

Technical Publication M-2008-7-12

Pre-Installation Manual

STANDARD FREQUENCY SERIES GENERATORS

Contents: Models TXR 325D TXR 325M TXR 425 TXR 525SFQ

REVISION	DATE	REASON FOR CHANGE
0	March 29, 2006	New Edition
1	August 25, 2003	Advisory Symbols
2	January 22, 2004	Added Tables and Illustrations
3	April 4, 2006	General Revision
4	July 11, 2008	Added TXR 425 Model Designation

REVISION HISTORY

This document is the English original version, edited and supplied by the manufacturer. All Copy including Advisory Symbols: Type Style Arial.

The state of revision 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.



DANGER ADVISES OF CONDITIONS OR SITUATIONS THAT IF NOT HEEDED OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH



WARNING ADVISES OF CONDITIONS OR SITUATIONS THAT IF NOT HEEDED OR AVOIDED COULD CAUSE SERIOUS PERSONAL INJURY OR DAMAGE OF EQUIPMENT.



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



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

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INTRODUCTION

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 only the generator and its associated components. Product information, environmental and electrical requirements are specified.

For system-related requirements, such as room layout, and system interconnections, refer to documentation provided with other subsystems.

1.1 RESPONSIBILITY OF PURCHASER

Site planning and preparation are the responsibilities of the purchaser. The following points should be considered fundamental to the customers Pre-Installation activities; additional work may be needed depending on specific site circumstances.

- Provide current room dimensions, including hallway and entry door sizes.
- Install required material prior to the delivery of the system components.
- · Install conduit, duct, raceways and proper size junction boxes with covers specified in the plan.
- Install mains power of proper voltage, output and kVa Rating.
- Install all safety devices according to this document and local Codes.
- Complete room floor and ceilings and base coat walls.
- After equipment installation has been completed, paint final coating on the walls.



Complete and proper pre-installation will avoid delays and confusion.

PRE-INSTALLATION DATA

This section provides product information and illustrations showing physical dimensions, weight, normal mounting and access areas for cabling and service.

2.1 PHYSICAL CHARACTERISTICS

COMPONENT		WEICHT		
CONFONENT	Length	Width	Height	WEIGHT

STANDARD CONTROL CONSOLES

RAD Control Consoles				
TXR 325 D	457 mm	305 mm	941 mm	61 kg
	18 in	12 in	37 in	135 lbs
TXR 325 M	457 mm	305 mm	941 mm	61 kg
	18 in	12 in	37 in	135 lbs
TXR 425	457 mm	305 mm	941 mm	61 kg
	18 in	12 in	37 in	135 lbs
TXR 525 SFQ	457 mm	305 mm	941 mm	62 kg
	18 in	12 in	37 in	137 lbs

HIGH VOLTAGE TRANSFORMERS

High Voltage Transformer				
TXR 325-1	559 mm	508 mm	351 mm	118 kg
	22 in	20 in	13.8 in	260 lbs
TXR 625-1	559 mm	508 mm	351 mm	120 kg
	22 in	20 in	13.8 in	265 lbs

2.2 METHOD OF MOUNTING

COMPONENT	NORMAL METHOD OF MOUNTING			
Control Console	Floor freestanding or anchor to floor with four (1/4") bolts.			
High Voltage Transformer Floor freestanding or strap to the floor.				
Note: Anchoring hardware should be field supplied. For seismic areas all components must be anchored, Local Standards should be applied.				

2.3 MINIMUM RECOMMENDED FREE AREA FOR SERVICE ACCESS

COMPONENT		SURFACE					
COMPONENT	Left Side	Right Side	Front	Rear	Тор	Bottom	
Transformer	50 cm (19.7")	50 cm (19.7")	100 cm (40")	-	Completely free	-	
Control Console	10 cm (4")	10 cm (4")	Completely free	10 cm (4")	Completely free	-	
Ventilation conditions require keeping a minimum free distance of 10 cm (4") from both sides and rear of the Control Console.							

2.4 HV Transformer and Console — Illustration

Illustration 2-1

HV Transformer And Console





ROOM REQUIREMENTS

3.1 ENVIRONMENTAL REQUIREMENTS

	LINE POWERED GENERATORS
Storage / Transport Environmental Conditions	Temperature range of -40 to 70 degree C. Relative Humidity range of 10 to 100% Atmospheric Pressure range of 600 hPa to 1060 hPa
Operating Environmental Conditions	Temperature range of 10 to 70 degree C. Relative Humidity (no condensing) range of 30% to 75% Atmospheric Pressure range of 700 hPa to 1060 hPa
Heat Output	In normal environmental circumstances the maximum heat output of the equipment can reach 0.220 kW (751 btu/hr). Components must not be allowed to overheat. Overheating of components can cause system malfunction.

3.2 ELECTRICAL REQUIREMENTS

This generator 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 insure proper operation:

- Do not undersize the Distribution Transformer.
- Size feeder and ground wires per this document.
- Ensure and maintain input mains voltage to specification. Ensure that the ground resistance is lower than 10 ohms.

The power requirements given here (wire sizes, etc.) are the recommended specification. With the exception of high current carrying conductors and grounds, low voltage connections are made with pre-terminated wires.



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

3.3 LINE POWERED GENERATORS – POWER LINE REQUIREMENTS

Operation

GENERATOR MODEL	TXR 325D	TXR 325 M	TXR 425			
Maximum Power kW	40 kW	40 kW	40 kW			
Maximum mA	400 mA	400 mA	400 mA			
Maximum kVp	125 kVp	125 kVp	125 kVp			
Power Line	230 / 240 VAC Single Phase, 50 /60 Hertz	230 / 240 VAC Single Phase, 50 /60 Hertz	230 / 240 VAC Single Phase, 50 /60 Hertz			
	Line voltage automation	c compensation: $\pm 10\%$.				
	Maximum line regulation for maximum kVA demand: 5%.					
NOTES: For lines below 230 or above 240 VAC requires matching the autotransformer to the supply line. Instructions in the installation document and labels in the x-ray console provide instructions for Line Strap Adjustments.						

GENERATOR MODEL	TXR 525 SFQ			
Maximum Power kW	50 kW			
Maximum mA	500 mA			
Maximum kVp	125 kVp			
Power Line	230 / 240 VAC Single Phase, 50 /60 Hertz			
Line v	oltage automatic compensation: ±10%.			
Maximum line regulation for maximum kVA demand: 5%.				
NOTES: For lines below or above 240 VAC requires matching the autotransformer to the supply line. Instructions in the installation document and labels in the x-ray console provide instructions for Line Strap Adjustments.				

• RMS line current during a X-ray exposure, minimum line power required, Generator stand-by consumption (W), the differential sensitivity (mA) and the thermomagnetic breaker should be:

LINE VOLTAGE	SINGLE			
	40 Kw	40 Kw	40 Kw	50 Kw
240 VAC	160 A	160 A	160 A	180 A
Maximum kVA required	Maximum kW x 1.25			
Stand-by Consumption	240 W			
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA			
Differential, Thermomagnetic (Fuses) and Contactor	50% of the RMS line current (RMS = momentary line current based on 100 ms X-ray exposures)			ay exposures)

NOTES: For lines below or above 240 VAC requires matching the autotransformer to the supply line. Instructions in the installation document and labels in the x-ray console provide instructions for Line Strap Adjustments.

3.4 MAXIMUM POWER LINE IMPEDANCE

• Maximum Power Line Impedance. The Impedance of the Power Line in the installation must be lower than the maximum value indicated below:

	SINGLE-P	SINGLE-PHASE GENERATORS POWER			
	40 Kw	40 Kw	50 Kw		
208 VAC	0.063 ohm	0.063 ohm	0.056 ohm		
230 VAC	0.072 ohm	0.072 ohm	0.064 ohm		
240 VAC	0.075 ohm	0.075 ohms	0.067 ohm		

NOTES: - The above values comply with the Standard IEC-60601.2.7.

- For lines below or above 240 VAC requires matching the autotransformer to the supply line.

- Instructions in the installation document and labels in the x-ray console provide instructions for Line Strap Adjustments.

3.5 LINE POWERED GENERATORS – 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 normal mains value.

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

Recommended wire sizing is indicated in **Table 3-1.** These lengths are measured from the Distribution Transformer to the Room Electrical Cabinet (room disconnect). From the Room Electrical Cabinet to the Control Console (AWG 8) may be used as long as the length does not exceed 3 m (10 feet).

Table 3-1	
Minimum Wire Size from Distribution	Transformer to Room Electrical Cabinet

	LINE	WIRE SIZE AT:			
GENERATOR	VOLTAGE	15 m (50 ft)	30 m (100 ft)	45 m (150 ft)	60 m (200 ft)
40 kW 1 Phase	208 VAC	AWG 1	AWG 3/0	AWG 4/0	-
	230 VAC	AWG 1	AWG 3/0	AWG 4/0	-
	240 VAC	AWG 1	AWG 3/0	AWG 4/0	-
50 kW 1 Phase	208 VAC	AWG 2/0	AWG 4/0	AWG 4/0	-
	230 VAC	AWG 2/0	AWG 4/0	AWG 4/0	-
	240 VAC	AWG 2/0	AWG 4/0	AWG 4/0	-
				and the star offered to	

NOTES: For lines below or above 240 VAC requires matching the autotransformer to the supply line. Instructions in the installation document and labels in the x-ray console provide instructions for Line Strap Adjustments.

3.6 INTERCONNECTION AND GROUNDING REQUIREMENTS

Every installation must be provided with a main line disconnect device (thermomagnetic breaker) and the remote disconnect devices required at all Consoles that are not located next to the line safety switch. (For more information about interconnection and grounding refer to "Installation" Document).

Illustration 3-1 Interconnection Block Diagram



Table 3-2Wire and Cable Runs (Numbers indicate connections above)

Run No	Cable Qty	Cable Length	Function	Remarks
1	1	Depends Room	Single Phase Power. (1 Phase: 230 / 240 VAC)	Connect to Room Electrical Cabinet according to the indicated electrical requirements. Customer Supplied.
			Ground	
	2 1 Depends Room	Single Phase Power. (1 Phase: 230 / 240 VAC)	Connect to X-Ray Control Console	
2		Depends Room	Ground	requirements. Customer Supplied.
3	2	Depends Room	Single Phase Power. (1 Phase: 230 / 240 VAC)	Connects X-Ray Control Console to High Voltage Generator according to the indicated electrical requirements. Customer Supplied.
			Ground	
		Denenda Deem	Stator Supply.	
4		Depends Room		Provided with X-Ray Tube
5	2	Depends Room	High Voltage Interconnect	Connects X-ray Tube Anode and Cathode to provide High Voltage.
			Ground	Provide low voltage to X-ray tube filaments.



Note: For wire sizes refer to Section 3.4 Consult to Local Standards for feeder and ground wire size requirements. The System power ground point is located inside the X-Ray Control Console Cabinet.

Illustration 3-3

Grounding Diagram (EARTHING DIAGRAM)



3.7 SAFETY REQUIREMENTS

Devices such as Safety Switch / Emergency Switch, Warning Lights, and Door interlock Switch should be supplied and installed by the customer. (Refer to illustration 3-4, 3-5 and 3-6).

3.7.1 SAFETY SWITCH / EMERGENCY SWITCH

The main Safety Switch should be installed in the Room Electrical Cabinet (Room Disconnect) (close to the Generator Cabinet), and provided with light indicators for "Power On / Off". It should be used for main disconnection, 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 to the main entrance door or to 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 VAC, NC.

Illustration 3-4 Room Electrical Cabinet and Mains Connection

LEGEND

EC:	Electrical Cabinet (Room Disconnect) for powering X-ray equipment.		
	(Customer supplied)		
TD-CB:	Thermo-magnetic Differential / Circuit Breaker.		
CR:	Contactor controlled by the Safety Switch (SS).		
SS: L:	Safety Switch used for generator main disconnection, with ON/OFF positions. 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 Power Cabinet.		
WL:	Warning Light (red lamp) located outside of the X-ray room (near of the main entrance)		
DIS:	Door Interlock Switch located on the main entrance(s).		

3.7.2 DOOR INTERLOCK SWITCH

The Door Interlock Switch indicates to the operator when Doorways to the X-ray room are open. It inhibits the X-ray generation by preventing Prep and Expose Commands, 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 Control Cabinet.



Door Interlock X-Ray Tube Switch Thermal Switch

In any case, the installation must be in compliance with the local regulation.

3.7.3 REMOTE READY STATE (WARNING LIGHTS)

The Warning Lights are signal lamps installed outside of the X-ray room (near to the main entrance) that indicates: The system is under voltage (Red lamp "ON"). X-Ray exposure is in process (Yellow lamp "ON"). For connections see illustration 3-6 below.

The customer is responsible for ordering and installing the Warning Light Relay Coils and the Warning Lights. Wire to customer preference (one or both lamps).

Illustration 3-6 Warning Lights

- Wiring for the Warning Lights Relay Coil should be routed to the Generator Control Cabinet.
- Connect "Red" Warning Light Relay Coil to Control Terminals # 6 and A1.
- Connect "Yellow" Warning Light Relay Coil to Control Terminals B1 and A1.
- Connect output of isolated contacts to the other side of the lamp relays. (For Schematic see Illustration 3-6 below).

Warning Light Circuit

CERTIFICATIONS AND CLASSIFICATION

4.1 CERTIFICATIONS

This Product conforms to DHHS Radiation Standards of 21 CFR Subchapter J as of the date of manufacture.

4.2 CLASSIFICATION

The X-ray Generator covered by this Pre-Installation Manual is classified as:

- Protection against Electric Shock: Class 1 Type B (♣) applied parts.
- Protection against Harmful Ingress of Water: Ordinary.
- Degree of Safety in the presence of Flammable Anesthetics Mixture with air or with oxygen or with nitrous oxide: Not suitable for use in the presence of Flammable Anesthetics Mixture with air or oxygen or with nitrous oxide.

SECTION 5

MINIMUM CURRENT TIME PRODUCT

5.1 MINIMUM CURRENT TIME PRODUCT (mAs)

- Minimum Current Time Product obtained at 0.1 s (second) is 5.0 mAs.
- Minimum Current Time Product within the specified ranges of compliance for linearity and constancy is 0.4 mAs.

SECTION 6

CONTINUOUS MODE NOMINAL ELECTRIC POWER OUTPUT

6.1 CONTINUOUS MODE NOMINAL ELECTRIC POWER OUTPUT (KW)

Continuous mode nominal power for 0.1s at 100 kV is as follows: TXR 325D,TXR 325M, and TXR 425 40kW.
Model TXR 525 SFQ, 50kW. Reference IEC 60601-2-7 CL. 6.8.2 4)

For Additional Information see the Installation and Operation Manuals.

SECTION 7

SAMPLE ROOM PLANS

7.0 Systems without X-Ray Tables

NOTE: If MA/RA stand used focal center from column is 22.5".

7.1 Systems with X-Ray Tables (medical)

NOTE: If CSM stand used top rail extends 12" from the wall.

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PUBLICATIONS AVAILABLE FOR STANDARD FREQUENCY SERIES UNITS A full set of manuals are provided with each x-ray control. A complete replacement set may be ordered. Cost \$50.00.			
L	Manuals may be ordered for replacing damaged ones or to use for planning or training BMET's.		
	MANUAL	COST PER COPY	
	Pre-Installation Manual M-2008-7-12	\$20.00	
	Installation Manual M-2008-7-13	\$35.00	
Γ	Operation Manual M-2008-7-14	\$25.00	
Γ	Maintenance Manual M-2008-7-15	\$20.00	
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