



# Pre-Installation

**Veterinary Systems  
HF Series Generators**

**Technical Publication  
PI-1016R3**



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This product bears a CE marking in accordance with the provisions of the 93/42/EEC MDD dated June 14, 1993.*

## REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	APR 1, 2001	New edition
1	DEC 20, 2001	Environmental requirements
2	APR 15, 2002	New Tube Support Assembly for Variable SID
3	FEB 6, 2003	Sliding Column 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 HEHEDED OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.***



**ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEHEDED 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

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:

- Install required material prior the delivery of the system components.
- Complete room floor, ceiling and wall finish.
- Install conduit, duct, and raceway.
- Install proper size junction boxes with covers at locations specified in the installation plan.
- Install mains power of proper voltage output and adequate kVA rating.
- Install all safety devices according to the Service Manual and Local Codes.
- Provide current room dimensions, including hall way and entry door sizes.

*Note* 

*Complete and proper Pre-Installation will avoid delays and confusion.*

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## SECTION 2 PRE-INSTALLATION DATA

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

### PHYSICAL CHARACTERISTICS

COMPONENT	DIMENSIONS			WEIGHT
	Length	Width	Height	
<b>Compact Generator Cabinet</b> with Power Module and HV Transformer	445 mm	360 mm	568 mm	72 kg
<b>Compact-ESM Generator Cabinet</b> Power Module, HV Transformer, and ESM (30 x 7 A/h Batteries)	813 mm	436 mm	948 mm	350 kg
<b>Sliding Column Assembly</b> with X-ray Tube, Collimator and Control Console	2000 mm	987 mm	2295 mm	224 kg
<b>Tube Support Assembly for Variable SID</b> with X-ray Tube, Collimator and Control Console	500 mm	max. 828 mm	2235 mm	174 kg
<b>Tube Support Assembly for Fixed SID</b> with X-ray Tube, Collimator, Control Console and Bucky / Cassette Tray Support	500 mm	max. 980 mm	2000 mm	77 kg
<b>Fixed Radiographic Table (Floating Table-Top)</b>	1500 mm	719 mm	756 mm	112 kg
<b>Mobile Radiographic Table</b>	1500 mm	719 mm	756 mm	44 kg
<b>Control Console (freestand) (optional)</b>	440 mm	290 mm	90 mm	6.5 kg
<b>Control Console with Pedestal (optional)</b>	440 mm	290 mm	1023 mm	20.5 kg

## Veterinary Systems - HF Series Generators

### Pre-Installation

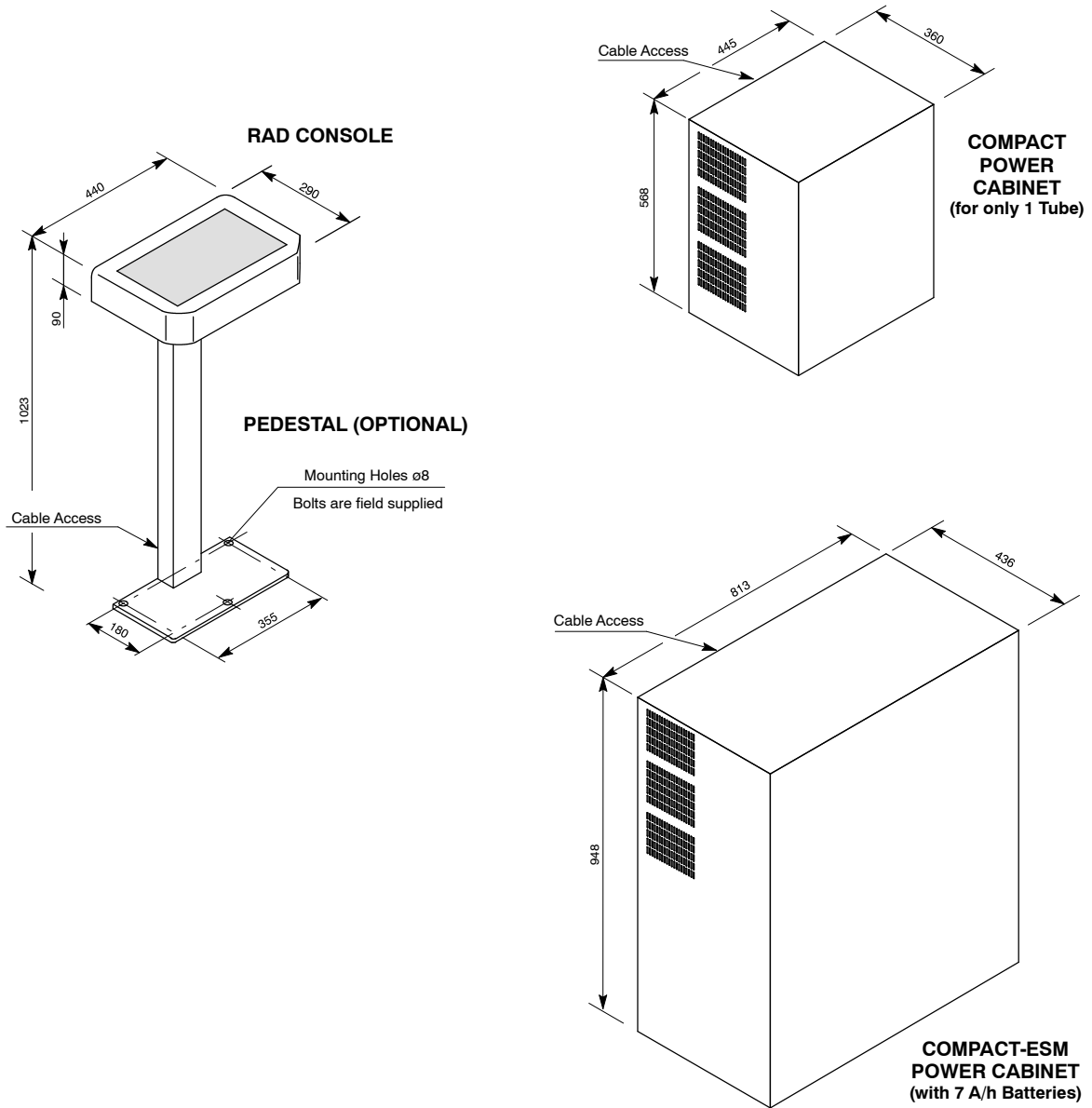
#### METHOD OF MOUNTING

COMPONENT	NORMAL METHOD OF MOUNTING
<b>Generator Cabinet</b> with Power Module and HV Transformer	Freestanding or anchored to floor with four bolts.
<b>Tube Support Assembly for Variable SID</b> with X-ray Tube, Collimator and Control Console	Anchored to wall with two / four bolts on the upper area and anchored to floor with two bolts on the base. Assembled to the Fixed Table.
<b>Sliding Column Assembly</b> with X-ray Tube, Collimator and Control Console	Base anchored to the floor with ten bolts and the Column slided in the Base rail.
<b>Tube Support Assembly for Fixed SID</b> with X-ray Tube, Collimator, Control Console and Bucky / Cassette Tray Support	Anchored to wall with two / four bolts on the upper area and anchor to floor with two bolts on the base. Assembled to the Fixed Table.
<b>Fixed Radiographic Table (Floating Table-Top)</b>	Anchored to floor with four bolts. Generator Cabinet inside.
<b>Mobile Radiographic Table</b>	Freestanding or wheels blocked.
<b>Control Console (freestand) (optional)</b>	Freestanding or anchor with three bolts.
<b>Control Console with Pedestal (optional)</b>	Anchor to floor with three bolts.
<i>Note: Anchoring hardware should be field supplied. For seismic areas all components must be anchored, Local Standards should be applied.</i>	

#### MINIMUM RECOMMENDED FREE AREA FOR SERVICE ACCESS

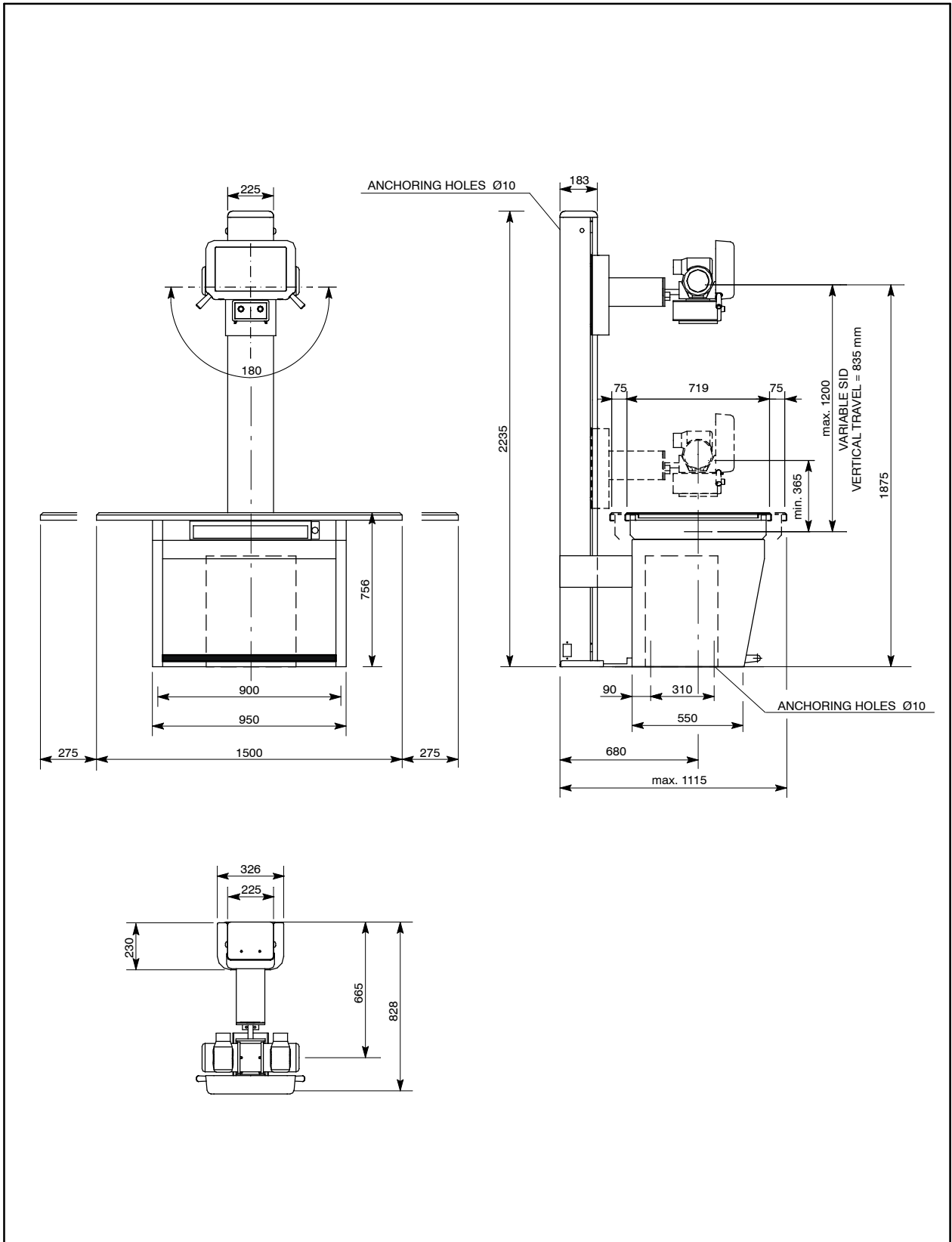
COMPONENT	SURFACE					
	Left Side	Right Side	Front	Rear	Top	Bottom
<b>Tube Support Assemblies</b> (Generator Cabinet included)	1.2 m	1.2 m	Free	-	0.18 m	-
<b>Fixed Radiographic Table</b>	0.75 m	0.75 m	Free	-	Free	-
<b>Mobile Radiographic Table</b>	Free movements					
<b>Control Console (optional)</b>	1 m	1 m	Free	0.1 m	Free	-
<i>Note: Ventilation conditions requires to keep a minimum free distance of 15 cm from both lateral sides of the Cabinet.</i>						

**Illustration 2-1**  
**Optional Control Console with Pedestal and Generator Cabinets**





**Illustration 2-3**  
**Systems with Variable SID**





## SECTION 3 ROOM REQUIREMENTS

### 3.1 ENVIRONMENTAL REQUIREMENTS

	LINE POWERED GENERATOR	BATTERIES POWERED GENERATOR
<b>Operating Temperature</b>	10°C / 40°C	15°C / 30°C
<b>Storage Temperature</b>	-10°C / 60°C	15°C / 25°C (never above 30°C)
<b>Relative Humidity (no condensating)</b>	95%	95%
<b>Altitude</b>	4000 m	4000 m
<b>Heat Output</b>	In normal environmental circumstances the maximum heat output of the equipment can reach 0.16 kW (544 btu/hr). Components must not be allowed to overheat. Overheating of components can cause system malfunction.	In normal environmental circumstances the maximum heat output of the equipment can reach 0.26 kW (890 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 generators ability to correct for inadequate line power.

To insure proper operation:

- Do not under size the Distribution Transformer (*Line Powered Generators*).
- Insure and maintain input mains voltage to specification.
- Size feeder and ground wires per this document.

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 preterminated wires.



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

### 3.3 LINE POWERED GENERATORS - POWER LINE REQUIREMENTS

- Operation:

GENERATOR MODEL	SHF-161	SHF-162	SHF-163
Max. Power kW	16 kW		
Maximum mA	200 mA		
Maximum kVp	125 kVp		
Power Line	A	B	C / D

GENERATOR MODEL	SHF-210	SHF-220	SHF-230
Max. Power kW	20 kW		
Maximum mA	320 mA		
Maximum kVp	125 kVp		
Power Line	A	B	C / D

GENERATOR MODEL	SHF-310	SHF-320	SHF-330
Maximum Power kW	32 kW		
Maximum mA	320 mA		
Maximum kVp	125 kVp		
Power Line	A	B	C / D

POWER LINE			
A	B	C	D
230 - 240 VAC, Single-Phase, 50 / 60 Hz	230 - 240 VAC, Three-Phase, 50 / 60 Hz	400 - 440 VAC, Three-Phase, 50 / 60 Hz	480 VAC, Three-Phase, 50 / 60 Hz
Power line compensation: automatic for $\pm 10\%$ variations			
Maximum line regulation for maximum kVA demand: 5%.			
NOTE: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the generator input.			

- 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-PHASE GENERATORS		
	16 kW	20 kW	32 kW
208 VAC *	109 A	135 kW	218 A
230 VAC	100 A	125 A	197 A
240 VAC	95 A	120 A	189 A
Minimum kVA required	Maximum kW x 1.2		
Stand-by Consumption	500 W		
Diferential Sensitivity	30 mA		
Thermomagnetic Breaker	50% of the RMS line current (RMS = momentary line current based on 100 ms X-ray exposures)		

NOTE: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the generator input.

LINE VOLTAGE	THREE-PHASES GENERATORS		
	16 kW	20 kW	32 kW
208 VAC *	63 A	80 A	126 A
230 VAC	60 A	73 A	114 A
240 VAC	55 A	70 A	109 A
400 VAC	33 A	41 A	65 A
415 VAC	32 A	40 A	63 A
440 VAC	30 A	37 A	60 A
480 VAC	27 A	35 A	55 A
Minimum kVA required	Maximum kW x 1.2		
Stand-by Consumption	500 W		
Diferential Sensitivity	30 mA		
Thermomagnetic Breaker	50% of the RMS line current (RMS = momentary line current based on 100 ms X-ray exposures)		

NOTE: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the generator input.

- Maximum power line impedance:

LINE VOLTAGE	SINGLE-PHASE GENERATORS POWER		
	16 kW	20 kW	32 kW
208 VAC *	0.090 Ω	0.070 Ω	0.045 Ω
230 VAC	0.110 Ω	0.085 Ω	0.055 Ω.
240 VAC	0.120 Ω	0.090 Ω	0.060 Ω

NOTES: - The above values comply with the Standard IEC-60601.2.7.  
 - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the generator input.

LINE VOLTAGE	THREE-PHASE GENERATORS POWER		
	16 kW	20 kW	32 kW
208 VAC *	0.140 Ω	0.110 Ω	0.070 Ω
230 VAC	0.180 Ω	0.150 Ω	0.087 Ω.
240 VAC	0.190 Ω	0.140 Ω	0.094 Ω
400 VAC	0.550 Ω	0.440 Ω	0.270 Ω
415 VAC	0.600 Ω	0.480 Ω	0.300 Ω
440 VAC	0.650 Ω	0.500 Ω	0.340 Ω
480 VAC	0.830 Ω	0.640 Ω	0.400 Ω

NOTES: - The above values comply with the Standard IEC-60601.2.7.  
 - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the generator input.

### 3.4 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 nominal mains value.

It is recommended that the Distribution Transformer (Clinic) used as power source have at least a power of the 20% 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). Wires size of 16 mm<sup>2</sup> (AWG 5) can be used from the Room Electrical Cabinet to the Generator Cabinet if that length does not exceed 6 m.

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

GENERATOR	LINE VOLTAGE	WIRE SIZE AT:							
		15 m		30 m		45 m		60 m	
16 kW, 1φ	208 VAC *	25 mm <sup>2</sup>	AWG 3	50 mm <sup>2</sup>	AWG 1/0	83 mm <sup>2</sup>	AWG 3/0	105 mm <sup>2</sup>	AWG 4/0
	230 VAC	25 mm <sup>2</sup>	AWG 3	50 mm <sup>2</sup>	AWG 1/0	83 mm <sup>2</sup>	AWG 3/0	105 mm <sup>2</sup>	AWG 4/0
	240 VAC	25 mm <sup>2</sup>	AWG 3	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0	95 mm <sup>2</sup>	AWG 3/0
16 kW, 3φ	208 VAC *	16 mm <sup>2</sup>	AWG 5	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0
	230 VAC	16 mm <sup>2</sup>	AWG 5	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0
	240 VAC	16 mm <sup>2</sup>	AWG 5	25 mm <sup>2</sup>	AWG 3	50 mm <sup>2</sup>	AWG 1/0	50 mm <sup>2</sup>	AWG 1/0
	400 VAC	10 mm <sup>2</sup>	AWG 7	16 mm <sup>2</sup>	AWG 5	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2
	415 VAC	10 mm <sup>2</sup>	AWG 7	16 mm <sup>2</sup>	AWG 5	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2
	440 VAC	10 mm <sup>2</sup>	AWG 7	16 mm <sup>2</sup>	AWG 5	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2
	480 VAC	6 mm <sup>2</sup>	AWG 9	16 mm <sup>2</sup>	AWG 5	25 mm <sup>2</sup>	AWG 3	25 mm <sup>2</sup>	AWG 3
20 kW, 1φ	208 VAC *	35 mm <sup>2</sup>	AWG 2	70 mm <sup>2</sup>	AWG 2/0	105 mm <sup>2</sup>	AWG 4/0	120 mm <sup>2</sup>	AWG 5/0
	230 VAC	35 mm <sup>2</sup>	AWG 2	70 mm <sup>2</sup>	AWG 2/0	95 mm <sup>2</sup>	AWG 3/0	120 mm <sup>2</sup>	AWG 5/0
	240 VAC	35 mm <sup>2</sup>	AWG 2	70 mm <sup>2</sup>	AWG 2/0	95 mm <sup>2</sup>	AWG 3/0	120 mm <sup>2</sup>	AWG 5/0
20 kW, 3φ	208 VAC *	25 mm <sup>2</sup>	AWG 3	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0	83 mm <sup>2</sup>	AWG 3/0
	230 VAC	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2	70 mm <sup>2</sup>	AWG 2/0	83 mm <sup>2</sup>	AWG 3/0
	240 VAC	16 mm <sup>2</sup>	AWG 5	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0
	400 VAC	10 mm <sup>2</sup>	AWG 7	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0
	415 VAC	10 mm <sup>2</sup>	AWG 7	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0
	440 VAC	10 mm <sup>2</sup>	AWG 7	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2	35 mm <sup>2</sup>	AWG 2
	480 VAC	10 mm <sup>2</sup>	AWG 7	16 mm <sup>2</sup>	AWG 5	25 mm <sup>2</sup>	AWG 3	35 mm <sup>2</sup>	AWG 2
32 kW, 1φ	208 VAC *	50 mm <sup>2</sup>	AWG 1/0	105 mm <sup>2</sup>	AWG 4/0	120 mm <sup>2</sup>	AWG 5/0	-	-
	230 VAC	50 mm <sup>2</sup>	AWG 1/0	105 mm <sup>2</sup>	AWG 4/0	120 mm <sup>2</sup>	AWG 5/0	-	-
	240 VAC	50 mm <sup>2</sup>	AWG 1/0	95 mm <sup>2</sup>	AWG 3/0	120 mm <sup>2</sup>	AWG 5/0	-	-
32 kW, 3φ	208 VAC *	35 mm <sup>2</sup>	AWG 2	70 mm <sup>2</sup>	AWG 2/0	95 mm <sup>2</sup>	AWG 3/0	120 mm <sup>2</sup>	AWG 5/0
	230 VAC	35 mm <sup>2</sup>	AWG 2	70 mm <sup>2</sup>	AWG 2/0	95 mm <sup>2</sup>	AWG 3/0	120 mm <sup>2</sup>	AWG 5/0
	240 VAC	25 mm <sup>2</sup>	AWG 3	50 mm <sup>2</sup>	AWG 1/0	83 mm <sup>2</sup>	AWG 3/0	105 mm <sup>2</sup>	AWG 4/0
	400 VAC	16 mm <sup>2</sup>	AWG 5	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0
	415 VAC	16 mm <sup>2</sup>	AWG 5	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0
	440 VAC	16 mm <sup>2</sup>	AWG 5	35 mm <sup>2</sup>	AWG 2	50 mm <sup>2</sup>	AWG 1/0	70 mm <sup>2</sup>	AWG 2/0
	480 VAC	16 mm <sup>2</sup>	AWG 5	25 mm <sup>2</sup>	AWG 3	50 mm <sup>2</sup>	AWG 1/0	50 mm <sup>2</sup>	AWG 1/0

NOTE: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the generator input.

### 3.5 BATTERIES POWERED GENERATORS - POWER LINE REQUIREMENTS

- Power line voltage variations must not exceed  $\pm 15\%$ .
- Line Operation:
  - Single-Phase.
  - 110 VAC / 230 VAC / 240 VAC.
  - 50 Hz / 60 Hz.
- Thermomagnetic Interruptor / Circuit breaker rating should be:
  - 10 A (1P+N D).
- Differential Sensitivity: 30 mA
- Minimum kW required:
  - without Stand-Alone option: 2.2 kW
  - with Stand-Alone option: 0.5 kW
- Line Impedance should comply with Standard IEC-60601.2.7.

### 3.6 BATTERIES POWERED GENERATORS - RECOMMENDED WIRE SIZE

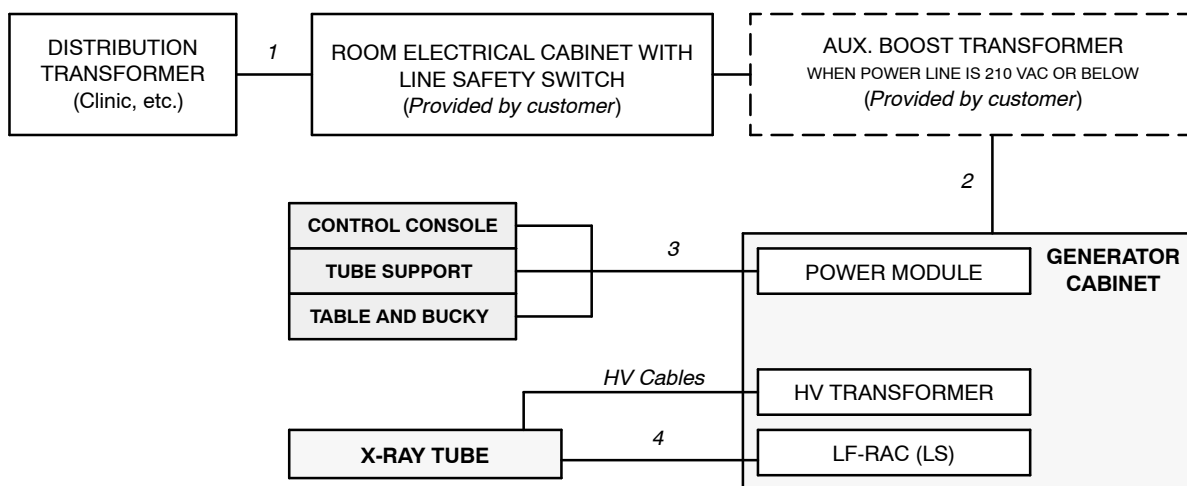
The minimum recommended wire size for the line voltage is:

LINE VOLTAGE	WIRE SIZE	
110 VAC	3.30 mm <sup>2</sup>	AWG 12
230 VAC / 240 VAC	2.08 mm <sup>2</sup>	AWG 14

### 3.7 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).

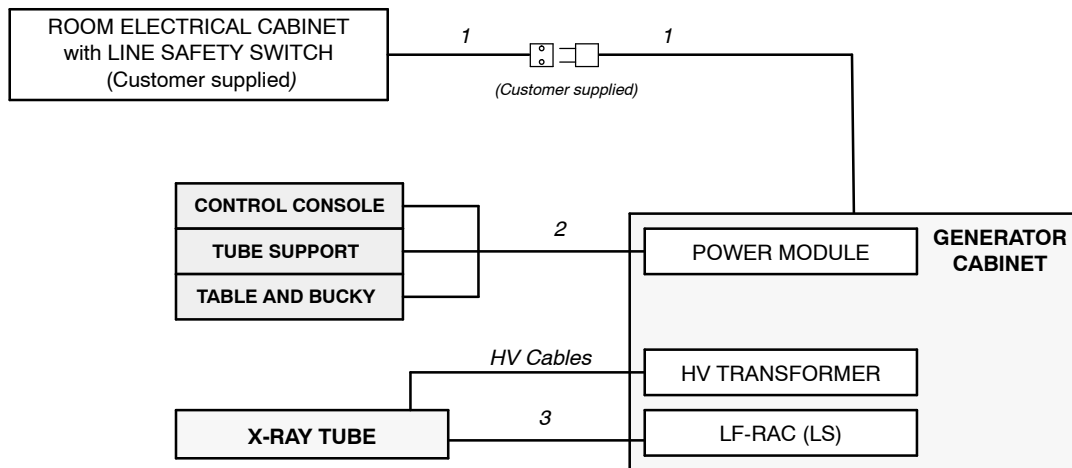
**Illustration 3-1**  
**Interconnection Block Diagram for LINE POWERED GENERATORS**



RUN No.	CABLE QTY	CABLE LENGTH	FUNCTION	REMARKS
1	1	Depends Room	Single or Three Phase Power. (1 $\phi$ : 208 - 240 VAC) (3 $\phi$ : 208 - 240 VAC or 400 - 480 VAC) Ground.	Connect to Room Electrical Cabinet according to the indicated electrical requirements. <i>Customer supplied.</i>
2	1	Depends Room	Single or Three Phase Power. (1 $\phi$ : 230 - 240 VAC) (3 $\phi$ : 230 - 240 VAC or 400 - 480 VAC) Ground.	Connect to Power Module according to the indicated electrical requirements. Install an Auxiliari Boost Transformer when it is required. <i>Customer supplied.</i>
3	Variable	15 m	Control Signals + Peripheral Devices + Ground	Cable quantity depends on the options installed (AEC, etc.)
4	1	Depends Room	Stator Supply. Ground.	<i>Provided with X-ray Tube.</i>
<p><b>NOTES:</b> - For wire size refer to Section 3.4. Consult to Local Standards for feeder and ground wire size requirements. - The system power ground point is located in the Generator Cabinet.</p>				

Illustration 3-2

Interconnection Block Diagram for BATTERIES POWERED GENERATORS



RUN No.	CABLE QTY	CABLE LENGTH	FUNCTION	REMARKS
1	1	Depends Room	Single-Phase Line. 110 VAC / 230 VAC / 240 VAC Ground.	The Unit is connected by a Line Plug. Power Line from a Room Electrical Cabinet with Safety Switch. <i>Line plugs and cable are Customer supplied.</i>
2	Variable	15 m	Control Signals + Peripheral Devices + Ground	Cable quantity depends on the options installed (AEC, etc.)
3	1	Depends Room	Stator Supply. Ground.	<i>Provided with X-ray Tube.</i>
<p>NOTES: - For wire size refer to Section 3.6. Consult to Local Standards for ground wire size requirements. - The system power ground point is located in the Generator Cabinet.</p>				

### 3.8 SAFETY DEVICES

Devices such as Safety Switch / Emergency Switch, Warning Light, and Door Interlock Switch should be supplied and installed by the customer. (*Refer to Illustration 3-3.*)

#### 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.

#### 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.

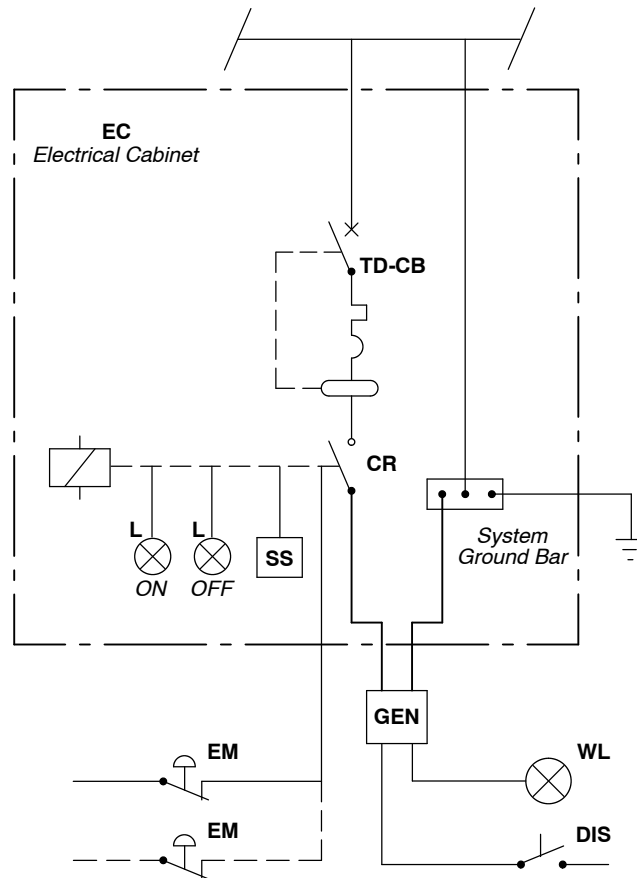
#### WARNING LIGHT

The Warning Light is a signal lamp installed outside of the X-ray room (near of the main entrance) that indicates an X-ray exposure is ON. The Warning Light connection cable should be routed to the Generator Cabinet. (*For schematic refer to Installation document.*)

Note 

*In any case, the installation must be in compliance with the Local Regulation.*

**Illustration 3-3**  
**Room Electrical Cabinet and Mains Connection**



**LEGEND**

- EC:** Electrical Cabinet (Room Disconnect) for powering X-ray equipment. *(Customer supplied)*
- TD-CB:** Thermomagnetic Differential / 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 Generator 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).