GE HealthCare

Revolution RT

Pre-Installation

Operating Documentation

5938483-1EN
Revision 2

General Service Documentation
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Effectivity:

The information in this manual applies to the following GE HealthCare CT Scanners:

- Revolution RT

The information in this manual does NOT apply to non-fixed (mobile) installations.

Language Policy

DOC0371395 - Global Language Procedure

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Damage in Transportion

All packages should be closely examined at time of delivery. If damage is apparent, have notation "damage in shipment" written on all copies of the freight or express bill before delivery is accepted or "signed for" by a GE HealthCare representative or a hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

To file a report:

- Call 1-800-548-3366 and use option 6.
- Fill out the GIQ workflow for any items missing, damaged, OBF/FOI for in process installs: https://app.sc.ge.com
- Contact your local service coordinator for more information on this process.

Rev. Nov. 10, 2017

Certified Electrical Contractor Statement

All electrical Installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE HealthCare personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE HealthCare will use its own specially trained field engineers. All of GE HealthCare's electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE HealthCare equipment shall only utilize qualified personnel (i.e., GE HealthCare's field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

IMPORTANT ... X-Ray Protection

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. The GE HealthCare will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical

design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

It is important that anyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that the GE HealthCare, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective materials and devices are available. It is urged that such materials or devices be used.

Lithium Battery Cautionary Statements

⚠ CAUTION

RISK OF EXPLOSION.

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

WARNING

DANGER D'EXPLOSION

Il y a danger d'explosion s'il y a replacement incorrect de la batterie.

Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rébut les batteries usagées conformément aux instructions du fabricant.

Omissions & Errors

Customers, please contact your GE HealthCare Sales or Service representatives.

GE HealthCare personnel, please use the GE HealthCare PQR Process to report all omissions, errors, and defects in this publication.

Revision History

Revision	Date	Reason for change
1	July 11, 2024	Initial release.

Revision	Date	Reason for change
2	December 05, 2024	**Chapter 7:** Update Table 7-1 to add size of "Table in lowest position with cradle at home position to surface of Gantry front cover" and "Table to maximum extension head end with extender from center line". **Chapter 8:** Update Boom information. Correct minimum thickness of concrete floors for High Capacity Table from 110 mm to 102 mm. Delete anchor lock ring for Table due to it's only for gantry. **Chapter 12/ Chapter 13:** Update Feeder Wire Size based on DOC3061766.

Contents

1 Introduction

This document contains the physical and electrical data necessary for planning and preparing a site for system installation. The responsibility of arranging and paying for this work rests solely with the purchaser.

1.1 Introduction

1.1.1 Using Pre-Installation Manual

This manual is the official source of prerequisites to installing a General Electric (GE) Computed Tomography (CT) system. Topics covered are site planning, site preparation, and the system requirements. This manual is divided into requirements for the customer, the system, the environment and on-site construction. It also includes the importance of addressing the local and national regulatory requirements, which may be specific to your location.

A GE Project Manager of Installation (PMI) will be available for specific questions or concerns. The PMI's primary responsibility is to assist the buyer with the siting requirements. This manual is a guide toward the actual installation of your GE CT system. Prior to any construction or installation, GE Headquarters Architectural Planning must approve the completeness of all preliminary concepts, site plans, and final working drawings.

Pre-installation includes the procurement and installation of ALL requirements, materials, and services necessary for the installation and startup of a CT system.

1.1.2 Assigning a Site Project Coordinator

It is the customers (purchaser) responsibility to assign a site project coordinator. The site project coordinator is the primary contact and liaison between with the construction planners, architects, contractors, and any other site administrative personnel for all site related functions; reporting to the purchaser.

The primary responsibility of the site project coordinator, working closely with GE, is to ensure the purchaser upholds all requirements outlined in this manual. To ensure a successful installation, it is recommended that the site project coordinator manage the entire project from pre-install to final startup, be familiar with all phases of pre-installation and installation of similar medical device construction projects. The site project coordinator should read and understand the contents of this manual and be familiar with the installation procedures.

1.1.3 Customer Responsibility

It is the responsibility of the customer to prepare the site in accordance with all the specifications provided in this manual and in conjunction with site-specific drawings and applicable regulations. Consideration should be taken for future expansion during the design phase of the site. It is essential to verify all aspects of the site configuration before construction has begun, as subsequent changes can be costly or impractical.

Pre-Install Checklist A detailed pre-installation checklist is provided in this manual. It is the responsibility of the customer to ensure all requirements on the checklist are fulfilled and that the site conforms to all specifications and requirements detailed in this manual.

Planning and Design Work The customer will select the location of the site. All architectural, mechanical, and electrical drawings associated with the design and planning of the site are the responsibility of the customer. Any alterations or modifications to the drawings or to products not specifically included in the sales contract are the customers responsibility. The customer shall provide the site project coordinator, a clean and safe work environment including proper lighting, and a level suitably supported structured floor. All floors, walls and ceiling should be in a finished state prior to installation, and all site-construction renovation completed.

Regulatory Compliance The customer shall be solely responsible for all regulatory compliance. All work shall comply with national, state and local regulatory and building codes for the location in which the installation occurs. This includes but is not limited to: permits, inspections, radiation licensing, fire control devices, earthquake regulations, international building codes.

Electrical Requirements The customer shall be solely responsible for providing all electrical material and service required as outlined and illustrated in this publication. This includes but is not limited to: Installation of all properly-sized junction boxes, outlets with covers, line safety switches, and fittings installed at the locations specified in the site design. Supplying electrical power of the required voltage, all necessary power supply cables and grounds, all necessary power cables and grounds to the PDU, and an Emergency-Off switch in the scan room.

1.1.4 Roles and Responsibilities

- **Customer :** Also known as Buyer or Purchaser or End User. This is the entity that has enteredinto contract with GE to buy the product.
- **GE Salesperson :** Responsible for completing the customer order process. They coordinate the completion of customer order as desired by the customer, for the customer. They are responsible for correcting incorrect orders. Changing orders, coordinating any replacement of damage in shipment items and for resolving missing in shipment issues.
- **GE Project Manager of Installation (PMI) :** Responsibilities include the overall project coordination and site planning of GE products; manages activities cross-functionally with sales, customer, customer contractors, and local field teams to ensure customer site is designed and prepared to accept and install product in the facility.
- **GE Field Engineer :** GE field personnel responsible for the actual assembly, installation, calibration of the product and verification of the proper operation and configuration of the GE product. This may include the physical movement of the system and its subcomponents from the point of delivery to the scan suite.
- **Zone Broadband Specialist :** GE personnel responsible for providing IT expertise and maintaining records of specific network IT connectivity parameters that are required to properly configure the products' connection to the broadband connection provided by the customer.
- **Network IT Personnel :** Dedicated on site personnel affiliated with or contracted by the customer. Responsible for providing IT expertise necessary to ensure successful network IT connectivity between the GE product and the facility.
- **Qualified Electrician :** Also known as Electrical Contractor. Qualified (Certified by a regulatory agency), In-House individual or entity contracted by the customer. Responsible for electrical connections between customer power source and up to and including the final connection to the GE product.
- **Architectural Engineer :** Dedicated on site personnel affiliated with the customer or contracted by the customer to manage the details of the construction parameters defined by regulatory agencies and as defined by parameters in the GE Pre-installation manual for the proper installation of the GE product.

- **Structural Engineer :** Dedicated on site personnel affiliated with the customer or contracted by the customer to manage the details of the structural parameters defined by regulatory agencies and as defined by the structural parameters provided in the GE Pre-installation manual for the proper installation of the GE product.
- **HVAC Design Engineer :** Dedicated on site personnel affiliated with the customer or contracted by the customer to manage the details of the air conditioning and air handling parameters defined by regulatory agencies and as defined by parameters in the GE Pre-installation manual for the proper installation of the GE product.
- **Independent Contractor :** Person or entity who contracts to do work for another person according to his or her own processes and methods; the contractor is not subject to another's control except for what is specified in a mutually binding agreement for a specific job. Can be contracted by GE personnel or by the customer for a unique or special task as part of the GE product installation process.
- **Customer provided Project Coordinator :** Dedicated contact person that works with GE Project Manager (PM). Acts as the single point of contact for the customer. Coordinates with all persons or entities contracted by the customer for the successful installation of a GE product.
- **Rigger :** Person, persons or entity hired as an Independent Contractor to perform a specific task related to the movement of GE product from the point of delivery to the scan suit where it will be installed.

1.2 What is Pre-Installation?

Pre-installation is any site preparation required prior to the installation of the system. This manual states all pre-installation siting and regulatory requirements. The Pre-Installation Kit may not answer all of your questions, contact your GE Project Manager of Installation (PMI) for answers. Likewise, prior to any construction or approval, GE Headquarters Architectural Planning must review all CT site plans, preliminary concepts, and final working drawings. Contact your GE Project Manager of Installation (PMI) for complete information regarding your site-specific room layout.

1.3 What is Pre-Installation Work?

Pre-Installation work includes:

- Site renovation.
- Alterations or modifications to products not specifically included in the sales contract.
- Installation of electrical conduit, junction boxes, ducts, outlets, and line safety switches.
- Installation of AWG stranded copper interconnection wiring, conforming to the following requirements:
  - The electrical contractor shall ring out and tag all wires at both ends.
  - Wires shall be continuous and without splices.
  - Ground wires shall conform to product requirements.
  - Color-coded wires shall be used whenever possible, to enable easier identification.
- All work shall conform to IBC (International Building Code) and local building and safety codes.

NOTE
GE neither provides nor installs the wires, conduits, junction boxes, or ducts illustrated in this publication, unless specifically mentioned.

1.4 Pre-Installation Tools

A list of primary customer tools for successfully completing the pre-installation process for a system is described below.

Customer Pre-Installation Task

- Regulatory and Service Clearance Information
- System Installation and Alignment Tool (P/N 5824714)

  Not included with system, and also available from your PMI/FE from GE tool warehouse. Use this to determine equipment layout and anchoring locations.
- Site Print

  Supplied by your PMI or sales rep. Must show actual room size, location of all equipment in the finished room, all service and operating clearances, and meet all regulatory requirements

Pre-Installation Manual Guide

Table below shows the location of the information necessary for fulfilling each of the pre-installation requirements.

Table 1-1 Locations of Site Requirement Information in this manual

Installation Site Requirement Information	
2 Installation Types on page 19	3 System Siting Requirements on page 23
4 Regulatory Requirements on page 29	5 Service Clearance Requirements on page 31
6 Room Sizes on page 37	8 Structural and Mounting Requirements on page 51
9 Environmental Requirements on page 75	10 Radiation Protection Requirements on page 91
11 Network Requirements on page 97	12 Power Requirements on page 101
14 Delivery and Storage Requirements on page 121	15 Handling Requirements on page 129
Contractors must complete ALL WORK before the scheduled delivery date.	

1.5 Pre-Installation Checklist

To ensure the latest revision is used, locate DOC2949059 on SIMS Content Viewer.

2 Installation Types

2.1 How to Determine the Best Installation Type for Your Site

Discuss installation options with your PMI to determine which of the installation types listed below best fits your site and schedule.

2.2 Typical Installations

Typical installations occur at established sites with finished, dust-free, occupancy-ready scan suites. The rooms range from suggested to minimum room sizes, and have NO ongoing construction on-site. A typical installation allows customers flexibility for room upgrades and site improvements. Upgrades and improvements may require additional planning prior to system delivery, especially when involving:

- Seismic approval
- Floor structural improvements
- HVAC improvements
- Electrical improvements
- Review of scan room shielding requirements by a qualified radiological health physicist.

As with any installation, the final site design for a typical installation must meet all service and regulatory requirements detailed in this manual.

2.3 Construction Site Installations

A *construction installation* describes installation at sites without an occupancy permit, often with ongoing construction. In general, construction sites fail to meet the recommended specifications for delivery of the system. GE does not recommend construction installations, as they can result in delays, increased costs, and possible damage to the system. When construction-site delivery proves unavoidable, the installation falls into one of two categories.

- Full construction site with completed radiology area.
- Full constructions site with limited delivery access.

Review the following categories to determine which most closely matches the condition of the planned installation site.

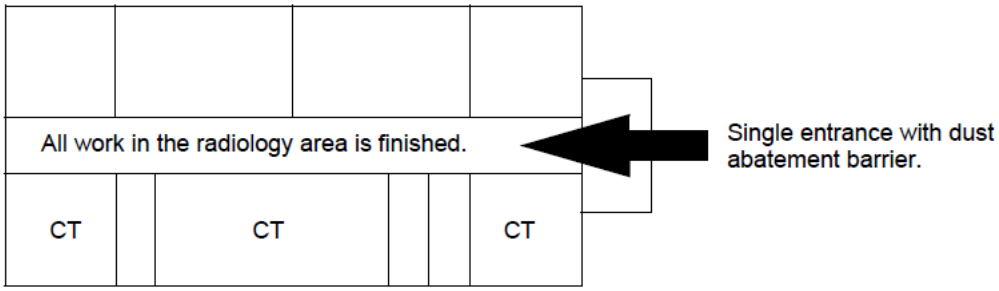
2.3.1 Full Construction Site with Completed Radiology Area

This type of site consists of a finished, dust-free, occupancy-ready radiology suite. While there is no remaining construction in or around the scan suite area, there may be ongoing construction in other areas. At the time of delivery such sites feature:

- Dust control measures deployed in the radiology suite area.
- Scan suite access limited to a single entrance (see Figure 2-1 Full construction site with completed radiology area on page 20).
- Radiology suite sealed off from the remaining construction area.
- Operational HVAC, with a positive air pressure within the radiology suite.

In addition the radiology suite at such a site REMAINS in a dust-free, occupancy-ready state after delivery and throughout the remaining construction phase.

Figure 2-1 Full construction site with completed radiology area



2.3.2 Full Construction Site with Limited Delivery Access

This type of site allows delivery during ongoing construction of the radiology suite area. At such sites, delivery occurs prior to site completion, but the product remains stored until a finished, dustfree, occupancy-ready radiology suite area is ready. This type of site requires the system scanner to be delivered in a sealed package with dollies. Delivery to the storage area may require a lift truck or riggers. Installation work begins only when the site reaches the completed, dust-free, occupancy-ready radiology suite requirement.

NOTE
If delivery requires vertical or horizontal lifting, the PMI adds the necessary identifier to the order.

2.4 Relocatable Building Installations

A re-locatable building is made in a factory and delivered to the site of its permanent location. Relocatable buildings qualify as fixed sites and must satisfy all of the requirements of a fixed site. The gantry and table must be mounted on a solid concrete floor. Any other floor type installations must designed by the customer's structural engineer and meet all GE Healthcare's specifications listed in this manual.

Refer to the 8 Structural and Mounting Requirements on page 51 of this manual for further information.

2.5 Upgrade Installations

Upgrade installations occur after the installation of another system. A change in the customer's needs requires the installation of additional equipment at the same site. For example, adding a PET system to an existing CT system.

To proceed with an upgrade installation, the customer's room size must be large enough to accommodate the new product without violating the regulatory and service requirements of the new product. When planning for an upgrade installation, siting requirements of the new equipment may exceed those of your existing system. Requirements needing additional consideration include:

- Floor thickness
- Room shielding
- Additional electrical capacity
- Increased cooling capacity
- Scan room shielding requirements

The final site design must include a room layout showing the equipment room with the recommended room size dimensions. All upgrade installations must meet all service and regulatory requirements detailed in the manual.

2.6 Quick Installations

Quick Installations involve sites requiring minimum room improvements. These installations typically consist of a weekend de-installation and room preparation completion, with a next business day delivery and installation.

Requirements

A site must meet a number of requirements to qualify for a Quick Installation, including:

- Existing electrical disconnect device, wire size, and grounds must meet all requirements referenced in 3.2.2 Electrical on page 24
- Existing structural specifications met, including floor thickness, and all requirements referenced in 3.2.3 Structural on page 24
- Existing HVAC capacity and regulation must meet all requirements referenced in 3.2.5 Environmental on page 26
- Existing CT suite must meet all regulatory and minimum size requirements referenced in 3.2.7 Clearances on page 26
- Existing facility must accommodate delivery and meet all delivery requirements referenced in 3.2.10 Delivery on page 27
- Existing facility must meet all scan room shielding requirements referenced in 3.2.4 Radiation Protection on page 26

Consult your Project Manager of Installation (PMI) for information about any additional requirements.

Restrictions

The following restrictions govern Quick Installations: check with your PMI regarding floor anchor re-use.

- Quick Installations require a new room print that accurately reflects the rooms targeted for upgrade.
- You ***CANNOT*** re-use existing floor anchors for a new CT system.
- New floor anchors must be a minimum of 102 mm (4 in) from any existing floor penetrations.
- Rooms not meeting the minimum requirements for the final product must undergo an upgrade/enlargement prior to the installation.

2.7 Two-Step (Temporary) Installations

The two-step installation is a temporary installation of one system in a site, with the intention of upgrading the site to another system in a near future date. The following restrictions apply to two-step installations:

- Must comply with ALL siting requirements necessary for the upgraded or final system. This includes the recommended room size and all electrical, structural, and HVAC requirements.
- All requirements referenced in 3 System Siting Requirements on page 23 apply to these types of installations.
- The customer is responsible for verifying compliance with all requirements.
- Rooms not meeting minimum requirements for the final product must undergo sufficient upgrading/enlargement.

NOTE
Temporary installations include all systems installed at a site for a period ranging from two weeks to six months.

3 System Siting Requirements

3.1 System Siting Requirements

The requirements listed in this manual apply to all fixed-site customer installations, including installation within re-locatable buildings. The following requirements represent the **MINIMUM** that a site must meet before beginning **ANY** new or replacement system installation. All parties should review these requirements to ensure that the site:

- Meets all Service requirements
- Meets all Regulatory requirements
- Meets all minimum structural, flooring, and vibration requirements
- Meets minimum HVAC requirements
- Meets minimum Electrical requirements
- Meets all network requirements
- Meets all radiation protection requirements
- Meets all operational clearances
- Includes all finished doors, floors, windows, ceilings, walls, and all plumbing and cabinets are installed (3.2.3.3 Finished Floor Requirements on page 25 and 3.2.3.4 Finished Walls Requirements on page 26 may apply).
- Does not have ANY continuing construction in the scan room OR neighboring suite areas.
- Conforms to the final GE site print, which must be kept ON-SITE and must show all items intended for the finished room.

> **NOTE**
> Each site should receive a Quick Start Kit from the PMI. Use the Pre-Installation Checklist in this manual to confirm that the site meets all of the requirements listed above.
> GE recommends completing all work to meet these requirements PRIOR to starting installation.

3.2 Customer System Siting Requirements

This section provides a breakdown of the customer tasks crucial for ensuring proper site preparation, regardless of whether planning for a replacement system at an existing site, or designing a new scan room for a first time.

Installation cannot proceed until verification of site-readiness occurs. A site is ready ONLY when it meets ALL delivery, regulatory, system, network, radiation protection, and operational requirements, as well as, requirements for any options. The purchaser is responsible for completing all work necessary to install the system, and includes:

- Completion of all items in 3.2.3 Structural on page 24 (recommended before installation begins.)
- PMI verification that ALL items on the Pre-Installation Checklist are completed.
- Review and preparation of all site-ready items.

To ensure timely delivery and installation, GE recommends that the customer complete all necessary work and schedule a site-ready visit prior to the delivery date. To confirm that the site meets all requirements, you may need to employ these and other contractors:

- Structural Engineer and/or Architect
- HVAC Contractor
- Electrical Contractor
- Qualified Radiological Health Physicist
- Cleaning Services.

NOTICE

An improperly prepared site—one that is in a state of construction—can result in a delayed installation date and/or damage to the system.

3.2.1 Regulatory Requirements

Verify that the site conforms to all of the following:

- The room must meet all regulatory clearance requirements.
- The room must meet all minimum size requirements.
- The site print is on-site, reflects actual room size and layout, and has received final approval.
- No grounded walls are found in regulatory clearance areas.
- The room meets all local codes.

3.2.2 Electrical

- Install the correct size junction boxes with covers at locations shown in the installation plan.
- Install appropriate conduits and duct work for system cables. If the suite houses additional components, determine the necessary considerations and complete the connections.
- Install a power supply of correct voltage output and adequate kVA rating.
- Install local disconnects, including proper over-current protection. This includes the A1/MDP main disconnect with Lock-out and Tag-out (LOTO) installation.

3.2.3 Structural

- Install “steelwork” or other suitable support work for mounting equipment from walls or ceilings.
- Review structural requirements including:
  - floor vibration
  - floor levelness
  - floor thickness
  - any seismic considerations, if applicable.
- Complete all suite and room renovations and modifications prior to delivery.

3.2.3.1 Dust and Air Quality

Ensure that the scan suite area is free of all dust, and not subject to ANY ongoing construction, including the installation of cabinets, hanging doors, and ceiling tiles.

⚠ CAUTION

POTENTIAL EARLY SYSTEM FAILURE.

Fine dust can deposit on the internal electronic components in Gantry, DAS, Tube, Table, PDU, and Operator Console.

It results in potential damage to the electronic components and lead to an early system failure.

Before installing scanner systems, ensure that the scan suite area is free of all dust and not subject to any ongoing construction.

TYPES OF DUST TO AVOID Ensure that NO construction occurs in or immediately around the scan suite area that results in:

- concrete dust
- drywall dust
- ceiling tile dust
- wood sawdust or shavings
- dust tracked into the CT suite from adjoining rooms

Failure to take appropriate precautions to protect the system against these types of dust may result in DAMAGE to the system and early SYSTEM FAILURE.

3.2.3.2 Environmental Influences

CT systems are designed with commercial components that are sensitive to air contaminants like sulfide, chloride and nitrates. It is the responsibility of the purchaser to ensure that the levels of these contaminates are low (Class1). See IEC60654-4 for air quality guidelines.

3.2.3.3 Finished Floor Requirements

NOTE
If a customer does not have concrete floor for the system installation, then the required anchoring must be approved by customer's structural engineer. It is is customer's responsibility to finish the flooring.

Installation requires a finish floor in the scan and control rooms. The floor surface in the scan room directly under the gantry and table must be level. The scan room must be level by 6 mm (1/4 in) over the table and gantry area to be acceptable. Shims should not be used to compensate for a floor that does not meet this requirement. Eight or more floor covering openings that are 102 mm (4 in) in diameter are made to ensure the table and gantry rest on a solid surface. These floor penetrations can be sealed if required. These requirements apply to all installation types.

Finished Floor Exception 1

For sites replacing their scan room floor covering after the table and gantry are installed, the floor can be clean-finished with dust free concrete. The finish floor in the scan room requires no dust-producing operations when applying final floor covering.

Finished Floor Exception 2

Facilities under new construction that have a finished radiology area with a single controlled-access and dust abatement barrier, can have a finished concrete floor in the scan room. The finished concrete floor in the scan room requires no dust-producing operations when applying final floor covering.

3.2.3.4 Finished Walls Requirements

Finished walls inside the scan and control rooms must be painted at the time of installation. This requirement applies to all installation types. A finished walls exception is made for new construction and upgraded facilities. A primer coat of paint is acceptable for equipment installation. However, the final coat of paint must be applied using a brush of some type (roller, or bristle). The final coat of paint cannot be applied using a spray method.

3.2.4 Radiation Protection

A qualified radiological health physicist should verify that the scan room's radiation shielding provides adequate radiation protection for the planned system. Refer Shielding Requirements for more details.

3.2.5 Environmental

Review HVAC requirements, including system environmental controls and patient comfort needs. Make sure the site provides an HVAC system capable of maintaining the recommended temperature and humidity specifications at the time of installation.

3.2.6 Options

- Confirm that all customer installation options are reviewed and final locations determined.
- All GE supplied installation options are reviewed and final locations determined.
- The laser camera should be on site at the time of system installation.

3.2.7 Clearances

- Review operational clearances to verify whether daily use items fit (e.g. beds, carts).
- Consider clearances for emergency medical equipment.
- Ensure that all storage cabinets and sinks appear on the site print in their proper locations.
- Confirm that adequate space exists in the scan suite for delivery and installation of all replacement parts following installation of the system.

3.2.8 Network

Ensure that network communication is in place and active.

3.2.9 Chemical Contamination

Never install wet film processors in the same room as the scanner, as this may result in possible contamination of scanner components. Chemicals utilized by such processors can contribute to increased equipment failures and downtime, and decreased reliability.

When siting this equipment, consider the effects that contact with these chemicals and the resulting fumes might have on human subjects in proximity to them. In addition, film processor equipment installation must meet all manufacturer requirements (e.g. ventilation specifications) as well as all applicable local, state, and national codes.

3.2.10 Delivery

- Determine room dimensions and verify that doorways adequately accommodate the system.
- Verify the existence of an accessible dust-free non-construction zone route to the scan suite that accommodates delivery.
- Identify elevators, doorways and hallways that can accommodate delivery.
- Provide floor protection, if needed.
- Request rigging, if needed.

3.3 Site Readiness

The GE Healthcare Project Manager of Installation (PMI) assists the purchaser in meeting all system siting requirements.

3.3.1 Pre-Installation Delivery Tasks

The PMI also performs the following pre-installation delivery tasks:

- Determines the delivery type: ground, dock.
- Determines if the delivery requires tilt dollies or riggers; orders dollies and lifting crates, as needed.
- Determines if the delivery requires the use of floor protection.
- Determines if the ground delivery requires the use of a forklift, and informs GE Transportation of the need for a forklift.

3.3.2 Site Review with Customer

A site-ready visit should occur prior to the delivery date. This visit verifies that the site meets all system siting requirements and confirms that installation can proceed. During the site-ready visit, a GE representative confirms that the site meets all of the required site-ready conditions including floor levelness, and delivery route readiness. Lifting options and construction site packaging must be ordered prior to delivery and cannot be added on-site.

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4 Regulatory Requirements

4.1 Regulatory Terms and Definitions

CLEARANCES

Clearances are the clear space or distance between or around objects and equipment, governed by all applicable safety, service and regulatory requirements and representing the lowest margin of freedom permissible for equipment siting.

DIMENSIONS

The length, width, depth and height of equipment.

EGRESS

An egress is the single path of exit from within any room. It is the customer's responsibility to provide a means of egress.

PRE-INSTALLATION ESCALATION

Pre-installation escalation is the process used to consult CT Engineering, the Design Center, or Environmental Health and Safety (EHS) to resolve preinstallation issues related to siting concerns and requirements.

GROUNDED WALL

A grounded wall is any wall with electrical conductivity to earth. Conductive materials generally found in walls include masonry, concrete, and tile. Treat as grounded additional elements commonly found in walls, including but limited to:

- Medical gas ports and plates
- Metal doors and window frames
- Water sources and metallic sink structures
- Metallic wall mounted cabinets
- A1 main disconnect panel
- Equipment Emergency Off panels
- Industrial equipment (such as air conditioners and vents)
- Expansion joints
- Surface raceway
- Exposed wall conduits
- Floor outlet boxes
- Floor HVAC boxes
- Floor medical gas

Common wall components **NOT** constituting grounded elements include:

- Standard wall outlet

- Light switches
- Telephones
- Communication wall jacks
- Ceiling tile grids

HEAD CLEARANCE

Head clearance represents the height dimension of the workspace, measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. It requires a minimum of 1981 mm (78 in) of the height of the equipment, whichever is greater.

MINIMUM

Minimum indicates the lowest limit permitted by law or other authority.

SERVICE ACCESS WIDTH

Service access width refers to the width of the working space in front of the equipment, and requires a minimum of 762 mm (30 in) or the width of the equipment, whichever is greater.

WORKSPACE

The workspace represents a three dimensional box of space required for safe inspection or service of energized equipment. It consists of depth, width, and height, with the depth dimension measured perpendicular to the direction of access. US regulation requires a minimum depth of 914 mm (36 in). Additional conditions can increase the minimum requirement. For example, FCT defines workspace as the envelope of the component superstructure, measured for the PDU with the front panel removed, and measured for the gantry and table with the extended covers removed.

4.2 Regulatory Clearances

Refer to A Regulatory Clearances for US on page 131 for United States (US) installations.

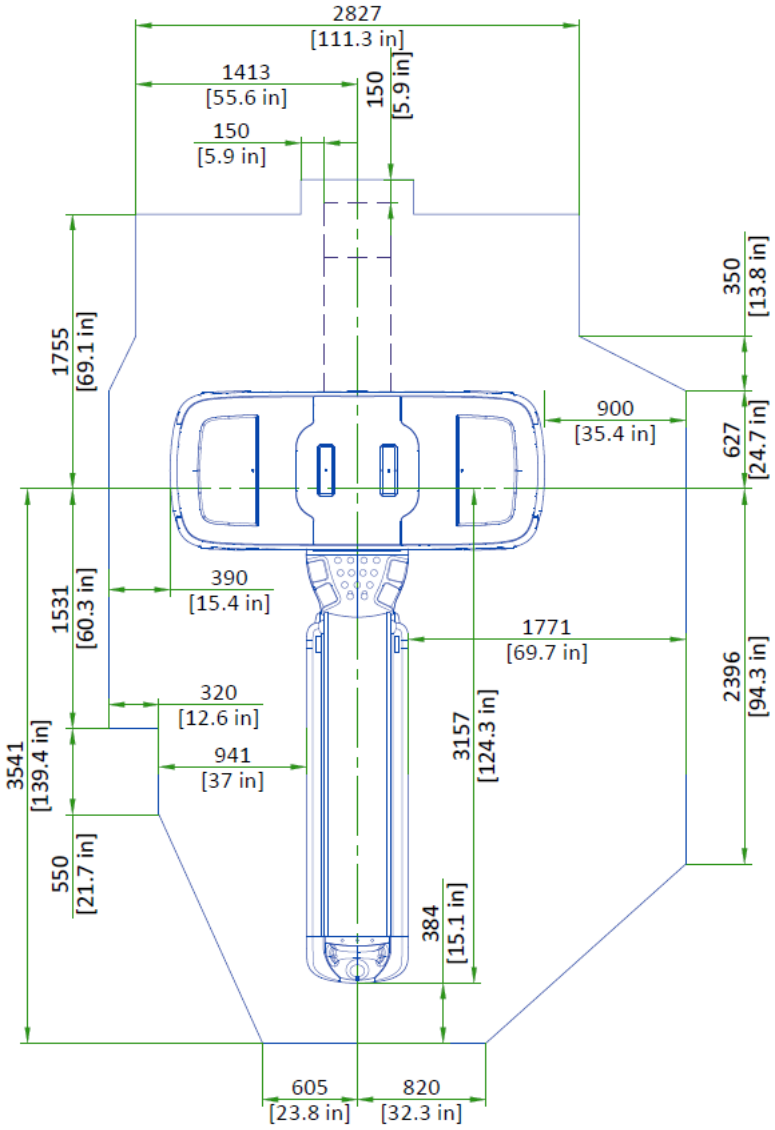
5 Service Clearance Requirements

5.1 Service Clearance Requirements

- Sufficient space to remove the covers, see Figure 5-1 Minimum Service Clearances with GT1700 Table on page 32 and Figure 5-2 Minimum Service Clearances with High Capacity Table on page 33.

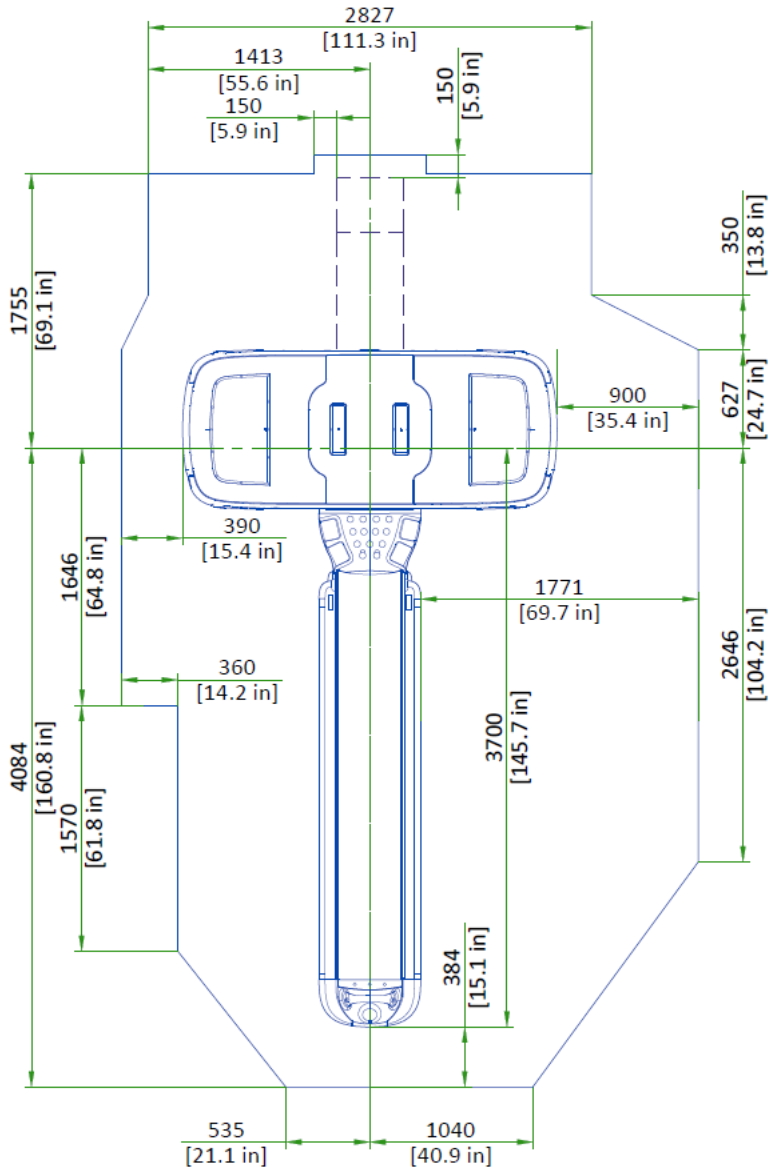
> **NOTE**
> Refer to B Alternate Cover Removal Options on page 137 for alternative cover removal options.

Figure 5-1 Minimum Service Clearances with GT1700 Table



NOTE
Unit: mm (in)

Figure 5-2 Minimum Service Clearances with High Capacity Table



NOTE
Unit: mm (in)

- One service engineer shall be able to accomplish all service component replacement tasks without needing special tools or equipment.
- ALL room layouts to provide service space and access around the table to the gantry right side. This is needed for replacement procedures that require components that are shipped in large boxes, such as the tube, detector, and HV tank.

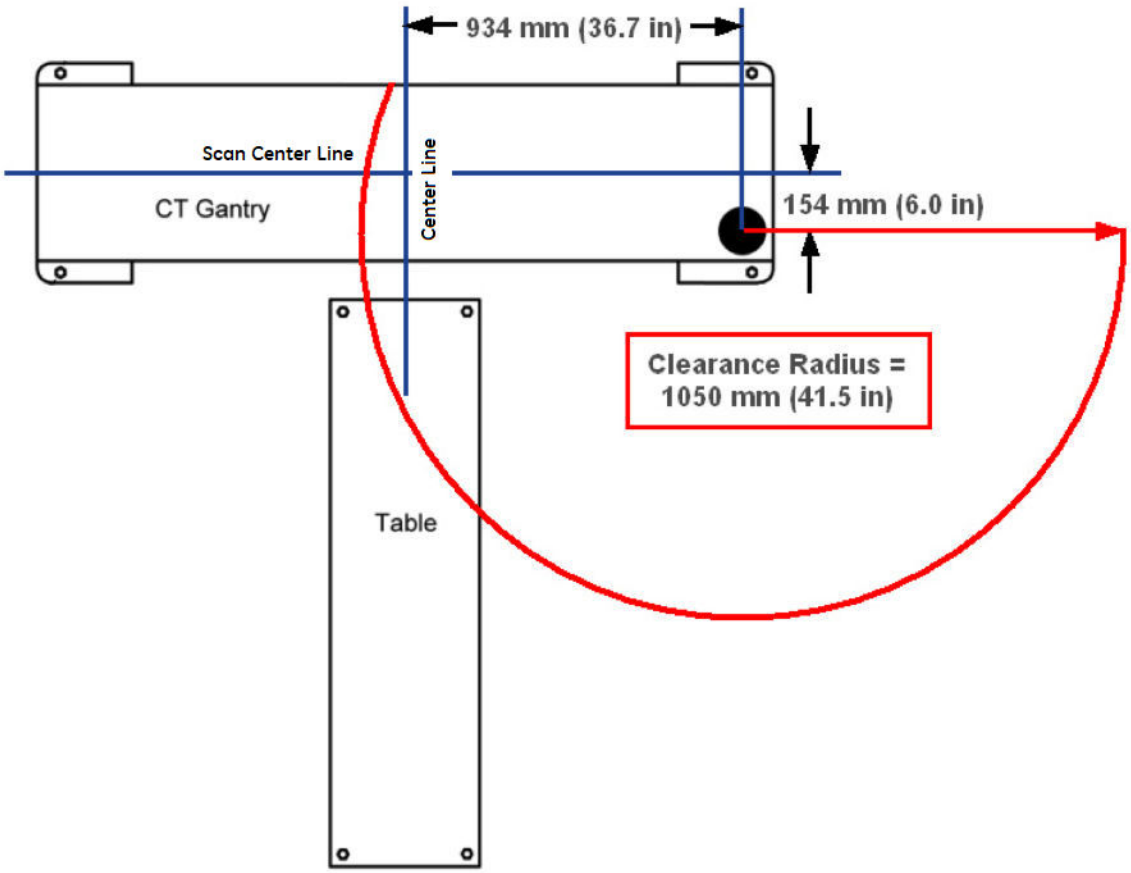
5.2 Service Clearances for Single Service Engineer

NOTE
When calculating service clearances, refer to Figure 5-1 Minimum Service Clearances with GT1700 Table on page 32 and Figure 5-2 Minimum Service Clearances with High Capacity Table on page 33 for all service clearance needs.

5.2.1 Gantry Service Clearance

Specifications for Boom Assembly clearance arc are defined in Figure 5-3 Boom Assembly Clearance on page 34. The boom assembly is used during tube and detector replacement. The minimum ceiling height within the clearance radius is 2286 mm (90 in).

Figure 5-3 Boom Assembly Clearance

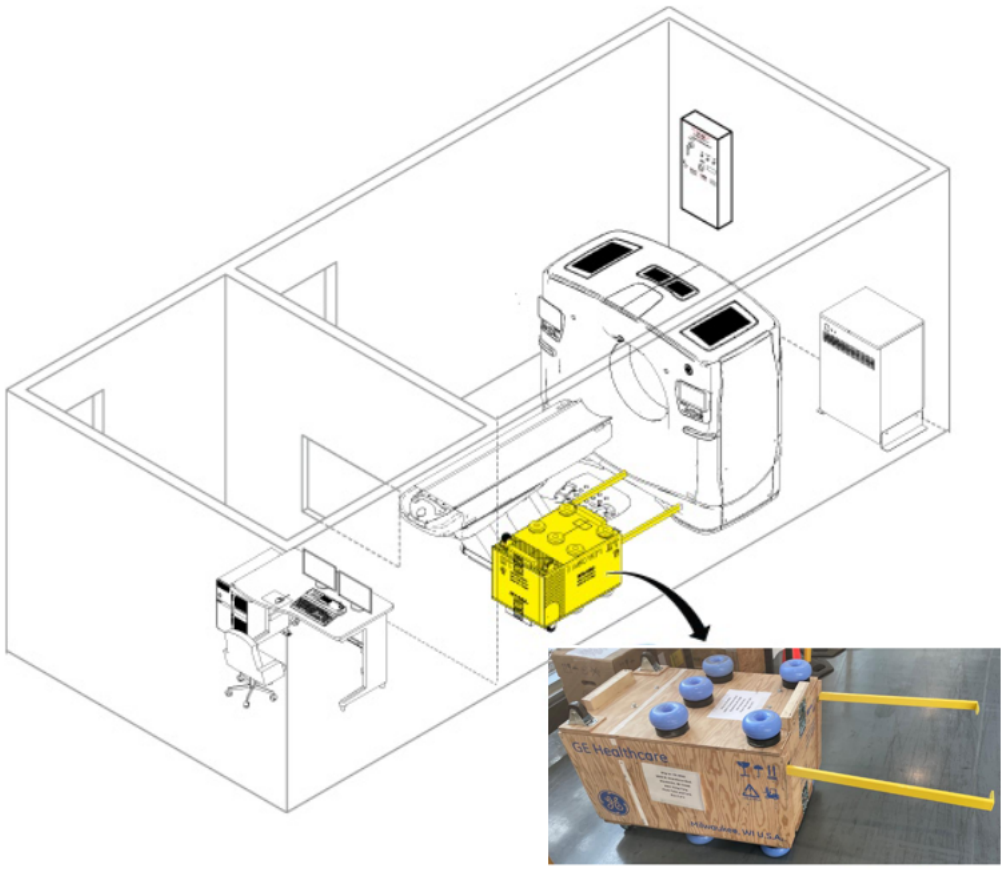


5.2.2 Cover Removal

- Gantry front cover removal requires the use of the Tilting Cover Dollies and a minimum clearance space of 3234 mm (127 in.) to maneuver the cover. The dollies allow the service engineer to separate the cover from the gantry, tilt it 90 degrees, roll it to the foot end of the table, and then tilt it an additional 90 degrees, so that it is upside-down relative to its normal system-mounted condition. After removal, the service engineer must then move the gantry front cover to a position that satisfies the minimum regulatory clearances.

- The gantry rear cover, with service dollies installed, requires a clearance width of 2827 mm (111.3 in.) and a depth of 1128 mm (44.4 in.) for removal, as shown in 5.1 Service Clearance Requirements on page 31. Sufficient space to allow the service engineer to move the cover either straight back or to one side of the table to satisfy the minimum service clearances shown in 5.1 Service Clearance Requirements on page 31 must be maintained. The rear cover with dollies cannot extend past the allowable clearance space within the room. If the system is not sited straight (it is positioned diagonally), full service space is still required. The PMI and customer should discuss this consideration and make the necessary provisions.
- The scan room must offer sufficient space to allow adequate egress during service operations that require both front and rear cover removal. If the customer and PMI have any concern that site will not provide adequate space for egress under these conditions, they should discuss these requirements and make the necessary provisions to accommodate this event.
- A single service engineer can safely perform servicing of the table. Ensure sufficient clear space to maintain egress clearances with the table covers or cradle removed.
- A single service engineer can safely perform servicing of the system. Ensure sufficient clear space to maintain egress clearances with covers or cradle removed.
- A tube change box is 1006 mm (L) x 700 mm (W) x 737 mm (H) (39.6 in. x 27.6 in. x 29 in.), with the handles not extended, and 1812 mm (L) x 700 mm (W) x 737 mm (H) (71.3 in. x 27.6 in. x 29 in.) with the handles extended. The box rolls like a wheelbarrow and must have access to the right side of the gantry. It is the PMI's responsibility to demonstrate that the tube change box can be positioned in the tube change area next to the gantry and that the front and rear covers can be removed.

Figure 5-4 Tube Change Box Delivery (example)



5.2.3 Power Distribution Unit (PDU)

When positioning the Power Distribution Unit (PDU), consider regulatory compliance, as defined in Regulatory Clearances. See Table A-2 PDU — Minimum Workspace Clearances on page 132 in that section.

5.2.4 Console

As some service activities require access to the rear of the console, be sure to maintain sufficient space for moving the console to allow rear service access.

See Figure 6-1 Typical Control Room Layout on page 38 for a typical control room layout.

5.2.5 Storage Cabinet

GE Healthcare provides a storage cabinet (see Note below) for storing all supplied service equipment (see Table 5-1 Equipment Stored in Storage Cabinet on page 36). Situate this storage cabinet within the scan room suite area to allow easy service access. The dimensions of the cabinet measure 610 mm D x 914 mm W x 1067 mm H (24 in. D x 36 in. W x 42 in. H), complete unit not to exceed 68kg (150 lbs) (empty).

NOTE
A storage cabinet is provided as option (B77292CA).

Table 5-1 Equipment Stored in Storage Cabinet

Item	Size	Weight (total)	
QA Phantom (water filled)	20 cm x 15 cm (7.9 in. x 5.9 in.)	5.5 kg	12 lb
Phantom Holder	25 cm x 25 cm (9.8 in. x 9.8 in.)	3.6 kg	8 lb
FE Box (Purple)	30 cm x 38 cm x 30 cm (11.8 in. x 15 in. x 11.8 in.)	6.8 kg	15 lb
Install Support Kit (box)	30 cm x 30 cm x 38 cm	9.1 kg	20 lb
Three Piece Tube Hoist Assembly	77 cm x 8 cm and 38 cm x 15 cm (30.3 in. x 3.1 in. and 15 in. x 5.9 in.)	9.1 kg	20 lb
Balance Weight Kit		33 kg	73 lb
Front Cover Dollies	85 cm x 20 cm and 85 cm x 15 cm (33.5 in. x 7.9 in. and 33.5 in. x 5.9 in.)	~15.9 kg	35 lb
Rear Cover Dollies	70 cm x 135 cm	~11.5 kg	25 lb

6 Room Sizes

6.1 Room Dimensions

Table 6-1 Scan Room Minimum Size Dimensions

System Configuration	Minimum Room Size
System with GT1700 Table	5517 mm * 3681 mm (18.1 ft * 12.1 ft)
System with High Capacity Table	5960 mm * 3681 mm (19.6 ft * 12.1 ft)

NOTE
All service/regulatory requirements apply in accordance with country specific regulations.

All service/regulatory requirements apply, with the addition of no energized left-side service. Minimum room size includes Axial Head Holder and Extender.

6.1.1 Minimum Room Size

The minimum room configuration represents the smallest functionally acceptable space for this product and represents the type of room often found at doctor's offices and smaller clinics and outpatient facilities. Due to its limited size, and to functional and regulatory requirements, this room usually provides only LIMITED workspace, and leaves to NO space to add in-room millwork and sinks and still meet the necessary regulatory and service requirements. This room can accommodate the transportation of patients into the scan area using wheelchairs, and provides access for crash carts and other emergency medical equipment on only one side of the table.

Sites considering a minimum room size may not have been designed with the structural requirements necessary to support the system and consequently may require upgrading prior to installation.

Customers considering a minimum room size should discuss their workspace requirements and future upgrade plans with their PMI, as the size and layout of these rooms often eliminates them from any future upgrade considerations and offers NO compatibility with future two-step installations.

If using the square meters (square footage) to determine regulatory compliance, please note that the front and rear cover clearances are wider than the regulatory clearance along the table length, and that the cover park position is behind the table in the home position.

NOTE
Sites must provide sufficient space to allow the removal of the rear cover, which is on wheels, from behind the gantry during service operations.

6.2 Control Room Considerations

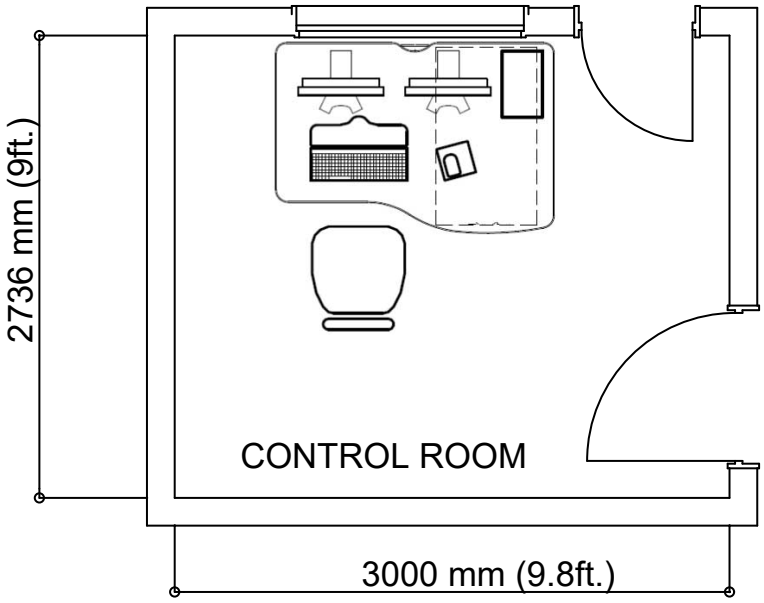
- The control room must provide an operating environment suitable for the console electronics and the operator's working comfort. See 9 Environmental Requirements on page 75.
- As the console requires adequate venting, maintain 96 mm (4 in.) of clear, unobstructed space on all sides of the console to allow the four fans located on the rear of the console to exhaust air to both the left and right.

- Provide a suitable work area within reach of the console for the placement of the injector control. Injector controls differ in dimensions depending on the brand selected.
- A PACS, workstation, image printer, or filming device may appear in the console control room area. These devices or other components, though having a direct link to the console via network or ethernet cable, shall NOT receive power from the console (if outlets exists on the console). If you are using additional devices or components, consider additional room power and network connections when reviewing the console workspace.

6.2.1 Typical Console Considerations

- The console must remain in the same configuration as shipped. Do not dismantle the console, or remove or rearrange its components.
- Cable lengths must remain as shipped (cables cannot be cut or extended to mount the monitor on the customer's counter).

Figure 6-1 Typical Control Room Layout



6.2.2 Console Long Cable Option

Console cabinet can be placed approximately 3 meters away from LCD monitor, GSCB and keyboard by using Long Cable Option.

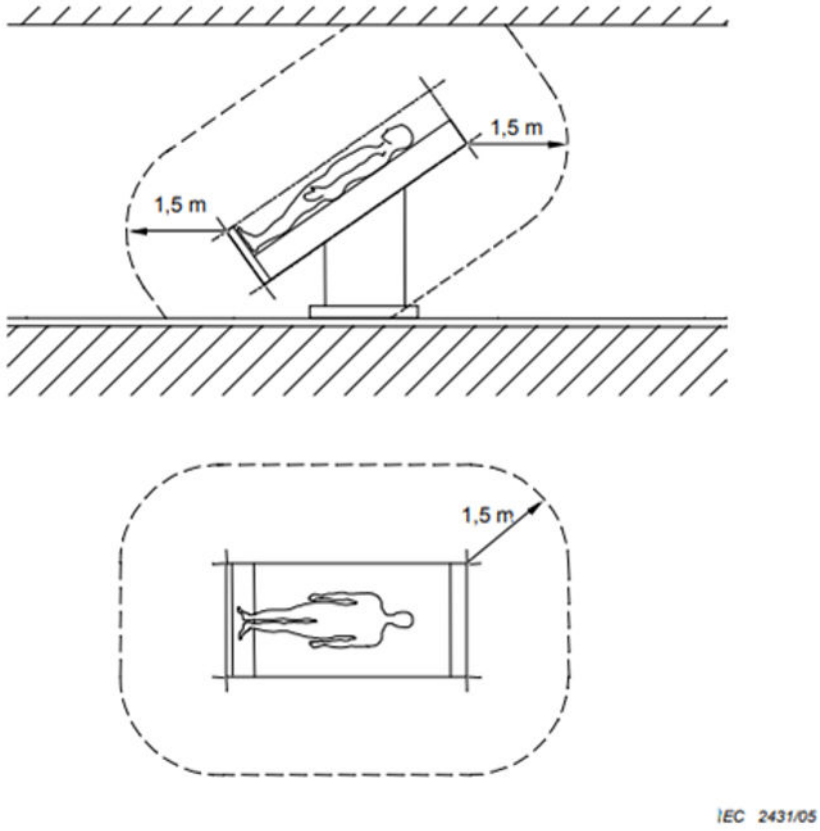
Refer to Console Long Cable Option Installation Manual (Direction 5456816-1EN) for the details.

NOTICE

When install the console cabinet in the scan room, do not place it within the patient environment. Refer to Patient Environment for the details.

6.3 Patient Environment

The patient environment is defined as the following picture.



Only Scanning Gantry, Patient Table components and the following options can be placed in this area.

- Advantage 4D
- In room monitor
- SmartStep
- Extream Injector
- CT Simulation Laser Alignment Systems

6.4 CT Simulation Laser Alignment Systems

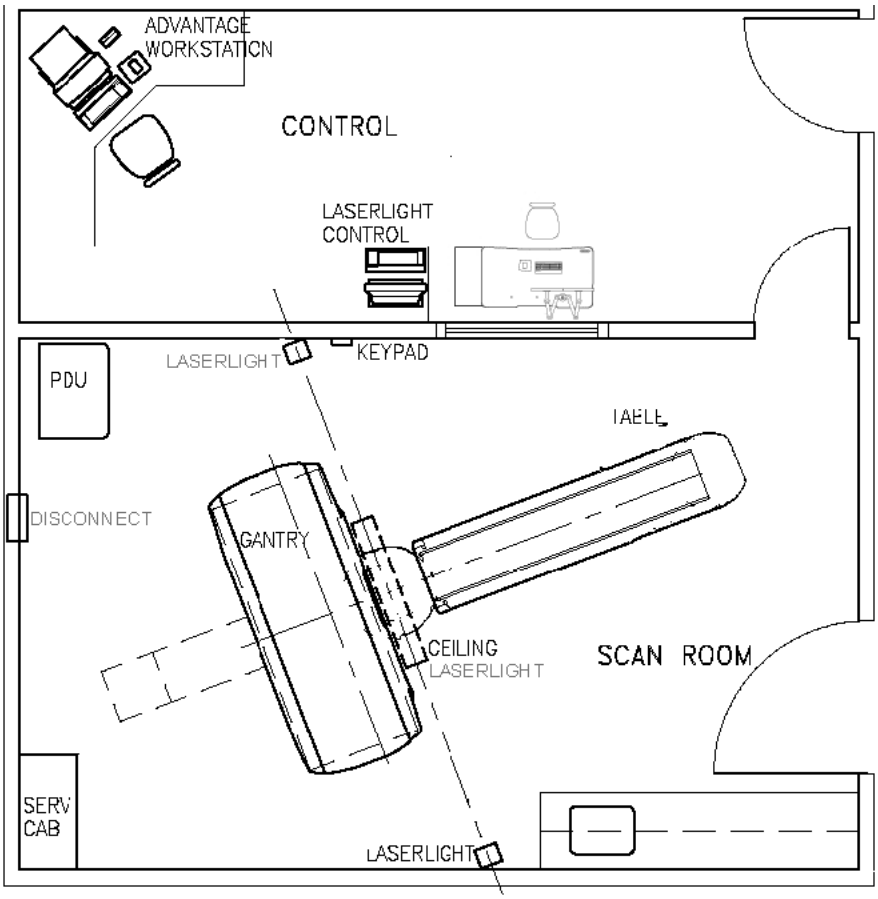
CT simulation laser alignment systems are used to reproduce the patient position for simulation and subsequent treatment on a linear accelerator. These lasers can be wall mounted or can be free standing. Work with your installation planner to determine the correct installation solution for your site.

Laser Options: http://www.gammex.com and http://www.lap-laser.com.

Custom freestanding mounting structures are available for rooms that have no suitable wall or ceiling mounting space. Stanchion systems can provide flexibility in room design for placing alignment devices in rooms that may not be suitable for wall-mounted lasers.

NOTE
The CT simulation laser alignment systems are not supplied by GE HealthCare. Figure 6-2 Room Layout with CT Simulation Laser Alignment System on page 40 is location indication of the room layout. For specific information, please refer to the manual supplied by contractor from above links.

Figure 6-2 Room Layout with CT Simulation Laser Alignment System



7 System Component Dimensions

7.1 Minimum Operating Clearances

The sections in this chapter provide the minimum dimension and operating clearance information for each category of components listed. Be sure that the site conforms to each of these specifications.

7.1.1 Ceiling Pedestal Mount Installation

The distance from the floor to the lowest point of the ceiling pedestal mount for the Injector or Monitor CANNOT measure LESS than 2134 mm (84 in.). Refer to the installation guides of those components for the length of the mounting post.

NOTE
The down post or ceiling mounted pedestal used to mount injectors, remote monitors or other devices shall not be installed within the tube crane area. See 5.2.1 Gantry Service Clearance on page 34.

NOTICE

Failure to maintain a distance of at least 2134 mm (84 in.) from the floor to the lowest point of the Injector or Monitor ceiling pedestal mount may pose a safety hazard. For installations with a finished ceiling height that is less than suggested, consideration should be given to utilizing floor mounted components, or attaching the mounting plate in the overhead (for example, above dropped ceiling tiles).

7.1.2 Injector Control Installation

Minimum dimensions and clearances include the following requirements for the injector control:

- Provision of a suitable work area for placement of the injector control, within reach of the console.
- Wall mounted, ceiling mounted, and pedestal units require routing of cables from the gantry area to the console area. The supplied cable measures 15.2 m (50 ft).
- Injectors require an AC power source that is powered from the console. The IEC power cord is supplied with the injector.
- Available mounts come in several different lengths and configurations. Refer to the injector documentation for detailed installation instructions.

NOTE
The console requires IEC power plugs to power GE approved options. All Options used with the system must be powered using the console or gantry power plugs.

For systems using any NEC power plugs, Options (such as Video splitter) must be plugged inside the console power strip.

7.1.3 System Operational Clearances

The clearances listed in Table 7-1 Minimum Dimensions and Operational Clearances on page 42 govern system operation; be sure that the site maintains each of these clearances.

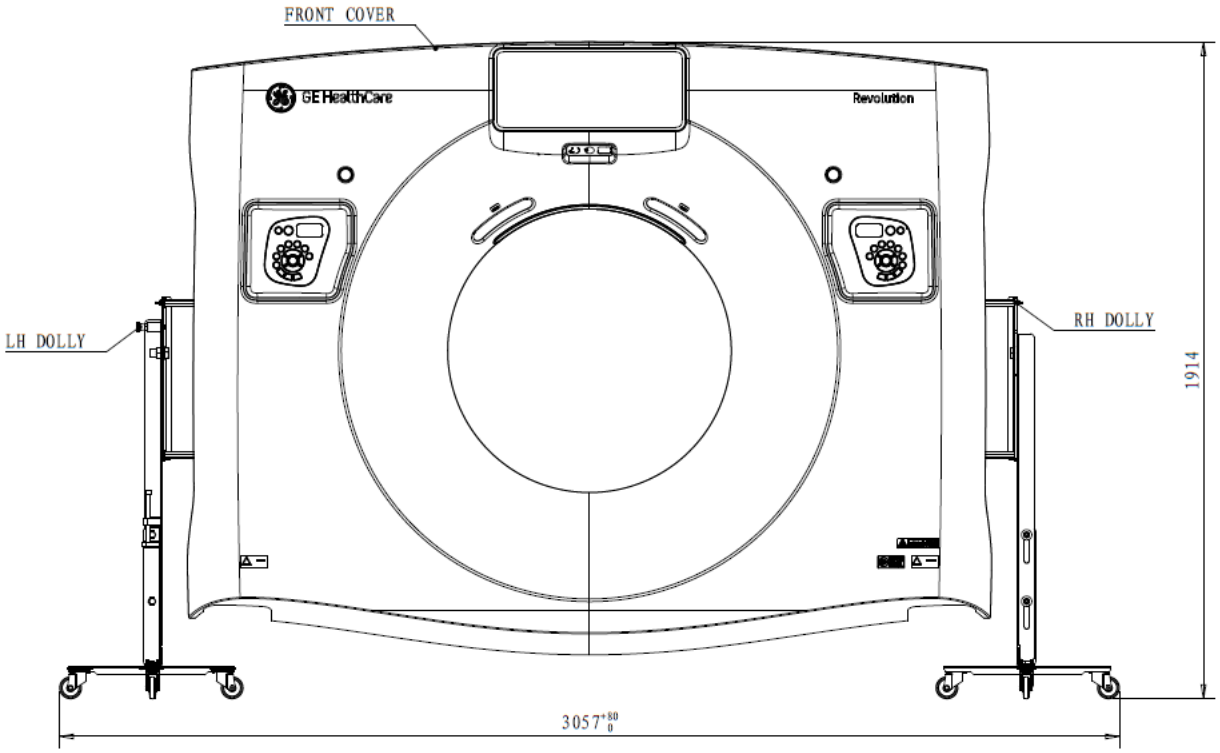
Table 7-1 Minimum Dimensions and Operational Clearances

System Operation	mm	inches
Ceiling Pedestal mount (optional) lowest point to floor injector or monitor	2134 mm	84 in.
Finished ceiling to floor (suggested)	2743 mm	108 in.
Finished ceiling to floor (minimum)	2286 mm	90 in.
Table to maximum extension head end with extender from center line	1826mm (GT1700 Table)	72 in.
	1726mm (High Capacity Table)	68 in.
Table extension head end with extender to obstruction	152 mm	6 in.
Table in lowest position with cradle at home position to surface of Gantry front cover	2761mm (GT1700 Table)	108.7 in.
	3304mm (High Capacity Table)	130 in.
Back of Console to wall	100 mm	4 in.
Back of PDU to wall	150 mm	5.9 in.

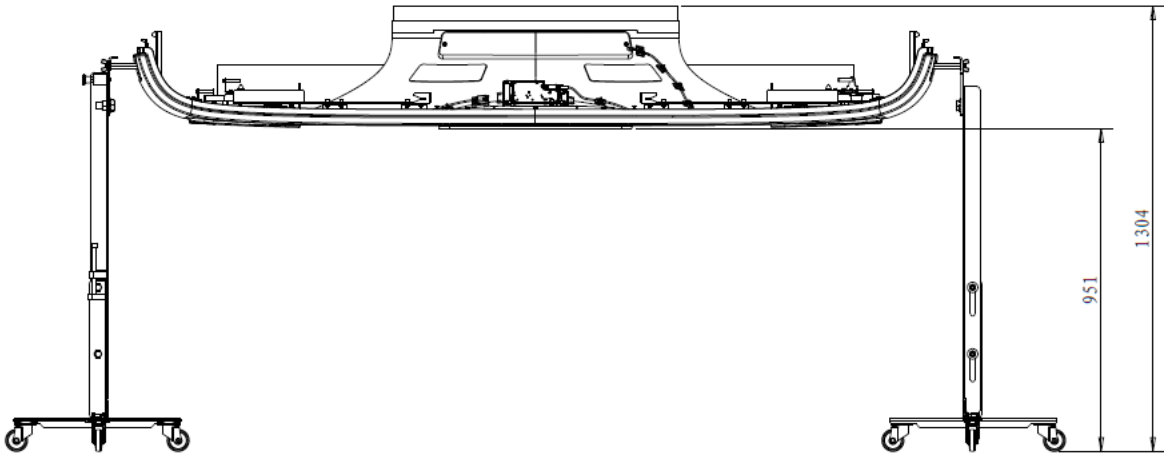
7.2 Component Dimensions

7.2.1 Gantry Dimensions

Figure 7-1 Front Cover Vertical and Horizontal

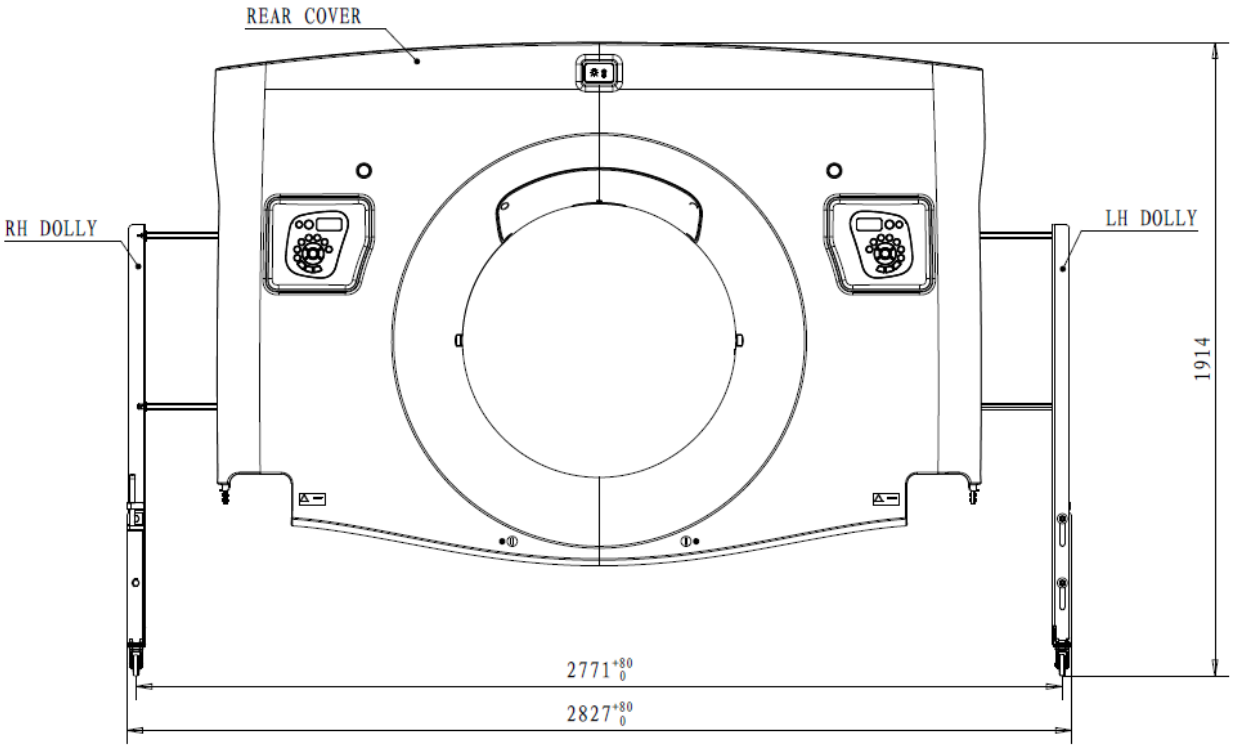


FRONT COVER MOUNTED TO DOLLIES, VERTICAL POSITION

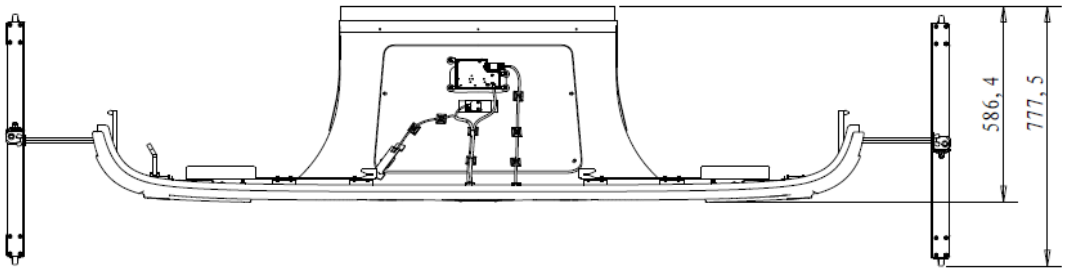


FRONT COVER MOUNTED TO DOLLIES, HORIZONTAL POSITION

Figure 7-2 Rear Cover Front and Top Views

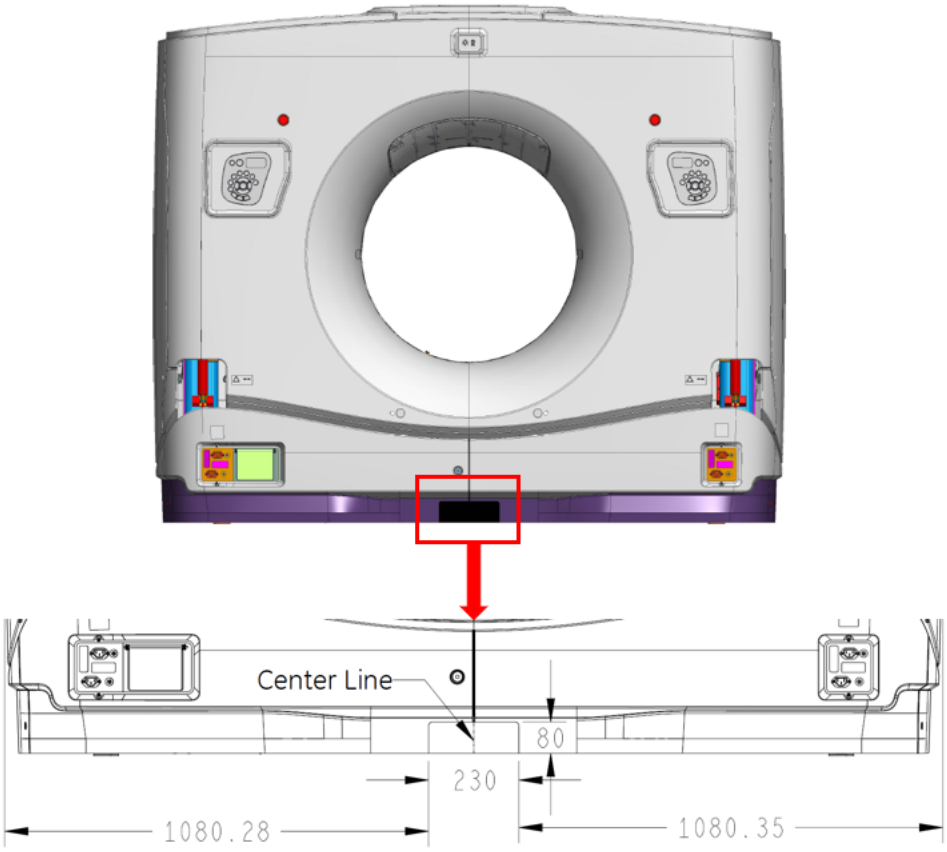


REAR COVER MOUNTED TO DOLLIES, VERTICAL POSITION



REAR COVER MOUNTED TO DOLLIES, HORIZONTAL POSITION

Figure 7-3 Rear Cover Door Dimensions



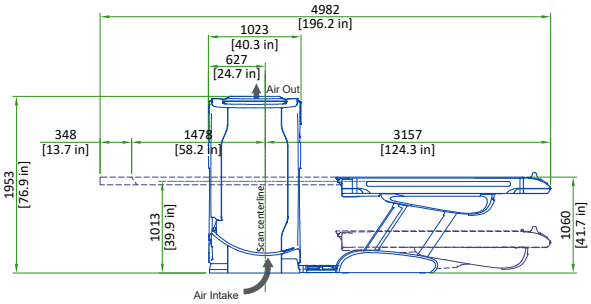
7.2.2 Gantry and Table Dimensions

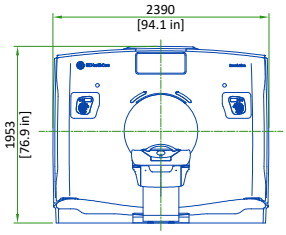
Figure 7-4 Gantry and Table Dimensions - Table Options

Side view

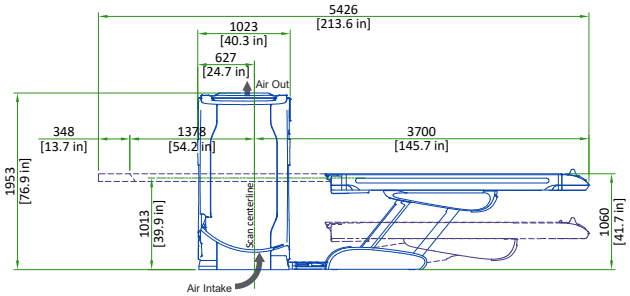
Front View

GT1700 Table





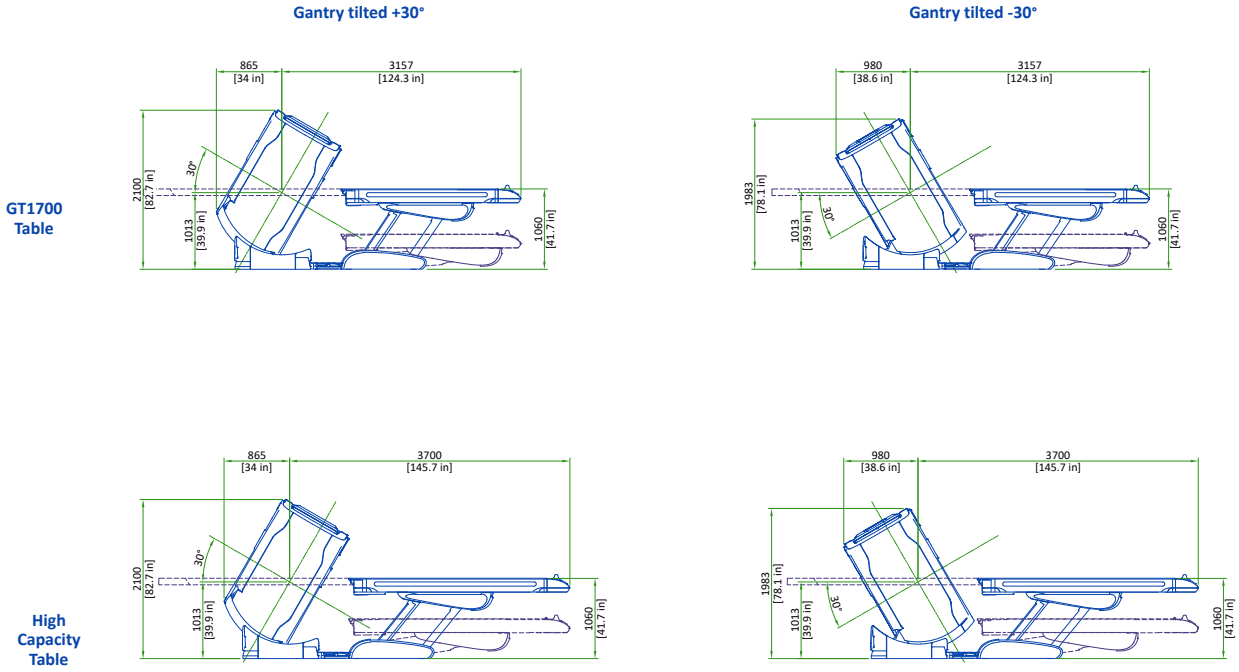
High Capacity Table



NOTE

Table is located in the highest and the lowest position of electrical limit.

Figure 7-5 Gantry shown tilted +30° (top) and -30° (bottom) - Table Options



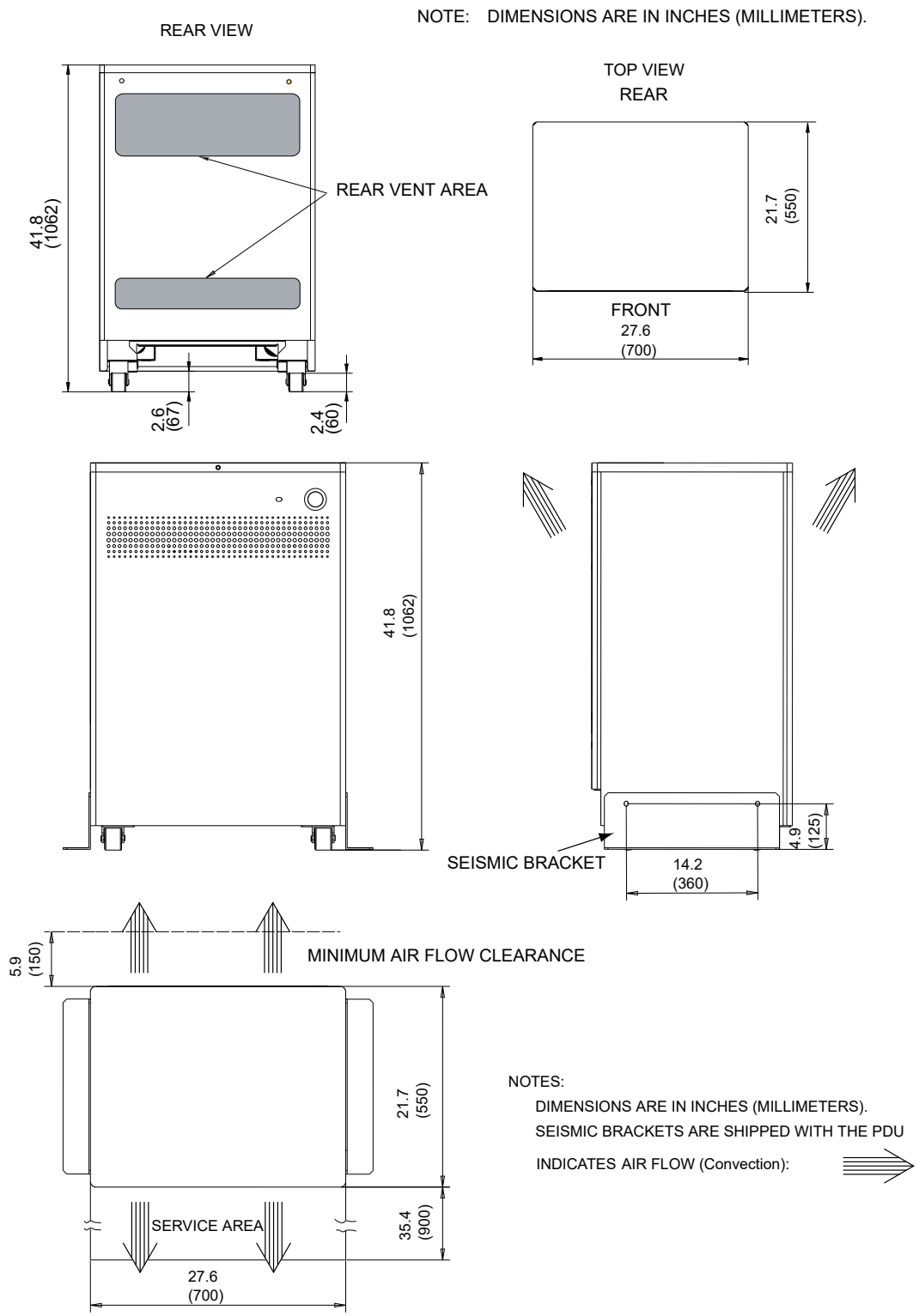
NOTE

Table is located in the highest and the lowest position of electrical limit.

7.2.3 Power Distribution Unit Dimensions

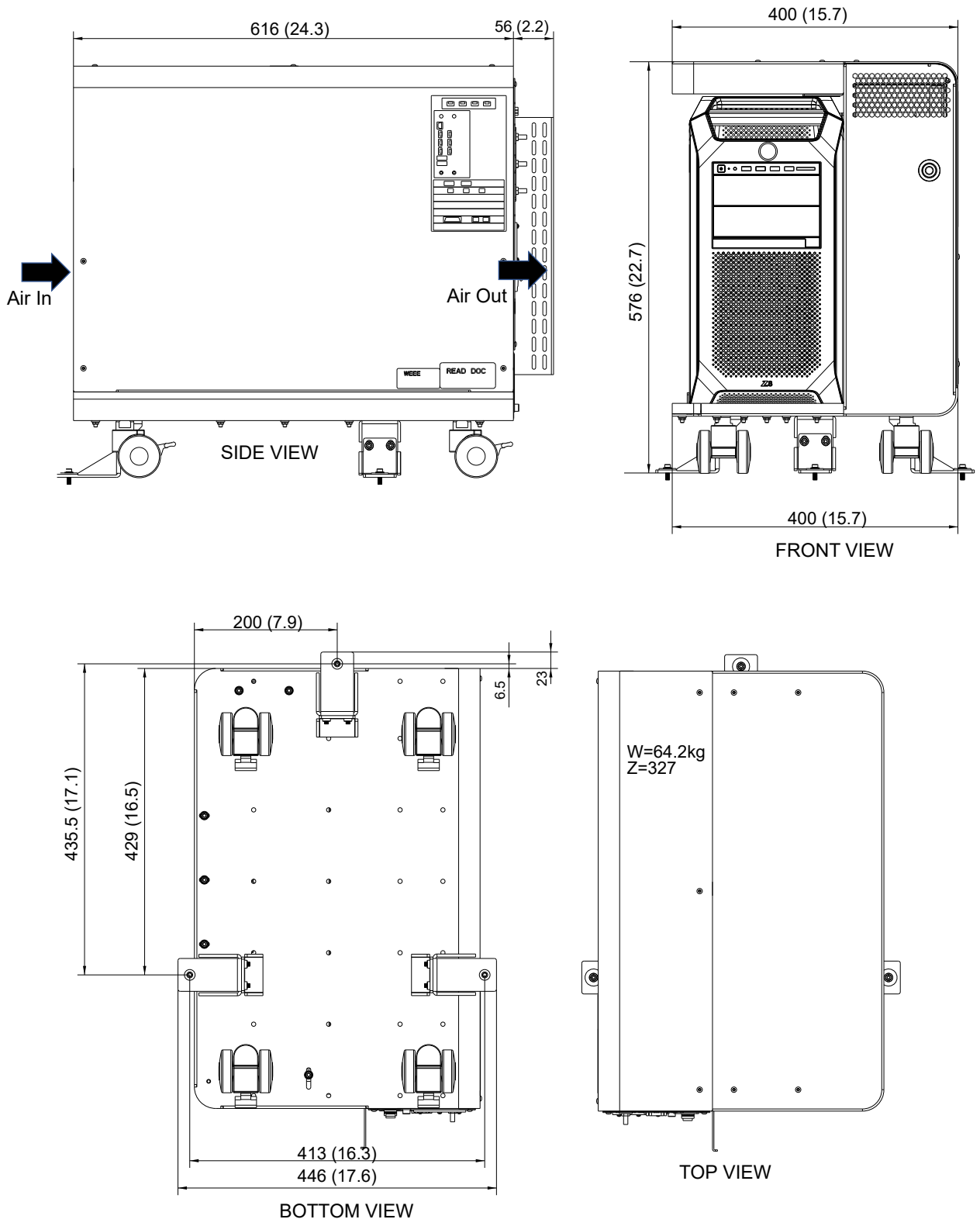
PDU dimensions, air intake/exhaust, seismic bracket locations, and service areas appear below.

Figure 7-6 Power Distribution Unit



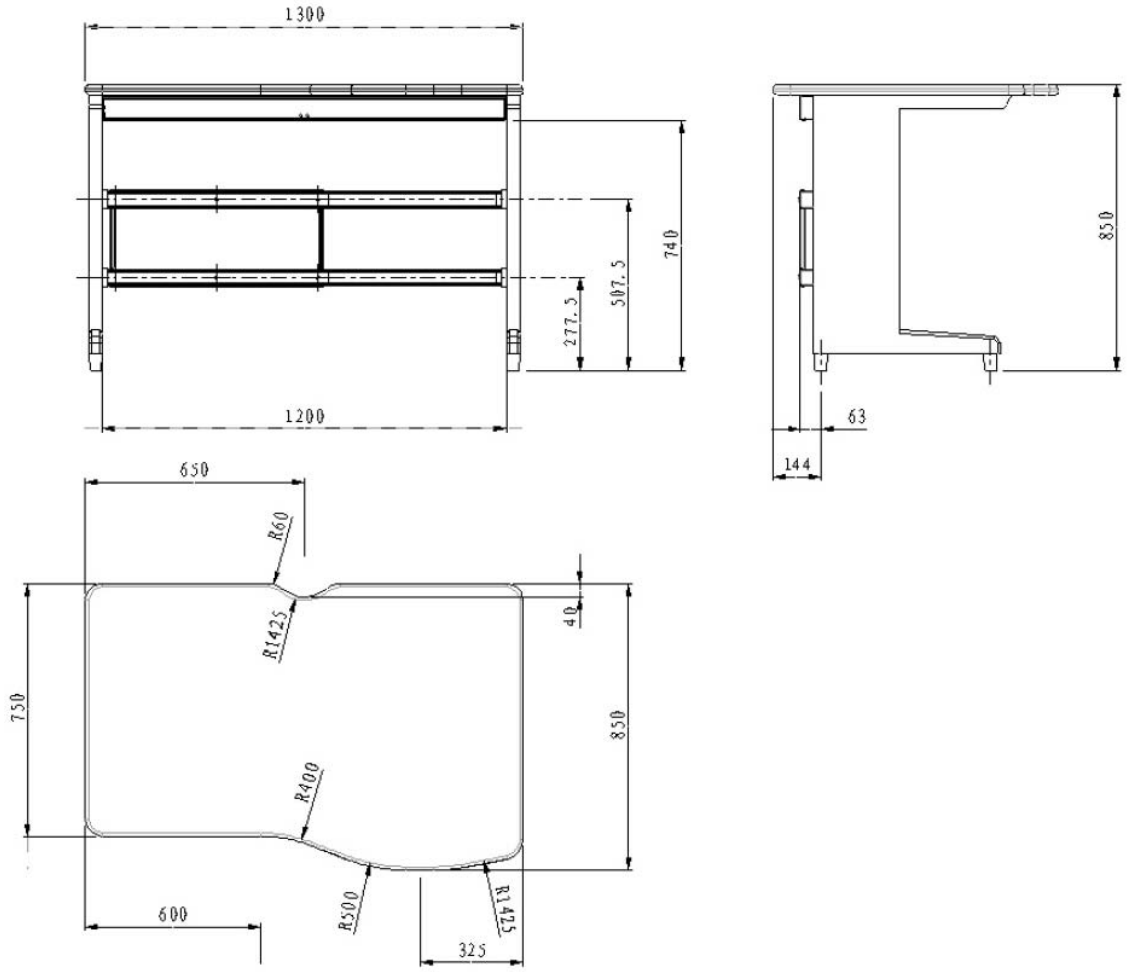
7.2.4 Operator Console Dimensions

Figure 7-7 OpenOC Console with Z8G4 Dimensions



7.2.5 Workspace Table Dimensions

Figure 7-8 Aurora SWS Table (part 5449758-2)



8 Structural and Mounting Requirements

8.1 Importance of Meeting Structural Requirements

System performance specifications require close consideration of the customer's floor properties. The information in this chapter provides critical information and guidelines that the customer or PMI should communicate to the architect, structural engineer, and contractor prior to construction or renovation. Failure to properly evaluate the customer's floor and ceiling properties may result in limited performance and possible safety hazards.

8.1.1 Levelness, Vibration, and Floor Loading

All floors, whether configured to use the recommended GE-supplied anchoring system or an equivalent anchoring method, must meet the system requirements for Levelness, Vibration and Floor Loading.

8.1.2 Seismic Loading

Local laws and building codes in some areas may require the customer's contractor and structural engineer to consider seismic loads. Seismic Mounting provides the information necessary for the customer's contractor and structural engineer to complete the proper seismic calculations.

8.1.3 Anchoring

8.5 GE-Supplied Anchoring on page 64 lists the information necessary for the customer's contractor or structural engineer to properly implement the GE-supplied anchoring system, if appropriate for the site. Please note that local laws, building codes, seismic considerations, and building or structural limitations may require the use of anchoring methods other than the GE-supplied anchoring system. In such cases, responsibility for providing an equivalent anchoring method rests solely with the customer's contractor or structural engineer.

Consult your architect, structural engineer, contractor, or PMI to resolve any questions.

NOTICE

Responsibility for providing an approved support structure and mounting method for all floor types, other than those listed in this chapter, rests with the purchaser. General Electric accepts no responsibility for any failure of the support structure or anchoring method, including seismic mounting and anchoring. GE accepts no responsibility for methods other than those listed.

8.2 Ceiling Requirements

8.2.1 Regulatory Requirements

For systems with Suspension Options (Boom-in-Room or Depth Camera etc...), the overhead suspension shall be installed by strictly following the GEMS installation instruction. The system manufacturer specifically disclaims any and all liability arising out of or relating to the use or performance of the suspension (including cables), including, without limitation, any liability or claims relating to patient injury, death, or the reliability of such suspension.

Where a Junction Plate is supplied and installed by the Purchaser of the system, the installation plate should comply with the applicable Regulation enforced in the country.

⚠ WARNING

The customer's architect is responsible for designing and installing of all junction plates for ceiling mounted components. The system manufacturer will NOT inspect and test that the junction plate meets the loading capacity specified (recommend a 6x safety factor).

8.2.2 Ceiling Requirement for Boom-In-Room

If customer has purchased Boom-In-Room kit, please refer to the correct option manual for details.

The minimum ceiling height above the table and gantry shall measure at least 2286 mm (90 in.) or the minimum distance allowed by local laws and codes, whichever is greater, when measured from the floor to the finished ceiling or to the ceiling pedestal mounts of any ceiling-mounted components. The purchaser or their contractor shall complete the installation of all pedestals for ceiling-mounted components. The PMI will provide the necessary bolt hole information upon request.

The support structure for a ceiling-mounted option using a Mavig pedestal, requires a flush ceiling mounting plate. This flush ceiling mounting plate must be designed by a structural engineer and installed by a qualified contractor prior to the system installation.

NOTE
A finished ceiling is required.

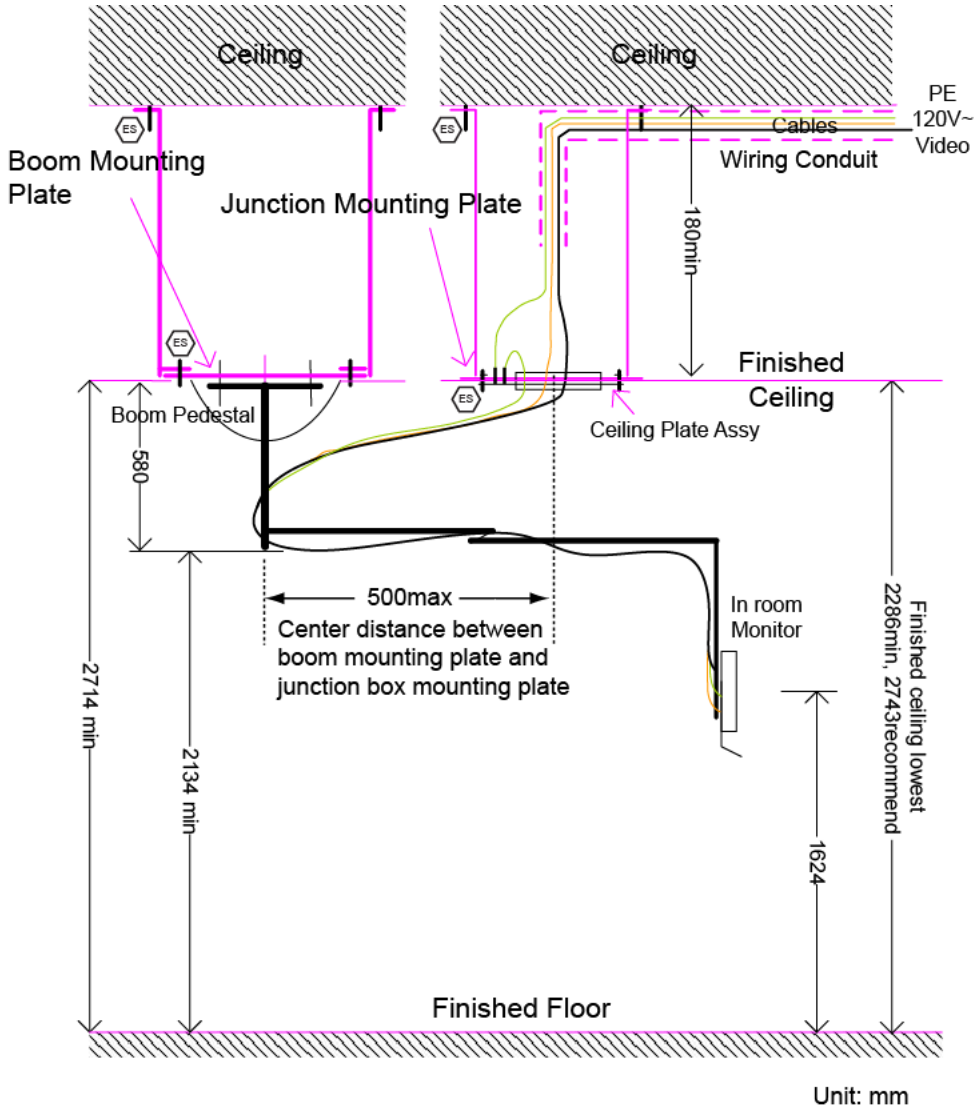
8.2.2.1 Ceiling Mounted Devices

If a ceiling mounted injector, remote monitor or other device is installed, it should be mounted in a position that allows for adequate patient and site personnel access to the table and gantry. It should not obstruct access to the gantry operator controls or interfere with patient loading. Refer to the table entitled Minimum Dimensions and Operational Clearances in System Component Dimensions chapter for minimum clearance requirements between the lowest points of the fixed ceiling mounted device and finished floor. The installation of any ceiling mounted device not specifically installed by GE Healthcare personnel shall be completed by the purchaser of their contractor. The GE Healthcare Project Manager will provide the necessary bolt hole information upon request.

NOTE
If a ceiling mounted boom-in-room monitor, it should NOT be mounted another arm with equipment (like injector etc..) on the same pedestal ceiling.

8.2.2.2 Boom Installation Typical Layout

Figure 8-1 Boom-In-Room Cables Routing - DVI Hybrid-Active Fiber 5830535

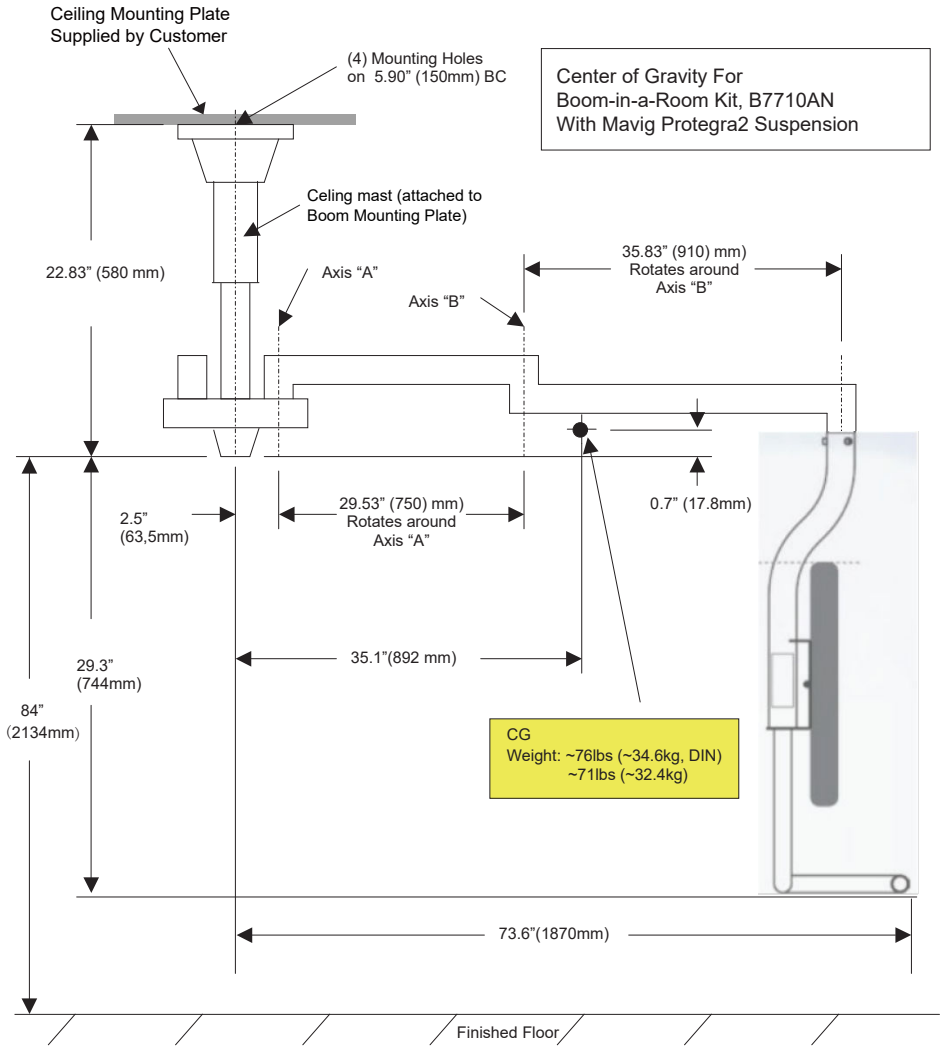


8.2.2.3 Pedestal Mounting Plate (Supplied by Customer)

The pedestal ceiling mount requires a flush ceiling mounting plate that is structurally supported to handle the weight of the load as shown in Figure 8-2 Center of Gravity for Boom-In-Room Kits, shown on the site print on page 54.

Some options may required different option plates than those listed below. Refer to the options install manual to determine which plate is required.

Figure 8-2 Center of Gravity for Boom-In-Room Kits, shown on the site print

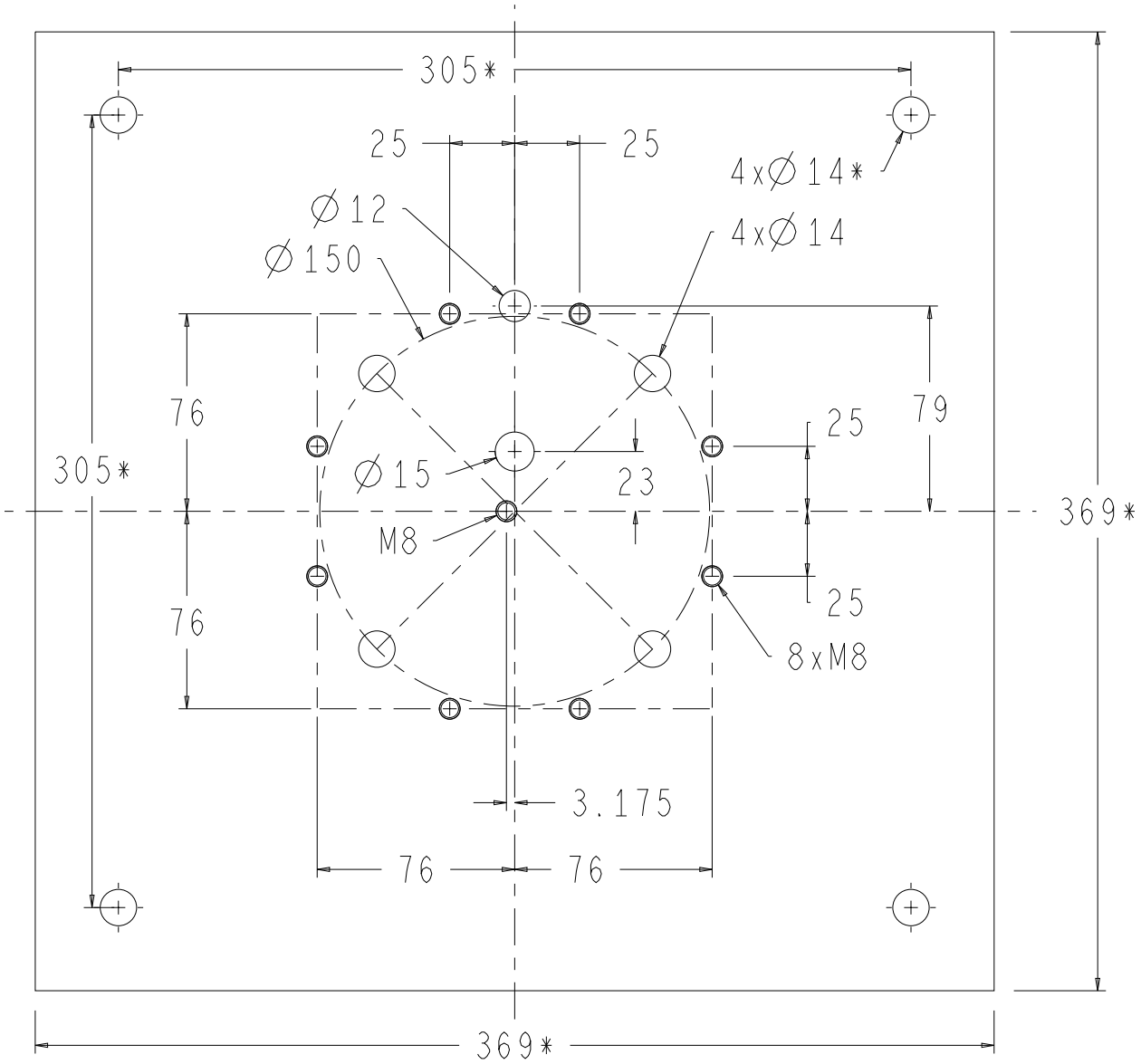


8.2.2.3.1 Mounting Plate for Boom-In-Room (B7710AN)

If a structural contractor designed an equivalent plate, four (4) Φ14 (0.55 in.) mounting holes are required to anchor the boom pedestal (with flat washer, lock washer and hex nut) to the boom mounting plate and one M8 (0.32 in.) hole is used to anchor the safety chain bracket assembly. One Φ15 (0.59 in.) hole is used for the ground cable connection.

Detailed instruction for hole size and a template is available from Mavig or in their Portegra Installation Manual. Refer to Figure 8-3 Mounting Hole Pattern for Pedestal Mounting Plate on page 55.

Figure 8-3 Mounting Hole Pattern for Pedestal Mounting Plate



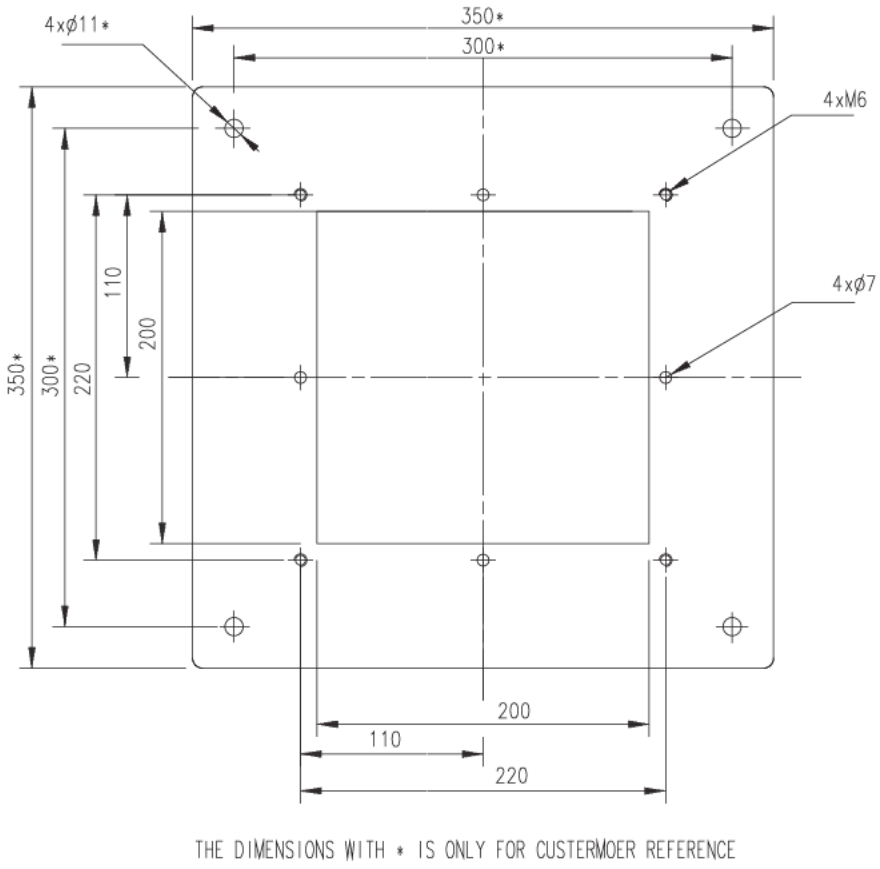
8.2.2.4 Pedestal Height Requirement

The pedestal ceiling mount assembly must be installed at least 2134 mm (84 in) from the lowest point to the finished floor. (See Figure 1)

8.2.2.5 Junction Mounting Plate

Mounting Plate for Boom-In-Room (B7710AN)

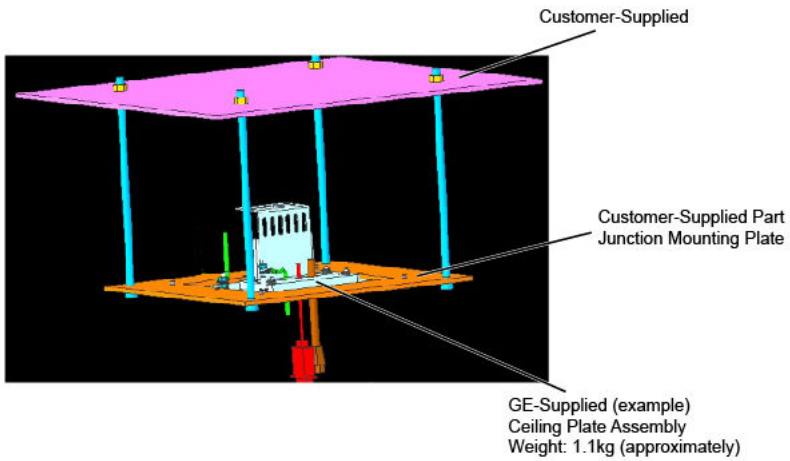
Figure 8-4 Junction Mounting Plate Dimension



NOTE

Dimensions marked with an asterisk (*) above (and the available engineering drawing provided by the PMI) are for customer reference only. Since the customer supplies this plate, dimensions marked with (*) are minimum size recommendations and may vary, depending on customer ceiling layout.

Figure 8-5 Junction Mounting Plate/Ceiling Plate Assy



8.3 Minimum Floor Requirements

8.3.1 Floor Levelness Specification

8.3.1.1 Critical Specifications

Accurate patient positioning during scanning depends on proper alignment of the gantry and the table. The floor levelness specifications in Table 8-1 CRITICAL SPECIFICATIONS for Floor Levelness on page 57 ensure that the table and gantry height adjusters have enough range to allow proper leveling of the system.

Table 8-1 CRITICAL SPECIFICATIONS for Floor Levelness

Specification	Metric (minimum)	English (minimum)
Levelness	6 mm maximum variance over 3048 mm	1/4 in. maximum variance over 10 ft

8.3.1.2 Floor Levelness Guidelines

Consider the following factors when determining floor levelness:

- Factors that can disturb the levelness of a weak floor, including:
  - Moving weights such as gurneys or heavy personal equipment.
  - Changes in the system's center-of-gravity when the table moves, as the table can carry a load capacity of up to GT1700 Table with 227kg (500lbs) / High Capacity Table with 295kg (650lbs).
- Resilient tile, carpeting, or equivalent that may yield or compress over time. At sites with such floor coverings, be sure to cut away the tile or carpeting where the table and gantry adjusters touch the floor to expose the stable base material upon which to seat the adjusters.
- Floor shims are NOT PERMITTED.
- Refer to the steps listed in 8.3.1.3 Measuring Floor Levelness on page 58 to check whether the floor of the scan suite meets the floor levelness specifications for the system.

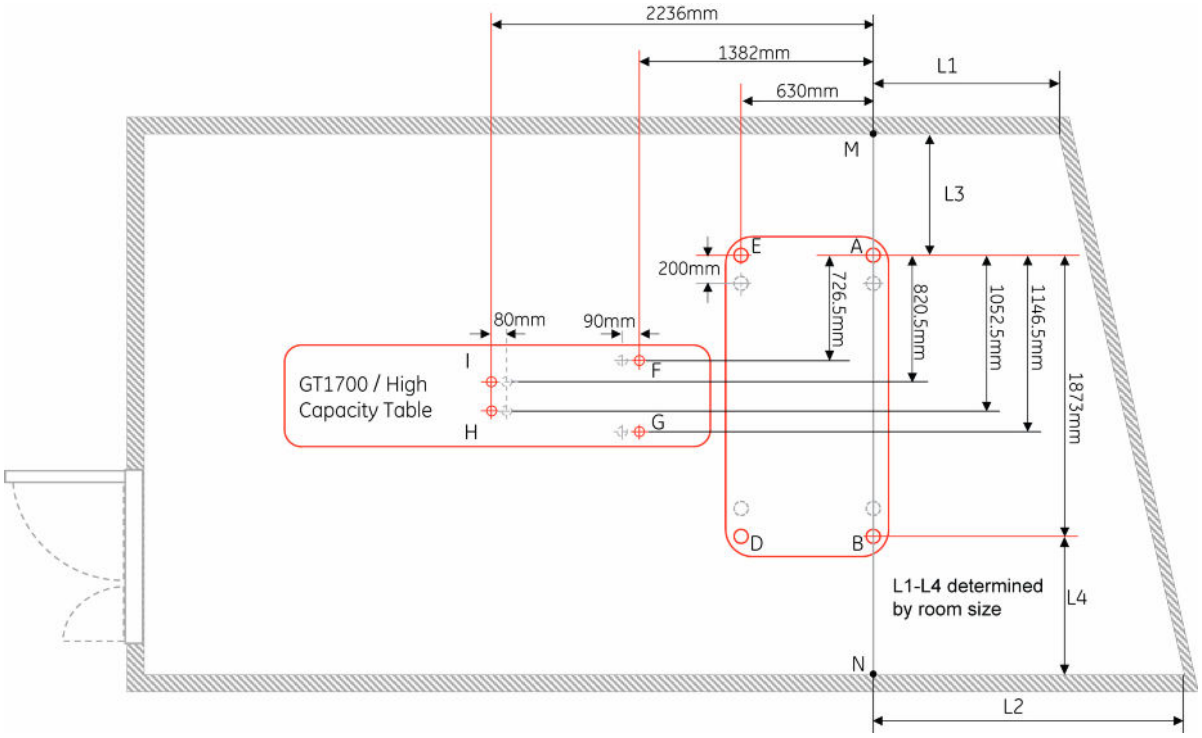
8.3.1.3 Measuring Floor Levelness

8.3.1.3.1 GE Site CAD Drawing with Alignment Tool (5824714)

NOTE
The alignment tool (5824714) NOT shipped with system, and also available from your PMI / FE from GE tool warehouse. Use this to determine equipment layout and anchoring locations.

1. Identify the position of the gantry and table in the room per the GE print. If everything matches the GE print, continue. If not, please redo two points M and N identification.

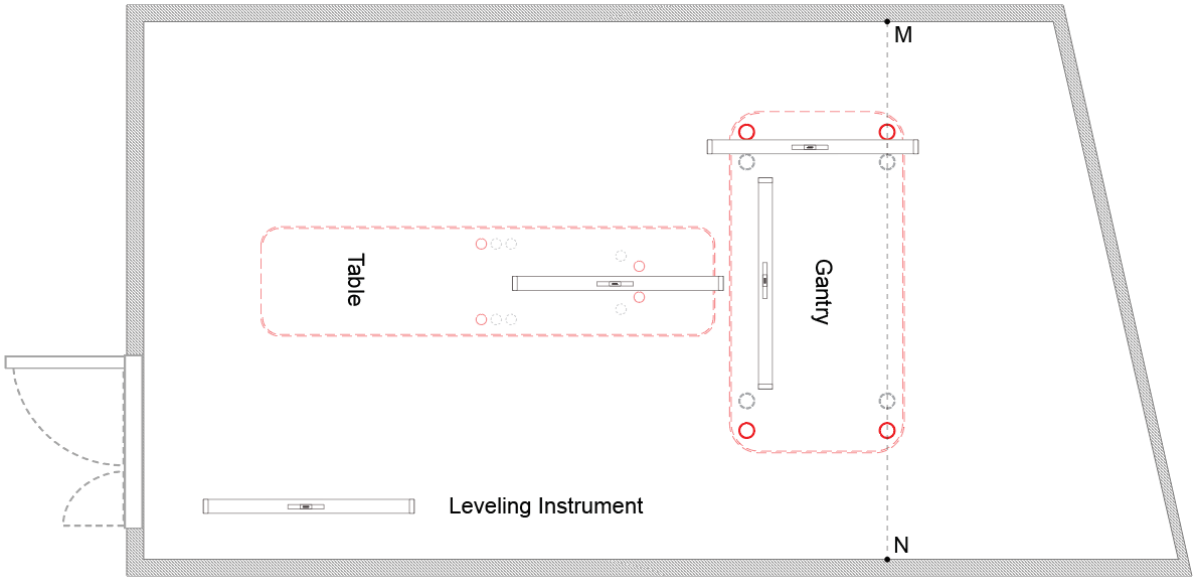
Figure 8-6 Site CAD Drawing



2. Make sure there are no potential clearance issues. If there are floor obstructions, such as conduits or old anchors, be sure to cut them flush to the floor to prevent the gantry from resting on them. Also, be sure there is at least 102 mm (4 in.) of clearance between any existing floor penetration and the new gantry position.
3. Use a laser to check the floor levelness across the entire area covered by the gantry and the table (as shown in Figure 8-7 Check Floor Levelness on page 59) after determining and marking the position of the gantry and the table.

NOTE
If the floor is not level, your system cannot be properly aligned.

Figure 8-7 Check Floor Levelness



8.3.2 Scan Window

The recommended patient viewing window dimensions are 1219 mm wide x 1067 mm high (48 in. x 42 in.). The location of the window is dependent on the position of the operator workspace position. Consult Radiation Protection Requirements and a qualified radiological health physicist for radiation protection requirements of the window glass (lead content and thickness).

NOTE
The operator at the operator workspace must be able to view the patient during a scan.

8.3.3 Floor Vibration Specification

8.3.3.1 Requirements

CT systems are sensitive to vibration and may display limited performance if exceeding the vibration limits listed below. The band of frequencies in which systems exhibit the most sensitivity appears at or near the resonant frequencies of the gantry and the patient table, the latter of which varies depending on patient mass and location. These frequencies fall within the following ranges:

- Patient Table: 2 - 10 Hz
- Gantry: 8 - 14 Hz

  Floor vibration from any intermittent or continuous source, such as walking, running, exercising, mechanical equipment, and traffic, must not exceed the levels shown in Figure 8-8 Allowable floor vibration in velocity units compared to ISO class A & B limits on page 60 or Figure 8-9 Allowable floor vibration in acceleration units compared to ISO class A & B limits on page 61, as represented by the solid line labeled CT system/Table. These figures compare this limit to the limits of what the AISC (American Institute of Steel Construction) and the ISO (International Organization for Standardization) call Class A (VC-A) and Class B (VC-B).

NOTE

In Figure 8-8 Allowable floor vibration in velocity units compared to ISO class A & B limits on page 60 and Figure 8-9 Allowable floor vibration in acceleration units compared to ISO class A & B limits on page 61 the symbol µ represents 10^{-6}.

The preferred format for measuring vibration is velocity versus frequency, as shown in Figure 8-8 Allowable floor vibration in velocity units compared to ISO class A & B limits on page 60. However, should it prove necessary to measure acceleration and there is no means to convert the measured data to velocity, then use the equivalent acceleration limit shown in Figure 8-9 Allowable floor vibration in acceleration units compared to ISO class A & B limits on page 61, derived from the velocity spectrum.

Figure 8-8 Allowable floor vibration in velocity units compared to ISO class A & B limits

Frequency [Hz]	Velocity [µm/s, rms]
4	100
10	40
12.5	40
16	50
80	50

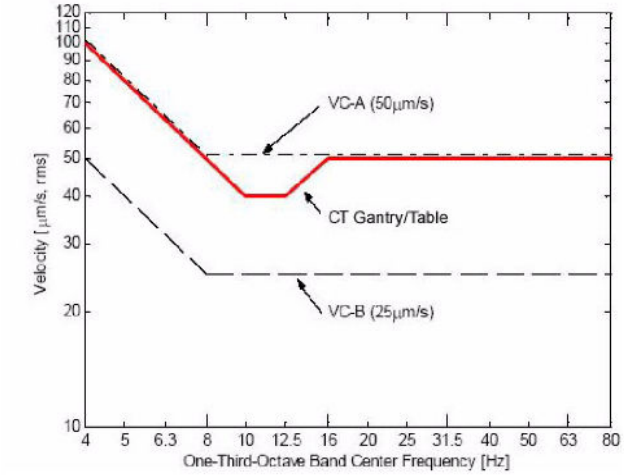
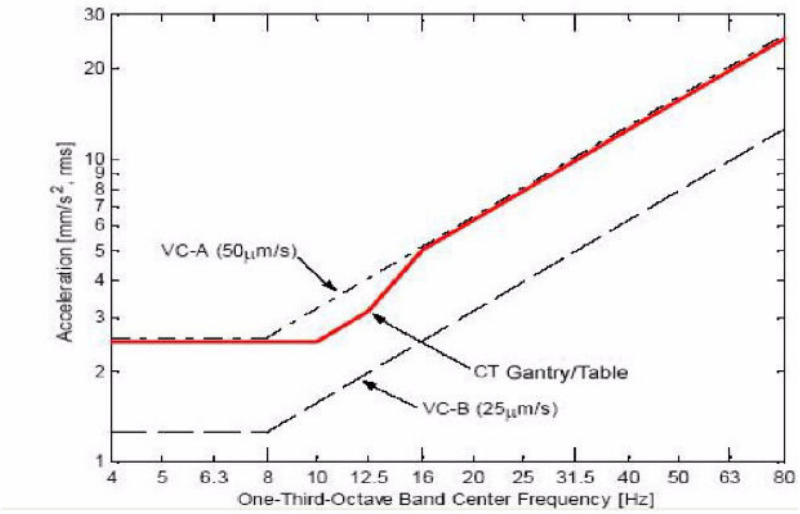


Figure 8-9 Allowable floor vibration in acceleration units compared to ISO class A & B limits

Frequency [Hz]	Acceleration [mm/s^2, rms]
4	2.5
10	2.5
12.5	3.1
16	5
80	25



8.3.3.2 Sources of Floor Vibration

Consider that vibrations strong enough to affect the floor may emanate from the following sources in and around the scanning facility, requiring possible isolation of the floor or structure from them:

- Hospital power plants housing pumps, motors, air handling equipment, or air conditioning units
- Hallway foot traffic
- Elevators
- Parking lots
- Roadways
- Subways
- Trains
- Heliports

8.3.4 Floor Strength

Concrete floors must have a minimum strength of f'c = 2000 psi ($1.4 X10^7$ Pa) for mounting floor anchors. It is the responsibility of each customer to have appropriate tests performed to determine and measure concrete strength.

NOTE
If installing the GE scanner on a floor type thinner than a 102 mm (4 in.) concrete floor, the purchaser, at their expense, shall provide acceptable anchoring and mounting methods that meet all structural specifications provide in 8.3 Minimum Floor Requirements on page 57 of this Pre-Installation Manual.

8.4 Floor Loading and Component Weights

The customer's contractor and structural engineer should use the information in Table 8-2 Component Weight and Floor Loading Data on page 62 to help determine if the floor structure in the scan suite possesses sufficient strength to support the weight of the system.

Table 8-2 Component Weight and Floor Loading Data

System Component	NET Weight kg / lb	Overall W x D mm (in.)	Load Pattern mm (in.)	Normal Method of Mounting mm (in.) (GE Supplied)[1]
Gantry (with covers)	~1866 / ~4114	2448 x 1013 (96.4 x 39.9)	Rectangular base plate 700 x 2165.7 (27.6 x 85.26) with four round pads, each 63.5 (2.5) in contact with floor. Individual pad loadings are: 499kg (1100 lb), 518kg (1140 lb), 558kg (1230 lb), and 593kg (1306 lb)	Hilti Kwik-Bolt II 12.7mm (1/2 in) diameter by 178mm (7 in) long per P/N 5874830-2 at four leveling pads into concrete floor.
Dolly (each)	99 / 218.4 (Light-Weight Gantry Dolly) 114 / 251(Heavy Gantry Dolly)	-		
High Capacity Table with 295kg (650lbs) load capacity	813 / 1792	650 x 2910 (25.6 x 114.5)	Four round 63.5 (2.5) pads: 19.7 x 40.3	Hilti Kwik-Bolt II 12.7mm (1/2 in) diameter by 178mm (7 in) long per P/N 5874830-2 at the leveling pads into concrete floor.
GT1700 Table with 227kg (500lb) load capacity	673 / 1484	650 x 2370 (25.6 x 93.3)	Four round 63.5 (2.5) pads: 19.7 x 40.3	Hilti Kwik-Bolt II 12.7mm (1/2 in) diameter by 178mm (7 in) long per P/N 5874830-2 at leveling pads into concrete floor.
Footswitch (GT)	15 / 33	-	-	-
Power Distribution Unit	~370 / ~815	700 x 550 (27.5 x 21.6)	Four Casters support area of 700 x 550 (27.5 x 21.6)	Casters are for positioning and service. Set on floor. May be anchored to floor using angle brackets[2] in seismic zones.
OpenOC Console	65.1 / 143.5	400 x 672 (15.7 x 26.4)	Four Casters support	-
EIZO LCD Monitor (each)	5.6 / 12.3	405 x 244 (15.9 x 9.6)	-	-
SWS Desk (5449758-2)	40 / 88	1300 x 850 (51 x 33)	-	-

[1] **Note:** Use the GE HealthCare Supplied mounting hardware ONLY IF APPROVED by qualified personnel.

[2] **Note:** Seismic angle brackets are included and shipped with the PDU.

8.4.1 Floor Loading and Anchoring Guidelines

Follow the floor loading and anchoring guidelines below when preparing a site for system installation:

- The table and gantry require secure anchoring to the scan room floor. The power distribution unit and the console sit on the floor with casters; anchoring of these components to the floor is optional, unless required because of seismic considerations.
- For total floor load of system with GT1700/High Capacity Table and no UPS, refer to Table 8-2 Component Weight and Floor Loading Data on page 62.
- When carrying the heaviest possible patient, the table-gantry-footswitch assembly represents a concentrated load within the scan room. Refer to Table 8-2 Component Weight and Floor Loading Data on page 62 for total weight.
- Anchors mount through the table and gantry supports. Use the gantry/table alignment tool to locate the table and gantry support positions within the scan room, making sure that any anchors that pass through the supports clear all structural beams and interferences in the floor.
- If a loading analysis determines that the gantry and table position should change relative to their position on the GE HealthCare site print, be sure to take into account the clearance requirements in 4 Regulatory Requirements on page 29 and 5 Service Clearance Requirements on page 31 when determining an appropriate location for the system.
- Hospitals and scanning facilities throughout the world should follow the instructions and adhere to the flooring requirements specified by GE HealthCare:
  - Wood floors often require substantial reinforcements, hence GE HealthCare strongly suggest not to use wooden floors for anchoring table and gantry.
  - Temperature variation in blacktop or marble floors allow anchor movement and pullout, hence GE HealthCare strongly suggests not to use these floors for anchoring table and gantry.
  - GE HealthCare recommends using concrete floors with a minimum thickness of 102 mm (4 in.) for Gantry and Table. Table 8-4 Gantry and Table Anchoring Requirements on page 65 describe embedment depth, hole depth, minimum concrete thickness etc. for table anchoring.
  - Customers should use GE HealthCare supplied/specified anchors only.

⚠ CAUTION

ESSENTIAL TO SAFETY!

GE HealthCare strongly suggests not to use any alternate anchoring methods; GE HealthCare accepts no responsibility for any failure of the support or the anchoring method, including those used for seismic mounting. GE HealthCare accepts no responsibility for methods other than those listed. The customer is responsible for meeting all code requirements specific to the site and for this product when using alternate system anchoring.

8.4.2 Anchor Edge Distance Definition

The edge distance of Gantry and Table floor anchor must meet following requirements:

- **Gantry and Table:** Using Hilti Kwik 0.5inch Dia*7 inch long anchor (P/N: 5874830-2)

The distance from CL of anchor to the edge of concrete basement of Gantry and Table should not be less than 178mm, which is necessary to keep anchor full tension strength f_{RN}

NOTICE

Responsibility for providing an approved support structure and mounting method for all floor types other than the GE-recommended floor rests with the purchaser. General Electric accepts no responsibility for any failure of the support structure or anchoring method, including those used for seismic mounting. GE accepts no responsibility for methods other than those listed.

8.5 GE-Supplied Anchoring

GE supplies anchors for mounting the table and gantry. The console and power distribution unit do not require anchoring to the floor. It is the responsibility of the customer to have a structural engineer and trained contractor to use either the GE-supplied anchoring method or to provide an equivalent anchoring method to mount the table and gantry to the floor. Consult your architect, structural engineer, contractor, or PMI to resolve any questions.

⚠ WARNING

POTENTIAL FOR PATIENT INJURY!

AN IMPROPERLY SECURED SYSTEM WILL CAUSE DAMAGE OR PERSONAL INJURY.

SYSTEM CAN MOVE OR TIP DURING OPERATION IF NOT PROPERLY SECURED.

PATIENT SAFETY DURING SYSTEM OPERATION REQUIRES PROPER ANCHORING OF THE SYSTEM.

8.5.1 Specifications of GE-supplied Anchors

Table 8-3 GE-Supplied Anchor Specifications on page 64 lists the specifications of GE-supplied anchor for the system. For a detailed view, including dimensions and additional specifications, see Table 8-4 Gantry and Table Anchoring Requirements on page 65 of this section.

Table 8-3 GE-Supplied Anchor Specifications

GE-Supplied Anchors	Gantry and Table
Part Number	5874830-2
Description	Hilti Kwik Bolt 1
Diameter	12.7 mm (0.5 in.)
Length	178 mm (7 in.)

8.5.2 Requirements for Using GE-supplied Anchors

Use of GE HealthCare-supplied anchors shall adhere to the following requirements:

- Use the GE HealthCare-supplied anchors ONLY when mounting components on concrete floors.
- Adhere to all anchoring requirements listed in Table 8-4 Gantry and Table Anchoring Requirements on page 65.

- Any anchors showing more than specified length of thread above the torqued nut requires the installation of a second anchor in the closest adjacent mounting location. The second anchor shall meet the same requirements in Table 8-4 Gantry and Table Anchoring Requirements on page 65.
- Non-seismic installations must use a minimum of four (4) anchors to mount the gantry and four (4) anchors to mount the table.
- **(Only for Gantry)** Fully engage the Adjuster Lock Rings with at least one full thread showing below the notched portion on the Adjuster Screw.

Table 8-4 Gantry and Table Anchoring Requirements

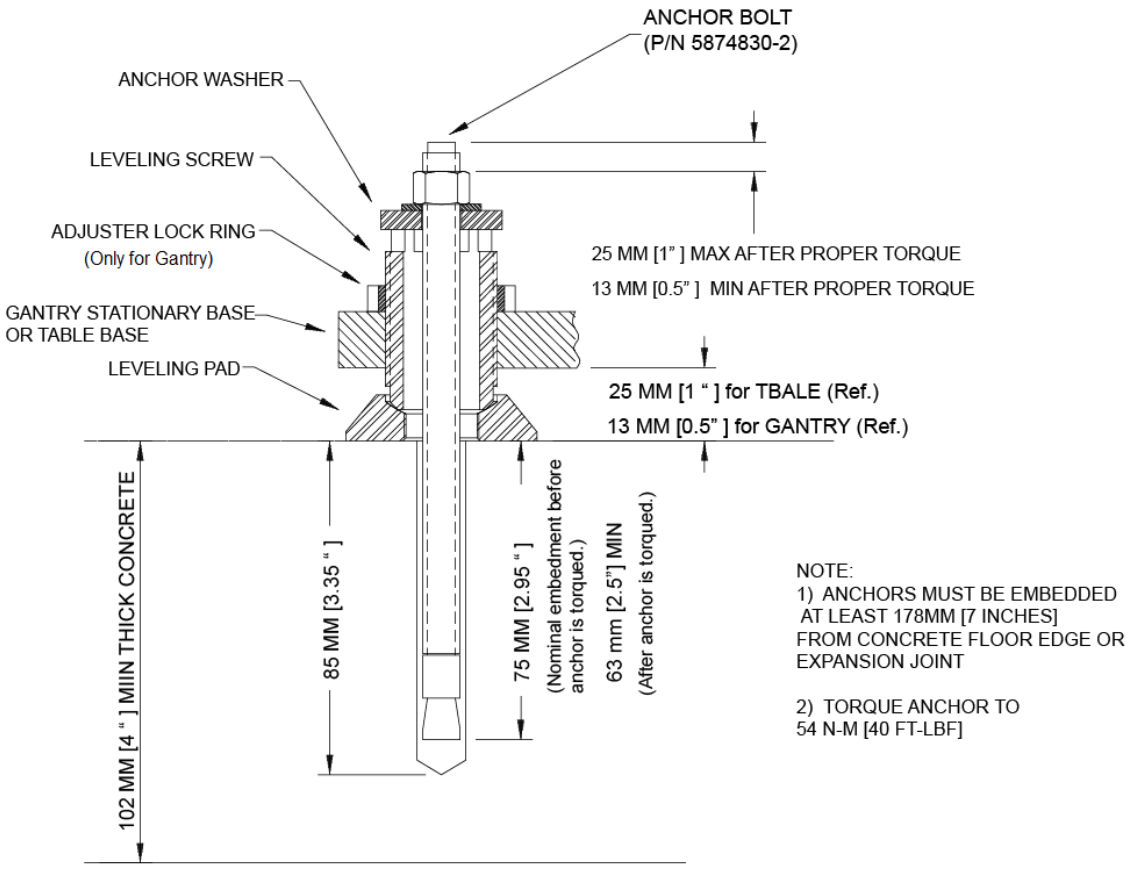
Mounting Requirements	Gantry and Table Anchor P/N 5874830-2
Minimum Floor Thickness	102 mm (4 in.)
Recommended Drilling Depth	85 mm (3.35 in.)
Minimum Anchor Embedment	75 mm (2.95 in.)
Available Alternate Anchor Locations	Yes
Shipped Anchor Size	178 mm (7 in.)
Alternate Anchoring Methods	Yes
Floor Levelness Requirement	6 mm (1/4 in.) over 3 m (10 ft)

If the Installers cannot set at four anchors for GT1700 or High capacity table, the installer must inform the customer that the minimum anchoring cannot be met, and a structural engineering contractor is required to determine the anchoring method and certify that their anchoring meets the stated GE HealthCare minimum load requirement and torque specifications.

NOTE
All other anchoring methods on floor types other than the concrete minimum must be determined at the customer's expense by a structural engineering contractor, and anchoring method must be certified to meet the stated GE HealthCare minimum load requirement and torque specification.

NOTE
If installing the GE HealthCare scanner on a floor type other than 102 mm (4 in.) concrete floor, all structural specifications in this document must be reviewed and met.

Figure 8-10 Gantry and Table Anchoring with 5874830-2 (7 in.) Anchor Bolt



8.6 Seismic Mounting

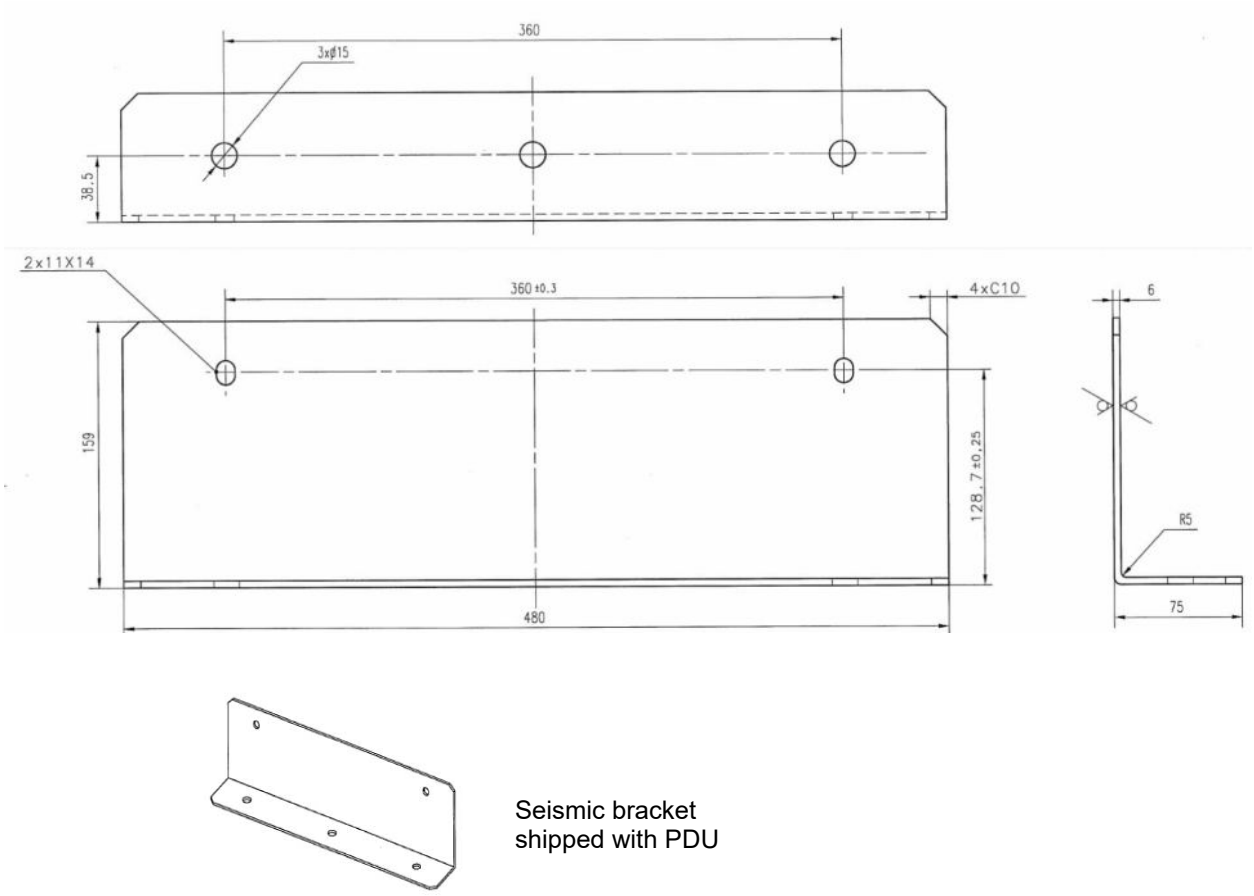
8.6.1 Overview

Refer to the guidelines in this section when mounting the system in seismic zones:

- Responsibility for proper seismic mounting rests with the customer. Refer to all applicable laws and codes for your locality.
- The customer's contractor often supplies a state-certified print or equivalent, showing seismic installation instructions.
- Consider seismic requirements for ceiling-mounted fixtures and refer to the appropriate installation instructions for ceiling-mounted fixtures.

(For NGPDU seismic:) PDU seismic brackets (2354563-2) and the PDU shipping kit (5453382-2) are shipped with the PDU. Detail bracket Installation procedure refer to Installation Manual.

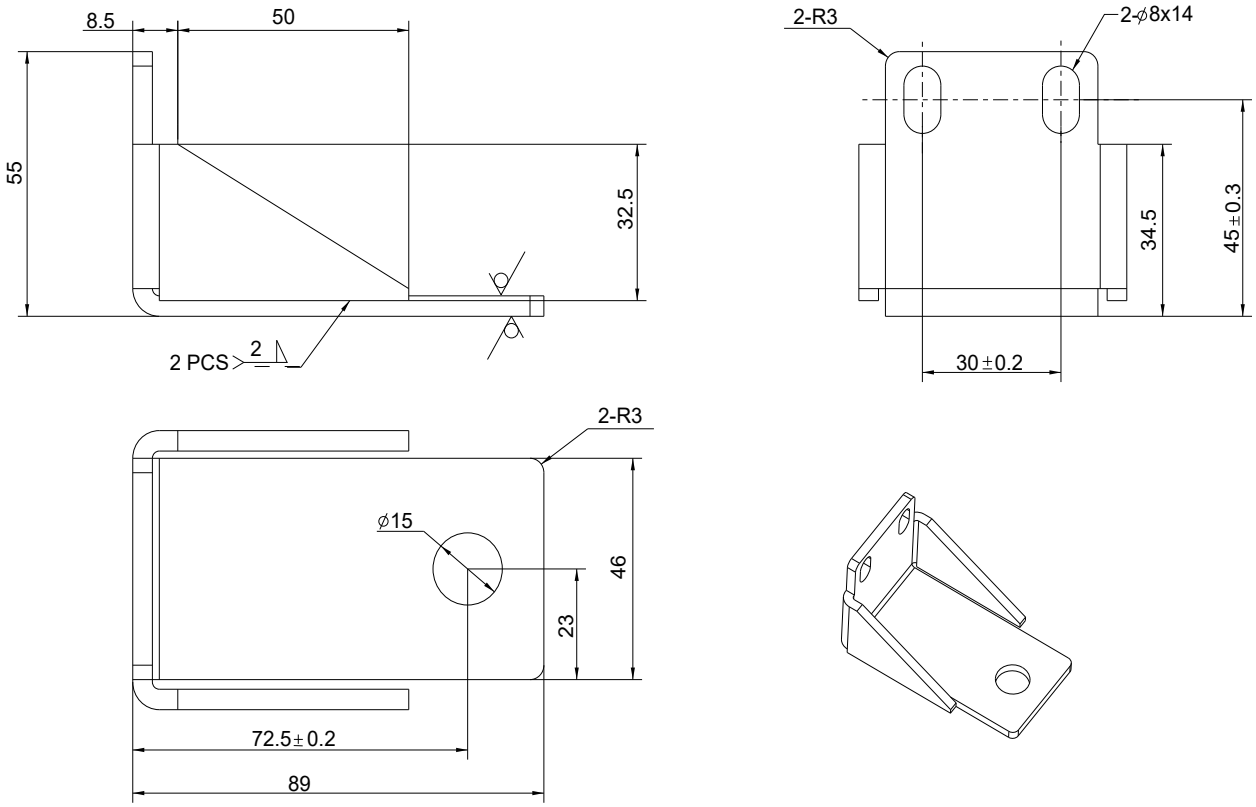
Figure 8-11 PDU Anti Seismic Bracket (2354563-2)



(For Open Console seismic:) Console seismic brackets are included in Console Seismic Kit (5812703-2).

Figure 8-12 Open Console Seismic Bracket (5357148-3)

Material: STEEL Q/BQB 403 DCO1 FB
Thickness 4.0mm



8.6.2 Center-of-Gravity Information

The information in the following figures provides the customer's contractor and/or structural engineer with center-of gravity information to assist in seismic calculations for the system:

- Gantry: Figure 8-13 Gantry Center of Gravity on page 69
- Table: Figure 8-15 GT1700 Table Center-of-Gravity on page 70 and Figure 8-16 High Capacity Table Center-of-Gravity on page 71
- Conosle: OpenOC Console with Z8G4 Center-of-Gravity on page 71
- Power Distribution Unit: Figure 8-18 PDU Center of Gravity on page 73 (PDU Seismic Mounting Bracket)

Figure 8-13 Gantry Center of Gravity

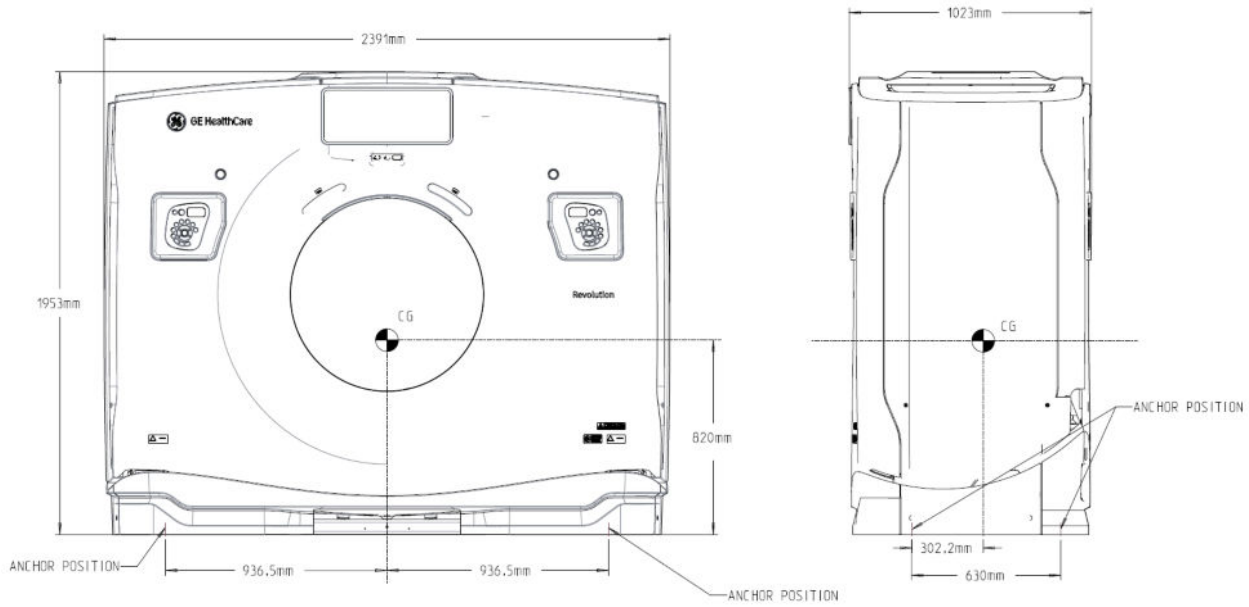


Figure 8-14 Gantry Anchor Locations

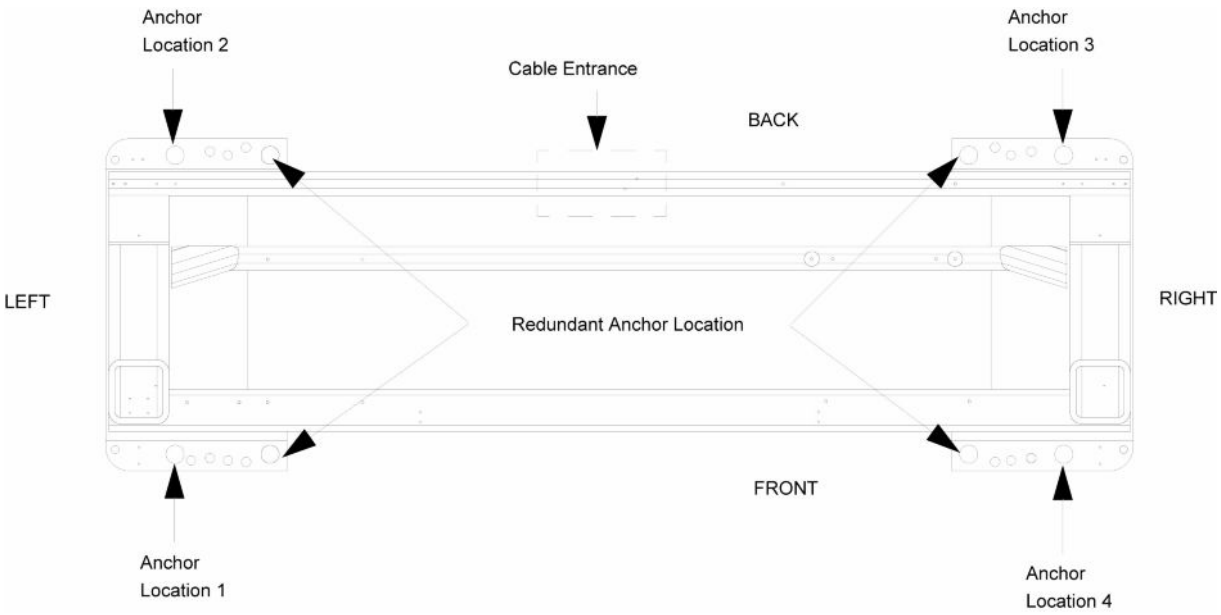
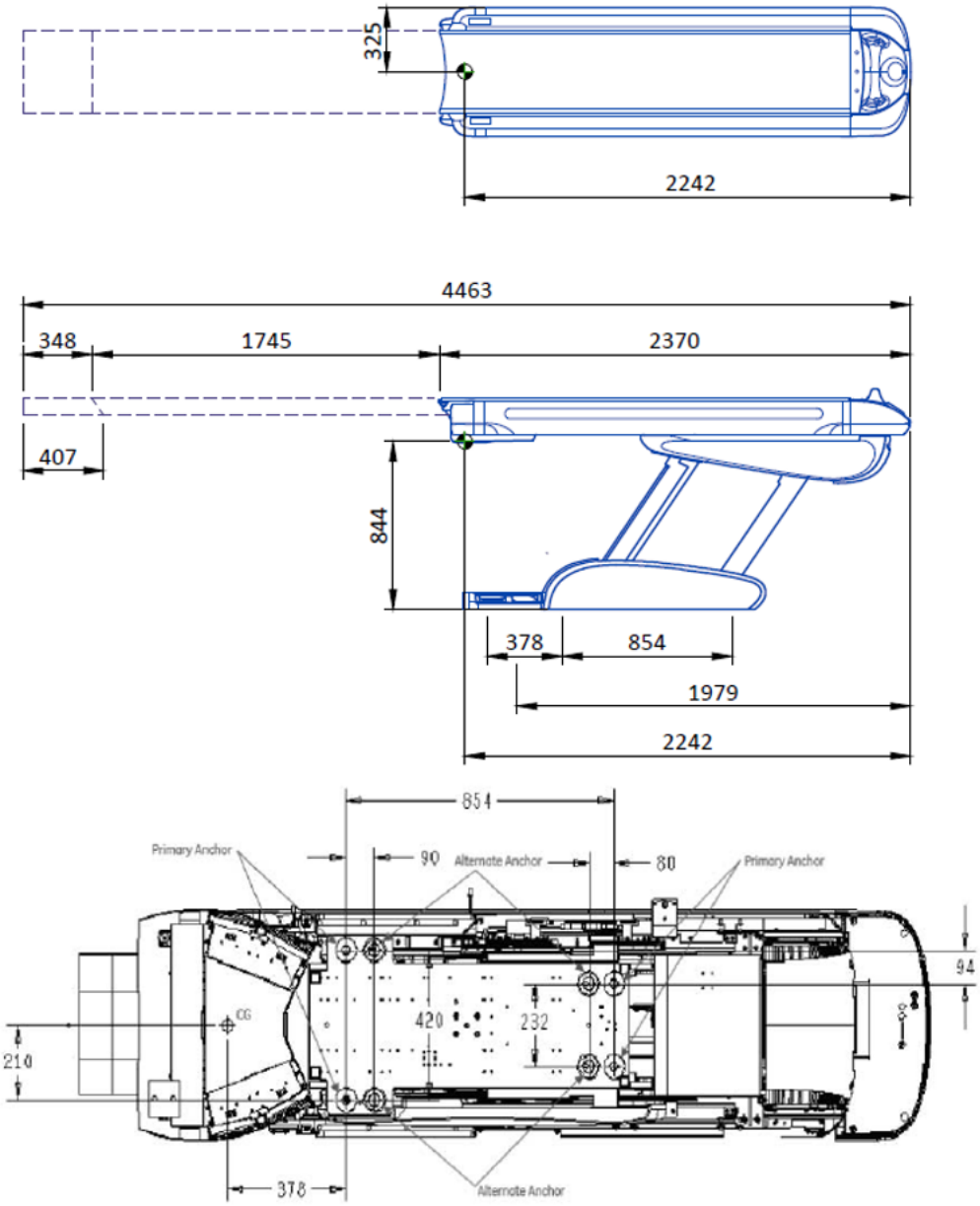
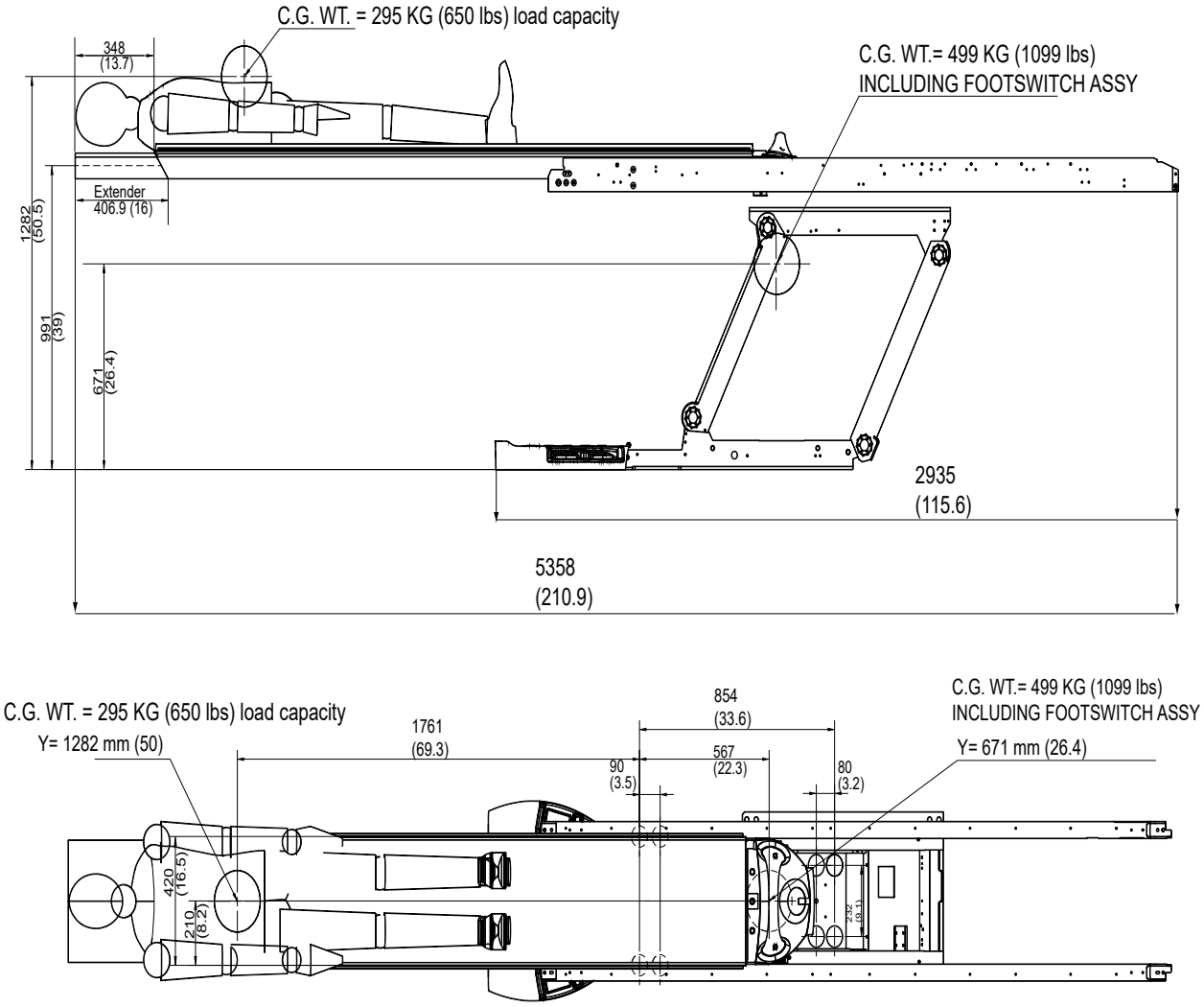


Figure 8-15 GT1700 Table Center-of-Gravity



Note: Center of Gravity location marked above includes the mass of a maximum 227kg load capacity on the table with a fully extended cradle.

Figure 8-16 High Capacity Table Center-of-Gravity



CRADLE : INMAX POSITION

IMS : INMAX POSITION

TABLE HEIGHT : 991 mm (39)

UNIT: mm (in.)

Figure 8-17 OpenOC Console with Z8G4 Center-of-Gravity

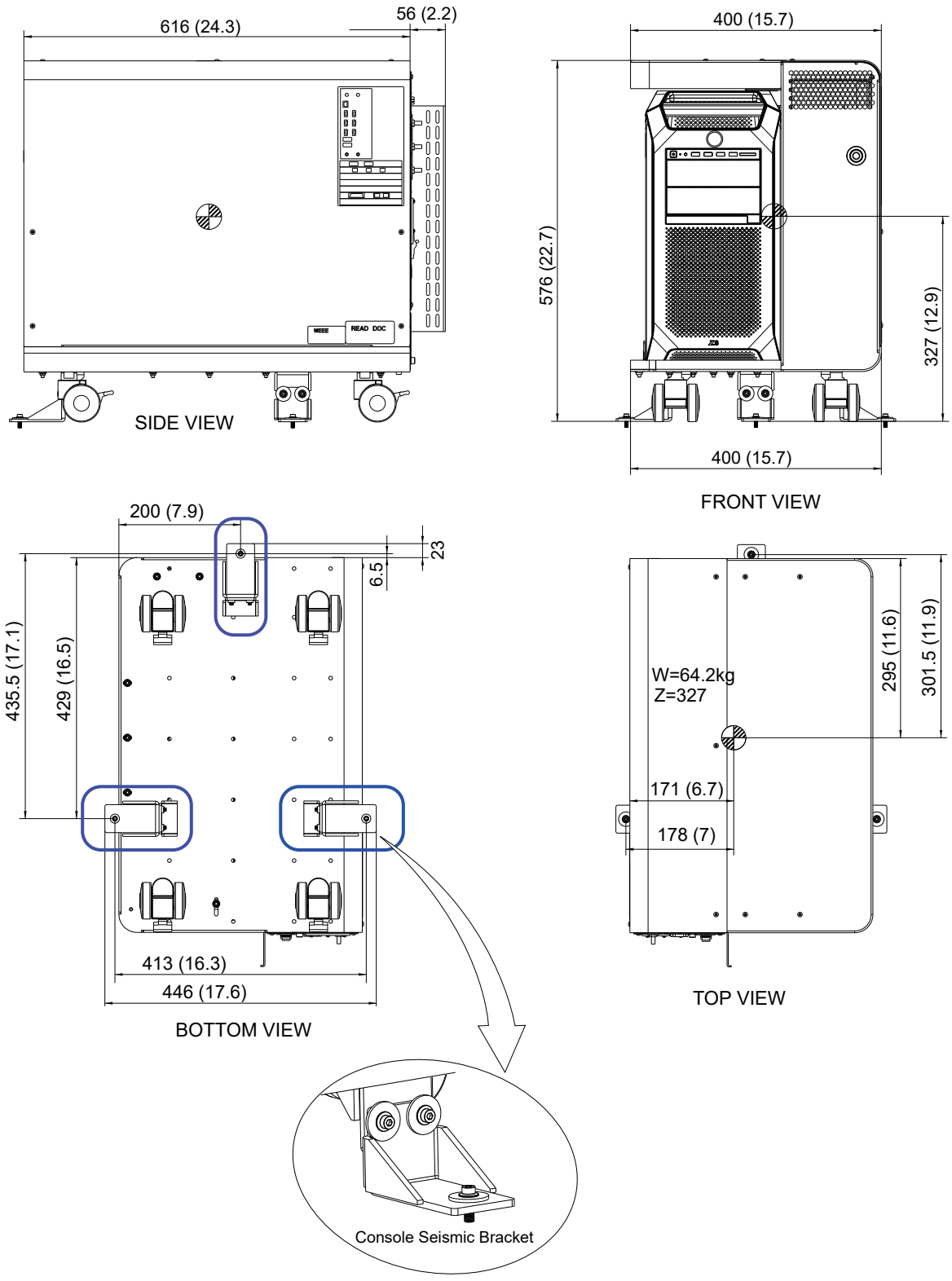
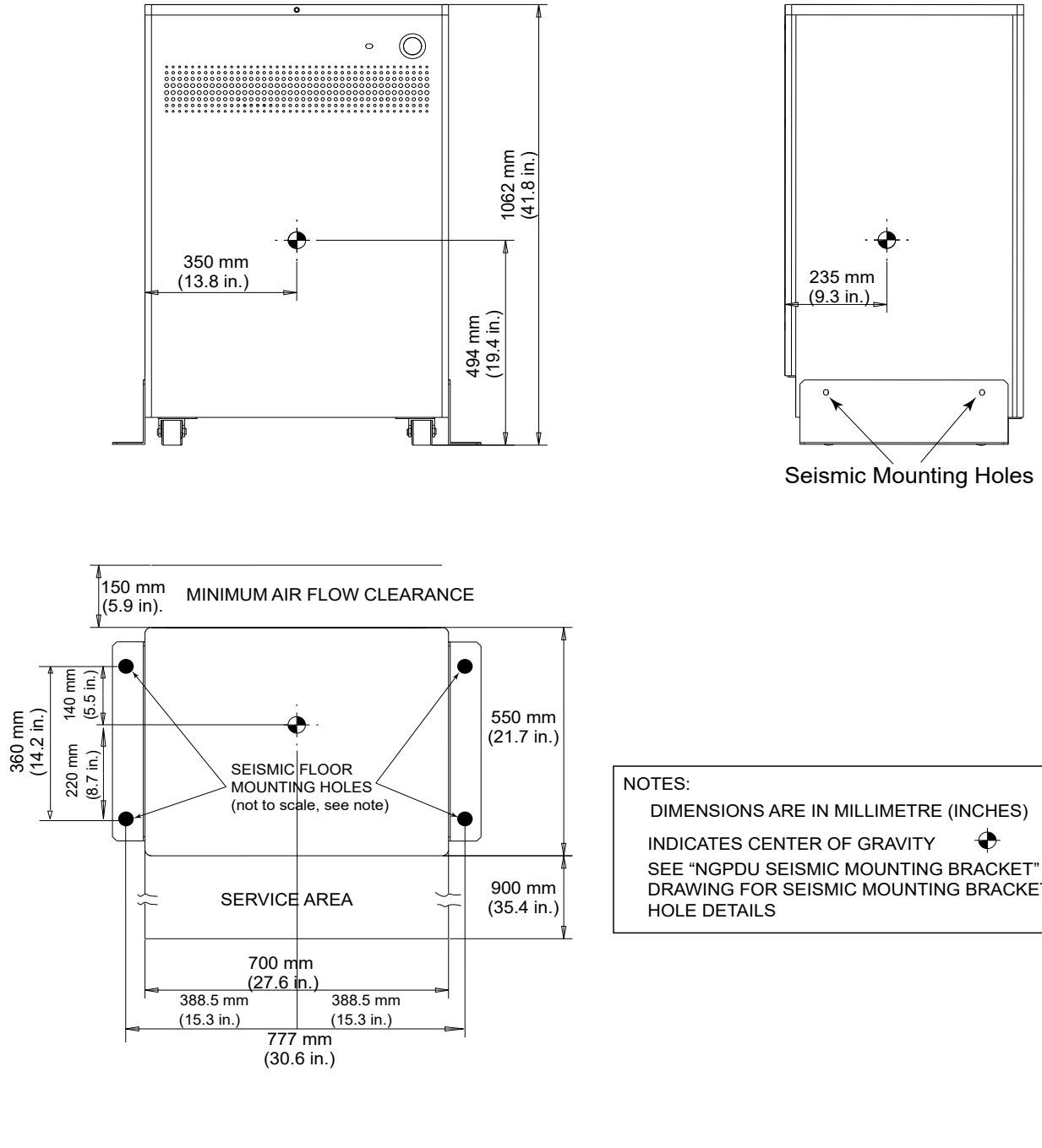


Figure 8-18 PDU Center of Gravity



NOTES:

- DIMENSIONS ARE IN MILLIMETRE (INCHES)
- INDICATES CENTER OF GRAVITY
- SEE “NGPDU SEISMIC MOUNTING BRACKET” DRAWING FOR SEISMIC MOUNTING BRACKET HOLE DETAILS

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9 Environmental Requirements

Ensure the operational readiness and proper system calibration of HVAC prior to installation. Maintain the environmental conditions listed below at ALL times, including over nights, weekends, and holidays. Shut down the CT system if air conditioning is not working. When shutting down the system for major repair, you may also shut down the air conditioning.

9.1 Temperature and Humidity Specifications

Environmental specifications apply to the table, gantry, power distribution unit, and console.

NOTICE

Exceeding environmental specifications may adversely affect system operation and image quality.

9.1.1 Temperature (Scan and Control Rooms)

Table 9-1 System Temperature Limits

Maximum allowable ambient room temperature:	26°C (79° F)
Recommended ambient room temperature:	22°C (72°F)
Minimum allowable ambient room temperature:	18°C (64°F)

NOTE

Be certain to account for ANY cooling equipment cycle control range, ensuring that the maximum and minimum ambient room temperatures do not exceed those shown in Table 9-1 System Temperature Limits on page 75 during room thermal cycling. For example, if the HVAC is capable of ± 2°C control, then the limits would be 20°C - 24°C to maintain absolute limits.

9.1.2 Humidity (Scan Room & Control Room)

Table 9-2 System Humidity Limits

Maximum allowable non-condensing relative humidity:	60%
Minimum allowable non-condensing relative humidity:	30%

9.1.3 Other Guidelines

- Accurate determination of hospital room environmental conditions may require the temporary installation of a temperature and humidity recorder near the location designated for system installation. Record temperature and humidity readings before and after installation to verify the site's true environmental conditions.
- Consider heating, ventilating, air conditioning (HVAC) needs, and redundancy (back-up). An air conditioner with two compressor units rather than one, may prevent system downtime. A

redundant (back-up) air conditioner permits CT system operation during an extended repair of the primary air conditioner.

9.2 Cooling Requirements

Use Table 9-3 System Heat Output on page 76 to assist in cooling requirements planning. Gantry operation requires over half of the cooling utilized by your system. Contact an HVAC specialist to determine optimal placement of the thermostat and all HVAC vents, bearing in mind that:

- Gantry air INTAKE occurs across the BOTTOM of the gantry.
- Gantry air EXHAUST occurs across the TOP of the gantry.

Table 9-3 System Heat Output

System Component	Max BTU/HR	Max Watt
Gantry maximum	30,570	8,964
Table	1,030	300
Power Distribution Unit	3,400	1,000
Scan Room Subtotal	**35,000**	**10,264**
Operators Console w/ 2 monitors	340	100
Recommended Control Room Subtotal (w/o option)	**8,189**	**2,400**
System Total (Recommended) (See NOTE 1)	**43,189**	**12,664**
Option: Remote Color Monitor UPS	 170 2900	 50 850
ROOM TOTAL (SEE NOTE 2)	**46,259**	**13,564**
NOTE 1: With 75 scan rotations per patient. Recommended BTU/hr. provides for up to six patients per hour. It is also needed during calibration of the system. **NOTE 2:** Cooling requirements do not include cooling for room lighting, personnel or non-CT equipment.		

Refer to Figure 7-4 Gantry and Table Dimensions - Table Options on page 46, Figure 7-6 Power Distribution Unit on page 48 and 7.2.4 Operator Console Dimensions on page 49 for component air flow requirements.

Figure 9-1 HVAC Air Vent Placement in Scan Room on page 77 and Figure 9-2 HVAC Air Vent Placement in Control Room on page 77 show the recommended placements of the thermostat and HVAC vents (intake and output) for the scan and control rooms.

Figure 9-1 HVAC Air Vent Placement in Scan Room

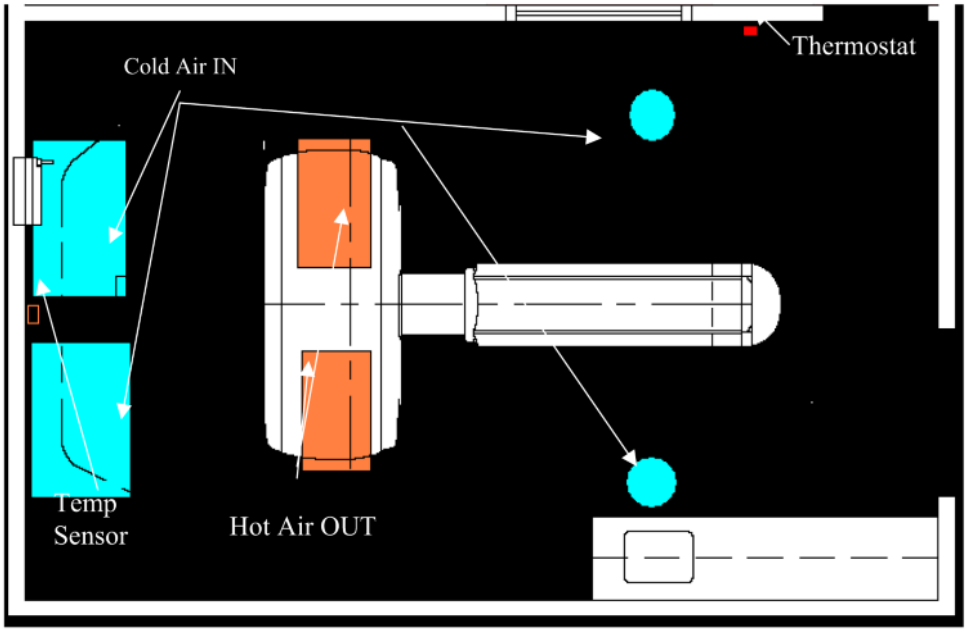
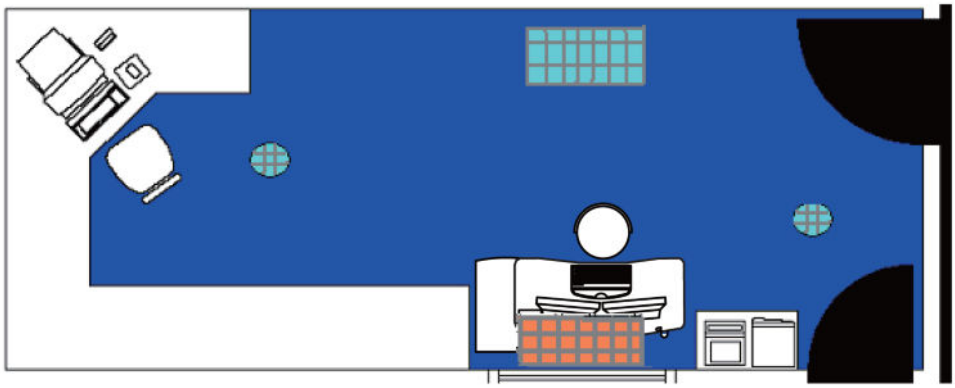


Figure 9-2 HVAC Air Vent Placement in Control Room



9.3 Altitude

The system shall meet all functional and performance specifications when placed in a room that is at an elevation of -150 m to 2,400 m (-492 ft to 7,875 ft) above sea level.

NOTE
For sites with altitudes 2,400 m to 3,000 m (7,875 ft to 9842.5 ft), you need a deviation to site at this altitude. Altitudes above 2,400 m (7,875 ft) require engineering approval.

9.4 Electro-Magnetic Interference (EMI)

9.4.1 Gantry

Locate the gantry in ambient static magnetic fields of less than 0.1 mTesla (1 Gauss) to guarantee the specified imaging performance. Ambient AC magnetic fields must measure below 1 µTesla (10 mGauss) peak.

9.4.2 Console / Computer Equipment

Locate computer equipment in ambient static magnetic fields of less than 1 mTesla (10 Gauss) to guarantee data integrity (see Figure 9-3 Sample Room Layout on page 79).

9.4.3 PDU

The PDU produces an electromagnetic field that radiates outward from its cabinet in all directions. Do not place other sensitive electronics around or above the PDU.

9.4.4 UPS

The Uninterruptable Power Supply (UPS) provides a consistent power supply to various electrical components of the system. Also, it continues to provide electrical power to components during a site-wide power outage so components can be safely shut down. The UPS should be kept at least one meter (1 m) (3.28 ft.) away from sensitive electronics (the PDU does not include sensitive electronics).

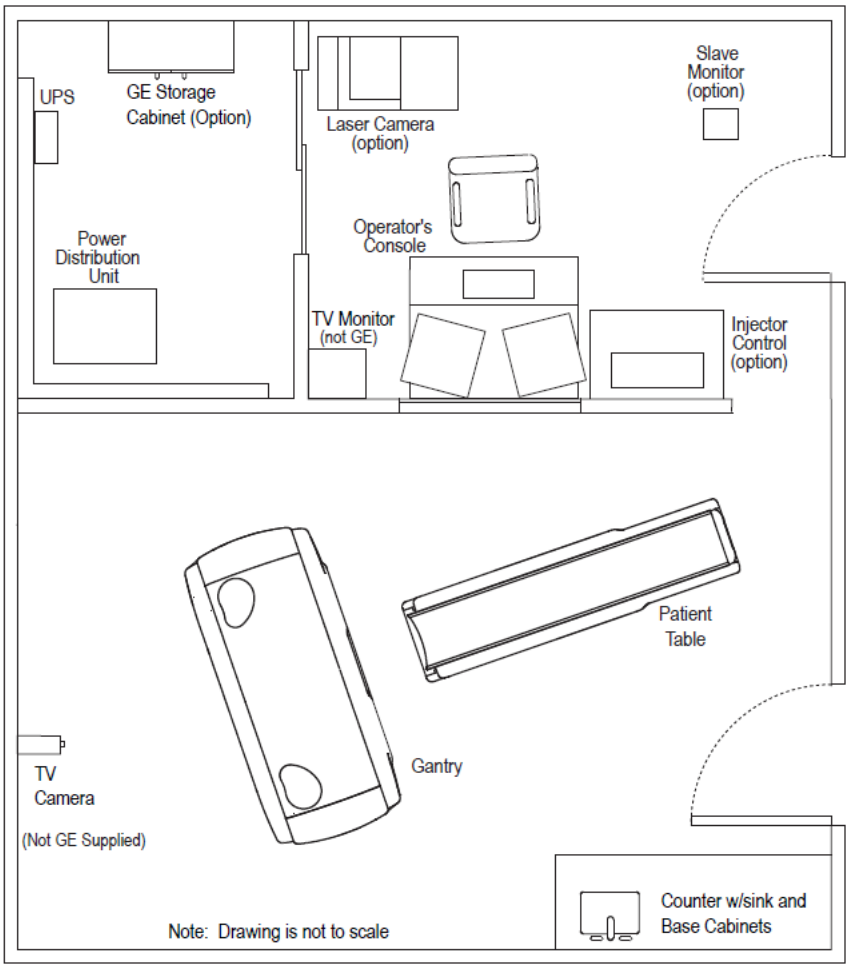
9.4.5 EMI Reduction

If you suspect the presence of fields of excessive EMI, consult GE Sales & Service for recommendations. Consider the following when attempting to reduce EMI:

- External field strength decreases rapidly with distance from source of the magnetic field.
- External leakage magnetic field of a three-phase transformer measures much less than that of a bank of three single-phase transformers of an equivalent power rating.
- Large electric motors constitute a source of substantial EMI.
- High-powered radio signals constitute a source of EMI.
- Maintain good screening of cables and cabinets.
- Consider and measure EMI fields of sites with main facility power running UNDER the floor or WITHIN the walls or ceilings of the scan room.
- Pay special attention to power substations and high-voltage power lines in proximity to the scan facility.
- If any concerns remain regarding excessive EMI fields, be sure to measure to confirm that your site meets all required specifications.

9.4.6 Equipment EMI "Envelopes"

Figure 9-3 Sample Room Layout



9.5 Electro-Magnetic Compatibility (EMC)

9.5.1 General Scope

Revolution RT (equipment or system for short in the following) complies with IEC 60601-1-2 2014 Edition 4.0, A1:2020 Edition 4.1.

The system scanner complies with IEC 60601-1-2 2014 Edition 4.0, A1:2020 Edition 4.1 for the unit determined by means one of below:

- The scanner delivered with TRM, in the Regulatory chapter statement IEC 60601-1-2 2014 Edition 4.0, A1:2020 Edition 4.1 compliance.
- The scanner installed with the below parts in Gantry:

Part	P/N EMC4.0	Description	Location
Slip Ring Receiver	2333611-4	850M Receiver Antenna, ROHS Version	Gantry HLA
Slip Ring Transmitter	2333615-4	850MB Transmitter, ROHS Version	Gantry Slip Ring

The system is suitable to be used in the Electromagnetic Environment, as per Environment of Intended Use and the limits & recommendations described in the tables hereafter:

- Emission Compliance level & limits (see Table 9-4 Guidance and manufacturer’s declaration – electromagnetic emissions on page 81).
- Immunity Compliance level & recommendations to maintain equipment clinical utility (see Guidance and manufacturer's declaration – electromagnetic immunity on page 82, Table 9-8 Immunity and recommended separation between RF wireless communication equipment for IEC60601-1-2 Edition 4 on page 85 and Table 9-7 Recommended separation distances between portable and mobile RF communications equipment and the Equipment on page 84).

NOTE
This system complies with the EMC standard when used with supplied cables. If different cable lengths are required, contact a qualified GE service representative for advice.

9.5.2 Electromagnetic Emission

Table 9-4 Guidance and manufacturer's declaration – electromagnetic emissions

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.		
Emissions Test	**Compliance**	**Electromagnetic Environment Guidance**
RF emissions CISPR 11 GB 4824	Group 1	The system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11 GB 4824	Class A	The system is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
HarmonIc emissions IEC 61000-3-2 GB 17625.1	Not applicable	
Voltage fluctuations / flicker emissions IEC 61000-3-3 GB 17625.2	Not applicable	

NOTE
GB4824, GB17625.X and GB17626.X standard apply to China only.

NOTE
The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 / GB 4824 class A). If it is used in a residential environment (for which CISPR 11 / GB 4824 class B is normally required), this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

9.5.3 Electromagnetic Immunity

Table 9-5 Guidance and manufacture's declaration - electromagnetic immunity

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.			
Immunity Test	**EC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment - Guidance**
Electrostatic discharge (ESD) IEC 61000-4-2 GB/T 17626.2	±6 kV contact ±8 kV air ±8 kV contact [a)] ±15 kV air [a)]	±6 kV contact ±8 kV air ±8 kV contact [a)] ±15 kV air [a)]	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4 GB/T 17626.4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5 GB/T 17626.5	±1 kV line-line ±2 kV line-earth	±1 kV line-line ±2 kV line-earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11 GB/T 17626.11	<5 % U_T for 0.5 cycle (>95 % dip in U_T) 40 % U_T for 5 cycles (60 % dip in U_T) 70 % U_T for 25 cycles (30 % dip in U_T)	Not applicable	Mains power quality should be that of a typical commercial or hospital environment. If the user of the equipment requires continued operation during power mains interruptions, it is recommended that the equipment be powered from an uninterruptible power supply or a battery.
	<5 % U_T for 5s (>95 % dip in U_T) 0%U_T, 5s[a)]	<5 % U_T for 5s (>95 % dip in U_T) 0%U_T, 5s[a)]	
Power frequency (50/60Hz) magnetic fields IEC 61000-4-8 GB/T 17626.8	3 A/m 30 A/m [a)]	3 A/m 30 A/m [a)]	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Proximity Magnetic Fields [a)] IEC 61000-4-39	8 A/m 30 kHz	Not applicable	
	65 A/m 134.2 kHz 7.5 A/m 13.56 MHz	65 A/m 134.2 kHz 7.5 A/m 13.56 MHz	

NOTE
U_T is the a.c. mains voltage prior to application of the test level.

NOTE
[a)] For IEC 60601-1-2:2014 Ed4.0 and A1:2020 Ed4.1, Proximity Magnetic Fields apply to IEC 60601-1-2 Ed4.1 only.

Table 9-6 Guidance and manufacturer's declaration – electromagnetic immunity

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the equipment, including cables, than the recommended separation distance calculated from the equation appropriate to the frequency of the transmitter **Recommended Separation Distance**
Conducted RF IEC 61000-4-6 GB/T 17626.6	3Vrms 150 kHz ~ 80 MHz 6Vrms [a)] ISM bands between 150 kHz and 80 MHz 80%AM at 1kHz	3Vrms 6Vrms [a)] ISM bands between 150 kHz and 80 MHz	$d = 1.2\sqrt{p}$
Radiated RF Fields IEC 61000-4-3 GB/T 17626.3	3V/m 80 MHz ~ 2.5/2.7[a)] GHz 80% AM at 1kHz	3V/m	$d = 1.2\sqrt{p}$ 80 MHz ~ 800 MHz $d = 2.3\sqrt{p}$ 800 MHz ~ 2.5/2.7[a)] GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in meters (m).
Proximity fields from RF Wireless communications equipment [a)] IEC 61000-4-3	refer to Table 9-8 Immunity and recommended separation between RF wireless communication equipment for IEC60601-1-2 Edition 4 on page 85	refer to Table 9-8 Immunity and recommended separation between RF wireless communication equipment for IEC60601-1-2 Edition 4 on page 85	Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE
At 80 MHz and 800 MHz, the higher frequency range (6.765 MHz~6.795 MHz , 13.553 MHz~ 13.567 MHz, 26.957 MHz~27.283 MHz, 40.66 MHz~40.70 MHz) applies.

NOTE
These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

NOTE
[a)] For IEC 60601-1-2:2014 Ed4.0 and A1:2020 Ed4.1.

Table 9-6 Guidance and manufacturer's declaration – electromagnetic immunity (Table continued)

The system is intended for use in the electromagnetic environment specified below. The customer or the user of the system should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment - Guidance**
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio. AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the equipment is used exceeds the applicable RF compliance level above, the equipment should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the equipment. [b] Over the frequency range 150 kHz to 80 MHz. field strengths should be less than 3V/m.			

Table 9-7 Recommended separation distances between portable and mobile RF communications equipment and the Equipment

The system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the system can help prevent electromagnetic Interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the system as recommended below, according to the maximum output power of the communications equipment			
Rated Maximum Output Power (P) of Transmitter (W)	**Separation Distance according to Frequency of Transmitter**		
	150 kHz ~ 80 MHz $d = 1.2\sqrt{p}$	**80 MHz ~ 800 MHz** $d = 1.2\sqrt{p}$	**800 MHz ~ 2.5/2.7[a)] GHz** $d = 2.3\sqrt{p}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.74
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters rated at a maximum output power not listed above, the separation distance can be estimated using the equation in the corresponding column, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			

NOTE
At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE
These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

NOTE
[a)] For IEC 60601-1-2:2014 Ed4.0 and A1:2020 Ed4.1.

⚠ WARNING

PORTABLE RF COMMUNICATIONS EQUIPMENT (INCLUDING PERIPHERALS SUCH AS ANTENNA CABLES AND EXTERNAL ANTENNAS) SHOULD BE USED NO CLOSER THAN 30 CM (12 INCHES) TO ANY PART OF THE SYSTEM, INCLUDING CABLES SPECIFIED BY THE MANUFACTURER. OTHERWISE, DEGRADATION OF THE PERFORMANCE OF THIS EQUIPMENT COULD RESULT.

Table 9-8 Immunity and recommended separation between RF wireless communication equipment for IEC60601-1-2 Edition 4

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) at frequencies noted below should be used no closer than 30cm (12 inches) to any part of the system, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

Minimum separation distances for higher IMMUNITY TEST LEVELS shall be calculated using the following equation:

$$d = \left[\frac{6}{E}\right]\sqrt{P}$$

Where *P* is the maximum power in W, *d* is the minimum separation distance in m, and *E* is the IMMUNITY TEST LEVEL in V/m.

Test frequency (MHz)	Band (MHz)	Service	Maximum power (W)	IMMUNITY TEST LEVEL (V/m)
385	380 - 390	TETRA 400	1.8	27
450	430 - 470	GMRS 460 FRS 460	2	28
710	704 - 787	LTE Band 13, 17	0.2	9
745				
780				
810	800 - 960	GSM 800/900 TETRA 800 iDEN 820 CDMA 850 LTE Band 5	2	28
870				
930				
1720	1700 - 1990	GSM 1800 CDMA 1900 GSM 1900 DECT LTE Band 1, 3, 4, 25 UMTS	2	28
1845				
1970				
2450	2400 - 2570	Bluetooth, WLAN 802.11 b/g/n RFID 2450 LTE Band 7	2	28

Table 9-8 Immunity and recommended separation between RF wireless communication equipment for IEC60601-1-2 Edition 4 (Table continued)

Portable RF communications equipment (including peripherals such as antenna cables and external antennas) at frequencies noted below should be used no closer than 30cm (12 inches) to any part of the system, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

Minimum separation distances for higher IMMUNITY TEST LEVELS shall be calculated using the following equation:

$$d = \left[\frac{6}{E}\right]\sqrt{P}$$

Where *P* is the maximum power in W, *d* is the minimum separation distance in m, and *E* is the IMMUNITY TEST LEVEL in V/m.

Test frequency (MHz)	Band (MHz)	Service	Maximum power (W)	IMMUNITY TEST LEVEL (V/m)
5240	5100 - 5800	WLAN 802.11 a/n	0.2	9
5500				
5785				

9.5.4 Use Limitation

The scanner is intended for use only by trained professionals who must be trained in CT system operation and has sufficient knowledge of radiation, scan setting, image annotation and review, the operator shall understand the operation and expected performance of the system per training and reading of the operator manual and technical reference manual.

The scanner is expected to be able to position patient, scan, display or output images with annotation and without artifact or noise that emulate or hide pathology, timely and accordingly. Test per chapter Quality Assurance to ensure scanner performance as expectation, Daily preparation procedure and calibration shall be used to maintain scanner performance and prevent failure or degradation before use. Contact GE service if any failure.

The table below described some possible failure or degradation of performance need to check before further use.

Table 9-9 Performance Failure and Detection

Function	Performance Failure and Detection	Instruction to Check or Maintain
Patient positioning	Unintended motion or positioning	Manual check table positioning or positioning patient successfully during scan
Scan	Unintended scan exposure	Check scan control button response as expected Daily prepare or Test per Quality Assurance
Image annotation	Unintended image annotation or scan setting	Complete patient information and scan settings accordingly before scan, ensure keyboard and display response as expected
Display and output	Unexpected display or output, not available for visual check or diagnose	Daily prepare or test per Quality Assurance, ensure scan recon setting, display and printer function as expected

Table 9-9 Performance Failure and Detection (Table continued)

Function	Performance Failure and Detection	Instruction to Check or Maintain
IQ/artifact	Unexpected artifact or noise that emulate or hide pathology	Daily prepare or test per Quality Assurance, ensure Image Quality according with spec. Verify CT# for air, water and object scanned for doubts in the image
Image delay	Unexpected scan image time delay	Daily prepare or test per Quality Assurance, verify scan and recon setting

The system should be installed, maintained and used per guidance in EMC section for safety and expected performance. To use per guidance, separate from other device sensitive or with EM disturbance will help to maintain the performance of the scanner and other device.

⚠ WARNING

This system is intended for use by healthcare professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as reorienting or relocating the system or shielding the location.

⚠ WARNING

CT Scans may cause interference with implanted or externally worn electronic medical devices such as pacemakers, defibrillators, neuro stimulators and drug infusion pumps. The interference could cause operational changes or malfunction of the electronic medical device.

Use of RF (Radio Frequency) sources that intentionally transmit, such as cellular telephones, transceivers, radio-controlled products, or other RF emitting equipment may cause performance outside the systems published specifications or other adverse operation. Keep the power to these RF sources turned off when near this equipment. Recommended separation distances and information regarding compatibility with other equipment are located in the Manufacturer's EMC Declaration Tables.

Operation of the accessories like EKG monitor and respiratory gating device below the manufacturer specified minimum amplitude or value of patient physiological signals may cause inaccurate results.

Only transducers and cables GE specified can be replacement parts for internal components, details of components and cables refer to Pre-Installation Manual.

The use of accessories, transducers, and cables other than those specified in GE Approved Accessories may result in increased emissions or decreased immunity performance of the equipment.

⚠ WARNING

Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

9.5.5 Installation Requirements and Environment Control

In order to minimize interference risks, the following requirements apply.

9.5.5.1 Environment of Intended Use

This medical device is evaluated to the IEC60601-1-2 safety standard electromagnetic emissions and immunity levels in the Professional Healthcare Facility environment category, predominantly for use in hospital except for near active HF SURGICAL EQUIPMENT or SHORT-WAVE THERAPY EQUIPMENT with a dedicated supply system, and with an X-ray shielded room. The equipment is not directly connected to the Public Mains Network.

The CT System is exposed to EM sources generally from LAN and WLAN, mobile phones, paging systems, computers, printers, monitors, and other medical devices. See sections in this manual for the electromagnetic disturbance compliance levels this product meets including a list of wireless communications services evaluated.

This medical device is not suitable for use in certain hospital environments. Electrical devices that are brought into the CT System room that generate intense EM disturbances have not been considered per the safety standard. Also, the CT System compliance levels don't guarantee that other equipment in the room that is EM sensitive is not impacted. The IEC60601-1-2 safety standard requires additional testing and/or risk assessment for compliance and patient/operator safety of the CT system.

Table 9-10 Environment of Intended Use

Environment of Intended Use	
This medical device is evaluated to the IEC60601-1-2 safety standard electromagnetic emissions and immunity levels in the environment category shown below.	
ENVIRONMENT CATEGORY	**EXAMPLES**
Professional Healthcare Facility	EM sources generally are from LAN and WLAN, mobile phones, paging systems, IT equipment, medical devices. Physician Offices / Clinics / Limited Care Facilities / Freestanding Surgical Centers / Multiple Treatment Facilities / Hospitals / Trailer connected to Hospital power (for CT mobile qualified)
Environment Exclusions	
This medical device may not be suitable for use in the IEC60601-1-2 safety standard environment categories listed below. The types of electromagnetic disturbances emitted from electrical devices found in these environments and their effect on the performance of this medical device have not been considered per the safety standard. The safety standard requires additional testing and/or risk assessment for compliance and patient/operator safety of the CT system.	
ENVIRONMENT CATEGORY	**EXAMPLES**
Home Healthcare Environment	Locations that have diverse electromagnetic disturbances. Category includes transportation. Residences / Homes / Nursing Homes / Vehicles (Cars, Trains, Planes) / Mobile Emergency Medical Services / Airports / Outdoors
Special Environment – Medical	EM sensitive locations or sources of intense emissions. Rooms with HF surgical equipment / Rooms with short-wave therapy equipment / Inside RF shielded room of an MRI system.
Special Environment - Military	Unique locations that have not been EM characterized. Near Radar Installations / Near Weapons Control Systems

Table 9-10 Environment of Intended Use (Table continued)

Environment of Intended Use	
Special Environment – Industrial	Unique locations that have not been EM characterized. Power Plants / Manufacturing Facilities / Mining / Refineries / Mills

9.5.5.2 Cable Shielding and Grounding

All interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference.

9.5.5.3 Subsystem & Accessories Power Supply Distribution

All components, accessories subsystems, systems which are electrically connected to the system, must have all AC power supplied by the same power distribution panel & line.

9.5.5.4 Stacked Components & Equipment

System should not be used adjacent to or stacked with other equipment; if adjacent or stacked use is necessary, System should be observed in order to verify normal operation in the configuration in which it will be used.

⚠ WARNING

Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

9.5.5.5 Low Frequency Magnetic Field

In case of a digital System, the Gantry (digital detector) shall be apart 1 meter from the generator cabinet, and 1 meter apart from the analog (CRT) monitors. These distance specifications will minimize the low frequency magnetic field interference risk.

9.5.5.6 Static Magnetic Field Limit

In order to avoid interference on system, static field limits from the surrounding environment are specified.

- Static field is specified less than <1 Gauss in Examination room, and in the Control Area.
- Static field is specified less than <3 Gauss in the Technical Room.

9.5.5.7 Electrostatic Discharge Environment & Recommendations

In order to reduce electrostatic discharge interference, install a charge dissipative floor material to avoid electrostatic charge buildup.

The relative humidity shall be at least 30 percent.

The dissipative material shall be connected to the system ground reference, if applicable.

9.6 System Component Noise Levels

Maximum Gantry Audible Noise Level The maximum ambient noise level is produced by the gantry during a CT scan acquisition. It is less than 75dBA when measured at a distance of one meter from the nearest gantry surface, in any direction.

Maximum Console Audible Noise Level The maximum ambient noise levels is less than or equal to 56dBA when measured 1m up and 1m away from the console at an ambient temperature of 26°C.

10 Radiation Protection Requirements

10.1 Shielding Requirements

NOTICE

Engage a QUALIFIED RADIOLOGICAL HEALTH PHYSICIST to review your scan room shielding requirements, taking into consideration:

- **Scatter radiation levels within the scanning room (see** Figure 10-1 Typical Scatter Survey (Head Filter - Phantom 16cm CTDI) on page 93 **and** Figure 10-3 Typical Scatter Survey (Body Filter - Phantom 32cm CTDI) on page 95**).**
- **Equipment placement.**
- **Weekly projected work-loads (number of patients/day technique (kvp*ma)).**
- **Materials used for construction of walls, floors, ceiling, doors, and windows.**
- **Activities in surrounding scan room areas.**
- **Equipment in surrounding scan room areas (e.g., film developer, film storage).**
- **Room size and equipment placement within the room relative to room size.**

The illustrations in this Chapter depict measured radiation levels within the scanning room, while scanning a 32 cm or 16 cm CTDI phantom with the technique shown.

NOTE
Actual measurements can vary. All measurements have an accuracy of ±20% because of measurement equipment, technique, and system-to-system variation.

Use the correction factors shown in Table 10-1 Shielding Requirements Scaling on page 91 to adjust exposure levels to the scan technique used at the site.

Table 10-1 Shielding Requirements Scaling

Changed Parameter	Multiplication Factor
mAs	new mAs/100
80 kV	0.21
120 kV	0.71
140 kV	1.00
4 x 3.75mm images	0.82
16 x 0.625 LD 8 x 1.25 LD Fluro 5mm	0.59
4 x 1.25 LD 5mm (1i) Fluro 2.5mm	0.40

Table 10-1 Shielding Requirements Scaling (Table continued)

Changed Parameter	Multiplication Factor
1 x 1.25mm images	0.20
4 x 0.625 LD 1 x 1.25 LD	0.10

NOTICE

This publication uses µGy (micrograys) to measure radiation levels. The conversion factor from mR to µGy (micrograys) is: 1 mR = 8.76 µGy.

Figure 10-1 Typical Scatter Survey (Head Filter - Phantom 16cm CTDI)

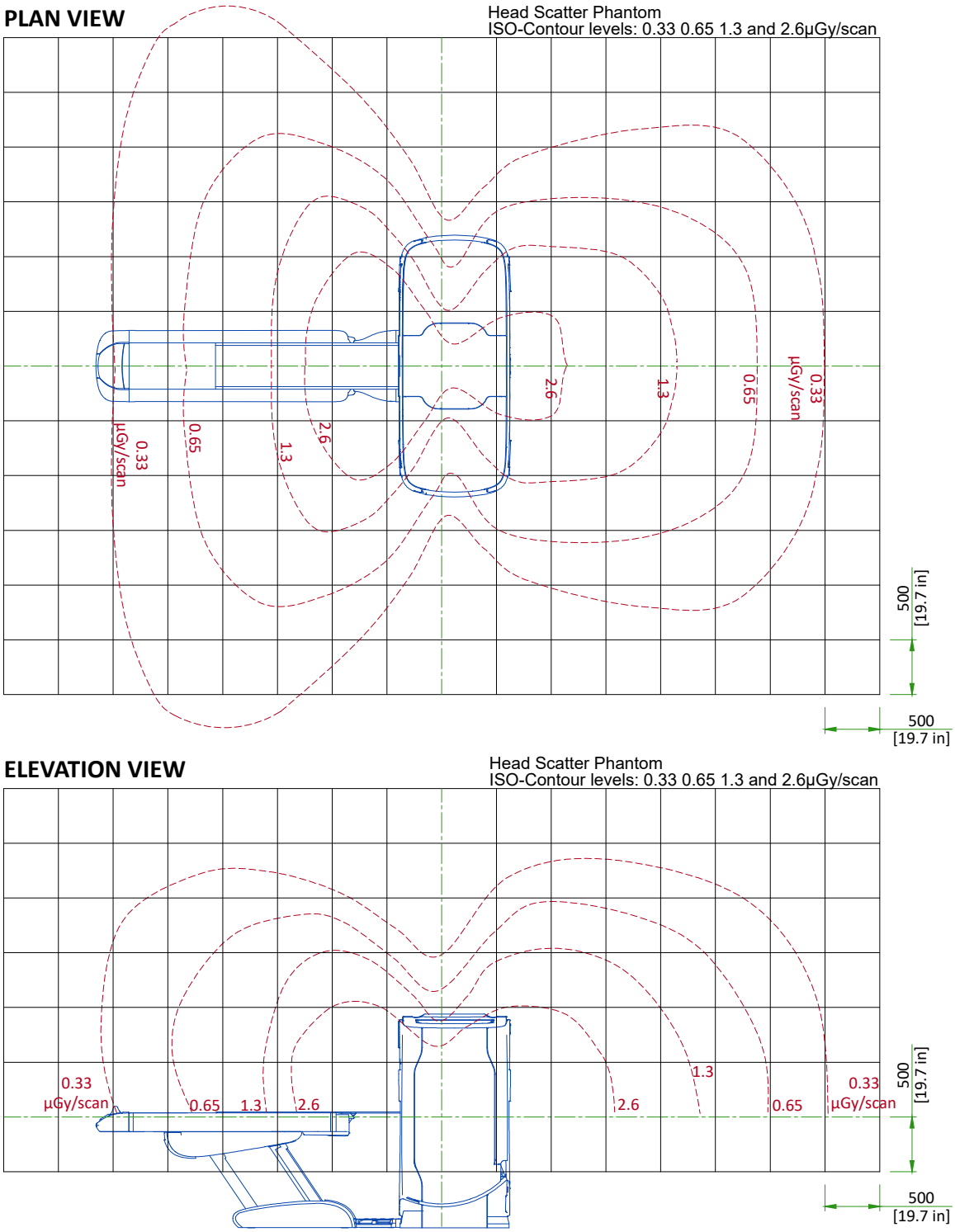


Figure 10-2 Typical Stray Radiation in µGy per 100 mAs – Head, Horizontal Plane and Vertical Plane 20mm Collimation

µGy/Scan	Horizontal - Head16												
	3.0m	2.5m	2.0m	1.5m	1.0m	0.5m	0.0m	0.5m	1.0m	1.5m	2.0m	2.5m	3.0m
F1.5m	0.23	0.47	0.80	1.08	1.55	1.15	1.07	1.15	1.55	1.08	0.80	0.47	0.23
F1.0m	0.14	0.58	0.52	1.54	2.13	2.44	2.98	2.44	2.13	1.54	0.52	0.58	0.14
F0.5m	0.36	0.56	0.32	0.51	2.07	10.31	11.28	10.31	2.07	0.51	0.32	0.56	0.36
0	0.18	0.26	0.10	0.36	-	-	ISO	-	-	0.36	0.10	0.26	0.18
R0.5m	0.03	0.03	0.04	0.04	-	-	13.62	-	-	0.04	0.04	0.03	0.03
R1.0m	0.02	0.04	0.03	0.06	1.13	3.88	4.45	3.88	1.13	0.06	0.03	0.04	0.02
R1.5m	0.02	0.03	0.10	0.57	1.60	1.86	1.98	1.86	1.60	0.57	0.10	0.03	0.02
R2.0m	0.03	0.15	0.30	0.70	0.99	1.08	1.11	1.08	0.99	0.70	0.30	0.15	0.03
R2.5m	0.07	0.21	0.38	0.56	0.66	0.69	0.72	0.69	0.66	0.56	0.38	0.21	0.07
R3.0m	0.15	0.25	0.35	0.42	0.46	0.47	0.49	0.47	0.46	0.42	0.35	0.25	0.15

µGy/Scan	Vertical - Head16												
	F3.0m	F2.5m	F2.0m	F1.5m	F1.0m	F0.5m	0	R0.5m	R1.0m	R1.5m	R2.0m	R2.5m	R3.0m
U1.5m	0.36	0.48	0.68	1.09	1.49	0.33	-	0.04	0.06	0.93	0.90	0.71	0.55
U1.0m	0.34	0.54	0.83	1.34	2.55	1.18	-	0.04	1.86	1.79	1.14	0.88	0.58
U0.5m	0.35	0.51	0.88	1.52	3.11	10.45	-	10.43	4.61	2.13	1.24	0.80	0.57
0	0.20	0.28	0.45	1.31	3.16	12.13	ISO	13.21	4.61	2.64	1.19	0.72	0.49
L0.5m	0.01	/	/	/	/	8.04	-	/	3.89	2.10	1.21	0.79	0.53

Figure 10-3 Typical Scatter Survey (Body Filter - Phantom 32cm CTDI)

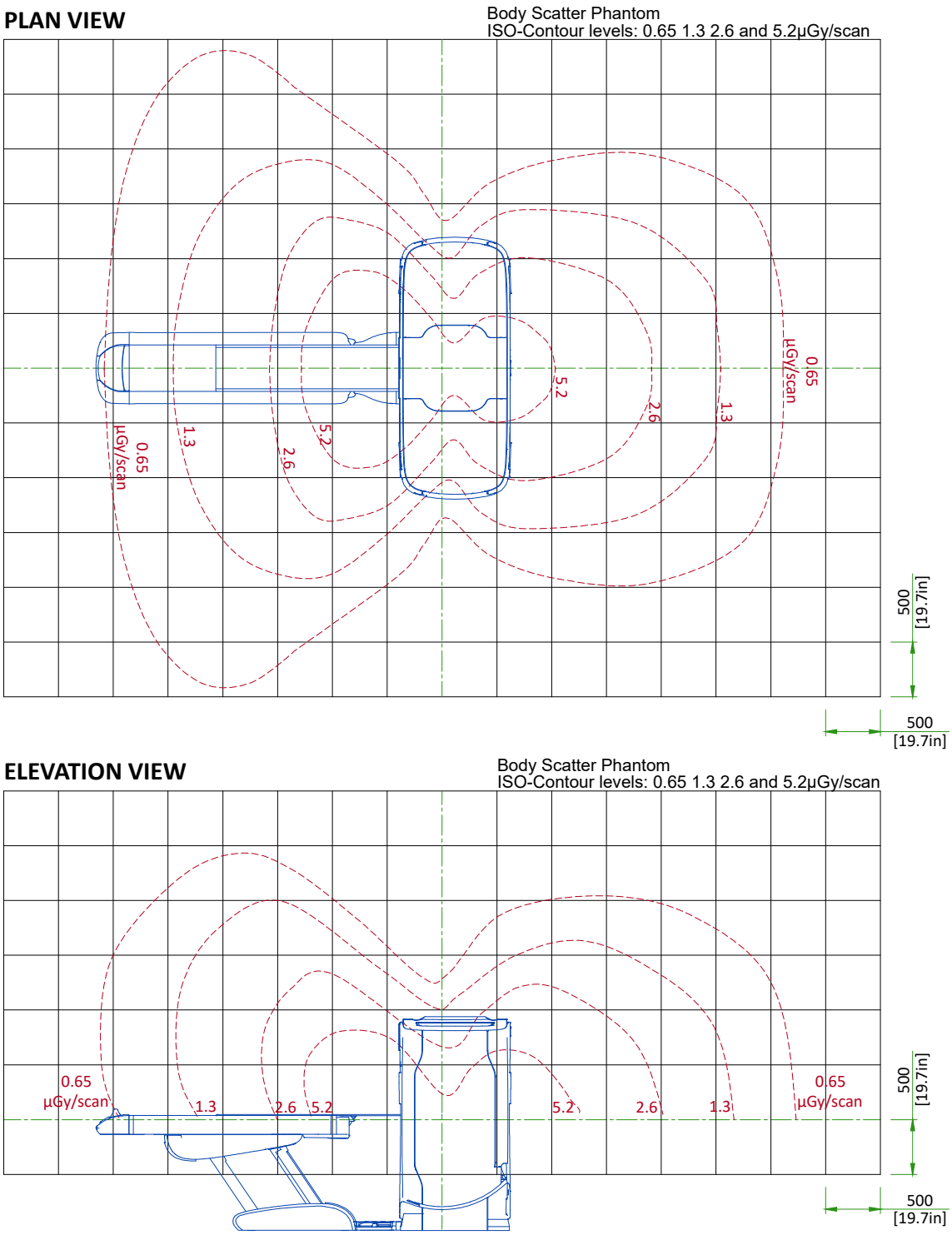


Figure 10-4 Typical Stray Radiation in µGy per 100 mAs – Body, Horizontal Plane and Vertical Plane 20mm Collimation

µGy/Scar	Horizontal - Body32												
	3.0m	2.5m	2.0m	1.5m	1.0m	0.5m	0.0m	0.5m	1.0m	1.5m	2.0m	2.5m	3.0m
F1.5m	0.28	0.52	1.24	1.94	2.22	2.54	2.92	2.54	2.22	1.94	1.24	0.52	0.28
F1.0m	0.10	0.26	0.79	2.17	4.66	5.40	5.94	5.40	4.66	2.17	0.79	0.26	0.10
F0.5m	0.09	0.30	0.16	0.32	3.65	15.16	24.35	15.16	3.65	0.32	0.16	0.30	0.09
0	0.15	0.20	1.00	1.96	-	-	ISO	-	-	1.96	1.00	0.20	0.15
R0.5m	0.03	0.04	0.04	0.04	-	-	28.81	-	-	0.04	0.04	0.04	0.03
R1.0m	0.03	0.04	0.05	0.08	2.55	5.86	7.10	5.86	2.55	0.08	0.05	0.04	0.03
R1.5m	0.03	0.05	0.18	1.04	2.24	2.72	2.98	2.72	2.24	1.04	0.18	0.05	0.03
R2.0m	0.05	0.21	0.66	0.92	1.46	1.61	1.65	1.61	1.46	0.92	0.66	0.21	0.05
R2.5m	0.14	0.42	0.46	0.85	1.00	1.03	1.08	1.03	1.00	0.85	0.46	0.42	0.14
R3.0m	0.20	0.20	0.36	0.43	0.46	0.48	0.48	0.48	0.46	0.43	0.36	0.20	0.20

µGy/Scar	Vertical - Body32												
	F3.0m	F2.5m	F2.0m	F1.5m	F1.0m	F0.5m	0	R0.5m	R1.0m	R1.5m	R2.0m	R2.5m	R3.0m
U1.5m	0.60	0.90	1.06	7.60	0.79	0.71	-	0.05	0.07	0.77	1.09	0.87	0.66
U1.0m	0.69	0.99	1.29	2.21	4.50	1.09	-	0.05	1.87	2.21	1.57	1.05	0.71
U0.5m	0.74	1.03	1.68	2.58	8.35	10.20	-	11.32	6.00	2.88	1.74	1.20	0.79
0	0.61	0.82	1.33	2.50	6.06	17.95	ISO	22.44	6.31	3.38	1.66	1.11	0.76
L0.5m	0.01	/	/	/	/	10.56	-	/	14.02	1.75	1.21	0.83	0.66

11 Network Requirements

11.1 Network Connections

The network requirements listed in this chapter should allow you to connect the system to:

- Hospital/facility networks
- Filming cameras
- PACS
- Workstations
- Patient Information Systems

11.1.1 Network Type

The systems require a broadband network connection.

11.1.2 Network Speed

The customer and the customer's IT contact should ensure that the site provides access to broadband using one of the following interface types:

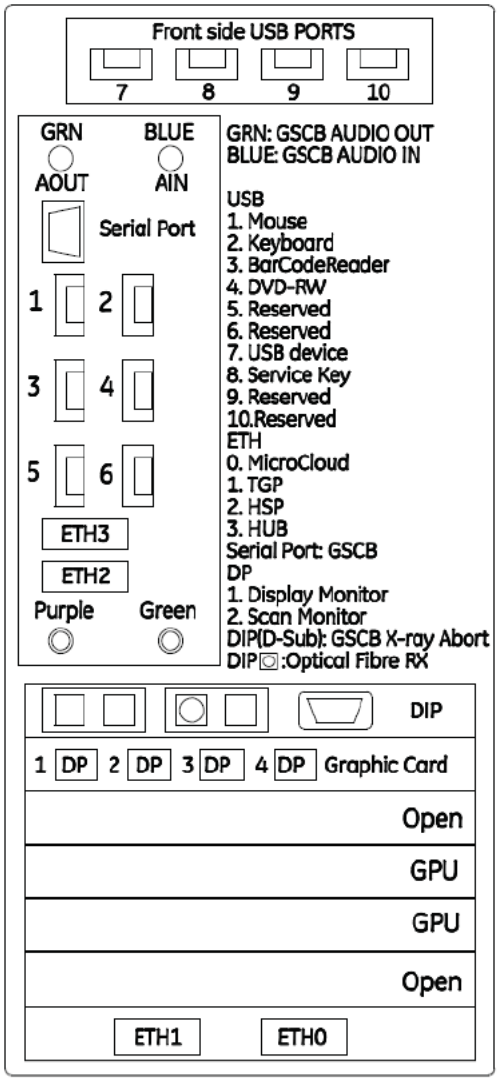
- 100BASE-TX (100 Mbit/s)
- 1000BASE-T (1000 Mbit/s [1 Gbit/s]).

11.1.3 Network Cable Routing

The CT system connects to the facility's network through the console. To enable proper network cabling, the customer and the customer's IT contact should:

- Provide an RJ45 wall outlet within 2 m (79 in.) of the console location.
- Provide a patch cable, not to exceed 3.05 m (10 ft), to connect the console to a wall box. (See Notes on Figure 13-2 Interconnection Runs on page 115)
- Complete any cable duct-work or conduit installation that the customer site-unit might require to route connecting network cables to the workstation, camera, and console.
- Ensure that the run from the hospital/facility switch to the CT wall outlet does not exceed 88 m (290 ft). Bandwidth performance degrades significantly when the length exceeds 91 m (300 ft).
- Use of STP (Shielded Twisted Pair) cable is not allowed.

Figure 11-1 OpenOC Console with Z8G4 Host Computer Rear



11.2 Customer Broadband Responsibilities

11.2.1 Contact GE to Find Zone Broadband Specialist

Contact your GE PMI to obtain the name of the zone broadband specialist who will:

- Work with the Customer Champion to complete any identified infrastructure changes.
- Provide IP addresses for new CT equipment.
- Provide a VPN compatible appliance that will support the IPSec tunneling protocol and 3DES data encryption.
- Utilize an Internet Service Provider that supports static routing.

11.2.2 Provide GE with IT Contact Information for the Site

Provide your GE PMI with an accurate site address, telephone number, contact name, and e-mail address for the customer IT contact who will:

- Coordinate VPN activities between Radiology/Cardiology and the Information Technology (IT) departments.
- Act as a focal point in assuring site broadband infrastructure meets GE requirements for connection, as determined by a mutual assessment with the GE connectivity team.
- Complete an equipment assessment with the GE connectivity team to determine site readiness for broadband.

11.3 Digital Service and Connectivity Requirements

11.3.1 Background

GE Healthcare provides digital service and asset management through its InSite Connectivity Platform.

InSite RSvP (Remote Service Platform) is the latest connectivity platform that will eventually replace the existing InSite 1 connectivity infrastructure in the system.

GE can proactively monitor the key operational parameters of your medical systems to provide early warning of potential issues to head off costly and unscheduled downtime. The GE online engineers can recalibrate key operational parameters to help ensure optimal system performance or can dispatch a field engineer to assist in mitigating the issue. Additionally, automated software downloads require reliable connectivity platform to ensure software updates and upgrades in a timely manner to keep the system working efficiently. Software downloads also significantly reduce the time it takes to upgrade your GE Healthcare devices, which means the scheduled system downtime and clinical workflow interruptions are greatly reduced.

The two major technical components of InSite RSvP are Agent and Server. The Agent is installed on the GE Healthcare equipment at the customer sites while the Server resides within GE Healthcare. The role of the Agent is to:

- monitor device performance data on an ongoing basis,
- establish secure communications to the Server via the Internet,

- and send fault information and log files to the Server

The Server uses the secure Web Services to communicate with the Agent. It processes the performance and fault information provided by the Agent.

11.3.2 InSite RSVP Connectivity Requirements

The Agent establishes connectivity from behind the safety of your corporate firewall, adhering to all the security policies set up by your network administrators. To your network, the Agent is just another computer on the LAN. To set up the InSite 2.0 Agent at your site, the only networking requirements are as follows:

1. A physical connection or a route to an existing enterprise LAN
2. Allow outbound Internet access for the device using HTTPS protocol over port 443

A GE Healthcare Field Engineer will configure network connections for InSite RSVP connectivity according to the site IT requirements.

Customer IT personal would need to ensure the following details to enable connectivity at install:

1. DNS IP Address or Proxy IP address and authentication information as applicable is made available when requested by the GE Field Engineer or Project manager of Installation
2. In case it is required to whitelist, only certain URLs being used by GE Healthcare, here is a list that could be used:
    2.1. Enterprise production: https://insite.gehealthcare.com:443
    2.2. Flexera URL: https://gehealthcare-ns.flexnetoperations.com

InSite RSVP utilizes existing the outbound broadband internet connection. It uses the Secure Sockets Layer (SSL) and complies with the existing firewall rules and Web proxies. Once the Agent has established a secure tunnel, the connection is visible only to InSite RSvP clients and services (applications or users)

NOTE
For GE HealthCare Personnel only:

1. If a customer is not able to provide the internet connection then GE HealthCare needs to provide the internet connection along with the required router device.
2. If a customer has GE HealthCare provided internet connection or has GE HealthCare provided router device running on the customer provided internet connection then consult the customer if the same set is to be used.

12 Power Requirements

Be sure to communicate all necessary information in this chapter to the electrical contractor employed at the installation site.

12.1 Introduction

NOTICE

Be sure to communicate all necessary information in this chapter to the electrical contractor employed at the installation site.

The Power Distribution Unit (PDU) supplied with the system transforms and distributes power to all system components. The PDU constitutes the only power entry point required to operate the system. To minimize voltage regulation effects, keep power wiring between the facility main distribution panel and the PDU as short as possible.

When routing the power wiring, all three-phase wires and ground must run in the same conduit or raceway duct. Route power wires separate from the system control and signal cables, using a separate conduit or trough in a raceway duct. You may use a metallic conduit, floor duct, or surface raceway for running cables, depending upon local codes and practices. However, ensure that cable passageways are large enough to install additional cables with all other cables already installed. Do not use non-metallic conduit.

12.2 System Input Power

12.2.1 Power Source Configuration

The system operates on a three-phase, solidly grounded four-wire wye or Delta power source. The neutral wire does not need to run to the system, (i.e., four-wire connection). If you are running a NEUTRAL wire, terminate it in the A1/MDP box.

A dedicated feeder from the nearest Main Distribution Panel (MDP) should supply power to the system. In accordance with the National Electric Code (U.S.) and similar applicable national and local codes, the site MUST provide a protective disconnect device with LOCK-OUT and TAG-OUT provisions in the power line supplying the PDU, and MUST locate the protective disconnect device within 10 m (32 ft) of the PDU, visible to PDU service personnel. The disconnect device appears as *A1/MDP* in the interconnection schematic diagrams.

12.2.2 Rating

The system operates on three-phase power that meets the following specifications:

- Voltage: 380 to 480 VAC
- Capacity: 150 kVA
- Frequency: 50 or 60 Hz ± 3 Hz
- Maximum power demand = 150 kVA @ 0.85 PF at a selected technique of 140 kV, 715 mA.

- Average (continuous) power demand at maximum duty cycle = 30 kVA.

The A1/MDP disconnect device referenced above must provide overcurrent protection for the system and have at least one Emergency Off switch within the scan suite, near the console. The preferred disconnect utilizes undervoltage release control, rather than shunt trip devices. The rating of the A1/MDP disconnect device depends on the nominal line voltage at the site. Refer to 12.3 Recommended Power Distribution System on page 103 for minimum rating requirements and suggested disconnect devices.

12.2.3 Regulation

Total load regulation, as measured at the PDU input terminals, must not exceed 6%. The capacity of the facility transformer and size and length of feeder wires directly affect the load regulation presented to the system. Refer to 12.3 Recommended Power Distribution System on page 103, for recommended single-unit installation specifics.

12.2.4 Phase Imbalance

The difference between the highest line-to-line voltage and lowest line-to-line voltage must not exceed 2% of the lowest line-to-line voltage.

12.2.5 Sags, Surges and Transients

Sags and surges of the power line must not exceed the absolute range limits shown in Table 12-1 Nominal Line Voltage Ranges on page 104. Limit maximum transient voltages to 1500 V peak.

12.2.6 Grounding

The customer's electrician needs to perform the following tasks:

- Bond metal conduit, raceway, or the armor of armored cable used to power the system to the PDU cabinet and to the A1/MDP Disconnect
- Run a dedicated 1/0 (50 mm^2) or larger insulated copper ground wire from the main distribution panel to the PDU with the phase wires.
- Run the ground wire with the three-phase wires from the power source to the A1/MDP Disconnect and from A1/MDP Disconnect to the PDU. Grounding does not require a neutral wire.

NOTE
The shield or armor of armored cable ALONE does NOT provide sufficient grounding.

Bond the ground wire to the intermediate distribution panels through which it passes in accordance with local codes. The resistance between the PDU ground and the facility earth ground must not exceed 0.5 ohm. In addition, the total resistance between the PDU ground and earth must not exceed 2 ohms. In addition:

- The facility ground for the CT system must originate at the system power source (i.e., transformer or first access point of power into the facility) and be continuous to the CT system A1/MDP Disconnect in the room.
- Main facility ground conductor to A1/MDP Disconnect must be appropriately sized insulated copper wire.
- Run a dedicated 1/0 (50 mm^2) or larger insulated copper ground wire from A1/MDP to PDU. The main facility ground to the A1/MDP Disconnect must meet local codes, in all cases the recommended ground wire is a 1/0 (50 mm^2) ground wire.

12.2.7 Potential Equalization Conductor (Reference IEC 60601-1-2 2014; 2020)

The voltage of a conductor or body to earth is called the “potential” of this conductor or body. The earth is electrically neutral and thus has the potential “zero”. The unit of measurement for the potential is volt. This terminal will be used for Option installation. Refer to each Option manual of instruction for use.

12.3 Recommended Power Distribution System

In all cases, qualified personnel must verify that the transformer and feeder (at the point of take-off) and the run to the CT system meet all the requirements stated in this document.

12.3.1 Using a Dedicated Distribution Transformer (Recommended)

The recommended power distribution system for a CT system is a dedicated feeder from the facility main isolation transformer. The minimum recommended transformer size for a dedicated distribution transformer provided for the system is 225kVA, rated 2.4% regulation at unity power factor. 12.3.3 System Power Requirements on page 104 shows the minimum recommended feeder size and overcurrent protection device based on line voltage for this configuration.

12.3.2 Using an Existing Distribution Transformer

If it proves necessary to power the system from an existing distribution transformer and secondary feeder, such as the equipment distribution panel of an X-ray department, avoid installation with other X-ray equipment that uses rapid film changers. These changers use a large number of high-powered, closely-spaced exposures, which may coincide with the CT scan and produce image artifacts.

12.3.3 System Power Requirements

Be sure that the site can meet all of the minimum power requirements listed below before installing the system:

- Maximum power demand = 150kVA @ 0.85 PF: at a Selected Technique of 140 kV, 715 mA.
- Continuous (average) power demand at maximum duty cycle = 30 kVA.
- Average power demand at maximum duty cycle = 10 kVA
- Maximum allowable total source regulation is 6%.
- Minimum recommended transformer size: 225 kVA, with 2.4% rated regulation at unity power factor. Resultant maximum allowable feeder regulation is 3.4%.

Table 12-1 Nominal Line Voltage Ranges

Nominal line voltage MUST fall within ONE of these ranges.						
Nominal Line Voltage [V]	380	400	420	440	460	480
Hi-Line Limit, +10% [V]	418	440	462	484	506	528
Lo-Line Limit, -10% [V]	342	360	378	396	414	432
Continuous Line Current [A]	38	36	34	33	31	30
Momentary Line Current [A]	228	217	206	197	188	180
Maximum Line Current [A]	253	241	229	219	209	200
Minimum Recommended Circuit Breaker [A]	150	150	150	125	125	125

Table 12-2 Minimum Feeder Wire Size

Feeder Length (MDA to A1/MDP) Meters (Feet)	**Minimum Feeder Wire Size, AWG or MCM (sq. mm)/VAC (Supplied by Customer)**					
	380VAC	**400VAC**	**420VAC**	**440VAC**	**460VAC**	**480VAC**
15 m (50 ft)	1/0 (50)	1/0 (50)	1/0 (50)	1 (35)	1 (35)	1 (35)
30 m (100 ft)	1/0 (50)	1/0 (50)	1/0 (50)	1 (35)	1 (35)	1 (35)
46 m (150 ft)	1/0 (50)	1/0 (50)	1/0 (50)	1 (35)	1 (35)	1 (35)
61 m (200 ft)	1/0 (50)	1/0 (50)	1/0 (50)	1 (35)	1 (35)	1 (35)
76 m (250 ft)	2/0 (70)	2/0 (70)	1/0 (50)	1/0 (50)	1 (35)	1 (35)
91 m (300 ft)	3/0 (95)	3/0 (95)	2/0 (70)	2/0 (70)	1/0 (50)	1/0 (50)
107 m (350 ft)	4/0 (120)	3/0 (95)	3/0 (95)	2/0 (70)	2/0 (70)	1/0 (50)
122 m (400 ft)	250 (120)	4/0 (120)	3/0 (95)	3/0 (95)	3/0 (95)	2/0 (70)

NOTE
According to length and voltage, select the appropriate wire size. The length should consider the actual total length of feeder and sub-feeder.

NOTE

In all cases the recommended ground wire is a 1/0 (50 mm^2) ground wire.

NOTE

If the wire size does not match the above lists, please select the nearest wire size as per to local standards.

Table 12-3 Minimum Sub-Feeder Wire Size

Sub-Feeder Length (A1/MDP to PDU) Meters (Feet)	Minimum Sub-Feeder Wire Size, AWG or MCM (sq. mm)/VAC (Supplied by Customer)					
	380VAC	400VAC	420VAC	440VAC	460VAC	480VAC
9.75 m (32 ft)	1/0 (50)	1/0 (50)	1/0 (50)	1 (35)	1 (35)	1 (35)

The information in Table 12-1 Nominal Line Voltage Ranges on page 104, Table 12-2 Minimum Feeder Wire Size on page 104, and Table 12-3 Minimum Sub-Feeder Wire Size on page 105 (above) assumes the use of copper wire, rated 75 C and run in steel conduit. All ampacity is determined in accordance with the National Electrical Code (NFPA 70), Table 310-16 (2002). The ampacity of the circuit protection device listed above determines the minimum feeder size, except where total source regulation limits require a larger size.

NOTICE

Power feeders running under the scan room floor, as well as power vault substations under the floor, above the scan suite, or in adjacent rooms, may cause excessive EMI fields. The responsibility for meeting all site EMI requirements rests with the customer.

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13 Interconnection Data

13.1 Introduction

The customer and the customer's electrical contractor should refer to the information in this section when establishing network and power interconnections for the system. Please note the following:

- Figure 13-2 Interconnection Runs on page 115 shows interconnection runs for a 50/60 Hz system.
- Table 13-1 Component Designators on page 107 shows component designators for supplied equipment and options and wall power outlets.
- Table 13-6 Runs 1, 2, 3, 4 and 5 Connections on page 113 lists customer-installed wiring and supplied cables. The actual length of each run is less than the length of supplied cables to allow for routing inside the equipment. Cable diameters and sizes of connectors are provided to aid in sizing conduit and access plates.
- 13.3.1 GE Supplied (Standard Length) on page 109 and 13.3.2 GE Supplied (Optional, Long Run) on page 110 list details for connection to the system and GE approved accessories using standard (short) length and non-standard (long) length cables, respectively. Details appear for the following types of runs, when appropriate:
  - Flush-floor duct
  - Computer floor
  - Through-wall bushing
  - Junction box
  - Surface floor duct
  - Through-floor duct
  - Wall duct
  - Conduit
- To minimize the need for additional junction boxes, use either a cable raceway system or a raised computer floor. Systems use prefabricated cables with large plugs. Therefore, try to avoid conduit or pipe for cable runs.

13.2 Component Designators

Table 13-1 Component Designators

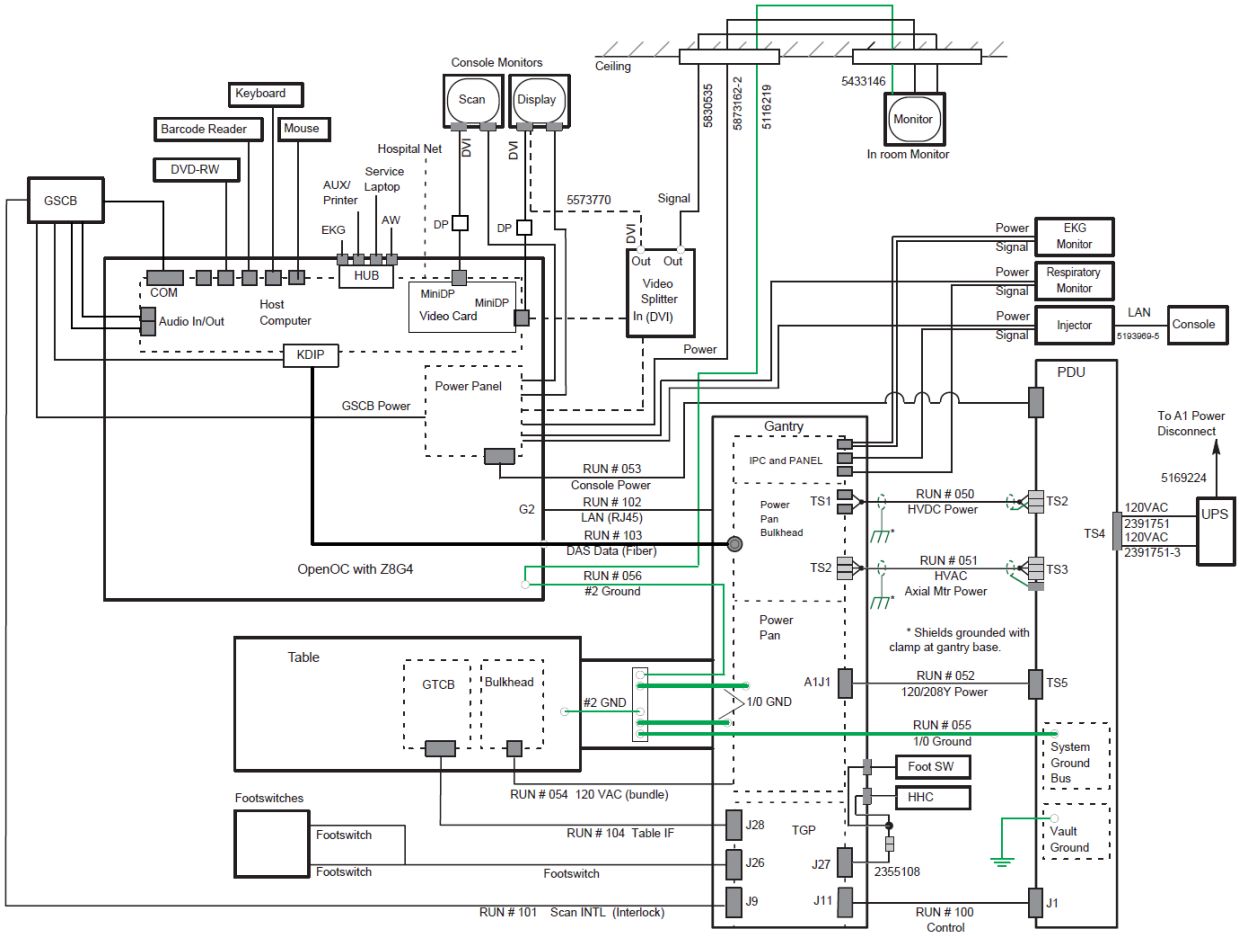
DESIGNATOR	APPLIES TO	SOURCE
A1	Primary power disconnect	**Contractor supplied**
MDP	Main distribution panel	**Contractor supplied**
CT1	Patient table	System
CT2	Gantry	System
OC1	Operator's console/computer	System
PDU	Power Distribution Unit	System
SEO	System emergency off	**Contractor supplied**
SM	Slave monitor	Option
WL	"X-ray on" warning light	**Contractor supplied**
DS	Door Interlock Switch	**Contractor supplied**

Table 13-1 Component Designators (Table continued)

DESIGNATOR	APPLIES TO	SOURCE
XCVR	Ethernet transceiver	System
BBNC	Broad-band network connection	**Contractor supplied**

13.3 Interconnect Runs, Wiring and Cables

Figure 13-1 System Interconnect Diagram with OpenOC Console with Z8G4



13.3.1 GE Supplied (Standard Length)

Table 13-2 GE Supplied Cables for OpenOC 16 Console with Simplified Powerpan (Standard Run) (5443710)- UL Information

Run #	Length,Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flam. Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
050	28 (20)	8.5 (6.1)	2343529-2	HVDC, PDU to Gantry	2587	FT4	600	+ & -350VDC	90	19 (0.751)	3	(2) 4 (1) 8	22 (0.87) Dia.
051	28 (20)	8.5 (6.1)	2343530-2	HVAC, PDU Axial Drive Power to Gantry	2587	FT4	600	440Y/254	90	15.3 (0.604)	4	14	11.2 (0.44) Dia.
052	28 (20)	8.5 (6.1)	2343528-4	LVAC, PDU to Gantry 120VAC Power	2587	FT4	600	208Y/120	90	13.8 (0.542)	5	8	56.4 (2.22) Dia.
053	65 (60)	19.8 (18.3)	2343531-2	LVAC, PDU to Console	2587	FT4	600	120VAC	90	12.3 (0.483)	3	10	56.4 (2.22) Dia.
055	28 (20)	8.5 (6.0)	2371450-2	Ground, PDU to Raceway	1284	VW-1 (FT-1)	600	0	105	15.5 (0.608)	1	1/0	15.8 (0.62) Dia.
056	68 (57)	20.8 (17.4)	2371450-4	Ground, Console to Raceway	1283	VW-1 (FT-1)	600	0	105	11.9 (0.467)	1	2	12.2 (0.48) Dia.
100	32.5 (20)	9.9 (6.1)	5120646-2	Signal, PDU Interface to Gantry TGPU J11		FT-4	300	<30VDC	80	11.2 (0.44)	25	22	17 x 58 (0.68 x 2.30) 19 x 51 (0.75 x 2.01)
101	71 (60)	21.7 (18.3)	5419981-2	Signal, Console to TGPU J9		FT-4	300	<30VDC	80	11.2 (0.44)	25	22	17 x 58 (0.68 x 2.30) 19 x 51 (0.75 x 2.01)
102	71 (63)	21.7 (19.3)	2373436-3	Signal (LAN), Gantry to OC			1900	<30VDC		5.9 (0.234)	8	24	15 (0.59) Dia.

Table 13-2 GE Supplied Cables for OpenOC 16 Console with Simplified Powerpan (Standard Run) (5443710)- UL Information (Table continued)

Run #	Length,Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flam. Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
103	68 (60)	20.7 (18.3)	5432019	Fiber Optic, Gantry to OC			N/A	N/A			1	N/A	10 (0.39) Dia

NOTE
For short cable kits GEHW Cat# is B75372CB, WSO Cat# is B7580GA.

13.3.2 GE Supplied (Optional, Long Run)

Table 13-3 GE Supplied Cables for OpenOC16 Console with Simplified Powerpan (Optional, Long Run) (5438124)- UL Information

Run #	Length,Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flam. Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
050	63 (55)	19.5 (16.8)	2343529	HVDC, PDU to Gantry	2587	FT4	600	+ & -350VDC	90	19 (0.751)	3	(2) 4 (1) 8	22 (0.87) Dia.
051	63 (55)	19.5 (16.8)	2343530	HVAC, PDU Axial Drive Power to Gantry	2587	FT4	600	440Y/254	90	15.3 (0.604)	4	14	11.2 (0.44) Dia.
052	63 (58)	19.5 (16.8)	2343528-3	LVAC, PDU to Gantry 120VAC Power	2587	FT4	600	208Y/120	90	13.8 (0.542)	5	8	56.4 (2.22) Dia.
053	80 (75)	24.5 (22.9)	2343531	LVAC, PDU to Console	2587	FT4	600	120VAC	90	12.3 (0.483)	3	10	56.4 (2.22) Dia.
055	63 (55)	19.5 (16.8)	2371450	Ground, PDU to raceway	1284	VW-1 (FT-1)	600	0	105	15.5 (0.608)	1	1/0	15.8 (0.62) Dia.
056	83 (75)	25.5 (22.9)	2371450-3	Ground, Raceway to console	1283	VW-1 (FT-1)	600	0	105	11.9 (0.467)	1	2	12.2 (0.48) Dia.

Table 13-3 GE Supplied Cables for OpenOC16 Console with Simplified Powerpan (Optional, Long Run) (5438124)- UL Information (Table continued)

Run #	Length,Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flam. Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
100	70 (62)	21.4 (18.9)	5120646	Signal, PDU Interface to Gantry TGPU J11		FT-4	300	<30VDC	80	11.2 (0.44)	25	22	17 x 58 (0.68 x 2.30) 19 x 51 (0.75 x 2.01)
101	86 (78)	26.4 (23.7)	5419981	Signal, Console to TGPU J9		FT-4	300	<30VDC	80	11.2 (0.44)	25	22	17 x 58 (0.68 x 2.30) 19 x 51 (0.75 x 2.01)
102	86 (81)	26.3 (24.9)	2373436-2	Signal (LAN), Gantry to OC			1900	<30VDC		5.9 (0.234)	8	24	15 (0.59) Dia.
103	80 (75)	24.5 (22.9)	5432019	Fiber Optic, Gantry to OC			N/A	N/A			1	N/A	10 (0.39) Dia

NOTE
For long cable kits GEHW Cat# is B75262CB, WSO Cat# is B7580GB.

13.3.3 GE Supplied Console Cables

Table 13-4 Supplied OpenOC16 Console Cables with Z8G4

PART#	DESCRIPTION	CONNECT TO	QUANTITY	LENGTH	
				MM	INCHES
5431909	Cable, USB_Extend	Keyboard	1	3500 ± 50	137.8 ± 1.97
5458346	Cable, USB_Extend	Mouse	1	3500 ± 50	137.8 ± 1.97
5408703-2	DP to DVI Cable, 3 meter	Scan Monitor	2	3000 ± 50	118.11 ± 1.97
5795077	Mini DP to DP Dongle	Monitor	2	250	9.8
5478299-6	Power Cable, Display monitor to Open Console	Display Monitor	1	3050 ± 50	120 ± 1.97
5478299-5	Power Cable, Scan monitor to Open Console	Scan Monitor	1	3050 ± 50	120 ± 1.97

13.3.4 GE Supplied (Cables of Options)

Table 13-5 GE Supplied Cables for Option - UL Information

Option	Length,Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flam. Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
Fluoro	75	22.9	2403438-3	5 BNC MALE TO HD 15 MALE 75 FEET	1015	FT4		1Vp-p	75	9.1 (0.358)	5	26	
	70	21.2	2213219	POWER CABLE FOR LCD-CONSOLE TO LCD		FT1	120	120VAC	105	9.3 (0.366)	3	14	
	71	21.5	5116219	Grounding Cable For LCD Console To LCD		VW-1	600	0V	105		1	8	
	15	4.6	2403438-4	HD 15 FEMALE TO HD 15 MALE 15 FEET				1Vp-p	60	8.0 (0.315)	5	26	
	1.3	0.4	2355108	JUMPER CABLE FOR ADAPTING 2286150 TO WORK WITH H-POWER MSUB							8	22	
UPS (B7999ZB/E4502KZ))	15	4.6	5817584	POWER CABLE for 2PH UPS, NGPDU TS4 to UPS TB1	E319545	FT2	600	208VAC		5.3 (0.2)		8	
	15	4.6	5817583	POWER CABLE for 2PH UPS, NGPDU TS4 to UPS TB1	E319545	FT2	600	208VAC		5.3 (0.2)		8	

Table 13-5 GE Supplied Cables for Option - UL Information (Table continued)

Option	Length,Actual (Usable)		Part #	Description	UL Cable Information								Pull Size mm (Inches)
	ft	m			UL Style	Flam. Rating	Voltage Rating	Voltage Actual	Temp. Rating (C)	Dia. mm (inch)	# of Cond	Size AWG	
	46	14	5817581	UPS CONTROL CABLE, A1 MDP TB1 to UPS	2464		600	120VAC		8 (0.3)		18	
Injector	100	30.5	5169456	Gantry to Injector	1007	VW-1	300	<30VDC	80	1.57 (0.062)	3	22	45 (1.78) Dia.
	8.2	2.5	5317258	Power Cable Injector to Console	62	VW-1	300	120VAC	60	9.4 (0.37)	3	14	36 (1.41) Dia
Cardiac	30	9.1	5198566	Gantry to EKG Monitor	2919	UL1685 UL Loading	30	<30VDC	80	6.45 (0.254)	6	24	37 (1.45) Dia
Adv 4D Resp	100	30.5	5199717	Gantry to RPM Unit	2464	FT4	300	<30VDC	80	6.6 (0.26)	4	22	37 (1.45) Dia

13.3.5 Contractor/Customer Supplied

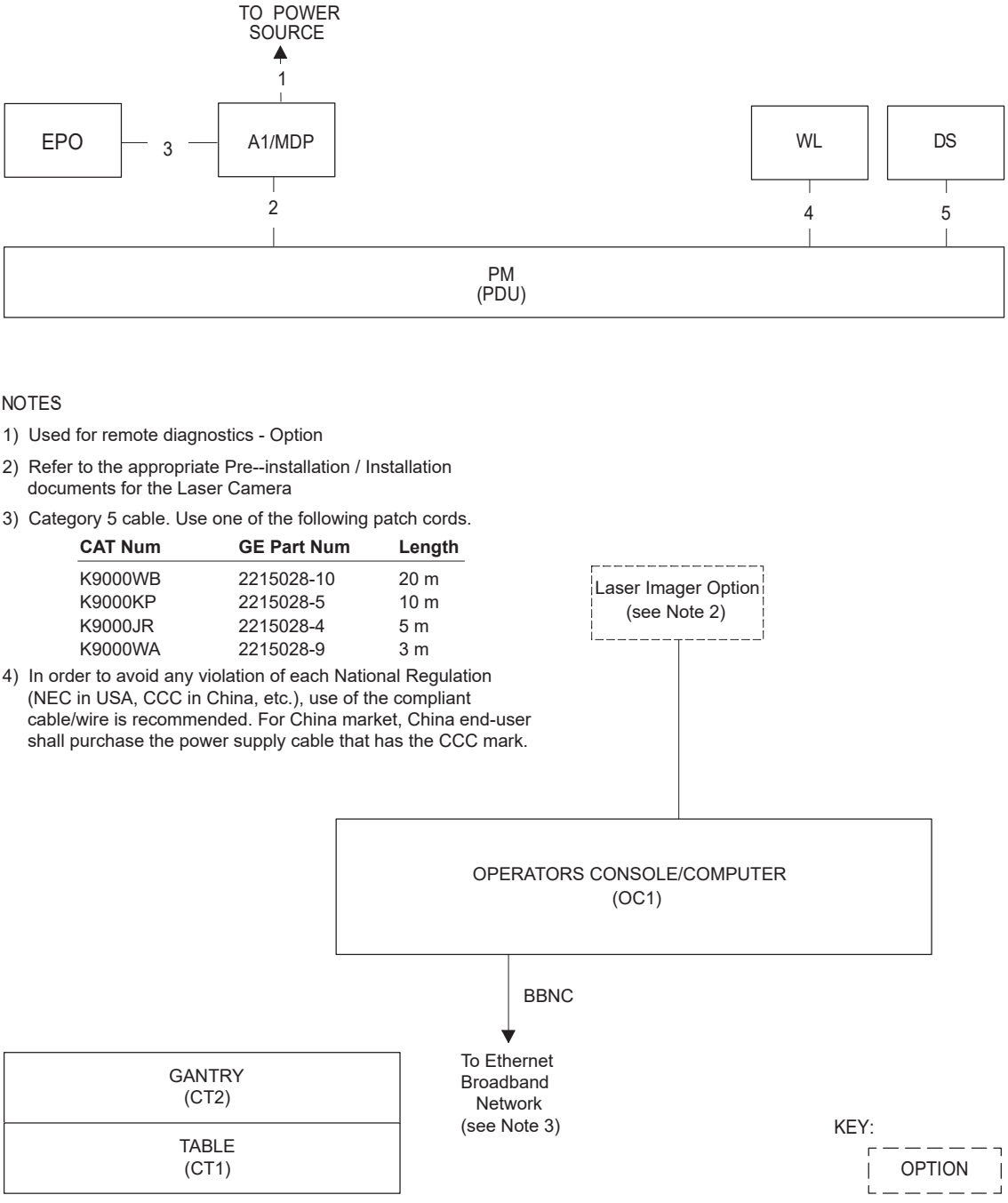
Table 13-6 Runs 1, 2, 3, 4 and 5 Connections

Customer Installed Wiring		Description	Cables Supplied			Plug Pulling Dimensions		Wire and Cable Pigtails ft. (m)	
Qty	Size AWG (mm^2)		Part No.	Length ft. (m)	Dia. in. (mm)	From	To	From	To
RUN NO. 1 FROM PRIMARY POWER SOURCE TO FACILITY DISCONNECT (POWER SOURCE - A1/MDP)									
NOTE The primary power ground to A1/MDP disconnect must meet local codes, in all cases the recommended ground wire is a 1/0 (50 mm^2) ground wire. Maximum Run Length *									
3	*	Power						3 (1)	3 (1)
1	1/0 (50)	Ground						3 (1)	3 (1)
RUN NO. 2 FROM FACILITY DISCONNECT TO POWER DISTRIBUTION UNIT (A1/MDP - PM)									
3	*	Power						3 (1)	3 (1)

Table 13-6 Runs 1, 2, 3, 4 and 5 Connections (Table continued)

Customer Installed Wiring		Description	Cables Supplied			Plug Pulling Dimensions		Wire and Cable Pigtails ft. (m)	
Qty	Size AWG (mm^2)		Part No.	Length ft. (m)	Dia. in. (mm)	From	To	From	To
1	1/0 (50)	Ground						3 (1)	3 (1)
1	*	Neutral						3 (1)	3 (1)
RUN NO. 3									
* FROM FACILITY DISCONNECT TO SYSTEM EMERGENCY OFF (A1/MDP - SEO)									
2	14 (2.5)	POWER						6 (2)	6 (2)
1	14 (2.5)	GROUND						6 (2)	6 (2)
* BEVCO PANEL - FROM FACILITY DISCONNECT TO SYSTEM EMERGENCY POWER OFF (A1/MDP - EPO)									
2	14 (2.5)	Partial UPS EPO Circuit						6 (2)	6 (2)
2	14 (2.5)	Facility Disconnect EPO Circuit						6 (2)	6 (2)
1	14 (2.5)	Ground						6 (2)	6 (2)
RUN NO. 4 POWER DISTRIBUTION UNIT TO WARNING LIGHT CONTROL (PM - WL)									
2	14 (2.5)	Warning Light 24 Volt Control A3J2-1,2,3,4							
RUN NO. 5 POWER DISTRIBUTION UNIT TO SCAN ROOM DOOR INTERLOCK (PM - DOOR SWITCH)									
2	14 (2.5)	Scan Room Door Inter Lock A3J6-1,2							
*	Refer to 12.3.3 System Power Requirements on page 104 for AWG (mm^2) wire sizes.								
RUN NO. n/a BBNC									
1	Customer Determined	Hospital Broadband Network Connection (Wall Jack: Placed on the wall behind the console.)							

Figure 13-2 Interconnection Runs



NOTES

1) Used for remote diagnostics - Option
2) Refer to the appropriate Pre--installation / Installation documents for the Laser Camera
3) Category 5 cable. Use one of the following patch cords.

CAT Num	GE Part Num	Length
K9000WB	2215028-10	20 m
K9000KP	2215028-5	10 m
K9000JR	2215028-4	5 m
K9000WA	2215028-9	3 m

4) In order to avoid any violation of each National Regulation (NEC in USA, CCC in China, etc.), use of the compliant cable/wire is recommended. For China market, China end-user shall purchase the power supply cable that has the CCC mark.

13.4 Contractor Supplied Components

Table 13-7 Contractor Supplied Components

Reference	Associated Equipment	Material/Labor Supplied by Customer Contractor	USA Vendor / CAT No. GE Catalog
A1/MDP 380 - 480V 50/60 Hz	Fusible Disconnect and Magnetic Contactor	3 Pole, 380V - 480V, Combination breaker with magnetic contactor. Includes control transformer, optional UPS interface, On/Off controls and auto-restart feature.	Recommend*1 • E4502BE (125A) • E4502BF (150A) • GEMS_CT_330 (European PDB) Optional remote operator control available from GE Supply, Cat# GESCTR0CS1
BBNC (required)	Broad-Band Network Connection	Broad-Band network connection wall jack, located within 1m (39inches) of Operator Console location, for internal hospital networking and InSite Broad-Band connectivity. Cabling to conform to facility's IT standards.	
	System Components	Reference the system installation drawings supplied by Installation Support Services within your geographic area.	
*1: Refer to 13.6 UPS Interconnect on page 117.			

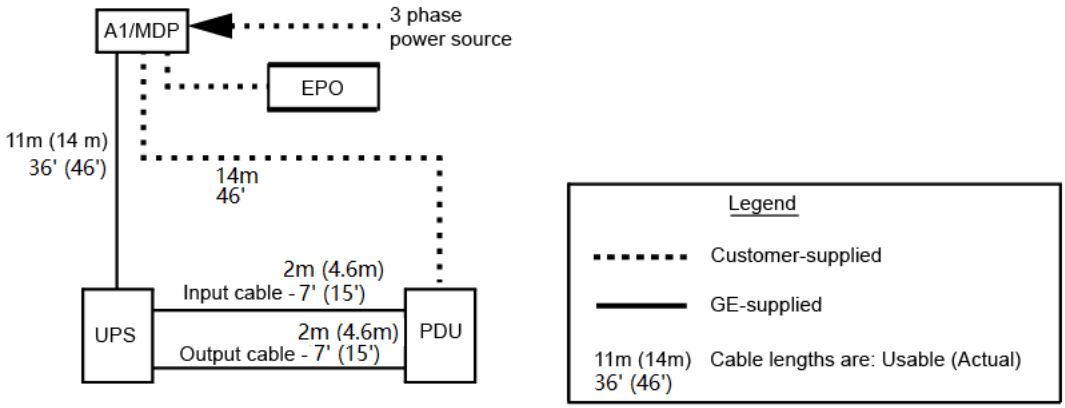
13.5 Fuse

Table 13-8 RT Fuse Kit (2218570-4 BOM, rev 8)

ITEM	NUMBER	QTY	FRU CODE	DESCRIPTION/NAME
1	2364059	1	Yes	GLASS FUSE
2	46-170021P50	1	Yes	FUSE 12 AMPS 250 VOLTS
4	46-170021P52	2	Yes	FUSE 3 AMPS 250 VOLTS
5	46-170021P31	2	Yes	1/2A, 250V SLO-BLO FUSE
8	2374694	2	Yes	8A TIME DELAY FUSES
11	5368105	1	Yes	1A Time_Delay fuse,10_4X38_1CLIP
13	5327448-2	2	Yes	PROTECTION FUSE, 2A, NA, FAST ACTION, 250V, HM FUSE,

13.6 UPS Interconnect

Figure 13-3 Typical UPS Interconnect



NOTICE

UPS Kits REQUIRES installation of one of the A1/MDP Panels listed below.

Table 13-9 Partial UPS Back-up Options

PDU Type & Model No.	Maximum Nom. kVA Rating	Required Main Disconnect (A1/MDP) Cat #		Optional Partial UPS Kit Cat #
		380-420V, 150A	440-480V, 125A	
NGPDU 2326492-61	150kVA	**E4502BF** (incl. Auto Restart & Integrated UPS Control)	**E4502BE** (incl. Auto Restart & Integrated UPS Control)	**B7999ZB / E4502KZ** (includes 5820687 Vertiv 10kVA, 2ph. UPS & hardware kit)

NOTE

Conduit is required between:

- A1/MDP and UPS
- UPS and PDU
- PDU and A1/MDP

13.7 Typical Customer Supplied Wiring

13.7.1 Primary Power Disconnect

Installing this system requires a Lockout/Tagout-compatible disconnect. If a UPS is required, a GE HealthCare Disconnect is strongly recommended for safe operation. The GE HealthCare disconnect and UPS are designed to work together. Details refer to DOC2058932 on SIMS Content Viewer. This is a restricted file, contact your PMI for specific questions or concerns.

13.7.2 Scan Room Warning Light and Door Interlock

Figure 13-4 TS6 X-Ray Warning Light Connections

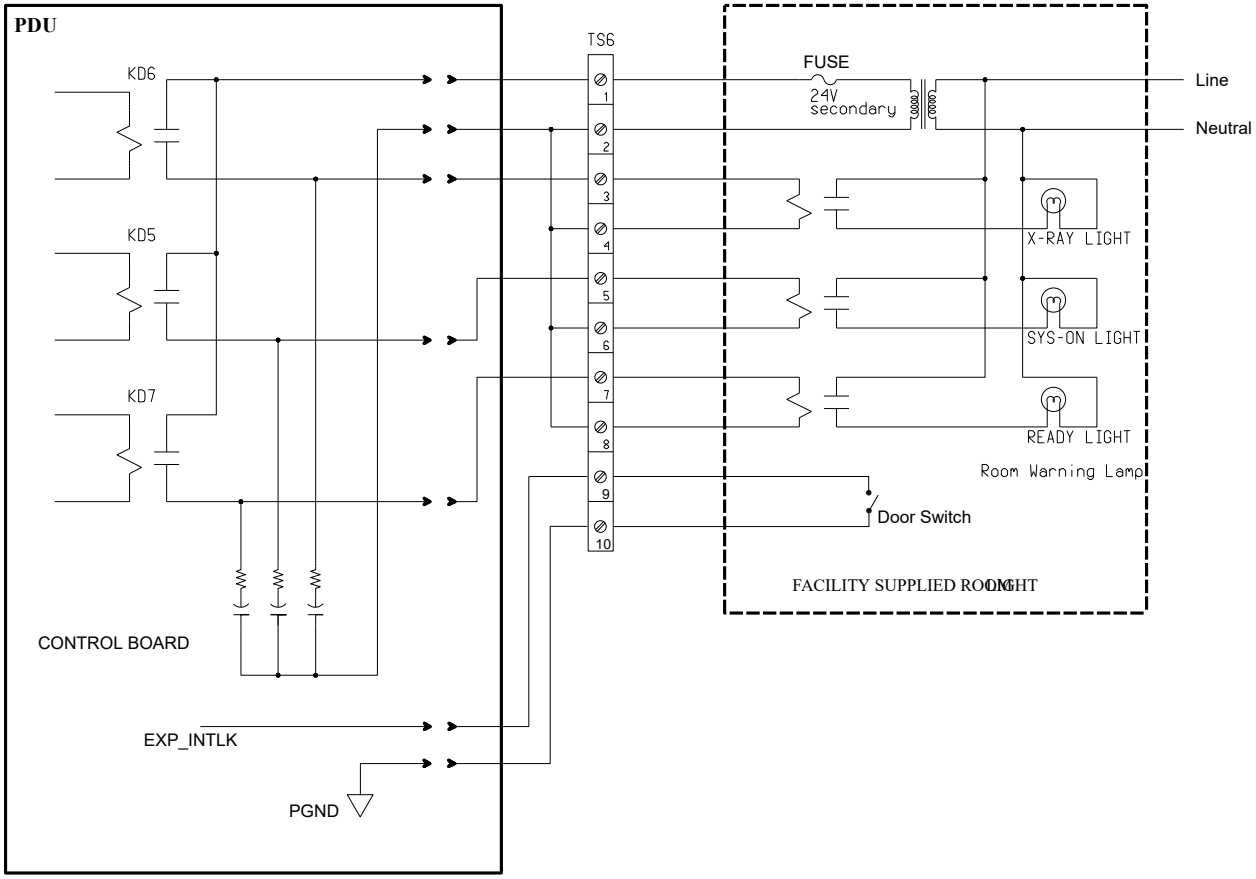
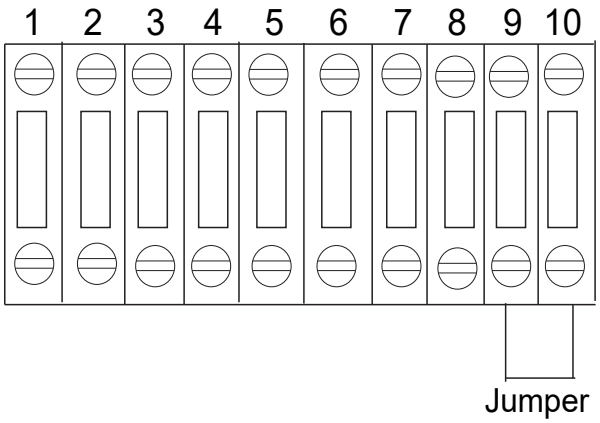


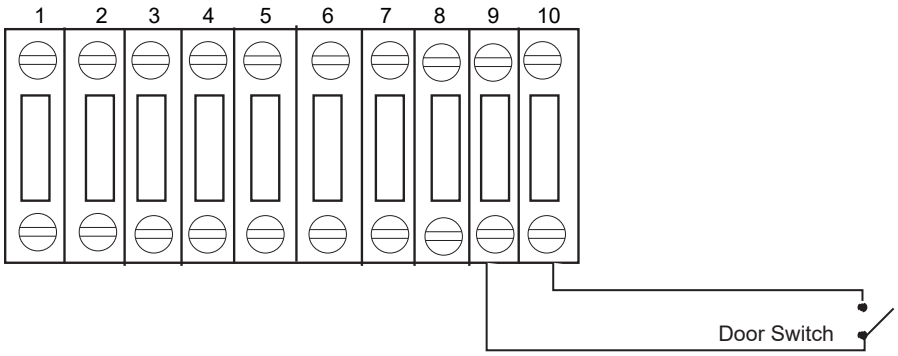
Figure 13-5 TS6 Room Door Interlock Connections - Without a Door Interlock



If not using a door switch, add a jumper.

If jumper is not in place, exposures will not be made. Check this jumper if you get scan interlock errors.

Figure 13-6 TS6 Room Door Interlock Connections - With a Door Interlock



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14 Delivery and Storage Requirements

This chapter provides information necessary for planning a safe and successful delivery of the system from GE HealthCare to the receiving area of the installation site, and from the receiving area of that facility to the scan suite.

14.1 Delivery Types and System Lifting and Rigging Restriction

⚠ DANGER

PERSONAL INJURY OR DEATH, EQUIPMENT DAMAGE. TIP HAZARD.

GANTRY IS VERY HEAVY AND MAY TIP OVER IF TILTED PAST 10 DEGREES.

WHEN TRANSPORTING A SYSTEM TO THE FINAL DESTINATION, DO NOT EXCEED TILT ANGLE EQUAL TO, OR GREATER THAN 10 DEGREES IN EITHER DIRECTION OF AXIS.

NOTE
The system shall never be lifted by the dollies.

Your Project Manager of Installation will determine the most appropriate means of transporting the system to your facility. However, the type of receiving area at the facility where the installation will occur determines, to a large extent, the method used to transport the system to that facility. When planning for delivery, facilities fall into two general categories: those with a loading dock, and those without a loading dock.

14.1.1 Loading Dock Deliveries

Facilities with a loading dock in their receiving area can generally accommodate delivery of the system by van. This is the preferred method of transporting the system to the installation site, as dock-to-dock shipment by van minimizes the possibility of dropping the gantry. Also, packing the CT system for van shipment involves minimum tear-down of components. This system is shipped Lean packed on pallets and dollies with approximately 10 units.

14.1.2 Ground (Non-Loading Dock) Deliveries

Facilities without a loading dock usually require ground delivery by either liftgate or appropriately sized forklift. Such deliveries require unloading the system components from the truck and then rolling them across smooth sidewalks or other paved surfaces into the facility.

14.1.2.1 Liftgate Truck

Delivery of the system by liftgate truck requires an appropriate capacity truck with a liftgate capable of lifting 3 tons. If using a rollback truck, the Project Manager of Installation should be on-site at the time of delivery to supervise this operation in person.

14.1.2.2 Tiltbed Truck - NOT Approved

Delivery of the system by tilt-bed truck is no longer an approved delivery method due to EHS safety risks of tipping the system over. If a loading dock is not available, then a Fork-lift truck shall instead be used.

14.1.2.3 Forklift Truck

NOTE
The tines on the fork truck need to be a minimum of 8' long in order to pick the gantry on the lifting skid past the center point of gravity.

A forklift can be used to unload the gantry, provided that the lifting option is ordered and delivered. The system will arrive with a lifting skid attached to the gantry and table. This option cannot be added later as an on-site addition.

14.1.2.4 Rigging

The CT gantry assemblies shall not be lifted by their dollies. The CT gantry assemblies shall not be transported across any surface by any means other than the dollies provided by GE HealthCare. The CT gantry assemblies have no lifting points on them and are not designed to be lifted by any special rigging attached to the gantry assemblies themselves.

⚠ DANGER

POSSIBLE SEVERE PERSONAL INJURY OR DEATH.

THE DOLLIES ARE NOT DESIGNED TO BE USED AS AN ATTACHMENT POINT FOR ANY METHOD OF LIFTING THE SUBSYSTEMS.

ATTACHING LIFTING STRAPS, CABLES OR MECHANISMS TO THE DOLLY HANDLES OR ANY OTHER PART OF THE DOLLY IS STRICTLY PROHIBITED.

NOTICE

If it is determined that the subsystems must be lifted by crane or other lifting method the PM or person responsible for local siting of the system shall NOT proceed with the installation without consulting directly with GE HealthCare Engineering.

Lifting the subsystems by crane or other lifting method should always be avoided. All alternate methods of delivery should be evaluated including the removal of any obstructions, doorways, walls, and windows.

If lifting is still required:

1. The entire gantry assembly and both gantry transport side dollies must be placed on a lifting platform. GE HealthCare does not provide a lifting platform.

   NOTE
   If the platform has limited space, the gantry transport side dollies may be removed during the lift. Once the lift is completed, the gantry transport side dollies must be installed back on the gantry assembly.

2. The entire patient table must be on its dollies and lifted while sitting on a lifting platform.

The patient table on its dolly shall be lowered to its transport position so the table base is in contact with the platform.

3. The platform must be designed so no lifting straps or cables come in contact with any part of the gantry or table subsystems or its side dollies.
4. The lifting platform shall bear the entire load. No part of the subsystem shall bear any load during the lift.

NOTE
If delivery requires vertical or horizontal lifting, the PM needs to add the necessary identifier to the order.

14.2 Delivery to the Scan Suite

Once at the installation site, conveyance of the system into the scan suite may involve special considerations, such as vertical lifting, or transportation though stairwells, which involves additional planning by the Project Manager of Installation.

14.2.1 Packing Dimension

Table 14-1 Packing Dimension

SubSystem	Length mm (in.)	Width mm (in.)	Height mm (in.)
Gantry	2620 mm (103 in.)	1370 mm (54 in.)	2270 mm (89.4 in.)
Table	3200 mm (126 in.)	900 mm (35 in.)	1360 mm (53.5 in.)
PDU	900 mm (35 in.)	700 mm (27.6 in.)	1230 mm (48.4 in.)
Open Console	920 mm (36.2 in.)	590 mm (23.2 in.)	770 mm (30.3 in.)

14.2.2 Lifting

Both vertical and horizontal lifting require professional riggers.

If delivery requires horizontal lifting, the PMI should contact with CT engineering team with installation concession.

If delivery requires vertical lifting and deviates from the requirement outlined in the PIM then engineering must be contacted for approval.

14.2.2.1 Stairway Deliveries

Stairways with angles at or less than 45 degrees can accommodate delivery of system components. If the site requires delivery through stairwells, the PMI adds the appropriate identifier to the order to ensure proper packaging of the system, and notifies CT engineering before attempting the procedure. The components ship attached to special lifting skids with lifting instruction for riggers.

14.2.3 Floor Protection

GE recommends floor protection along the delivery path from the dock/receiving area to scan room.

14.2.4 Un-loading and un-packing the System

Retain the packaging surrounding the following components:

- Console-Shipped on a shock resistant skid. Do not remove the skid.
- UPS-Shipped on a shock resistant skid. Do not remove the skid.

14.3 Dollies

14.3.1 Installations within the United States

Typically, domestic shipments (shipments within the United States) involve the use of dollies for moving the gantry, table, and console. After completing installation, return the dollies to GE using the shipping document found in Box #1.

14.3.2 Zero Clearance Dollies

Deliveries involving small elevators with a depth of at least 2692 mm (106 in.) require zero clearance dollies. Zero clearance dollies allow movement of the gantry in tight areas; avoid using them for normal dock or van deliveries. To order zero clearance dollies, go to: http://www.umi-dollyshop.com.

14.3.3 Tilting Table Dollies

Deliveries involving small elevators with a depth of at least 2438 mm (96 in.) require tilting table dollies. If storing the system prior to installation, do not order tilt dollies. If you are unable to obtain tilt dollies for delivery, substitute riggers in their place. A limited number of tilt dollies exist for U.S. deliveries. To order tilt dollies, go to: http://www.umi-dollyshop.com.

14.3.4 Installations Outside of the United States

Customers may purchase dollies (B82392DA) for shipments outside of the United States. After removing the system from the crates, DO NOT return dollies shipped outside of the US to GE Healthcare in Milwaukee, WI, USA. Instead, forward them to the local GE office or warehouse.

Zero Clearance and Tilting Table dollies can be purchased through UMI, To buy tilt dollies, go to: http://www.umi-dollyshop.com.

14.4 Gantry Delivery Considerations

14.4.1 Gantry Shipping State

The gantry is shipped with most covers installed, and the assembly is mounted between two dollies. Two side rails are bolted to the dollies to stabilize dollies and protect the gantry. Use the dolly elevating casters to lift the gantry off its base and roll it into position.

Gantry with LightWeight dollies, see Figure 14-1 Gantry with LightWeight Dollies on page 125.

Figure 14-1 Gantry with LightWeight Dollies

Gantry with heavy dollies, see Figure 14-2 Gantry with Heavy Dollies (example) on page 125.

Figure 14-2 Gantry with Heavy Dollies (example)

14.4.2 Door Openings

Unobstructed door openings, for moving equipment into the building, must measure 1067 mm X 2083 mm (42 in. X 82 in.) minimum. Routing through corridors with a width of 2800 mm (9 ft.) also prove helpful.

There are 4 options of Gantry considerations for delivery the system, all of them are fit with the minimum requirement. please consider the situation in fact:

NOTE
Option **1)** and **2)**, we define the gantry as the primary point, so the corridor must be fit with gantry.

Option **3)** and **4)**, we define the corridor as the primary point, use a reference and fixed data of corridor.

1. 42" door with 120" corridor (dollies on, side rails removed)
2. 52" door with 125" corridor (dollies on, side rails on)
3. 55" door with 96" corridor (dollies on, side rails removed)
4. 68" door with 96" corridor (dollies on, side rails on)

If you cannot meet the above specifications on side, you can order the Zero clearance dollies from http://www.umi-dollyshop.com.

14.4.3 Elevator Requirements

When moving the gantry from the receiving location to the scanning room, pay special attention to elevator size and capacity. Removing side rails and one dolly after placing the gantry in the elevator reduces the gantry width/length and elevator depth requirements.

Due to gantry component weight differences all weights listed below are averages. This change can measure ±18.14 kg (±40 lb). Contact the elevator manufacturer if the gantry weight exceeds elevator capacity (see Table 14-2 Size of Gantry & Dollies, with and without Side Rails on page 126).

Table 14-2 Size of Gantry & Dollies, with and without Side Rails

Configuration	Length	Width	Height	Weight
Dollies On, Side Rails On	3170 mm (124.8 in.)	1290 mm (50.8 in.)	1969 mm - 2306 mm (77.5 in. - 90.8 in.) **NOTE** Dolly Height can adjust in this range.	2064 kg (4550 lb) (LightWeight Gantry Dolly) 2262kg (4987 lb) (Heavy Gantry Dolly)
Dollies On, Side Rails Removed	3170 mm (124.8 in.)	1023 mm (40.3 in.)	1969 mm - 2306 mm (77.5 in. - 90.8 in.) **NOTE** Dolly Height can adjust in this range.	2038 kg (4493 lb) (LightWeight Gantry Dolly) 2236 kg (4929.5 lb) (Heavy Gantry Dolly)
Dollies Off, Covers Off	2336 mm (92 in.)	894 mm (35.2 in.)	1937 mm (76.3 in.)	1670 kg (3681.7 lb)

The minimum hallway and door size is for a gantry with covers and dollies attached, but side rails removed. For alternative lifting arrangements and instructions, contact GE HealthCare Installation Support Services.

14.5 Table Delivery Considerations

The table is shipped without side covers installed. Covers are shipped in separate boxes. The table is mounted between two dollies.

Table 14-3 Table Dimensions with Dollies

	Length		Width		Height		Weight	
	mm	in	mm	in	mm	in	kg	lb
GT1700	2370	93.3	650	25.6	991	39	537	1184
High Capacity Table	2997	118	650	25.6	991	39	569	1254.4

Table 14-4 Table Tilting Dollies Dimensions

	Length		Width		Height		Weight	
	mm	in	mm	in	mm	in	kg	lb
High Capacity Table Tilting	762	30	762	30	889	35	136	300
GT1700 Tilting	762	30	762	30	889	35	132	291

Table 14-5 Table Elevator Delivery Dimensions

	Length		Width		Height		Weight	
	mm	in	mm	in	mm	in	kg	lb
High Capacity Table - Tilting (approx. dimensions)	2489~2921	98~115	660	26	1778~2032	70~80	636	1400
GT1700	2489	98	762	30	1143	45	602	1325

14.6 Console Delivery Considerations

Open Console:

The console is open chassis console without covers installed.

The dimensions of the console alone (as shipped) measure: 671 mm (26.4 in.) deep, 400 mm (15.7 in.) wide, and 576 mm (22.7 in.) high.

14.7 Storage Requirements

NOTICE

Failure to adhere to storage requirements can result in equipment damage.

14.7.1 Short-term Storage (Less than Six Months)

If storing the CT system before installation for less than six months, store it in a temperature- and humidity-controlled warehouse. Protect it from weather, dirt, and dust.Meeting the following requirements prevents rust and corrosion from forming on bearing surfaces due to condensation:

- Storage temperature should not exceed 0° to 30° C (32° to 86° F).
- Maintain relative humidity (non-condensing) up to 70%.
- Maximum rate of relative humidity change measures 5%/hr.
- Maximum rate of temperature change measures 3° C/hr. (5° F/hr.)

NOTICE

Between delivery qualifies as short-term storage. Van storage must meet the same specifications listed above.

14.7.2 Construction-Site Storage

When storing the CT system at a construction site be sure to adhere to the following storage requirements:

- Do not damage or puncture the shipping crate.
- Do not remove packaging until all construction is completed at the site and all dust created by the construction is removed.
- Maintain a storage temperature within the range of 10° to 32° C (50° to 90° F).
- Maintain a relative humidity (non-condensing) between 20% and 70%.

14.8 Extreme Temperature Delivery and Storage

⚠ CAUTION

Failure to adhere to extreme temperature requirements during delivery and storage can result in equipment damage.

Avoid extreme temperatures during system transportation and delivery.

Extreme temperatures consist of temperatures below -18° C (0° F), or above 49° C (120° F), without humidity control.

When transporting the CT system, prevent extended exposure of the system to temperatures or humidity outside of the following specifications:

- Up to two weeks duration
- Temperature: -40° to +70° C (-40° to +158° F)
- Humidity: 10% to 100%, including condensing
- Altitude: -549m to 5486m (-1,800ft to 18,000ft)

NOTICE

Component freezing occurs when exposing the CT system to temperatures below -18° C (0° F) for a period longer than two (2) days. Allow a minimum of 12 hours for the CT system to adjust to ambient room temperature prior to installation.

15 Handling Requirements

Communicate the information in this chapter to any personnel who will transport, move, or otherwise handle the system components during transportation and delivery of the system.

15.1 Transportation

To avoid dropping the gantry, it is recommended that the system is transported from GE to the facility of the installation site, shipping dock-to-dock in a van. However, facilities without a loading dock may transport the system using liftgate or flatbed trucks, provided that no dropping or mis-handling of the system occurs. These methods involve unloading system components from the truck and then rolling them across SMOOTH sidewalks or other paved surfaces.

15.2 Handling Requirements

The design of the system does not tolerate dropping, shock, vibration, tipping, or hoisting. Be sure to communicate these handling requirements to all parties involved in transporting, moving, and handling system components.

15.2.1 Avoid Dropping

Never drop the gantry, console, table, or PDU. A drop from a height greater than 13 mm (0.5 in.) may cause structural damage to the frame or other major components. Damage resulting from a drop (e.g., bent frame, misalignment) may not become apparent until after the system is installed.

15.2.2 Avoid Shocks and Vibrations

The design of the system, including the gantry, console, table, and PDU, does not tolerate excessive shock or vibration, which may occur during unloading. For example, rolling the console across a "washboard" style ramp may vibrate components, causing loose or broken connections. Damage resulting from shock or vibration (e.g., monitor, CD-ROM, hard-drive, or console failure) may not become evident until after the system is installed.

15.2.3 Avoid Tipping

All system components must remain upright at all times; avoid tipping them. Move the gantry by rolling it on its dollies ONLY, do NOT hoist it. Avoid tipping or lifting the gantry when moving it through hallways, doorways, elevators, etc.

NOTICE

Lifting the gantry requires engineering approval for each occurrence. Your GE PMI should contact CT Engineering for all special lifting requirements, as unauthorized gantry lifting can cause gantry bearing damage.

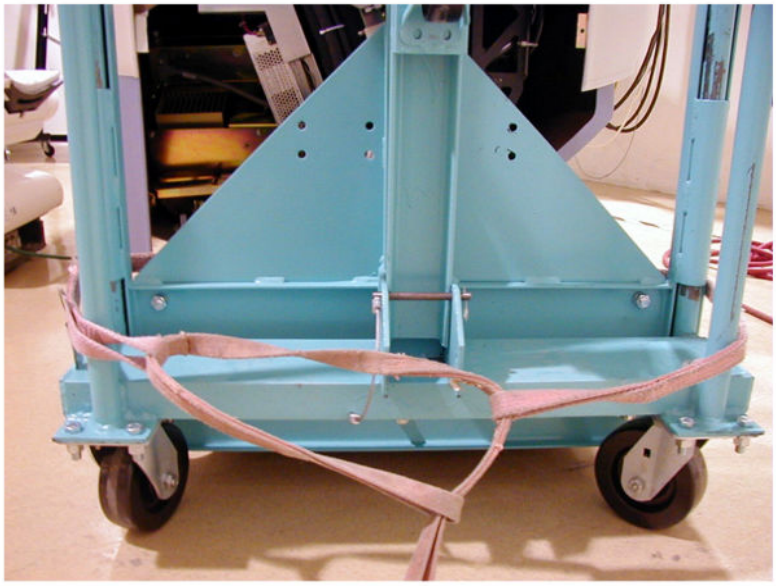
15.2.4 Flat-bed Truck Removal (NOT Approved Tilting)

Flat-bed Truck Removalwrecker, attach the straps to the LOWEST possible point on the dolly, and lower the gantry at the SLOWEST reasonable rate, (see Figure 15-1 Proper Gantry Strap Location on page 130).

⚠ CAUTION

Tilt-bed truck is no longer an approved delivery methods. It is allowed to use a tilt-bed truck (tilt disabled) as a flatbed truck and use a forklift or crane to unload a system.

Figure 15-1 Proper Gantry Strap Location



⚠ WARNING

SOME ASSEMBLIES MAY BE TOP-HEAVY. BE CAREFUL NOT TO TIP!

A Regulatory Clearances for US

A.1 Regulations

Review all codes in your area prior to your installation date. US customers should consider these codes:

- 29 CFR 1910 (OSHA)
- NFPA 70E (Standard for Electrical Safety in the Workplace)
- NFPA 101 (Life Safety Code)
- Americans with Disabilities Act

NOTICE

All systems installed within the United States and United States territories, and within United States government facilities, regardless of country, must comply with all United States Federal and local regulations. All systems installed outside the United States must comply with either the national, state, or local regulatory clearance requirements for the country in which the installation occurs, or US Federal regulations, whichever is greater.

A.2 Clearance Requirements

A map of clearance requirements necessary for proper operation and serviing of the system is provided in section *Service Clearance Requirements*. This is for standard layout in the suggested room size. Refer to the appendix for alternate layouts and room configurations.

NOTICE

The maps and dimensions shown in this manual depict the required clearances for proper equipment operation and service only. The purchaser is responsible for federal, state, and local codes regarding facility egress and related facility requirements. The use of alternate layouts puts severe limitations on space for patient care and work flow. Customer approval of site drawings signifies customer agreement to these limitations.

A.3 Minimum Regulatory Workspace Clearances by Major Subsystem

Note the following when referring to the tables below:

- These requirements apply to equipment operating at 600 V or less, where examination, adjustment, servicing, or maintenance is likely to be performed with live parts exposed.

- The customer MUST maintain the required regulatory clearance distances and may NOT use these area for storage. This applies during normal system operation as well as during service inspection and maintenance.
- Direction of Service Access refers to a direction perpendicular to the surface of the equipment serviced.

Table A-1 CONSOLE – Minimum Workspace Clearances

Workspace Requirement	Minimum Clear Space	Additional Conditions
Direction of Service Access (front and rear of console)	Not applicable. (no exposed live part hazards.)	
Service Access Width (front and back of work-space)		Refers to the width of the working space in front of equipment. 762 mm (30 in) minimum or the equipment width, whichever is greater.
Head Clearance	1981 mm (78 in.)	Refers to the height of the work-space measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in) or the height of the equipment, whichever is greater.

NOTE
Distances are measured to the finished covers.

Table A-2 PDU — Minimum Workspace Clearances

Workspace Requirement	Minimum Clear Space	Additional Conditions
Direction of Service Access (Front of PDU)	914 mm (36 in.)	1219 mm (48 in) if exposed live parts of 151-600 Volts are present on both sides of the work-space with the operator between. 1067 mm (42 in) if the opposite wall is grounded and exposed live parts of 151-600 Volts are present.
Service Access Width (Front of Work-space)	762 mm (30 in.)	Refers to the width of the working space in front of equipment. 762 mm (30 in) minimum or the equipment width, whichever is greater.
Head Clearance	1981 mm (78 in.)	Refers to the height of the work-space measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in) or the height of the equipment, whichever is greater.

NOTE
For the Gantry and Table, distances are measured from the finished covers.

Table A-3 GANTRY – Minimum Workspace Clearances

Workspace Requirement	Minimum Clear Space	Additional Conditions
Direction of Service Access (All Sides)	914 mm (36 in.)	1219 mm (48 in), if exposed live parts of 151-600 V are present on both sides of the work-space with the operator between. 1067 mm (42 in), if the opposite wall is grounded and exposed live parts of 151-600 V are present.
Service Access Width (Left-Right of Workspace)	762 mm (30 in.)	Refers to the width of the working space in front of equipment. 762 mm (30 in) minimum or the equipment width, whichever is greater.
Head Clearance	1981 mm (78 in.)	Refers to the height of the work-space measured from the floor at the front edge of the equipment to the ceililng or any overhead obstructions. 1981 mm (78 in) of the height of the equipment, whichever is greater.

Table A-4 TABLE – Minimum Workspace Clearances

Workspace Requirement	Minimum Clear Space	Additional Conditions
Direction of Service Access (Table Head)	not applicable	
Direction of Service Access (Table Sides)	914 mm (36 in.)	Can be reduced to 711 mm (28 in) provided the local team obtains written and signed approval from the local AHJ (Authority Having Jurisdiction). GE must have the signed document on file.
Direction of Service Access (Table Foot)	711 mm (28 in.)	457 mm (18 in.) minimum for Front Gantry Cover removal, only if an unobstructed egress space of 711 mm (28 in.) exists around the equipment for room exit, and no trip hazards exist along the path of egress.
Service Access Width (Left-Right of Workspace)	762 mm (30 in.)	Refers to the width of working space in front of equipment. 762 mm (30 in) minimum or the equipment width, whichever is greater.
Head Clearance	1981 mm (78 in.)	Refers to the height of the work-space measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in) minimum or the equipment height, whichever is greater.

Table A-5 UPS – Minimum Workspace Clearances

Workspace Requirement	Minimum Clear Space	Additional Conditions
Direction of Service Access (Front of UPS)	914 mm (36 in.)	There are no exposed live part hazards with the cover in place. This component is typically serviced from the front with access to the rear. * If exposed live parts of 151 - 600 volts are present, 1219 mm (48 in.) is required on both sides of the workspace with the opera-tor between. * If the opposite wall is grounded and exposed live parts of 151 - 600 volts are present, 1067 mm (42 in.) is required.
Service Access Width (Left-Right of Workspace)	762 mm (30 in.)	Refers to the width of working space in front of equipment. 762 mm (30 in.) minimum or the equipment width, whichever is greater.

Table A-5 UPS – Minimum Workspace Clearances (Table continued)

Workspace Requirement	Minimum Clear Space	Additional Conditions
Head Clearance	1981 mm (78 in.)	Refers to the height of the work-space measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in) minimum or the equipment height, whichever is greater.

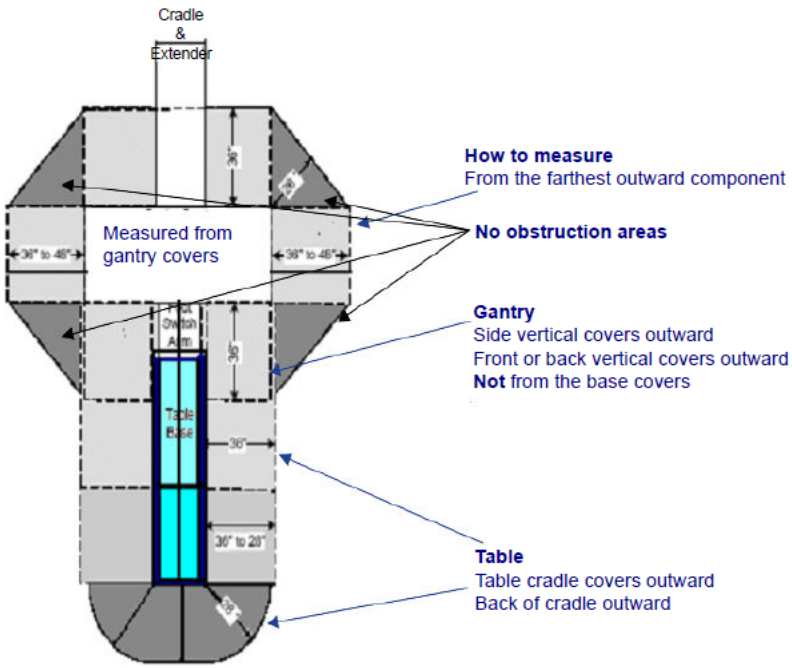
Table A-6 A1/MDP – Minimum Workspace Clearances

Workspace Requirement	Minimum Clear Space	Additional Conditions
Direction of Service Access (Front of A1/MDP Disconnect)	914 mm (36 in.)	There are no exposed live part hazards with the cover in place. This component is typically serviced from the front with access to the rear. * If exposed live parts of 151 - 600 volts are present, 1219 mm (48 in.) is required on both sides of the workspace with the opera-tor between. * If the opposite wall is grounded and exposed live parts of 151 - 600 volts are present, 1067 mm (42 in.) is required.
Service Access Width (Left-Right of Workspace)	762 mm (30 in.)	Refers to the width of working space in front of equipment. 762 mm (30 in.) minimum or the equipment width, whichever is greater.
Head Clearance	1981 mm (78 in.)	Refers to the height of the work-space measured from the floor at the front edge of the equipment to the ceiling or any overhead obstructions. 1981 mm (78 in) minimum or the equipment height, whichever is greater.

A.4 How to Measure

Figure below offers guidance on the proper way to measure to check minimum regulatory clearances.

Figure A-1 Measuring Minimum Regulatory Clearances



⚠ CAUTION

REGULATORY CAUTION

All system installations, relocations, and moves, require site prints. The CT room layout shall match the layout shown on your site print and meet all regulatory requirements described in the installation manual. Additional room components, such as cabinets and sinks, reduce room size. Consequently, equipment not shown on the site print may void the caution statement, making the room NON-COMPLIANT. Actual site measurements obtained by the mechanical installer before installation determines room size and compliance.

⚠ CAUTION

OPERATIONAL CAUTION

In the minimum room layout (356 mm to 686 mm [14 in. to 27 in.]) the customer should consider workflow, customer access for patient care, and critical-care operations space requirements. Additionally, this layout may offer only limited equipment access on the gantry left side when loading patients or when positioning patient equipment in the room between the gantry and the wall.

A.5 NEC Conduit and Duct Fill Rate

Full operation, service, and safety of the system requires the maintenance of sufficient regulatory and service clearances around equipment.

Cable length is an important consideration in room layout. The system ships with standard (short) length cables, with a set of longer cables available as an option. Refer to the electrical page of your GE site print for the specific requirements of your site. The following rules govern cable usage for the system:

- When possible, use the rear cable cover assembly to let cables enter the gantry from the rear.
- Do not cut or otherwise shorten long cables.
- Do not store excess cable length behind the operator console, gantry, or PDU.
- Store excess cable in wall or floor ducts, if desired, provided that sufficient space exists. Refer to NEC code to determine cable fill rates for conduits and ducts.
- All installed systems shall comply with NFPA 70-E Electrical Regulations governing conduit or duct fill.

B Alternate Cover Removal Options

B.1 Overview

The room dimensions and clearance dimensions shown in this manual assume a room configuration in which the front and rear gantry covers are removed and stored straight back/ forward from the gantry. However, not all room configurations are the same, meaning covers can be stored in other available spaces. For example, some rooms are long and skinny, while other rooms are short and wide. Some rooms may have a support column in the way, while other rooms have an adjacent room to store the gantry covers. For this reason, some alternative cover removal options for different room configurations are presented in this appendix.

B.2 Front Cover Removal

Rather than storing the front cover straight forward from the gantry at the foot of the table, the cover can be moved and stored on the right or left side of the table if there is space available while still maintaining service access to the table. Additionally, the cover can be moved out of the scan room to a temporary storage location.

The standard procedure for removing the front cover is with the table all the way down. A second method for front cover removal is with the table partially raised and the IMS moved into the bore of the gantry by table service switch. Under this method, the minimum length of the room can be reduced.

NOTICE

A room size that utilizes the table-up cover removal method has severe limitations in space for patient care and work flow. The map and dimensions shown in this manual depict the required clearances for proper equipment operation and service only. The customer/purchaser is responsible for federal, state and/or local codes regarding facility egress and related facility requirements.

B.3 Rear Cover Removal

Rather than storing the rear cover straight back from the gantry, the cover can be moved and stored on the right or left side or angled if there is space available while still maintaining service access to the gantry. Additionally, the cover can be moved to the side of the table or out of the scan room to a temporary storage location.

For rooms with a surface floor duct (without ramps) behind the gantry, the rear cover cannot be moved to the side of the gantry. Due to the weight of the gantry cover, lifting it over a surface floor duct without ramps is prohibited.

Figure B-1 Cover Removal Clearance (GT1700 - Gantry Front Cover is flipped at left side of table and removed to inside/outside of room)

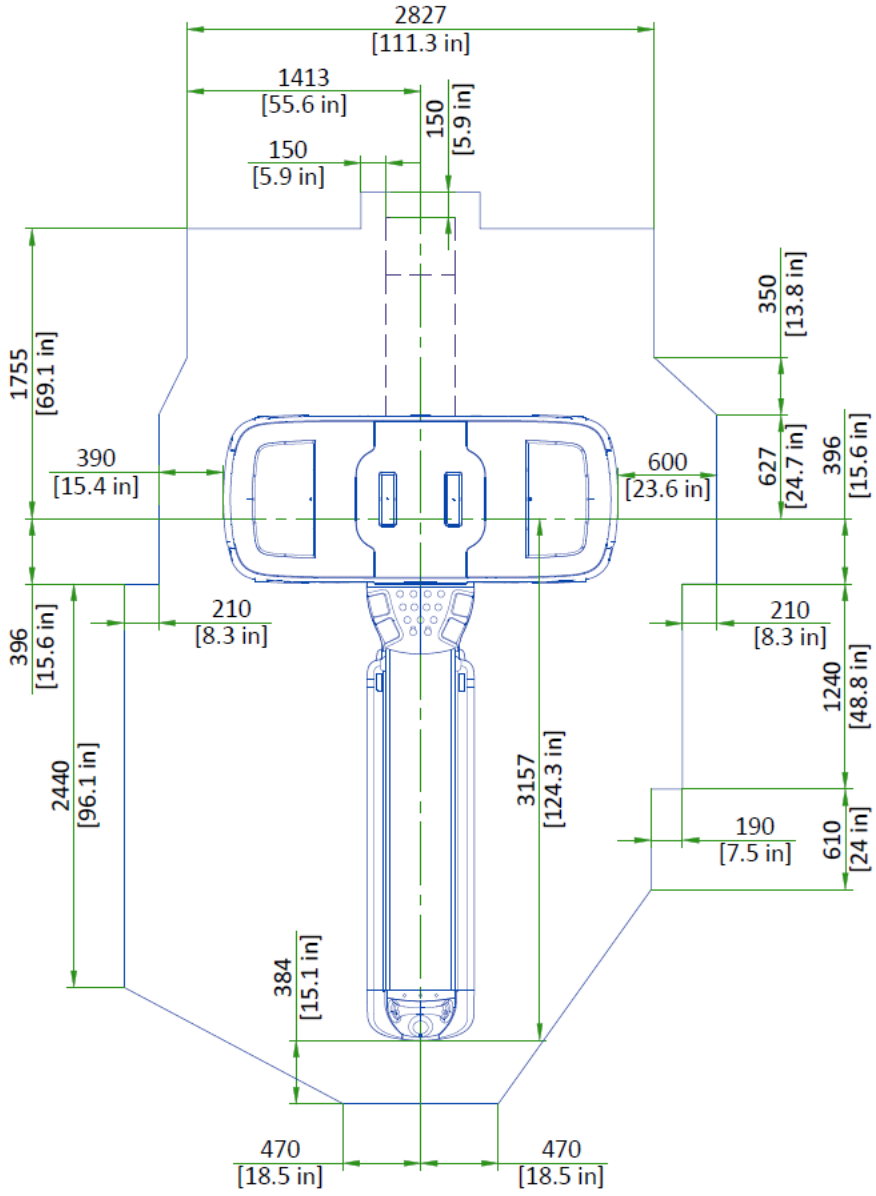


Figure B-2 Cover Removal Clearance (GT1700 - Gantry Front Cover is flipped at right side of table and removed to outside of room)

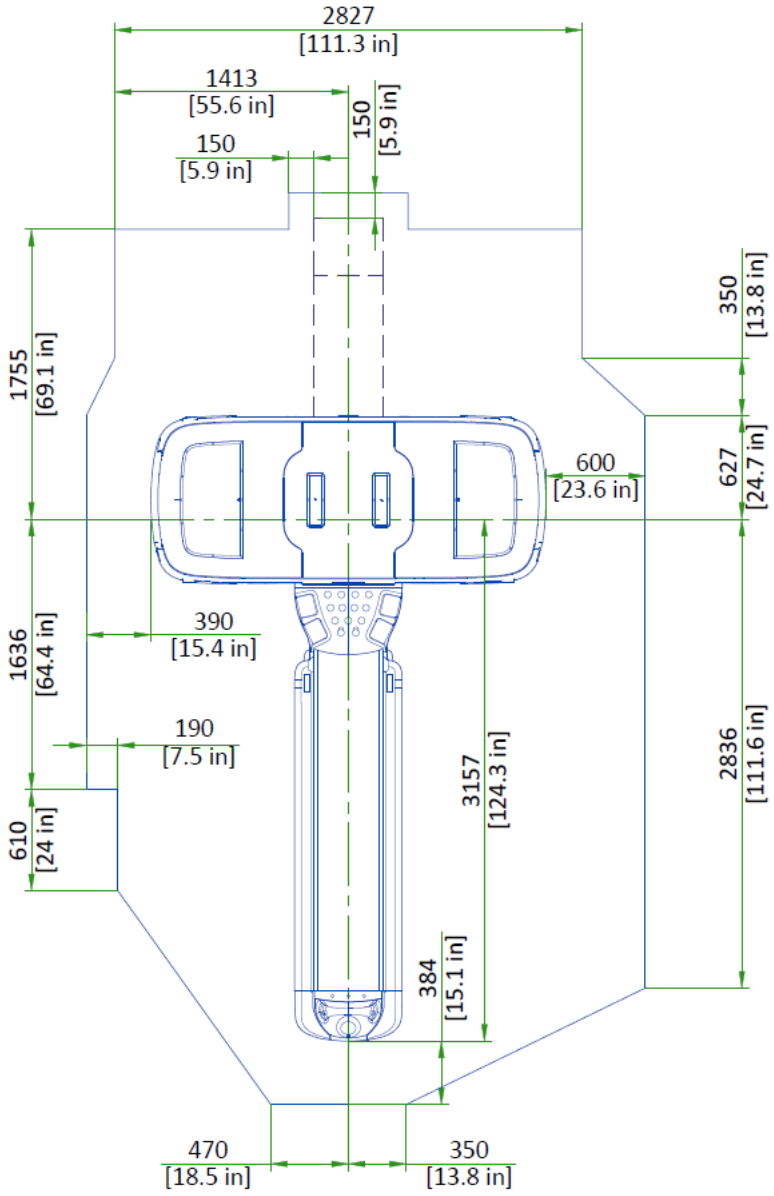


Figure B-3 Cover Removal Clearance (High Capacity Table - Gantry Front Cover is flipped at left side of table and removed to inside/outside of room)

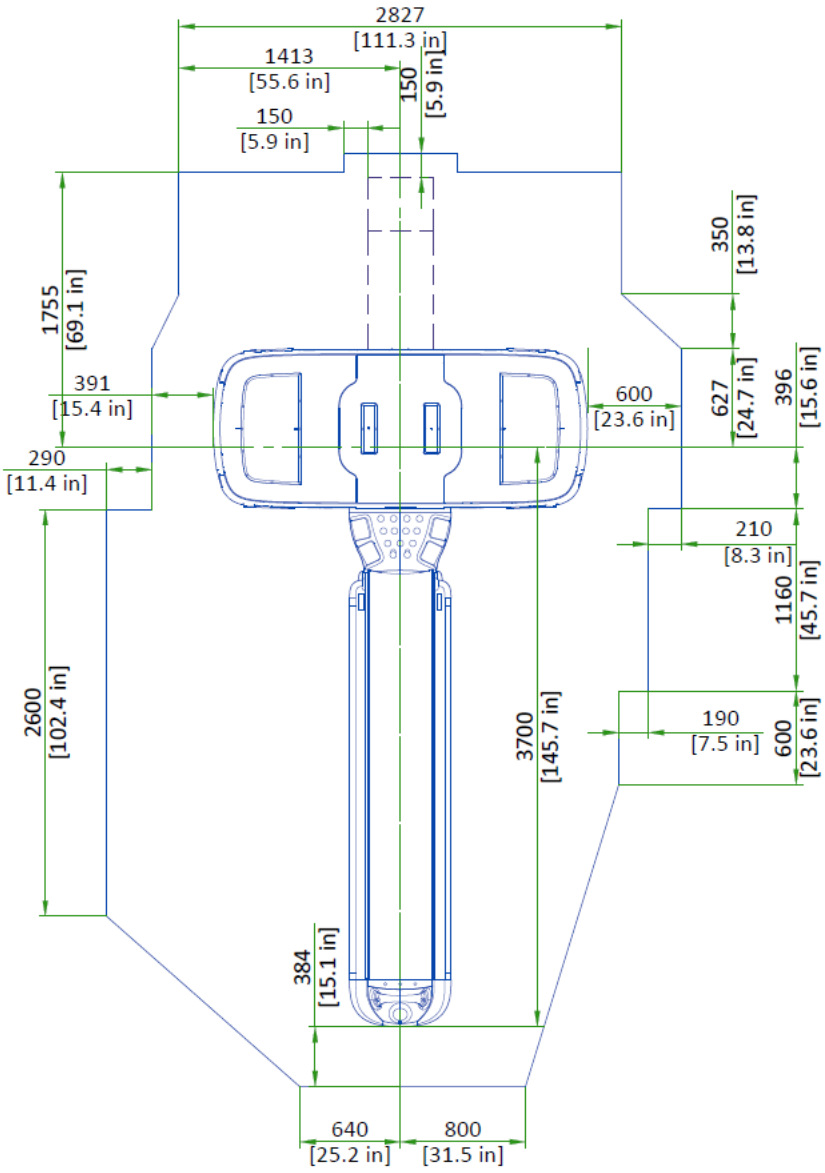
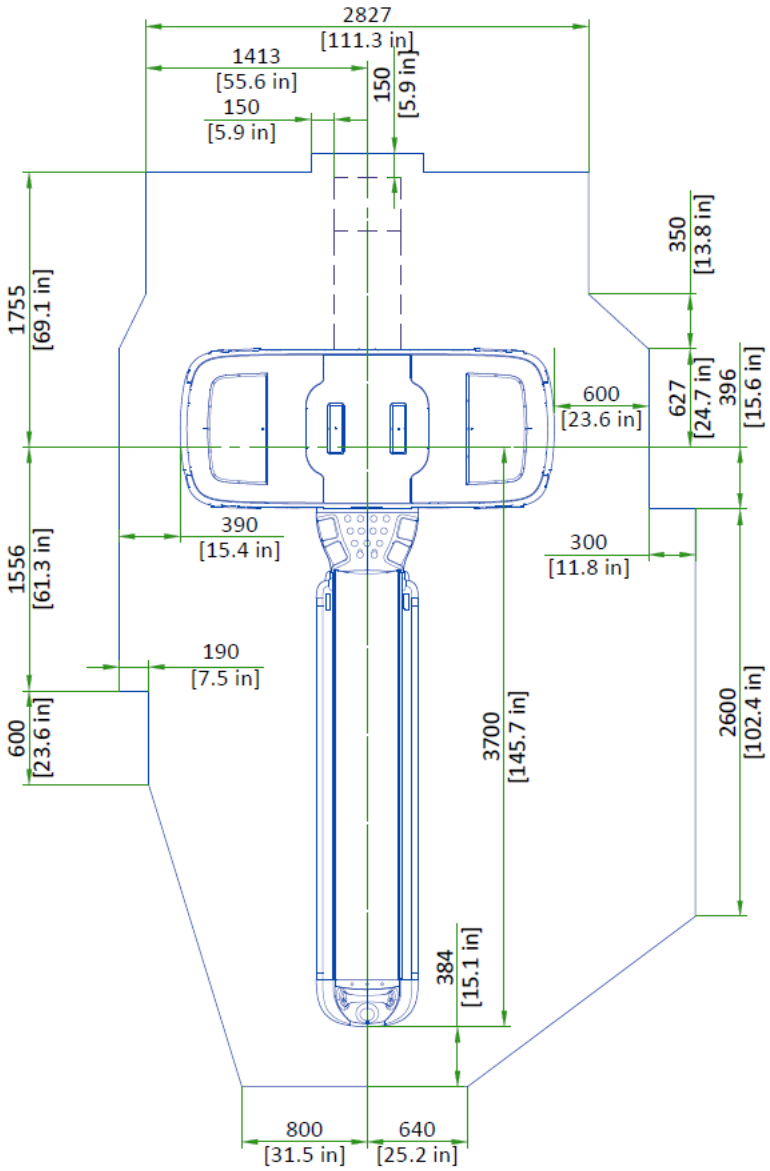


Figure B-4 Cover Removal Clearance (High Capacity Table - Gantry Front Cover is flipped at right side of table and removed to outside of room)



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