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Pre-installation

X-ray System

REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	JUL 09, 2021	First Edition.
1	APR 20, 2022	Interconnection and Grounding Requirements Section Update. Removed Section: Detectors & Cabinets Specifications.
2	SEP 19, 2022	Room Layout update.

This Document is the English original version, edited and supplied by the manufacturer.

The Revision state of this Document is indicated in the code number shown at the bottom of this page.

ADVISORY SYMBOLS

The following advisory symbols will be used throughout this manual. Their application and meaning are described below.

DANGERS ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEEDED OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.

ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEEDED OR AVOIDED COULD CAUSE SERIOUS PERSONAL INJURY, OR CATASTROPHIC DAMAGE OF EQUIPMENT OR DATA.

Advise of conditions or situations that if not heeded or avoided could cause personal injury or damage to equipment or data.

Note ☞

Alert readers to pertinent facts and conditions. Notes represent information that is important to know but which do not necessarily relate to possible injury or damage to equipment.

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SECTION 1 INTRODUCTION

1.1 OBJECTIVE AND SCOPE OF THIS MANUAL

This document is intended as a guide and informational resource for planning and properly preparing a location for the installation of the X-ray System.

This Pre-installation document provides the information and data needed to plan and qualify the customer site prior to equipment delivery and installation.

This document considers the whole X-ray System composed by the Overhead Tube Crane (OTC), RAD Table, RAD Wall Stand and X-ray Generator. Product information, environmental and electrical requirements are specified.

1.2 AVOIDING UNNECESSARY EXPENSES AND DELAYS

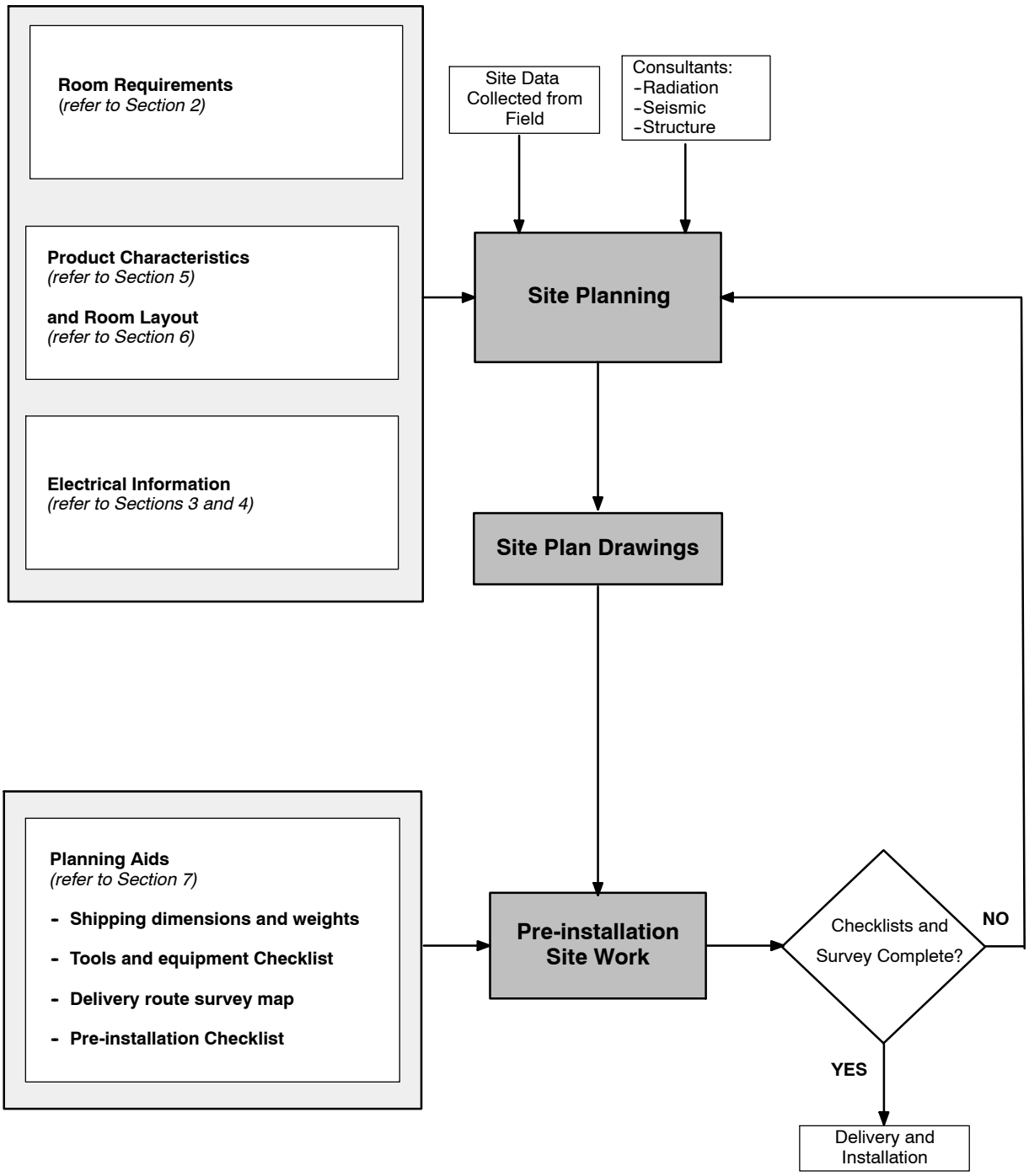
To avoid unnecessary expenses and delays use the “Pre-installation Checklist” (refer to *Section 7.3*) to determine if you are ready for the installation to begin. Once you believe that the room/location is ready for installation to begin, complete the “Pre-installation Checklist”. The checklist is an important tool that helps verify that nothing has been missed. The checklist summarizes the preparations and allows you to permanently record the activities that have taken place.

1.3 AN OVERVIEW OF THE PRE-INSTALLATION PROCESS

Complete the checklists contained in this manual. They are an important part of the Pre-installation process. The checklists summarize the required preparations and verify the completion of the Pre-installation procedures.

Illustration 1-1 outlines the information in this document and its place in the pre-installation process.

Illustration 1-1
Pre-installation Overview



1.4 RESPONSIBILITY OF PURCHASER/CUSTOMER

To ensure that the installation of the system meets the Purchaser or Customer expectations, it is important to determine who will take responsibility for various items in the course of the system installation process.

To determine these responsibilities, review the following checklists with the customer and assign responsibilities as appropriate:

- Tools and Equipment Checklist *(refer to Section 7.1)*
- Pre-installation Checklist *(refer to Section 7.3)*

1.5 RESPONSIBILITIES OF THE PURCHASER

The purchaser is responsible for the completion of “Pre-installation”. This includes the procurement and installation of all required materials and services to get the room ready for the installation of the product, and the cost of alterations and modifications when not specifically provided in the sales contract.

Delay, confusion and waste of manpower can be avoided by adequate Service and Pre-installation.

The purchaser’s responsibility includes providing:

- A clean and safe work environment for the installation of the product (ceiling and proper room lighting).
- A location suitable for the installation of the product (*refer to Section 2*).
    - Suitable support structures in the floor and walls necessary for the mounting of the X-ray Generator, RAD Table and RAD Wall Stand (*refer to Section 2.2*).
    - Installation of conduit, ducts, and/or raceways necessary to route cables safely *(refer to Section 4 and Section 5)*.

- Electrical power and grounds of specified quality and reliability *(refer to Section 4)*.

  - Electrical power of the required voltage output and adequate kVA rating, including the emergency-off safety switch(es) in the room. Power and ground cables to the Room Electrical Cabinet (Main Disconnect).

    Install all safety devices according to this document and Local Codes.

  - Properly installed and sized junction boxes, including covers and fittings, at locations required and called out in architectural drawings.

- A location suitable for operation of the product *(refer to Section 6)*.
- Installation of non-electric services (if required).
- Installation of room environment control equipment.
- Current room dimensions plan, including hallway and entry door sizes.

Note ☞ *Complete and proper Pre-installation will avoid delays and confusion.*

1.6 EQUIPMENT OR ACCESSORIES AT END-OF-LIFE

The elimination of equipment and accessories must be in accordance with local regulations for waste processing. The waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. All materials and components that could pose a risk to the environment must be removed from the end-of-life equipment and accessories (example: dry and wet cell batteries, transformer oil, etc.). Please contact an authorized representative of the manufacturer or an authorized waste management company for information concerning the decommissioning of your equipment.

1.7 PACKING MATERIALS

The materials used to pack our equipment are recyclable. They must be collected and processed in accordance with the regulations in force in the country where the machines or accessories are un packed.

SECTION 2 ROOM REQUIREMENTS

2.1 ENVIRONMENTAL REQUIREMENTS

There are no special environmental conditions required for the safe operation of the Overhead Tube Crane. However, it is not designed for the use in the presence of explosive or flammable gases as might be found in operating rooms.

Note ☞ *STORAGE values only refer to equipment that is still in shipping containers. If the equipment is partially or completely installed, refer to WORKING values.*

Note ☞ *These environmental conditions do not include the Digital Detector. Refer to the Digital Detector Documentation.*

2.1.1 ATMOSPHERIC PRESSURE, TEMPERATURE AND RELATIVE HUMIDITY SPECIFICATION

ATMOSPHERIC PRESSURE (hPa)		RELATIVE HUMIDITY (%)		AMBIENT TEMPERATURE	
MIN	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**
WORKING					
700 hPa	1060 hPa	30 %	75 %	10 ^{O}C (50 ^{O}F)	40 ^{O}C (104 ^{O}F)
TRANSPORT & STORAGE					
500 hPa	1060 hPa	10 %	90 %	-10 ^{O}C (14 ^{O}F)	50 ^{O}C (122 ^{O}F)

2.1.2 LIGHT SPECIFICATION

The system screens are adjusted for an optimum ambient light level of 50 lux.

2.1.3 RADIATION PROTECTION

Because X-ray equipment produces radiation, special precautions may need to be taken or special site modifications may be required. The manufacturer does not make recommendations regarding radiation protection. It is the purchasers responsibility to consult a radiation physicist for advice on radiation protection in X-ray rooms.

2.1.4 FUSES

Overhead Tube Crane, RAD Table and RAD Wall Stand are provided in the Input Module with a pair of fuses each, they are identified as F1 & F2. The Fuses have next specifications:

- System set at 115 V~:
  - Input Module Fuses 5A, 250V 3A-SB
  - Breaking Capacity . . . . . 10000 A
- System set at 230 V~:
  - Input Module Fuses 2A, 250V 3A-SB
  - Breaking Capacity . . . . . 100 A

IN CASE OF SINGLE PHASE CHANGE THE F2 FUSE BY THE NEUTRAL CARTRIDGE PROVIDED WITH THE OVERHEAD TUBE CRANE, RAD TABLE AND WALL STAND.

2.1.5 HEAT OUTPUT

In normal environmental circumstances the maximum heat output of the equipment can reach:

- for Line Powered Generators 0.30 kW (1025 btu/hr),
- for Overhead Tube Crane 0.161 kW (542 btu/hr),
- for RAD Table 0.092 kW (310 btu/hr),
- for RAD Wall Stand 0.069 kW (232 btu/hr).

Note ☞ *Overheating of components can cause system malfunction.*

2.2 STRUCTURAL REQUIREMENTS

Prior to beginning installation, it is recommended to inspect the site and verify that the X-ray room complies with Pre-installation requirements for the System installation such as:

- Floor, wall, ceiling and raceways for equipment installation.
- A plan distribution is strongly recommended prior equipment installation. Take into account dimensions, travels, operation and passing through areas. Minimum room space required to allow installation and travels of the equipments depends on:
  - **Longitudinal Rails** from 3900 mm (153.5”) to 6100 mm (240.2”).
  - **Transversal Rails** from 2500 mm (98.4”) to 3500 mm (137.8”).
  - **Ceiling Height**. The recommended height of the Ceiling is between 2800 mm (110.2”) and 3094 mm (121.8”).

IT IS HIGHLY RECOMMENDED TO HEED THE ROOM HEIGHT REQUIREMENTS. IN CASE OF ROOMS LOWER THAN 2800 mm (110.2”), THE AUTO-POSITIONING OR OTHER AUTOMATIC FUNCTIONS MAY BE NEGATIVELY AFFECTED:

IN CASE OF AUTO-POSITIONS WITH THE RAD WALL STAND DETECTOR IN HORIZONTAL POSITION AND WITH THE RAD TABLE, THE OVERHEAD TUBE CRANE MAY COLLIDE WITH THE RECEPTOR. THE TRAVEL AVAILABLE FOR THE HORIZONTAL RECEPTOR WILL BE SHORTENED.

IN CASE OF ROOMS HIGHER THAN 3094 mm (121.8”), THE TRAVEL AVAILABLE FOR THE VERTICAL RECEPTOR WILL BE SHORTENED. THE MAXIMUM DISPLACEMENT OF THE COLUMN (2000 mm / 78.7”) IS ACHIEVED WITH A CEILING HEIGHT OF 3094 mm (121.8”) AND A TELESCOPIC COLUMN OF 2000 mm (78.7”).

2.2.1 DOOR SIZE REQUIREMENTS

Minimum door sizes also apply to the hallway and elevator.

The minimum door height must be 2030 mm (80”) and door width must be 1000 mm (39.3”) to take delivery and install system based on a 2600 mm (102.3”) corridor.

The elevator door must meet with the above door requirements and the minimum depth of the elevator measured from the back wall to the elevator door must be 2150 mm (84.6”) to transport the Main Assembly and other components of the System, except the Overhead Tube Crane Rails.

Note ☞ *The above dimensions are calculated as per dimensions of the shipping crates. For dimensions and weights of the crated components refer to Table 2-1. For dimensions and weights of the uncrated components refer to Section 5.*

Table 2-1
System Crates

COMPONENT CRATED	DIMENSIONS			WEIGHT
	Length	Width	Height	
OVERHEAD TUBE CRANE				
Main Crate	1150 mm (45.3”)	800 mm (31.5”)	1170 mm (46”)	264 kg (582 lb)
Large Longitudinal Rails & Transversal Rails	6200 mm (244.1”)	280 mm (11”)	350 mm (13.8”)	120 kg (264.5 lb)
Medium Longitudinal Rails & Transversal Rails	4850 (190.9”)	280 (11”)	350 (13.8”)	100 kg (220.5 lb)
RAD TABLE				
RAD Table Base	1600 mm (62.9”)	950 mm (37.4”)	1100 mm (43.3”)	310 Kg (683.4 lb)
Tabletop	2290 mm (90.1”)	860 mm (33.8”)	130 mm (5.1”)	64 Kg (141 lb)
RAD WALL STAND				
RAD Wall Stand	2410 mm (94.8”)	940 mm (37”)	890 mm (35”)	300 Kg (661.5 lb)
X-RAY GENERATOR				
Line Powered Generator	1070 mm (42.1”)	620 mm (24.4”)	740 mm (29.1”)	86 kg (189.6 lb)

2.2.2 FLOOR AND WALL REQUIREMENTS

The method of installing the system is:

COMPONENT	NORMAL METHOD OF MOUNTING
Generator Cabinet	Floor freestanding, wall mounted or anchor to floor with four M10 (3/8") bolts.
RAD Table	Anchor to floor with 4 x M10 bolts
RAD Wall Stand	Anchor to floor with 4 x M12 bolts and optionally to the wall with 3 x M4.5 screws
Note: Anchoring hardware should be field supplied. For seismic areas all components must be anchored, Local Standards should be applied.	

The Drill Templates of the anchoring holes are shown in the next illustrations.

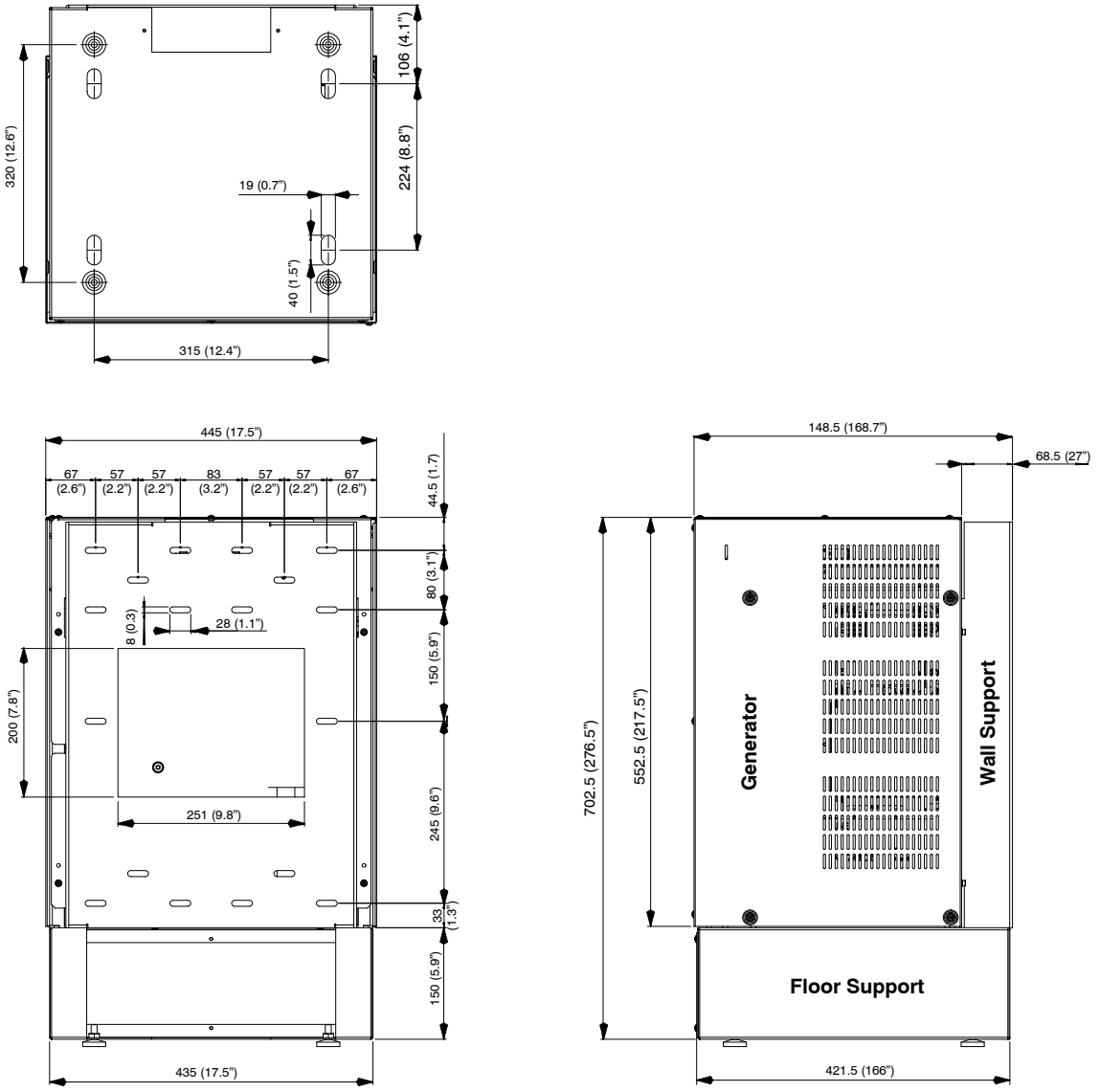
Potential for Injury and/or Equipment Damage: Floor anchors must be a minimum of 150 mm (6") from any concrete edge including ducts and cracks. In addition, the general condition of the concrete in the immediate mounting area should be inspected to ensure that anchors will be set in good quality concrete.

The floor bearing the Rad Room must be concrete and the thickness to be determined by a Structural Engineer to properly support the equipment loads, minimum 700kg/m^2 (162.5 lb/ft^2). The anchors require a minimum embedment of 57.2 mm (2.2") into the concrete. If the floor thickness is less than 101.6 mm (4"), it is recommended that the unit be secured using a through-bolt method with a reinforcement plate on the back side.

Note ☞ *The floor surface under the equipments must be flat and horizontal. The maximum tolerance for the Floor levelling should be ± 1.5 mm per meter (0.02" per feet).*

Note ☞ *The recommended distance from the back of the Wall Stand to the wall is between 128 mm (5") and 188 mm (7.4") when using the Wall Mount Kit of the Wall Stand. The maximum distance can be increased up to 218 mm (8.6") using only two bolts to fix the brackets of the Wall Mount Kit to each other.*

Illustration 2-1
Drill Template of the optional Generator Supports



** Dimensions in mm*

Illustration 2-2
Drill Template of the RAD Table

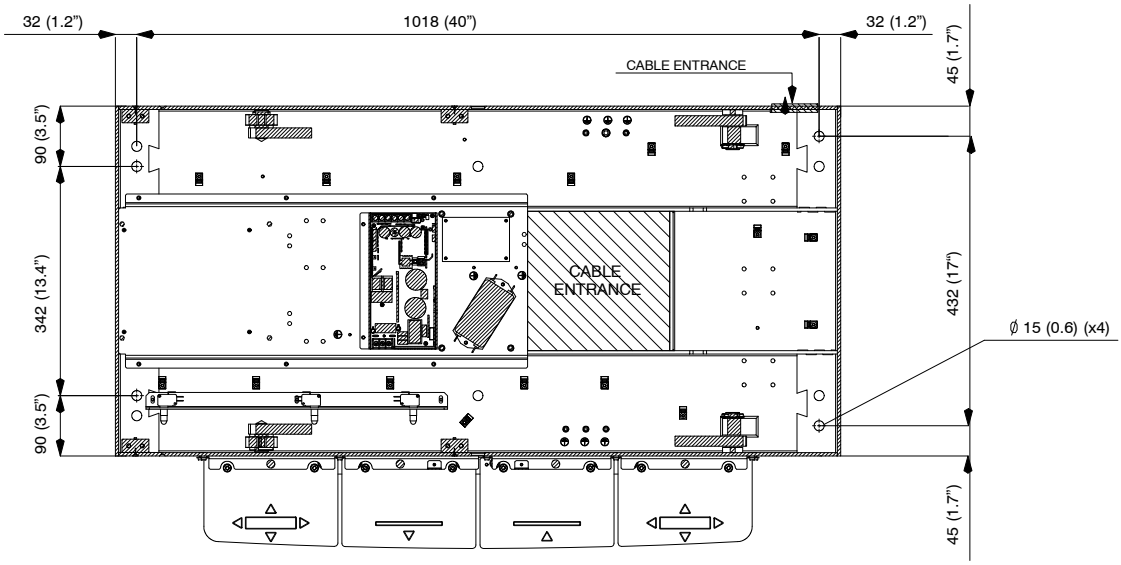


Illustration 2-3
Drill Template of the RAD Wall Stand

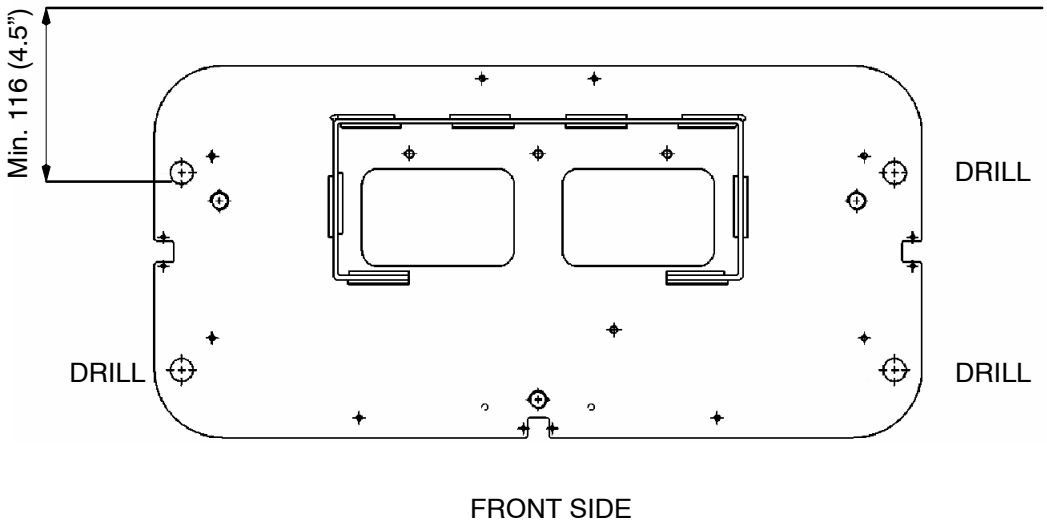
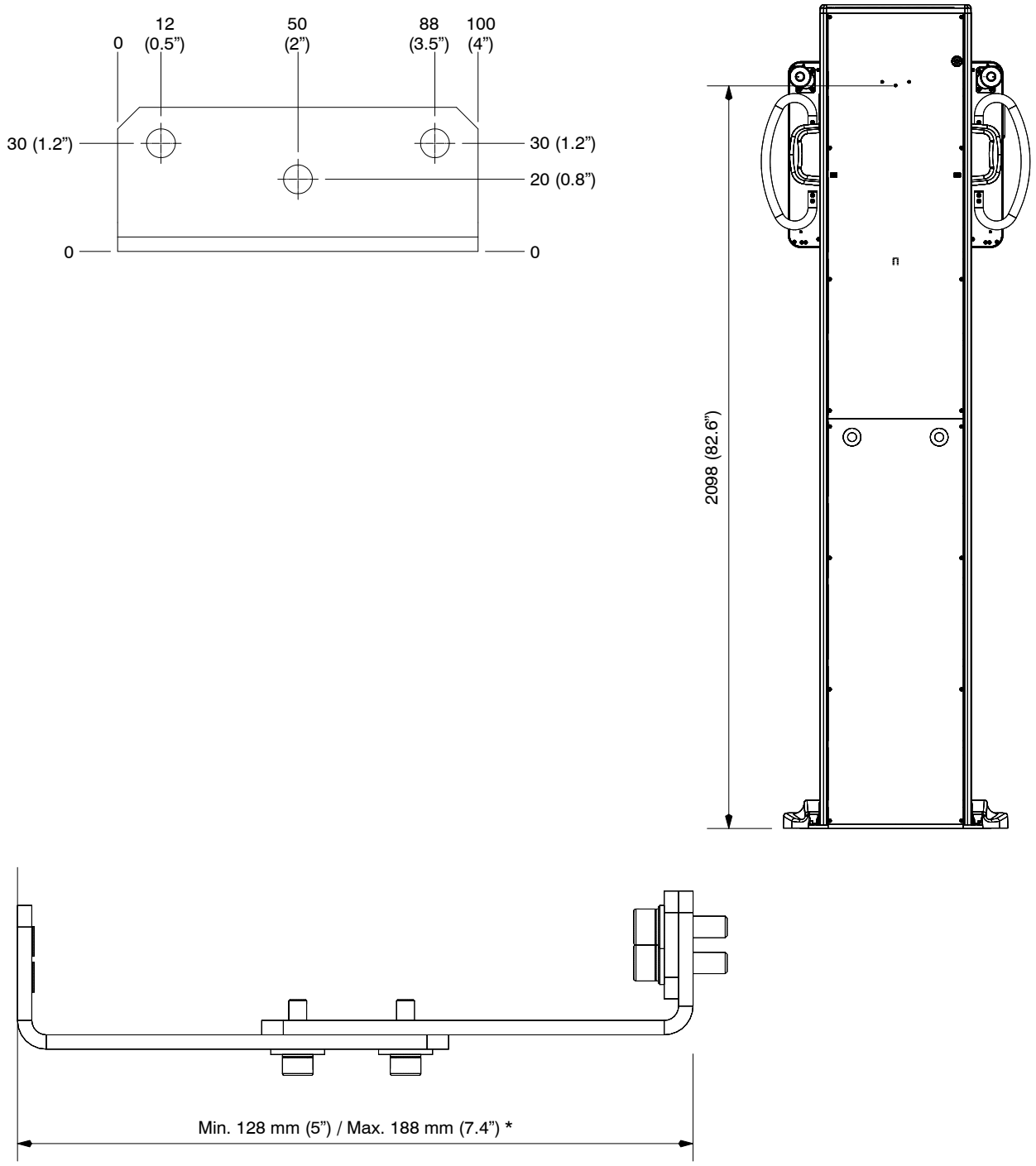


Illustration 2-4
Drill Template of the Wall Mount kit of the Wall Stand



** Maximum distance from the back of the Wall Stand to the wall can be increased up to 218 mm (8.6") using only 2 bolts to fix the brackets to each other.*

2.2.3 CEILING REQUIREMENTS

Note ☞ *There should not be anything mounted in the ceiling (i.e. lights, A/C returns, etc.) between stationary rails. This is because the Overhead Tube Crane may come into contact with those ceiling-mounted items during normal use.*

Stationary rails are designed for top (ceiling) mounting. Rails can be ordered and are supplied in the following sizes: 3900 mm (153.5”), 4600 mm (181.1”), 5100 mm (200.8”) and 6100 mm (240.2”), totaling four different sizes. The choice of length depends on room size, configuration and the possible presence of obstructions.

Complete details of room dimensions must be known when planning an installation. Work with the architect or building engineer and obtain approval from the customer before proceeding with the layout plan.

Methods of support that will permit attachment to structural steel or through bolts in concrete construction should be favored. Do not use anchors in direct tension.

The recommended height is between 2800 mm (110.2”) and 3094 mm (121.8”) for normal use with RAD Wall Stand and RAD Table.

Note ☞ *Following distances can vary ±10 mm depending on the tube.*

- The distances between the Focal Spot and the floor with a 2800 mm ceiling height are:
  - minimum: 290 mm (11.4”).
  - maximum: 2033 mm (80”).
- The distances between the Focal Spot and the ceiling with a 2800 mm ceiling height are:
  - minimum: 767 mm (30.2”).
  - maximum: 2510 mm (98.8”)

For low ceiling height, the stationary rails may be mounted directly to the ceiling slab or to flush-mounted Unistrut or similar structure. For higher rooms in which a false ceiling is to be used, the stationary rails may be attached to rigid vertical members hung from ceiling slab. A supplementary channel may be secured to the bottom of the vertical members to facilitate provision for mounting holes. A Unistrut system or equivalent is a convenient type of support to employ.

WARNING

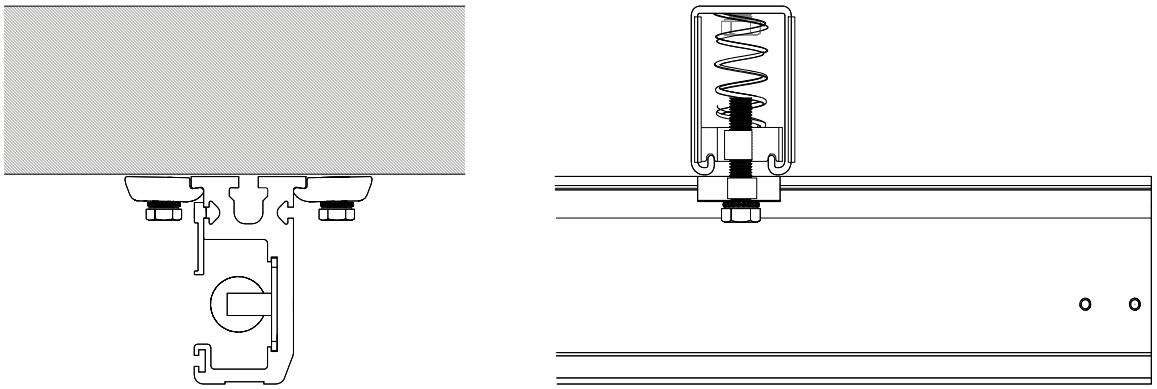
CEILING WORK MUST BE ABSOLUTELY DONE AS REQUIRED IN THE NEXT PROCEDURE.

- Make sure that the ceiling structure complies with the Ceiling recommendations.
- Make sure that the room complies with all the room specifications.
- Make sure that the drilled holes for the Longitudinal Rails comply with the Ceiling recommendations.
- Make sure that the drilled holes for the Longitudinal Rails comply with the next specifications:
  - Rails are mounted on Screws M10 and quality 8.8 and 45 mm (1.8”) length for Unistrut or similar Ceiling Systems and M10 class 10.9 for other types of ceilings.
  - Mounting holes every 700 or 750 mm (27.6 or 29.5”), standard distance. Check distances between holes in table *Table 2-2.*
  - 10 kN maximum load for each ceiling point and screw.
  - Make sure the alignment of the drilled holes along each Longitudinal Rail and between rails are correct. The distance between Transversal Rails (C) can be set from 1400 (55.1”) to 1800 mm (70.9”), which is the recommended one.
- Make sure that vertical level of the ceiling is the same along all the Longitudinal Rails.

Note ☞ *Rails are delivered by default for installation in Unistrut ceilings. For other Ceiling systems, contact Service to order the kit with slide screw and hex bolt (SAT-A18104-04).*

Illustration 2-5
Types of Fixation of the Longitudinal Rails and Ceiling Systems

FIXATION TO UNISTRUT RAIL



FIXATION TO STEEL PROFILES / BEAMS SYSTEM

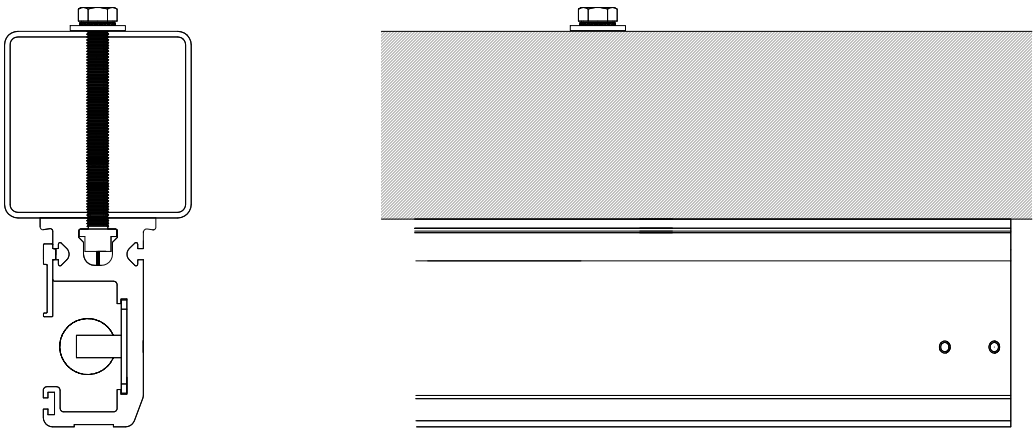


Table 2-2
Rails Dimensions and Carriage Travels

Length Long. Rail (X)	Holes Pitch (P)	Holes #	Distance to Ends of Long. Rails (A)	Maximum Longitudinal Travel *
3900 mm (153.5”)	750 mm (29.5”)	6	75 mm (3”)	2972 mm (117”)
4600 mm (181.1”)	750 mm (29.5”)	7	50 mm (2”)	3672 mm (144.6”)
5100 mm (200.8”)	700 mm (27.6”)	8	100 mm (4”)	4172 mm (164.3“)
6100 mm (240.2”)	750 mm (29.5”)	9	50 mm (2”)	5172 mm (203.6”)

Length Trans. Rail (Y)	Distance Between Rails (B)	Distance to Ends of Transversal Rails (C)	Maximum Transversal Travel *
2500 mm (98.4”)	From 1400 mm (55.1”) to 1800 mm (70.9”)	350 mm – 550 mm (13.8” – 21.7”)	1595 mm (62.8”)
3000 mm (118.1”)		600 mm – 800 mm (23.6” – 31.5”)	2095 mm (82.5”)
3500 mm (137.8”)		850 mm – 1050 mm (33.5” – 41.3”)	2595 mm (102.2”)

Illustration 2-6
Standard Configuration of Ceiling A

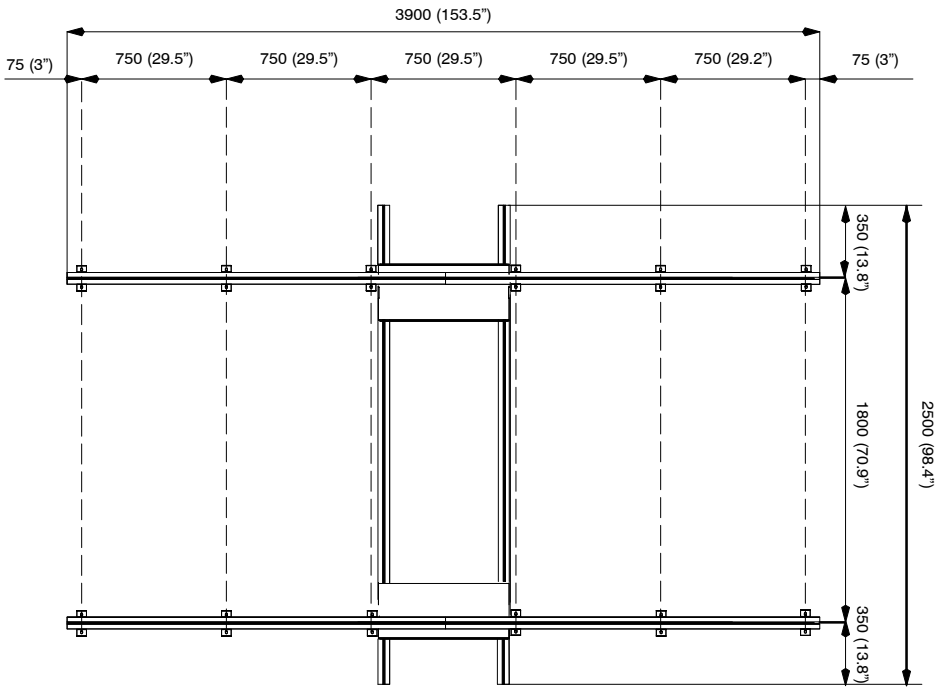


Illustration 2-7
Standard Configuration of Ceiling B

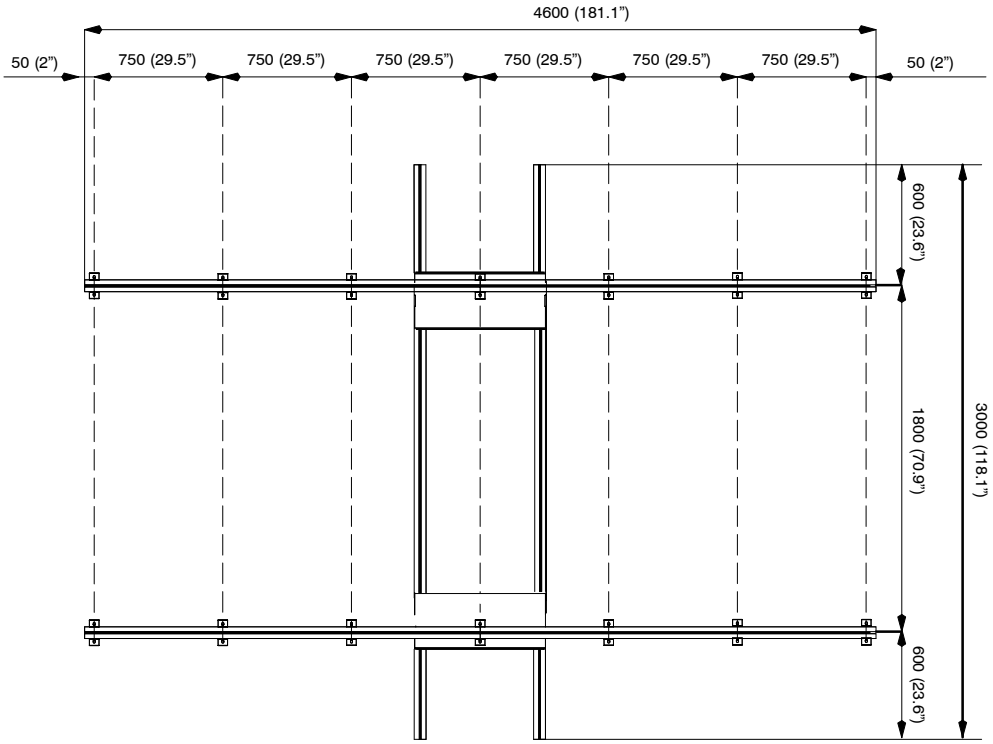


Illustration 2-8
Standard Configuration of Ceiling C

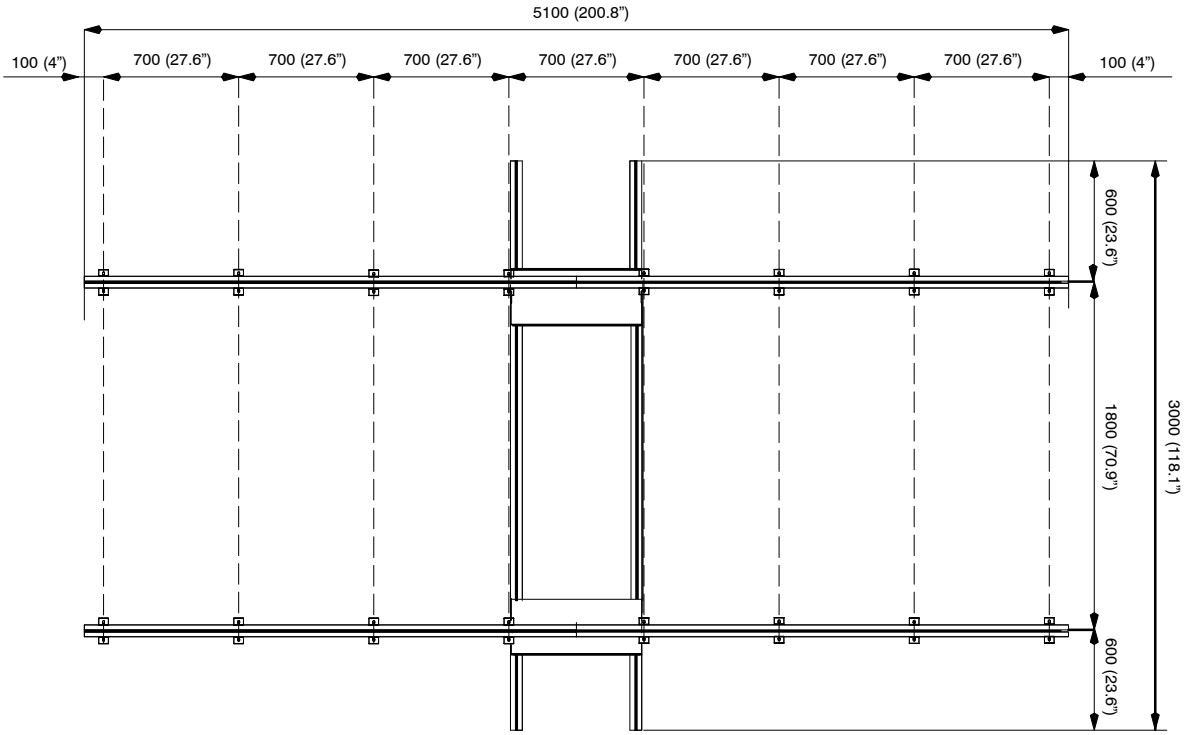


Illustration 2-9
Standard Configuration of Ceiling D

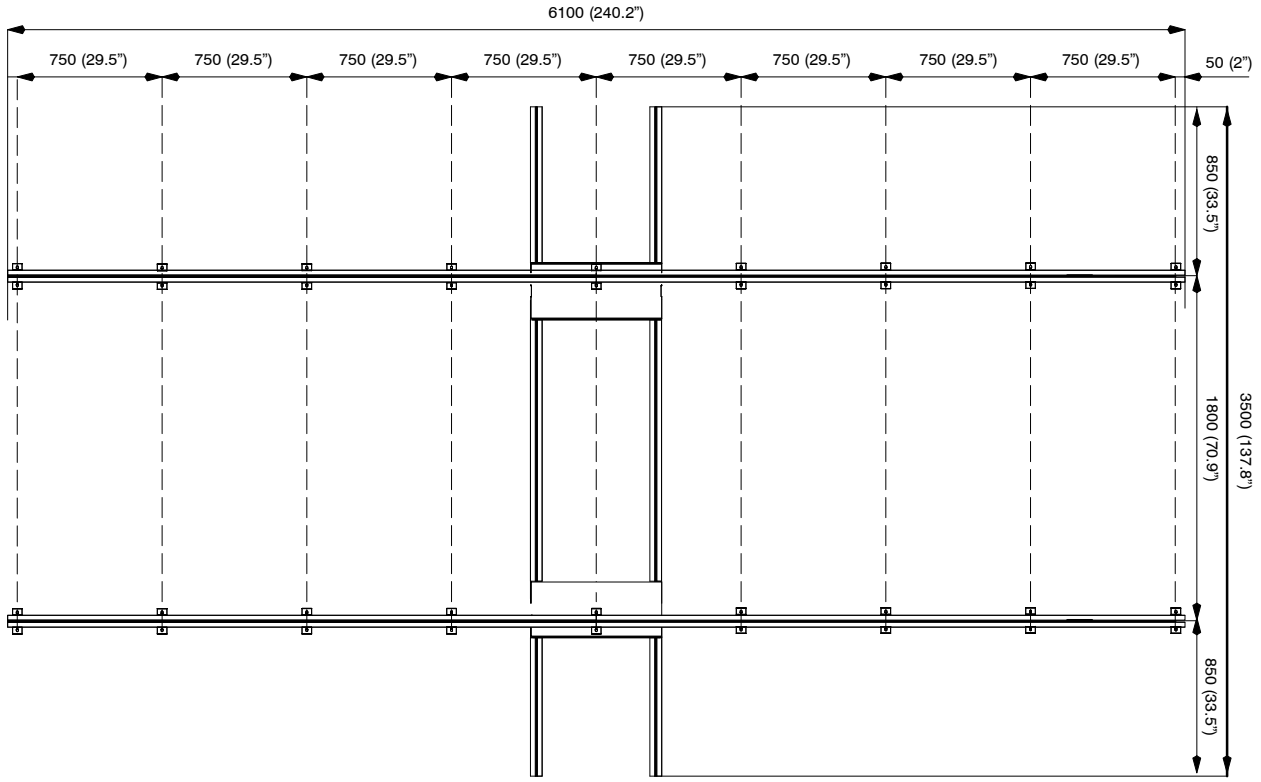
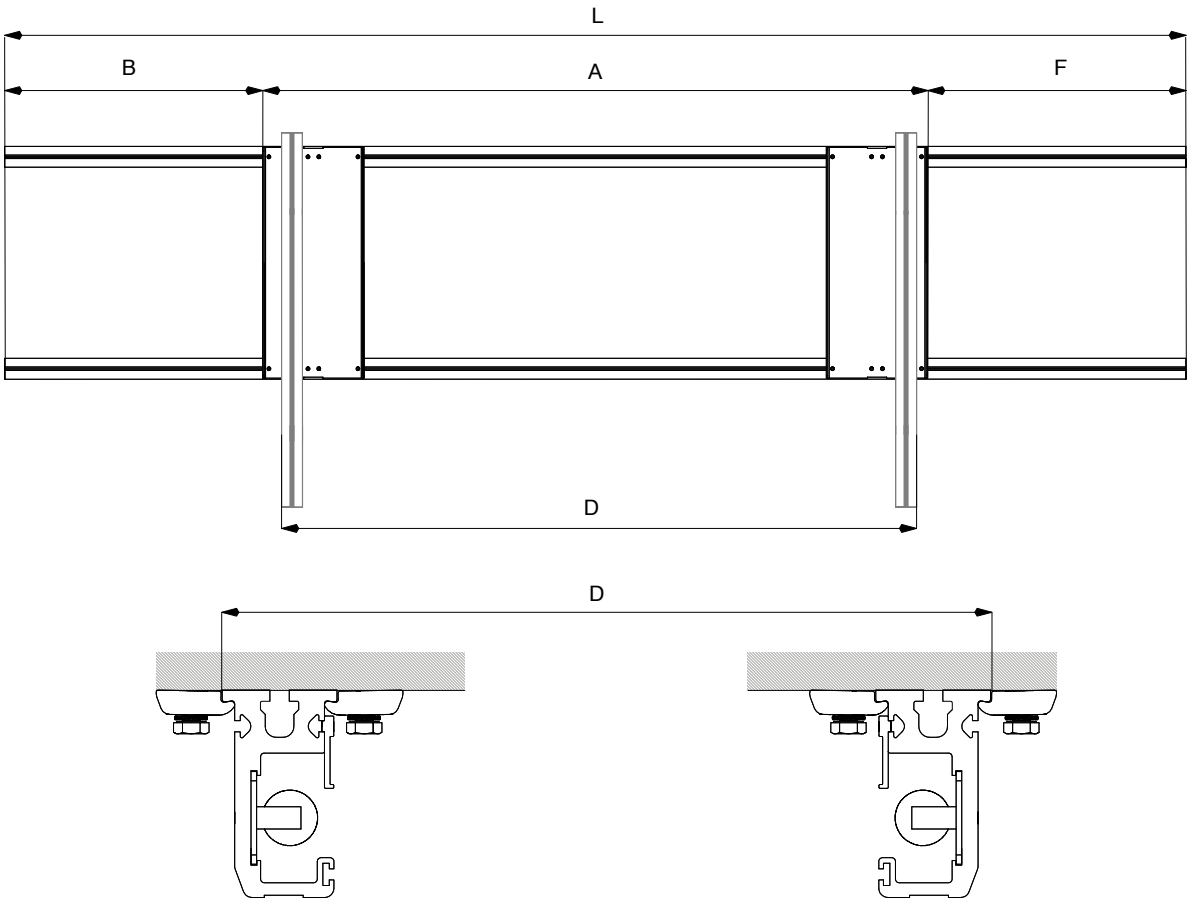


Illustration 2-10
Distances for the Transversal Trays' Installation



L Length of the Transversal Rails
B Distance between the Motor Tray to the back end of the Transversal Rail
A Distance between the back end of the Motor Tray and the front end of the Brake Tray
F Distance between the front end of the Brake Tray and the front end of the Transversal Rails
D Distance between the Longitudinal Rails (external sides)

B + F = L – D – 104mm (4.1")
A = D + 104 mm (4.1")

If Transversal Rails are centered then B = F
B = F = (L – D – 104mm) / 2

For example:
L = 2900 (114.17") mm and D = 1862 (73.3") and Transversal Rails Centered:

B = F = (2900 – 1862 – 104) /2 = 467 mm
(114.17" – 73.3" – 4.1") /2 = 18.38"

SECTION 3 PLANNING ELECTRICAL CONNECTIONS

3.1 ROUTING CABLES

3.1.1 GENERAL

High voltage and power cables must be separated from other cables. Use a separate trough in the duct system or use a separate conduit. Minimize cable length between the Room Electrical Cabinet and the System Generator Cabinet to reduce voltage regulation problems and wiring costs.

Avoid to pass the wires next to high magnetic field devices (microwaves, amplifiers, etc.)

3.1.2 CONDUIT

Separate conduits must be used for power and signal wires. These wires must be kept separate from each other.

Using conduit imposes some important considerations when used with this system. Of primary concern, the majority of cables used are pre-terminated. Pre-termination greatly simplifies interconnection but makes cable-pulling difficult because of the added dimensions of the connectors.

Conduit must be large enough to pass the cable and connector through with all other cables already in the conduit. Also, the size of the conduit chosen must allow for future growth. There is the possibility of additional cables being added later as the system is developed and options are added.

The use of conduit is recommended for cables running overhead between rooms, especially when a diagonal run provides the shortest cable path.

3.1.3 ELECTRICAL DUCTS

It is important that electrical ducts have separate compartments for power and signal wires. These wires must be kept separate from each other for proper system operation.

Electrical ducts have advantages when used with a single room or two (2) adjacent rooms. Electrical ducts combine cabling in a neat and functional appearance, with accessibility and room for expansion.

3.1.4 BROADBAND NETWORK CONNECTION FOR REMOTE SERVICE

The X-ray room is equipped with Broadband fast Ethernet hardware for Service diagnostics. The Overhead Tube Crane, equipped with Digital Imaging, is capable of placing electronic images on the Hospital image Ethernet Network. It is the purchasers responsibility to provide the Ethernet connection (rated at 100Mb/sec transfer rate for optimal performance) within 10 meters of the OTC.

The network connection is made at the OTC.

- 100BaseT network connection is preferred.
- 10BaseT network connection is acceptable.

To enable an easier installation and to benefit from remote support (service and engineering teams), equipments should be Insite connected at installation.

Thus the connectivity solution to implement should be decided during pre installation and all related data should be available before installation starts.

For all installations make sure that you have at least one RJ45 dedicated to connect the new equipment on the LAN. In case of Broadband, this connection will also be used for the remote service of the equipment.

For each solution selected by the customer the pre-installation checklist must be fulfilled by site IT manager in order to get connectivity information (site IT manager contacts, IP address…) available at installation.

In case Broadband is not available: Modem. A dedicated phone line using a RJ11 used only for the connection to a modem must be located at 1 m maximum from the operator console. This line will be a direct classical phone line.

3.1.5 SYSTEM INTERCONNECTIONS

System interconnect cables are described in the General Wiring Schematics shipped with the system. These documents specify all interconnections between components within the system and its options.

For specific interconnections maps and connection details, refer to the Service Manual shipped with the system.

SECTION 4 ELECTRICAL REQUIREMENTS

The System Generator Cabinet contains advanced circuitry which will maintain the selected X-ray techniques during adverse line conditions. However, there is a limit to the Generator's ability to correct for inadequate line power.

To ensure proper operation of the equipment:

- Do not under-size the Distribution Transformer. The secondary of the Distribution Transformer can be a "WYE" ("Star") or "DELTA" wire configuration.
- Size feeder and ground wires as per this document.
- Ensure and maintain input mains voltage to specification. **Ensure that the earth ground resistance of the installation (hospital/clinic) is lower than 10Ω.**

The electrical requirements in this document (wire sizes, etc.) relating to the Equipment Power and Power Line are the recommended specification.

TO AVOID THE RISK OF ELECTRIC SHOCK, THIS EQUIPMENT MUST ONLY BE CONNECTED TO A SUPPLY MAINS WITH PROTECTIVE EARTH.

ACCORDING TO THE MDD/93/42/EEC, THE EQUIPMENT IS EQUIPPED WITH EMC FILTERS. THE LACK OF THE PROPER GROUNDING MAY PRODUCE ELECTRICAL SHOCK TO THE USER.

The installation should comply with all the electrical requirements indicated in this document. These requirements should be upgraded if Local Standards were more stringent.

4.1 SYSTEM GENERATOR CABINET

4.1.1 POWER LINE REQUIREMENTS

- Factors:

FACTORS	GENERATOR MODEL *(Refer to Identification Label)*				
Maximum Power kW	**32 kW**	**40 kW**	**50 kW**	**65 kW**	**80 kW**
Maximum mA	400 mA(1)	500 mA(1)	630 mA(1 & 2)	630 mA(2)	800 mA *(or 1000 mA)*
Maximum kVp	125 or 150 kVp	125 or 150 kVp	125 or 150 kVp	125 or 150 kVp	150 kVp
Input Line Operation	Single-Phase Generator of 32 kW: 208/230 V~ - 50 / 60 Hz. Single-Phase Generator from 40 to 50 kW: 208(3)/230 V~ - 50/60 Hz. Three-Phase Generator from 32 to 50 kW: 208/230/400/415/440/480 V~ - 50 / 60 Hz. Three-Phase Generator from 65 to 80 kW: 400/415/440/480 V~ - 50/60 Hz. Line voltage automatic compensation ±10% V~. Maximum line regulation for maximum kVA demand: 6%.				

NOTES:

(1) For Single-Phase Generators of 32 kW at 208 V~, the maximum mA are limited to 160 when the selected kVp are within 126 and 134; to 125 mA when the selected kVp are 135 or 136; and to 100 mA when the selected kVp are higher than 136.
For Three-Phase Generators from 40 to 50 kW at 208 V, the maximum mA are limited to 200 when the selected kVp are 140 or higher.
For Single-Phase Generators of 50 kW at 230 V, the maximum mA are limited to 250 when the selected kVp are 140 or higher.

(2) Configurable to 640 mA or 650 mA under requirement.

(3) For Single-Phase Generators from 40 to 50 kW operating with lines at 208 V~ or below, an auxiliary boost transformer is required to adequate the line voltage to 230 V~.
The Auxiliary Boost Transformer should be dimensioned 25% above the actual kVA requirement of the Generator
(e.g. for 50 kW Generator -> 80 kVA Minimum required -> Auxiliary Boost Transformer should be dimensioned to 100 kVA [80 x 1.25]).

- I_{RMS} line current during an X-ray exposure, circuit breaker type and value, differential sensitivity (mA), minimum line power required (kVA), Generator stand-by consumption (W), should be:

	SINGLE-PHASE GENERATOR					
	32 kW					
LINE VOLTAGE	I_{RMS} (1)	Continuous Current (Stand-by)	CIRCUIT BREAKER TYPE (2)			
			IEC Standard			NEC Standard
			B	C	D	
208 V~	192 A	3.6 A	80 A	50 A	25 A	100 A
230 V~	174 A	3.3 A	80 A	40 A	20 A	90 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	54 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ single\text{-}phase)} = (1.25 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*
$I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

	THREE-PHASE GENERATOR					
	32 kW					
LINE VOLTAGE	I_{RMS} (1)	Continuous Current (Stand-by)	CIRCUIT BREAKER TYPE (2)			
			IEC Standard			NEC Standard
			B	C	D	
208 V~	111 A	3.6 A	50 A	25 A	20 A	60 A
230 V~	100 A	3.3 A	40 A	25 A	20 A	50 A
400 V~	58 A	1.9 A	25 A	20 A	20 A	30 A
415 V~	56 A	1.8 A	25 A	20 A	20 A	30 A
440 V~	52 A	1.7 A	20 A	20 A	20 A	30 A
480 V~	48 A	1.6 A	20 A	20 A	20 A	25 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	54 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ single\text{-}phase)} = (1.25 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*
$I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

	SINGLE-PHASE GENERATOR					
	40 kW					
LINE VOLTAGE	I_{RMS} (1)	Continuous Current (Stand-by)	CIRCUIT BREAKER TYPE (2)			
			IEC Standard			NEC Standard
			B	C	D	
208 V~ (3)	240 A	3.6 A	100 A	63 A	32 A	125 A
230 V~	217 A	3.3 A	80 A	50 A	25 A	110 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	66 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ single\text{-}phase)} = (1.25 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*
$I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

(3) For Single-Phase Generators from 40 to 50 kW operating with lines at 208 V~ or below, an auxiliary boost transformer is required to adequate the line voltage to 230 V~.
The Auxiliary Boost Transformer should be dimensioned 25% above the actual kVA requirement of the Generator
(e.g. for 50 kW Generator -> 80 kVA Minimum required -> Auxiliary Boost Transformer should be dimensioned to 100 kVA [80 x 1.25]).

	THREE-PHASE GENERATOR					
	40 kW					
LINE VOLTAGE	I_{RMS} (1)	Continuous Current (Stand-by)	CIRCUIT BREAKER TYPE (2)			
			IEC Standard			NEC Standard
			B	C	D	
208 V~	138 A	3.6 A	63 A	32 A	20 A	70 A
230 V~	125 A	3.3 A	50 A	32 A	20 A	70 A
400 V~	72 A	1.9 A	32 A	20 A	20 A	40 A
415 V~	69 A	1.8 A	32 A	20 A	20 A	35 A
440 V~	65 A	1.7 A	25 A	20 A	20 A	35 A
480 V~	60 A	1.6 A	25 A	20 A	20 A	30 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	66 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ single\text{-}phase)} = (1.25 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*
$I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

	SINGLE-PHASE GENERATOR					
	50 kW					
LINE VOLTAGE	I_{RMS} (1)	Continuous Current (Stand-by)	CIRCUIT BREAKER TYPE (2)			
			IEC Standard			NEC Standard
			B	C	D	
208 V~ (3)	300 A	3.6 A	125 A	80 A	40 A	150 A
230 V~	272 A	3.3 A	100 A	63 A	32 A	150 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	80 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ single\text{-}phase)} = (1.25 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*
$I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

(3) For Single-Phase Generators from 40 to 50 kW operating with lines at 208 V~ or below, an auxiliary boost transformer is required to adequate the line voltage to 230 V~.
The Auxiliary Boost Transformer should be dimensioned 25% above the actual kVA requirement of the Generator
(e.g. for 50 kW Generator -> 80 kVA Minimum required -> Auxiliary Boost Transformer should be dimensioned to 100 kVA [80 x 1.25]).

	THREE-PHASE GENERATOR					
	50 kW					
LINE VOLTAGE	I_{RMS} (1)	Continuous Current (Stand-by)	CIRCUIT BREAKER TYPE (2)			
			IEC Standard			NEC Standard
			B	C	D	
208 V~	173 A	3.6 A	80 A	40 A	20 A	90 A
230 V~	157 A	3.3 A	63 A	40 A	20 A	80 A
400 V~	90 A	1.9 A	40 A	20 A	20 A	45 A
415 V~	87 A	1.8 A	32 A	20 A	20 A	45 A
440 V~	82 A	1.7 A	32 A	20 A	20 A	45 A
480 V~	75 A	1.6 A	32 A	20 A	20 A	40 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	80 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ single\text{-}phase)} = (1.25 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*
$I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

	THREE-PHASE GENERATOR					
	65 kW					
LINE VOLTAGE	**I_{RMS} (1)**	**Continuous Current (Stand-by)**	**CIRCUIT BREAKER TYPE (2)**			
			IEC Standard			**NEC Standard**
			B	**C**	**D**	
400 V~	115 A	1.9 A	50 A	32 A	20 A	60 A
415 V~	111 A	1.8 A	50 A	25 A	20 A	60 A
440 V~	105 A	1.7 A	40 A	20 A	20 A	60 A
480 V~	96 A	1.6 A	40 A	20 A	20 A	50 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	99 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ single\text{-}phase)} = (1.25 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*
$I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

	THREE-PHASE GENERATOR					
	80 kW					
LINE VOLTAGE	I_{RMS} (1)	Continuous Current (Stand-by)	CIRCUIT BREAKER TYPE (2)			
			IEC Standard			NEC Standard
			B	C	D	
400 V~	144 A	1.9 A	63 A	32 A	20 A	80 A
415 V~	139 A	1.8 A	63 A	32 A	20 A	70 A
440 V~	131 A	1.7 A	50 A	32 A	20 A	70 A
480 V~	120 A	1.6 A	50 A	32 A	20 A	60 A
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA					
Minimum kVA required	123 kVA					
Stand-by Consumption	750 W					

***Notes**:*

(1) $I_{RMS\ (for\ three\text{-}phase)} = (0.72 \times P) / V\sim$ *(I_{RMS} = maximum instantaneous current based on 100 ms X-ray exposure).*

(2) *Circuit Breaker (Differential, Thermomagnetic, Fuses and/or Contactor).*
The selected circuit breaker type must have a minimum tripping current of 1.1 x I_{RMS} @ 0.1 seconds.
For example:

Type "B" breaker: $M_B = (I_{RMS} \times 1.1) / 3$
Type "C" breaker: $M_C = (I_{RMS} \times 1.1) / 5$
Type "D" breaker: $M_D = (I_{RMS} \times 1.1) / 10$

Based on NEC Standard: The capacity of the selected Circuit Breaker must have at least 50% of the input required for the momentary rating of the X-ray equipment (I_{RMS}).

The selected circuit breaker should be equal or bigger than the calculated value. Minimum value should be 20 A.

IEC classification of circuit breakers: 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A.
NEC classification of circuit breakers: 20 A, 25 A, 30 A, 35 A, 40 A, 45 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A.

- The Maximum Impedance must be lower than the value indicated below:

LINE VOLTAGE	SINGLE-PHASE GENERATOR								
	32 kW			40 kW			50 kW		
	Z_L Ω	Z_C Ω	Z_T Ω	Z_L Ω	Z_C Ω	Z_T Ω	Z_L Ω	Z_C Ω	Z_T Ω
208 V~	0.043 Ω	0.012 Ω	0.068 Ω	0.035 Ω	0.010 Ω	0.054 Ω	0.028 Ω	0.008 Ω	0.043 Ω
230 V~	0.053 Ω	0.015 Ω	0.083 Ω	0.042 Ω	0.012 Ω	0.066 Ω	0.034 Ω	0.010 Ω	0.053 Ω

Z_L Ω = maximum impedance of the distribution transformer.
Z_C Ω = maximum impedance of every feeder cable.
Z_T Ω = maximum impedance at the generator's input terminals.
NOTE: *The above values comply with the Standards IEC 60601-2-54:2009 and IEC 60601-2-54:2009+AMD1:2015.*

LINE VOLTAGE	THREE-PHASE GENERATOR								
	32 kW			40 kW			50 kW		
	Z_L Ω	Z_C Ω	Z_T Ω	Z_L Ω	Z_C Ω	Z_T Ω	Z_L Ω	Z_C Ω	Z_T Ω
208 V~	0.074 Ω	0.024 Ω	0.118 Ω	0.060 Ω	0.020 Ω	0.094 Ω	0.048 Ω	0.016 Ω	0.075 Ω
230 V~	0.091 Ω	0.030 Ω	0.144 Ω	0.073 Ω	0.024 Ω	0.115 Ω	0.058 Ω	0.019 Ω	0.092 Ω
400 V~	0.275 Ω	0.090 Ω	0.435 Ω	0.220 Ω	0.072 Ω	0.348 Ω	0.176 Ω	0.058 Ω	0.278 Ω
415 V~	0.296 Ω	0.097 Ω	0.468 Ω	0.237 Ω	0.078 Ω	0.375 Ω	0.189 Ω	0.062 Ω	0.300 Ω
440 V~	0.333 Ω	0.109 Ω	0.526 Ω	0.266 Ω	0.087 Ω	0.421 Ω	0.213 Ω	0.070 Ω	0.337 Ω
480 V~	0.396 Ω	0.130 Ω	0.626 Ω	0.317 Ω	0.104 Ω	0.501 Ω	0.253 Ω	0.083 Ω	0.401 Ω

Z_L Ω = maximum impedance of the distribution transformer.
Z_C Ω = maximum impedance of every feeder cable.
Z_T Ω = maximum impedance at the generator's input terminals.
NOTE: *The above values comply with the Standards IEC 60601-2-54:2009 and IEC 60601-2-54:2009+AMD1:2015.*

LINE VOLTAGE	THREE-PHASE GENERATOR					
	65 kW			80 kW		
	Z_L Ω	Z_C Ω	Z_T Ω	Z_L Ω	Z_C Ω	Z_T Ω
400 V~	0.138 Ω	0.045 Ω	0.218 Ω	0.110 Ω	0.036 Ω	0.174 Ω
415 V~	0.148 Ω	0.048 Ω	0.234 Ω	0.118 Ω	0.039 Ω	0.187 Ω
440 V~	0.166 Ω	0.055 Ω	0.263 Ω	0.133 Ω	0.044 Ω	0.211 Ω
480 V~	0.198 Ω	0.065 Ω	0.313 Ω	0.158 Ω	0.052 Ω	0.251 Ω

Z_L Ω = maximum impedance of the distribution transformer.
Z_C Ω = maximum impedance of every feeder cable.
Z_T Ω = maximum impedance at the generator's input terminals.
NOTE: *The above values comply with the Standards IEC 60601-2-54:2009 and IEC 60601-2-54:2009+AMD1:2015.*

RECOMMENDED WIRE SIZE

Correct sizing of the feeder wires is critical to proper Generator operation. Wire size is dependent on the Generator power, the line voltage and the distance from the Distribution Transformer to the Generator Cabinet. The maximum voltage drop during an exposure must not exceed 5% of the nominal mains value.

It is recommended that the Distribution Transformer (Hospital / Clinic) used as the power source have at least 25% more power than the maximum power of the X-ray Generator.

The recommended wire sizing is indicated in Table 4-1 and the wire size conversion in Table 4-2. These lengths are measured from the Distribution Transformer to the Room Electrical Cabinet (Main Disconnect). **From the Room Electrical Cabinet to the Generator Cabinet, wire sizes should be consistent with those shown in Table 4-1 and based on the length of wires required to complete the run. The maximum wire size that can be connected to the Generator Cabinet (Input Line Fuse Holder) is 35 mm^2 (AWG 2).**

Table 4-1
Minimum Wire Size from Distribution Transformer to Room Electrical Cabinet

GENERATOR	LINE VOLTAGE	WIRE SIZE AT:							
		15 m (50 ft)		30 m (100 ft)		45 m (150 ft)		60 m (200 ft)	
32 kW, 1ϕ	208 V~	25 mm^2	AWG 2	50 mm^2	AWG 1/0	95 mm^2	AWG 3/0	120 mm^2	AWG 4/0
	230 V~	25 mm^2	AWG 4	50 mm^2	AWG 1	70 mm^2	AWG 2/0	95 mm^2	AWG 3/0
32 kW, 3ϕ	208 V~	16 mm^2	AWG 6	25 mm^2	AWG 2	50 mm^2	AWG 1	50 mm^2	AWG 1
	230 V~	10 mm^2	AWG 6	25 mm^2	AWG 4	35 mm^2	AWG 2	50 mm^2	AWG 1
	400 V~	4 mm^2	AWG 12	10 mm^2	AWG 8	10 mm^2	AWG 6	16 mm^2	AWG 6
	415 V~	4 mm^2	AWG 12	6 mm^2	AWG 8	10 mm^2	AWG 6	16 mm^2	AWG 6
	440 V~	4 mm^2	AWG 12	6 mm^2	AWG 8	10 mm^2	AWG 8	16 mm^2	AWG 6
	480 V~	4 mm^2	AWG 12	6 mm^2	AWG 10	10 mm^2	AWG 8	10 mm^2	AWG 6

Table 4-1 (cont.)
Minimum Wire Size from Distribution Transformer to Room Electrical Cabinet

GENERATOR	LINE VOLTAGE	WIRE SIZE AT:							
		15 m (50 ft)		30 m (100 ft)		45 m (150 ft)		60 m (200 ft)	
40 kW, 1ϕ	208 V~	35 mm^2	AWG 2	70 mm^2	AWG 2/0	95 mm^2	AWG 4/0	120 mm^2	AWG 4/0
	230 V~	25 mm^2	AWG 2	50 mm^2	AWG 1/0	95 mm^2	AWG 3/0	120 mm^2	AWG 4/0
40 kW, 3ϕ	208 V~	16 mm^2	AWG 4	35 mm^2	AWG 2	50 mm^2	AWG 1/0	70 mm^2	AWG 2/0
	230 V~	16 mm^2	AWG 6	25 mm^2	AWG 2	50 mm^2	AWG 1	50 mm^2	AWG 1/0
	400 V~	6 mm^2	AWG 10	10 mm^2	AWG 8	16 mm^2	AWG 6	25 mm^2	AWG 4
	415 V~	4 mm^2	AWG 10	10 mm^2	AWG 8	16 mm^2	AWG 6	16 mm^2	AWG 4
	440 V~	4 mm^2	AWG 10	10 mm^2	AWG 8	10 mm^2	AWG 6	16 mm^2	AWG 6
	480 V~	4 mm^2	AWG 12	6 mm^2	AWG 8	10 mm^2	AWG 8	16 mm^2	AWG 6
50 kW, 1ϕ	208 V~	50 mm^2	AWG 1	95 mm^2	AWG 3/0	N.A.	N.A.	N.A.	N.A.
	230 V~	35 mm^2	AWG 2	70 mm^2	AWG 2/0	95 mm^2	AWG 4/0	N.A.	N.A.
50 kW, 3ϕ	208 V~	25 mm^2	AWG 4	50 mm^2	AWG 1	70 mm^2	AWG 2/0	95 mm^2	AWG 3/0
	230 V~	16 mm^2	AWG 4	35 mm^2	AWG 2	50 mm^2	AWG 1/0	70 mm^2	AWG 2/0
	400 V~	6 mm^2	AWG 10	10 mm^2	AWG 6	16 mm^2	AWG 4	25 mm^2	AWG 4
	415 V~	6 mm^2	AWG 10	10 mm^2	AWG 6	16 mm^2	AWG 4	25 mm^2	AWG 4
	440 V~	6 mm^2	AWG 10	10 mm^2	AWG 8	16 mm^2	AWG 6	25 mm^2	AWG 4
	480 V~	4 mm^2	AWG 10	10 mm^2	AWG 8	16 mm^2	AWG 6	16 mm^2	AWG 4
65 kW, 3ϕ	400 V~	10 mm^2	AWG 8	16 mm^2	AWG 6	25 mm^2	AWG 4	35 mm^2	AWG 2
	415 V~	10 mm^2	AWG 8	16 mm^2	AWG 6	25 mm^2	AWG 4	25 mm^2	AWG 2
	440 V~	6 mm^2	AWG 8	16 mm^2	AWG 6	16 mm^2	AWG 4	25 mm^2	AWG 4
	480 V~	6 mm^2	AWG 10	10 mm^2	AWG 6	16 mm^2	AWG 4	25 mm^2	AWG 4
80 kW, 3ϕ	400 V~	10 mm^2	AWG 8	25 mm^2	AWG 4	25 mm^2	AWG 2	35 mm^2	AWG 2
	415 V~	10 mm^2	AWG 8	16 mm^2	AWG 4	25 mm^2	AWG 2	35 mm^2	AWG 2
	440 V~	10 mm^2	AWG 8	16 mm^2	AWG 6	25 mm^2	AWG 4	35 mm^2	AWG 2
	480 V~	6 mm^2	AWG 8	16 mm^2	AWG 6	25 mm^2	AWG 4	25 mm^2	AWG 2

Table 4-2
Wire Size Conversion and Ampacity

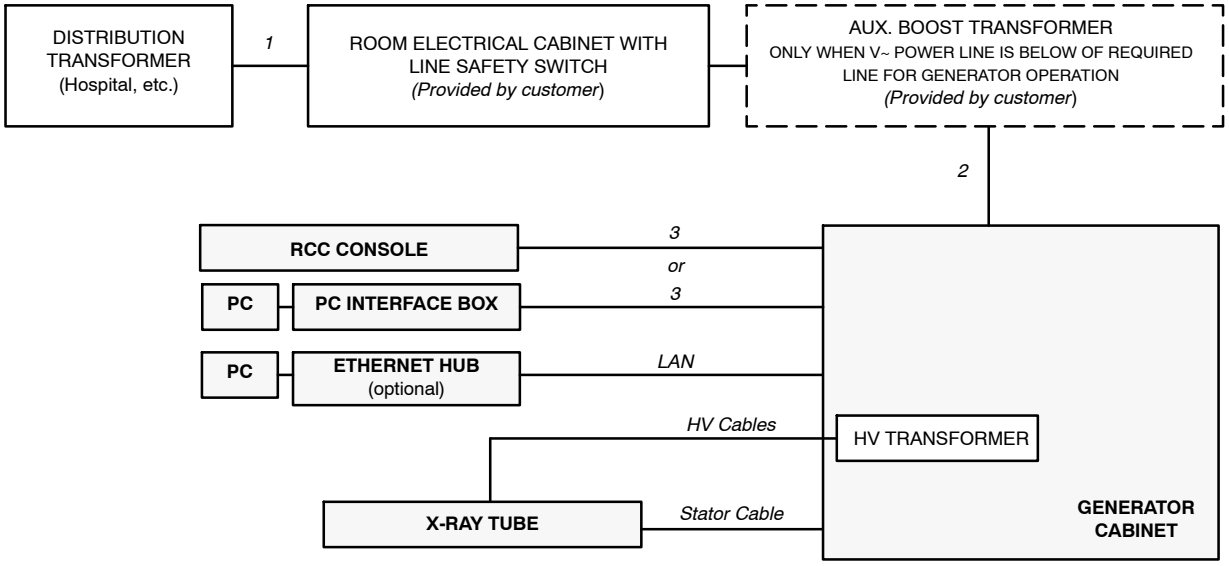
Wire Cross Section (mm^2)	IEC Standard		NEC Standard	
	Wire Size (mm^2)	Ampacity (A)	AWG Wire Size	Ampacity (A)
3.31			**12**	25
4	**4**	24		
5.26			**10**	35
6	**6**	39		
8.37			**8**	50
10	**10**	55		
13.3			**6**	65
16	**16**	70		
21.15			**4**	85
25	**25**	90		
33.6			**2**	115
35	**35**	115		
42.4			**1**	130
50	**50**	132		
53.5			**0 (1/0)**	150
67.4			**00 (2/0)**	175
70	**70**	170		
85			**000 (3/0)**	200
95	**95**	200		
107.2			**0000 (4/0)**	230
120	**120**	240		

The selected cable (copper) must have an Ampacity equal or greater than the Circuit Breaker.
Ampacity (A) values at Ambient Temperature of 30ºC (86ºF) and Cable Temperature rating of 75ºC (167ºF)
The smallest size used is 4 mm^2 or AWG 12.

4.1.2 INTERCONNECTION AND GROUNDING REQUIREMENTS

Note ☞ *For more information about interconnection and grounding refer to "Installation" document.*

Illustration 4-1
Interconnection Block Diagram for LINE POWERED GENERATORS



CABLE RUN	FUNCTION	REMARKS
1	Single or Three Phase Input Power Line	Connect to Room Electrical Cabinet according to the indicated electrical requirements. *Customer supplied.*
	Ground	
2	Single or Three Phase Input Power Line	Connect to Generator according to the indicated electrical requirements. Install an Auxiliar Boost Transformer when it is required. *Customer supplied.*
	Ground	
3	Input Power Cable	Connect to Generator Cabinet according to the Installation document of the Service Manual.

NOTES: - For wire size refer to Section 4.1. Consult to Local Standards for feeder and ground wire size requirements.
The system power ground point is located in the Room Electrical Cabinet.

4.2 OVERHEAD TUBE CRANE

FREQUENCY (HZ)		VOLTAGE (V~)		MAX CURRENT (A)	
MIN	**MAX**	**MIN**	**MAX**	**at 100 V~**	**at 240 V~**
50	60	100	240	5.2	2.6

Circuit Breaker type and value, differential sensitivity (mA), Overhead Tube Crane stand-by consumption (W), should be:

Circuit Breaker	16 A, curves type B, C or D
Differential Sensitivity	30 mA
Standby Consumption	161 W
Maximum Consumption	600 VA

Note ☞ *The Power Supply Cable for the Overhead Tube Crane is provided by the Manufacturer.*

4.3 RAD TABLE

FREQUENCY (HZ)		VOLTAGE (V~)		MAX CURRENT (A)	
MIN	**MAX**	**MIN**	**MAX**	**at 100 V~**	**at 240 V~**
50	60	100	240	6	2.9

Circuit Breaker type and value, differential sensitivity (mA), RAD Table stand-by consumption (W), should be:

Circuit Breaker	16 A, curves type B, C or D
Differential Sensitivity	30 mA
Standby Consumption	92 W
Maximum Consumption	900 VA

Note ☞ *The Power Supply Cable for the RAD Table is provided by the Manufacturer.*

4.4 RAD WALL STAND

FREQUENCY (HZ)		VOLTAGE (V ~)		MAX CURRENT (A)	
MIN	**MAX**	**MIN**	**MAX**	**at 100 V~**	**at 240 V~**
50	60	100	240	1.5	1

Circuit Breaker type and value, differential sensitivity (mA), RAD Wall Stand stand-by consumption (W), should be:

Circuit Breaker	16 A, curves type B, C or D
Differential Sensitivity	30 mA
Standby Consumption	69 W
Maximum Consumption	230 VA

Note ☞ *The Power Supply Cable for the RAD Wall Stand is provided by the Manufacturer.*

4.5 SAFETY DEVICES

Every installation must be provided with a main line disconnect device (Circuit Breaker/Thermomagnetic Breaker) and the remote disconnect devices required at all Consoles that are not located next to the line safety switch.

Devices such as Safety Switch / Emergency Switch, Warning Light, and a Door Interlock Switch should be supplied and installed by the customer. *(Refer to Illustration 4-2).*

SAFETY SWITCH / EMERGENCY SWITCH

The main Safety Switch should be installed in the Room Electrical Cabinet (Main Disconnect) close to the Overhead Tube Crane, RAD Table and/or RAD Wall Stand and provided with light indicators for “Power ON / OFF”. It should be used for main disconnection of the whole System and located in an accessible place where it can be seen and controlled during operation and service.

Other Emergency Switches should be installed in accessible locations in the room (near the main entrance door or the Control Console) for use in an emergency. They should be connected to the Room Electrical Cabinet (Room Disconnect) so that they cut power to the Generator when they are activated.

The rating of these switches should be: 10 A, 500 V~, NC, and should have at least 3.42 mm as Creepage Distances and Air Clearances in accordance with Standards IEC 60601-1:2005, IEC 60601-1:2005+AMD1:2012 and IEC 61058-1:2000 requirements.

DOOR INTERLOCK SWITCH

The Door Interlock Switch indicates to the operator when Doorways to the X-ray room are open. It inhibits or not the X-ray generation, according to the Local Standards and customer preferences.

This switch should be installed in the entrance door(s) and its connecting cable should be routed to the Generator Cabinet.

WARNING LIGHT

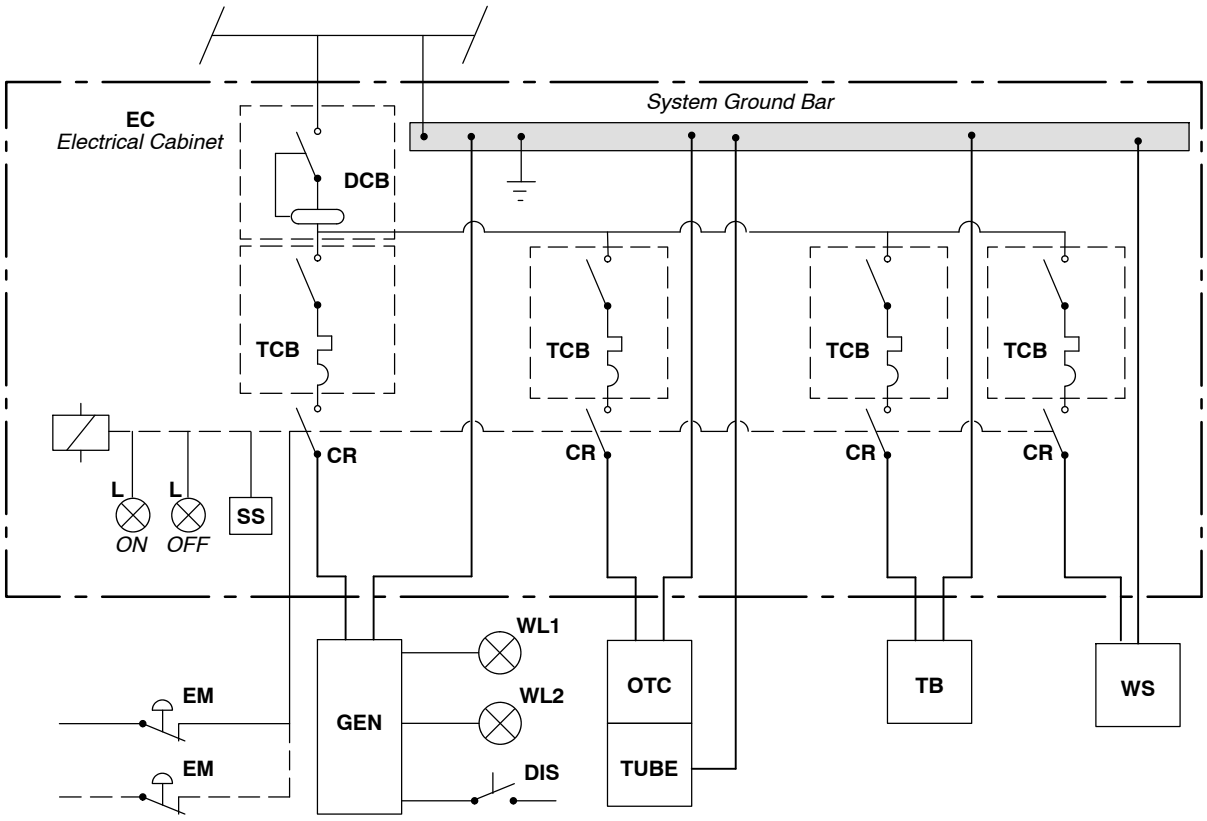
The Warning Lights are signal lamps installed outside of the X-ray room (near of the main entrance) that indicate:

1. The system is under voltage (red lamp “ON”).
2. X-ray exposure in process (yellow lamp “ON”) (*for connection refer to Installation document.*)

The Warning Lights connection cables should be routed to the Generator.

Note ☞ *The installation must be in compliance with all local regulations.*

Illustration 4-2
Room Electrical Cabinet and Mains Connection



LEGEND

EC: Electrical Cabinet (Room Disconnect) for powering X-ray equipment. (*Customer supplied)*

DCB: Differential Circuit Breaker.

TCB: Thermomagnetic (or Fuses) Circuit Breaker.

CR: Contactor controlled by the Safety Switch (**SS**).

SS: Safety Switch used for Generator main disconnection, with ON/OFF positions.

L: ON / OFF Indicator Lamps located on the Electrical Cabinet.

EM: Emergency Switch near to Control Console and/or to the Room main entrance.

GEN: Generator Cabinet

OTC: Overhead Tube Crane

TUBE: X-ray Tube

TB: RAD Table

WS: RAD Wall Stand

WL1: X-ray Emission Indicator Lamp (yellow lamp) connected to the Generator Cabinet, located outside of the X-ray Room (above the exam room entrance).

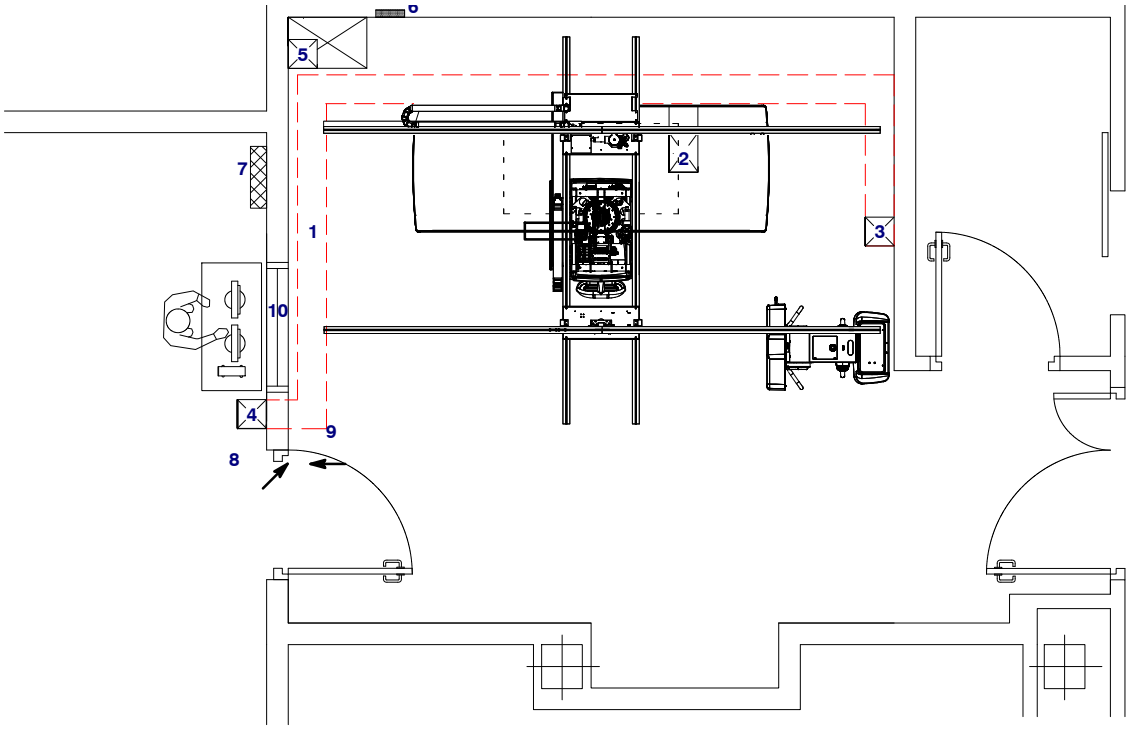
WL2: Warning Light (red lamp) located outside of the X-ray Room (above the exam room entrance).

DIS: Door Interlock Switch located on the main entrance(s).

4.6 SYSTEM CABLE INFORMATION

4.6.1 SUGGESTED CABLE RUN

1. Cable duct: 200x50 mm (7.87x1.97”) on floor
2. Cables output: 200x100 mm (7.87x3.94”) on floor over (1)
3. Cables output: 200x100 mm (7.87x3.94”) on floor over (1)
4. Cables output: 200x100 mm (7.87x3.94”) on floor over (1)
5. Cables output: 200x100 mm (7.87x3.94”) on floor over (1)
6. Wall Support of 200x50 mm (7.87x1.97”) connected to (1) with cable output over the useful ceiling
7. Electrical Cabinet connected to (5)
8. ON/OFF buttons panel for the Electrical Cabinet (7)
9. Emergency-OFF Switch of the Electrical Cabinet (7) on wall, 1200 mm (47.24”) height
10. Lead screen



4.7 CABLE ACCESS

Illustration 4-3
Line Powered Generator (Without Floor or Wall Supports)

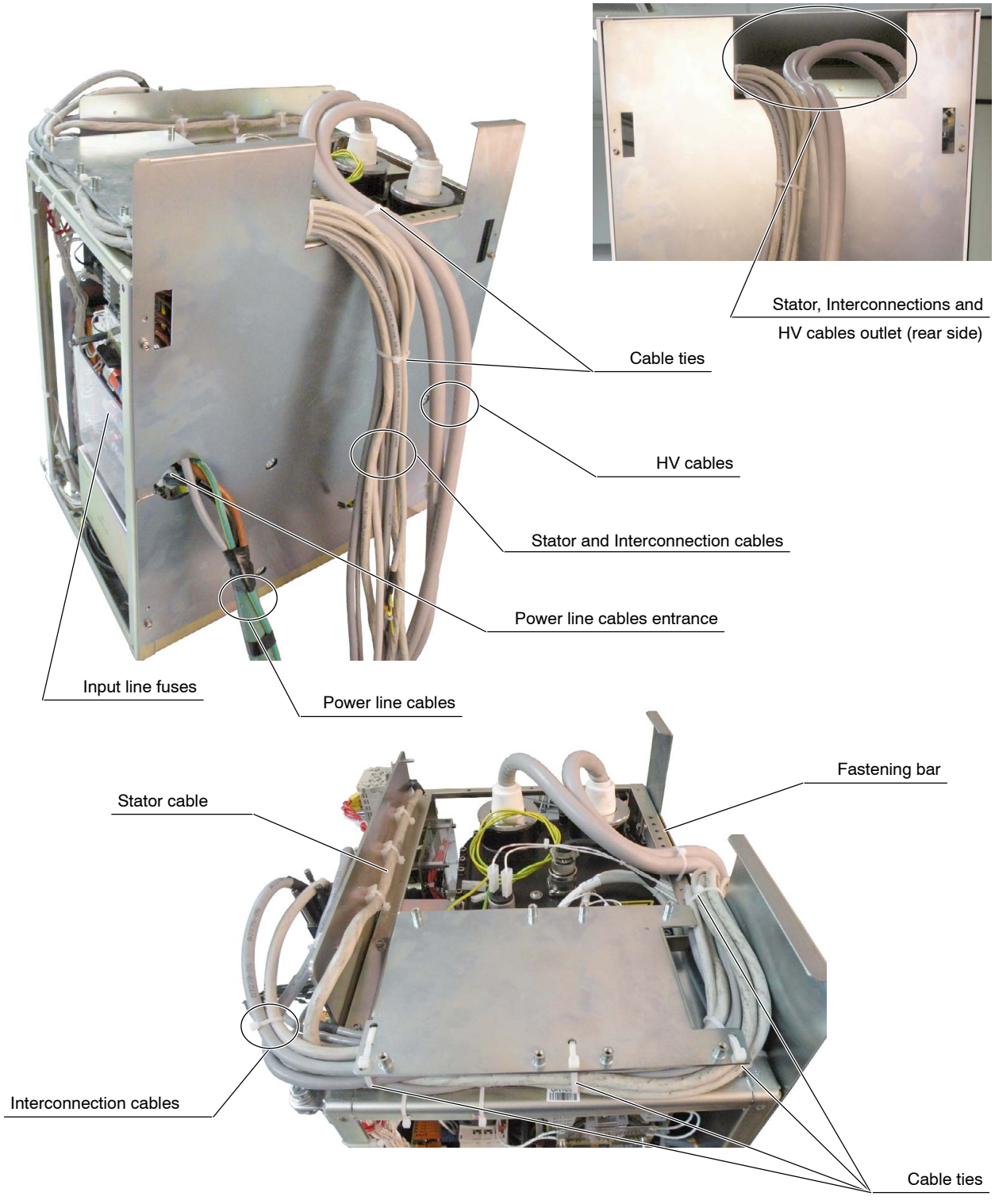
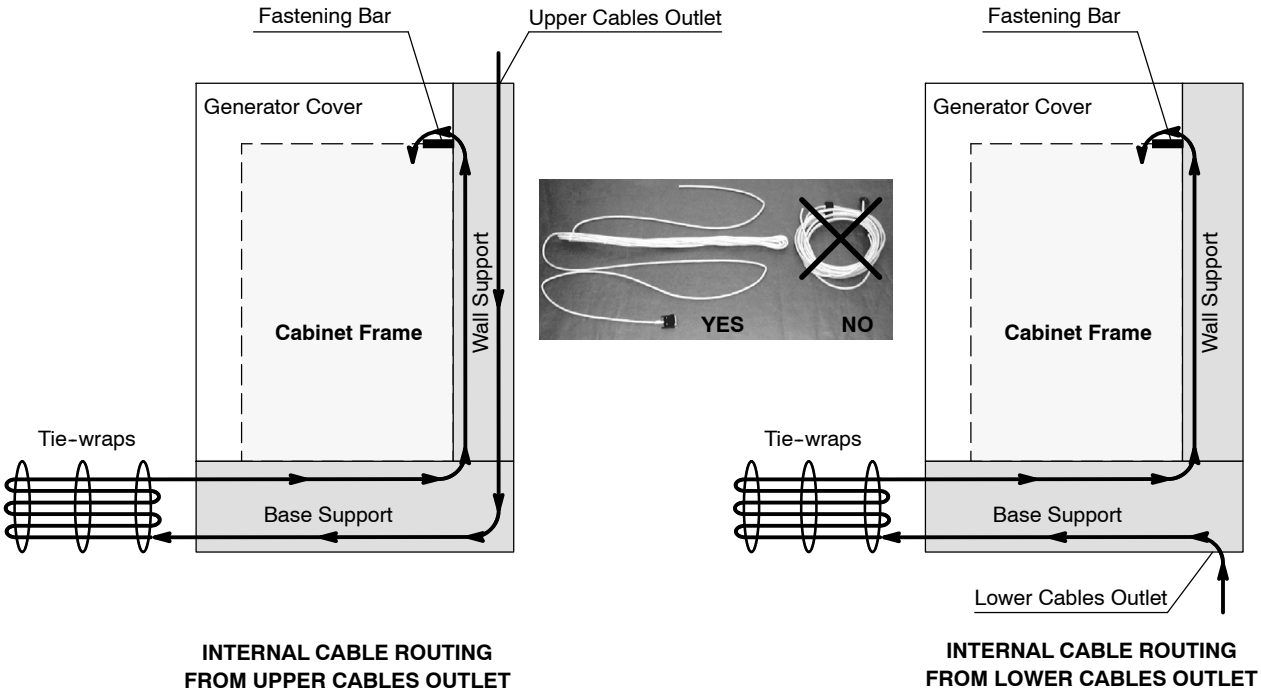


Illustration 4-4
Line Powered Generator (With Floor and Wall Support)



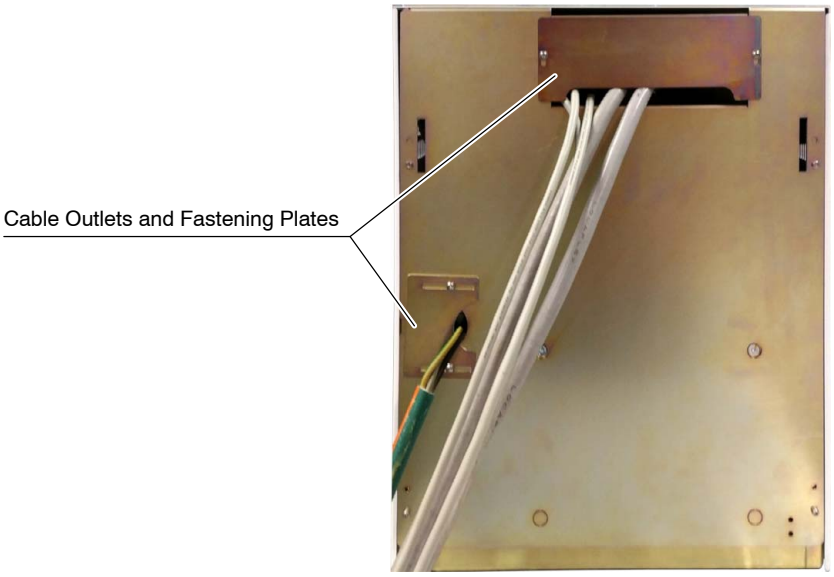
INTERNAL CABLE ROUTING FROM UPPER CABLES OUTLET

INTERNAL CABLE ROUTING FROM LOWER CABLES OUTLET

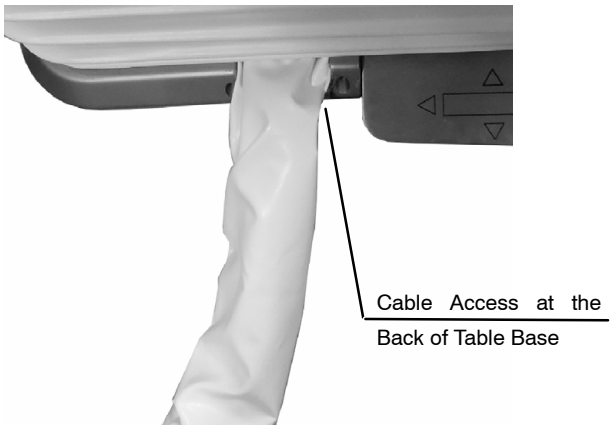
Cables routing from Cabinet to Base support (rear view)

Cables outlet (rear side of the Cabinet cover)

Illustration 4-5
Line Powered Generator (with optional Fastening Plates on the rear cover)

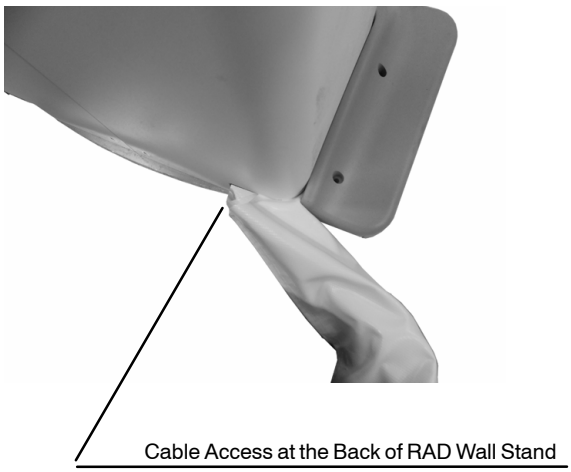


RAD TABLE



WALL SUPPORT FOR OTC

RAD WALL STAND



SECTION 5 PRODUCT CHARACTERISTICS

This section provides product information and illustrations showing physical dimensions, weight, mounting holes and cable access.

5.1 X-RAY GENERATOR

5.1.1 HIGH VOLTAGE CABLES

COMPONENT	LENGTHS	
High Voltage Cables	20 m (65.6 ft)	30 m (98.4 ft)

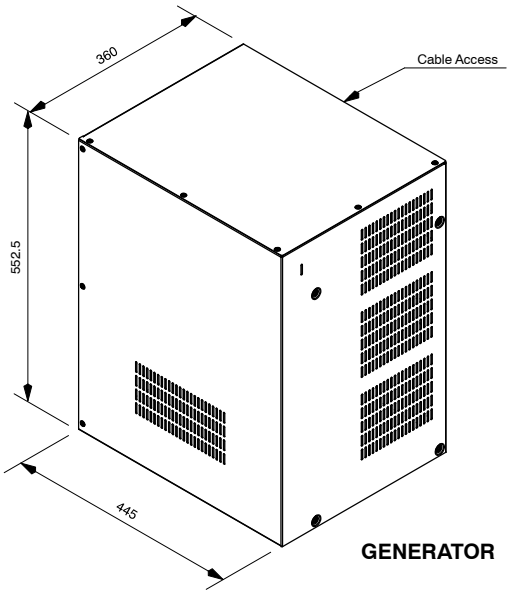
5.1.2 PHYSICAL CHARACTERISTICS

(Refer to Illustration 5-1)

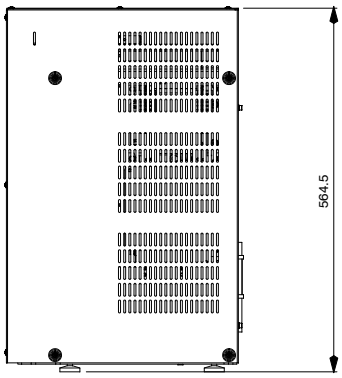
LINE POWERED GENERATORS

COMPONENT	DIMENSIONS			WEIGHT
	Length	Width	Height	
Generator Cabinet with Leveling Legs	445 mm (17.5”)	360 mm (14.2”)	564.5 mm (22.2”)	65 kg (143 lb)

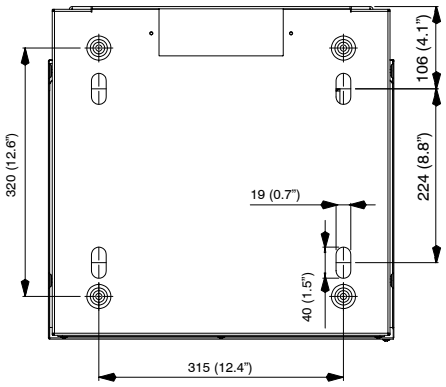
Illustration 5-1
Generator

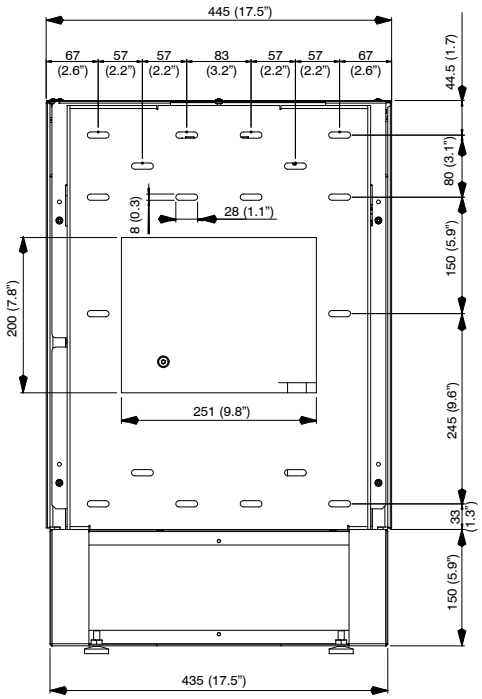


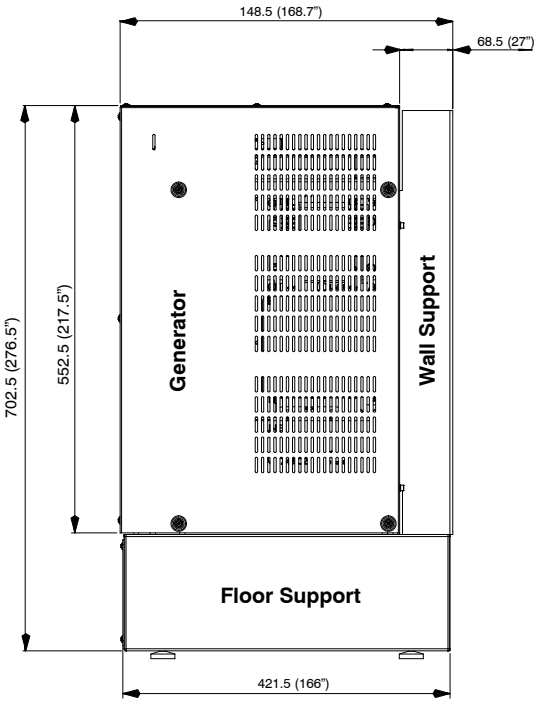
GENERATOR



Generator with Leveling Legs







Wall and Floor Supports are options

5.2 OVERHEAD TUBE CRANE SPECIFICATIONS

- Dimensions:
  - Maximum Width . . . . . 3500 mm (137.8”)
  - Maximum Length . . . . . 6100 mm (240.2”)
- Distance between Longitudinal Rails (recommended) . . . . . 1800 mm (70.9”)
- Weights:
  - Main assembly and Control Console 216.3 kg (476.8 lb)
  - Transversal Rails Maximum 3500 (137.8”) 53 kg (116.8 lb)
  - Longitudinal Rails Maximum 6100 (240.2”) 91.3 kg (201.3 lb)
  - Tube . . . . . Depending on the Tube
  - Collimator . . . . . Depending on the Collimator
- X-ray Tube Rotation (Beta Axis) . . . . . ±180º
- X-ray Tube Angulation (Alpha Axis) . . . . . -180º to +135º
- Nominal Speeds in Automatic Movements:
  - Longitudinal Axis . . . . . 180 mm/s
  - Transversal Axis . . . . . 180 mm/s
  - Vertical Axis . . . . . 150 mm/s
- SID Target is within 700 mm (27.5”) and 2000 mm (78.7”). Maximum and Minimum SID from X-ray Tube facing the Table and Wall Stand depends on the Room dimensions and Longitudinal Rails of the System.

Table 5-1
Transversal Rails Length and Transversal & Vertical Travels

TRANSVERSAL RAILS LENGTH	MAXIMUM TRANSVERSAL TRAVEL	MINIMUM DISTANCE FROM COLUMN CENTER TO END OF RAIL	
		To Front	To Back
2500 mm (98.4”)	1595 mm (62.8”)	575 mm (22.6”)	330 mm (13”)
3000 mm (118.1”)	2095 mm (82.5”)		
3500 mm (137.8”)	2595 mm (102.1”)		

Illustration 5-2
Overhead Tube Crane - Lateral View

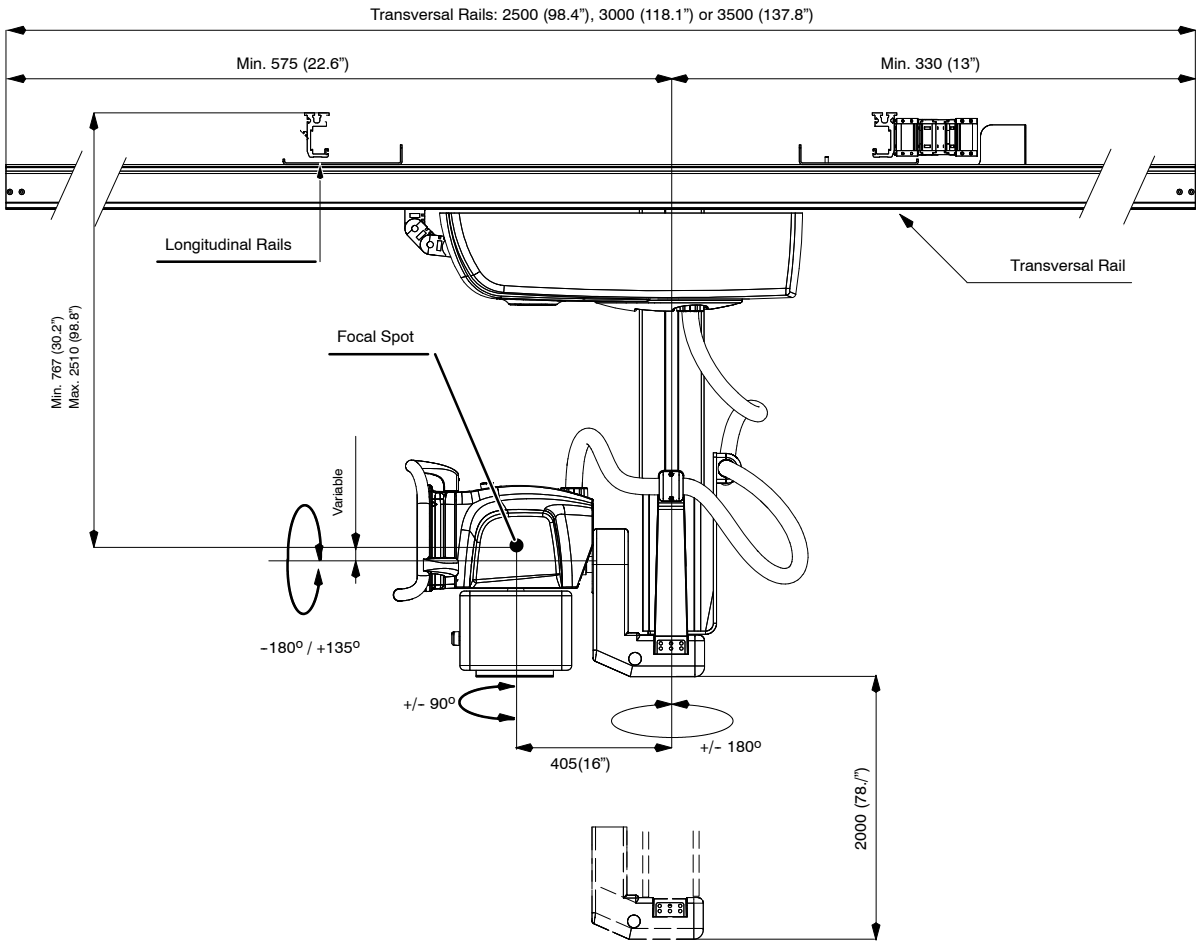


Table 5-2
Rails Dimensions and Carriage Travels

LONGITUDINAL RAILS LENGTH	CARRIAGE MAXIMUM TRAVEL	MINIMUM DISTANCE FROM COLUMN CENTER TO END OF RAIL	
		To Left	To Right
3900 mm (153.5”)	2972 mm (117”)	464mm (18.2”)	464 mm (18.2”)
4600 mm (181.1”)	3672 mm (144.6”)		
5100 mm (200.8”)	4172 mm (164.3“)		
6100 mm (240.2”)	5172 mm (203.6”)		

Illustration 5-3
Overhead Tube Crane - Front View

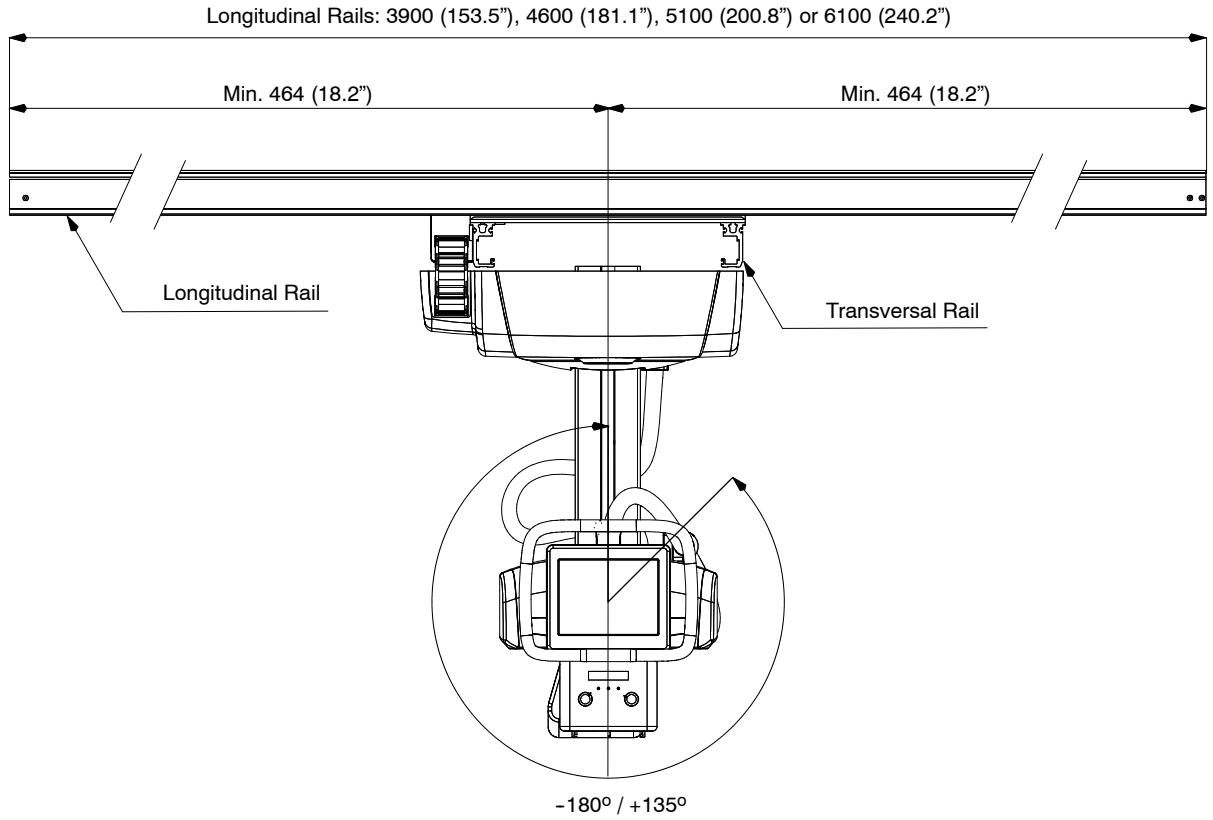


Illustration 5-4
Focal Sport Travel with the Control Console at 0º in Alpha and Beta Axes

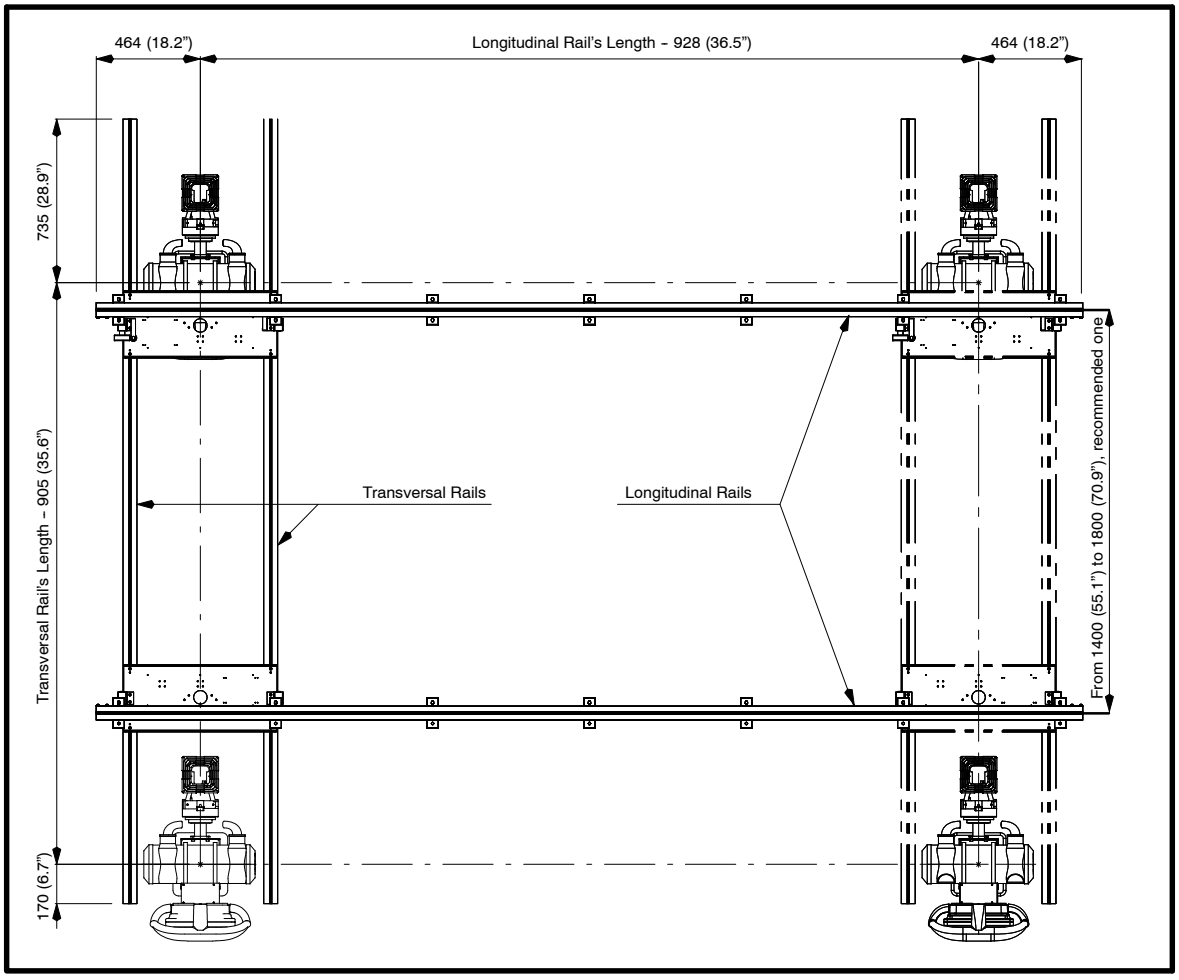


Illustration 5-5
Focal Spot Travel with the Control Console at 90º / -90º in Beta Axis

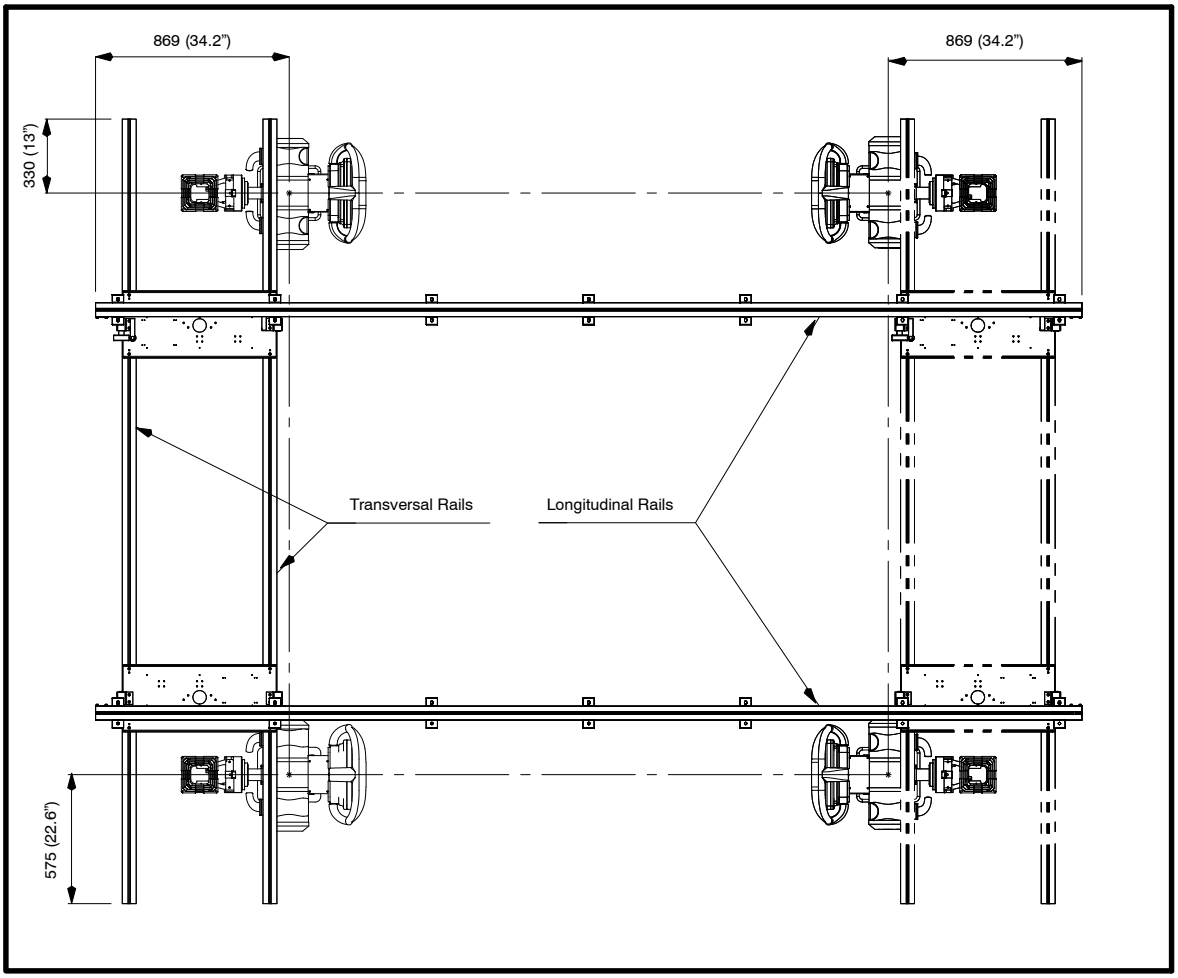
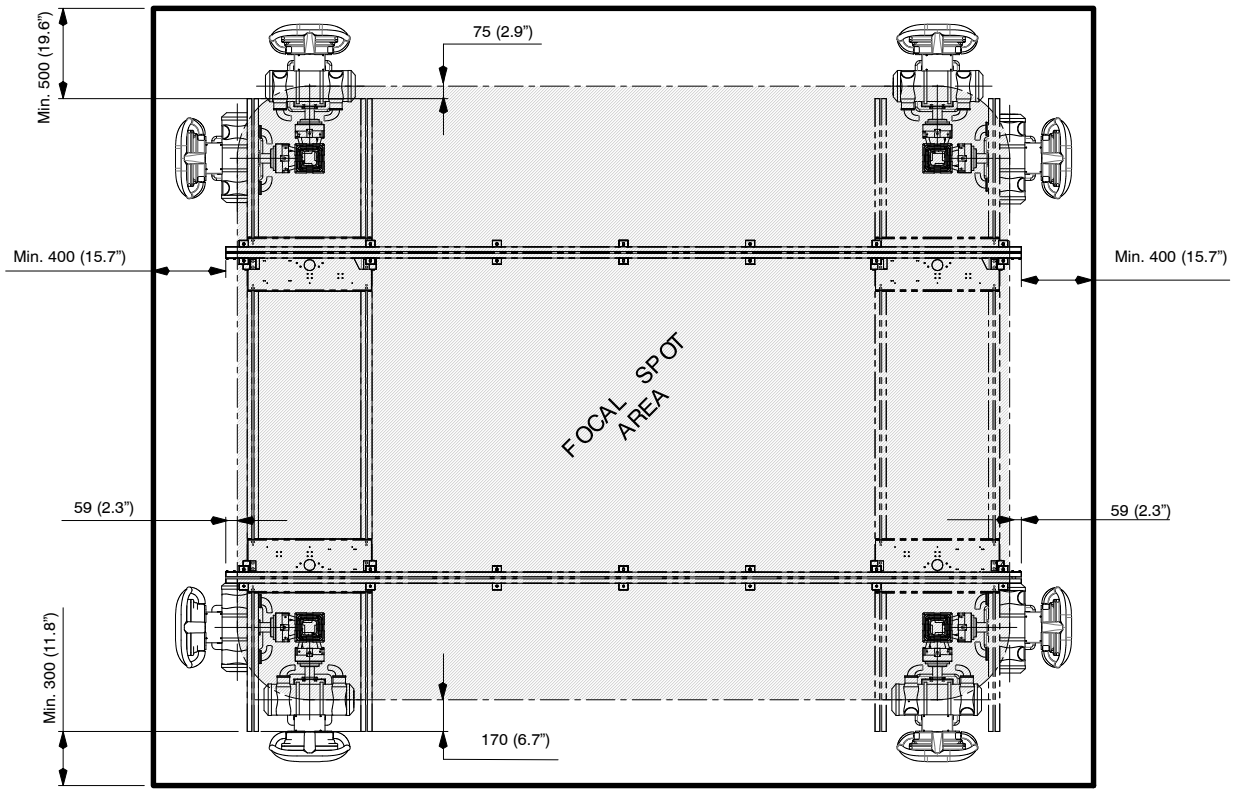


Illustration 5-6
Focal Spot Area



5.3 RAD TABLE SPECIFICATIONS

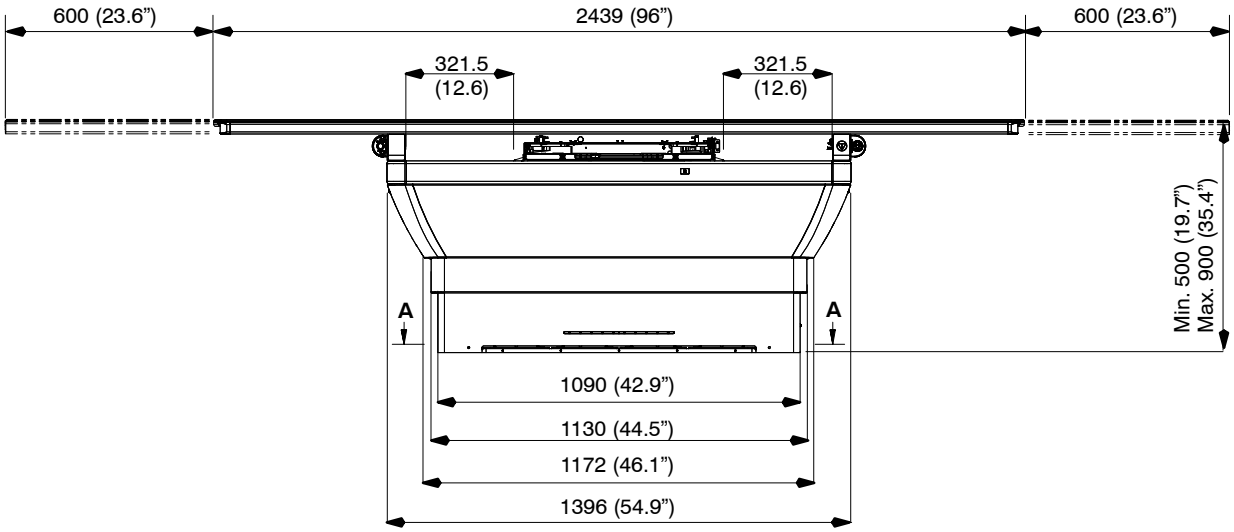
- Weight: . . . . . 290 Kg (639.3 lb)

Note ☞ *This weight is for a Table with default Digital Detector and standard Tabletop. Depending on the Detector and Receptor, total weight may change.*

- Dimensions:
  - Length . . . . . 2400 mm (94.5”)
  - Width . . . . . 868 mm (34.2”)
  - Maximum Height . . . . . 900 mm (35.4”)
  - Minimum Height . . . . . 500 mm (19.7”)
- Maximum Load Allowed . . . . . 350 kg (771.6 lb)
  - with 3rd Motor . . . . . 400 kg (881.8 lb)
- Tabletop Travels:
  - Longitudinal Travel . . . . . 1200 mm (47.2”)
  - Transversal Travel . . . . . 300 mm (11.8”)
  - Vertical Travel . . . . . 400 mm (15.7”)
- Tabletop Useful Area . . . . . 2299 mm (90.5”) x 618 mm (24.3”)
- Tabletop Attenuation:
  - Carbon Fiber Flat Tabletop . . . . . <0.8 mm eq. Al at 100kV
  - Laminated Flat Tabletop . . . . . <1.2 mm eq. Al at 100 kV

TABLE DRAWINGS

Illustration 5-7
Dimensions of the RAD Table



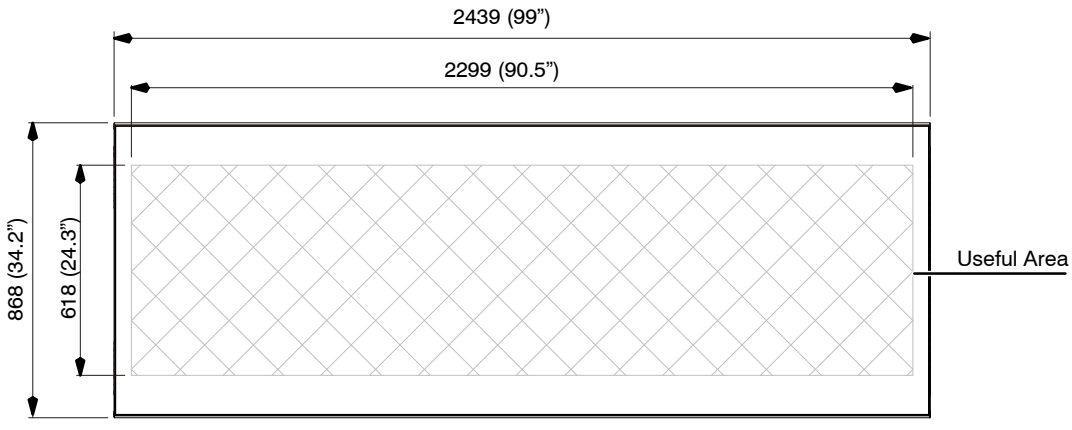


Illustration 5-8
Lateral View of the RAD Table

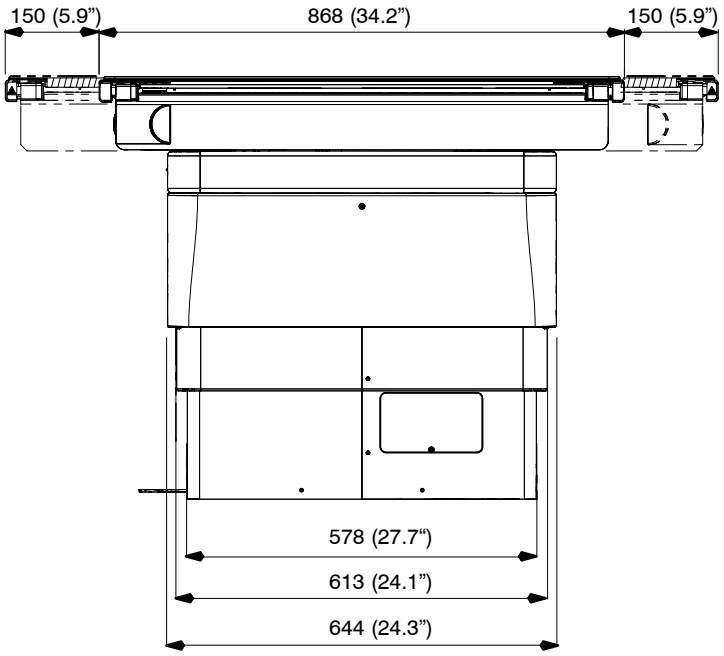
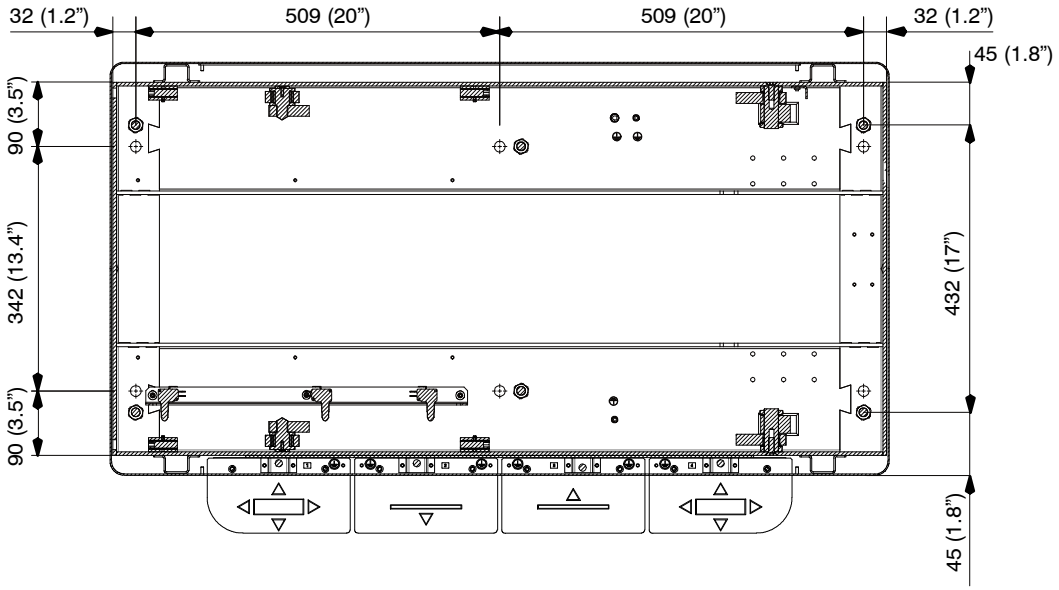


Illustration 5-9
Table Footprint and Anchor Bores Distances of the RAD Table

r



5.4 RAD WALL STAND

Table 5-3
Weights and Dimensions of the Equipment

MODEL	WALL STAND WITHOUT TILTING			WALL STAND WITH TILTING			WALL STAND WITH TILTING & ROTATION		
CABINET	Fixed Detectors	Portable Detectors	Portable Detectors with Rotating Tray	Fixed Detectors	Portable Detectors	Portable Detectors with Rotating Tray	Fixed Detectors	Portable Detectors	Portable Detectors with Rotating Tray
WIDTH	606 mm (23.9")		657 mm (25.9")	606 mm (23.9")		657 mm (25.9")	606 mm (23.9")		657 mm (25.9")
DEPTH (Receptor at 0º)	403 mm (15.9")		449 mm (17.7")	629 mm (24.8")		674 mm (26.5")	645 mm (25.4")		690 mm (27.2")
DEPTH (Receptor at 90º)	N/A			885 mm (34.8")		951 mm (37.4")	885 mm (34.8")		951 mm (37.4")
WEIGHT *	235 kg (518.1 lbs) ± 10 kg (22 lbs)			261 kg (575.4 lbs) ±10 kg (22 lbs)			270 kg (595.3 lbs) ± 10 kg (22 lbs)		
HEIGHT	2326 mm (91.6")								
FRONT PANEL ATTENUATION	<0.4 mm eq. Al at 100 kV								

*** Note**: These weights do not include any Detector, Grid or the Overhead Arm Support. The margin of tolerance depends on the Cabinet model mounted on the Wall Stand.

WALL STAND DRAWINGS

Illustration 5-10
Wall Stand Dimensions and Travels of the RAD Wall Stand Without Tilting (Cabinet for Fixed Detectors)

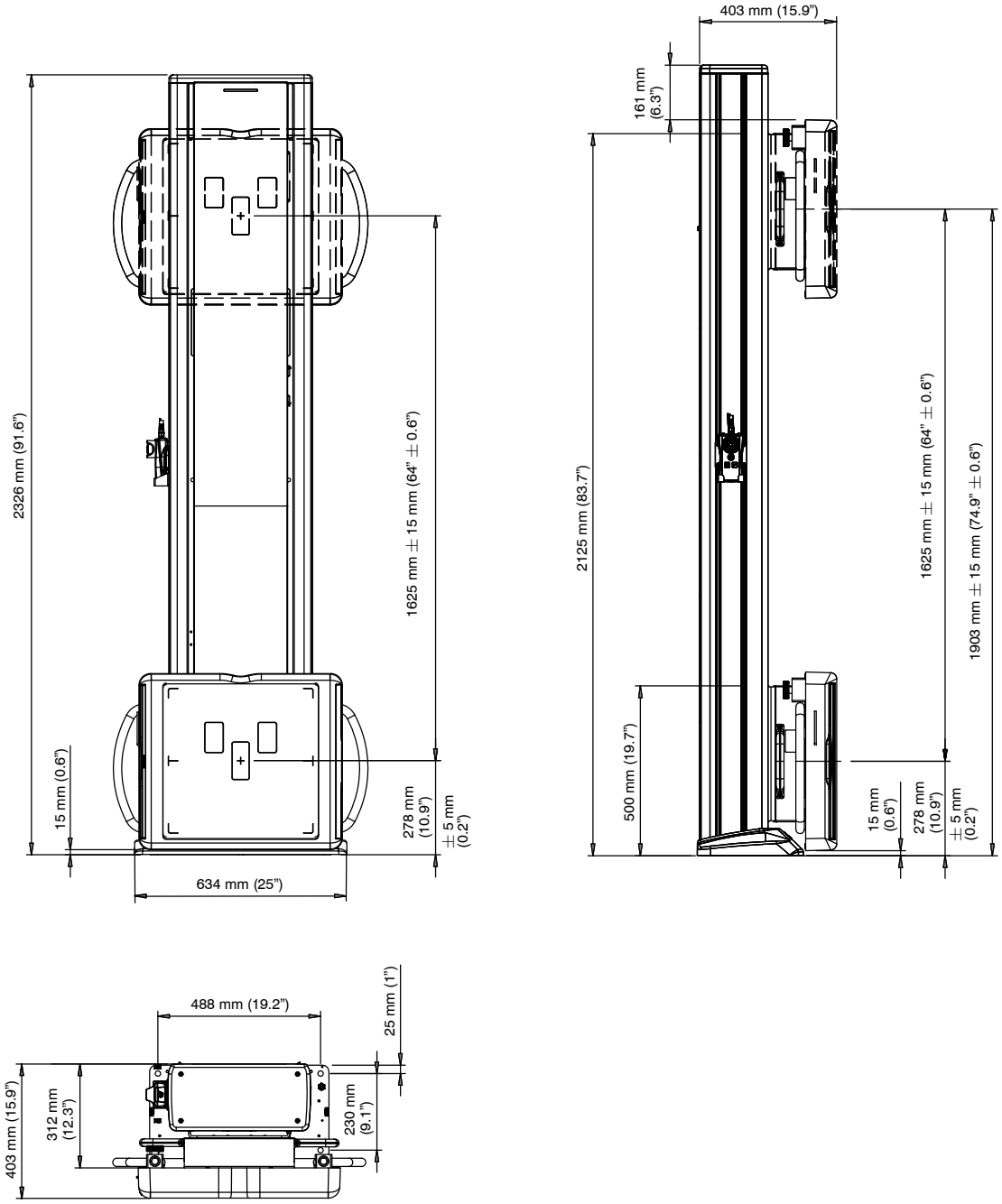


Illustration 5-11
Wall Stand Dimensions and Travels of the RAD Wall Stand without Tilting (Cabinet for Portable Detectors)

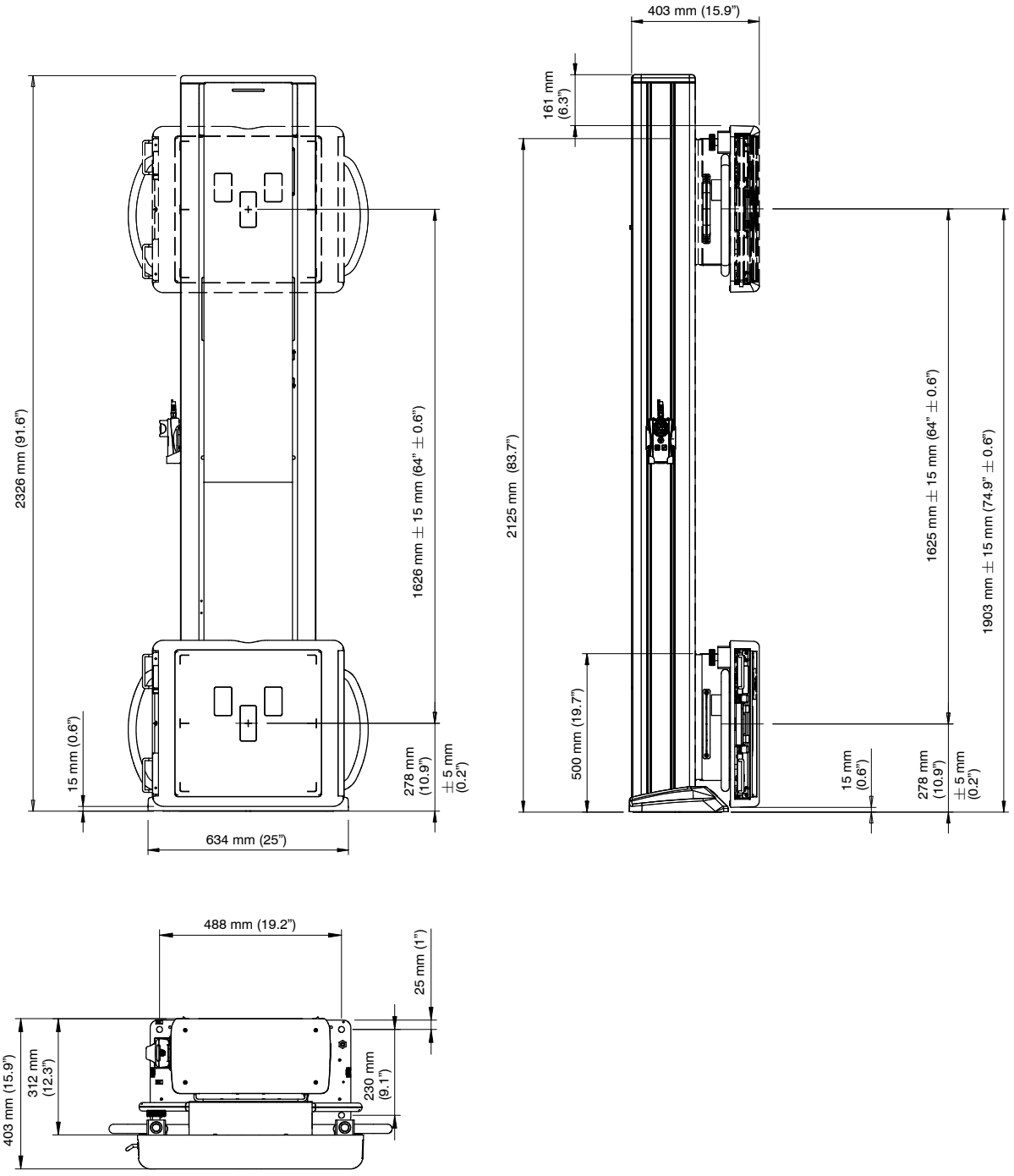


Illustration 5-12
Wall Stand Dimensions and Travels of the RAD Wall Stand without Tilting (Cabinet for Portable Detectors with Rotating Tray)

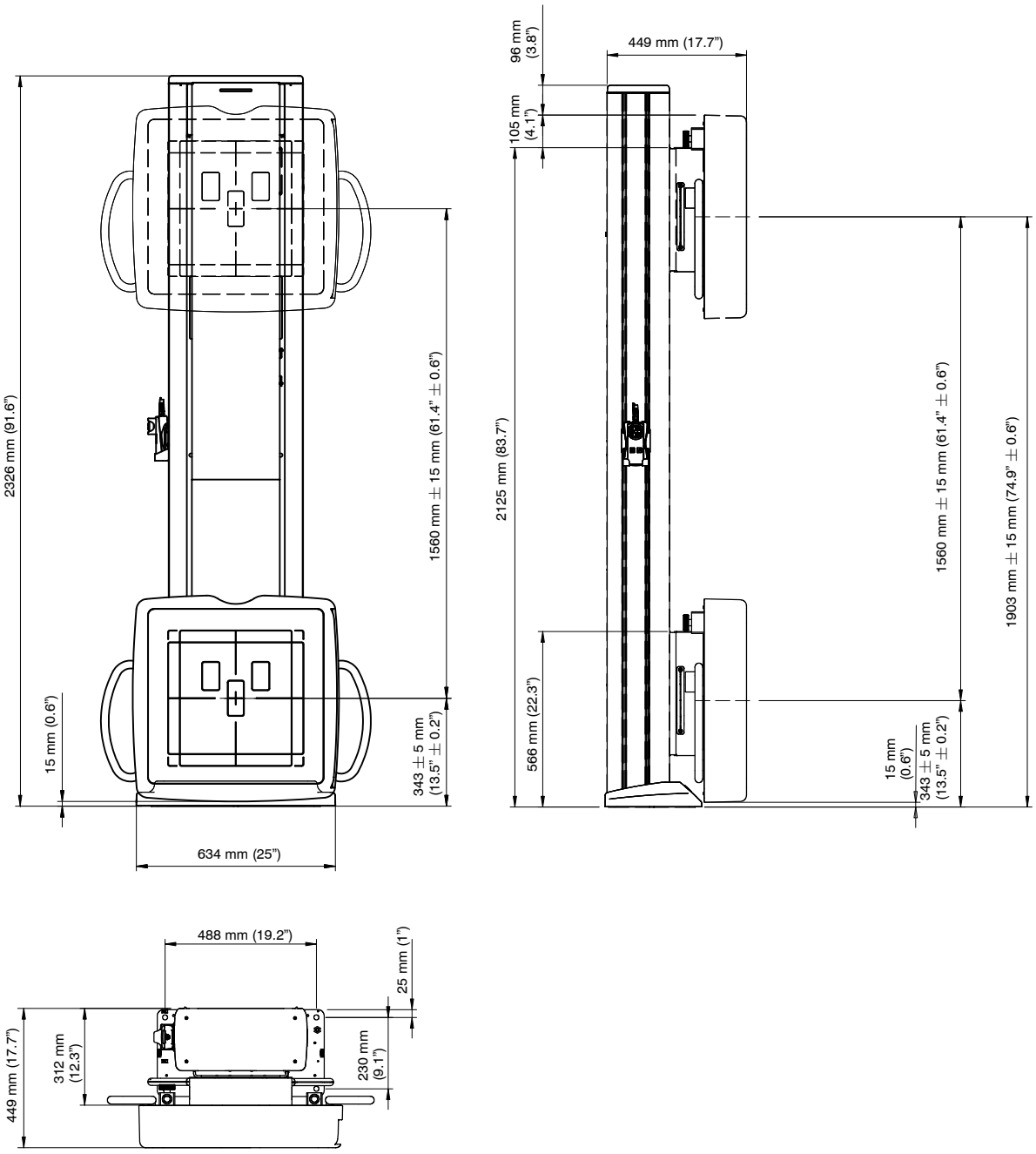
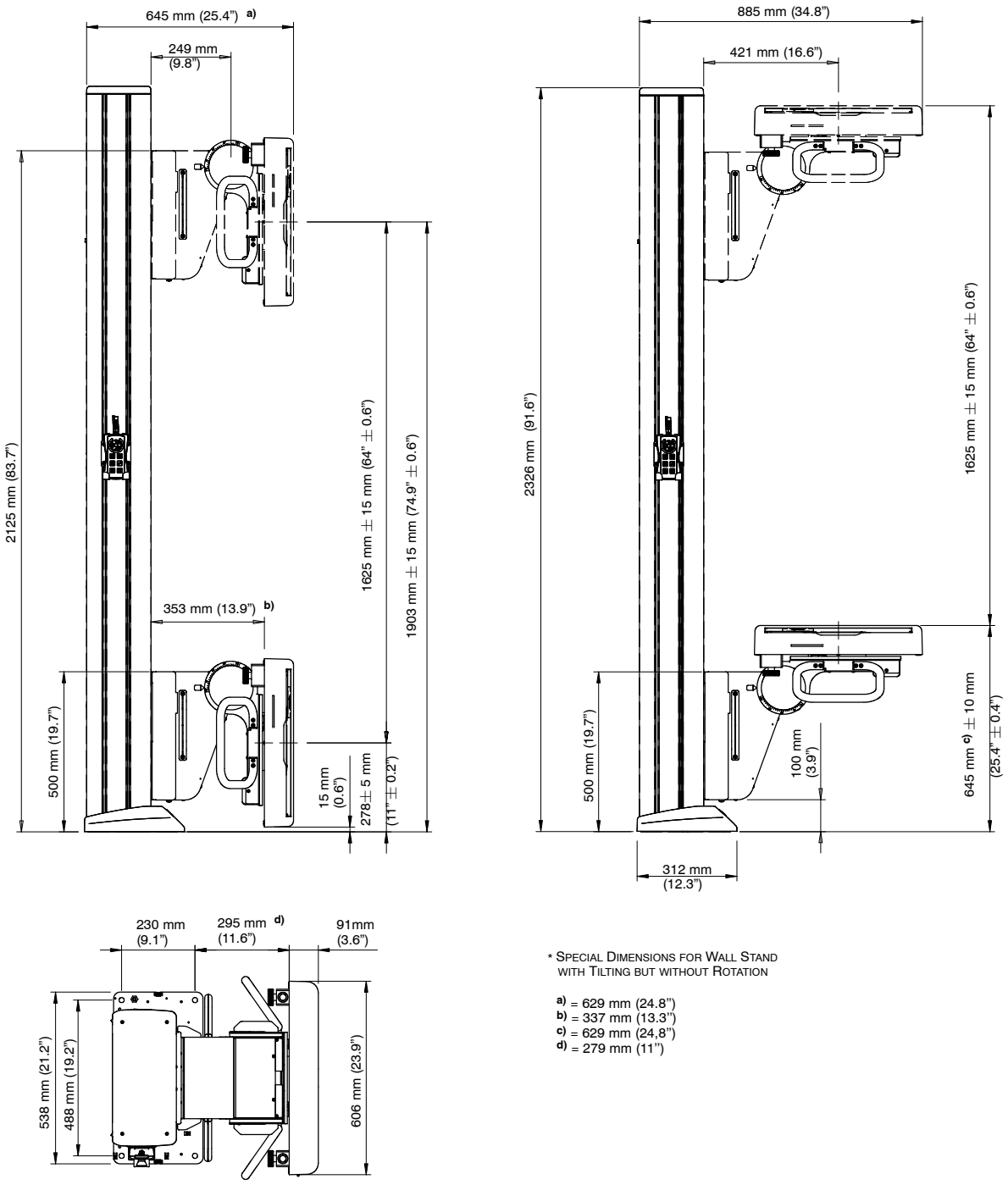


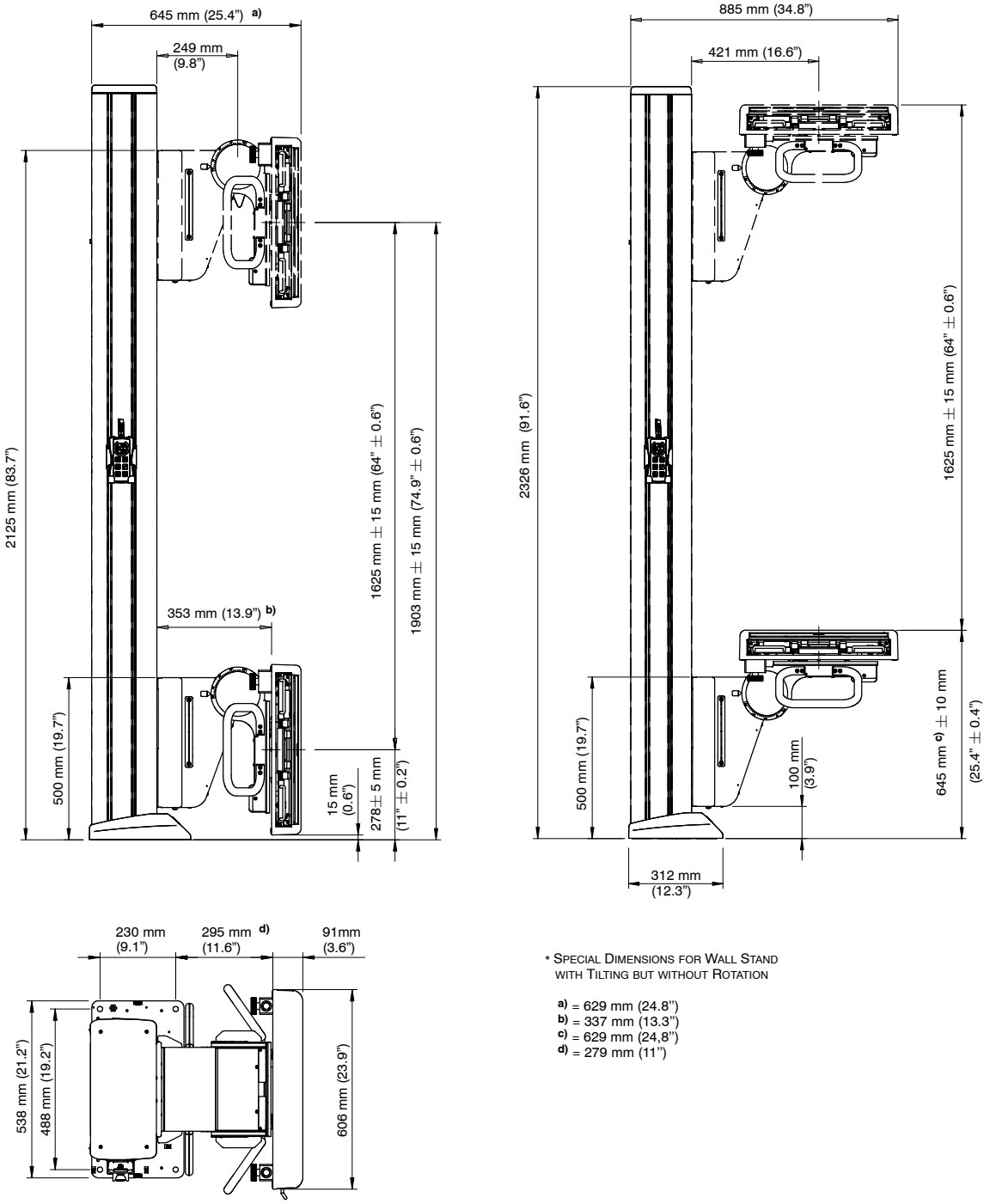
Illustration 5-13
Wall Stand Dimensions and Travels of the RAD Wall Stand with Tilting (Cabinet for Fixed Detectors)



* Special Dimensions for Wall Stand with Tilting but without Rotation

a) = 629 mm (24.8")
b) = 337 mm (13.3")
c) = 629 mm (24,8")
d) = 279 mm (11")

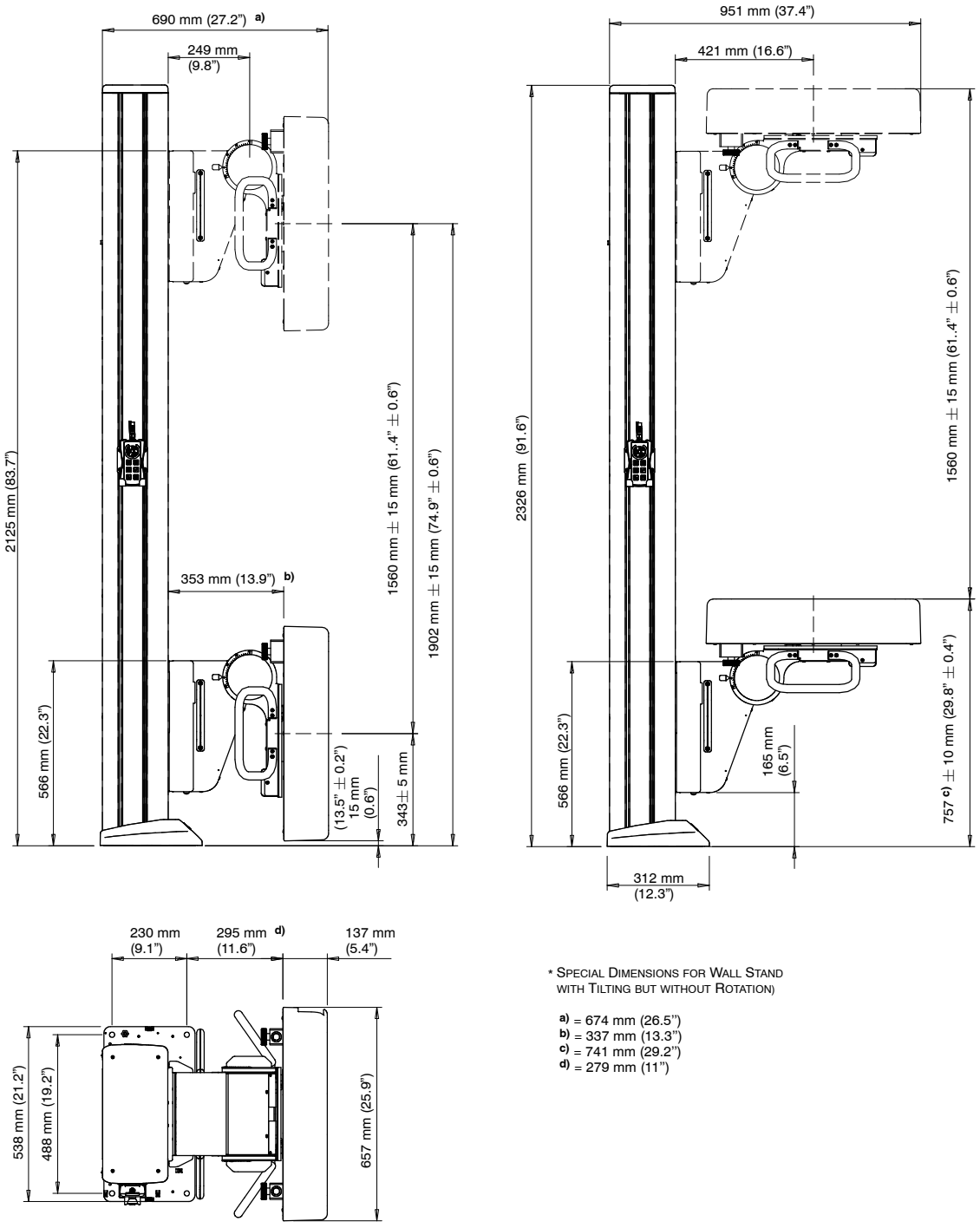
Illustration 5-14
Wall Stand Dimensions and Travels of the RAD Wall Stand with Tilting (Cabinet for Portable Detectors)



* Special Dimensions for Wall Stand with Tilting but without Rotation

a) = 629 mm (24.8")
b) = 337 mm (13.3")
c) = 629 mm (24,8")
d) = 279 mm (11")

Illustration 5-15
Wall Stand Dimensions and Travels of the RAD Wall Stand with Tilting (Cabinet for Portable Detectors with Rotating Tray)



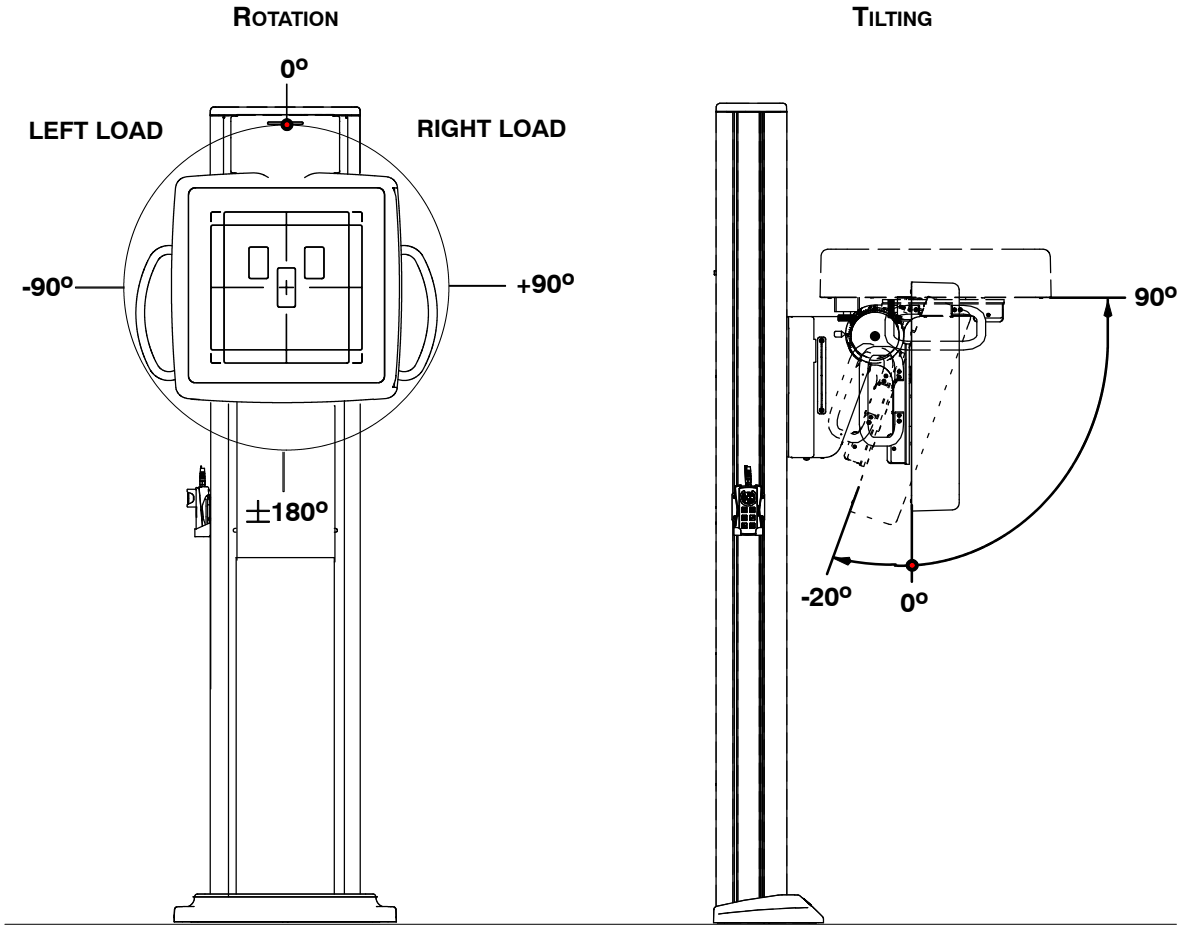
* Special Dimensions for Wall Stand with Tilting but without Rotation)

a) = 674 mm (26.5")
b) = 337 mm (13.3")
c) = 741 mm (29.2")
d) = 279 mm (11")

Table 5-4
Rotation Configuration

Rotation Configuration		
Receptor	**Left Configuration**	**Right Configuration**
Portable DR Detector	0º — -90º	0º – +90º
Fixed DR Detector	0º — +90º	N/A

Illustration 5-16
Wall Stand Rotation and Tilting specifications (Only for models with these functionalities)



5.5 GRIDS

RAD Table . . . . . 100 cm - 10:1 - 40Lp/cm (Carbon Fiber)

RAD Wall Stand . . . . . 100 cm - 10:1 - 40Lp/cm (Carbon Fiber)
150 cm - 10:1 - 40Lp/cm (Carbon Fiber)
180 cm - 12:1 - 40Lp/cm (Carbon Fiber)

5.6 CRATES SPECIFICATIONS

OVERHEAD TUBE CRANE CRATE SPECIFICATIONS

Table 5-5
System Crates

COMPONENT CRATED	DIMENSIONS			WEIGHT
	Length	Width	Height	
X-RAY GENERATOR				
Line Powered Generator	1070 mm (42.1”)	620 mm (24.4”)	740 mm (29.1”)	86 kg (189.6 lb)
OVERHEAD TUBE CRANE				
Main Crate	1480 mm (58.2”)	775 mm (30.5”)	995 mm (39.1”)	264 kg (582 lb)
Auxiliary Crate	1065 mm (41.9”)	615 mm (24.2”)	730 mm (28.7”)	108 kg (238.1 lb)
Large Longitudinal Rails & Transversal Rails	6200 mm (244.1”)	280 mm (11”)	350 mm (13.8”)	120 kg (264.5 lb)
Medium Longitudinal Rails & Transversal Rails	4850 mm (190.9”)	280 mm (11”)	350 mm (13.8”)	100 kg (220.5 lb)
RAD TABLE				
Table Base	1600 mm (62.9”)	950 mm (37.4”)	1100 mm (43.3”)	310 Kg (683.4 lb)
Tabletop	2290 mm (90.1”)	860 mm (33.8”)	130 mm (5.1”)	64 Kg (141 lb)
RAD WALL STAND				
RAD Wall Stand DR	2410 mm (94.8”)	940 mm (37”)	890 mm (35”)	300 Kg (661.5 lb)

SECTION 6 ROOM LAYOUT

6.1 CLINICAL ACCESS

Make sure that the room is planned with the following clinical access requirements:

- Provide easy access to the equipments.
- Clinicians at the patient table must be able to communicate with assistants in the control area.
- Operators in the control area must have easy access to the Operator Console. However, position the controls (including hand-switches) so the operator cannot take exposures while looking around or standing outside the control booth's lead glass window.
- Consult customer on the number and location of nonelectrical lines (air, oxygen, vacuum, water, etc.) in the RAD Room.

6.2 SERVICE ACCESS

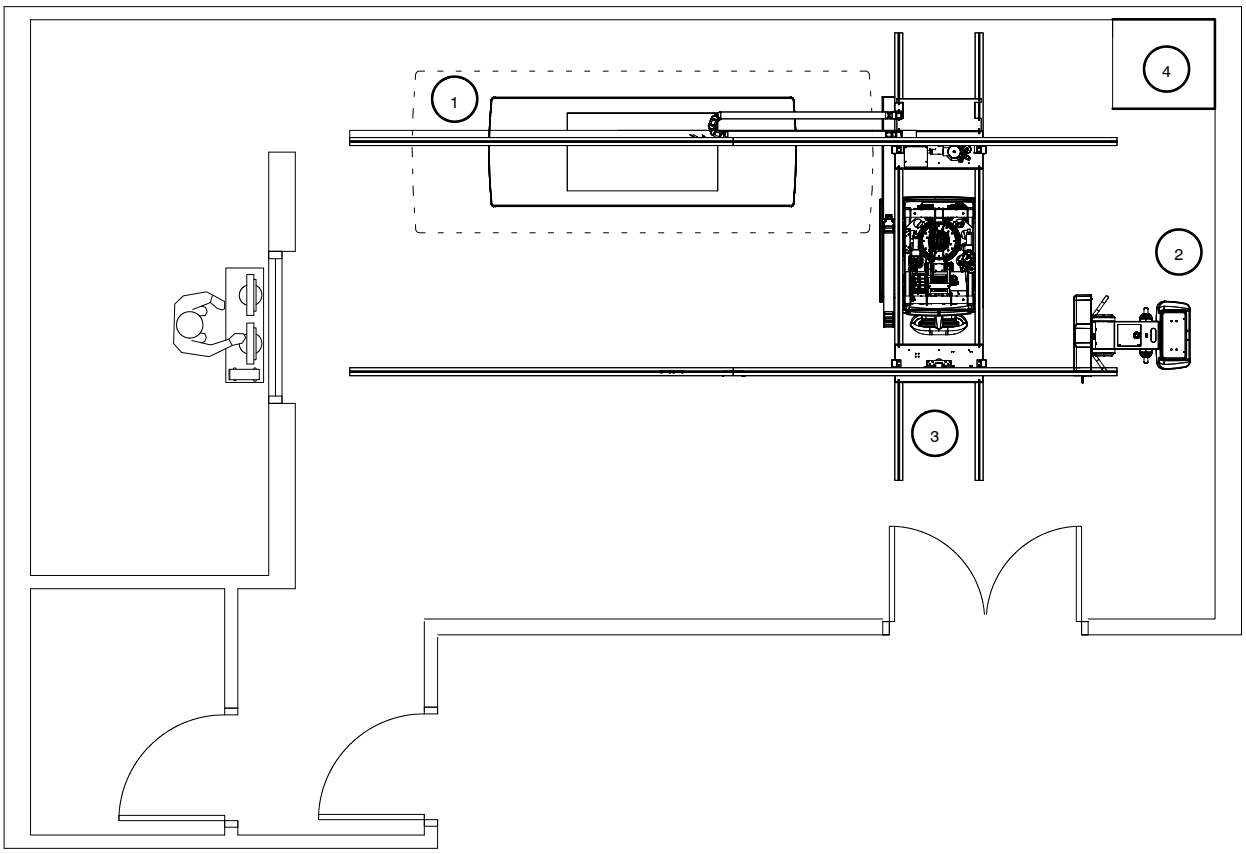
Allow appropriate space for service access of the equipment. The minimum recommended free area for service access is:

COMPONENT	SURFACE					
	Left Side	Right Side	Front	Rear	Top	Bottom
GENERATOR CABINET	500 mm (20")	500 mm (20")	1000 mm (40")	- *(see note)*	Completely free	-
OVERHEAD TUBE CRANE	Completely free	Completely free	Completely free	Completely free	-	Completely free
RAD TABLE	1000 mm (40")	1000 mm (40")	1000 mm (40")	1000 mm (40")	Completely free	-
RAD Wall Stand	1000 mm (40")	1000 mm (40")	Completely free	100 mm (4")	500 mm (20")	-
Note: Ventilation conditions requires to keep a minimum free distance of 150 mm (6") from both lateral sides of the Generator Cabinet and at least 75 mm (3") from the rear side when the Generator is not installed with a Wall Support.						

6.3 ROOM LAYOUTS

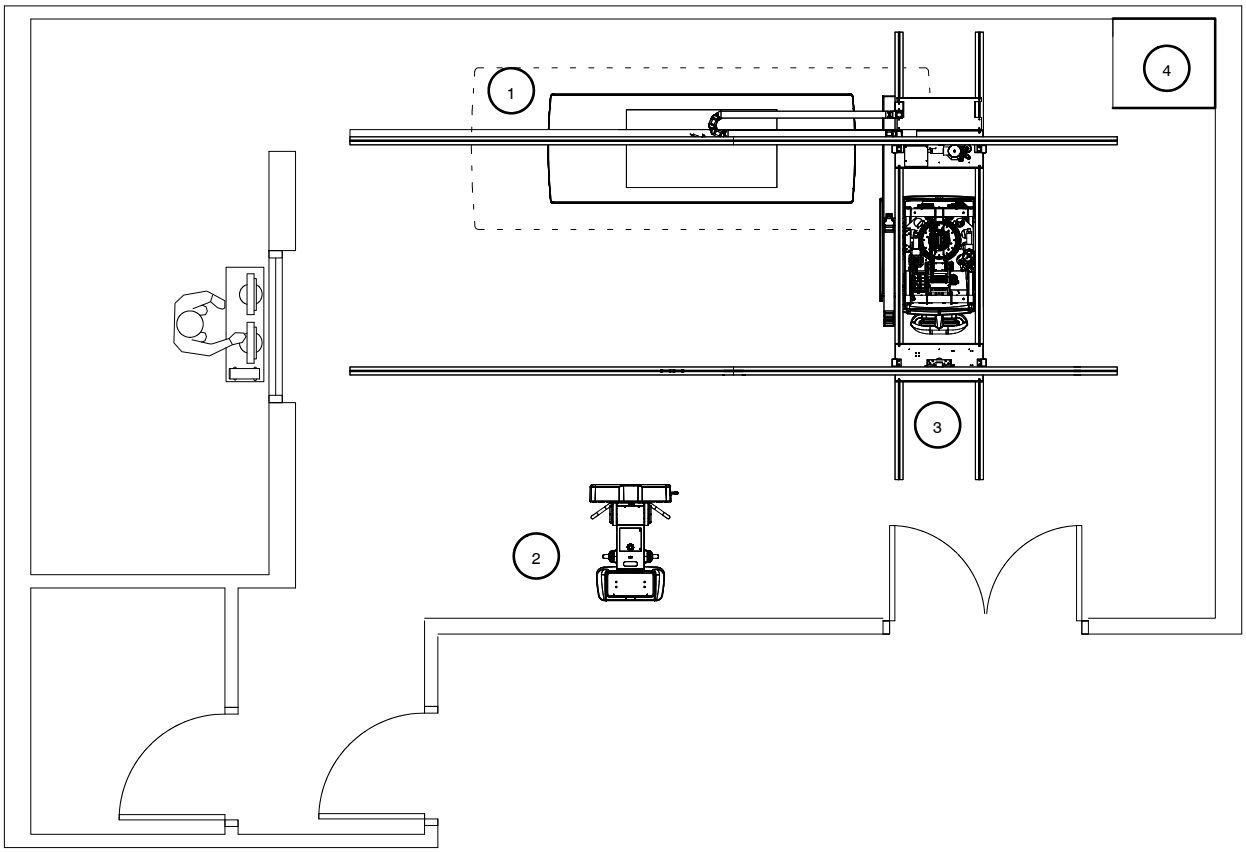
The following illustrations show the typical Room Layout for 6100 mm (240.2”) Longitudinal Rails and 3500 mm (137.8”) Transversal Rails. The RAD Wall Stand can be provided with its Handle installed at the left or right side.

Illustration 6-1
Typical Room Layout



1. RAD Table
2. RAD Wall Stand
3. Overhead Tube Crane
4. X-ray Generator

Illustration 6-2
Typical Room Layout for Single Panel System



1. RAD Table
2. RAD Wall Stand DR
3. Overhead Tube Crane
4. X-ray Generator

6.4 ALLOWED ROOM LAYOUTS

Note ☞ *A minimum distance of 1500 mm between the centre of the Table and the centre of the Wall Stand is required to avoid continuous activation of the safety area interlock during automatic movements of the OTC.*

TABLE POSITION	WALL STAND POSITION				
	Wall Stand Front	**Wall Stand Back**	**Wall Stand Left**	**Wall Stand Right**	**No Wall Stand**
Table Front	All	All	**Only with the Tube-Collimator assembly not rotated ***	**Only with the Tube-Collimator assembly not rotated ***	All
Table Back	Not allowed				
Table Left	Only with the Tube-Collimator assembly rotated to the right	Only with the Tube-Collimator assembly rotated to the right	All **	All **	All
Table Right	Only with the Tube-Collimator assembly rotated to the left	Only with the Tube-Collimator assembly rotated to the left	All **	All **	All
No Table	All	Not allowed	Only with the Tube-Collimator assembly not rotated	Only with the Tube-Collimator assembly not rotated	

*** Recommended Layouts (refer to Illustration 6-3)**

** Preferably with the Tube-Collimator assembly not rotated

NOTE: Not allowed positions are due to possible operator-Table interference.

Illustration 6-3
Recommended Layouts

Table Front + WS Right

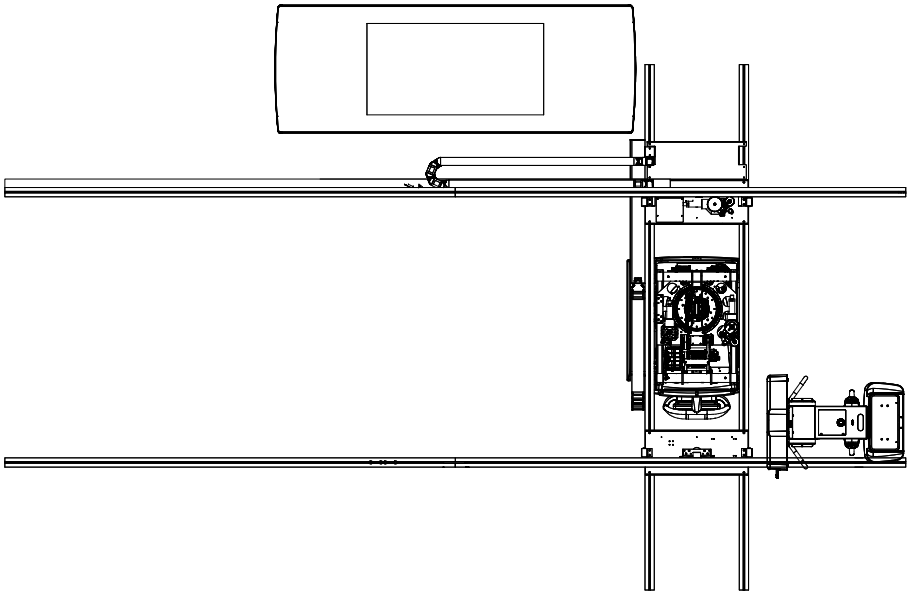
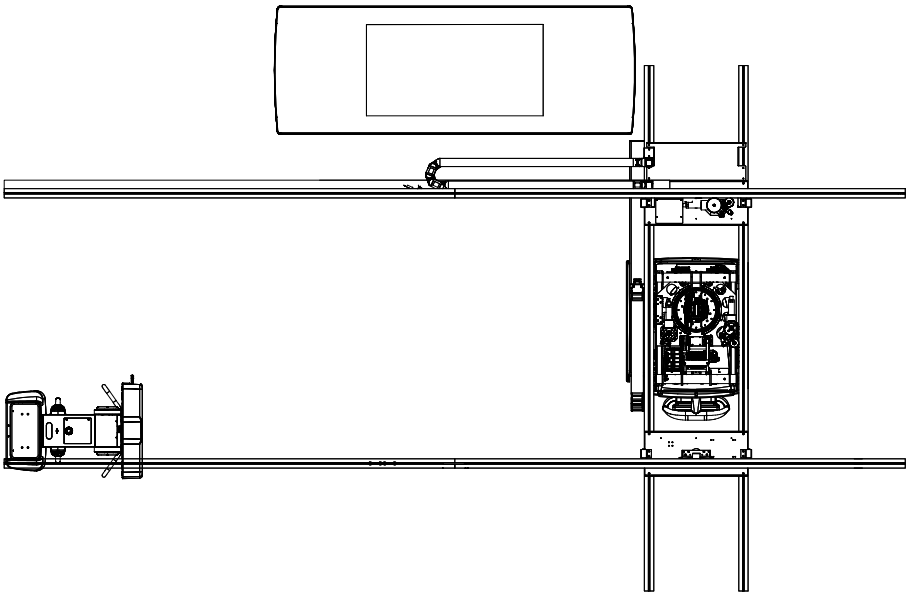


Table Front + WS Left



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SECTION 7 PLANNING AIDS

7.1 TOOLS AND EQUIPMENT CHECKLIST

TOOLS AND EQUIPMENT CHECKLIST *The following tools and materials are needed for installation but are not shipped with the product*	**COMPLETED**
Standard Service Engineer's Tool Kit	
Lever	
Electric and Hammer Drill. Assorted masonry and high-speed bits in both metric and SAE sizes	
Assorted sizes of tongue and grove pliers, hammers, hex wrenches (metric and SAE), screw drivers, and metal files	
Ceiling anchoring hardware	
Assorted hardware for termination of electrical connections	
Assorted sizes of wire cutters and strippers, ratchet and standard crimpers, and a 75-watt soldering iron	
Tie wraps, heat and electrical tape, and wire markers	
Tags for labeling incomplete work according to regulatory requirements	
Movers, dollies, ladders, shop vacuum and push-broom	

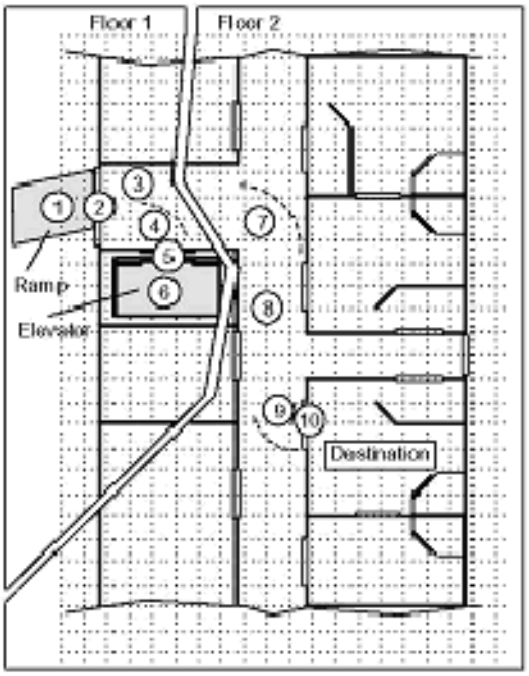
7.2 PREPARING THE DELIVERY ROUTE

Note ☞ *Refer to Section 2.2.1, "Door Size Requirements," for more information about the crated/uncrated dimensions and weights of the Components.*

1. **Sketch out the Route.**

   Begin preparing a Route Survey by sketching the area of the hospital or clinic which will receive the equipment. Include all areas on the delivery route from outside of the building to destination. See the sample sketch below.

Illustration 7-1
Sample Route



Reference Numbers:
Numbers in circles refer to the Route Survey data.
The Route Survey is a form on which site data is listed (step 2).

2. **Survey the Route.**

   Record all loading capacities, corridor widths, door openings, turning radius, flooring materials, elevator sizes, obstructions, and so on for reference.

3. **Check the Route.**

   Verify that the equipment can actually be transported via the route determined in step 1.

7.3 PRE-INSTALLATION CHECKLIST

Delivery Date:	
Sales Person:	
Customer:	
FDO No.:	
Room #	
Equipment:	

PHYSICAL REQUIREMENTS OF SITE	**COMPLETED**
1. Room size adequate for intended equipment configuration?	
2. Floor, wall and ceiling are strong enough for intended equipment and mounting methods approved – seismic regulatory codes considered?	
3. Delivery route accommodates all intended equipment?	
4. Radiation physicist consulted?	
5. Necessary alterations made to circumvent obstructions?	
6. Modifications to room finished?	
7. Supports, platforms, tube cranes, ceiling and wall materials have been provided?	
8. Support structures installed for floor, wall and ceiling mounted equipment?	
9. Wall and Ceiling supports leveled?	
10. Has floor been modified for cable ducts?	
11. Electrical service in place – at the ratings specified in Pre-Installation documentation?	
12. Power available to operate power tools?	
13. All non-electrical lines (air, water, oxygen, vacuum) installed?	

INTERCONNECTIONS	**COMPLETED**
1. Signal cable, power, and grounding plans produced?	
2. Necessary interconnection hardware, such as junction boxes, conduit or raceways, and fittings, provided?	
3. Interconnection hardware installed?	
4. Flexible, stranded wire provided for System input power connection?	
5. System “feeder” power cables pulled and sufficient length available at disconnect box for connections?	
6. Interconnecting cables continuity checked and labeled?	
7. All high voltage cable lengths verified?	
8. Interface information available for equipment?	

GENERAL	COMPLETED
1. Ceiling, walls and floor clear of all obstructions?	
2. Ceiling, walls and floor finished?	
3. Room lights installed?	
4. Dust-creating work completed?	
5. Old equipment within room removed?	
6. Component positions clearly marked on floor?	
7. Space available to store equipment?	
8. Lock on door, or locked room available?	
9. Room IP Addresses for DICOM and Broadband identified?	
10. Broadband connection provided for InSite connection? OR If Broadband connection will not be used, is dedicated inbound “dialup” phone line provided for InSite connection?	
11. Have all fire/safety inspections for occupancy been completed?	
12. Send completed checklist to the installation team.	

COMMENTS

INSPECTION DATE(S)

INSTALLATION PROJECT MANAGER SIGNATURE