hazard warnings provided in this manual and on any rack-mounted products to prevent or reduce the risk of personal injury and product damage. Table 1.1 lists and describes these hazard warnings.

The user is responsible for reading and complying fully with these hazard warnings. It is not possible to describe every hazard that may exist with this equipment. Be aware of all possible hazards and work safely.

Table 1.1 Hazard Warnings

Warning	Description
DANGER	Indicates an imminently hazardous situation which, if not avoided, may result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in injury or damage to product.

1.1.1 Repair, Modification, and Disassembly of the Rack and Components

Do not repair, remodel, or disassemble the rack or related components. Such actions may cause personal injury and equipment damage.

1.2 Emergency Precautions

This section covers emergency precautions for electric shock and fire.

1.2.1 Electric Shock

In case of electric shock:

- Remain calm.
- Take immediate and appropriate action according to your company's first-aid and safety procedures.

1.2.2 Fire

In case of fire:

- First, shut off all the power from the system using the emergency power-off switch.
- If the fire continues burning after the power is shut off, take immediate action such as using a fire extinguisher and/or calling the fire department.

1.3 Safety Precautions

This section explains safety precautions for:

- Equipment
- Cables
- Casters
- Air vents and airflow
- Blanking panels
- Inspection and cleaning
- Rack stability
- Working with the rack or with components in the rack
- Working around rotating or moving parts

1.3.1 Equipment

- If you notice unusual heat generation, odors, or smoke emission, shut off the power feed to the equipment and contact a maintenance engineer. Ignoring such conditions may result in hazardous physical conditions and equipment failure.
- Avoid physical disruption to the equipment that may create dangerous physical conditions or equipment failure.
- Avoid using the equipment for any use other than for its original purpose to avoid injury or equipment failure.
- If using a lift, do not move it away from the rack frame or lower the platform until the component you are mounting is fully inserted into the rack.
- If warning labels become dirty or start peeling off, replace them.

WARNING: The rack allows many components to be mounted vertically. The weight and location of the components in the rack must be placed as close as possible to the center of mass below the mid-point of the rack. To reduce the risk of danger to persons or equipment, please follow the safety guidelines and stabilize the rack as described in this manual.

WARNING: If installing a single (standalone) rack, be sure the rack is level and that it has been stabilized before installing the components. If an unstable rack is loaded with components, it may tip over.

1.3.2 Cables

- Be sure all cables are connected correctly and completely.
- Do not obstruct walkways when routing cables.
- Do not allow heavy material to be placed on cables.
- Do not place cables near anything that generates heat.
- Do not step on or subject cables or connectors to shearing or pulling forces since the cable jacket can be damaged or broken, resulting in an electric shock, fire, or loss of data.
- Be sure electrical and signal cables are clean before connecting them. Remove any dirt on a connector before inserting it into a socket.
- When connecting devices to the power distribution units (PDUs), do not exceed 12 amps per bank of four receptacles and do not exceed 24 amps per PDU. Follow the guidelines for PDU load as listed in the individual storage system's installation guide. Disconnect all the power supply cords before servicing to avoid electric shock.
- The rack has multiple power cords. To avoid electric shock, be sure to disconnect all power cords before servicing.

1.3.3 Casters

Casters on the bottom of the rack facilitate moving the rack across short distances to position it for final installation. Although the casters can support the weight of the rack with installed components, they are not designed to support the full weight of the rack on a long-term basis.

Once the rack is in its final position for installation, be sure its full weight is supported by the stabilizing feet. Otherwise, the casters may be damaged.

1.3.4 Air Vents and Airflow

- Be sure the air vents are free of obstruction and are inspected periodically.
- To prevent electric shock or fire, do not place metallic material such as paper clips or any combustible material such as paper into or near the air vents.
- Airflow for each rack-mounted Hitachi Data Systems storage system is from front to back. The rack has a ventilated door in the back that allows the system to draw air through the front and exhaust air through the back. Do not block the front of mounted components or the rear-ventilated door.

1.3.5 Blanking Panels

If all the vertical mounting space is not occupied by rack-mounted products, cover the empty space with blanking panels. Any empty gaps between the components can cause airflow changes and adversely affect cooling within the rack.

1.3.6 Precautions for Inspection and Cleaning

- If the unit must be powered off, perform the power-off sequence in section 1.4.2 before proceeding with maintenance.
- Do not work on the unit in a damp or flooded environment.
- Do not obstruct access to the unit with parts or tools.
- When performing work with the door open, remove metal watches or jewelry to prevent electric shock. If you wear metal-frame glasses, do not touch the equipment while wearing them.
- Ensure that loose clothing, jewelry, or hair does not become tangled in moving components.
- There are high-voltage parts in the equipment that should not be touched during maintenance. For safety reasons, another person should be on alert in case the power feed to the equipment must be turned off quickly.
- After the power feed to the equipment is turned off, electricity remains in the equipment for a period of time. Do not touch any components other than those indicated in this manual.
- The equipment can become extremely hot, so do not touch any parts other than those indicated in this manual.
- When working with the door open, wear cotton gloves to prevent injury due to touching sharp objects.

1.3.7 Rack Stability

To reduce the risk of injury to persons or equipment, follow these guidelines:

- Stabilize the rack frame on-site by adjusting the leveling feet as specified in section 3.5.

  Note: The full weight of the rack should be resting on the leveler feet and not on the casters.

- The use of anti-tip stabilizing plates installed at the bottom left and right sides increases rack stability.
- Be sure the front anti-tip stabilizing plate is installed before extending any equipment out the front of the rack (see section 4.3).
- When extending equipment out of the rack, extend only one piece at a time. Extending two or more pieces at a time may cause the rack to tip over.

1.3.8 Working with the Rack or Components in the Rack

For all procedures, observe the following guidelines and sequence of steps.

- Use only the tools and parts for maintenance that are specified in this manual.
- Keep the maintenance area clean.
- Put away any parts, materials, or tool not being used.
- Wear eye protection where liquid can splash or objects can fly about.
- When lifting anything heavy, lift using your legs, with your back kept erect to prevent back injury. Use a proper lifting tool if necessary or ask somebody to assist you.
- Before finishing your work, be sure the rack and any products mounted in it are returned to their original state. Be sure all parts removed during maintenance have been installed in their original positions in the rack or in the products that are mounted in the rack. Be sure no tool or foreign material is left in the rack.

1.3.9 Working Around Rotating or Moving Parts

- Tuck in any loose clothing so that it is not caught by a rotating or moving part.
- Tie up long hair.
- Unless otherwise specifically instructed, do not supply power to any device with rotating or moving parts that are not covered properly.
- If instructed to supply power to any device with rotating or moving parts whose covers have been removed, work with another person who can immediately turn off power in an emergency.

1.4 Power Precautions

For grounding requirements, see section 1.4.1.

For information about preventing electric shock, see section 1.4.2.

- The 19-inch rack is wired for 220V with four PDUs.
  - The PDU is rated for 200-240VAC, 50/60 Hz, 30 amps, derated 24 amps.
  - Four 30-amp PDUs come pre-installed in the rack.
- When connecting devices to PDUs, do not exceed 12 amps per bank of four receptacles, and do not exceed 24 amps per PDU. Follow the guidelines for PDU load as specified in the appropriate Hitachi Data Systems installation documentation applicable to the storage system.
- To support redundancy, always connect PDUs on the left side of the rack to one power source and PDUs on the right side of the rack to a different power source on another circuit.

  Connect dual-power supply components with one power cable to a PDU on the left side and the other power cable to a PDU on the right side.
- When installing third-party components in the rack, identify the component's amperage load and check the current amperage load on the PDUs to determine if the component can be plugged into a PDU.

  WARNING: To reduce the risk of injury, fire, or damage to persons or equipment, do not exceed the maximum usable amperage per PDU. Consult the electrical authority having jurisdiction over your facility's wiring and installation requirements. When planning for power distribution and requirements for your rack configuration, observe the following:
  - Balance the amperage load between available PDUs.
  - The amperage load on each PDU must not exceed 80% of the PDU current rating (i.e., the maximum amperage is 80% of the 30 amp PDUs, allowing for a maximum of 24 usable amps per PDU).
  - If an uninterruptible power supply (UPS) is used, the load should not exceed 80 % of the UPS' marked electrical current rating.

Caution: To reduce the risk of damage to the equipment, verify that all AC voltage selector switches are set to match your local AC line voltage (230V). If the AC voltage selector switch is not set properly, your components may be damaged when power is applied. The installation of rack and mounted components must comply with local and regional electrical regulations governing the installation of Information Technology Equipment by licensed electricians. For electrical power ratings on components, refer to their product rating label or to the product's user documentation.

1.4.1 Grounding Requirements

All powered equipment should be properly grounded for proper operation and safety. PDUs, wiring, equipment cabling, and receptacles must be listed grounding-type devices. Ground integrity should be maintained for each connection made in a reliably grounded outlet, such as with the included PDUs. The rack enclosure configured with PDUs provides complete frame grounding continuity. All EIA rail and server support rails are clear-plated and provide direct contact ground continuity to frame ground with the use of the following hardware:

- Support rails mounted with 10-32 thread forming TAPTITE® screw hardware
- Vertical EIA rails mounted with B5.5 x 13 Ph. Pan Hd screw hardware

The use of this hardware combination provides direct metal-to-metal grounding contact.

WARNING: To reduce the risk of electric shock or damage to equipment, follow proper grounding procedures and do not tamper with the pre-installed power distribution units. The rack connects to a grounded (earth) power outlet.

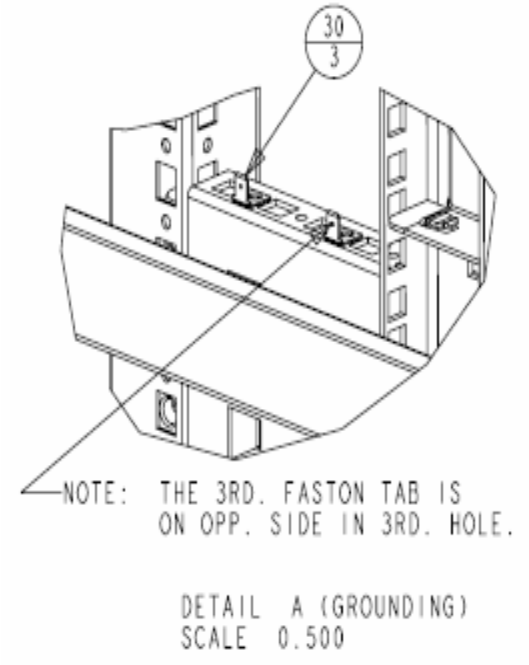


Figure 1.1 Grounding Details

1.4.2 Prevention of Electric Shock

- Before starting work, make sure that there are no potential electric hazards in the maintenance area such as insufficient grounding or a wet floor.
- Before starting work, note where emergency power-off switches are located and be sure you know how to operate them.
- Unless otherwise instructed, remove all power sources to the rack and to the mounted components before starting maintenance (switching off the rack-mounted components usually is not sufficient). If power is provided from a wall or floor outlet, unplug the power supply cord, or turn off the switch on the power distribution panel or board. Attach a notice on the panel or board prohibiting the use of the switch. If the rack-mounted components have already been powered-off, be sure these conditions are met.
- Do not touch any uninsulated conductor or surface that can remain charged after the external power supply to a rack-mounted component is disconnected.
- The rack has multiple power supply cords. To avoid electric shock, disconnect all of them before servicing.
- When working on a rack-mounted component that has a grounding terminal, be sure the terminal is properly connected to the facility's ground.
- When working near a hazardously energized part, do not work alone. Work with another person who can immediately turn off the power in an emergency.
- Do not wear any metallic item such as a wristwatch with a metallic surface or metallic accessories. If you wear eyeglasses with a metallic frame, do not allow the frame to touch an uninsulated surface.
- Be sure your hands and arms are dry.
- When working near an exposed live electric circuit, use only one hand unless otherwise instructed. This prevents the completion of the circuit through both hands should you accidentally touch the circuit.
- Do not use a dental mirror near an exposed live electric circuit. The mirror surface is conductive and can become hazardous even if it is made of plastic.
- Unless otherwise specifically instructed, do not supply power to any subassembly such as a power supply unit or a motor while it is removed from its main product.

1.5 Prevention of Electrostatic Discharge

To prevent damage to equipment mounted in the rack, take necessary precautions during maintenance activities. A discharge of static electricity from a finger or other conductor can damage system boards or other static-sensitive devices. Follow the recommended handling procedures that accompany the equipment that you are mounting or handling.

Use one of the following methods for grounding when handling or installing electrostatic-sensitive parts in the rack:

- Use a wrist strap connected by a ground cord to the grounded aluminum bar or to the chassis of mounted equipment that is grounded. For proper grounding, wear the strap snug against the skin.
- If you do not have any of the suggested equipment for proper grounding, have Hitachi Data Systems technical support personnel install the part.

1.6 Environmental Specifications

The rack installation guides for each Hitachi Data Systems storage system list the environmental specifications for the storage system that is installed in the 19-inch rack. These specifications must be observed to ensure the proper operating and storage environment for each storage system in the rack.

Avoid the following environmental conditions:

- Exposure to direct sunlight
- Rapid change in temperature and/or humidity (such as being near an air-conditioner)
- Proximity (near) to a device that generates electrical noise, such as the ungrounded motor of an air conditioner or washing machine
- Proximity (near) to a device that generates a strong magnetic field (do not bring any magnet close to the rack or to the Hitachi storage system*)*
- Exposure to dust or dirt
- Vibration

Caution: To reduce the risk of damage to equipment when installing third-party products (such as switches, hubs, etc.):

- Do not impede airflow to the products already mounted in the rack.
- Do not exceed the internal rack specifications stated in the storage system rack installation guide.
- Do not exceed any third-party product's recommended environmental specifications when the product is installed in the Hitachi Data Systems Global Rack.

Chapter 2 Features of the Hitachi Data Systems Global 19-inch Rack

This chapter describes the features of the Hitachi Data Systems 19-inch Global Rack.

Topics include:

- Rack features and characteristics (section 2.1)
- Installation and maintenance clearance areas (section 2.2)
- Power guidelines (section 2.3)
- PDU design characteristics (section 2.4)
- PDU plug types (section 2.5)
- Power jumper cables (section 2.6)

2.1 Rack Features and Characteristics

The Hitachi Data Systems 19-inch Global Rack is a full solution containing all components required for a full installation of Hitachi Data Systems storage systems. Key features include:

Table 2.1 Rack Features and Characteristics

Item	Description
Dimensions	Rack (HxWxD) • (mm): 1999.0 x 604.8 x 896.33 • (in): 78.7 x 23.81 x 35.29 Mounting height • 42U Usable Volume (HxWxD) • (mm): 1866.0 x 488.0 x 802.0 • (in): 73.4 x 19.2 x 31.5

Item	Description
Weight	W/o integrated equipment • 136 kg / 300 lbs Static Weight Capacity • 907 kg / 2000 lbs
Power	Rack • 200 – 240 VAC • (4) 200-240VAC, 30 amp power strips • UL60950, cUL1950, CE (rack with power strips) Power Strip • 200-240 VAC, 50/60 Hz • (8) receptacles (IEC C13) • (8) retainer clips, 1 per receptacle1 • Dimensions (HxWxD) o (mm): 800 x 43 x 76.2 o (in): 31.5 x 1.65 x 3 • Amperage: o 30 amps total o 24 amps usable/derated o 12 amps usable/derated, per 4 receptacles o 10 amp max. per receptacle • Circuit breakers (power on/off switch): o (2), 1 per 4 receptacles o (2) green lights, 1 per circuit breaker • Power Cord: o 200-240V o 30 amperage o APIA/EMEA plug: IEC 309 o US plug: L6-30P o Length: 12 feet (3.6 m) • Safety Approvals on Power Strip: o UL60950, cUL 1950, CE) Grounding • Ground straps (door, sides, roof)
Environmental	Temperature Operating: 0° to 50° C Storage: -25° to 65° C Humidity 0 to 95% non-condensing

1 Used to prevent power cables from being accidentally disconnected from PDU

Item	Description	
Rack Characteristics	Rack Frame	Welded Steel
	Roof	Solid with 4 cable entry holes
	Rear Door	Perforated, with lock, ability to optionally mount fans
	Side Panels	Solid, with locks
	Mounting	(4) 19” vertical rails, with “U” markings
	Leveling Feet	(4)
	Color	Black, Gray
	Casters	(2) fixed in the front (2) swivel casters in the rear Each caster rated at 349 kg (550 lbs) each
	U markings	On front and rear vertical rails
Accessories	Blanking Panels • 3U solid • 3U vented • 1U solid Support Rails • 14 pairs installed, customized for HDS storage products Stabilizers • Front and side “L” shaped stabilizer plates included Cable Management • Cable ring guides in the rear 2’ Power cables • 200-240V • 15 amp max. • Length: 2.25 in. (0.7 m) • Connector A: IEC320-C14 • Connector B: IEC320-C13 • Safety: cUL, CE	
Options	• Fan tray (installable in rear door) • Shelf • Pull-out shelf • Pull-out support rails	

Item	Description	
Rack BOM	Qty	Item
	1	Bag of 108 cage nuts, 108 screws, 108 washers
	8	Cable guide rings, mounted in rear
	4	30 amp PDU (Americas: L6-30P; APAC/EMEA: IEC 309)
	☞	3U Blanking Panels (qty & placement depending on storage config)
	☞	1U Blanking Panels (qty & placement depending on storage config)
	1	3U Vented Blanking Panel
	4	Grommet caps covering top 4 holes in rack roof
	1	Stabilizer kit
	1	Rear door
	*	Left-& Right hand support rails, pre-installed (qty is storage specific)
	1	Grounding kit, pre-installed
	1	Baying kit
	32	2.25 ft (0.7m) power cords, 15 amps, 250V
	1	Cage nut tool

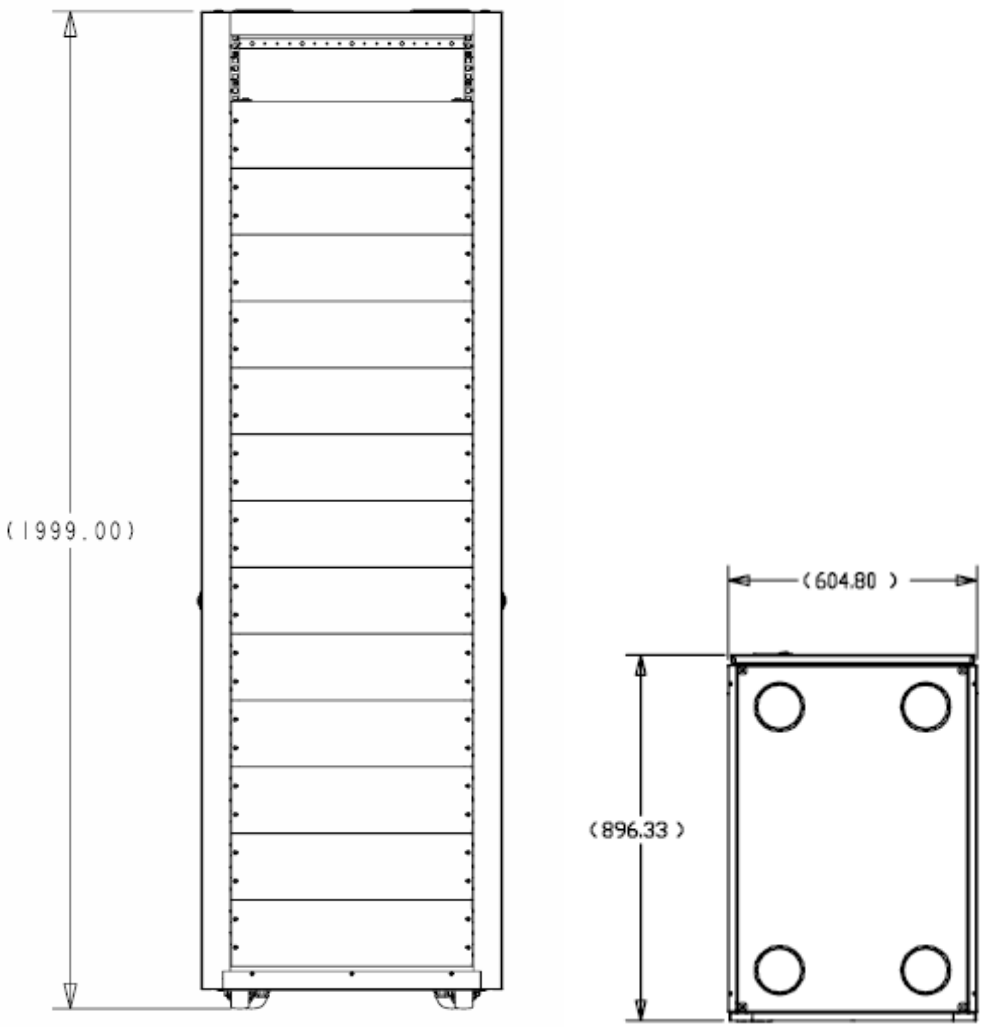
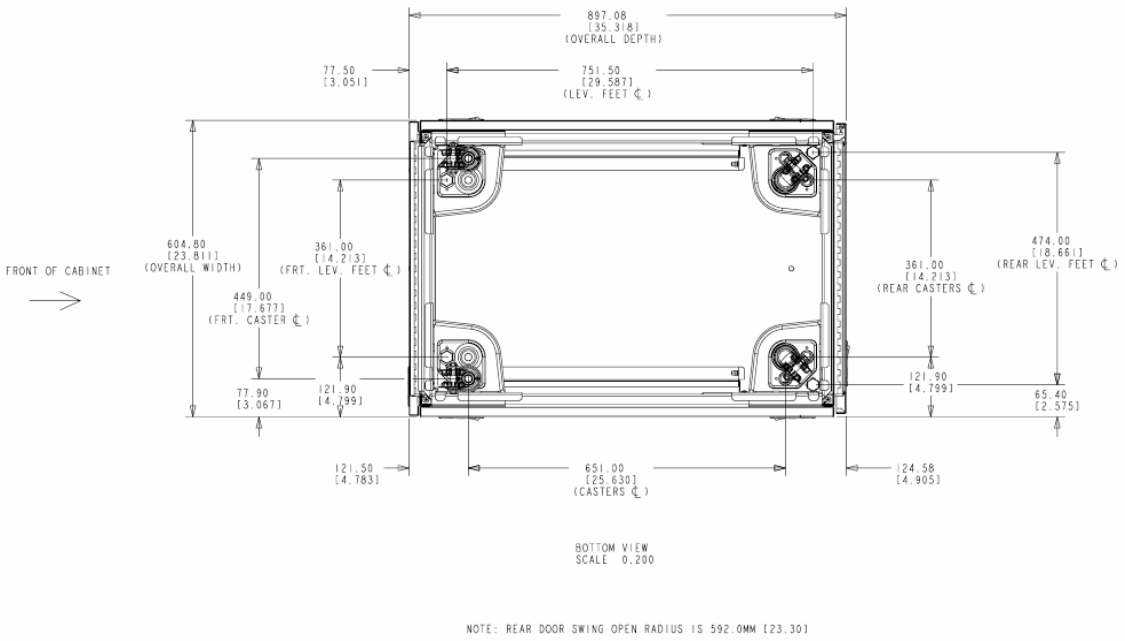


Figure 2.1 Front and Top of the Rack (measurements in millimeters)

For a list of components to order and Bill of Materials (BOM), refer to supplemental HDS installation guides for HDS storage solutions.

2.2 Installation and Maintenance Clearance Areas

Figure 2.2 shows the installation and maintenance clearance areas for the rack.



Note: All dimensions are shown in millimeters. Dimensions in square brackets (i.e., [23.30]) are in inches

Figure 2.2 Installation and Maintenance Areas

2.3 Power Guidelines

Observe the following guidelines for electrical power and the intended design and function of the rack:

- There are 4 PDUs in the rack.
- For power-redundancy purposes, the PDUs on the left side should be connected to one power source (circuit) and the PDUs on the right side PDUs should be connected to a separate circuit. Then, if one of the sides loses power, the rack and its mounted components can continue to receive power from the other side.

2.4 PDU Design and Characteristics

Figure 2.3 shows the PDU design:

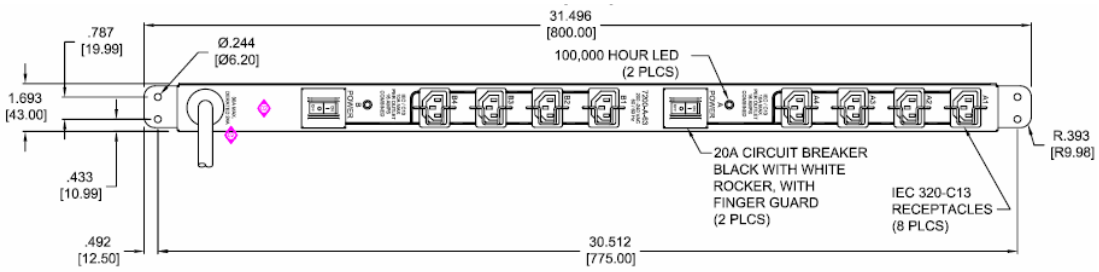


Figure 2.3 Rack Installation and Maintenance Clearance Areas

Each PDU has the following characteristics:

- **Electrical rating**
  - 200-240 VAC
  - 50/60 Hz
  - 30 amps
  - 24 amps derated (usable)
- **Outlets**
  - 8 outlets, IEC C13 (EN60324-C13)
  - 12A usable/derated, per 4 outlets
  - 10A max. capability per outlet
- **Circuit Breakers (on/off switch)**
  - 2, one per bank of 4 outlets
  - 2 green lights, one per circuit breaker when ON
- **Power Cord**
  - Rated 30A, 200-240V
  - APIA Plug: IEC 309
  - EMEA Plug: IEC 309
  - US Plug: L6–30P
- **PDU Dimensions**
  - (mm): 800 x 43 x 76.2
  - (in): 31.5” x 1.65” x 3”
- **Safety Approvals**
  - UL60950, cUL1950, CE

Caution: Do not overload the 30-amp PDU (24 amps usable). This can occur if you use only one PDU or if one of two PDUs loses its source power. Distribute the load across multiple PDUs, noting that the PDUs on the left go to one power source and the PDUs on the right go to a separate circuit.

2.5 PDU Plug Types

Figure 2.4 and Figure 2.5 show the types of PDU plugs used in regions around the world.

Figure 2.4 Plug Type Used in Asia-Pacific/EMEA Rack Models (IEC 309)

Figure 2.5 Plug Type Used in Canada, United States, and the Americas (L6-30P)

2.6 Power Jumper Cables

Figure 2.6 shows the power jumper cable shipped with the rack and Table 2.2 describes the cable. The cable is used to connect the storage system to the PDU.

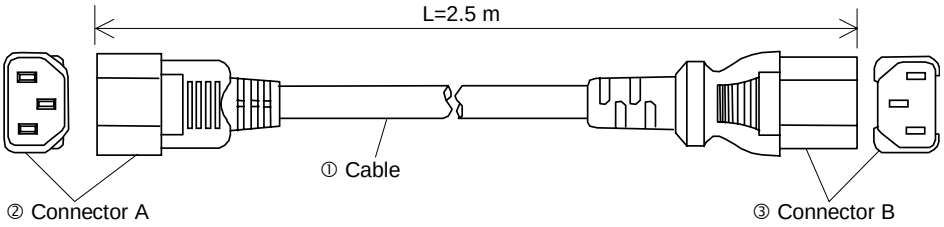


Figure 2.6 Power Jumper Cable

Table 2.2 Cable Description

Part No.	Name	Quantity	Model	Applicable Safety Standard / Rating
1	Cable	--	PVC code	UL and CSA
2	Connector A	1	EN60324-C14	For 250 VAC (10 A)
3	Connector B	1	EN60324-C13	For Rack frame

Chapter 3 Preparing for Installation

This chapter describes how to prepare the rack for installing equipment into it.

Topics include:

- Receiving considerations for the rack (section 3.1)
- Tools required (section 3.2)
- Checking the hardware (section 3.3)
- Casters (section 3.4)
- Leveling feet (section 3.5)
- Stabilizing the rack (section 3.6)
- Moving the rack (section 3.7)
- Opening and closing the side panels (section 3.8)

3.1 Receiving Considerations for the Rack

To receive a fully integrated and configured Hitachi Data Systems 19-inch Global Rack, observe the following:

- The dock door at the receiving site must accommodate the height and width of the rack.
- An appropriate freight elevator must be available for deliveries to upper and lower floors.
- Do not lay the rack down because the sheet metal may twist and/or distort.
- If the rack already has components mounted in it, it may be heavy (250 lbs. ~ 1000 lbs. if a Hitachi storage system subsystem is already installed in it)

3.2 Tools Required

The following tools are required for securing products to the front vertical rail mounting holes:

- Cage nuts
- Cage nut tool
- Screws
- Washers
- Adjustable wrench (not included)
- Phillips screwdriver (not included)

The rack comes with all the necessary screws, washers, cage nuts, and cage nut tool.

3.3 Checking the Hardware

If the rack is ordered empty, it should come with all the components described in Chapter 2. If additional features or options were ordered, or if the rack was ordered with Hitachi Data Systems products pre-installed, verify that all items have been received.

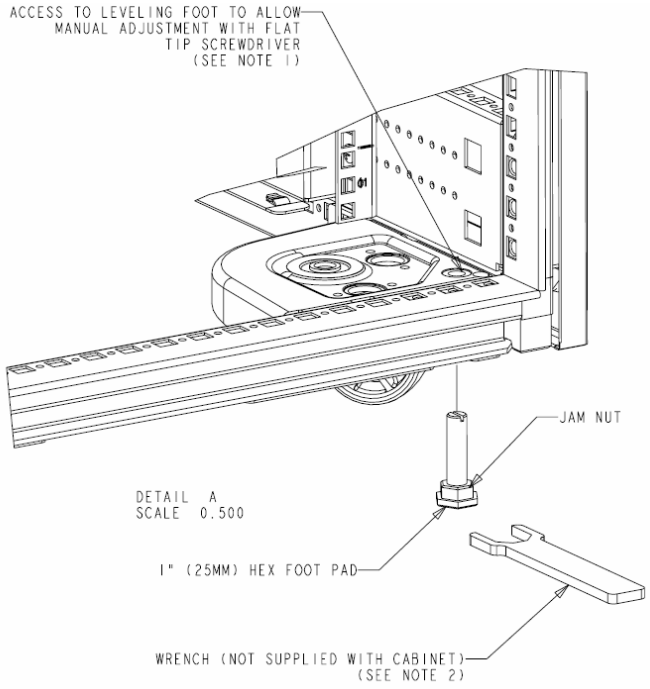
3.4 Casters

The casters facilitate movement of the rack across short distances to position it for final installation. Once the rack is in its final position for installation, be sure that the full weight of the rack is supported by the leveling feet.

WARNING: The casters can only support the weight of the rack with installed components for short periods of time and are not designed to support the full weight of the rack on a long-term basis. If this occurs, the casters may be damaged.

3.5 Leveling Feet

The leveling feet, located beside each caster on the rack, unscrew and extend to the floor. These feet support the rack and help compensate for uneven surfaces as shown in Figure 3.1.



Note 1: If access is available to the top of the leveling foot from the inside of the cabinet, a flat tip screwdriver may be used to lower the leveler.

Note 2: Alternatively, the leveler can be loosened by turning it clockwise with a wrench to fit into the 1-inch hex pad.

Note 3: Once leveled, the jaw nuts can be used to secure the leveler in place.

Note 4: The leveling feet are screwed in at the factory and tightened to avoid loosening during shipment. If you have difficulty loosening up the levelers from top, use the wrench to break them loose from the bottom.

Figure 3.1 Leveling Feet

3.6 Stabilizing the Rack

WARNING: The rack allows many components to be installed vertically. Plan the weight and location of the components to place the center of mass as much as possible below the mid-point of the rack. To reduce the risk of danger to persons or equipment, follow the safety guidelines and stabilize the rack as described in the following paragraphs.

WARNING: If you are installing a single (standalone) rack, be sure the rack is level and has been stabilized before installing the components. If an unstable rack is loaded with components, it may become unbalanced and fall over.

If installing two racks and baying them together, be sure both racks are level and have been stabilized before installing components in the rack.

To stabilize the rack, see Figure 3.2 and follow these guidelines:

- Stabilize the rack frame at its final installation location by adjusting the leveling feet.
- Using an adjustable wrench, turn each leveling foot clockwise until the clearance between the caster and the floor is 2.5 mm.

  Note: The full weight of the rack should be resting on the leveling feet, not on the casters.
- Adjust the leveling feet so the tilt of the rack (forwards, backwards, left, or right) becomes 0.0 ± 2 mm.
- When extending equipment out of the rack, be sure the front stabilizer plate is installed and extend only one item at a time. Extending two or more items of equipment at a time may cause the rack to become unstable and tip over.
- Always follow safety precautions and common sense.

3.6.1 Lowering the Leveling Feet

Figure 3.2 shows how to stabilize the rack by lowering the leveling feet.

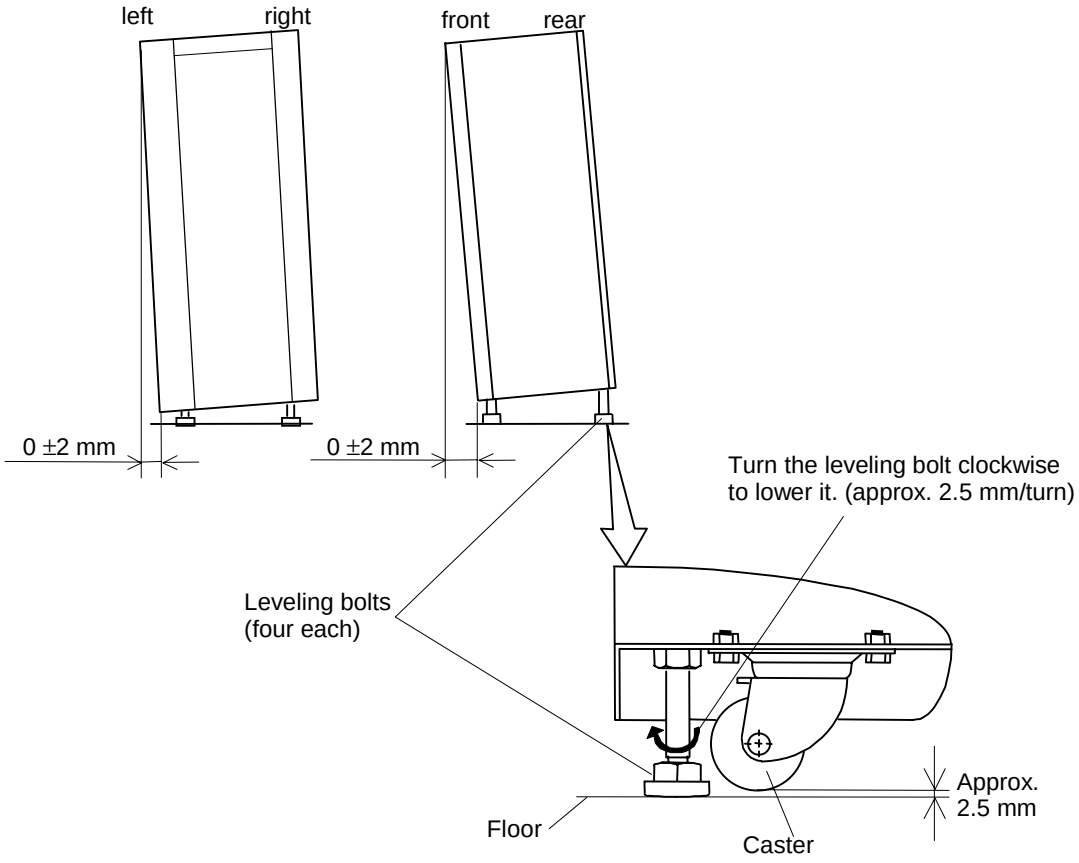


Figure 3.2 Stabilizing the Rack by Lowering the Leveling Feet

3.6.2 Installing Side Stabilizer Plates

Figure 3.3 shows how to install the side stabilizer plates.

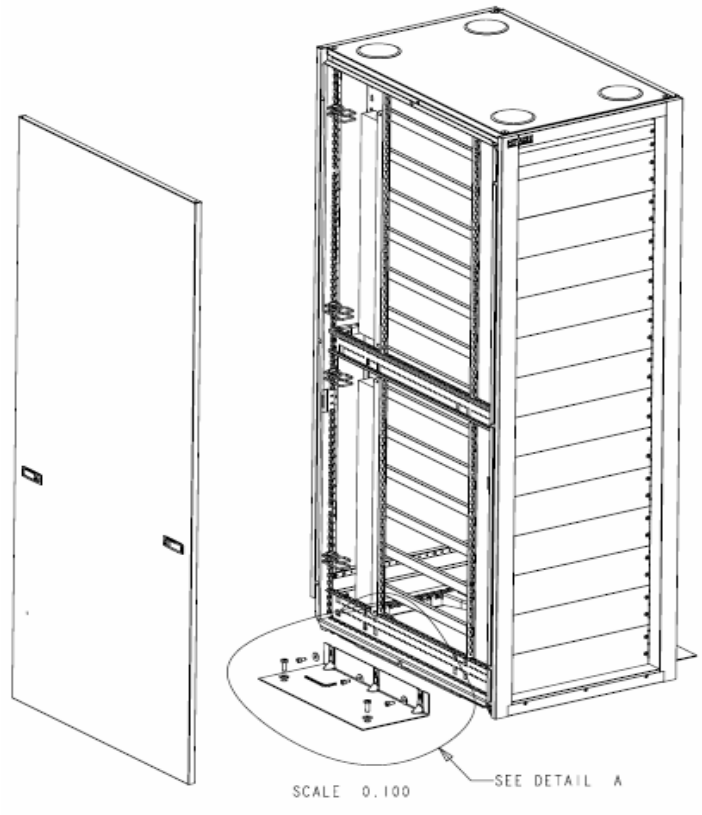


Figure 3.3 Installing the Side Stabilizer Plates (Detail A)

When installing the side stabilizer plates:

1. Remove side stabilizer plates from cabinet.

   Note: These sidewalls are grounded inside the cabinet. To remove them, unlock the latches and then pull panel out and up.

2. Place the stabilizer plate as shown in Figure 3.3, so it mates against the bracket at the bottom sides of frame and aligns with the holes.

3. Using the hardware supplied, attach both plates as shown in Figure 3.4 using the included hex tool.

4. Reinstall the side stabilizer plates.

5. Using the holes on the flat plate's surface, install bolts and washers to anchor the cabinet to the floor. This hardware is not included in the kit.

WARNING: The installation of side stabilizer plates is required only when the rack is installed as a stand-alone rack system with no equipment mounted in it. The side plates keep the rack from tipping on its sides. If equipment is mounted in the rack, using the side stabilizer plates is optional.

Figure 3.4 shows the final view after the side stabilizer plates have been installed.

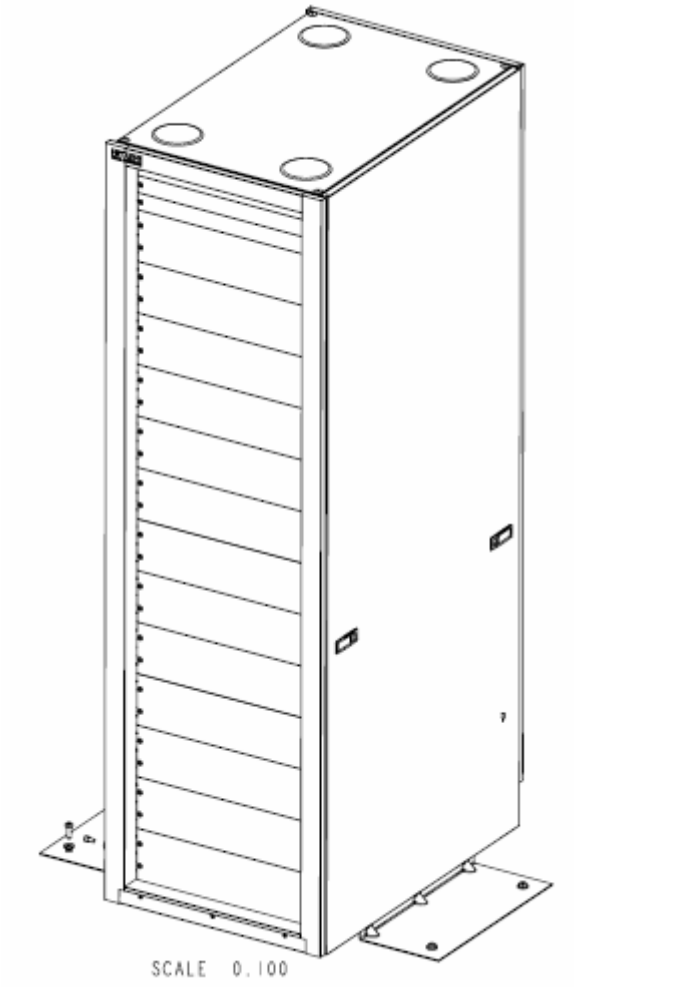


Figure 3.4 View of Global 19-inch Rack with Side Stabilizer Plates Installed

3.7 Moving the Rack

The maximum allowable inclination angle for the rack is eight degrees (8°). When moving the rack across steep slopes or different floor levels, use a gangway as shown in Figure 3.5 to form a slope with an inclination angle (slope) of less than eight degrees.

To reduce the risk of injury to persons or damage to equipment, it is recommended that all equipment be removed from the rack, in order from top to bottom. Transport the rack and the components individually to the desired location.

To move the rack with the mounted components in it, it is recommended to transport on the same pallet on which the rack was shipped. Take necessary precautions when loading onto the pallet. Package and secure the rack on the pallet as it was shipped and received.

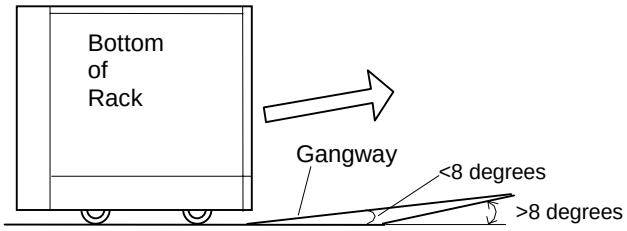


Figure 3.5 Maximum Incline (Slope) for Moving the Rack

3.8 Opening and Closing the Side Panels

The side panels can be locked and unlocked with keys supplied with the rack. Once unlocked, press the release levers inward and pull the panel outwards and lift to remove. Reverse these procedures when reinstalling the side panels.

Chapter 4 Installing Rack Components

This chapter describes how to install rack components.

Topics include:

- Installation steps (section 4.1)
- Installing cage nuts (section 4.2)
- Installing the anti-tip stabilizing bar (section 4.3)
- Installing blanking panels (section 4.4)
- Securing multiple racks together with the baying kit (section 4.5)

Before installing equipment, read the safety information in Chapter 1 and section 3.6.

When installing equipment, be sure to:

- Install the front anti-tip stabilizing plate when installing or removing equipment to provide greater stability and safety.
- Mount the heavier equipment at the bottom of the rack prior to installing equipment in the upper half of the rack.
- Refer to the specific instructions included with the equipment you will mount.

For instructions about mounting a specific Hitachi Data Systems subsystem(s) into the rack, refer to the appropriate Hitachi Data Systems installation guide.

4.1 Installation Steps

Most installations of equipment in the rack involve the following steps:

1. Determine location in the rack where the components will be mounted.
2. Remove side panels or rear door of rack (not necessary, but may simplify installation).
3. Install railkits or mounting hardware on which the equipment will rest in the rack:
    a. Prepare the mounting hardware.
    b. Insert the applicable cage nuts in the rack to which the railkits will be secured.
    c. Install the railkits/mounting hardware into the rack.
    d. Install the front anti-tip stabilizing plate to provide greater stability and safety.
4. Determine what mounting holes will be used for securing the equipment to the rack and install cage nuts at these locations.
5. Insert equipment into the rack using the previously installed railkits/mounting hardware.
6. Secure the equipment to the rack with screws that secure to the cage nuts as determined in Step 3.
7. It is recommended that once the rack is in its final destination that you keep the bar bolted to the rack for maintenance and safety purposes.
8. Identify the correct power source (220V) to which the equipment will be connected, then connect to power.
9. Install the blanking panels.
10. Reattach the side panels and/or rear door if they have been removed.

4.2 Installing Cage Nuts

When installing railkits or securing equipment to the rack, cage nuts are inserted into the square holes. Screws can then attach to the cage nut to secure the railkits or equipment.

To install cage nuts, insert one curved edge into the square hole and use the cage nut tool to pull the other end through the square hole as shown in Figure 4.1.

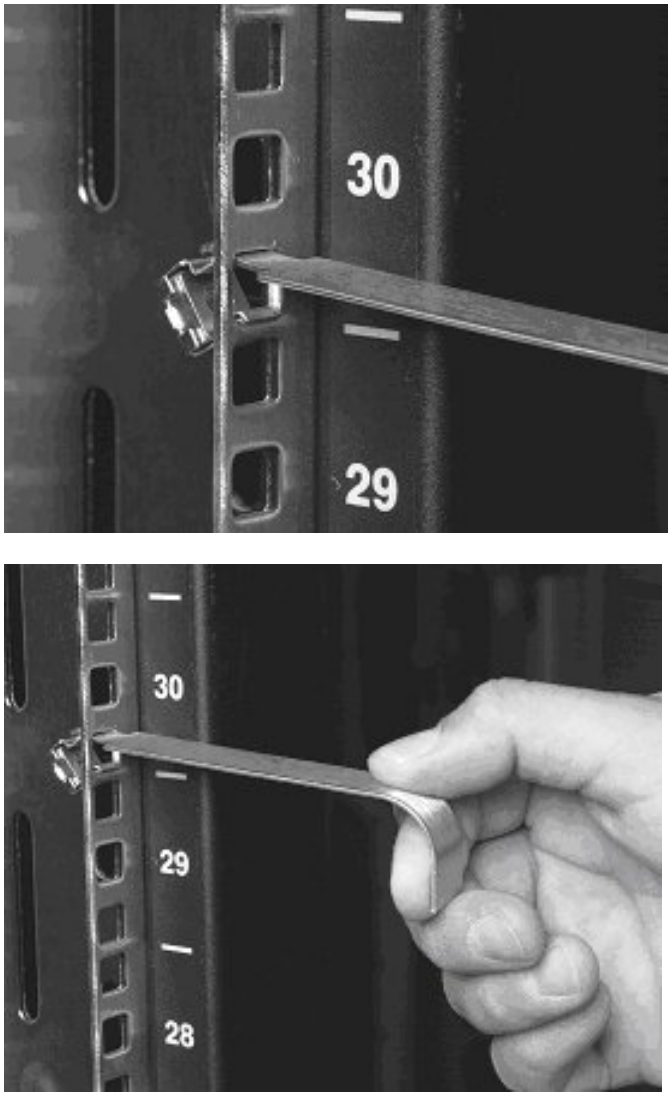


Figure 4.1 Installing the Cage Nuts

4.3 Installing and Uninstalling the Anti-Tip Stabilizing Plates

Install anti-tip stabilizing plates to provide further stability to the rack. This extra stability is especially important when installing equipment into the rack or removing equipment from it.

Figure 4.2 shows the installation of the anti-tip stabilizing plate. Reverse these actions to uninstall the anti-tip stabilizing plate.

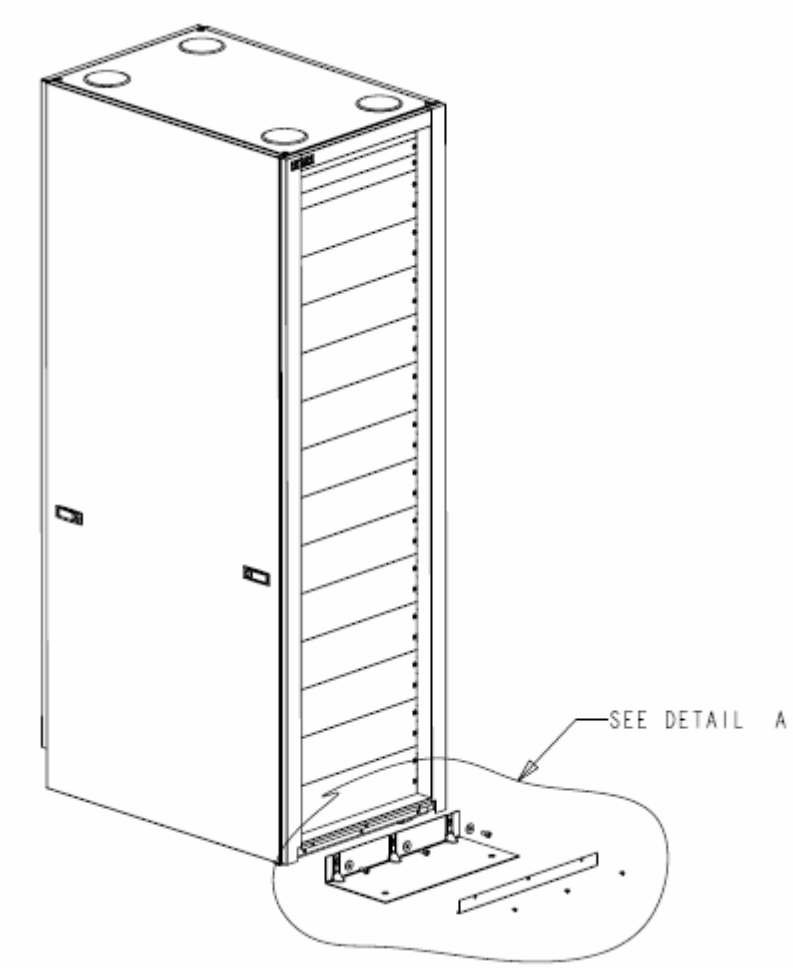


Figure 4.2 Installing and Uninstalling the Anti-Tip Stabilizing Plate - 1 of 2

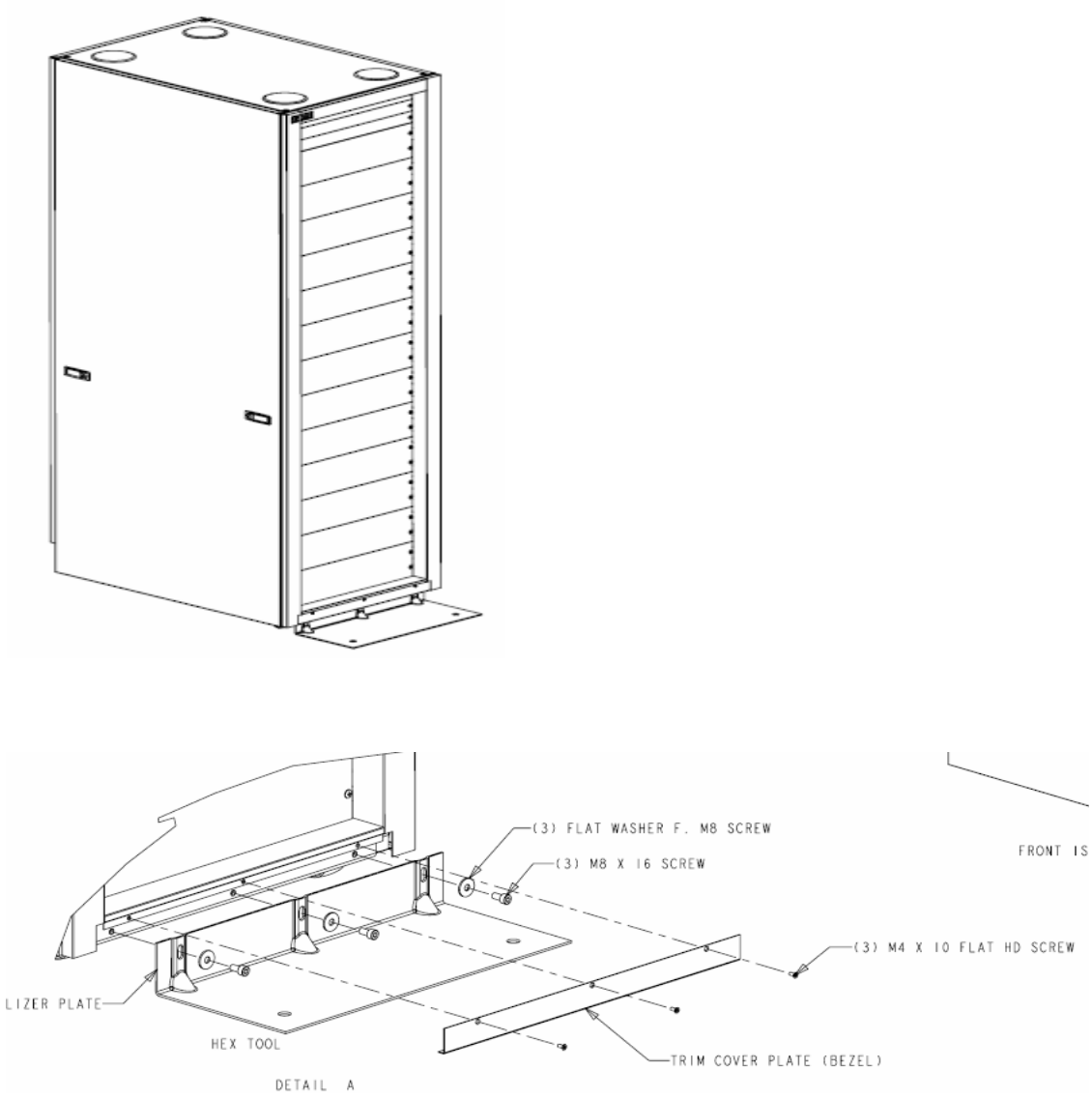


Figure 4.3 Installing and Uninstalling the Anti-Tip Stabilizing Plate - 2 of 2

To install the stabilizer plate:

1. Remove the trim cover plate from bottom of bezel and set it aside (you will need it when you reinstall the trim cover plate).
2. Unpack the stabilizer plate kit.
3. Place the stabilizer plate as shown to mate with the bracket at the bottom of the frame.

   Note: The plate may have to be tucked in at a slight angle to clear the bezel bottom flange. Be sure the large flat surface rests fully on floor surface.

3. Using the washers, M8 screws, and the tool supplied in kit, secure the plate to the frame.
4. Reinstall the trim cover plate with the M4 flat head screws removed in Step 1.

4.4 Installing Blanking Panels

Blanking panels should be installed to cover any empty space at the front of the rack. This will ensure adequate airflow to the equipment in the rack if the rack is not completely filled.

When installing blanking panels, follow these steps:

1. Place the blanking panel on the rack as a template to determine which holes will require cage nuts.
2. Insert the cage nuts.
3. Secure the panels to the rack by screwing them onto the rack at the cage nut locations.

4.5 Securing Multiple Racks Together with the Baying Kit

The baying kit is used to secure multiple racks together.

When securing multiple racks together, follow these steps:

1. Remove the side panels from the cabinets that are to be bayed together
2. Open the contents of the baying kit.
3. Place the cabinets side by side until they touch.
4. Once the cabinets are leveled, remove the two front-center roof installation screws using the TORX® tip tool supplied.
5. Place the baying plate on top (aligning the holes) and reinstall the roof installation screws into both holes to connect the cabinets (see Detail A in Figure 4.4).
6. For the baying connection at the front bottom, the M12 bolts must be started by hand into the holes at the bottom of the frame until they are high enough to clear the TORX tool for final tightening (see Detail B in Figure 4.4).

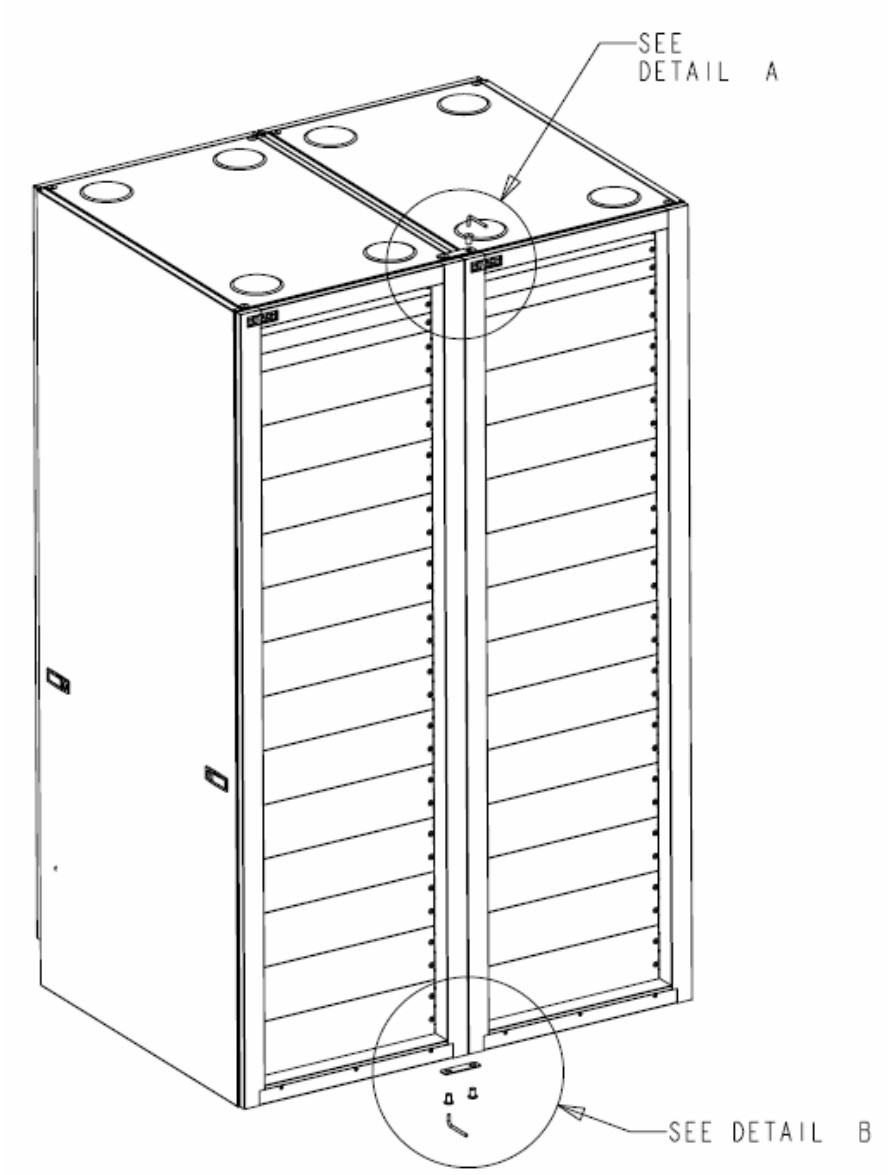


Figure 4.4 Baying Kit [Details A and B] - 1 of 2

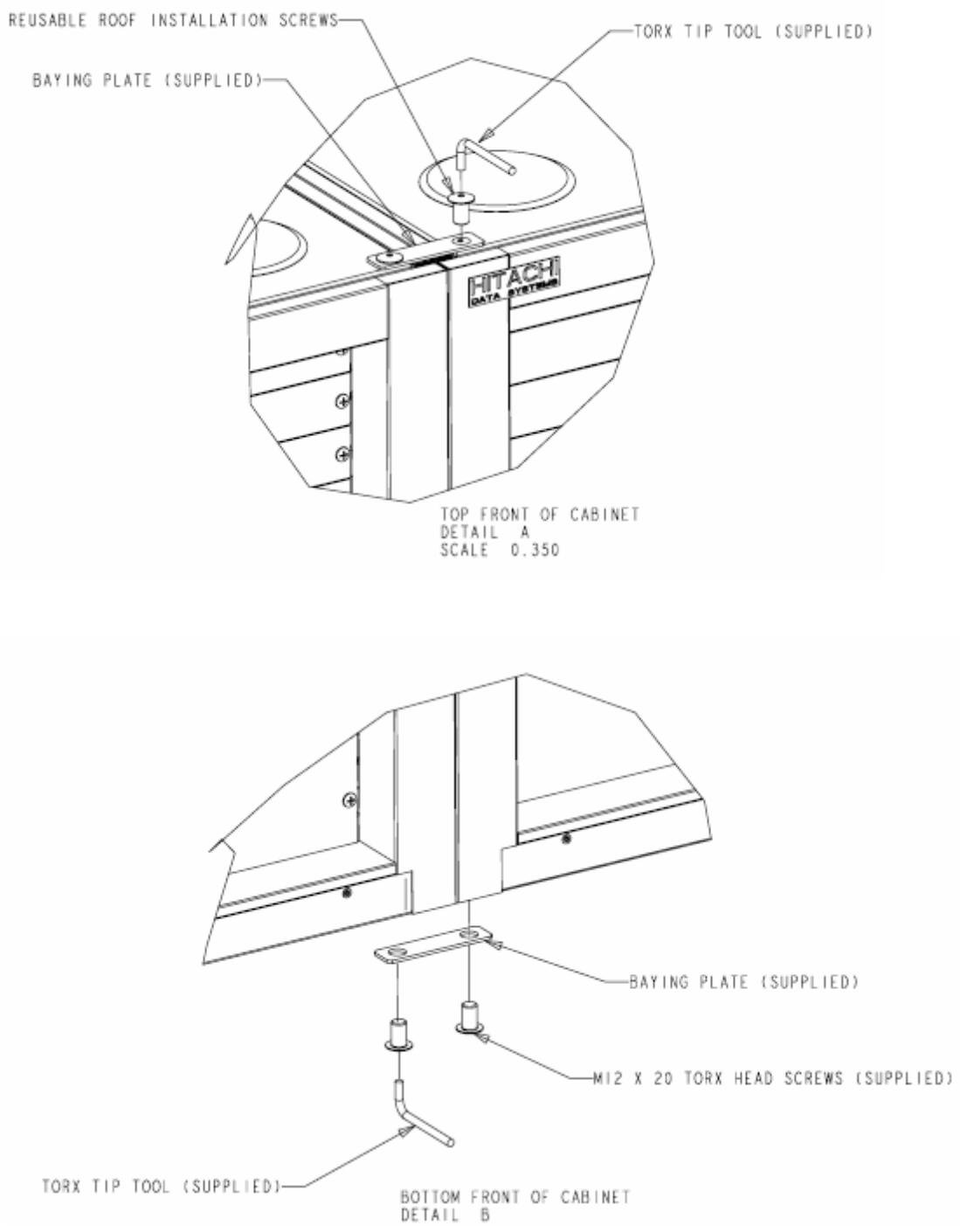


Figure 4.4 Baying Kit Baying Kit - 2 of 2

4.5.1 Rear Baying Instructions

The following steps describe the rear baying instructions:

1. Remove the rear doors to access cabinet frames.
2. Look for a common notch in frames where the baying connection will be made (one at the bottom and one at the top). See Figure 4.5.
3. Once the cabinets are even, place the hex connecting bushing. Use a 4mm hex Allen tool to put an M6 cap screw through the frame open square. This aligns the internal slot to reach the hex bushing. (A magnetic tool is recommended because screws may fall off inside the frame cavity.)
4. Repeat Step 3 with the remaining screws and the bushing installation.

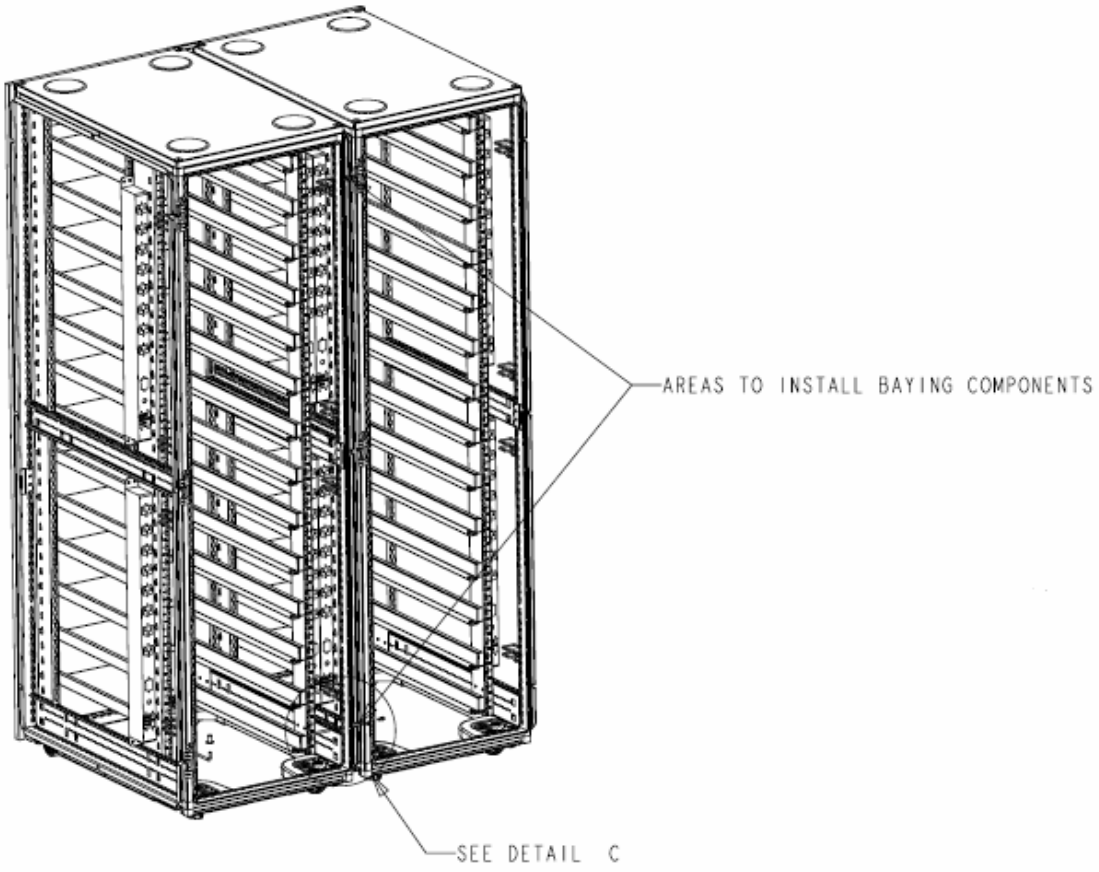


Figure 4.4 Baying Kit Rear Baying Instructions - 1 of 2

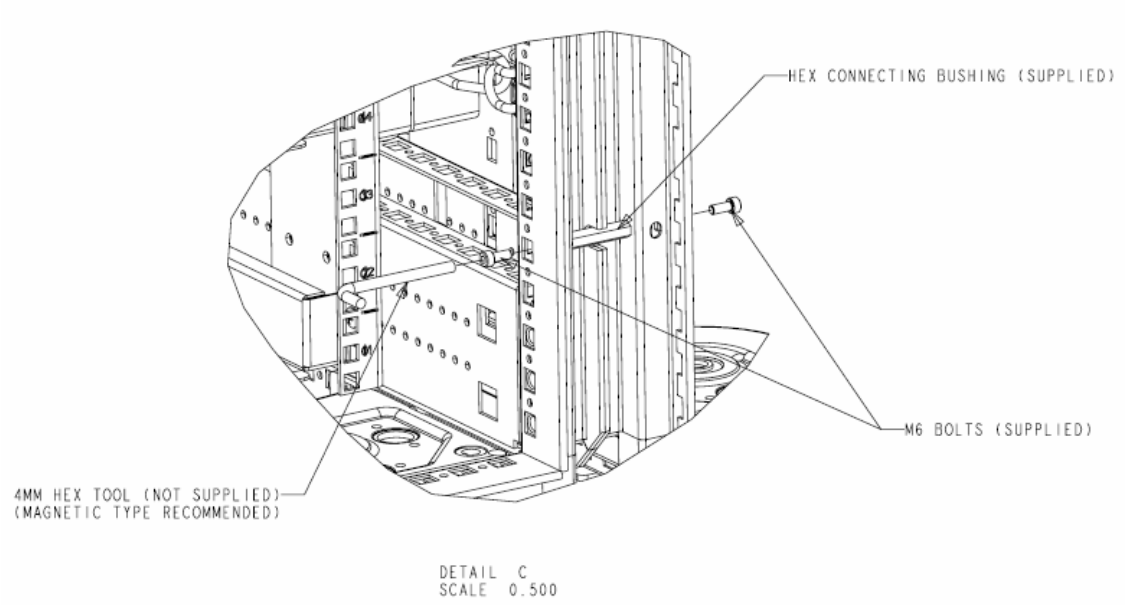


Figure 4.5 Rear Baying Instructions [Detail C] - 2 of 2

Chapter 5 Troubleshooting

If you need technical assistance, please contact your Hitachi Data Systems representative, or call the appropriate Hitachi Data Systems Support Center for assistance.

5.1 Calling the Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible, including the circumstances surrounding the error or failure and the exact content of any error messages displayed on the host system(s).

The worldwide Hitachi Data Systems Support Centers are:

- Hitachi Data Systems North America/Latin America
  San Diego, California, USA
  1-800-446-0744
- Hitachi Data Systems Europe
  Contact Hitachi Data Systems Local Support
- Hitachi Data Systems Asia Pacific
  North Ryde, Australia
  61-2-9325-3300

Appendix A EIA (U)nit Measurement Mark

An EIA (U)nit is a standard of measurement used in rack enclosures Figure A.1 shows the EIA (U)nit measurement mark visible on the front of the rack.

1U = 1.75 inches

One EIA (U)nit has three holes (square or round).

The spacing above and below the middle hole is larger than the spacing below the bottom hole or the spacing above the top hole. This allows you to measure "U"s when there is no reference label for comparison.

Figure A.1 EIA (U)nit Measurement on Rack

Appendix B Units and Unit Conversions

Table B.1 provides unit conversions for the standard (U.S.) and metric measurement systems.

Table B.1 Unit Conversions for Standard (U.S.) and Metric Measures

From	Multiply By	To Get
British thermal units (BTU)	0.251996	Kilocalories (kcal)
British thermal units (BTU)	0.000293018	Kilowatts (kW)
Inches (in)	2.54000508	Centimeters (cm)
Feet (ft)	0.3048006096	Meters (m)
Square feet (ft^2)	0.09290341	Square meters (m^2)
Cubic feet per minute (ft^3/min)	0.028317016	Cubic meters per minute (m^3/min)
Pound (lb)	0.4535924277	Kilogram (kg)
Kilocalories (kcal)	3.96832	British thermal units (BTU)
Kilocalories (kcal)	1.16279×10^{-3}	Kilowatts (kW)
Kilowatts (kW)	3412.08	British thermal units (BTU)
Kilowatts (kW)	859.828	Kilocalories (kcal)
Millimeters (mm)	0.03937	Inches (in)
Centimeters (cm)	0.3937	Inches (in)
Meters (m)	39.369996	Inches (in)
Meters (m)	3.280833	Feet (ft)
Square meters (m^2)	10.76387	Square feet (ft^2)
Cubic meters per minute (m^3/min)	35.314445	Cubic feet per minute (ft^3/min)
Kilograms (kg)	2.2046	Pounds (lb)
Ton (refrigerated)	12,000	BTUs per hour (BTU/hr)
Degrees Fahrenheit (°F)	Subtract 32, then multiply result by 0.555556	Degrees centigrade (°C) °C = (°F - 32) × 0.555556
Degrees centigrade (°C)	Multiply by 1.8, then add 32 to result	Degrees Fahrenheit (°F) °F = (°C × 1.8) + 32
Degrees Fahrenheit per hour (°F/hour)	0.555555	Degrees centigrade per hour (°C/hour)
Degrees centigrade per hour (°C/hour)	1.8	Degrees Fahrenheit per hour (°F/hour)

Acronyms and Abbreviations

A	amperes
AC	alternating current
APIA	Asia Pacific, International Americas
BOM	bill of materials
BTU	British thermal unit
CE	Consumer Electronics
cfm	cubic feet per minute
CSA	Canadian Standards Association
D	depth
dBA	decibels (A-scale)
DC	direct current
EIA	Electronic Industry Association
EMEA	Europe, Middle East, Africa
H	height
HDS	Hitachi Data Systems
Hz	Hertz
IEC	International Electrotechnical Commission
in	inches
kg	kilograms
lb(s)	pounds (weight)
mA	milliamperes
mm	millimeters
MΩ	megaohms
PDU	power distribution unit
PS	power supply
RK	rack
RKA	rack additional
U	standard EIA unit of measure in racks (one unit = 44.45 mm, 1.75 in)
UL	Underwriters Laboratories Incorporated
UPS	uninterruptible power supply
US	United States
V	volts
VA	volt-amperes
VAC	volts AC

W	width, watts