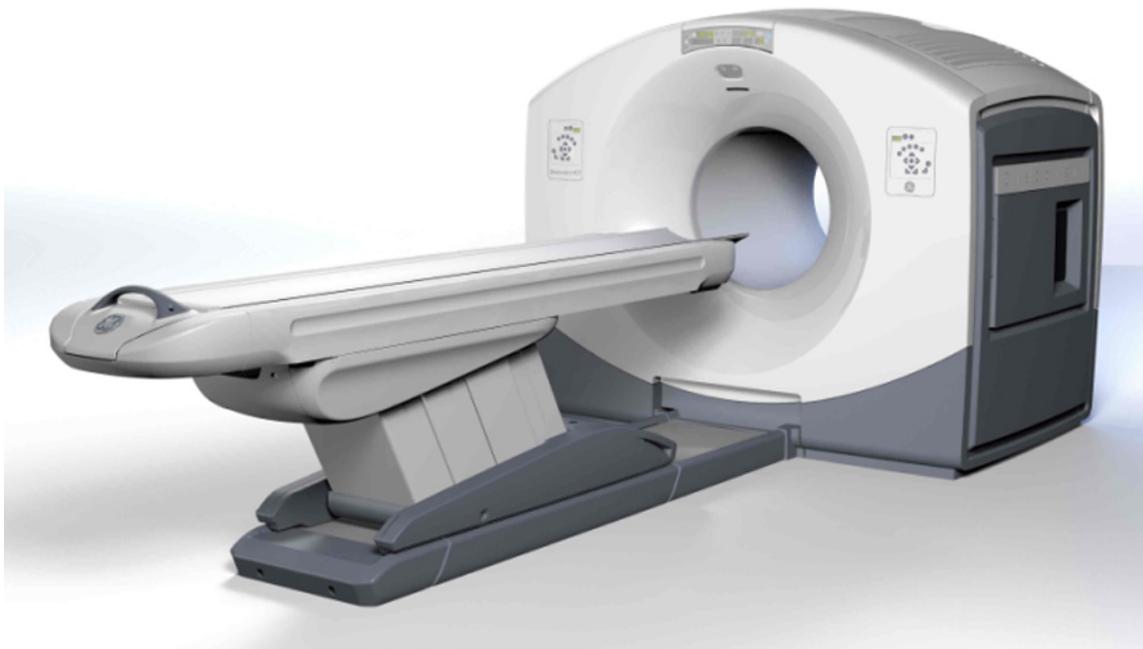


Optima PET/CT 560, 560 FX; Discovery PET/CT 610, 710 Pre-Installation Manual



OPERATING DOCUMENTATION

5433542-1EN
Revision 5

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 General Electric Company, Healthcare Technologies, 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 General Electric Company, Healthcare Technologies, 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.

Important...Radioactive Material Handling

Only employees formally trained in radioactive materials handling and this equipment are authorized by the GE Healthcare Radiation Safety Officer to use radioactive materials to service this equipment.

GE Healthcare Services is required to notify the applicable U.S. state agency PRIOR to any source service event involving pin source handling. See NUC/PET Radioactive material guides for specific instruction or contact your EHS Specialist.

A radiation survey must be performed when a pin source has been removed and replaced. See Radiation Survey Form Instructions or contact your EHS Specialist.

Rev 2 (July 21, 2005)

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Important Information

LANGUAGE

- ПРЕДУПРЕЖДЕНИЕ (BG)** Това упътване за работа е налично само на английски език.
- Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод.
 - Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа.
 - Неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациента в резултат на токов удар, механична или друга опасност.
- 警告 (ZH-CN)** 本维修手册仅提供英文版本。
- 如果客户的维修服务人员需要非英文版本，则客户需自行提供翻译服务。
 - 未详细阅读和完全理解本维修手册之前，不得进行维修。
 - 忽略本警告可能对维修服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤害。
- 警告 (ZH-HK)** 本服務手冊僅提供英文版本。
- 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。
 - 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。
 - 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他危險。
- 警告 (ZH-TW)** 本維修手冊僅有英文版。
- 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。
 - 請勿試圖維修本設備，除非您已查閱並瞭解本維修手冊。
 - 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。
- UPOZORENJE (HR)** Ovaj servisni priručnik dostupan je na engleskom jeziku.
- Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod.
 - Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik.
 - Zanimarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.

**VÝSTRAHA
(CS)**

Tento provozní návod existuje pouze v anglickém jazyce.

- V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištěn překlad do odpovídajícího jazyka úkolem zákazníka.
- Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah.
- V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.

**ADVARSEL
(DA)**

Denne servicemanual findes kun på engelsk.

- Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse.
- Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual.
- Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.

**WAARSCHUWING
(NL)**

Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar.

- Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan.
- Probeer de apparatuur niet te onderhouden alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is.
- Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de operator of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.

**WARNING
(EN)**

This service manual is available in English only.

- If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services.
- Do not attempt to service the equipment unless this service manual has been consulted and is understood.
- Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.

**HOIATUS
(ET)**

See teenindusjuhend on saadaval ainult inglise keeles.

- Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest.
- Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist.
- Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.

**VAROITUS
(FI)**

Tämä huolto-ohje on saatavilla vain englanniksi.

- Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla.
- Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen.
- Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.

**ATTENTION
(FR)**

Ce manuel d'installation et de maintenance est disponible uniquement en anglais.

- Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire.
- Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris.
- Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.

**WARNUNG
(DE)**

Diese Serviceanleitung existiert nur in englischer Sprache.

- Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen.
- Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben.
- Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendienst-technikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.

**ΠΡΟΕΙΔΟΠΟΙΗΣΗ
(EL)**

Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά.

- Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης.
- Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις.
- Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.

**FIGYELMEZTETÉS
(HU)**

Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el.

- Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészítése.
- Ne próbálja elkezdni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték.
- Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.

**AÐVÖRUN
(IS)**

Þessi þjónustuhandbók er aðeins fánleg á ensku.

- Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálaþjónustu.
- Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin.
- Brot á sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.

**AVVERTENZA
(IT)**

Il presente manuale di manutenzione è disponibile soltanto in lingua inglese.

- Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione.
- Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto.
- Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.

**警告
(JA)**

このサービスマニュアルには英語版しかありません。

- サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。
- この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

**경고
(KO)**

본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다.

- 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다.
- 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오.
- 본 경고 사항에 유의하지 않으면 전기 쇼크, 기계적 위험, 또는 기타 위험으로 인해 서비스 제공자, 사용자 또는 환자에게 부상을 입힐 수 있습니다.

**BRĪDINĀJUMS
(LV)**

Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā.

- Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu.
- Neveiciet aprikojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas.
- Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.

**ĮSPĖJIMAS
(LT)**

Šis eksploatavimo vadovas yra tik anglų kalba.

- Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas.
- Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploatavimo vadovo.
- Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.

**ADVARSEL
(NO)**

Denne servicehåndboken finnes bare på engelsk.

- Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse.
- Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått.
- Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.

**OSTRZEŻENIE
(PL)**

Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim.

- Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta.
- Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go.
- Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.

**ATENÇÃO
(PT-BR)**

Este manual de assistência técnica encontra-se disponível unicamente em inglês.

- Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.

**ATENÇÃO
(PT-PT)**

Este manual de assistência técnica só se encontra disponível em inglês.

- Se qualquer outro serviço de assistência técnica solicitar este manual noutra idioma, é da responsabilidade do cliente fornecer os serviços de tradução.
- Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica.
- O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.

**ATENȚIE
(RO)**

Acest manual de service este disponibil doar în limba engleză.

- Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere.
- Nu încercați să reparați echipamentul decât ulterior consultării și înțelegerii acestui manual de service.
- Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.

**ОСТОРОЖНО!
(RU)**

Данное руководство по техническому обслуживанию представлено только на английском языке.

- Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод.
- Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения.
- Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение.

**UPOZORENJE
(SR)**

Ovo servisno uputstvo je dostupno samo na engleskom jeziku.

- Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge.
- Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo.
- Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.

**UPOZORNENIE
(SK)**

Tento návod na obsluhu je k dispozícii len v angličtine.

- Ak zákazníkovi poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka.
- Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obsluhu a neporozumiete mu.
- Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.

**ATENCION
(ES)**

Este manual de servicio sólo existe en inglés.

- Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual.
- No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio.
- La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza.

**VARNING
(SV)**

Den här servicehandboken finns bara tillgänglig på engelska.

- Om en kunds servicetekniker har behov av ett annat språk än engelska, ansvarar kunden för att tillhandahålla översättningstjänster.
- Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken.
- Om du inte tar hänsyn till den här varningen kan det resultera i skador på serviceteknikern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.

**OPOZORILO
(SL)**

Ta servisni priročnik je na voljo samo v angleškem jeziku.

- Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod.
- Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli.
- Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.

**DİKKAT
(TR)**

Bu servis kılavuzunun sadece ingilizcesi mevcuttur.

- Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer.
- Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz.
- Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.

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Revision History

Revision	Date	Reason for Change
5	4-May-2017	Updated for PARC4 (Q.Core Power) upgrade option. Chapter 1: Updated Table 1-2 to add PARC4 (Q.Core Power) size and weight dimensions and revise dolly width and length dimensions per Engineering. Added section 4.2.2.6 for PARC4 (Q.Core Power) shipping methods. Updated section 4.4.4 for unpacking PARC4 (Q.Core Power). Chapter 2: Updated Table 2-1 to add PARC4 (Q.Core Power) system component weight load. Updated Table 2-2 for PARC4 (Q.Core Power) system component dimensions. Added Illustration 2-4 and table below for PARC4 (Q.Core Power) dimensions. Added Illustration 2-13 and table below for PARC 4 center-of-gravity. Updated table below Illustration 2-16 typical scan suite layout for PARC4 (Q.Core Power). Added section 3.8 for PARC4 (Q.Core Power) placement requirements. Updated section 4.1.1 for PARC4 (Q.Core Power) non-seismic anchoring statement. Chapter 4: Updated section 1.1.2 for Q.Core/PARC4 (Q.Core Power). Renamed section 1.2 from "System Cooling Requirements" to "Heat Output" to match other products. Added heat output text for PARC4 (Q.Core Power). Updated Table 4-3 with PARC4 (Q.Core Power) heat output. Updated Table 4-3 with Q.Core (Recon Cabinet) heat output.Chapter 5: Updated sections 1.4.4 and 1.9 for Continuous (average) power demand at maximum duty cycle value. Updated table below Illustration 5-2 system ground map for PARC4 (Q.Core Power). Updated Table 5-8 for PARC4 (Q.Core Power) component designators. Updated text in section 3.1 for PARC4 (Q.Core Power) upgrade cable kits. Added Table 5-17 and 5-18 for PARC4 (Q.Core Power) upgrade cable kits.
4	9-Oct-2014	HCSDM00314963: Chapter 5: Updated section 3.1 for new cable catalogs P5051TE, P5051TF, P5064TE, and P5064TF.
3	24-May-2013	HCSDM00196987: Chapter 1: Updated section 4.1.1. Table 1-2: Corrected width for PET Image Ring with dollies and PET Source Ring/Trailer with dollies. Updated Illus 1-3 and 1-4. Chapter 2: Corrected weights for Console, Monitor, and Workspace Table in Table 2-1. Corrected height for Q.Core and Operator Console in Table 2-2, Illus 2-3, and Illus 2-11. Corrected weights for Illus 2-4, and Illus 2-6 through 2-9.
2	26-Mar-2013	Front/back cover updates. HCSDM00179998: Chapter 1, section 2: Corrected "Floor Specification" minimum concrete thickness; Table 1-2: Weights corrected for CT Gantry (16 slice) and PET Image Ring. Chapter 2, Table 2-1: Weights corrected for CT Gantry (16 slice), Patient Table, and PDU; section 3: Removed VQC phantom from Tables 2-5 and 2-6. Chapter 3: Added section 1.2.6 – PET Alignment (VQC) Phantom. Chapter 5, Tables 2-9 and 2-10: Corrected cable length for Run # 56. Entire manual: Moved descriptive text in illustrations to tables.
1	8-Aug-2012	Initial release.

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Chapter 1 General Requirements

1 Introduction

1.1 Objective and Scope of this Manual

This manual is the official guide and informational resource for planning and preparing a location for the installation of the following PET/CT systems. The responsibility of arranging and paying for all work associated with site planning, site preparation, and system installation rests solely with the buyer/purchaser of the system.

- Optima™ PET/CT 560
- Optima™ PET/CT 560 FX
- Discovery™ PET/CT 610
- Discovery™ PET/CT 710

This manual guides you through the pre-installation siting and regulatory requirements. Keep in mind, this manual cannot address or answer each and every site specific question or concern. Contact your GE Healthcare Project Manager (PM) for answers to any additional questions or concerns not addressed in this manual. Prior to any construction or approval, General Electric Headquarters Architectural Planning must review all PET/CT preliminary concepts, site plans, and final working drawings associated with the installation of the system. Contact your GE PM or complete information regarding your site-specific room layout.

1.2 Responsibility of the Customer

It is the responsibility of the customer (buyer/purchaser) to prepare the site in accordance with all the specifications provided in this manual and in conjunction with site-specific drawings and applicable regulations. It is essential to verify all aspects of the site configuration before construction has begun, as subsequent changes can be costly or impractical. 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.

Pre-Installation requirements shall include the procurement and installation of all required materials and services necessary to prepare the room to be ready for installation of the PET/CT system. The customer is responsible for all aspects of site preparation, including:

- Assigning a project coordinator.
- Planning and construction requirements for the installation of the PET/CT system in accordance with all national, state, or local regulatory requirements for the country in which the installation occurs, for example:
 - Fire control devices as required by local codes.
 - Permits, inspections, radiation licensing, etc.
 - Earthquake-related regulations.
- Selecting a location suitable for the installation of the PET/CT system.

- Constructing or renovating the site.
- All design work associated with preparing the installation site for the PET/CT system and all architectural, mechanical, and electrical drawings associated with the design of the site.
- All alterations or modifications to products not specifically included in the sales contract.
- A clean and safe work environment for installation of the PET/CT system.
- A location with proper lighting, a level finished floor, finished walls, and a finished ceiling.
- A support structure in the floor, walls, and ceiling suitable for mounting all system components as specified in the site design.
- Installation of all required conduit, ducts, and raceways to safely route all cables.
- Supplying electrical power of the required voltage, all necessary power supply cables and grounds, all necessary power cables and grounds to the PDU and system cabinet, and an Emergency-Off switch in the scan room.
- Installation of all properly-sized junction boxes, outlets with covers, line safety switches, and fittings installed at the locations specified in the site design.
- All Non-GE wires and cables as specified in this document:
 - 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 Healthcare does not provide or install the wires, conduits, junction boxes, or ducting illustrated in this publication, unless specifically stated.

1.3 Site Project Coordinator

The site project coordinator is the primary contact and liaison between GE Healthcare and all site related functions, between the purchaser, the construction planners, architects, contractors, and any other site administrative personnel.

To ensure a successful installation, it is recommended that a single/individual site project coordinator manage the entire project. Ideally, the project coordinator is a person familiar with all phases of pre-installation and installation of similar medical device construction projects, from conceptual planning through to system start up. The site project coordinator shall be responsible for working closely with GE Healthcare to ensure the client (buyer/purchaser) upholds all requirements in this manual.

2 System Siting Requirements

- **System Site Print**

A system installation, relocation, or move requires a site print. The PET/CT room layout shall match the layout detailed on the site print.

- **Regulatory Code & System Requirements**

A site shall meet all regulatory code and system requirements associated with; service, structural, flooring, vibration, HVAC, electrical, IT network, radiation protection, operational clearance requirements, and all applicable codes.

- **Floor Specification**

The floor shall have a minimum concrete thickness of 127 mm (5 in.).

The floor shall be no greater than 6 mm (0.250 in.) out of level over a 3048 mm (10 ft.) range, with level defined as the horizontal surface between the highest and lowest points.

NOTE: If the concrete floor has a floor covering installed over it (such as floor tile), 17 or more openings 101.6 mm (4 in.) in diameter will be cut into the floor covering to ensure the table and gantry rest on the concrete. (Openings are cut during installation.)

Shims shall not be used to level the gantry or patient table.

- **Related Hospital Equipment Clearances**

Carefully check/verify the room layout for the necessary clearances required of any related hospital equipment. Good judgment is required to avoid compromising important system features. There shall be ample maneuvering space around the patient table for a hospital cart, any emergency equipment, and all personnel, etc.

2.1 Project Manager (PM) Tasks

GE Healthcare Project Manager (PM) will assist buyer with system siting requirements.

2.2 Customer Requirements for Site Readiness

- **Site Readiness Completion and Verification**

Installation cannot proceed until all site-readiness requirements have been completed and verified. A site is ready when all renovations/modifications have been completed and the scan suite meets all regulatory, code, and system requirements, system delivery needs, and all requirements for any options.

- **Contractor's Final Confirmation**

Final confirmation of installation site readiness shall be made by all contractors associated with the project; structural engineer/architect, HVAC contractor, electrical contractor, qualified radiological health physicist, cleaning service, etc.

- **Schedule of Site-Ready Visit**

To ensure timely system delivery and installation, the customer shall complete all necessary work listed in this Pre-Installation Manual and schedule a site-ready Project Manager (PM) visit prior to system delivery.

- **Pre-installation Checklist**

The customer shall also verify site readiness by filling out and signing the following Pre-Installation Checklist. The checklist shall be completed six weeks prior to scheduled delivery date.

Table 1-1: Customer Pre-Installation Checklist - Required Information for Site

<i>Complete prior to scheduled delivery date.</i>			
Today's Date:			
Hospital Name:			
(as it appears on the system screen)			
Network ID numbers/IP Addresses:		List IP Numbers and Address	
<input type="checkbox"/> AW			
AW Direct Connect Address:			
<input type="checkbox"/> Camera			
Camera Setup Information			
<input type="checkbox"/> PACS			
<input type="checkbox"/> Other _____			
<input type="checkbox"/> Other _____			
Do you want HIPAA enabled?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Do you want automatic downloads enabled?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Commitment Dates:			
Action Item	Action Item Completed?		Comments
	Yes	No	
Have the facilities department, contractor, and GE Healthcare certified the project schedule?			
Will committed site-ready date be met?			
Does construction completion date meet or precede the delivery date?			
Is the Power & Ground survey complete? Hospital Contact Name/No. _____ _____			
Is the site-ready visit scheduled?			
Is the delivery date scheduled?			
Does the delivery date require adjustment?			
Is the installation date scheduled?			

Does the installation date require adjustment?			
Is the installation timing determined?			
<input type="checkbox"/> Weekdays			
<input type="checkbox"/> Weekend			
<input type="checkbox"/> Quick Install			
If Weekend or Quick Install selected, have all sub-contractors been notified?			
Is the system first-use date scheduled?			
Are system applications/training dates scheduled?			
<input type="checkbox"/> On-Site Training Date: _____			
<input type="checkbox"/> Healthcare Institute Training Date: _____			
Equipment Compatibility:			
Action Item	Action Item Completed?		Comments
	Yes	No	
Has the order been reviewed for completeness and compatibility with existing equipment?			
<input type="checkbox"/> Remote Monitors			
<input type="checkbox"/> AW Relocation			
<input type="checkbox"/> Cardiac Option			
<input type="checkbox"/> Injectors			
Are interfaces to existing or new accessories ordered and planned accordingly?			
Are cables of the correct length on order?			
Have the locations of the following peripherals (or options) been included in the site drawings?			
<input type="checkbox"/> EKG Monitor			
<input type="checkbox"/> Injector Control			
<input type="checkbox"/> Laser camera			
<input type="checkbox"/> UPS			
<input type="checkbox"/> 2nd Monitor			
<input type="checkbox"/> Respiratory Gating			
Site Planning Requirements:			
Action Item	Action Item Completed?		Comments
	Yes	No	

Were final drawings approved and distributed to the contractors?			
Are final drawings signed off to approve equipment layout and orientation?			
Has the surface penetration permit been obtained and signed?			
Do the actual room dimensions match those on the final drawings?			
Has VQC Phantom been ordered by customer?			
Is RAM license valid?			
Is Radiation Safety Officer ready to receive Pin Source and VQC Phantom?			
Has the radiologist health physician reviewed and approved the room layout shielding requirements?			
Have any additional requirements or questions about the installation been discussed with GE Healthcare?			List additional items:
Is there a person assigned to review and verify that all installation requirements are met?			
Have the specific site requirements been discussed with all contractors?			
Has the responsibility of cabling, installing, and interfacing any GE approved accessories not on the order been discussed with GE Healthcare?			
Are all third-party vendors identified, notified, and scheduled?			
Have all Regulatory, Code, & System Requirements been met?			
Has it been verified there is no plumbing or any grounded surface within 1.83 m (6 ft.) of the table or gantry?			
Will the existing network, broadband, and camera cable drops reach all required locations for the PET/CT scanner?			List any issues or concerns:
Network Installation:			
Action Item	Action Item Completed?		Comments
	Yes	No	
Have IP address and host names been obtained?			
Will a network camera be used?			
Required: Is the network installed, are the network jacks installed, and is the entire network tested?			
Required: Is the broadband VPN installed and setup?			
Required: Are network software options ordered?			
<input type="checkbox"/> HIS RIS Option			
<input type="checkbox"/> DICOM Print			
<input type="checkbox"/> AW			

Delivery and Miscellaneous:			
Action Item	Action Item Completed?		Comments
	Yes	No	
Have arrangements been made in the schedule to allow adequate time for remodeling, if required (such as construction, floor or ceiling work, painting, or other cosmetic work)?			
Have arrangements been made to clean the floor after equipment removal and prior to the installation of the new equipment?			
Is de-installation of existing equipment required?			
Is there a trade-in of existing equipment?			
<input type="checkbox"/> GoldSeal			
Has the delivery route been identified with the proper hospital personnel?			
Have the elevators and doors been checked for size and weight constraints?			
Have the appropriate arrangements been made with traffic for delivery?			
Will any acceptance, performance, or bio-medical testing be required?			
Are trash and recycling bins available for the disposal of paper, cardboard, etc.			

3 Regulatory Requirements

The following codes, standards, and laws are referenced in this section:

- OSHA 29 CFR 1910
- NFPA 70E (Standard for Electrical Safety in the Workplace)
- NFPA 101: (Life Safety Code)
- NFPA 99: (Standard for Health Care Facilities)
- ADA Amendments Act of 2008 (Americans with Disabilities Act)

3.1 Building Codes, Regulations and Permits

Building Codes and Regulations Scan suite shall meet all building codes and applicable regulations.

GE Healthcare Surface Penetration Permit A GE surface penetration permit shall be approved by the appropriate facility or building representative. (Drilling holes into a concrete floor is an example of surface penetration.) The GE surface penetration permit can be obtained through GE Healthcare Service Operations, EHS Support Central.

3.2 Clearance Regulations

Federal & National Association Regulations

Clearance regulations for all systems installed in the U.S. are determined by various federal agencies and the National Fire Protection Association. The regulating publications are: OSHA 29 CFR 1910, NFPA 70E (Standard for Electrical Safety in the Workplace), NFPA 101: (Life Safety Code), NFPA 99: (Standard for Health Care Facilities), and the ADA Amendments Act of 2008 (Americans with Disabilities Act).

Federal and Foreign Regulations

All systems installed within the U.S. and its territories shall comply with all federal and local regulations. Systems installed outside the U.S. shall comply with either the national state or local regulatory clearance requirements for the country in which the installation occurs, or U.S. federal regulations, whichever is greater.

3.3 Codes, Clearances, and Service Space Regulation

Federal, State, and Local Codes The diagrams and dimensions used throughout this manual, detail required clearances for proper system operation and servicing only. The customer shall be responsible for ensuring all federal, state, and local codes and clearances are followed and maintained, regarding facility egress and all other related requirements.

4 Delivery and Handling

4.1 Project Manager Tasks

Task	Description
Site Dimensions	PM shall measure and verify all site dimensions to ensure the facility can accommodate the delivery of the system (and any related components or equipment), from the delivery drop-off point to the scan suite. NOTE: The minimum unobstructed doorway opening to accommodate delivery of the system is 1067 mm (42 in.). The minimum unobstructed hallway width to accommodate delivery of the system is 1803 mm (71 in.).
Delivery Type	PM shall determine type of delivery: ground level, loading dock, or tilt-bed truck.
Delivery Equipment	PM shall determine if delivery requires special dollies, lifting crates, or riggers. PM shall order any additional delivery equipment and all necessary delivery personnel. NOTE: The CT gantry cannot be lifted or transported by any means other than the GE support cradle and dolly system on which is was shipped. Otherwise, serious damage to the gantry could result. The CT gantry is not designed to be lifted by special rigging.
Identify Delivery Route	PM shall identify the delivery route, which may include any elevators, doorways, and hallways necessary to accommodate the delivery of all system components.
Non-Construction-Zone Route to Scan Suite	PM shall verify an accessible, dust-free, non-construction-zone delivery route to the scan suite.
Packaging Requirements	PM shall order any construction site packaging requirements prior to shipment. Packaging cannot be modified once the system is shipped.
Floor Protection	PM shall determine if floor protection is required along facility delivery route and communicates requirement to delivery company/personnel.

4.1.1 Minimum Doorway Opening

The minimum unobstructed doorway opening to accommodate delivery of the system is 1067 mm (42 in.). This accommodates the CT Gantry with covers and dollies attached, but side rails removed. This also accommodates the PET Image Ring with dollies attached, but side protective braces removed.

4.1.2 Minimum Hallway Width

The minimum unobstructed hallway width to accommodate delivery of the system is 1803 mm (71 in.).

4.2 Shipping Dimensions and Weight

4.2.1 Delivery Sizes and Weights

Table 1-2: Estimated Loading Dock Delivery Sizes and Weights

Item	Height mm (in.)	Width/Depth mm (in.)	Length mm (in.)	Weight kg (lb)
CT Gantry (64 Slice) with Dollies On, Side Rails On	1955 (77)	1295 (51)	2438.4 (96)	1932 (4260)
CT Gantry (64 Slice) with Dollies On, Side Rails Off	1955 (77)	970 (38.25)	2438.4 (96)	1914 (4220)
CT Gantry (16 slice) with Dollies On, Side Rails On	2000 (79)	1290 (51)	2810 (111)	1982 (4360)
CT Gantry (16 slice) with Dollies On, Side Rails Off	2000 (79)	1067 (42)	2810 (111)	1967 (4310)
PET Base and Retractor Assembly with Dollies	990 (39)	1054 (41.5)	2286 (90)	678 (1495)
PET Image Ring with Dollies On, Side Protective Braces On	1880 (74)	1041.4 (41)	2667 (105)	1282 (2820)
PET Image Ring with Dollies On, Side Protective Braces Off	1880 (74)	985.52 (38.8)	2667 (105)	1282 (2820)
PET Image Ring without Dollies	1819 (72)	720 (28)	1931 (76)	954 (2110)
PET Image Ring Dolly (assembled)	—	1041.4 (41)	2667 (105)	327 (720)
PET Source Ring and Trailer with Dollies	1092 (43)	1041.4 (41)	2387.6 (94)	608 (1340)
Table (Blue Dollies On)	1410 (55.5)	864 (34)	3836 (151)	1241 (2736)
Table (Blue Dollies Off, Red Castors On)	1410 (55.5)	1016 (40)	3048 (120)	1295 (2856)
Table (Tilting Dollies On)	1778-2032 (70-80)	965 (38)	2489-2921 (98-115)	1147 (2530)
Power Distribution Unit (with cardboard packaging)	1092 (43)	584 (23)	762 (30)	413 (910)
Q.Core (on skid)	1067 (42)	635 (25)	864 (34)	87 (192)
PARC4 (Q.Core Power) Reconstruction Cabinet (on skid)	1655 (65.2)	1480 (58.3)	980 (38.6)	304 (670)
Console (on skid)	1067 (42)	635 (25)	864 (34)	87 (192)

4.2.2 Shipping Methods (Dollies, Skids)

4.2.2.1 CT Gantry

The CT Gantry ships with the front and rear covers attached to its front and rear cover brackets. During installation, the rear cover is transferred to the PET Gantry, and the rear cover brackets are removed from the CT Gantry. The assembly is mounted between two dollies [Illustration 1-1](#).

Two side rails are bolted to the dollies to stabilize dollies and protect the CT Gantry. The dolly elevating casters lift the CT Gantry off its base and roll it into position.

Illustration 1-1: CT Gantry with Shipping Dollies and Side Rails



4.2.2.2 PET Components

The PET Gantry consists of:

- PET Base and Retractor Assembly (see [Illustration 1-2](#)). The PET Base dollies have a center stabilizing frame to protect the exposed components.
- PET Image Ring (see [Illustration 1-3](#))
- PET Source Ring and Trailer (see [Illustration 1-4](#))

Illustration 1-2: PET Base and Retractor Assembly, with Shipping Dollies



Illustration 1-3: PET Gantry Image Ring, with Shipping Dollies and Side Rails



Illustration 1-4: PET Source Ring and Trailer, with Shipping Dollies and Side Rails



4.2.2.3 Patient Table

The patient table ships to domestic (North American) installations on a set of dollies with stabilizing side rails (see [Illustration 1-5](#)). The secondary base covers ship separately.

Red caster towers ship attached to the ends of the dollies (see [Illustration 1-5](#)). They are used for fitting the Table in an elevator and for final positioning of the Table in front of the Gantry (see [Illustration 1-6](#)).

NOTE: The patient table ships to international sites in a crate. The installation team uncrates the table and attaches the dollies at the site.

Illustration 1-5: Patient Table with Shipping Dollies



Illustration 1-6: Patient Table on Red Caster Towers



4.2.2.4 PDU

The PDU is shipped on a skid. Do not remove the PDU from the skid until it is in the room ready for installation.

4.2.2.5 Q.Core

The Q.Core is shipped on a skid. Do not remove the Q.Core from the skid until it is in the room ready for installation.

4.2.2.6 PARC4 (Q.Core Power) Reconstruction Cabinet

The PARC4 (Q.Core Power) is shipped on a skid. Do not remove the PARC4 (Q.Core Power) from the skid until it is in the room ready for installation.

Illustration 1-7: PARC4 (Q.Core Power) Packaging



4.2.2.7 Operator Console

The Console is shipped on a skid. Do not remove the Console from the skid until it is in the equipment room. The keyboard table is shipped with the Console, but not assembled.

4.3 System Lifting and Rigging Restrictions

Lift-Gate and Rollback Truck Deliveries

Delivery to a facility without a loading dock can generally be serviced by a lift-gate or rollback truck. A lift-gate delivery truck requires a lift gate rated for a 3-ton capacity.

If a rollback delivery truck is used, a GE representative shall personally supervise the delivery of the PET/CT scanner to ensure the system is safely delivered without damage. To avoid damaging the gantry, the representative shall direct the driver to attach strapping to the lowest point (not the wheels) of each dolly. When the gantry is lowered from the back of the delivery truck, it shall be lowered at the slowest reasonable rate without jerking the gantry. Otherwise, serious damage to the gantry could occur.

4.4 Shipping and Receiving

4.4.1 Handling Restrictions

- *Forklift Restrictions:* Never lift the gantry using a forklift under the gantry frame.
- *Shock Restrictions:* The system cannot tolerate shock or vibration. System components cannot be tipped, dropped, or hoisted. The PM shall communicate these restrictions to everyone involved with handling the system components.
- *Rolling on Surfaces:* System components shall be rolled across smooth surfaces (sidewalks, parking lots, etc.) only. If a smooth surface is not available, then floor protection should be used to move the system.

- *Shipping Crate/Packaging Integrity:* Do not damage or puncture the shipping crate or packaging.

Floor Protection

To protect the floor during delivery, floor protection shall be used along the entire delivery path and throughout the scan suite, where necessary.

4.4.2 Dollies

- U.S. Installations – Shipments within the United States typically involve the use of dollies for moving the gantry and table. After completing the installation, return all dollies and the gantry shipping cage to GE using the shipping document found in Box #1.
- Zero Clearance Dollies (Mini) (For CT Gantry only) – 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>.
- Tilting Dollies (for Patient Table) – Deliveries involving small elevators with a depth of at least 2438 mm (96 in.) require tilting dollies. If storing the patient table prior to installation, do not order tilting dollies as there is a limited number of dollies available. If you are unable to obtain tilting dollies, substitute riggers in place of the dollies to deliver the table. To order tilting dollies for the patient table, go to: <http://www.umi-dollyshop.com>.
- Installations Outside U.S. – For shipments outside the United States, customers may purchase dollies at: <http://www.umi-dollyshop.com>. DO NOT return dollies or the gantry shipping cage to the U.S. Instead, forward dollies and cage to the local GE office or warehouse.

4.4.3 Delivery Temperature and Humidity Tolerance



NOTICE

Failure to adhere to temperature requirements during delivery and storage will likely result in equipment damage.

Avoid extreme temperatures during system transportation and delivery.

When transporting the system, all packing material shall remain intact. Prevent extended exposure of the system (maximum two weeks) to temperatures or humidity outside of the following specifications:

- Temperature: -40° to +50° C (-40° to +122° F), inclusive
- Humidity: 5% to 95%, inclusive

After delivery to the scan suite and before unpacking any system components, allow 12 hours for the equipment to adjust to room temperature.

4.4.4 Unpacking System

Do not remove any protective wrapper or packaging from any system component until all construction is complete and all construction dust is removed from the installation site.

Retain the packaging surrounding the scanner desktop and UPS.

Do not remove the Console or Q.Core/PARC4 (Q.Core Power) from their shipping skids until after they have been delivered to the CT equipment room.

4.5 Storage

If storing a system prior to installation, the system shall be stored in its original packaging in a temperature and humidity controlled environment protected from water and dust. It is advised that storage of the system be no longer than six months. If storage is going to exceed six months, contact your PM for long-term storage procedures.

Table 1-3: Humidity and Ambient Temperatures for Storage*

Ambient temperature shall be maintained within a range of:	+4 to +27° C (+40 to +80° F)
Maximum rate of change in the temperature shall be no greater than:	3° C per hour (+37° F)
Relative humidity (non-condensing) shall be maintained within a range of:	30 to 60% RH
Maximum rate of change in the relative humidity shall be no greater than:	5% RH per hour
* Delivery van/truck storage shall meet these same requirements.	



NOTICE

Storage exceeding six months is not advised.

Chapter 2 Equipment Requirements

1 System Components

1.1 Component Weight/Load, Dimensions, and Center of Gravity

Table 2-1: System Component Weight/Load

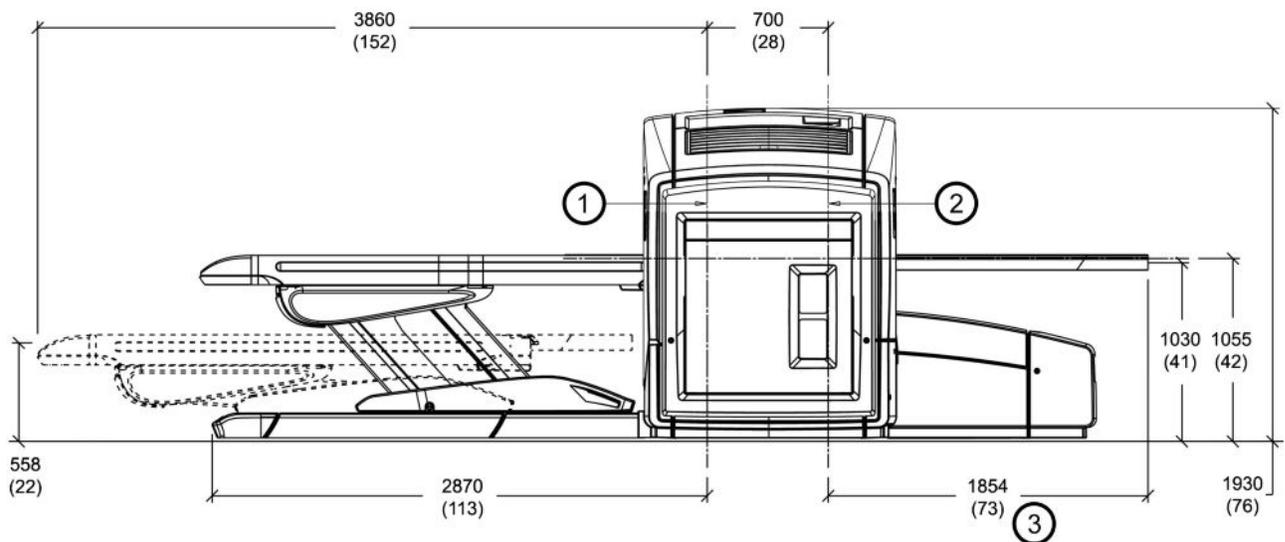
System Component	Net Weight kg (lb)	Maximum Uplift Load N (lb)	Maximum Compressive load N (lb)	Load Pattern mm (in.)	Normal Method of Mounting mm (in.) (GE-supplied ¹)
CT Gantry (64 slice)	1810 (3990)	0	4588 (1031)	CT effective load area is 700 x 2013 (27.6 x 79.25) with four round pads, each 63.5 (2.5) in contact with the floor.	Hilti Kwik-Bolt II 12.7 mm (1/2 in.) diameter x 254 mm (10 in.) long per P/N 2106573-2 at four leveling pads into concrete floor.
CT Gantry (16 slice)	1682 (3700)	0	4895 (1100)	Rectangular base plate 700 x 1966 (28 x 77) with four round pads, each 63.5 (2.5) in contact with floor. Individual pad loadings are 910 lb., 960 lb., 1040 lb., and 1090 lb.	Hilti Kwik-Bolt II 12.7 mm (1/2 in.) diameter by 203 mm (8 in.) long per P/N 2106573 at four leveling pads into the concrete floor.
PET Gantry	1968 (4339)	0	6101 (1250)	While in the imaging position, the effective PET load area is 398 x 645 (15.7 x 25.4) with 7 pads each 63.5 (2.5) as well as 2 pads that do not get anchored (support only)	Hilti Kwik-Bolt II 12.7mm (1/2 in.) diameter by 8 in. (203mm) long per P/N 2106573 at seven leveling pads into concrete floor.
Patient Table	1049 (2308) Includes 227 (500) Patient	890 (200)	4926 (1107)	Rectangular base 550 x 2134 (21.7 x 84.0) with 6 round pads, each 63.5 (2.5) in contact with the floor.	Hilti Kwik-Bolt II 12.7mm (1/2 in.) diameter per 8 in. (203 mm) long per P/N 2106573 at four leveling pads into concrete floor.
Power Distribution Unit (PDU)	370 (813)	0	1070 (240)	Four Casters support area of 711 x 559 (28 x 22).	Casters are for positioning and service. See Note 2.
Q.Core	87 (192)	0			
PARC4 (Q.Core Power)	246 (540)	0	737 (166)	Rectangular base with four castors.	Casters are for positioning and service. See Note 2.
Console w/o monitors	72 (159)		318 (71)		
Monitor - LCD (each)	10 (22)				
Console Work-space Table (with 2 monitors)	76 (167)				
Optional Components					
Universal Power Supply (UPS)	281 (619)	0	689 (155)	Rectangular base 305 x 813 (22 x 32) with four castors, each in contact with the floor.	Casters are for positioning. Set on floor. Adjust the six leveling pads on the floor.
Notes:					
1.) Use the GE-supplied mounting hardware only if anchoring the system to 127 mm (5 in.) concrete floors.					
2.) Seismic angle brackets are included and shipped with the PDU and PARC4 (Q.Core Power).					

Table 2-2: System Component Dimensions

System Component	A	B	C
	Width mm (in.)	Depth mm (in.)	Height mm (in.)
PET-CT Gantry (overall) without Trailer	2235 (88)	1473 (58)	1930 (76)
Table (at max elevation; 1" [25 mm] below Gantry ISO center)	660 (26)	3454 (136)	1067 (42)
Power Distribution Unit (PDU)	711 (28)	559 (22)	1067 (42)
Q.Core	470 (19)	740 (29)	655 (26)
PARC4 (Q.Core Power) Reconstruction Cabinet	616 (24.3)	1257 (49.5)	1422 (56)
Operator Console	470 (19)	740 (29)	655 (26)
Console Workspace Table (adjustable height)	1350 (53)	741 (29)	683-912 (27-36)
UPS	305 (12)	813 (32)	1219 (48)

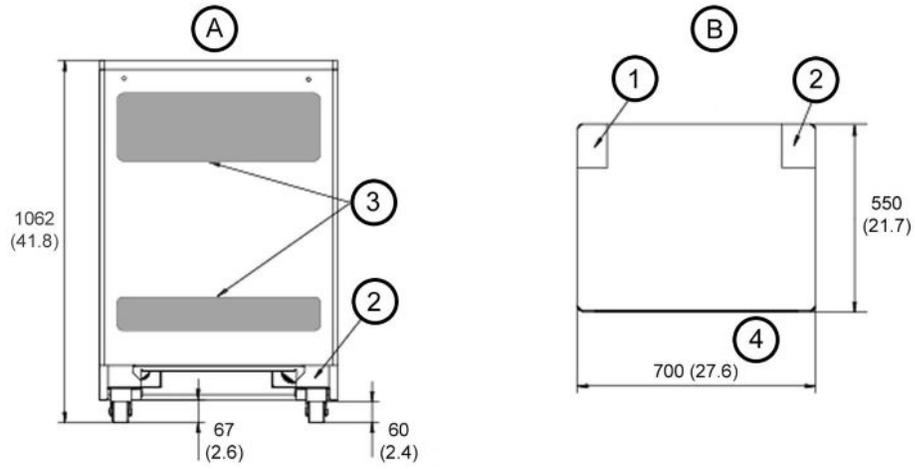
1.2 System Component Diagrams

Illustration 2-1: Gantry and Table Dimensions



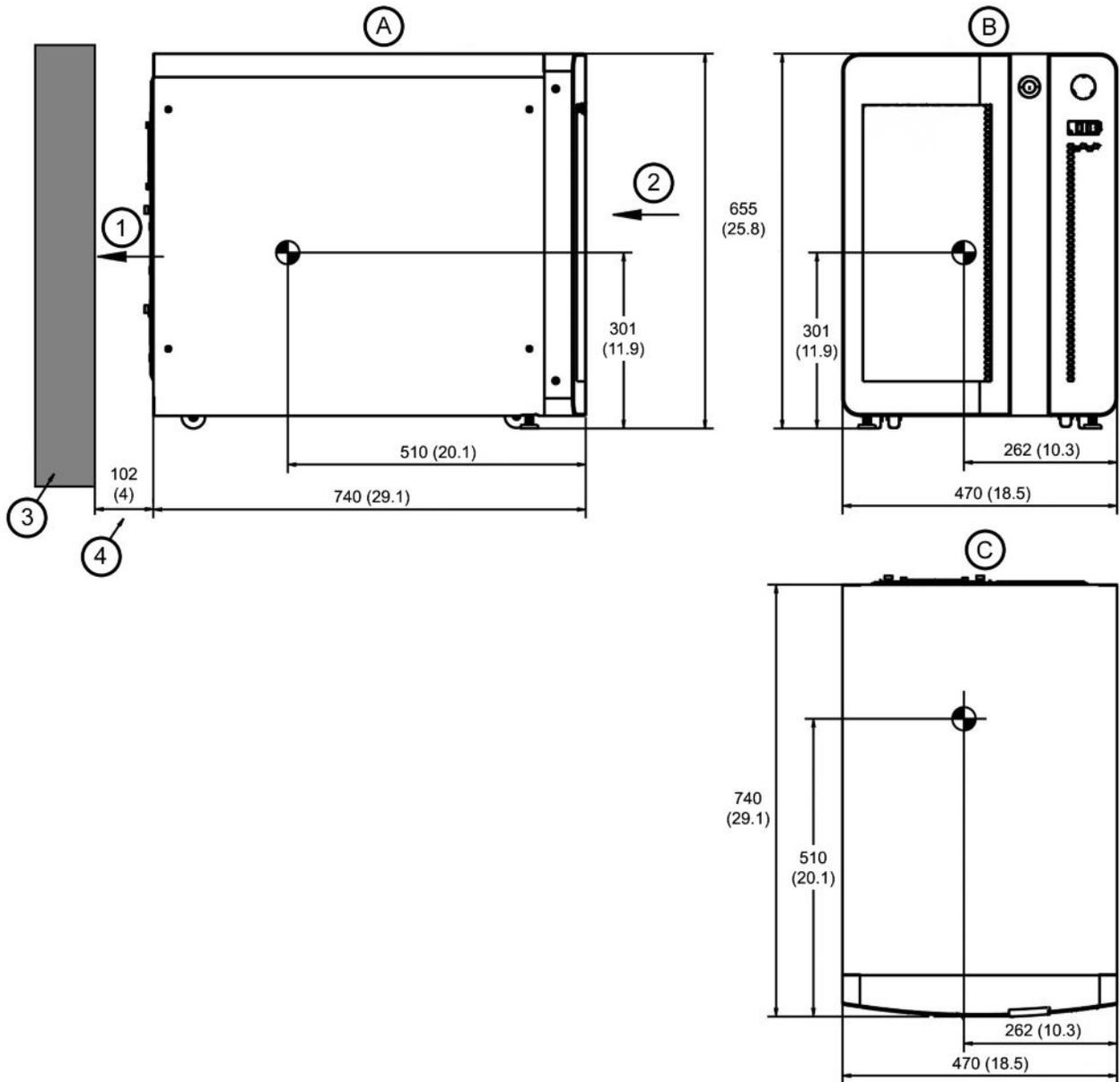
All dimensions are in millimeters; bracketed dimensions are in inches.	
1	CT scan plane centerline
2	PET primary scan plane centerline
3	With Head Extender

Illustration 2-2: Power Distribution Unit (PDU) Dimensions



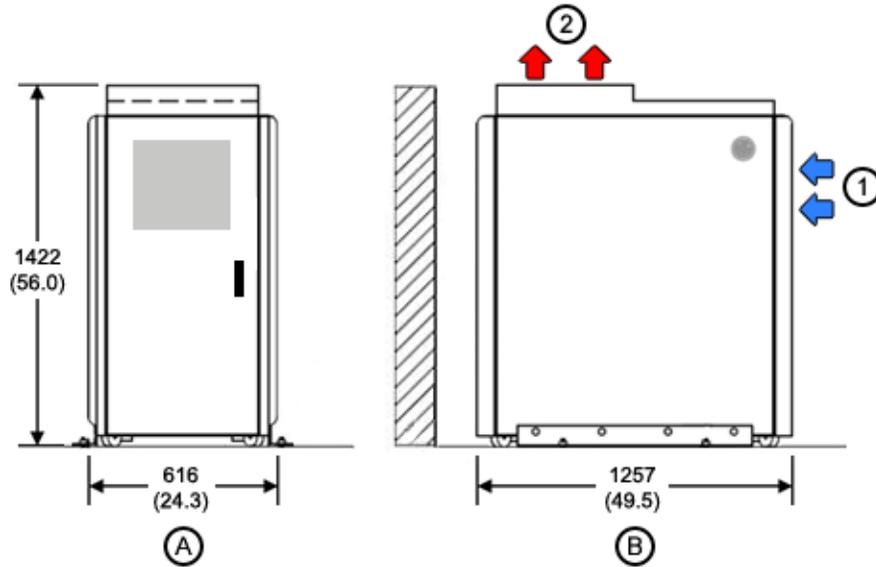
All dimensions are in millimeters; bracketed dimensions are in inches.			
A	Rear View	1	I/O Connections Panel
B	Top View	2	AC Power Input Box
		3	Rear vent access
		4	Front

Illustration 2-3: Q.Core and Operator Console Dimensions



All dimensions are in millimeters; bracketed dimensions are in inches.			
A	Side View	1	Air out
B	Front View	2	Air in
C	Top View	3	Wall
		4	Clearance (minimum)

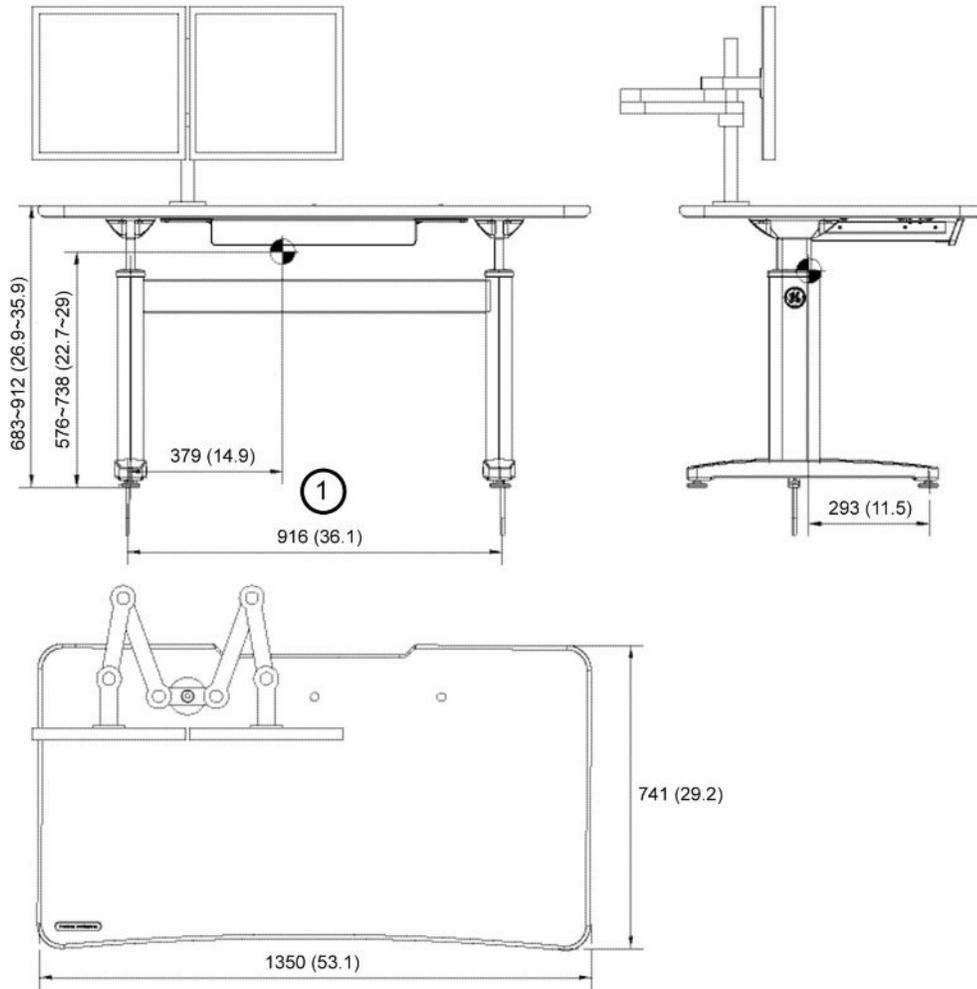
Illustration 2-4: PARC4 (Q.Core Power) Reconstruction Cabinet Dimensions



All dimensions are in millimeters; bracketed dimensions are in inches.

A	Front View	1	Air in (front of cabinet)
B	Side View	2	Air out (top of cabinet)

Illustration 2-5: Console Workspace Table Dimensions



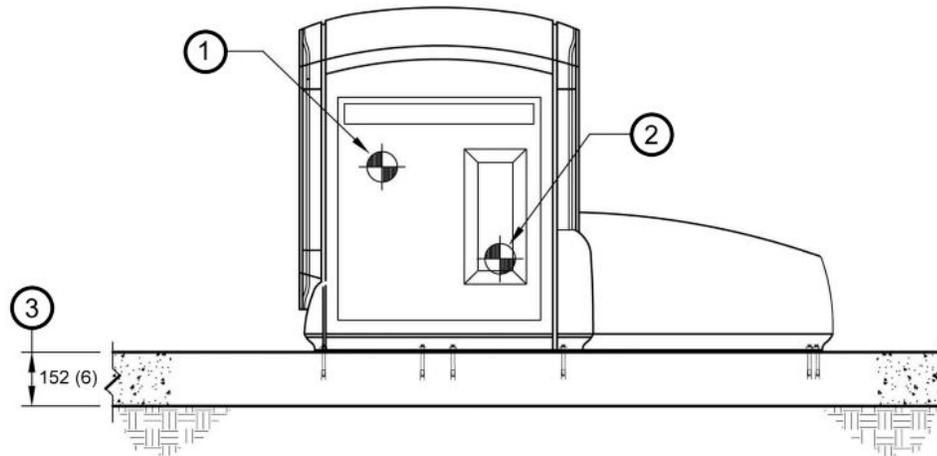
All dimensions are in millimeters; bracketed dimensions are in inches.

1	76 kg (167 lb)
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1.3 System Component Center-of-Gravity Diagrams

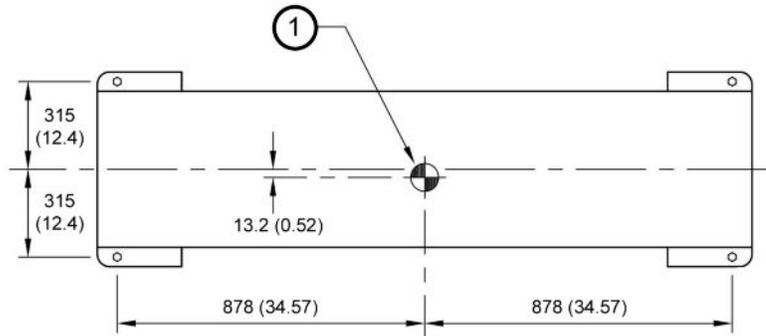
Refer to [Illustration 2-6](#) through [Illustration 2-15](#) for the individual system component center-of-gravity dimensions for the PET/CT system.

Illustration 2-6: CT/PET Gantry Center-of-Gravity (Side View)



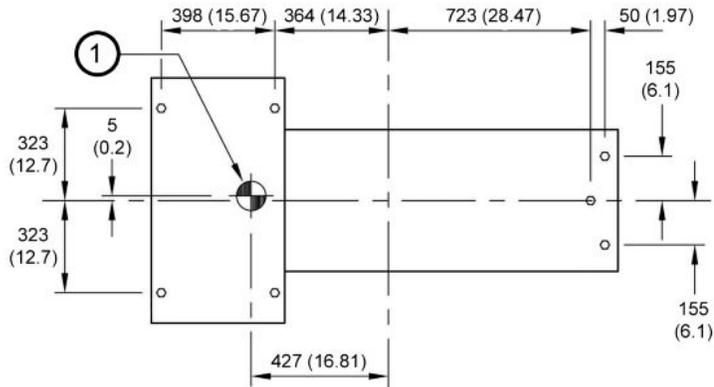
All dimensions are in millimeters; bracketed dimensions are in inches.	
1	Center of gravity for CT Gantry
2	Center of gravity for PET Gantry
3	Minimum thickness

Illustration 2-7: CT Gantry Center-of-Gravity (Top View – Plan at Base)



All dimensions are in millimeters; bracketed dimensions are in inches.	
1	Center of gravity weight (16 Slice) = 1682 kg (3700 lb); Y = 39.96"
	Center of gravity weight (64 Slice) = 1810 kg (3990 lb); Y = 39.96"

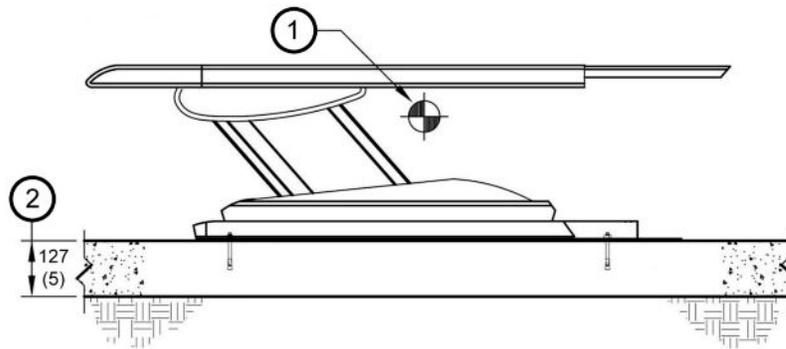
Illustration 2-8: PET Gantry Center-of-Gravity (Top View – Plan at Base)



All dimensions are in millimeters; bracketed dimensions are in inches.

1	Center of gravity weight = 1968 kg (4339 lb); Y = 22.69"
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Illustration 2-9: Patient Table Center-of-Gravity (Side View)

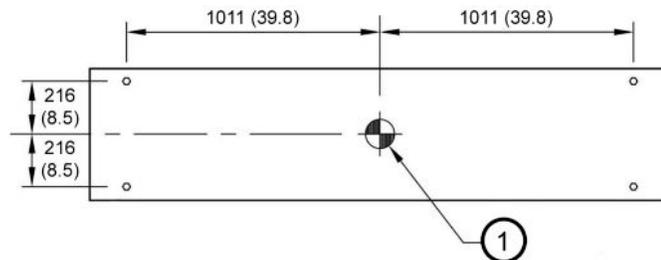


All dimensions are in millimeters; bracketed dimensions are in inches.

1	Center of gravity weight = 1049 kg (2308 lb); includes 227 kg (500 lb) patient
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2	Minimum thickness
---	-------------------

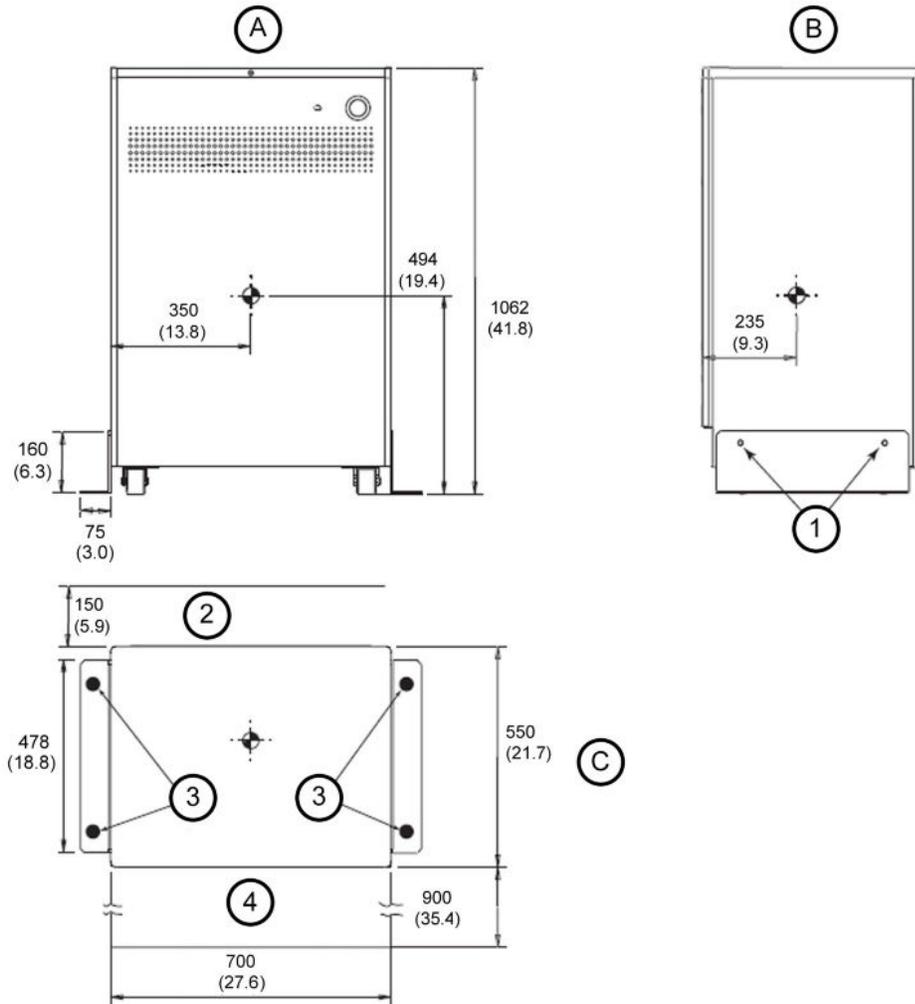
Illustration 2-10: Patient Table Center-of-Gravity (Top View – Plan at Base)



All dimensions are in millimeters; bracketed dimensions are in inches.

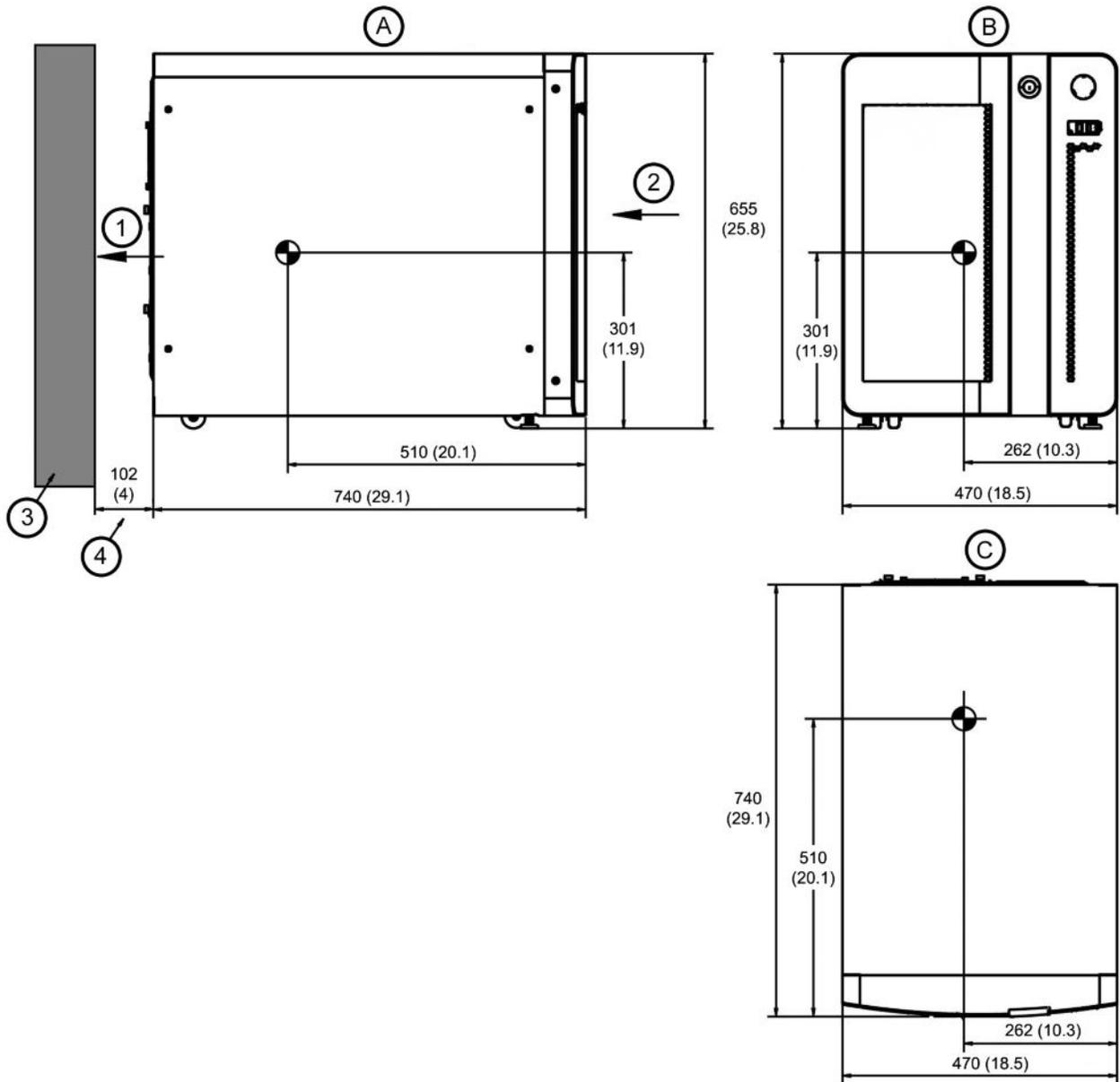
1	Center of gravity weight = 1049 kg (2308 lb); includes 227 kg (500 lb) patient. Y = 21.3"
---	---

Illustration 2-11: Power Distribution Unit Center-of-Gravity (NGPDU)



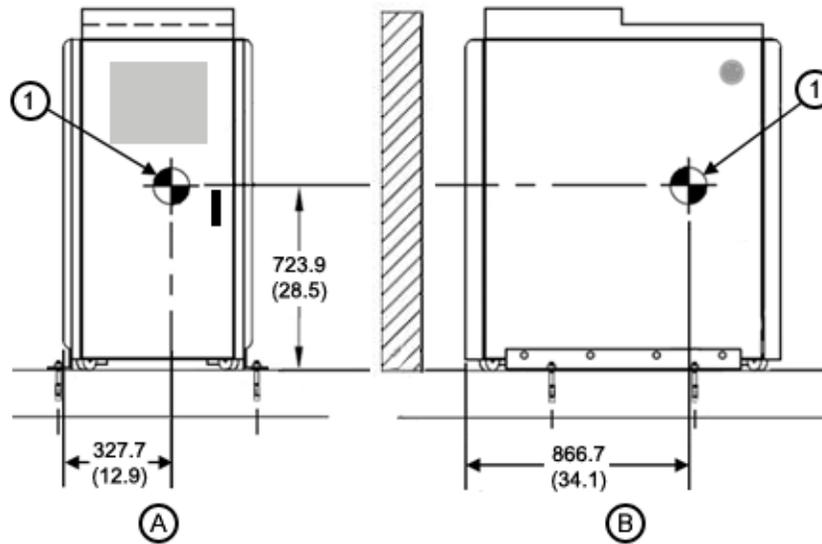
All dimensions are in millimeters; bracketed dimensions are in inches.			
A	Front View	1	Seismic mounting holes
B	Side View	2	Minimum air flow clearance
C	Top View	3	Seismic floor mounting holes; 15 mm (0.6 in.)
		4	Clearance (minimum)

Illustration 2-12: Q.Core and Operator Console Center-of-Gravity



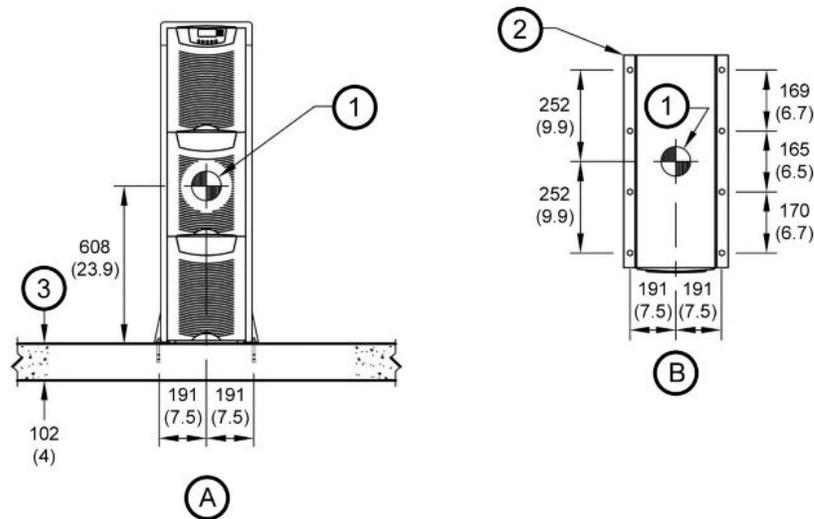
All dimensions are in millimeters; bracketed dimensions are in inches.			
A	Side View	1	Air out
B	Front View	2	Air in
C	Top View	3	Wall
		4	Clearance (minimum)

Illustration 2-13: PARC4 (Q.Core Power) Reconstruction Cabinet Center-of-Gravity



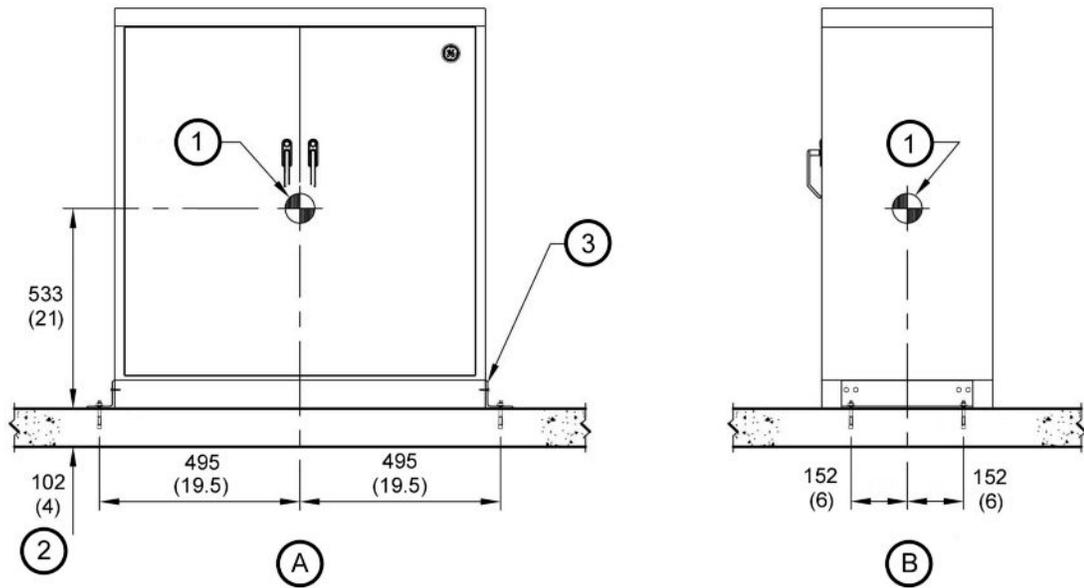
All dimensions are in millimeters; bracketed dimensions are in inches.			
A	Front View	1	Center of gravity weight = 246 kg (540 lb)
B	Side View		

Illustration 2-14: Uninterruptible Power Supply (UPS) Center-of-Gravity



All dimensions are in millimeters; bracketed dimensions are in inches.			
A	Front View	1	Center of gravity weight = 281 kg (619 lb)
B	Top View (plan at base)	2	Pre-manufactured mounting bracket (by GE)
		3	Minimum thickness

Illustration 2-15: Storage Cabinet Center-of-Gravity



All dimensions are in millimeters; bracketed dimensions are in inches.

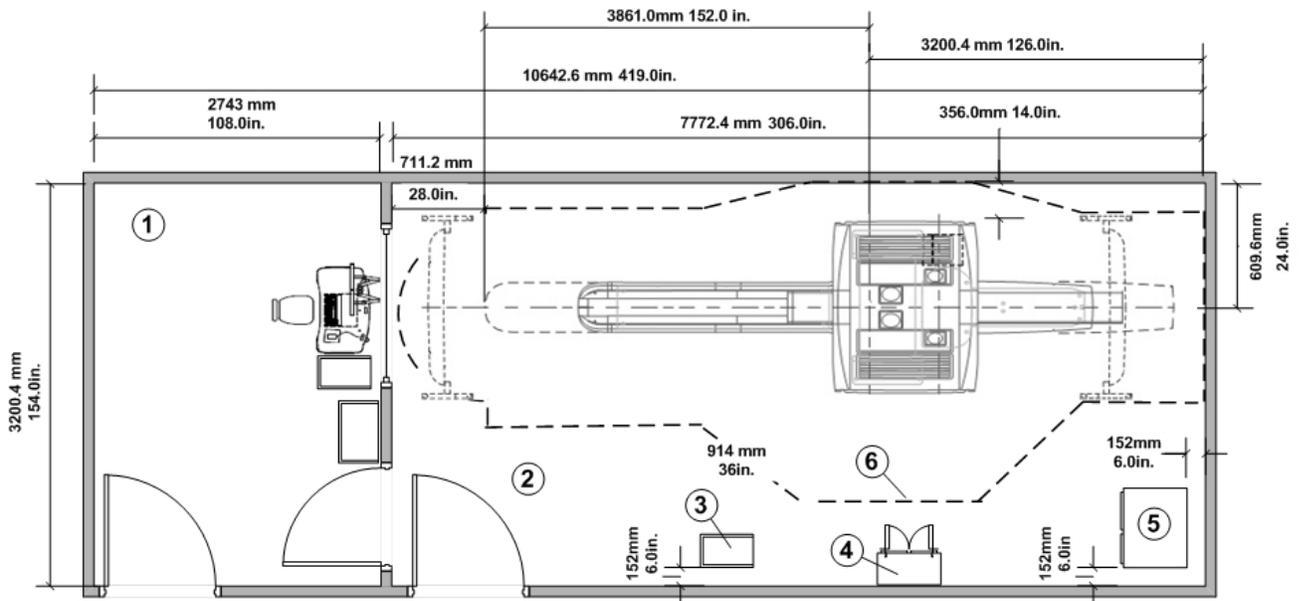
A	Front View	1	Center of gravity weight = 158 kg (350 lb)
B	Side View	2	Minimum thickness
		3	L 3" x 3" x 1/4" x 14" bracket mounted to cabinet frame with 4 - #12 S.M. screws (each side)

2 Room Layout

2.1 Scan Suite Configuration

A scan suite, which includes a control room and a scan room, requires a minimum room size to safely support all PET/CT service activities. An example of a typical system configuration is detailed in [Illustration 2-16](#).

Illustration 2-16: Typical Scan Suite Layout Configuration

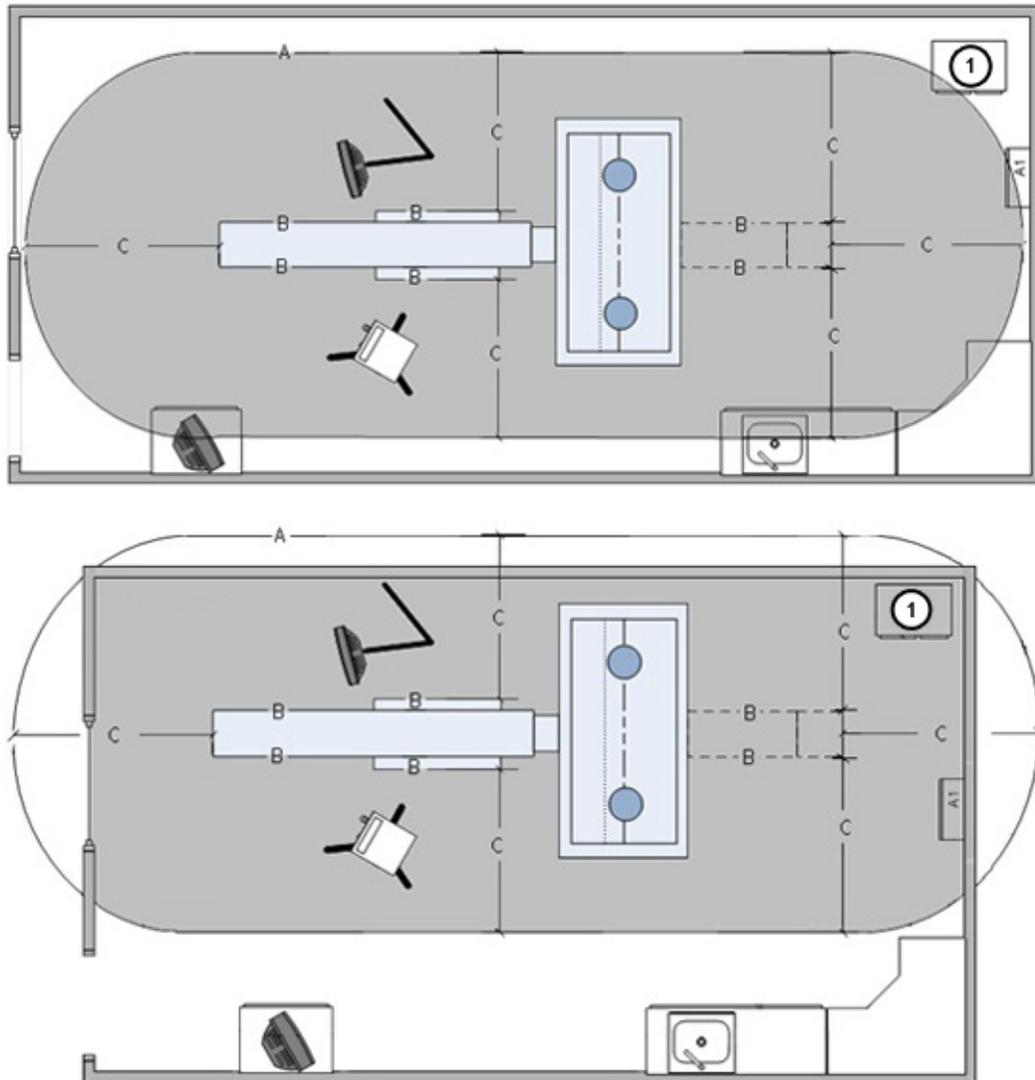


All dimensions are in millimeters (mm) and inches (in.).			
1	Control Room	4	Service Cabinet
2	Scan Room	5	PDU
3	Q.Core or PARC4 (Q.Core Power)	6	Service Clearance

The enclosure (Patient Touch) Leakage Envelope, as detailed in [Illustration 2-17](#), defines a zone in the Scan Room only, where the enclosure leakage must be tested. Areas that fall outside of this envelope DO NOT need to be tested. The intent of this graphic is to provide the PM with a view of potential electrical devices, plumbing fixtures, hospital gas outlets, and metal surfaces that may fall within this scan room envelope, which may require additional grounding prior to customer turnover. [Height of envelope from floor-to-ceiling: IEC-2 = 2286.0 mm (7.5 Ft.), IEC-3 = 1829.0 mm (6.0 Ft.). UL60601-1 (2.12.20 DV Addition) and GE Healthcare requirement.]

NOTE: The enclosure leakage envelope has nothing to do with Regulatory Work Space Clearance or Safe Egress requirements for Service Personnel (NFPA 70E).

Illustration 2-17: Leakage Envelope – Scan Room



1 = PDU, A = Patient Care Perimeter Envelope, B = Equipment Perimeter, C = Width and Height		
Reference	Dimension [C]	
	Width	Height
IEC Ed 2	1829.0 mm (6.0 Ft.)	2286.0 mm (7.5 Ft.)
IEC Ed 3	1829.0 mm (6.0 Ft.)	1829.0 mm (6.0 Ft.)

2.2 Minimum Scan Room Sizing

2.2.1 Scan Room Operational Space Requirement

For a minimum scan room layout, the customer should consider room workflow, patient care accessibility, critical-care equipment space requirements, and applicable local building codes. Refer to the dimensions detailed in [Illustration 2-16](#) and [Illustration 2-17](#).

2.2.2 Scan Room Equipment Accessibility

Minimum scan room layout provides limited equipment accessibility on the left side of the gantry, particularly when loading patients or when positioning equipment between the gantry and wall. Refer to the dimensions detailed in [Illustration 2-16](#) and [Illustration 2-17](#).

2.3 Minimum Control Room Sizing

2.3.1 Control Room Considerations and Requirements

The control room shall be suitably sized for the scanner desktop. Refer to the dimensions detailed in [Illustration 2-16](#) and [Illustration 2-17](#). The control room should also provide a comfortable working environment for the operator. Refer to [Chapter 4, HVAC Requirements](#).

2.3.2 Autoinjector Control Placement

Provide a suitable work area for placement of the autoinjector control, within reach of the scanner desktop. Autoinjector controls vary in size, depending on the manufacturer. Refer to the manufacturer's installation instructions.

2.4 Control Room Scanner Desktop Requirements

2.4.1 Scanner Desktop Configuration

The scanner desktop shall remain in the same configuration it was shipped. System components shall not be disassembled, removed, or rearranged.

Once the system is installed, do not relocate any system or operator components to a different counter, table, or location in the room.

2.4.2 Scanner Desktop Clearance

To ensure the exhaust fans located on the back of the scanner desktop vent without obstruction, maintain 152 mm (6 in.) of clear, unobstructed space along the sides of the desktop.

2.4.3 Scanner Desktop Power

No other electrical devices may be connected to the scanner desktop components. All other devices shall be connected to their own electrical outlet or power source.

2.4.4 Scanner Desktop Cables

Scanner desktop cables shall remain as shipped. Cables cannot be cut or lengthened to relocate the desktop monitor to a remote table or counter.

3 Hospital Equipment and Service Space Requirements

3.1 Clearances

3.1.1 Operational Clearances

Review operational clearances to verify daily use items will properly fit (beds, carts, wheelchairs, etc.).

3.1.2 Emergency Medical Equipment Clearances

Consider clearances for emergency medical equipment.

3.1.3 Replacement Parts and Service Equipment Space

Prior to the installation of the system, verify there will be adequate space in the scan room to receive and install all replacement parts and provide room for all service equipment that will be used during the installation.

3.1.4 Ceiling Height Requirements

The minimum ceiling height above the table and gantry shall measure at least 2286.0 mm (90.0 in.), or the minimum distance allowed by local laws and codes, whichever is greater, when measured from the floor to the finished ceiling.

3.2 Workplace Requirements

3.2.1 U.S. Code Requirements

The required service space, as noted in [Illustration 2-18](#) and [Illustration 2-19](#), has several conditions defined by the (U.S.) National Electrical Code (NEC). These conditions are defined by the wall type and accessibility/exposure to: electrical power panels, electrical outlets, surface mounted conduits, plumbing, hospital gases, or surface ground points directly opposite exposed CT equipment.

Work space clearances apply to equipment operating at 600V or less, where examination, adjustment, servicing, and maintenance is likely to occur with live parts exposed. System servicing requires a space for one service engineer to accomplish all system component replacement tasks without the need of special tools or equipment.

There shall be sufficient working space in the scan room to allow adequate egress during service operations that require both front and rear cover removal. If the customer and PM have any concern that the site will not provide adequate work space for egress under these conditions, the necessary provisions should be made to accommodate this event.

The customer shall maintain the required regulatory clearance distances and not use these areas for storage. This applies during normal system operation and during service inspection and routine maintenance.

This work space is defined where the cover has been removed in an area where service is performed, with power applied to the system. The conditions of this space are as follows:

Service Space: Also defined as Working Space by: IEC/NFPA 70e (Table 110.26) 2011 Edition. GE Healthcare also requires the following minimum work space requirements for the safe servicing of the product:

Working Space: Work space for equipment operating at 600 Volts, nominal, or less, to ground, and likely to require examination, adjustment, servicing, or maintenance while energized. Refer to the conditions in [Table 2-3](#) and [Table 2-4](#).

IEC/NFPA 70e (Table 110.26) 2011 Edition GE Healthcare requires the following minimum work space requirements for the safe servicing of the product.

Terms Defined for “Work Space Conditions”

- **Grounded Surface/Wall:** Made of concrete, masonry, brick, ceramic tile, or a wall that contains surface mounted electrical boxes, conduits, or ducting.
- **Ungrounded Surface/Wall:** Made of wood or other insulated construction material that will not create a path to ground when touched.
- **Obstructions:** Surface mounted floor ducts or other trip hazards, walls, pilasters, support columns, and equipment covers stored temporarily that would block direct access to an exit from the room.
- **Head Clearance:** Head clearance represents the height dimension of the work space, as measured from the floor directly in front of the equipment to the ceiling (or overhead obstruction). It requires a minimum of 1981 mm (78.0 in.), or the height of the equipment, whichever is greater.
- **Powered On Service – Work Space Egress - 712.0 mm (28.0 in.):** Any work space around the perimeter of the system or subsystem, shall have at least one unobstructed route to a direct exit of the room. The width of the exit route shall not be less than 712.0 mm (28.0 in.) along the entire length of the route. This emergency egress route must be free of obstructions and trip hazards, including equipment covers that may have been removed for service.
- **Small Room – (Not Recommended):** A condition of installation where the gantry may be placed a minimum of 356.0 mm (14.0 in.) from a wall where access to electrical power or the wall is not required. (Limited to the side of the gantry, opposite the Tube-Change side of the gantry.)

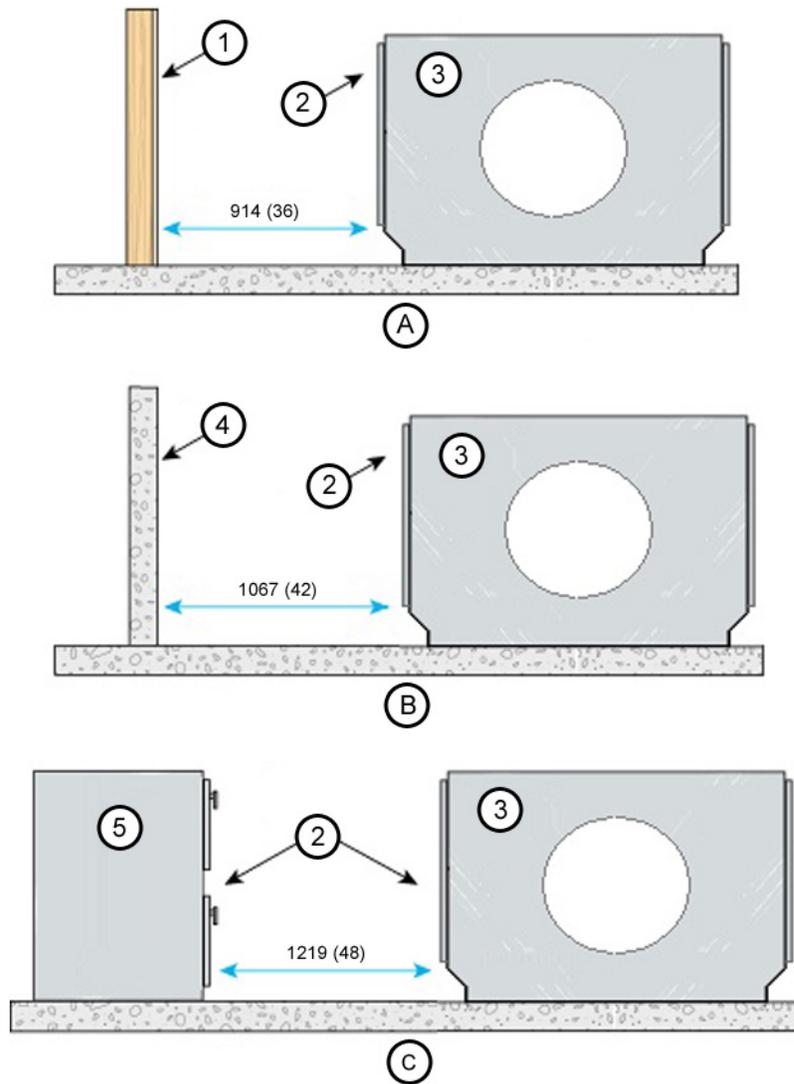
Table 2-3: Work Space Conditions

Dimension	Condition Number	Condition	Separation Distance mm (in.)
Length/Depth	1	If the depth of the working space is directly facing an ungrounded surface or wall without live voltage panels (600V or less) and without surface mounted ducts or conduits.	914.0 (36.0)
	2	If the depth of the working space is directly facing a grounded surface or wall.	1067.0 (42.0)
	3	If the depth of the working space is directly facing a surface or wall with live voltage panels (600V or less), grounded surface mounted ducts, or conduits.	1219.0 (48.0)
Width	4	Minimum width of the working space in front of the electrical equipment, unless the width of the equipment is larger.	762.0 (30.0)
		If the equipment is wider than 762.0 mm (30.0 in) the width of the equipment shall become the width of working space.	Size of Equipment
		The working space shall permit at least a 90 degree opening of equipment doors.	—
Height	5	Minimum Height of the working space shall be clear and extend from the grade (floor), unless the height of the equipment is higher.	2000.0 (78.0)
		If the equipment is taller than 2000.0 mm (78.0 in.), the required height of the working space shall become the height of the equipment.	Height of Equipment

Table 2-4: Small Room Condition

Small Room Condition	Separation Distance mm (in.)
Minimum distance required on the side of the gantry, opposite the Tube-Change side of the gantry.	356.0 (14.0)

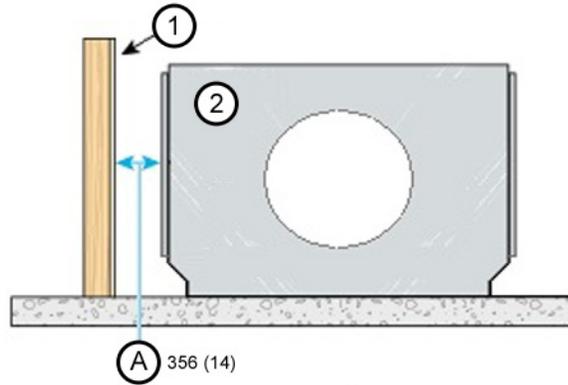
Illustration 2-18: Work Space Conditions



All dimensions are in millimeters; bracketed dimensions are in inches.

A	Condition 1	2	Exposed live parts
B	Condition 2	3	Scanner or subsystem
C	Condition 3	4	Grounded parts, concrete, etc.
1	Effectively insulated	5	A1, other electrical equipment power panels

Illustration 2-19: Small Room Condition



All dimensions are in millimeters; bracketed dimensions are in inches.	
1	Effectively insulated
2	Scanner or subsystem
A	Small Room Condition. No live parts to service on this side.

3.2.2 Cover Removal Clearance

System servicing requires sufficient space to remove all covers from the system.

3.3 Cover Clearance Requirements

3.3.1 Gantry Front Cover – Removal Clearance

Front cover removal requires a minimum clearance space of 3010 mm (118.5 in.). The cover is removed using a pair of dollies that allow the service engineer to remove the cover from the gantry, tilt the cover 90° to roll it to the foot end of the table, and then tilt the cover an additional 90° so it is upside-down, relative to its normal installation position. Minimum service clearances are a regulatory requirement.

3.3.2 Gantry Front Cover – Service Clearance

Once the front cover of the gantry is removed, the service engineer shall have the ability to reposition the cover to an area that satisfies the minimum regulatory service clearance. The cover cannot be placed in an area where it will encroach on the minimum service area.

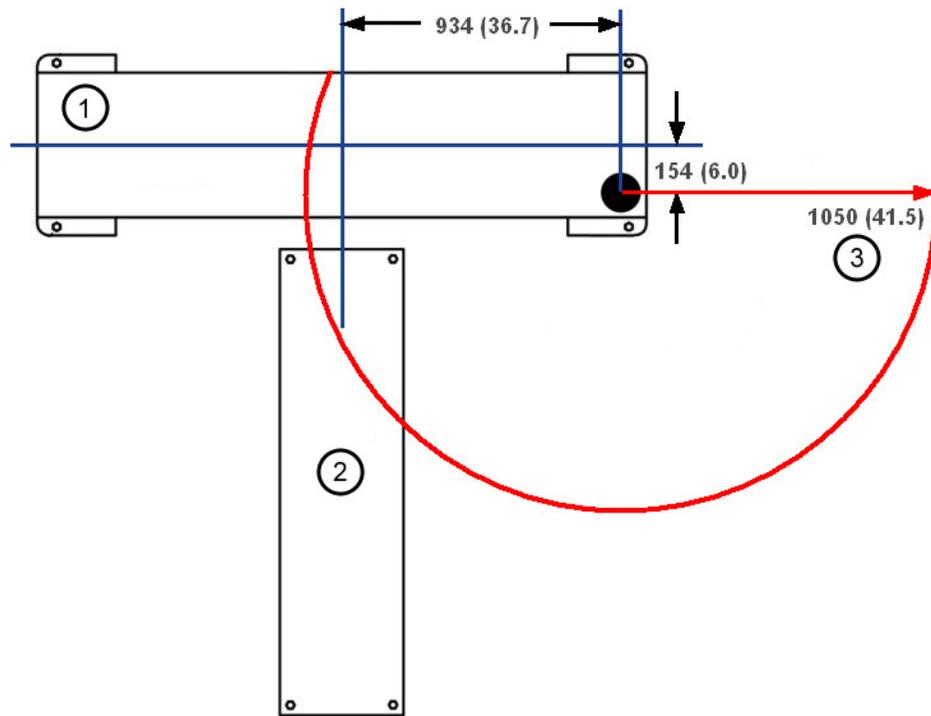
3.3.3 Gantry Rear Cover – Removal Clearance

Rear cover removal requires the use of tilting cover dollies with a minimum clearance width of 2388 mm (94 in.) and a depth of 584 mm (23 in.). Minimum service clearance space allows the service engineer to move the cover either straight back or off to one side of the table. The rear cover and dollies cannot extend into the service clearance space, even if the system is positioned diagonally. Minimum service clearances are a regulatory requirement.

3.4 Gantry Space Requirements

Specifications for Boom Assembly clearance arc are defined in [Illustration 2-20](#). The Boom Assembly is used during Tube and Detector replacement.

Illustration 2-20: Boom Assembly Clearances



All dimensions are in millimeters; bracketed dimensions are in inches.	
1	CT Gantry
2	Table
3	Clearance radius

3.5 PDU Placement Requirements

When positioning the PDU, consider regulatory compliance. Also, refer to the room layout illustrations in [Room Layouts](#).

3.6 Scanner Desktop Placement Requirements

3.6.1 Scanner Desktop Depth

The site shall maintain a working space at all times, with a minimum depth of 1219 mm (48 in.), extending the full width of the scanner desktop for service activity.

3.6.2 Scanner Desktop Operating Space

The console is on wheels. 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.

3.7 Q.Core Placement Requirements

The Q.Core unit is on wheels and is serviced from the left side. Power connections are located in the rear.

3.8 PARC4 (Q.Core Power) Reconstruction Cabinet Placement Requirements

The PARC4 (Q.Core Power) Reconstruction Cabinet is on wheels and can be pulled away from the wall for service. Power connections are brought in through an access panel on the bottom of the cabinet. Front clearance must be at least 152 mm (6 in.) for input air flow. Do not block upwards exhaust air flow on the top-rear area of the cabinet.

3.9 Trailer Requirements

Trailer is serviced from the right and left sides with power on and the gantry in the home position. Gantry-expanded power-on service is not recommended.

3.10 Storage Cabinet Requirements

A storage cabinet is provided by GE Healthcare to store all supplied service equipment. (See [Table 2-5](#) or [Table 2-6](#) for equipment list.) This storage cabinet should be located in the scan room suite area for easy service access.

Table 2-5: Discovery 610 and 710 (64 slice) Storage Cabinet and Equipment

Item	Size	Weight (total)
Storage Cabinet	46 x 91 x 107 cm (18" D x 36" W x 42" H)	45.3 kg (100 lb) (approximately)
QA Phantom (water filled)	23 x 15 cm (9" x 6")	4.5 kg (10 lb)
Phantom Holder	25 x 25 cm (10" x 10")	9.1 kg (20 lb)
FE Documents & CD/DVD		4.5 kg (10 lb)
Stool	48 x 48 cm (19" x 19")	1 kg (2 lb)
Blue Tote	81 x 51 x 32 cm (30" x 20" x 17")	2 kg (4 lb)
Install Support Kit (box)	30 x 30 x 38 cm (12" x 12" x 15")	9.1 kg (20 lb)
Tube Hoist Kit	77 x 8 cm and 38 x 15 cm (30" x 3" and 15" x 6")	13.6 kg (30 lb)
Balance Weight Kit	(2 boxes)	33 kg (73 lb)
Spatial Resolution Phantom	18 x 15 x 8 cm (7" x 6" x 3")	

Table 2-6: Optima 560, Discovery 610 and 710 (16 slice) Storage Cabinet and Equipment

Item	Size	Weight (total)
Storage Cabinet	46 x 91 x 107 cm (18" D x 36" W x 42" H)	45.3 kg (100 lb) (approximately)
QA Phantom (water filled)	23 x 15 cm (9" x 6")	4.5 kg (10 lb)
Phantom Holder	25 x 25 cm (10" x 10")	3.6 kg (8 lb)
FE Documents & CD/DVD		4.5 kg (10 lb)
35 CM Poly (Circle)	35 x 8 cm (14" x 3")	6.8 kg (15 lb)
48 CM Poly (Circle)	48 x 8 cm (19" x 3")	11.3 kg (25 lb)
Stool	48 x 48 cm (19" x 19")	1 kg (2 lb)
Blue Tote	81 x 51 x 32 cm (30" x 20" x 17")	2 kg (4 lb)
Install Support Kit (box)	30 x 30 x 38 cm (12" x 12" x 15")	9.1 kg (20 lb)
Tube Hoist Kit	77 x 8 cm and 38 x 15 cm (30" x 3" and 15" x 6")	13.6 kg (30 lb)
Balance Weight Kit	(2 boxes)	33 kg (73 lb)

Item	Size	Weight (total)
Spatial Resolution Phantom	18 x 15 x 8 cm (7" x 6" x 3")	

3.11 Verify Site Print

The customer shall ensure all equipment, storage cabinets, countertops, and sinks appear on the site print, in their proper location.

4 Anchoring

4.1 Anchoring Requirements – Non-Seismic Installation



WARNING

**POTENTIAL FOR PATIENT INJURY!
AN IMPROPERLY SECURED TABLE MAY TIP, DISLODGING THE PATIENT.
PATIENT SAFETY DURING SYSTEM OPERATION REQUIRES PROPER
ANCHORING OF SYSTEM COMPONENTS.**

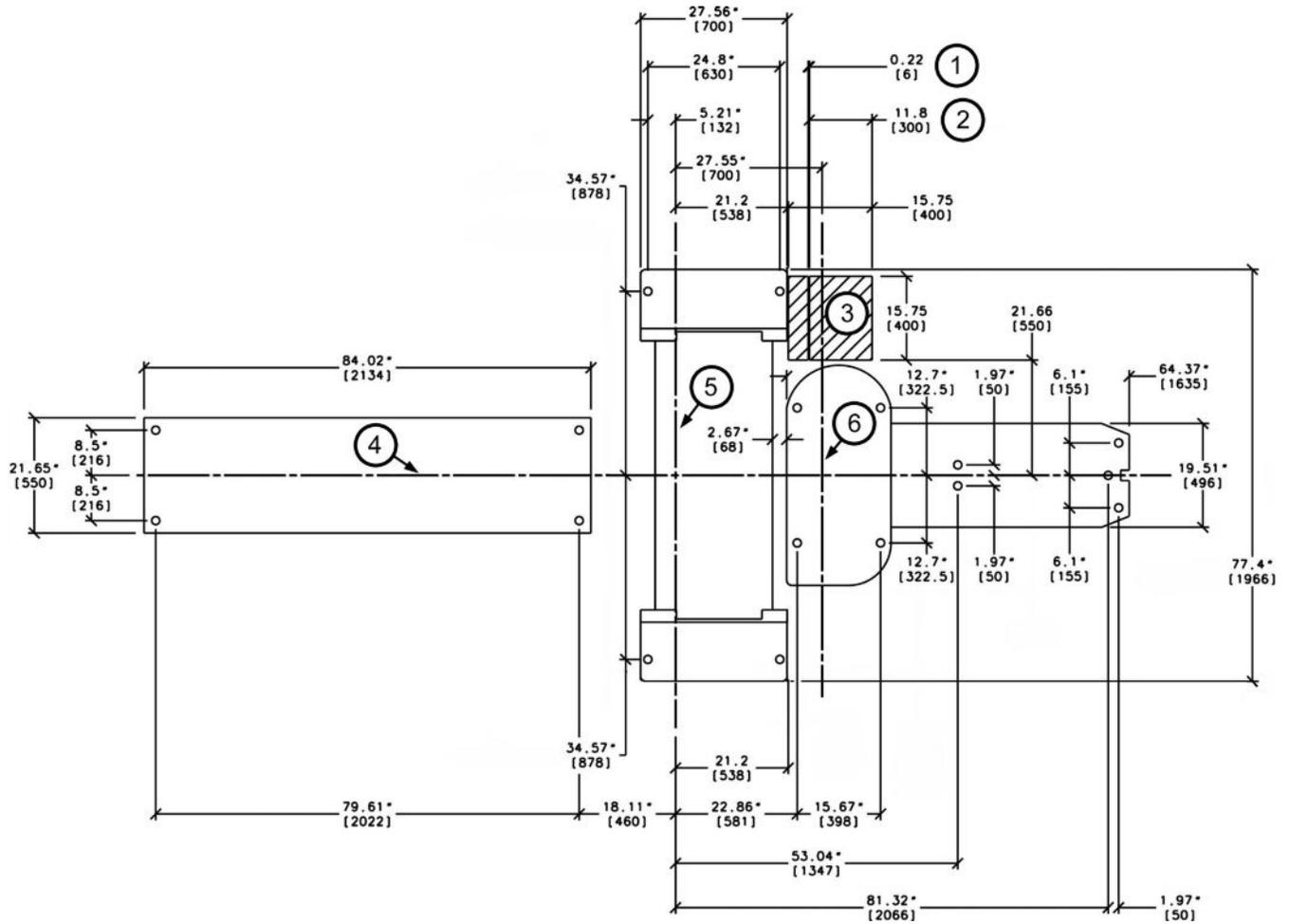
4.1.1 Gantry, Patient Table, and Trailer Anchoring – Non-Seismic

The Gantry, Patient Table, and Trailer shall be securely anchored to the floor (see [Illustration 2-21](#)). The scanner desktop, Power Distribution Unit, and system recon cabinet (Q.Core or PARC4 (Q.Core Power)) do not require anchoring to the floor in a non-seismic installation. Use the floor template (p/n 5322810) or its dimensions to locate the Gantry, Patient Table, and Trailer 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.

It is the responsibility of the buyer/purchaser of the system to have a licensed structural engineer work in conjunction with a qualified contractor to use either the GE-supplied floor anchor hardware or provide an equivalent anchoring system to mount the gantry and patient table to the floor.

The buyer/purchaser shall consult a licensed architect, licensed structural engineer, qualified contractor, or the PM to resolve all anchoring issues.

Illustration 2-21: Floor Mounting Detail

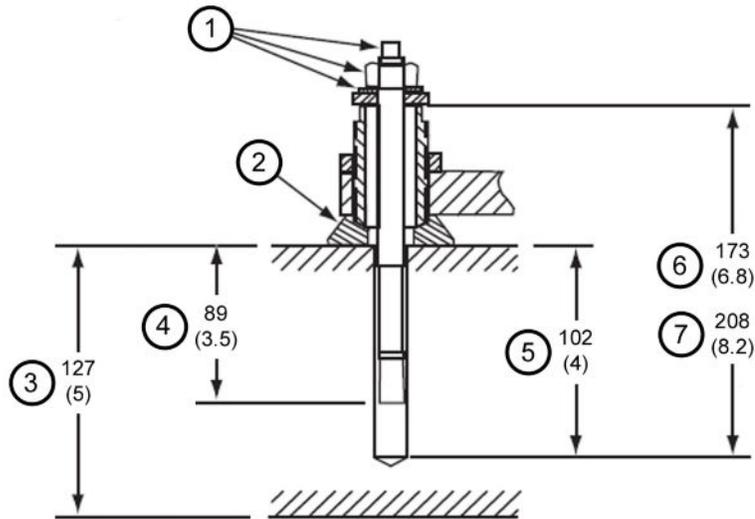


All dimensions are in inches; bracketed dimensions are in millimeters.			
1	Heat shield thickness	4	Table centerline
2	PET side of heat shield	5	CT scan plane centerline
3	Cable access area	6	PET primary scan plane centerline

4.1.2 GE-Supplied Anchors

The GE-supplied anchors for the Gantry, Patient Table, and Trailer shall only be used for mounting components to a concrete floor, in a non-seismic application. Refer to [Illustration 2-22](#) for anchoring requirements.

Illustration 2-22: GE-Supplied Floor Anchor Cross-Section



All dimensions are in millimeters; bracketed dimensions are in inches.	
1	Anchor Assembly
2	63.5 mm (2.5 in) diameter leveling pad 9.7 mm (0.38 in) height for short 8 inch rod 44.5 mm (1.75 in) height for long 10 inch rod
3	Floor depth
4	Minimum anchor embedment
5	Drill depth
6	For short 8 inch rod
7	For long 10 inch rod

4.1.3 Anchor Placement

Each floor anchor shall be installed to clear any structural object hidden or buried in the floor. (Hidden objects could be floor beams, rebar, and concrete wire mesh.)

4.1.4 Minimum Number of Anchors

Non-Seismic installations shall use a minimum of eight floor anchors to mount the Gantry, four floor anchors to mount the Patient Table, and five anchors to mount the Trailer. Any anchors showing more than 21 mm (~0.9 in.) of thread above the torqued nut shall require the installation of a second anchor in the closest adjacent mounting location. The second anchor shall meet the same requirements in [Illustration 2-22](#).

4.2 Anchoring Requirements – Seismic Installation

For a seismic installation, the buyer shall refer to all applicable state/local laws and building codes. Buyer shall consult with structural engineer, site contractor, or architect for seismic installation requirements. The purchaser can also contact a GEHC Project Manager to obtain additional seismic calculations and information.

Chapter 3 Special Construction Requirements

1 Radiation Protection

1.1 X-Ray Radiation Protection

1.1.1 Shielding Requirements

A qualified radiological health physicist shall verify the scan room radiation barrier is properly designed and installed, taking into consideration:

- Scatter radiation levels within the scanning room (see [Illustration 3-1](#) to [Illustration 3-4](#)).
- Equipment placement
- Weekly projected workloads (# patient/day technique (kvp*ma))
- Materials used for construction of walls, floors, ceiling, doors, and windows
- Access to surrounding scan room areas
- Equipment in surrounding scan room areas (such as film developer, film storage)
- For small and medium filter survey, the 20 cm water phantom should be placed on the phantom headholder inserted into the end of the patient table.

The four scatter surveys depict measured radiation levels within the scanning room at the indicated distances, while scanning a 16cm CTDI phantom for the Head Scan mode and 32cm CTDI phantom for the Body Scan Mode. The mAs, kV and aperture scaling factors are provided in [Table 3-1](#) and they can be utilized to adjust the exposure levels to the typical usage at the site.

For example: The exposure level for a 120kV, 800 mA, 1sec scan at 50" (127 cm) away from the scan plane is: 10.4 µGy (from [Illustration 3-4](#)) × 0.71 (from [Table 3-1](#)) × 800/100 (from [Table 3-1](#)) = 59.1 µGy.

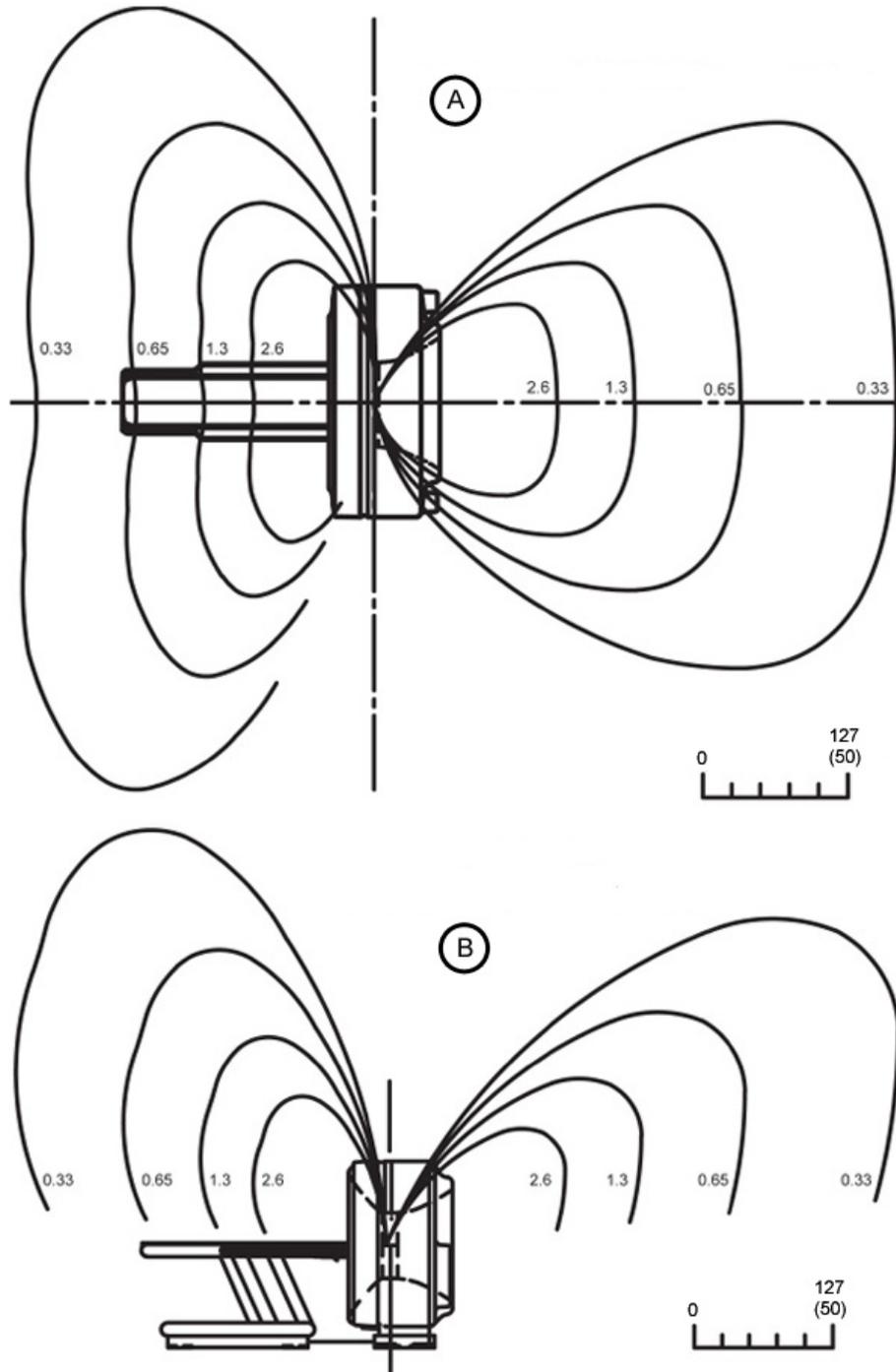
NOTE: Actual measurements can vary. Expected deviation equals ±15%, except for the 5mA and 1.25mm techniques, where variation may be greater (up to a factor of 2), due to the inherent deviation in small values. The maximum deviation anticipated for tube output equals ±40%. Isocurves already include the deviation margins.

Table 3-1: Shielding Requirements Scaling

Changed Parameter	Multiplication Factor	Changed Parameter	Multiplication Factor
mAs	new mAs/100	1.25 mm aperture	0.20
80 kV	0.24	2.5 mm aperture	0.22
100 kV	0.45	5 mm aperture	0.27
120 kV	0.71	10 mm aperture	0.38
140 kV	1.00	20 mm aperture	0.59
		40 mm aperture	1.00

1.1.2 System X-ray Scatter Envelope

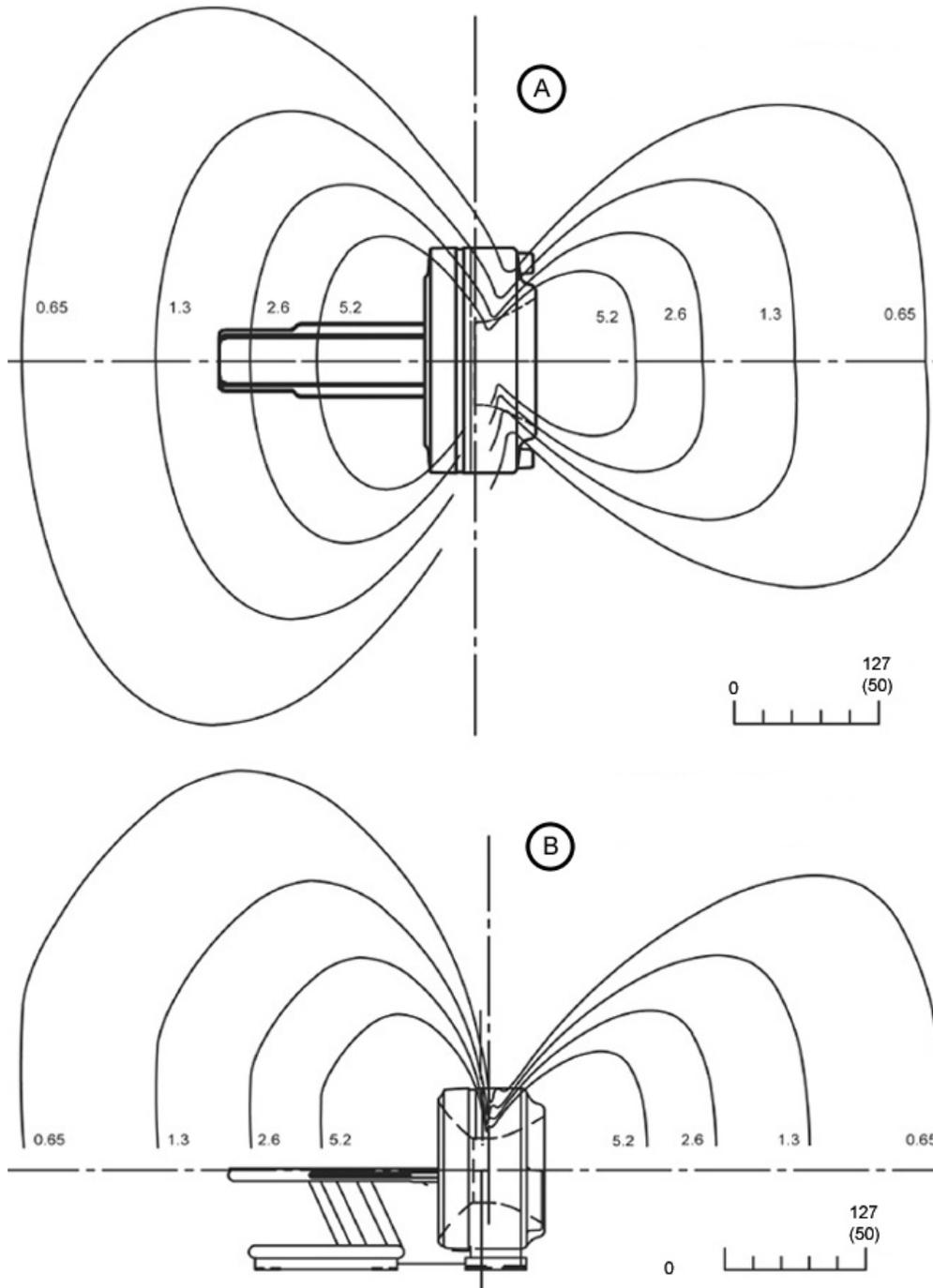
Illustration 3-1: Typical Scatter Survey (Small & Medium Filter) - 16 Slice Optima 560, D610, D710



Scale units: centimeters (inches). ISO-contour level units: $\mu\text{Gy}/\text{scan}$. Technique: 140 kV, 100 mA, 1 sec, 4x5.00 mm

A	Head Phantom (top view)	B	Head Phantom (side view)
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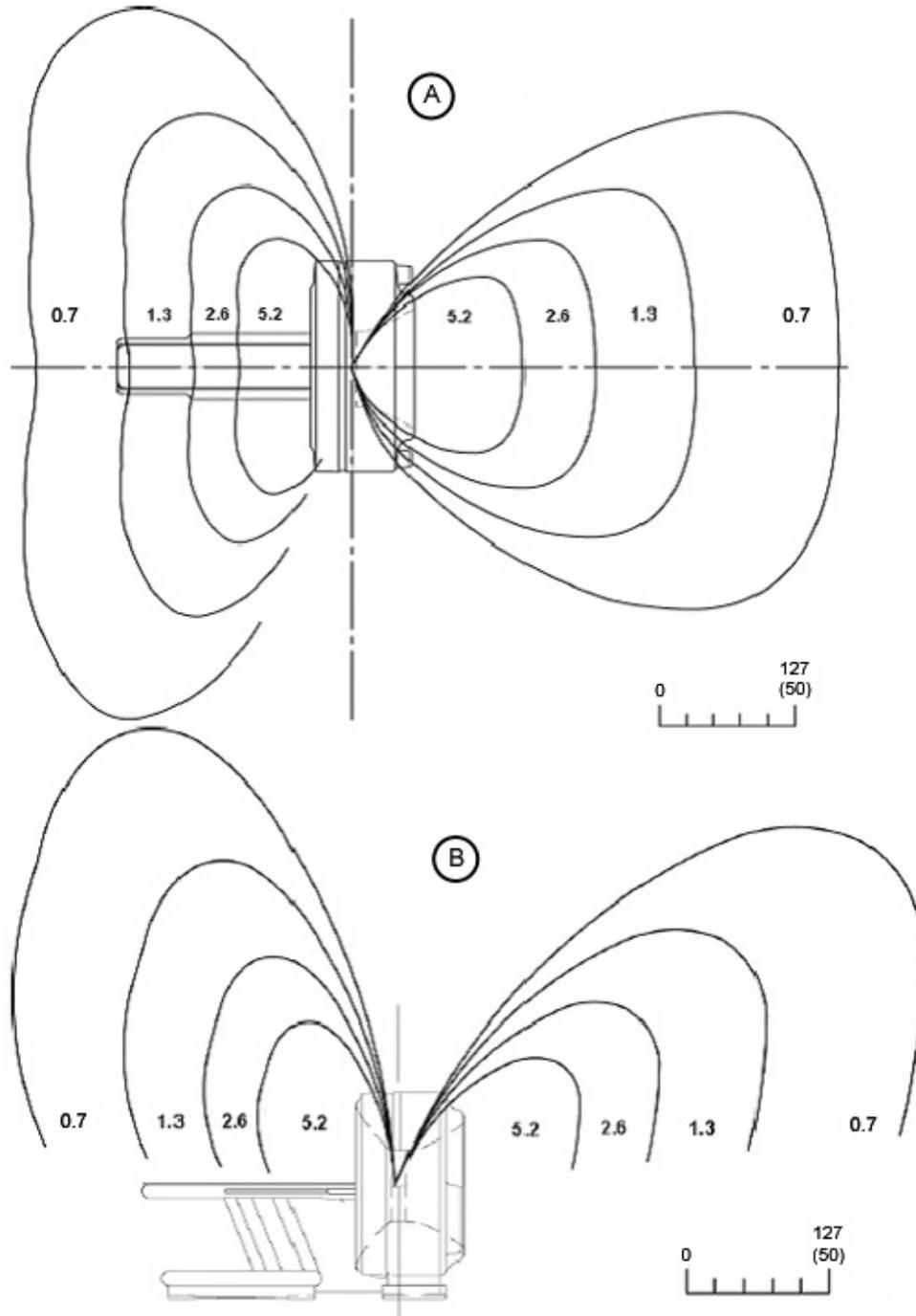
Illustration 3-2: Typical Scatter Survey (Large Filter) - 16 Slice Optima 560, D610, D710



Scale units: centimeters (inches). ISO-contour level units: $\mu\text{Gy}/\text{scan}$. Technique: 140 kV, 100 mA, 1 sec, 4x5.00 mm

A	Body Scatter (top view)	B	Body Scatter (side view)
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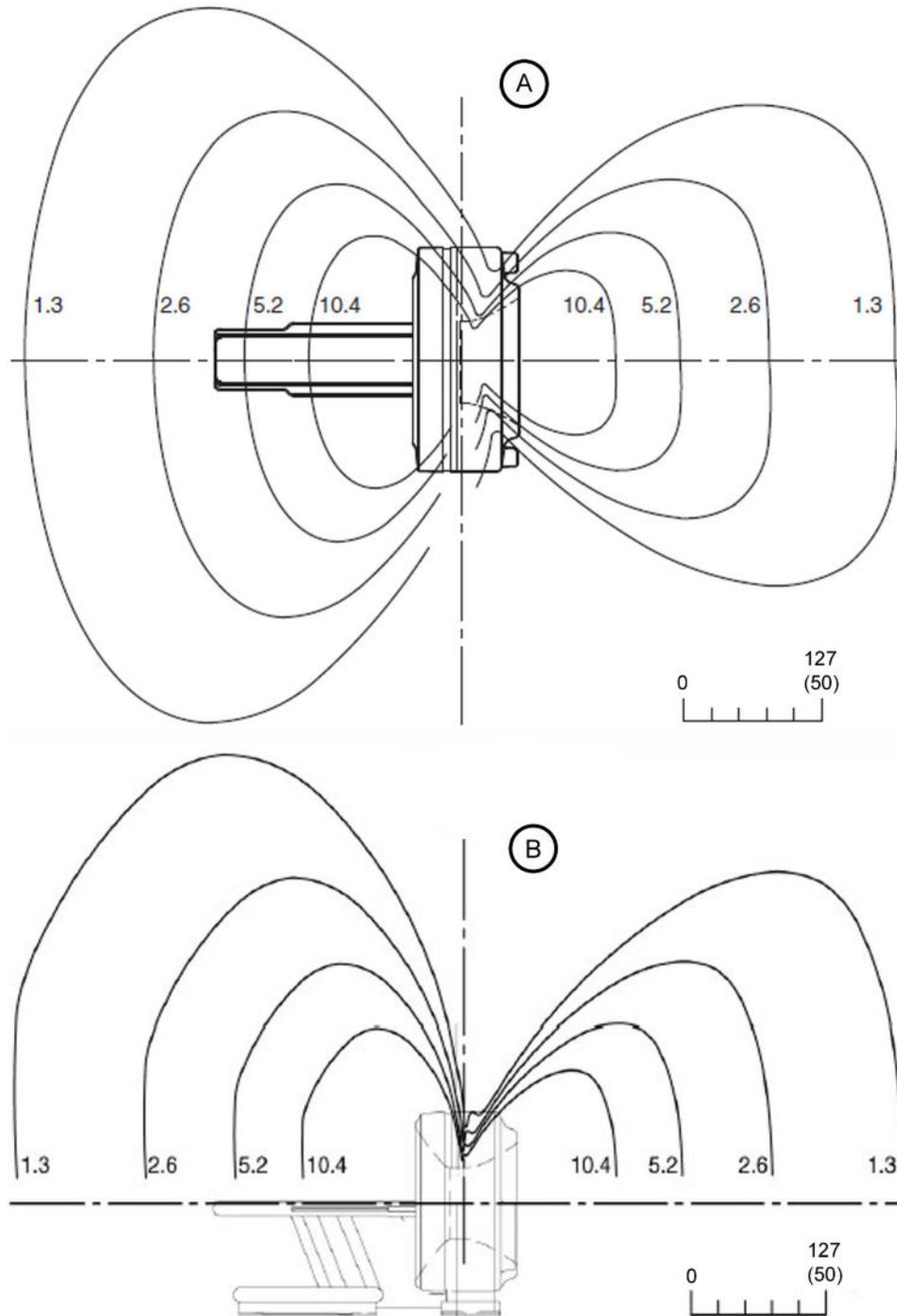
Illustration 3-3: Typical Scatter Survey (Small & Medium Filter) - 64 Slice D610, D710



Scale units: centimeters (inches). ISO-contour level units: $\mu\text{Gy}/\text{scan}$. Technique: 140 kV, 100 mA, 1 sec, 40 mm aperture

A	Head Phantom (top view)	B	Head Phantom (side view)
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Illustration 3-4: Typical Scatter Survey (Large Filter) - 64 Slice D610, D710



Scale units: centimeters (inches). ISO-contour level units: $\mu\text{Gy}/\text{scan}$. Technique: 140 kV, 100 mA, 1 sec, 40 mm aperture

A	Body Phantom (top view)	B	Body Phantom (side view)
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1.2 Gamma Ray Protection

A number of radioactive substances, of various levels of stability are used by the PET unit of the PET/CT system. This material is necessary in imaging procedures. Before the suite is

operational, unstable material may be on the premises. It is very important to recognize that clear and significant hazards from ionizing radiation may exist at the site, as it is undergoing preparation. Other equipment may be in place and operational at this time. This may include such equipment as X-ray systems and CT scanners (other than the CT Gantry within the PET/CT system). Calibration source may be on the site at some time during the preparation process, as well as after the PET imager has been put into operation. A cyclotron may be operational at the site. Definite steps should be taken to ensure the safety of workers, patients, and visitors, during all phases of the construction, installation and operation of the facility.

NOTE: By the time the site is ready to have radioactive material brought in, the licensing process must be complete. The site must be properly licensed before receiving radioactive material.

1.2.1 Protection of Equipment

It is important that background radiation be kept to a minimum. The coincidence detection used in a PET system allows a moderate amount of external singles events. The PET/CT system has been found to have less than 1% deadtime if the external field is below 1 mR/hr from a single source. Because area background can be more general than a single source, a lower limit is appropriate. If the area dose rate is maintained to less than 0.2 mR/hr (due to 511 or lower energy gamma rays) at the covers, detector deadtime should not exceed 1%.

Radioactive sources must be stored in approved shielded containers. It is recommended that any radioactive source not specifically designed to be housed in the gantry's lead storage container be stored in a separate room (hot lab) adjacent to, and accessible from, the Scan Room. This hot lab should be near the cyclotron (if used). Doses should be prepared in the same area.

Consideration should be given to the placement of the gantry in relation to existing X-ray, Magnetic Resonance, or Nuclear diagnostic equipment. Magnetic interference above 1.0 gauss, at the surface of PET components, can adversely affect the image quality. Good shielding techniques must be implemented in order to avoid this type of interference.

Some procedures involve the use of radioactive water. This will result in the patient exhaling radioactive carbon dioxide. This carbon dioxide must be contained in order to avoid adversely affecting the image quality. Some PET procedures require the use of radioactive gases. This too can result in compromising image quality if not properly controlled.

1.2.2 Protection of Personnel

The escape of radioactive gases, if not properly confined, can cause unnecessary exposure to clinical staff. All sources must be properly stored in appropriate enclosures to provide adequate protection to all in the suite.

1.2.3 Barriers, Partitions and Shielding

Appropriate barriers such as walls, lead-shielded glass, lead shields etc. must be installed to protect staff from unnecessary exposure to radiation. A qualified radiological health physicist must be consulted in the design of walls and safety barriers to assure proper attenuation.

Keep in mind that patients become significant sources of radioactivity. Consideration should be given to maximize the distance between the patient and operator during the uptake and acquisition phases of scan procedures.

1.2.4 External Sources of Radiation

A number of common radio nuclides are used in the PET/CT system. These radio nuclides are either produced at the site or brought to the site from an outside source. In either case, these nuclides have relatively short half-life (2 min. to 110 min.) and as such decay to benign levels fairly quickly. Typical positron emitting isotopes include: Carbon-11, Nitrogen-13, Oxygen-15, and Fluorine-18.

1.2.5 Dose Rate from Radioactive Pin Source

The PET/CT system uses one radioactive pin source during calibration and the Daily QA Check. During normal operation, the source pin remains in storage in a shielded container inside the PET trailer. The system automatically withdraws the source from its container before each use, and is automatically returned to the container after each use.

The dose rates described in this document are estimates, based on measurements taken under specific measurement conditions, described in detail for each measurement. Since the measurement conditions vary at every scanner installation (due to differing room geometries, the presence of other equipment or shielding material, etc.), use these measurements as guidelines only.

PET images are generated by measuring radiation resulting from electron positron annihilation events within the patient. No external radiation source is required to generate this data. The pin radiation source is never used during a patient scan.

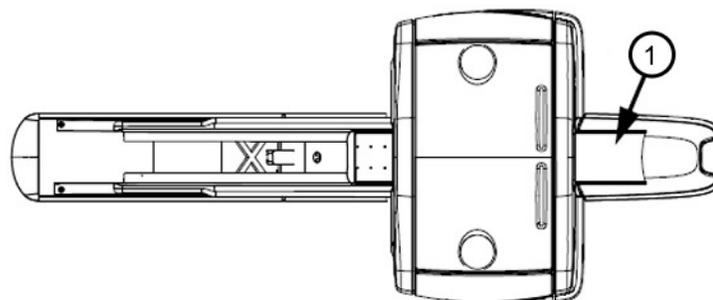
The system uses the source pin to:

- Calibrate the scanner's detectors and electronics.
- Assess the relative performance of the scanner's detector channels, so differences in individual detector efficiency can be accommodated during reconstruction.

The PET scanner uses a radioactive source pin that contains Ge68, an isotope with a half-life of 270.8 days. The radioactive source pin is referred to as "low activity pin." The pin has an initial activity level of 10MBq (0.27mCi) \pm 20% for Optima 560 and Discovery 610, and 18.5MBq (0.5mCi) \pm 20% for Optima 560 FX, and Discovery 710.

Refer to [Illustration 3-5](#). During normal system operation, the radioactive source pin resides in a storage container, located inside the PET Trailer, at the rear of the PET/CT gantry.

Illustration 3-5: Source Pin Storage Location



1	PET Trailer (Source Pin stored inside)
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When the pin is in use, it is located inside the gantry near the wall of the patient port. Depending on the task the pin is performing, it may be held in a fixed location or rotated around the circumference of the patient port at a speed of up to 20 revolutions per minute (one revolution per three seconds). The pin is transferred from the storage container to its position near the patient port, and returned to the storage container after use, by a mechanical system under software control. Radiation indicators are displayed on both the gantry control panels and the operator's keypad when the pin source leaves the storage container.

1.2.5.1 Dose Rates with Pin Source Stored

When the radioactive source pin is stored in the lead container, and no other sources are present in the scanner room, the maximum dose rates on the PET/CT system are directly over the source loader. The PET/CT system uses one pin with an initial activity level of 10MBq (0.27mCi) ± 20% or less for Optima 560 and Discovery 610, and 18.5MBq (0.5mCi) ± 20% for Optima 560 FX, and Discovery 710. The exposure rate at the cover is specified to equal 2mR/hr or less.

1.2.5.2 Dose Rates with Pin Source in Use

The dose rates were measured in the following conditions:

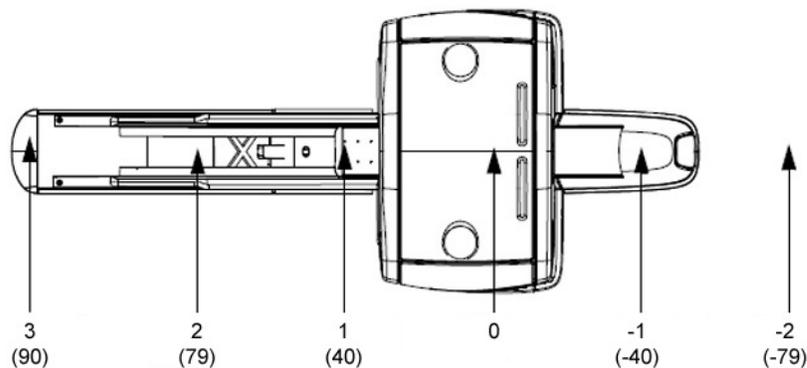
- Pin source rotating around the patient port.
- Patient table lowered to its lower limit (55 cm above the floor).
- All measurements were taken at a height equal the center of the patient port.

The results of these experiments, measured along the central axis of the scanner, are summarized in [Table 3-2](#). (Distances are measured from the front-most imaging slice; positive distance is in the direction towards the scanner table.)

Table 3-2: Dose Rate at Specified Distances

Distances	+3 m	+2 m	+1 m	Front Slice	-1 m	-2 m
Dose rate per mCi mR/hr/mCi	0.07	0.14	0.75	5.46	0.68	0.68

Illustration 3-6: Distance Measurement Location



All dimensions are in meters; bracketed dimensions are in inches.

1.2.6 PET Alignment (VQC) Phantom

The PET Alignment (VQC) phantom is used during the Check Image Alignment procedure. This special phantom contains spheres (commonly referred to as “marbles”). The five (5) small spheres embedded in the phantom are a source of very low radiation (0.7 MBq Germanium-68 per sphere; total 3.5 MBq for p/n 5308767 phantom). The average life of the phantom is 2.5 to 4.0 years. Individuals using this phantom must be trained to handle radioactive materials as well as maintain proper source handling procedures while handling the phantom. This may include local site-specific procedures for the safe handling of radioactive material.

2 Electromagnetic Interference (EMI) Consideration

2.1 Electromagnetic Interference (EMI) System Placement

If you know of, or suspect, the presence of excessive electromagnetic interference (EMI), consult your GE Healthcare PM or GE Sales and Service for recommendations to reduce EMI fields. Consider the following to reduce EMI:

- EMI field strength decreases rapidly with distance from the source of the electromagnetic field.
- EMI from a three-phase transformer is much less than a bank of three single-phase transformers of equivalent power.
- Large electric motors are a substantial source of EMI.
- High-powered radio signals are a source of EMI.
- Maintain good shielding of cables and electronic cabinets.
- Consider and measure EMI where the facility power is running near the scan room.
- Pay attention to power substations and high-voltage power lines near the scan facility.
- If you have any concerns, measure for all EMI to confirm the site meets all required specifications.

2.1.1 EMI – Gantry

The gantry shall be located in an area where the ambient static magnetic field is less than 10E-4 tesla (1000 milligauss) and the ambient AC magnetic field is less than 10E-6 tesla (10 milligauss); otherwise, EMI will affect the image quality of the scanner.

2.1.2 EMI – PDU

The gantry or patient table shall not be placed within 0.3 meters (12 in.) of the power distribution unit.

Sensitive electronics shall not be placed within 1.0 m (39 in.) of the power distribution unit.

2.1.3 EMI – Scanner Desktop/Computer Equipment

The scanner desktop and its associated computer equipment shall be located in an area where the ambient static magnetic field is less than 10E-3 tesla (10,000 milligauss).

2.1.4 Electromagnetic Immunity

The system is intended for use in the electromagnetic environment specified in [Table 3-3](#). The customer, or the user of the system, shall ensure the system is used in such an environment.

Table 3-3: Electromagnetic Immunity

Immunity Test	EC 60601–1–2 Test Level	Compliance Level	Electromagnetic Environment Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors shall be concrete. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 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 a typical commercial or hospital environment.
Surge IEC 61000-4-5	5 ± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % U_T (> 95% dip in U_T) for 5 sec	< 5 % U_T (> 95% dip in U_T) for 5 sec	Mains power quality should be a typical commercial or hospital environment. If the user of the system requires continued operation during power mains interruptions, it is recommended that the system is powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3 (Alternative method: Full range IEC 61000-4-21 test in lieu of Large, Permanently-Installed Equipment exemption)	3 VRMS 150 kHz to 80 MHz 3 V/m 150 kHz to 80 MHz	3 V 150 kHz to 80 MHz 3 V/m 150 kHz to 80 MHz	Do not use portable and mobile RF communications equipment closer to any part of the system, including cables, than the recommended separation distance calculated from the equation appropriate for the frequency of the transmitter. Recommended Separation Distance: See Table 3-4 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). 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: 
<p>^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 system is used exceeds the applicable RF compliance level above, the system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the system.</p> <p>^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			

2.1.5 Electromagnetic Separation Distance

Maintain the electromagnetic separation distance as described in [Table 3-4](#) (between 150K to 2.5G Hz).

Table 3-4: Recommended Separation Distances

Rated Maximum Output Power (P) of Transmitter Watts (W)	Separation Distance (Meters) by Frequency of Transmitter		
	150 kHz to 80 MHz $d = \left[\frac{3.5}{3}\right]\sqrt{P}$	80 MHz to 800 MHz $d = \left[\frac{3.5}{3}\right]\sqrt{P}$	800 MHz to 2.5 GHz $d = \left[\frac{7}{3}\right]\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.69	3.69	7.38
100	11.7	11.7	23.3

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 power (P) is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE: At 80 MHz to 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.

As an example, keep a 1 W mobile phone (800 MHz to 2.5 GHz carrier frequency) at least 2.3 m from the PET/CT system (to avoid image interference risks).

Limitations Management:

Adhering to the distance separation recommended in (150 KHz to 2.5 GHz) reduces disturbances recorded at the image level, but may not eliminate all disturbances. However, when installed and operated as specified, the system maintains its essential performance by continuing to acquire, display, and store diagnostic quality images safely.

2.1.6 Cable Shielding and Grounding

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

GE Healthcare is not responsible for any interference caused by using other than recommended interconnect cables or panels, or by unauthorized changes or modifications to this equipment.

Unauthorized changes or modifications could void the users' authority to operate the equipment.

2.2 Electromagnetic Emission

This equipment complies with IEC 60601-1-2 Edition 3 (2007) EMC standard for medical devices.

NOTE: This system complies with the EMC standard when used with supplied cables. If cables of different lengths are required, contact your PM. Cables cannot be cut, shortened, lengthened, or spliced.

The system is suitable to be used in an electromagnetic environment, in compliance with the limits and recommendations provided in [Table 3-5](#).

Table 3-5: Electromagnetic Compliance

Emissions Test	Compliance	Electromagnetic Environment Guidance
RF emissions CISPR 11	Group 1	The system uses RF energy only for its internal function. Therefore, its RF emissions are very low and not likely to cause interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	When installed in such a shielded location, the scanner 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	N/A	N/A
Voltage fluctuation/ flicker emissions IEC 61000-3-2	N/A	N/A

3 Vibration Isolation

3.1 Scanning Facility Vibration Isolation

The scanning facility shall be isolated from vibration such as; hospital power plants, pumps, motors, air handling equipment, air conditioning units, nearby rooms with exercise equipment or where exercise occurs, hallway foot traffic, elevators, parking lots, roads, subways, trains, and heliports; otherwise, vibration will affect the image quality of the scanner.

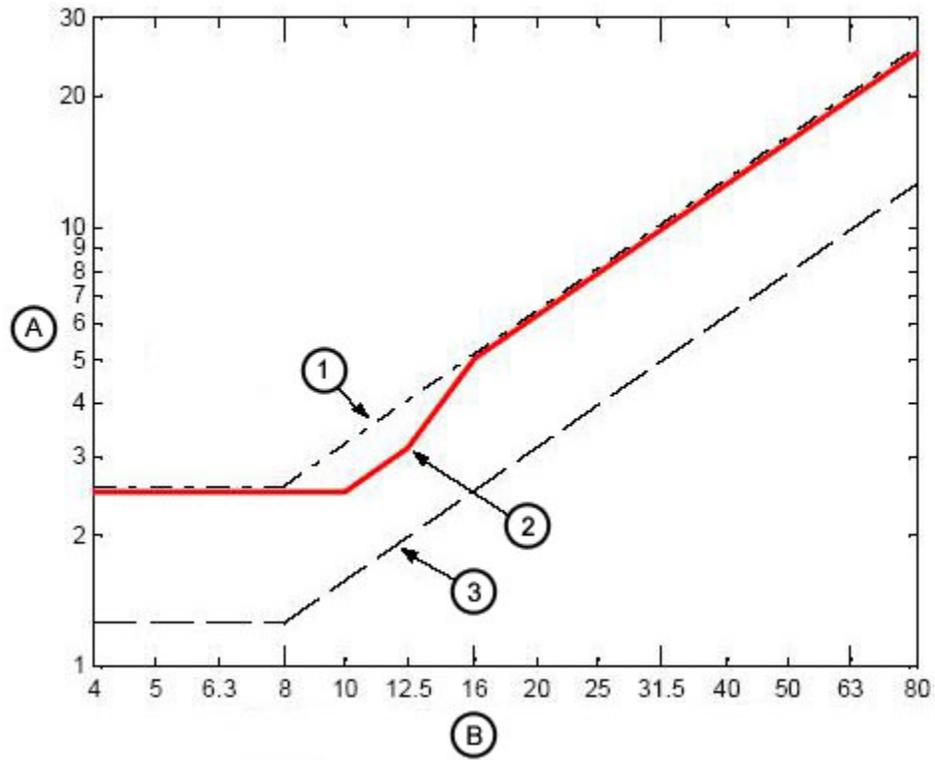
3.2 Frequency/Vibration Range

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

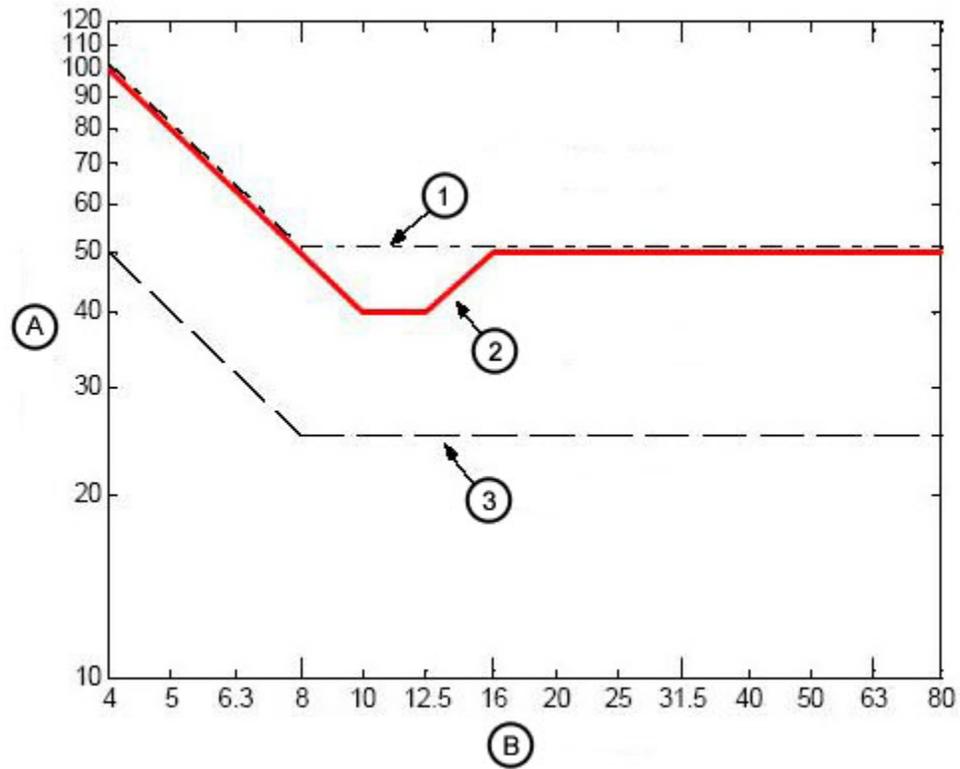
Floor vibration from any source shall not exceed the levels detailed in [Illustration 3-7](#) and [Illustration 3-8](#), as represented by the solid line labeled CT Scanner/Table. These illustrations compare this limit to the limits of what the AISC (American Institute of Steel Construction) and the ISO (International Organization for Standardization) call Class A (VC-A) and Class B (VC-B).

Illustration 3-7: Allowable floor vibration in acceleration units compared to ISO class A and B limits



A	Acceleration [mm/s ² , rms]	Frequency [Hz]	Acceleration [mm/s ² , rms]
B	One-Third-Octave Band Center Frequency [Hz]	42	2.5
1	VC-A (50 μm/s)	10	2.5
2	CT Scanner/Table	12.5	3.1
3	VC-B (25 μm/s)	16	5
		80	25

Illustration 3-8: Allowable floor vibration in velocity units compared to ISO class A and B limits



A	Velocity [$\mu\text{m/s}$, rms]	Frequency [Hz]	Velocity [$\mu\text{m/s}$, rms]
B	One-Third-Octave Band Center Frequency [Hz]	4	100
1	VC-A (50 $\mu\text{m/s}$)	10	40
2	CT Scanner/Table	12.5	40
3	VC-B (25 $\mu\text{m/s}$)	16	50
		80	50

4 Other Construction Considerations

4.1 Patient Viewing Window Dimensions

The recommended patient viewing window is: 1219 mm wide x 1067 mm high (48 in. x 42 in.).

4.2 Support Structure Installation

Approved steelwork or equivalent support structure for mounting equipment to walls, ceilings, and floors shall be installed prior to the system installation.

4.3 Chemical Contamination Concerns



WARNING

THE SILVER, COPPER, GOLD FILMS USED IN THE CT SYSTEM ARE ESPECIALLY SENSITIVE TO CHEMICAL CONTAMINATION. THE PRESENCE OF SULFIDE, CHLORIDE AND NITRATE CONTAMINATES (WITH SULFUR BEING THE MOST DAMAGING), CAN DAMAGE THE CT SYSTEM. IF HIGH LEVELS OF CONTAMINATES EXIST, CONSIDER INSTALLING AN APPROPRIATE AIR FILTRATION SYSTEM.

The scanner shall not be installed in the same room with a wet film processor. Certain scanner components could become contaminated by the chemicals contained in the processor.

Ensure any sulfide, chloride, or nitrate contaminate levels are at acceptable levels (Class 1). See IEC 60654-4 for air quality guidelines.

4.4 Finished Wall Requirement

4.4.1 Wall Paint

The scan and control room walls shall be painted prior to the system installation.

4.4.2 Wall Paint - Exception

A primer coat of paint is acceptable for system installation. After the system is installed, any final coats of paint shall be applied by brush. Spray painting is not permitted as it can seriously damage CT system components.

NOTE: Spray painting is not permitted. Spray painting can seriously damage CT system components.

4.5 Option Requirements

4.5.1 Non-GE Installed Options

Buyer/purchaser shall confirm all non-GE installed options have been reviewed and final locations determined. Prior to system installation, the buyer/purchaser shall be responsible for pre-installing all ceiling mounting plates/pedestals for non-GE installed options prior to system delivery.

4.5.2 GE Options

Buyer/purchaser shall confirm all GE-installed options have been reviewed and final locations determined.

4.5.3 Options Power and Control Cables

Buyer/purchaser shall install all power source/connections and all control cables for all options prior to system delivery.

Chapter 4 Environmental Requirements (HVAC)

1 HVAC Requirements

The following standard is referenced in this section: IEC 60654-4

1.1 Climate Requirements

1.1.1 Air Quality

All construction, finish, and construction cleanup work of the scanner suite shall be completed prior to the installation of the CT system to prevent exposing the system to construction material contamination.

1.1.1.1 Construction Dust Concerns

Ensure NO construction dust occurs in or immediately around the scan suite. Avoid:

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

Failure to protect the CT system from these types of dust may result in damage to the system and early system failure.

1.1.1.2 Chemical Contamination Concerns



WARNING

THE SILVER, COPPER, GOLD FILMS USED IN THE CT SYSTEM ARE ESPECIALLY SENSITIVE TO CHEMICAL CONTAMINATION. THE PRESENCE OF SULFIDE, CHLORIDE AND NITRATE CONTAMINATES (WITH SULFUR BEING THE MOST DAMAGING), CAN DAMAGE THE CT SYSTEM.

IF HIGH LEVELS OF CONTAMINATES EXIST, CONSIDER INSTALLING AN APPROPRIATE AIR FILTRATION SYSTEM.

The scanner shall not be installed in the same room with a wet film processor. Certain scanner components could become contaminated by the chemicals contained in the processor.

It is the responsibility of the buyer/purchaser to insure any sulfide, chloride, or nitrate contaminate levels are at acceptable, low levels (Class 1). See IEC 60654-4 for air quality guidelines.

1.1.2 Temperature and Humidity Requirements

Ensure the site provides an HVAC system capable of maintaining the temperature and humidity requirements as specified in [Table 4-1](#) and [Table 4-2](#). The environmental conditions at the site shall be maintained at all times (including overnight, weekends, and holidays). Environmental

conditions apply to the Table, Gantry, Power Distribution Unit, Q.Core/PARC4 (Q.Core Power) and scanner desktop.

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

Table 4-1: 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 4-1](#) during room thermal cycling. For example, if the HVAC is capable of $\pm 2^\circ$ C control, then the limits would be 20° C - 24° C to maintain absolute limits.

Table 4-2: Humidity (Scan and Control Rooms)

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

1.1.3 Altitude Operating Range

The system shall be operated within an altitude range of -150 m to 2400 m (-492 ft. to 7875 ft.) sea level.

1.1.4 Environmental Conditions Verification

The temperature and humidity of the installation site shall be recorded before and after system installation to verify the environmental conditions of the site are met. Any necessary changes shall be made to maintain the proper environmental conditions.

1.1.5 Patient Comfort

Consider patient comfort needs when designing or modifying the HVAC system for the scan suite. To prevent cold air from venting onto patients, position air supply ducts in exam room so they do not discharge onto the patient Table. Position ducts over Gantry.

1.2 Heat Output

[Table 4-3](#) details the heat load produced by the PET/CT system and its various components. Use the BTU/Wattage ratings listed to determine the requirements of the HVAC system.

- Gantry air INTAKE occurs along the BOTTOM of the Gantry.
- Gantry air EXHAUST occurs along the TOP of the Gantry.
- PARC4 (Q.Core Power) air INTAKE occurs along the FRONT of the PARC4 (Q.Core Power). PARC4 (Q.Core Power) air EXHAUST occurs at the TOP of the PARC4 (Q.Core Power).

Table 4-3: System Heat Load*

System Components	Maximum BTU/HR	Maximum Kilowatts
-------------------	----------------	-------------------

Scan Room:		
CT Gantry	18766	5.50 kW
PET Gantry	5971	1.75 kW
Table	1024	0.30 kW
Power Distribution Unit (PDU)	3400	1.00 kW
Q.Core (Recon Cabinet)	2457	0.72 kW
PARC4 (Q.Core Power) (Reconstruction Cabinet)	6824	2.0 kW
Scan Room Subtotal:	31618 (35985 with PARC4 (Q.Core Power))	9.27 kW (10.55 with PARC4 (Q.Core Power))
Control Room:		
Operator Console	2860	0.84 kW
LCD Monitor (2 units, 170 BTU/50 Watts each)	340	0.10 kW
Peripheral Media Tower (PMT)	425	0.13 kW
Control Room Subtotal:	3625	1.07 kW
System Total	35243 (39610 with PARC4 (Q.Core Power))	10.34 kW (11.62 with PARC4 (Q.Core Power))

* Does not include heat load from room lighting, non-PET/CT equipment, personnel, etc.

1.3 Air-Handling System Initial Start-Up Considerations

Prior to the initial start-up of the scan suite air-handling system, ensure the air-handling system ducts and filters are thoroughly clean of dust and other potential airborne contaminants.

After new construction or scan suite renovation, the air-handling ventilation system, on initial startup, could blow dust and other airborne contaminants throughout the scan suite, potentially damaging the PET/CT scanner.

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Chapter 5 Electrical Requirements

1 Power Requirements

1.1 Regulations

NFPA 70E Standard

All electrical work shall comply with NFPA 70E: Standard for Electrical Safety in the Workplace.

1.2 Disconnects

1.2.1 Emergency Off Switch

The A1 mains disconnect shall provide over-current protection for the entire system and have at least one Emergency OFF switch within the scan suite, near the scanner desktop.

1.2.2 Local Disconnects

The A1 mains disconnect with Lock-out and Tag-out (LOTO) capability shall be installed within the scan suite. See [Illustration 5-1](#).

Illustration 5-1: Typical Primary Power Disconnect (A1) – Fusible Disconnect and Magnetic Contactor



1.3 Electrical and Junction Boxes

All electrical boxes and junction boxes shall be installed as specified by the architectural, mechanical, or electrical drawings associated with the design of the site.

1.4 Power Feed and Overcurrent Requirements

1.4.1 Power Feed

The system shall operate on a three-phase electrical power supply input that is provided with a 4-wire grounded-wye configuration. No delta configuration is available. Qualified personnel shall verify the power transformer and feeder lines (at the point of take-off) leading to the PET/CT scanner, meet all requirements stated in this document.

1.4.2 Voltage

(For 64 Slice Discovery 610, Discovery 710) Voltage range: 380 to 480 VAC

(For 16 Slice Optima 560, Discovery 610, Discovery 710) Voltage range: 200/220/240 VAC;
380-480 VAC

1.4.3 Frequency

Frequency ranges: 50 or 60 Hz, +/- 3 Hz

1.4.4 Average Power Demand at Maximum Duty Cycle

(For 64 Slice Discovery 610, Discovery 710) Average power demand at maximum duty cycle:
15.5 kVA

(For 16 Slice Optima 560, Discovery 610, Discovery 710) Average power demand at maximum
duty cycle: 10 kVA

1.4.5 Maximum Power Demand

(For 64 Slice Discovery 610, Discovery 710) Maximum power demand is 150 kVA at 0.85 PF at
a selected technique of 140 kV and 715 mA.

(For 16 Slice Optima 560, Discovery 610, Discovery 710) Maximum power demand is 90 kVA at
0.85 PF at a selected technique of 140 kV and 380 mA.

1.4.6 Under voltage Release Control

The preferred disconnect, will utilize under voltage release control, rather than shunt trip
devices.

1.4.7 Overcurrent Protection

To prevent power loss to other loads during an unexpected system fault, the power feeder shall
have overcurrent protection such that the downstream overcurrent protection devices clear the
fault before an up-stream overcurrent protection device opens.

1.4.8 Voltage Regulation Effects

To minimize voltage regulation effects, keep power wiring between the facility main distribution
panel and the PDU as short as possible.

1.4.9 Load Regulation

Total load regulation, measured at the PDU input terminals, shall not exceed 6%.

1.5 Phase Imbalance

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

1.6 Sags, Surges, and Transients

1.6.1 Sags and Surges

(For 64 Slice Discovery 610, Discovery 710) Sags and surges of the power line shall not exceed the absolute range limits show in [Table 5-1](#).

(For 16 Slice Optima 560, Discovery 610, Discovery 710) Sags and surges of the power line shall not exceed the absolute range limits show in [Table 5-4](#).

1.6.2 Transient Voltage

The maximum transient voltage is 1500 V peak.

1.7 Power Source Configuration

1.7.1 Neutral Wire

If a neutral wire is used, it shall be terminated in the A1 disconnect.

1.7.2 Dedicated Feeder

A dedicated main distribution panel (A1 Mains) shall be used to supply power to the scanner. The A1 mains shall be located in the same room as the PDU.

1.7.3 Protective Disconnect Device Location

The protective disconnect shall be located within 10 m (32 ft.) of the PDU and be visible to personnel servicing the PDU.

1.7.4 Protective Disconnect Device with LOCK-OUT/TAG-OUT

The National Electrical Code (NFPA 70) states there shall be a protective disconnect device with a LOCK-OUT and TAG-OUT provision in the power supply line leading to the PDU.

1.8 Dedicated Distribution Transformer

1.8.1 Dedicated Feeder

It is recommended a dedicated distribution transformer from the facility's main isolation transformer supply power to the PET/CT Scanner.

1.8.2 Power Distribution Transformer

(For 64 Slice Discovery 610, Discovery 710) The minimum recommended size for a dedicated distribution transformer is: 225 kVA, rated 2.4% regulation at unity power factor. Resultant maximum allowable feeder regulation is 3.4%.

(For 16 Slice Optima 560, Discovery 610, Discovery 710) The minimum recommended size for a dedicated distribution transformer is: 112.5 kVA, rated 2.4% regulation at unity power factor. Resultant maximum allowable feeder regulation is 3.4%.

1.8.3 Using an Existing Distribution Transformer

Do not use an existing distribution transformer to power a system if other X-ray equipment, using rapid film changers, is connected to the existing transformer.

1.9 System Power Requirements (64 Slice Discovery 610, Discovery 710)

The customer shall ensure the site meets all minimum system power requirements listed below before installation can begin.

- Maximum power demand = 150kVA @ 0.85 PF: at a Selected Technique of 140 kV, 715 mA.
- Continuous (average) power demand at maximum duty cycle = 15.5 kVA.
- Maximum allowable total source regulation is 10%.

Table 5-1: Nominal Line Voltage Ranges (64 Slice Discovery 610, Discovery 710)

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

Table 5-2: Minimum Feeder Wire Size (64 Slice Discovery 610, Discovery 710)

Feeder Length (Power Substation to A1 Disconnect)	Minimum Feeder Wire Size, AWG or MCM (sq. mm)/ VAC					
	380 VAC	400 VAC	420 VAC	440 VAC	460 VAC	480 VAC
15 m (50 ft)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)
30 m (100 ft)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)
46 m (150 ft)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)
61 m (200 ft)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)
76 m (250 ft)	2/0 (70)	2/0 (70)	1/0 (55)	1/0 (55)	1 (45)	1 (45)
91 m (300 ft)	3/0 (85)	3/0 (85)	2/0 (70)	2/0 (70)	1/0 (55)	1/0 (55)
107 m (350 ft)	4/0 (100)	3/0 (85)	3/0 (85)	2/0 (70)	2/0 (70)	1/0 (55)
122 m (400 ft)	250 (125)	4/0 (100)	3/0 (85)	3/0 (85)	3/0 (85)	2/0 (70)

NOTE: In all cases the recommended ground wire is a 1/0 (55 sq. mm) ground wire.

Table 5-3: Minimum Sub-Feeder Wire Size (64 Slice Discovery 610, Discovery 710)

Sub-feeder Length (A1 to PDU)	Minimum Sub-feeder Wire, AWG or MCM (sq. mm)					
	380 VAC	400 VAC	420 VAC	440 VAC	460 VAC	480 VAC
9.75 m (32 ft)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)

The information in [Table 5-1](#), [Table 5-2](#), and [Table 5-3](#) (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.

NOTE: 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.

1.10 System Power Requirements (16 Slice Optima 560, Discovery 610, Discovery 710)

The customer shall ensure the site meets all minimum system power requirements listed below before installation can begin.

- Maximum power demand = 90kVA @ 0.85 PF: at a Selected Technique of 140 kV, 380 mA.
- Continuous (average) power demand at maximum duty cycle = 10 kVA.
- Maximum allowable total source regulation is 6%.

Table 5-4: Nominal Line Voltage Ranges (16 Slice Optima 560, Discovery 610, Discovery 710)

Nominal line voltage MUST fall within ONE of these ranges.									
Nominal Line Voltage	200	220	240	380	400	420	440	460	480
Hi-Line Limit, +10%	220	242	264	418	440	462	484	506	528
Lo-Line Limit, -10%	180	198	216	342	360	378	396	414	434
Continuous Line Current	58	52	48	30	29	27	26	25	24
Momentary Line Current	260	236	217	137	130	124	118	113	108
Maximum Line Current	289	262	241	152	144	137	131	126	120
Minimum Recommended Circuit Protection Rating	150	150	150	110	110	100	100	90	90

Table 5-5: Minimum Feeder Wire Size (16 Slice Optima 560, Discovery 610, Discovery 710)

Feeder Length (Power Substation to A1 Disconnect)	Minimum Feeder Wire Size, AWG or MCM (sq. mm)/ VAC								
	200 VAC	220 VAC	240 VAC	380 VAC	400 VAC	420 VAC	440 VAC	460 VAC	480 VAC
15 m (50 ft)	1/0 (55)	1/0 (55)	1/0 (55)	2 (35)	2 (35)	3 (30)	3 (30)	3 (30)	3 (30)
30 m (100 ft)	2/0 (70)	1/0 (55)	1/0 (55)	2 (35)	2 (35)	3 (30)	3 (30)	3 (30)	3 (30)
46 m (150 ft)	4/0 (100)	3/0 (85)	2/0 (70)	2 (35)	2 (35)	3 (30)	3 (30)	3 (30)	3 (30)

Feeder Length (Power Substation to A1 Disconnect)	Minimum Feeder Wire Size, AWG or MCM (sq. mm)/ VAC								
	200 VAC	220 VAC	240 VAC	380 VAC	400 VAC	420 VAC	440 VAC	460 VAC	480 VAC
61 m (200 ft)	5/0 (125)	4/0 (100)	4/0 (100)	2 (35)	2 (35)	3 (30)	3 (30)	3 (30)	3 (30)
76 m (250 ft)	6/0 (170)	5/0 (125)	5/0 (125)	1 (45)	1 (45)	2 (35)	2 (35)	2 (35)	3 (30)
91 m (300 ft)	7/0 (215)	6/0 (170)	5/0 (125)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	2 (35)	2 (35)
107 m (350 ft)	8/0 (275)	7/0 (215)	6/0 (170)	2/0 (70)	1/0 (55)	1/0 (55)	1 (45)	1 (45)	1 (45)
122 m (400 ft)	8/0 (275)	7/0 (215)	7/0 (215)	2/0 (70)	2/0 (70)	1/0 (55)	1/0 (55)	1/0 (55)	1 (45)

NOTE: In all cases the recommended ground wire is a 1/0 (55 sq. mm) ground wire.

Table 5-6: Minimum Sub-Feeder Wire Size (16 Slice Optima 560, Discovery 610, Discovery 710)

Sub-feeder Length (A1 to PDU)	Minimum Sub-feeder Wire, AWG or MCM (sq. mm)								
	200 VAC	220 VAC	240 VAC	380 VAC	400 VAC	420 VAC	440 VAC	460 VAC	480 VAC
9.75 m (32 ft)	1/0 (55)	1/0 (55)	1/0 (55)	2 (35)	2 (35)	3 (30)	3 (30)	3 (30)	3 (30)

The information in [Table 5-4](#), [Table 5-5](#), and [Table 5-6](#) (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.

NOTE: 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.

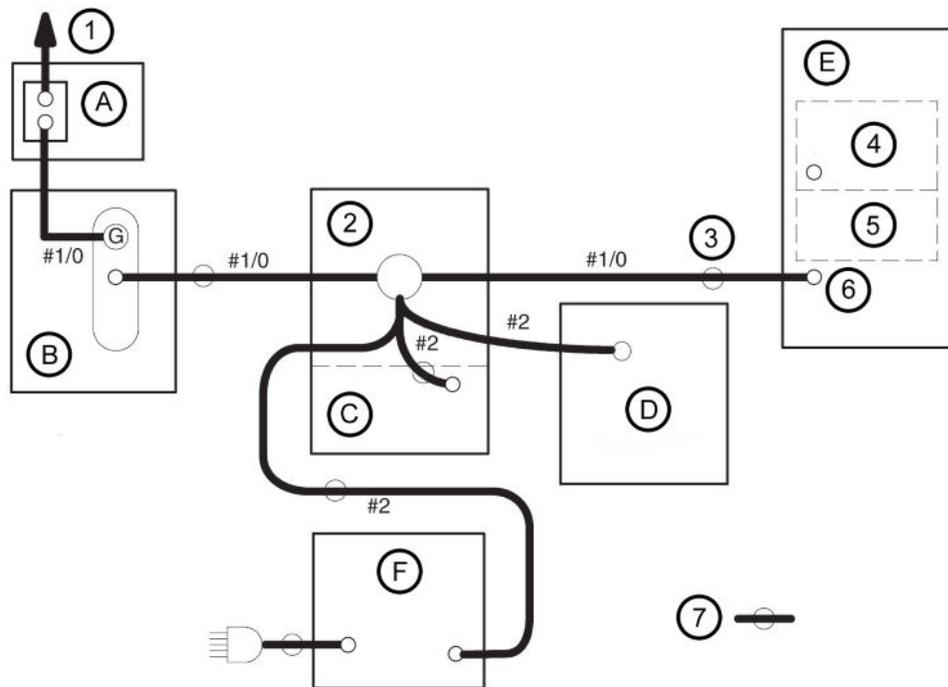
2 Grounding

The design of the scanner uses an equal potential grounding system. [Illustration 5-2](#) and [Table 5-7](#) detail the required ground system. Three primary grounding points exist, they include:

- A system power ground point located in the PDU.
- A reference ground point located between the gantry and the table base.
- A patient ground point located at the front of the table base.

The electrical contractor shall ground ALL patient-accessible metal surfaces to the same potential as the A1 Disconnect. The electrical contractor shall bond the ground wire to any intermediate distribution panel the ground wire passes through, in accordance with all local codes.

Illustration 5-2: System Ground Map



Note: Shield/signal grounds are not shown.			
A	A1 Power Disconnect	1	To power vault ground
B	Power Distribution Unit (PM)	2	Table/Gantry junction raceway
C	Table (CT1)	3	Part of Gantry
D	Q.Core or PARC4 (Q.Core Power) Re-construction Cabinet (PRC4)	4	Rotating Assembly frame
E	Gantry (CT2)	5	Tilt Mech
F	Operator's Console/Computer (OC1)	6	Frame
		7	Ground wire in supplied cable

Table 5-7: System Ground Points

Ground Points	Description
Bonding Power from A1 to PDU	The metal conduit, raceway, or armored cabling used to run power from the A1 Disconnect to the PDU shall be bonded in accordance to the NEC.
Dedicated Ground	A dedicated 1/0 (55 mm ²), or larger, insulated copper ground wire shall be installed between the main distribution panel and the PDU, in accordance with the NEC.
Grounding Power, A1, and PDU	All three-phase wires with ground running between the power source, the A1 Disconnect, and the PDU shall be installed in accordance to the NEC.
Maximum Resistance Between PDU and Facility Ground	The resistance between the PDU ground and the facility Earth ground shall not exceed 0.5 ohm.
Maximum Resistance Between PDU and Earth	The resistance between the PDU ground and Earth ground shall not exceed 2 ohms.
Cable Shielding and Grounding	All interconnect cables to peripheral devices shall be shielded and properly grounded, except where technologically prohibited.

3 System Interconnection and Cabling

3.1 Component Interconnections

The customer and electrical contractor shall refer to the following system, network, and power interconnection requirements:

- [Table 5-8](#) defines the component designators for system equipment, electrical components, options, and communication outlets.
- [Table 5-9](#) details the Standard-Length Cable Kit 5491000-3 (P5051TE) – Supplied by GE Healthcare.
- [Table 5-10](#) details the additional Standard-Length Cable Kit 5491000-10 (P5064TE) for 64-slice systems – Supplied by GE Healthcare.
- [Table 5-11](#) details the Long-Length Cable Kit, Optional 5491000-4 (P5051TF) – Supplied by GE Healthcare.
- [Table 5-12](#) details the additional Long-Length Cable Kit, Optional 5491000-20 (P5064TF) for 64-slice systems – Supplied by GE Healthcare.
- [Table 5-13](#) details the PDU/UPS Cables (Standard-Length) – Supplied by GE Healthcare.
- [Table 5-14](#) details the A1/UPS Cables – Supplied by GE Healthcare.
- [Table 5-15](#) details the Miscellaneous Electrical Cables – Supplied by Customer/Contractor.
- [Table 5-16](#) details the Miscellaneous Electrical Components – Supplied by Customer/Contractor.
- [Table 5-17](#) details the PARC4 (Q.Core Power) Upgrade Mandatory Cable Kit, Optional 5768790 (P3200ZH) for 64-slice systems – Supplied by GE Healthcare.
- [Table 5-18](#) details the PARC4 (Q.Core Power) Upgrade Relocation Cable Kit, Optional 5768683 (P3200PT) for 64-slice systems – Supplied by GE Healthcare.

3.1.1 Component Designators

Table 5-8: Component Designators

Designator	Applies to:	Source
A1	Primary power disconnect	Contractor-supplied
BBNC	Broadband Network Connection	Contractor-supplied
CT1	Patient Table	System
CT2	Gantry	System
DS	Door Interlock Switch	Contractor-supplied
OC1	Operator Console (Scanner Desktop)/computer	System
PDU	Power Distribution Unit	System
PRC4	PARC4 (Q.Core Power) Reconstruction Cabinet	System
SEO	System Emergency Off	Contractor-supplied
SM	Slave Monitor	Option

Designator	Applies to:	Source
WL	X-ray ON warning light	Contractor-supplied

3.1.2 Cable Specifications

Table 5-9: Standard-Length Cable Kit 5491000-3 (P5051TE) – Supplied by GE Healthcare

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Volt-age Rating	Actual Volt-age	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
PET Gantry to Console Cable Collector 5485380												
56	25.5 (83.7) [22.1 (73)]	5339979-3	Console GND to Raceway GND	1238	VW-1 (FT-1)	600	0	105	11.9 (0.47)	1	2	12.2 (0.5)
102	26.4 (86.6) [22.9 (75)]	2373436-2	Gantry to Console LAN	RG-2 2	FT-4	1900	<30 VDC		5.9 (0.23)	8	24	15 (0.6)
101	26.4 (86.6) [22.9 (75)]	5419981	Console to MSUB J9	RG-2 2	FT-4	300	<30 VDC	80	11.2 (0.44)	25	22	17x58 (0.7x2.3) 19x51 (0.7x2.0)
103 Note 1	25 (82) [21.9 (72)]	2117848-2	Fiber Optic - Console to Gantry (Not Used)			NA	NA			1	NA	10 (0.4)
XX	25 (82) [21.9 (72)]	5432019 (16 slice systems)	Fiber Optic - Gantry to Console			NA	NA			1	NA	
200	30.5 (100) [22.9 (75)]	5313938-6	J7 to Console, Respiratory	UL	FT-4	300	<30 VDC	60	6.8 (0.26)	4 pair	24	13 (0.5)
XX	28.2 (92.5) [24.8 (82)]	5193969-4	Cable - LAN	UL	FT-4			60			24	40 (1.5)
XX	30.5 (100) [27.7 (91)]	5169456	Gantry to In-jector	2464	FT-4	300		80	6.6 (0.26)		22	40 (1.5)
XX	30.5 (100) [7.6 (25)]	5199717	Gantry to RPM Unit	UL	FT-4	300	<15 VDC		5.9 (0.23)	4	22	15 (0.5)
PET Gantry to PDU Cable Collector 5485383												
52A	8.6 (28.2) [6.1 (20)]	2343528-2	PDU to Gantry 120VAC	2587	FT-4	600	208Y/1 20	90	13.8 (0.54)	5	8	56.4 (2.2)
52A Note 1	8.6 (28.2) [6.1 (20)]	2343528-4	PDU to Gantry 120VAC (Not Used)	2587	FT-4	600	208Y/1 20	90	13.8 (0.54)	5	8	56.4 (2.2)
50A	8.6 (28.2) [6.1 (20)]	2343529-2	HVDC from PDU to Gantry	2587	FT-4	600	350 VDC	90	19 (0.75)	3	(2) 4, (1) 8	22 (0.9)
51A	8.6 (28.2) [6.1 (20)]	2343530-2	Axial Drive Power PDU to Gantry	2587	FT-4	600	440Y/2 54	90	12.3 (0.48)	4	14	

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
55A	8.6 (28.2) [4.3 (14)]	5339979-2	Raceway GND to PDU - GND	1238	VW-1 (FT-1)	600	0	105	11.9 (0.47)	1	2	12.2 (0.5)
100A	9.9 (32.5) [6.1 (20)]	5120646-2	PDU to MSUB J11		FT-4	300	<30 VDC	80	11.2 (0.44)	25	22	17x58 (0.7x2.3) 19x51 (0.7x2.0)
PET Gantry to Q.Core Cable Collector 5485385												
209A	13 (42.6) [9.6 (32)]	5339979-6	Q.Core GND to Raceway GND	1238	VW-1 (FT-1)	600	0	105	11.9 (0.47)	1	2	12.2 (0.5)
203	13 (42.6) [9.9 (33)]	5313938-7	SBA J7 to Q.Core J6	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
201	13 (42.6) [8.4 (28)]	5313938-8	Q.Core J4 to Switch Port 5	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
202 Note 1	13 (42.6) [8.4 (28)]	5313938-9	PARC J5 to Switch Port 7 (Not Used)	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
Miscellaneous Cables in Kit 5491000-3												
203 Note 1	13 (42.6) [9.6 (32)]	5313941-2	PDU TS5 to PARC Bulk-head (Not Used)	2587	FT-4	600	208Y/120	60	19 (0.75)	5	10	25 (1.0)
203	13 (42.6) [9.6 (32)]	2343531-4	Q.Core Power from PDU, short	2587	FT-4	600	120 VAC	90	11.7 (0.46)	3	10	56.4 (2.2)
053A	19.9 (65.3) [16.6 (54)]	2343531-2	PDU TS5 to Console Power	2587	FT-4	600	120 VAC	90	12.2 (0.48)	3	10	56.4 (2.2)

Note 1: Extra Cable. Not used for Optima 560, Discovery 610, and Discovery 710 systems.

Table 5-10: Additional Standard-Length Cable Kit 5491000-10 (P5064TE) for 64-slice Systems – Supplied by GE Healthcare

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
103	24.6 (80.7) [21.6 (71)]	5125259	Fiber Optic - Console to Gantry			NA	NA			1	NA	
053A Note 1	19.9 (65.3) [16.6 (54)]	5121809-2	PDU TS5 to Console Power	2587	FT-4	600	208Y/120	90	12.3 (0.48)	4	10	56 (2.2)

Note 1: Not used. Extra cable (for GOC consoles only).

Table 5-11: Long-Length Cable Kit, Optional 5491000-4 (P5051TF) – Supplied by GE Healthcare

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond .	Wire Size (AWG)	
PET Gantry to Console Cable Collector 5485380												
56	25.5 (83.7) [22.1 (73)]	5339979-3	Console GND to Raceway GND	1238	VW-1 (FT-1)	600	0	105	11.9 (0.47)	1	2	12.2 (0.5)
102	26.4 (86.6) [22.9 (75)]	2373436-2	Gantry to Console LAN	RG-2 2	FT-4	1900	<30 VDC		5.9 (0.23)	8	24	15 (0.6)
101	26.4 (86.6) [22.9 (75)]	5419981	Console to MSUB J9	RG-2 2	FT-4	300	<30 VDC	80	11.2 (0.44)	25	22	17x58 (0.7x2.3) 19x51 (0.7x2.0)
103 Note 1	25 (82) [21.9 (72)]	2117848-2	Fiber Optic - Console to Gantry (Not Used)			NA				1	NA	10 (0.4)
XX	25 (82) [21.9 (72)]	5432019 (16 slice systems)	Fiber Optic - Gantry to Console			NA				1	NA	
200	30.5 (100) [22.9 (75)]	5313938-6	J7 to Console, Respiratory	UL	FT-4	300	<30 VDC	60	6.8 (0.26)	4 pair	24	13 (0.5)
XX	28.2 (92.5) [24.8 (82)]	5193969-4	Cable - LAN	UL	FT-4			60			24	40 (1.5)
XX	30.5 (100) [27.7 (91)]	5169456	Gantry to Injector	2464	FT-4	300		80	6.6 (0.26)		22	40 (1.5)
XX	30.5 (100) [7.6 (25)]	5199717	Gantry to RPM Unit	UL	FT-4	300	<15 VDC		5.9 (0.23)	4	22	15 (0.5)
PET Gantry to PDU Cable Collector 5485382												
52	19.4 (63.6) [17.2 (56)]	2343528	PDU to Gantry 120VAC	2587	FT-4	600	208Y/1 20	90	13.8 (0.54)	5	8	56.4 (2.2)
52 Note 1	19.4 (63.6) [17.2 (56)]	2343528-3	PDU to Gantry 120VAC (Not Used)	2587	FT-4	600	208Y/1 20	90	13.8 (0.54)	5	8	56.4 (2.2)
50	19.4 (63.6) [17.2 (56)]	2343529	HVDC from PDU to Gantry	2587	FT-4	600	350 VDC	90	19 (0.75)	3	(2) 4, (1) 8	22 (0.9)
51	19.4 (63.6) [17.2 (56)]	2343530	Axial Drive Power PDU to Gantry	2587	FT-4	600	440Y/2 54	90	12.3 (0.48)	4	14	
55	19.4 (63.6) [15.1 (50)]	5339979	Raceway GND to PDU - GND	1238	VW-1 (FT-1)	600	0	105	11.9 (0.47)	1	2	12.2 (0.5)

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
100	21.4 (70.2) [18.9 (62)]	5120646	PDU to MSUB J11		FT-4	300	<30 VDC	80	11.2 (0.44)	25	22	17x58 (0.7x2.3) 19x51 (0.7x2.0)
PET Gantry to Q.Core Cable Collector 5485384												
209	25.5 (83.6) [22.1 (73)]	5339979-5	Q.Core GND to Raceway GND	1238	VW-1 (FT-1)	600	0	105	11.9 (.47)	1	2	12.2 (0.5)
203	30.5 (100) [27.4 (90)]	5313938	SBA J7 to Q.Core J6	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
201	30.5 (100) [25.9 (85)]	5313938-2	Q.Core J4 to Switch Port 5	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
202 Note 1	30.5 (100) [25.9 (85)]	5313938-3	PARC J5 to Switch Port 7 (Not Used)	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
Miscellaneous Cables in Kit 5491000-4												
203 Note 1	19.4 (63.6) [15.8 (52)]	5313941	PDU TS5 to PARC Bulk-head (Not Used)	2587	FT-4	600	208Y/120	60	19 (0.75)	5	10	25 (1.0)
203	19.4 (63.6) [16 (52.6)]	2343531-3	Q.Core Power from PDU, long	2587	FT-4	600V	120 VAC	90	11.7 (0.46)	3	10	56.4 (2.2)
053	24.5 (80.4) [21.2 (69)]	2343531	PDU TS5 to Console Power	2587	FT-4	600	120 VAC	90	12.3 (0.48)	3	10	56.4 (2.2)

Note 1: Extra Cable. Not used for Optima 560, Discovery 610, and Discovery 710 systems.

Table 5-12: Additional Long-Length Cable Kit 5491000-20 (P5064TF) for 64-slice Systems – Supplied by GE Healthcare

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
103	24.6 (80.7) [21.6 (71)]	5125259	Fiber Optic - Console to Gantry			NA	NA			1	NA	
053A Note 1	24.5 (80.4) [21.2 (69)]	5121809	PDU TS5 to Console Power	2587	FT-4	600	208Y/120	90	12.3 (0.48)	4	10	56 (2.2)

Note 1: Not used. Extra cable (for GOC consoles only).

Table 5-13: UPS Cables (Standard-Length) – Supplied by GE Healthcare

Run #	Cable Length, Actual [Usable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
060	6 (19.7) [5 (16)]	5125079	PDU to UPS	2587	FT4	600	± 350V DC	90	19 (0.75)	5	8	22 (0.9) Dia.
061	6 (19.7) [5 (16)]	5125079-2	UPS to PDU	2587	FT4	600	440Y/254	90	15 (0.60)	5	8	22 (0.9) Dia.
110	14 (46) [13.7 (45)]	5169224	A1 to UPS	2587	FT4	600	208Y/120	90	14 (0.54)	5	18	25 (1.0) Dia.

Table 5-14: A1 UPS

PDU Model No.	Maximum Nominal kVA Rating	Required Mains Disconnect (A1) Catalog No.		Optional Partial UPS Kit Catalog No. (See Note 2)
		Europe and Asia (380-400V or 420V) (See Note 1)	North America (440V or 460-480V)	
NGPDU-71 (64 slice systems)	150 kVA	E4502AF (150A) Includes Auto Restart and Integrated UPS Control	E4502AE (125A) Includes Auto Restart and Integrated UPS Control	B7864PZ PowerWare 9355-15-14GE (14.4 kVa - 40A)
NGPDU-61 (16 slice systems)	90 kVA	E4502AC (110A) Includes Auto Restart and Integrated UPS Control	E4502AB (90A) Includes Auto Restart and Integrated UPS Control	B7864PZ PowerWare 9355-15-14GE (14.4 kVa - 40A)

Note 1: Additional A1 Disconnects for Europe available through European Sales Team
Note 2: REQUIRES one of the A1 mains disconnect detailed at left, or equivalent.

Table 5-15: Miscellaneous Electrical Cables – Supplied by Customer/Contractor

Customer Installed Wiring		Description	Cables Supplied			Plug Pulling Dimensions		Wire and Cable Pig-tails m (ft)	
Qty	Size AWG (mm ²)		Part No	Length m (ft)	Dia. in. (mm)	From	To	From	To
RUN NO. 1 FROM PRIMARY POWER SOURCE TO FACILITY DISCONNECT (POWER SOURCE - A1)									
Maximum Run Length *									
3	*	POWER						1 (3)	1 (3)
1	1/0 (50)	GROUND						1 (3)	1 (3)
RUN NO. 2 FROM FACILITY DISCONNECT TO POWER DISTRIBUTION UNIT (A1 - PM)									
Maximum Run Length *									
3	*	POWER						1 (3)	1 (3)
1	1/0 (50)	GROUND						1 (3)	1 (3)
-	-	NEUTRAL - Not Required						1 (3)	1 (3)
RUN NO. 3 FROM FACILITY DISCONNECT TO SYSTEM EMERGENCY OFF (A1 - SEO)									
2	14 (2)	POWER						2 (6)	2 (6)
1	14 (2)	GROUND						2 (6)	2 (6)
RUN NO. 4 POWER DISTRIBUTION UNIT TO WARNING LIGHT CONTROL (PDU - WL)									
2	14 (2)	WARNING LIGHT 24 VOLT							
		CONTROL TS6 1, 2, 3, 4, 5, 6, 7, 8							
RUN NO. 5 POWER DISTRIBUTION UNIT TO SCAN ROOM DOOR INTERLOCK (PDU - DOOR SWITCH)									
2	14 (2)	SCAN ROOM DOOR INTERLOCK TS6 9, 10							
*REFER TO LOCAL BUILDING CODES 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.)							

Table 5-16: Miscellaneous Electrical Components – Supplied by Customer/Contractor

System	Reference	Associated Equipment	Material/Labor Supplied by Customer Contractor	USA Vendor / CAT No. GE Catalog
64 Slice Discovery 610, Discovery 710	A1 380V - 480V 50/60 Hz	Circuit Breaker with Magnetic Contactor	Three Pole, 380V - 480V, Combination breaker with magnetic contactor. Includes control transformer, optional UPS interface, On/Off controls and auto-restart feature, if GE-supplied.	Recommend: <ul style="list-style-type: none"> • E4502AE (125A) • E4502AF (150A) Optional remote operator control available from GE Supply, Cat # GESCTR0CS1
16 Slice Optima 560, Discovery 610, Discovery 710	A1 200V - 240V, 380V - 480V 50/60 Hz	Circuit Breaker with Magnetic Contactor	Three Pole, 200V - 240V or 380V - 480V, Combination breaker with magnetic contactor. Includes control transformer, optional UPS interface, On/Off controls and auto-restart feature, if GE-supplied.	Recommend: <ul style="list-style-type: none"> • E4502AC (110A) • E4502AB (90A) Note: For systems with UPS, refer to Table 5-14 for A1 panel. Optional remote operator control available from GE Supply, Cat # GESCTR0CS1
All Systems	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.	
All Systems		System Components	Reference the system installation drawings supplied by Installation Support Services within your geographic area.	
All Systems			Room Warning Light Controller	E4500AM

Table 5-17: PARC4 (Q.Core Power) Upgrade Mandatory Cable Kit 5768790 (P3200ZH) (64-slice)

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
210	30.5 (100) [22.9 (75)]	5313938-14	PARC J7 to Switch J7, Long	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
203	19.4 (63.6) [18.8 (61.7)]	5313941	PDU-RRR POWER	2587	FT-4	600	208Y/120	90	19 (0.75)	5	10	25 (1.0)

Table 5-18: PARC4 (Q.Core Power) Upgrade Relocation Cable Kit 5768683 (P3200PT) (64-slice)

Run #	Length, Actual [Useable] m (ft)	Part Number	Description	UL Cable Information								Pull Size mm (in.)
				UL Style	Flame Rating	Voltage Rating	Actual Voltage	Temp. Rating (C)	Dia. mm (in.)	# of Cond.	Wire Size (AWG)	
209	25.5 (83.6) [21.8 (71.5)]	5339979-5	PARC GND to Raceway GND Bar	1015, 1063, 1284, 1283	VW-1 (FT-1)	600	0	105	11.9 (.47)	1	2	12.2 (0.5)
201	30.5 (100) [24.3 (79.7)]	5313938-2	RRR J4 to Switch Port 5	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)
203	30.5 (100) [27.4 (90)]	5313938	SBA J7 to RRR J6	UL	FT-4	300	<30 VDC	60	6.6 (0.26)	4 pair	24	13 (0.5)

3.2 Cable Routing Requirements

3.2.1 Properly Sized Conduit, Duct Work, and Floor Troughs

Install appropriate conduits, duct work, and floor troughs for all system cables. Refer to [Table 5-9](#) through [Table 5-15](#).

NOTE: To minimize the need for additional junction boxes, use either a cable raceway system or a raised computer floor. The system uses prefabricated cables with large plugs.

3.2.2 Future Expansion

Ensure all cable passageways have additional capacity for future cable installations.

3.2.3 Routing Power Wiring

All three-phase power wires and ground line shall run in the same conduit or raceway duct.

3.2.4 Power and System Control Wire Separation

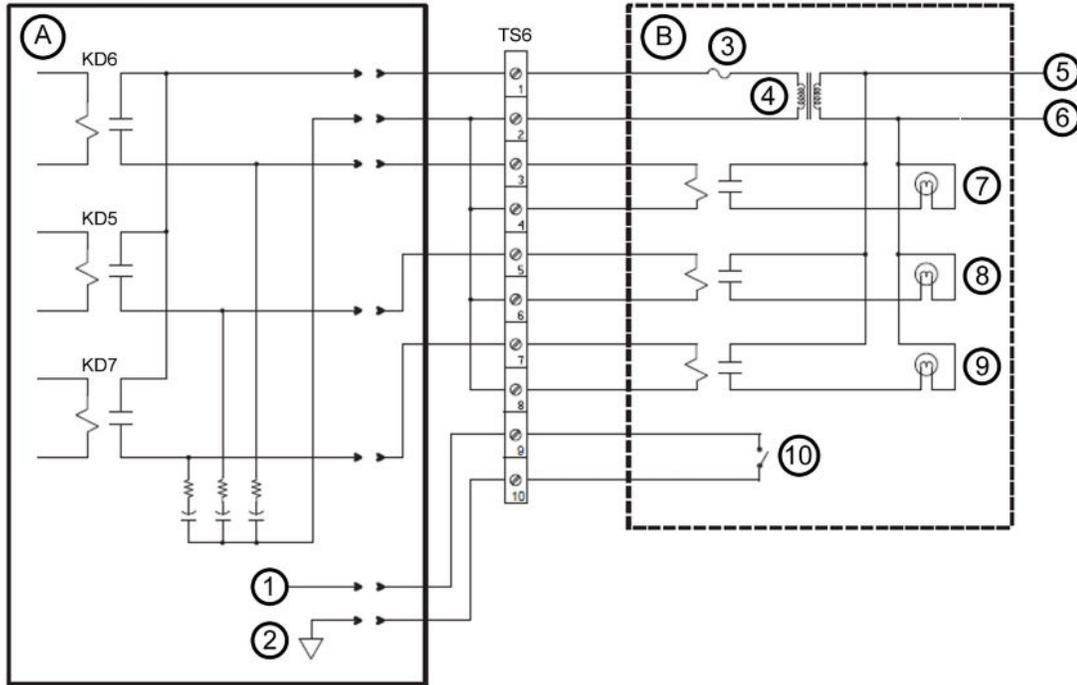
Power supply wires and system control lines shall be located in separate conduit or ductwork.

4 Scan Room Warning Light and Door Interlock

The scan room shall have a scan warning light and door interlock connected to the scan system as detailed in the following diagrams.

4.1 X-Ray Warning Light

Illustration 5-3: TS6 X-Ray Warning Light Connections



A	PDU	5	Line
B	Facility supplied room light	6	Neutral
1	EXP_INTLK signal	7	X-RAY light
2	PGND	8	SYS-ON light
3	Fuse	9	READY light (Room Warning lamp)
4	24V secondary	10	Door Switch

4.2 Scan Room Door Interlock Connections

NOTE: The terminal blocks detailed in [Illustration 5-4](#) and [Illustration 5-5](#) are located in the power distribution unit (PDU).

Illustration 5-4: TS6 Room Door Interlock Connections – without Door Interlock

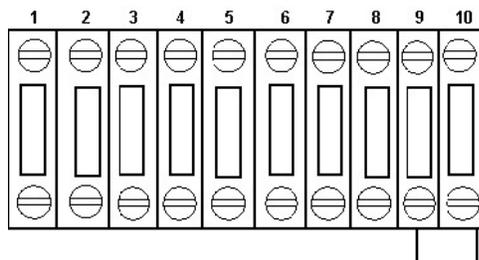
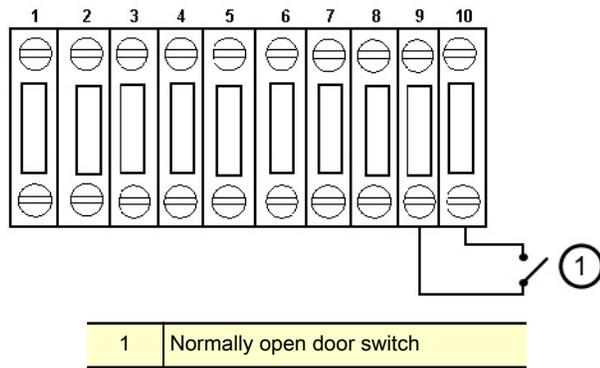


Illustration 5-5: TS6 Room Door Interlock Connections – with Door Interlock



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Chapter 6 Communications Requirements

1 Network Requirements

1.1 Communication Network

1.1.1 Network Wall Outlet

The customer shall provide an RJ45 wall outlet within 2 m (6.6 ft.) of the scanner desktop location.

1.1.2 Network Speed

Broadband interface type: 10 Gb Ethernet connection.

1.1.3 Network Communication

The customer shall ensure a network broadband line is installed and active.

1.1.4 Patch Cable

The customer shall provide a patch cable, not to exceed 3.05 m (10 ft.), to connect the scanner desktop to a wall outlet.

1.1.5 Cable Duct Work

The customer shall complete any cable duct work or conduit installation required for routing network cables to workstation, camera, and scanner desktop.

1.1.6 Communication Run to RJ45 Wall Outlet

The customer shall ensure the communication run from the hospital/facility network switch to the RJ45 wall outlet does not exceed 88 m (290 ft.).

1.2 Zone Broadband Specialist

1.2.1 Contact GE PM

Customer shall contact GE PM to obtain the name of a zone broadband specialist.

1.2.2 IT Infrastructure Changes

Zone broadband specialist will work with customer to complete identified infrastructure changes.

1.2.3 IP Addresses

Zone broadband specialist shall provide IP addresses for new system.

1.2.4 VPN Compatible Appliance

Zone broadband specialist shall provide a VPN compatible appliance to support the IPSec tunneling protocol and 3DES data encryption.

1.2.5 Internet Service Provider

Zone broadband specialist shall utilize an Internet Service Provider that supports static routing.

1.3 IT Site Contact Information

1.3.1 GE PM Information

Customer shall provide GE PM with an accurate site address, contact name, contact phone number, and contact email address for customer IT person.

1.3.2 Coordinate VPN Activities

Site IT contact shall coordinate VPN activities between radiology/cardiology department and Information Technology department.

1.3.3 Ensuring Broadband Infrastructure Requirements

Site IT contact will work as liaison to assure site broadband connectivity meets GE Healthcare requirements, as determined by mutual assessment with GE Healthcare connectivity team.

1.3.4 Equipment Assessment

Site IT contact shall complete an equipment assessment with GE Healthcare connectivity team to determine site broadband readiness.

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