

CHAPTER 1C

PREPARING FOR INSTALLATION

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1C.1.0 INTRODUCTION

The following items must be taken into consideration before installing your generator. These items will impact the services required:

- Power level of your generator.
- Power line requirements.
- Ground requirements.
- Physical placement of the generator.
- Environmental requirements for the generator.
- Cable runs from the generator to all room components: X-ray tubes, tables, Bucky's, AEC, DAP and other room equipment.

1C.2.0 GENERATOR POWER REQUIREMENTS

The generator power and grounding requirements are dependent on the model number.

1C.2.1 50 kW Three Phase (VZW2558FB8)

Line Voltage ¹	400-480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	107-90 Amps/phase
Standby Current ²	3 Amps.

1C.2.2 65 kW Three Phase (VZW2558FC8)

Line Voltage	400-480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	136-118 Amps/phase
Standby Current ²	3 Amps.

1C.2.3 80 kW Three Phase (VZW2558FD8)

Line Voltage	400-480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	173-130 Amps/phase
Standby Current ²	4 Amps.

1C.2.4 100 kW Three Phase (VZW2558FJ8)

Line Voltage	400-480 VAC \pm 10%, 3~
Line Frequency	50/60 Hz.
Momentary Current	220-170 Amps/phase
Standby Current ²	4 Amps.

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1C.2.0 GENERATOR POWER REQUIREMENTS (CONT)

- 1 Line Voltage: The generator may be operated with a line input voltage of 380VAC -5% / +15%. If the generator must be installed with a line input voltage below 360VAC (400VAC -10% or 380VAC -5%) then either the generator output power may be de-rated as specified in section 1.C.2.6 or a 3-phase line matching auto-transformer may be used. De-rating does not change the grounding and generator input power requirements in section 1C.2.5, which must satisfy the specifications for the generator model number. If using a 3-phase line matching autotransformer, it must meet the minimum requirements specified below:
- | | |
|--------------------------------------|---|
| Transformer Input | 380VAC 50/60 Hz |
| Transformer Output | 400/480VAC \pm 10% |
| Transformer Momentary Output Current | As specified above for each model number. |
| Transformer Continuous Output Rating | Same as the Minimum Recommended Distribution Transformer Rating specified in the table below. |
- 2 Standby Current: This is the current that the generator draws when it is "idle", i.e. with the generator switched on, the filaments at standby level, and with all the external or installer-supplied equipment connected at maximum load to the generator.

NOTE: THE FOLLOWING TABLE CONTAINS RECOMMENDED VALUES FOR THE WIRE SIZES BETWEEN THE MAINS DISCONNECT AND THE GENERATOR. THE ACTUAL VALUES USED AT AN INSTALLATION ARE DEPENDENT ON THE QUALITY OF THE INPUT LINE (VOLTAGE LEVEL), THE CURRENT REQUIREMENTS, THE LENGTH OF THE CABLE RUN, AND MUST BE CONFIRMED BY THE INSTALLER.

FINAL SELECTION OF GENERATOR INPUT WIRE AND DISCONNECTS, AS WELL AS THE CABLING FROM THE DISTRIBUTION TRANSFORMER TO THE MAINS DISCONNECT MUST MEET THE REQUIREMENTS OF THE LOCAL ELECTRICAL CODES AND IS USUALLY DETERMINED BY HOSPITAL / CONTRACTOR ENGINEERING.

ALL LISTED RATINGS CONSIDER THE GENERATOR REQUIREMENTS ONLY. THE INSTALLER MUST MAKE THE NECESSARY COMPENSATION FOR ADDITIONAL LOADS.

A POOR QUALITY INPUT LINE MAY RESULT IN THE INSTALLER HAVING TO DERATE THE GENERATOR'S MAXIMUM POWER

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1C.2.5 Generator Power requirements (AC) mains

Mains Voltage	Minimum Recommended Mains Disconnect to Generator 15 ft / 5 m max)	Generator Momentary Line Current	Minimum Recommended Generator Service Rating	Minimum Recommended Distribution Transformer Rating	Minimum Recommended Ground Wire Size*	Apparent Mains Resistance
VZW2558FB8YY						
400 VAC	#6 * (13.3 mm ²)	107 A	100 A	65 kVA	#6 (13.3 mm ²)	0.17 Ω
480 VAC	#6 * (13.3 mm ²)	90 A	100 A	65 kVA	#6 (13.3 mm ²)	0.24 Ω
VZW2558FC8YY						
400 VAC	#6 * (13.3 mm ²)	136 A	100 A	85 kVA	#6 (13.3 mm ²)	0.13 Ω
480 VAC	#6 * (13.3 mm ²)	118 A	100 A	85 kVA	#6 (13.3 mm ²)	0.19 Ω
VZW2558FD8YY						
400 VAC	#6 * (13.3 mm ²)	173 A	100 A	105 kVA	#6 (13.3 mm ²)	0.11 Ω
480 VAC	#6 * (13.3 mm ²)	130 A	100 A	105 kVA	#6 (13.3 mm ²)	0.15 Ω
VZW2558FJ8YY						
400 VAC	#4 * (21 mm ²)	220 A	100 A	130 kVA	#4 (21 mm ²)	0.09 Ω
480 VAC	#6 * (13.3 mm ²)	170 A	100 A	130 kVA	#6 (13.3 mm ²)	0.12 Ω

- All wiring and grounding must comply with local electrical codes.
- * Maximum size for the wire is #4 AWG (21 mm²).
- All wiring must be copper.
- The main disconnect switch shall be located within reach of the operator.

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1C.2.6 Generator maximum output power requirements based on AC mains conditions

Model	Rated Power (kW)	Rated Supply Voltage	Max Output Power (kW) @359 VAC Input	Max Output Power (kW) @350 VAC Input	Max Output Power (kW) @342 VAC Input
VZW2558FB8YY	50 kW	3~ 400 VAC	50 kW	45 kW	40 kW
VZW2558FC8YY	65 kW	3~ 400 VAC	65 kW	60 kW	50 kW
VZW2558FD8YY	80 kW	3~ 400 VAC	80 kW	75 kW	65 kW
VZW2558FJ8YY	100 kW	3~ 400 VAC	100 kW	93 kW	80 kW

The above table list the maximum power output for the different generator models at a supply voltage below 360 VAC (400 VAC -10%). If the measured supply voltage is 360 VAC or lower, de-rate the maximum power on the generator. For example, if the measured supply voltage on a 50 kW generator is 342 VAC de-rate the maximum output power of the generator to 40 kW. De-rating does not change the grounding and input power requirements in section 1C.2.5, which must satisfy the specifications for the generator model number.

1C.2.7 Service Disconnect (All Models)

Refer to the previous table for the recommended service disconnect ratings for the Indico IQ® series of X-ray generators.

1C.3.0 GROUND REQUIREMENTS

POWER LINE:

- A suitable ground must be connected from the main disconnect switch to the main ground connection on the generator, located below the input distribution board. The ground wire is typically part of the line cord, and the current capacity of the ground conductor must be equal to or greater than that of the line conductors.
- If a neutral line is provided with the system, under no circumstances is it to be used for ground purposes. The ground conductor only may carry fault currents.

X-RAY TUBE HOUSING:

- A copper ground cable, #10 AWG (6 mm²) or greater, is to be connected from each X-ray tube's housing to the HV module's ground stud located at the top of the HV module.

X-ray Stator Drive Cable Requirements

The X-ray stator cable used with the low speed starter 2/dual speed starter 2 assembly must meet the following requirements:

- The cable must be shielded, and the shield ground must be connected to the generator chassis ground and to the tube housing ground.

NOTE: FOR THE METAL CENTER X-RAY TUBE: CONNECT THE METAL CENTER SECTION LEAD TO ONE OF THE GROUND STUDS ON THE HVM.

- The cable must be rated to at least 600 VAC.
- The maximum total cable capacitance (from the inner conductors shorted together to the cable shield) must be less than 5.1 nF. For example, a cable type 8618 made by Belden has a capacitance of 4.1 nF for 26 meters.

NOTE: STATOR CABLE CAPACITANCE MUST NOT EXCEED 5.1NF. IF LONGER CABLES ARE NEEDED, THEN A CABLE WITH LOWER CAPACITANCE PER UNIT LENGTH MUST BE USED.

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1C.4.0 GENERATOR DIMENSIONS AND WEIGHT**1C.4.1 Generator Outline**

Refer to chapter 1A for the Indico IQ® generator outline.

1C.4.2 Generator Weight

The weight of the generator cabinet and of the available consoles is listed below:

Generator cabinet with HV module	200 lbs (91 kg).
R&F membrane console	8 lbs (3.7 kg).
Touchscreen console	8 lbs (3.7 kg).

1C.4.3 Generator Shipping Pack

The dimensions of the packed Indico IQ® X-ray generator are shown in the table below.

ITEM	LENGTH	WIDTH	HEIGHT	WEIGHT
Main cabinet in shipping pack	28 in (71 cm)	24 in (61 cm)	52 in (132 cm)	* 240-260 lbs (109-118 kg)

* The packed weight of the generator will vary within the specified range depending on console type and options.

1C.5.0 LOCATING THE GENERATOR CABINET AND CONTROL CONSOLE

WARNING: ENSURE THAT NO EQUIPMENT, BOXES, TOOLS, LIQUIDS OR OTHER ITEMS ARE PLACED ON TOP OF THE GENERATOR CABINET, AND THAT THE GENERATOR CABINET IS NOT SUBJECTED TO EXTERNAL FORCE UNDER ANY CIRCUMSTANCES.

The generator cabinet is self-standing and does not need to be supported. However, the installation should meet the following requirements:

- The floor should be flat and level. Leveling feet are available as an option.
- The generator installation area must be dry, clean and free of dirt or debris. Precautions should also be taken such that there is no chance that water or any type of liquid enters the generator or control console, before, during and after installation, and within the entire generator's or control console's service life.
- Mounting holes have been provided in the base of the generator to secure the generator to the floor, if required. Alternately, the generator may be anchored to the floor via installer supplied hold-down brackets. Refer to ***Seismic Centers and mounting hole locations*** for further details.
- Sufficient room must be provided to allow access to the generator for installation. A minimum of 42 inches (1.07 m) clearance is recommended on any side for which service access may be required during installation. This is to minimize the risk of accidentally contacting high voltage during service and maintenance.
- A minimum of 3 inches (76 mm) of clearance is required between the back of the generator and any wall behind the generator. Areas around the generator vents must be unobstructed to prevent overheating.

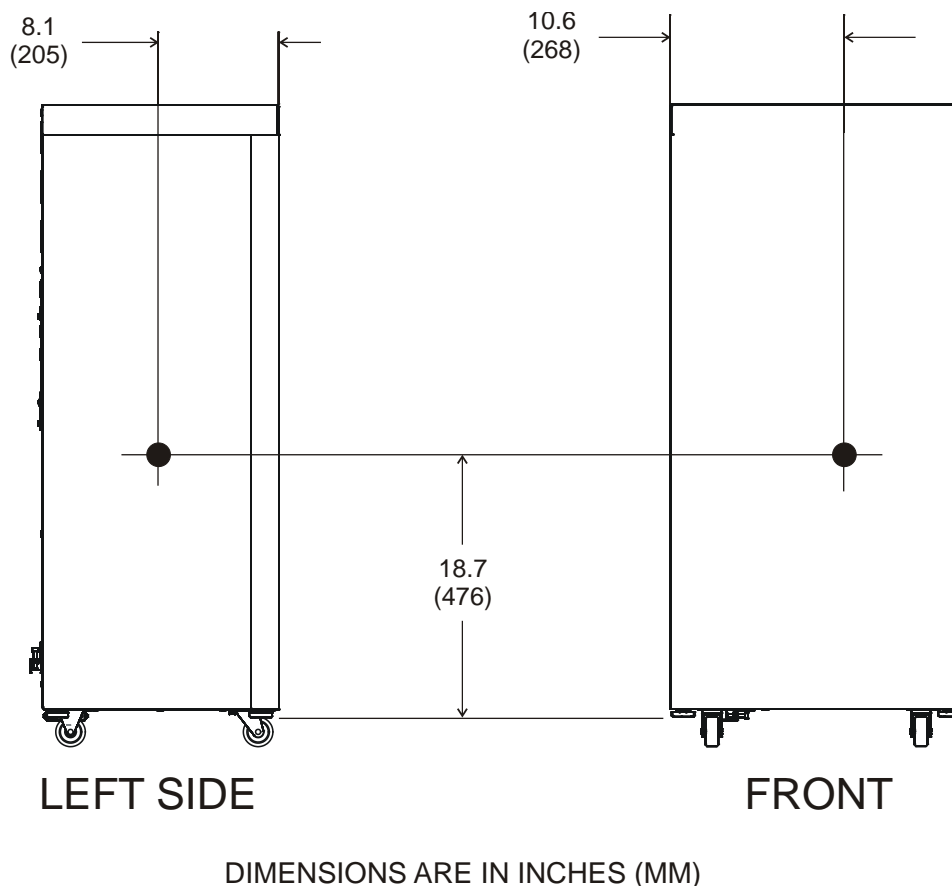
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1C.5.0 LOCATING THE GENERATOR CABINET AND CONTROL CONSOLE (CONT)

- Cable conduits, troughs or raceways should be provided to route cables from the generator cabinet to the console and to the room equipment if required. These should be large enough to allow the cables to be routed without risk of damage.
- The control console is normally free standing on a desk or shelf and the vents on the control console must be unobstructed. It may be anchored if necessary and should be installed in a stable, flat, non-slippery surface. An optional floor stand is available for the R&F membrane console, and an optional wall mount kit is also available for the StarQ™ Touchscreen Console.
- The control console user should consider ergonomics. This manual does not provide ergonomics information but appropriate materials should be consulted, as it applies to specific work area regulations and requirements.

1C.5.1 Seismic Centers and Mounting Hole Locations

Figure 1C-1 shows the seismic center location for the Indico IQ® X-ray generator. The generator should normally be secured to the floor via the 1/2 inch (13 mm) diameter clearance holes that are located in the base of the cabinet as shown in Figure 1C-2.



IndicoIQ_seismic.cdr

FIGURE 1C-1: INDICO IQ® SEISMIC CENTERS

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1C.5.1 Seismic Centers and Mounting Hole Locations (Cont)

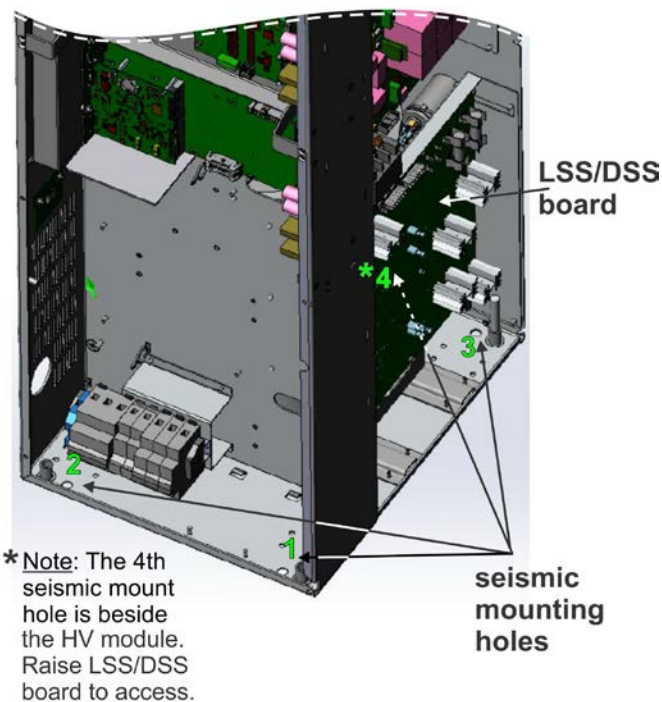
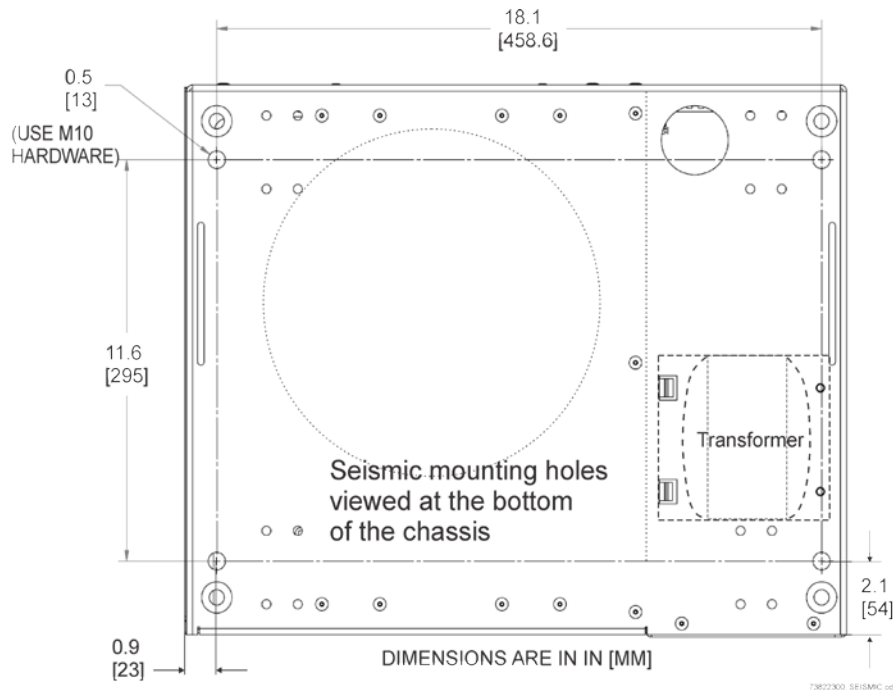


FIGURE 1C-2: HOLES IN BASE OF CABINET FOR SECURING THE GENERATOR

Seismic holes are provided as indicated in Figure 1C-2. Depending on your installation requirement, these holes can be used if seismic mounting is necessary. The customer has to provide the hardware required to secure the generator to the floor. The recommended diameter of the mounting hardware (such as the mounting bolt) is 10 mm of sufficient length so the generator assembly is properly secured.

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1C.5.1 Seismic Centers and Mounting Hole Locations (Cont)

When mounting for seismic consideration, all mounting holes should be utilized. All of them are easily accessible, with one of the holes marked number 4 in the figure, located behind the high voltage module and can be reached by following this procedure:

- Follow all safety procedures outlined in this manual before commencing any work on the generator.
- Loosen but DO NOT remove the four (4) Keps nuts on the LSS2/DSS2 mounting plate using 8mm socket or hex driver.

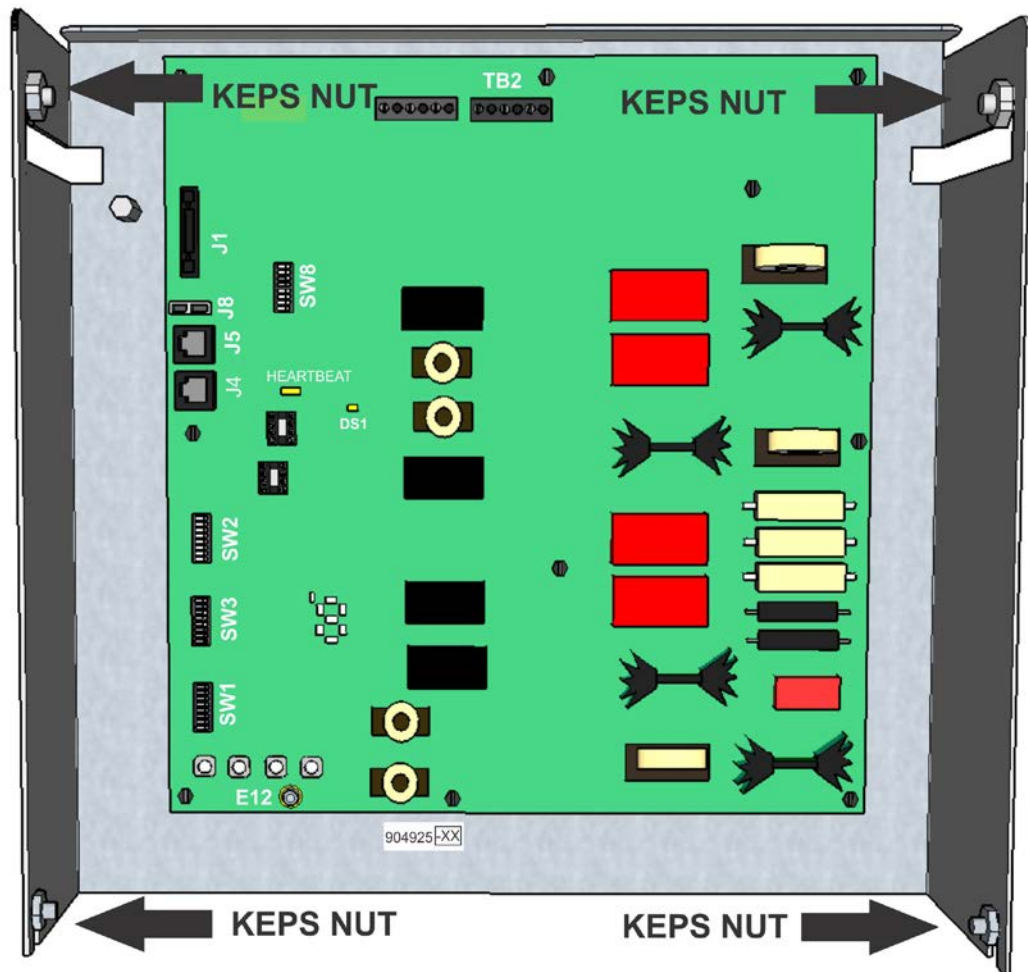


FIGURE 1C-3: LOCATIONS OF KEPS NUTS HOLDING THE STARTER MOUNTING PLATE TO THE CHASSIS

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1C.5.1 Seismic Centers and Mounting Hole Locations (Cont)

- Push the LSS2/DSS2 mounting plate slightly up to free the bottom part of the plate from the unit. **Important: Make sure any cables connected to the LSS2 or DSS2 board do not get pinched, pulled or damaged when moving the mounting plate. If necessary, unplug them from the board.**
- Once the bottom part of the mounting plate is free, swing the LSS2/DSS2 board mounting plate away from the unit then up, to access the seismic mounting hole beside the high voltage module. See figure.
- Install the bolt facing downwards.
- Use a wrench to hold the bolt while tightening the nut.

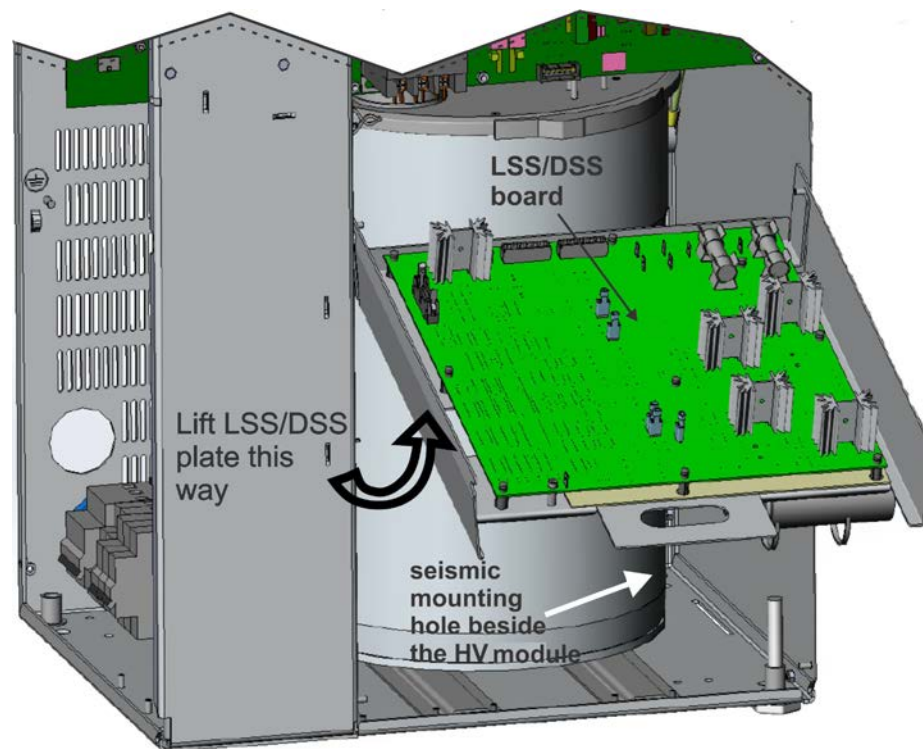


FIGURE 1C-4: LIFT THE LSS2/DSS2 BOARD MOUNTING PLATE UPWARDS TO ACCESS THE SEISMIC MOUNTING HOLE

- The mounting plate needs to be held securely in the position shown in Figure 1C-4 while the seismic mounting hardware is secured.
- When done, slide the LSS2/DSS2 board mounting plate back into place. Check that the washers under the Keps nut are not caught between the LSS2/DSS2 mounting plate and the generator chassis.
- If cables were removed earlier, plug them all back to their proper locations.
- Secure and tighten the hardware and check that all connections are properly connected.

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1C.6.0 COOLING REQUIREMENTS

- Listed below are the cooling requirements for the Indico IQ® series X-ray generator:
- The main generator cabinet is fan cooled; the membrane console is convection-cooled and touchscreen console is fan cooled.
- Unrestricted airflow [minimum 3 inches (76 mm)] must be provided at the back of the generator cabinet.
- The console and generator cabinet should never be covered when the generator is switched on, as any covering may interfere with the cooling.
- The maximum heat output of the generator is approximately 22 watts (75 BTU / hour) during standby and approximately 1025 watts (3500 BTU / hour) during fluoroscopic operation. The heat output of the console is less than 30 watts (100 BTU / hour).

1C.7.0 PRE-INSTALLATION CHECK LISTS

The following checklists are provided to help the installer during the pre-installation phase.

1C.7.1 Tools and Test Equipment Required

The following is a checklist of recommended tools and test equipment for installation and calibration of the generator.

CHECK <input type="checkbox"/>	DESCRIPTION
<input type="checkbox"/>	A computer with a suitable browser is needed to connect to GenWeb™ for setup and calibration. A suitable length CAT-5 Ethernet cable will be needed to connect the computer Ethernet port to the generator. GenWeb can be access using Chrome, Firefox, or Internet Explorer. The operating system, security software, and computer settings may display GenWeb slightly differently on the various versions of each browser. If there is an issue with the rendering of the pages in GenWeb™, try a different browser.
<input type="checkbox"/>	General hand tools for installation: Wrenches, nut drivers, assortment of screwdrivers, pliers, etc.
<input type="checkbox"/>	If the generator is to be anchored to the floor, suitable tools (i.e. drill, drill bits, etc) and mounting hardware must be available.
<input type="checkbox"/>	A supply of connectors for wiring: terminal lugs, caps, splices etc.
<input type="checkbox"/>	A calibrated DVM that indicates true RMS voltages.
<input type="checkbox"/>	Dual trace memory oscilloscope with a minimum 20 MHz bandwidth; appropriate leads, probes, etc.
<input type="checkbox"/>	Device for measuring true kVp. This may be a Dynalyzer equivalent or a non-invasive meter such as the Keithley TRIAD system.
<input type="checkbox"/>	A calibrated radiation meter with detectors that will allow for uGy and Gy/min measurements.
<input type="checkbox"/>	A suitable mA / mAs meter.
<input type="checkbox"/>	A strobe or reed type tachometer to verify that the anode is rotating up to speed.
<input type="checkbox"/>	A sufficient selection of absorbers to allow AEC calibration if this option is fitted. A suggested selection is Lexan in thickness of 5.0, 10.0, and 15.0 cm or a plastic container with uniform density that has a flat bottom and can be filled up to 15.0 cm in height with water.
<input type="checkbox"/>	Test phantoms to verify the imaging systems (if applicable) with the generator.
<input type="checkbox"/>	High voltage grease for the HV cable terminations.

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1C.7.2 Site Logistics

Before starting the generator installation, review the following checklist.

CHECK ✓	DESCRIPTION
	Is there an unloading area to transport the generator from the delivery truck to the inside of the building?
	If the installation is not on the same floor as the delivery entrance, is there an elevator available?
	Is there a transport dolly or similar device to move the generator?
	Do any regulatory bodies need to be notified before installation?
	If movers are required, have arrangements for time and equipment been completed?
	Are lifting straps or some other suitable device available to lift the generator off the shipping pallet?

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1C.8.0 REVISION HISTORY

The following table provides a revision history of the updates made to chapter 1C.

Revision History for Chapter 1C		
Rev	Description	Date
L	Updated sections 1C.2.0 & 1C.2.6 with information regarding the de-rating of the generator power.	Jan. 04, 2021

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