

CHAPTER 1C

PREPARING FOR INSTALLATION

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1C.1.0 INTRODUCTION

The following items must be considered before installing your generator:

- 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: tables, Buckys, X-ray tubes etc.

1C.2.0 GENERATOR POWER REQUIREMENTS

NOTE: *50 kW AND HIGHER THREE-PHASE INDICO 100 GENERATORS ARE AVAILABLE IN 400 VAC AND 480 VAC MODELS. 400 VAC MODELS MUST BE OPERATED FROM 400 VAC MAINS, OR MAY BE OPERATED FROM 480 VAC MAINS WITH AN OPTIONAL LINE ADJUSTING TRANSFORMER. 480 VAC MODELS MUST BE OPERATED FROM 480 VAC MAINS (THESE ARE THE NOMINAL MAINS VOLTAGES, THE ALLOWED TOLERANCES ARE AS DETAILED IN THE PREVIOUS TABLES).*

1C.2.1 32 kW Single Phase

Line Voltage	230 VAC ± 10%, 1~.
Line Frequency	50/60 Hz.
Momentary Current	200 Amps.
Nominal Current *	5 Amps.

1C.2.2 40 kW Single Phase

Line Voltage	230 VAC ± 10%, 1~.
Line Frequency	50/60 Hz.
Momentary Current	250 Amps.
Nominal Current *	5 Amps.

1C.2.3 32 kW Three Phase

Line Voltage	400 VAC ± 10%, 3~. 480 VAC ± 10%, 3~ with optional line adjusting transformer.
Line Frequency	50/60 Hz.
Momentary Current	65 Amps/phase at 400 VAC. 55 Amps/phase at 480 VAC.
Nominal Current *	5 Amps.

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1C.2.4 40 kW Three Phase

Line Voltage	400 VAC \pm 10%, 3~. 480 VAC \pm 10%, 3~ with optional line adjusting transformer.
Line Frequency	50/60 Hz.
Momentary Current	80 Amps/phase at 400 VAC. 65 Amps/phase at 480 VAC.
Nominal Current *	5 Amps.

1C.2.5 50 kW Three Phase

Line Voltage	400 VAC \pm 10%, 3~ (for 400 VAC input generators). 480 VAC \pm 10%, 3~ with optional line adjusting transformer, (for 400 VAC input generators). 480 VAC \pm 10%, 3~ (for 480 VAC input generators). SEE NOTE IN SECTION 1C.2.0.
Line Frequency	50/60 Hz.
Momentary Current	100 Amps/phase at 400 VAC. 80 Amps/phase at 480 VAC.
Nominal Current *	5 Amps.

1C.2.6 65 kW Three Phase

Line Voltage	400 VAC \pm 10%, 3~ (for 400 VAC input generators). 480 VAC \pm 10%, 3~ with optional line adjusting transformer, (for 400 VAC input generators). 480 VAC \pm 10%, 3~ (for 480 VAC input generators). SEE NOTE IN SECTION 1C.2.0.
Line Frequency	50/60 Hz.
Momentary Current	125 Amps/phase at 400 VAC. 105 Amps/phase at 480 VAC.
Nominal Current *	5 Amps.

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1C.2.7 80 kW Three Phase

Line Voltage	400 VAC \pm 10%, 3~ (for 400 VAC input generators).
	480 VAC \pm 10%, 3~ with optional line adjusting transformer, (for 400 VAC input generators).
	480 VAC \pm 10%, 3~ (for 480 VAC input generators).
	SEE NOTE IN SECTION 1C.2.0.
Line Frequency	50/60 Hz.
Momentary Current	155 Amps/phase at 400 VAC. 130 Amps/phase at 480 VAC.
Nominal Current *	5 Amps.

1C.2.8 100 kW Three Phase

Line Voltage	400 VAC \pm 10%, 3~ (for 400 VAC input generators).
	480 VAC \pm 10%, 3~ with optional line adjusting transformer, (for 400 VAC input generators).
	480 VAC \pm 10%, 3~ (for 480 VAC input generators).
	SEE NOTE IN SECTION 1C.2.0.
Line Frequency	50/60 Hz.
Momentary Current	195 Amps/phase at 400 VAC. 160 Amps/phase at 480 VAC.
Nominal Current *	5 Amps.

* Nominal Current = Standby current + the current drain in continuous-fluoro or pulsed-fluoro modes (R&F generators) or standby current only (rad-only generators). External or installer-supplied equipment connected to the generator may increase the nominal current beyond the values shown.

1C.2.9 Service Disconnect (All Models)

Refer to the following table for the recommended service disconnect ratings for the Generators (Power Supplies).

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1C.3.0 POWER LINE REQUIREMENTS

The following table defines the power line requirements for the generators.

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 THE RATINGS LISTED 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

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
32 kW 1Ø Generator						
230 VAC	#2 (33 mm ²)	200 A	120 A	50 kVA	#2 (33 mm ²)	0.055 Ω
40 kW 1Ø Generator						
230 VAC	#2 (33 mm ²)	250 A	120 A	65 kVA	#2 (33 mm ²)	0.045 Ω
32 kW 3Ø Generator						
400 VAC	#6 (13.3 mm ²)	65 A	100 A	45 kVA	#6 (13.3 mm ²)	0.27 Ω
480 VAC	#6 (13.3 mm ²)	55 A	100 A	45 kVA	#6 (13.3 mm ²)	0.40 Ω
40 kW 3Ø Generator						
400 VAC	#6 (13.3 mm ²)	80 A	100 A	55 kVA	#6 (13.3 mm ²)	0.22 Ω
480 VAC	#6 (13.3 mm ²)	65 A	100 A	55 kVA	#6 (13.3 mm ²)	0.32 Ω

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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
50 kW 3Ø Generator						
400 VAC	#6 (13.3 mm ²)	100 A	100 A	65 kVA	#6 (13.3 mm ²)	0.17 Ω
480 VAC	#6 (13.3 mm ²)	80 A	100 A	65 kVA	#6 (13.3 mm ²)	0.24 Ω
65 kW 3Ø Generator						
400 VAC	#6 (13.3 mm ²)	125 A	100 A	85 kVA	#6 (13.3 mm ²)	0.13 Ω
480 VAC	#6 (13.3 mm ²)	105 A	100 A	85 kVA	#6 (13.3 mm ²)	0.19 Ω
80 kW 3Ø Generator						
400 VAC	#6 (13.3 mm ²)	155 A	100 A	105 kVA	#6 (13.3 mm ²)	0.10 Ω
480 VAC	#6 (13.3 mm ²)	130 A	100 A	105 kVA	#6 (13.3 mm ²)	0.15 Ω
100 kW 3Ø Generator						
400 VAC	#4 (21 mm ²)	195 A	100 A	130 kVA	#4 (21 mm ²)	0.09 Ω
480 VAC	#6 (13.3 mm ²)	160 A	100 A	130 kVA	#6 (13.3 mm ²)	0.12 Ω

- All wiring and grounding must comply with local electrical codes.
- All wiring must be copper.
- The disconnect switch shall be located within reach of the operator.

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1C.4.0 GROUND REQUIREMENTS

POWER LINE:

- A suitable ground must be connected from the disconnect switch to the main ground on the generator, located to the left of the main fuse block on the power input board. The ground wire is typically part of the line cord, and the current capacity of the ground conductor must normally 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 must carry fault currents only.

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 ground stud (located at the top of the HV module).

X-ray Stator Drive Cable Requirements

The X-ray stator cable used with the dual speed starter 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, do not connect the shield ground to the tube housing ground.

- 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: If a longer cable is necessary with total cable capacitance over 5.1 nF, consult the cable manufacturer.

STATOR CABLE:

- For units with a low speed starter, shielded stator cables are recommended. For units with a dual speed starter, shielded stator cables **MUST** be used.
The shield for the stator cable(s) must be properly grounded at both the tube and the generator ends of the cable(s).

1C.5.0 OUTLINE DRAWINGS

1C.5.1 Generator Outline

Refer to chapter 1A for the Indico 100 generator outline.

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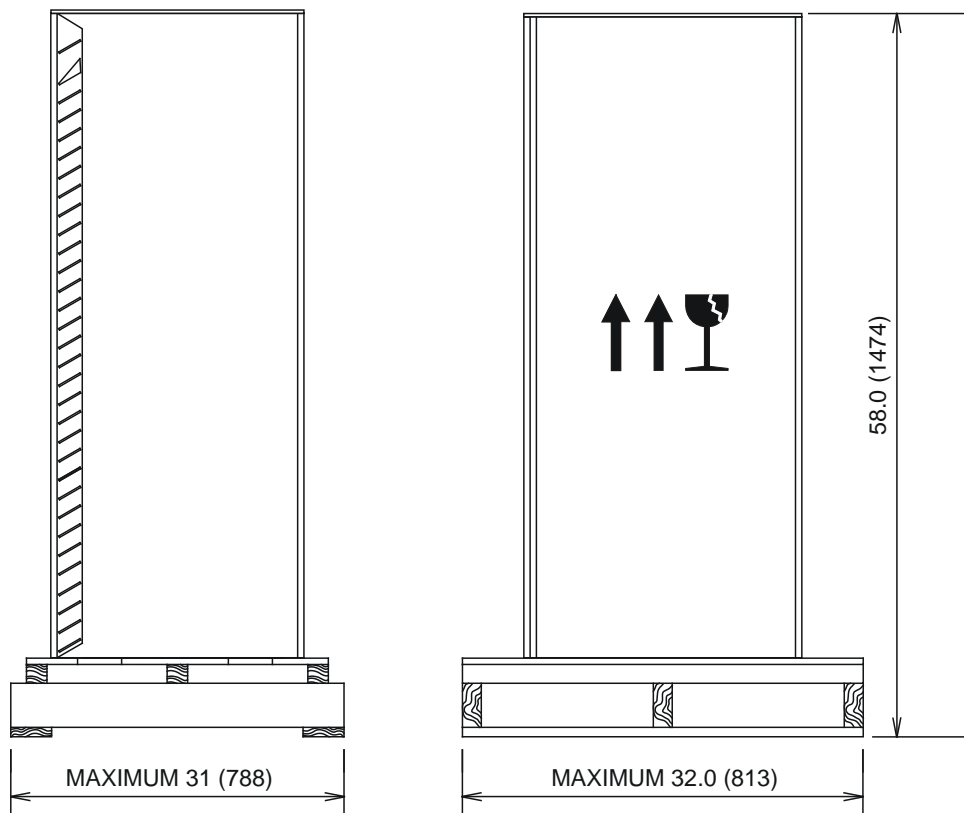
1C.5.2 Generator Weight

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

Generator cabinet including the HV module	217 lbs (98.6 kg).
HV module	Steel: 66 lbs (30 kg). Spun Aluminum: 48 lbs (22 kg).
Control console (23 X 56 cm)	7 lbs (3.2 kg).
Control console (31 X 42 cm)	8 lbs (3.7 kg).
Control console (Rad only)	6 lbs (2.7 kg).
Control console (15 in. / 38.5 cm. Touch screen)	18 lbs (8.2 kg) - with base 10 lbs (4.5 kg) - without base.

1C.5.3 Generator Shipping Containers: Dimensions

The overall dimensions of the Indico 100 shipping pack are shown below.



DIMENSIONS ARE IN INCHES (MM)

IN_PACK.CDR

Figure 1C-1: Generator shipping container

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1C.6.0 LOCATING THE GENERATOR CABINET AND CONTROLLER

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

- The floor must be flat and level.
- The floor must be capable of supporting a load of approximately 250 lbs (115 Kg).
- The generator installation area must be clean and free of dirt or debris.
- Sufficient room must be provided to allow access to the rear and side panels for installation. Clearance must also be provided at both sides of the cabinet, at the front, and at the rear of the upper cabinet to allow access for service. See Figure 1C-2 for recommended clearances.
- A cable conduit should be provided from the control console to the generator cabinet to allow routing of the control cable if required. Allow for a 2 inch conduit. See Figure 1C-3.
- Refer to 1C.6.2 for the seismic center location and for the mounting-hole locations to secure the generator to the floor, if required.

1C.6.1 Locating The Equipment In The X-Ray Room

Figure 1C-2 shows recommended clearances around the generator. Figure 1C-3 shows recommended clearances for through-the-wall cable routing.

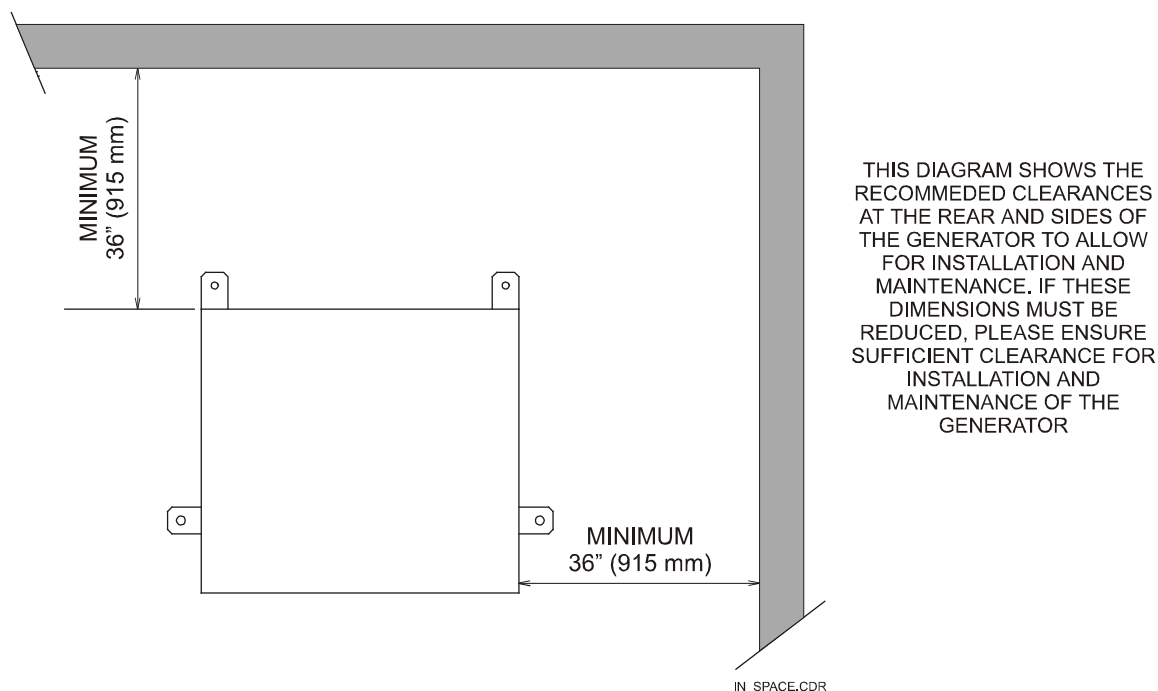


Figure 1C-2: Generator clearances

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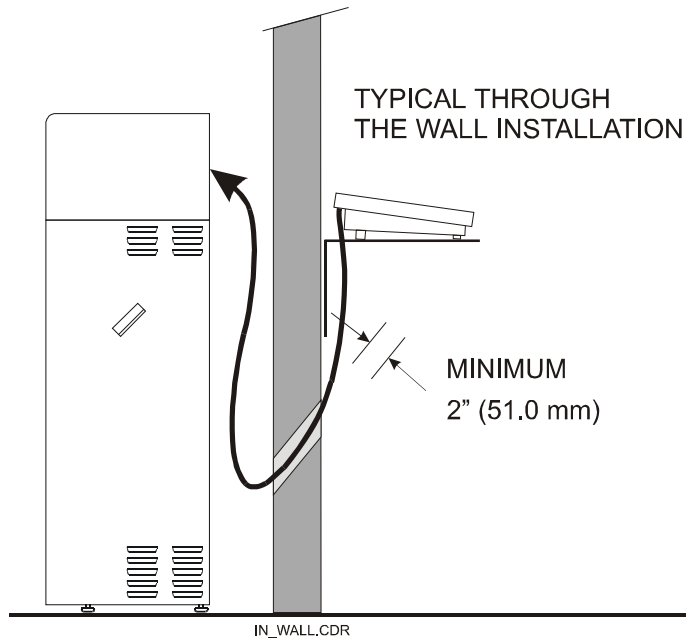


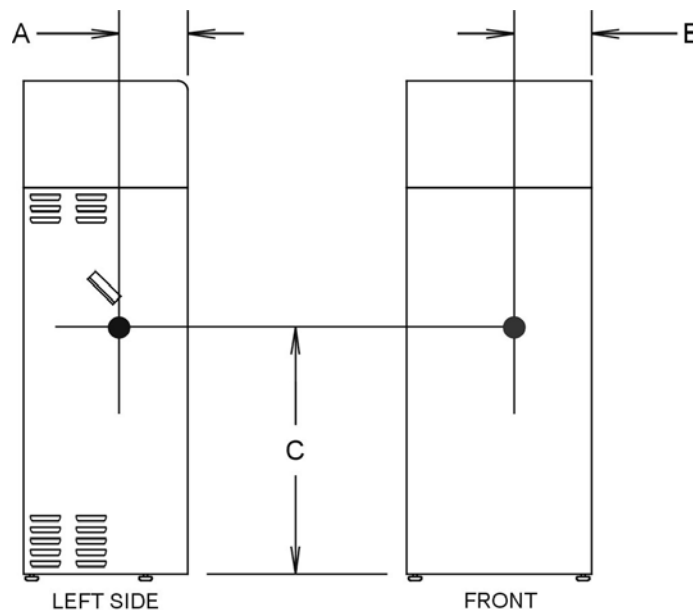
Figure 1C-3: Typical through the wall installation.

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1C.6.2 Seismic Centers and mounting hole locations

Figure 1C-4 shows the seismic center location for the Indico 100 X-ray generator. The dimensions are shown as a range of values because the seismic center location will vary slightly, depending on model and configuration of the generator. The installer will need to confirm the exact seismic center location if the published range is insufficiently precise.

The generator should be secured to the floor via the 5/8 inch (16 mm) diameter clearance holes that are located in the base of the cabinet as shown in figure 1C-6, or by means of the anchoring plates shown in figure 1C-5.



DIMENSION	VALUE
A	8.4 - 8.5 (213 - 216)
B	9.4 - 10.0 (238 - 254)
C	19.8 - 20.8 (502 - 527)

DIMENSIONS ARE IN INCHES (MM)

INDICO 100 SEISMIC.CDR

Figure 1C-4: Indico 100 seismic centers

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1C.6.2 Seismic Centers and mounting hole locations (Cont)

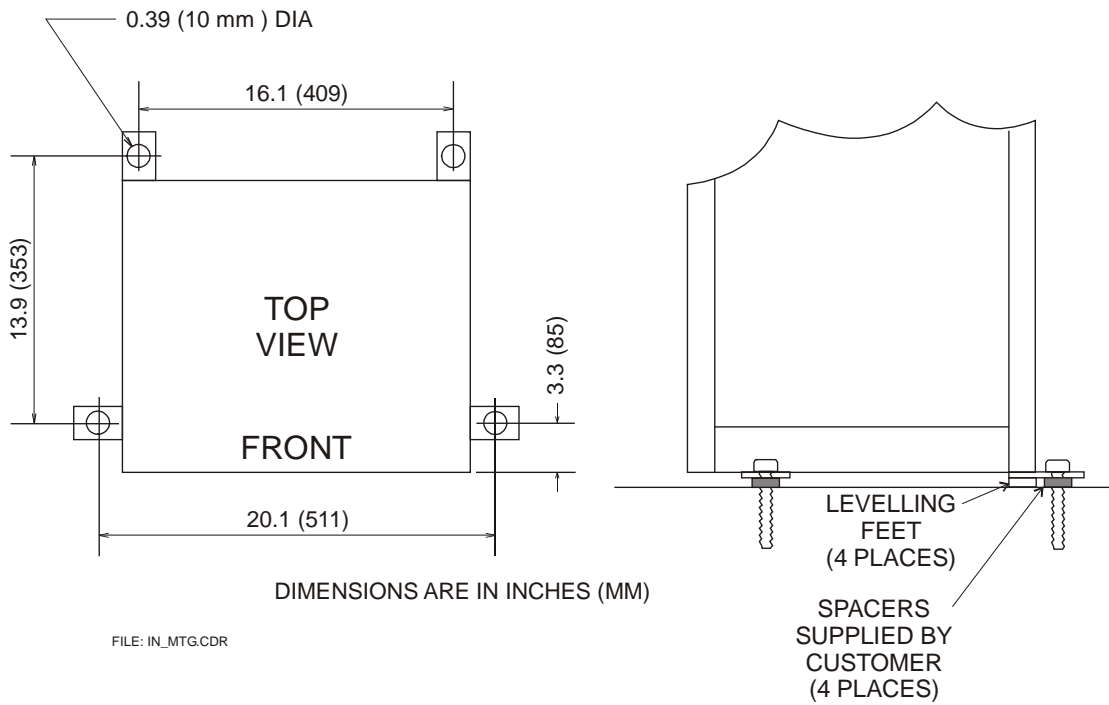


Figure 1C-5: Anchoring plates for securing the generator

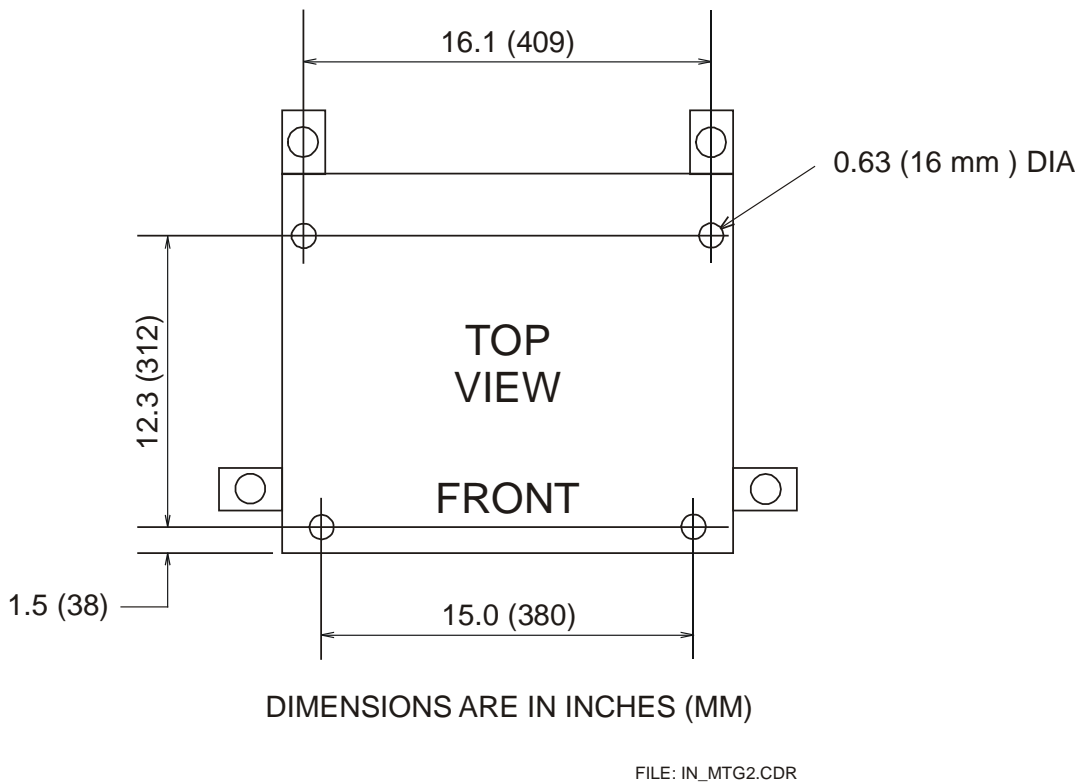


Figure 1C-6: Holes in base of cabinet for securing the generator

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1C.7.0 ENVIRONMENTAL REQUIREMENTS

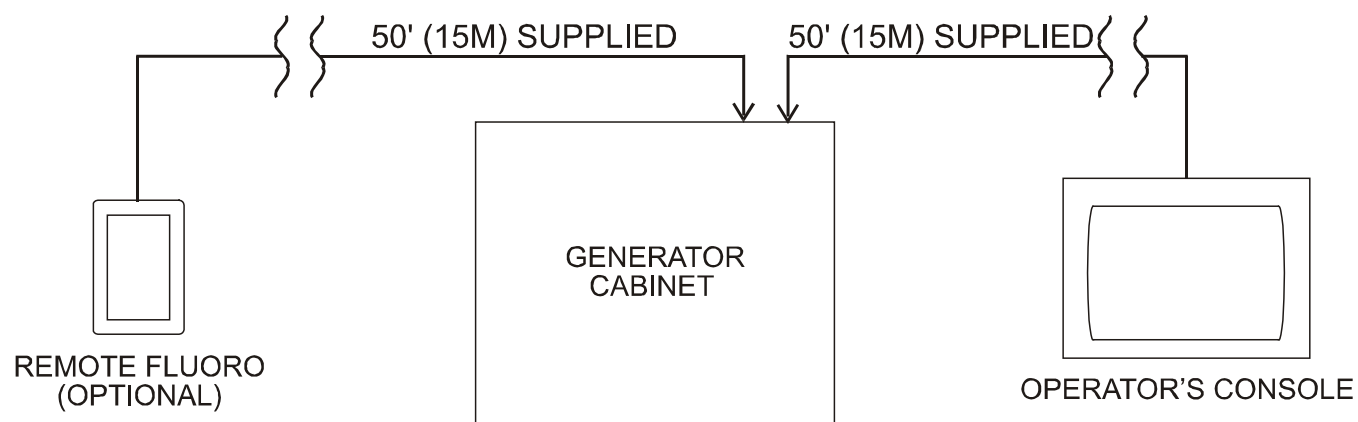
Listed below are the ventilation requirements for the Indico 100 series generator:

- Unrestricted air flow must be provided at the front and sides of the cabinet, as well as underneath the unit.
- Do not allow storage on top of the cabinet.
- Typical heat output of the generator during stand-by is 75 BTU/hr, or 4000 BTU/hr during fluoro operation.
- Control console heat output is negligible (150 BTU/hr).

1C.8.0 CABLES SUPPLIED WITH THE INDICO 100 GENERATOR

Figure 1C-7 shows the cabling supplied with the generator:

- The cable supplied for the console is a 15 conductor cable with a standard length of 50 ft. (15 m).
- The cable supplied for the optional remote fluoro control is a 9 conductor cable with a standard length of 50 ft. (15 m).



ML-CBLS.CDR

Figure 1C-7: Cabling supplied with generator

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1C.9.0 PRE-INSTALLATION CHECK LISTS

The following checklists are provided to help the installer during a pre-installation site visit, prior to installing the generator:

- Site logistics
- Installation equipment

1C.9.1 Site Logistics

Before starting the generator installation, review the following checklist for site logistics.

CHECK <input type="checkbox"/>	DESCRIPTION
<input type="checkbox"/>	Is there an unloading area to transport the generator from the delivery truck to the inside of the building?
<input type="checkbox"/>	If the installation is not on the same floor as the delivery entrance, is there an elevator available?
<input type="checkbox"/>	Are all halls and doorways large enough to allow the generator to pass through?
<input type="checkbox"/>	Is there a transport dolly or similar device to move the Generator? It must have a minimum rating of 350 lb. (160 Kg.)
<input type="checkbox"/>	Do any regulatory bodies need to be notified prior to installation?
<input type="checkbox"/>	If movers are required, have arrangements for time and equipment been completed?
<input type="checkbox"/>	Are lifting straps or some other suitable device available to lift the generator off the shipping pallet?

1C.9.2 Installation Equipment

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

NOTE: Please note that for membrane consoles GenWare® and a laptop are required for programming and calibration of the generator. Embedded GenWare® may be used when programming and calibrating via the touchscreen console, this can be accessed directly from the System Utilities menu. Refer to chapter 3C for details.

CHECK <input type="checkbox"/>	DESCRIPTION
<input type="checkbox"/>	GenWare® for setup and calibration using a membrane consoles if required. Embedded GenWare® may be used when calibrating and programming using a touchscreen console.
<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 hardware and drills, drill bits etc must be available.
<input type="checkbox"/>	A supply of connectors for wiring: lugs, caps, line splices etc.
<input type="checkbox"/>	A calibrated DVM which 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 X-ray true kVp and mA (mAs). An invasive meter is required, however if this is not possible, a non-invasive meter may be acceptable. The use of non-invasive meter requires extra precautions in order to read accurate kV. For more information, refer to application note for using non-invasive meter in kV measurement, 906930.
<input type="checkbox"/>	A calibrated radiation meter with detectors that will allow for R/min and uR type measurements (or uGy and Gy/min).
<input type="checkbox"/>	A strobe or reed type tachometer to verify that the anode is rotating up to speed.

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1C.9.2 Installation Equipment

CHECK ✓	DESCRIPTION
	A sufficient selection of absorbers to allow AEC and ABS calibration if applicable. A suggested selection is Lexan in thickness of 5.0, 10.0, and 15.0 cm, or water in plastic containers of homogenous density in thickness of 5.0, 10.0, and 15.0 cm.
	Test phantoms to verify the imaging system with the generator.

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