

CHAPTER 1

PRE-INSTALLATION

1.0 INTRODUCTION

1.1 Purpose

This manual applies to the Indico 100 family of generators and provides instructions for the installation and maintenance of all models of that generator.

This Chapter contains the following sections.

SECTION	TITLE
1A	Introduction
1B	Safety
1C	Preparing for installation
1D	Compatibility listing
1E	Generator layout and Major Components

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CHAPTER 1A

INTRODUCTION

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1A.1.0 INTRODUCTION**1A.1.1 Purpose**

This manual provides instructions for the installation and service of Indico 100 X-ray generators.

1A.2.0 GENERATOR DESCRIPTION

Depending on configuration and options, the generator provides the power and interfacing to operate X-ray tubes, Buckys, Rad tables, GI (gastro-intestinal) tables, remote R&F tables, tomographic devices, and digital imaging systems. The generator consists of power supply and control systems housed in the upper and lower cabinets, a control console, and an optional remote fluoro control along with the necessary interconnecting cable(s).

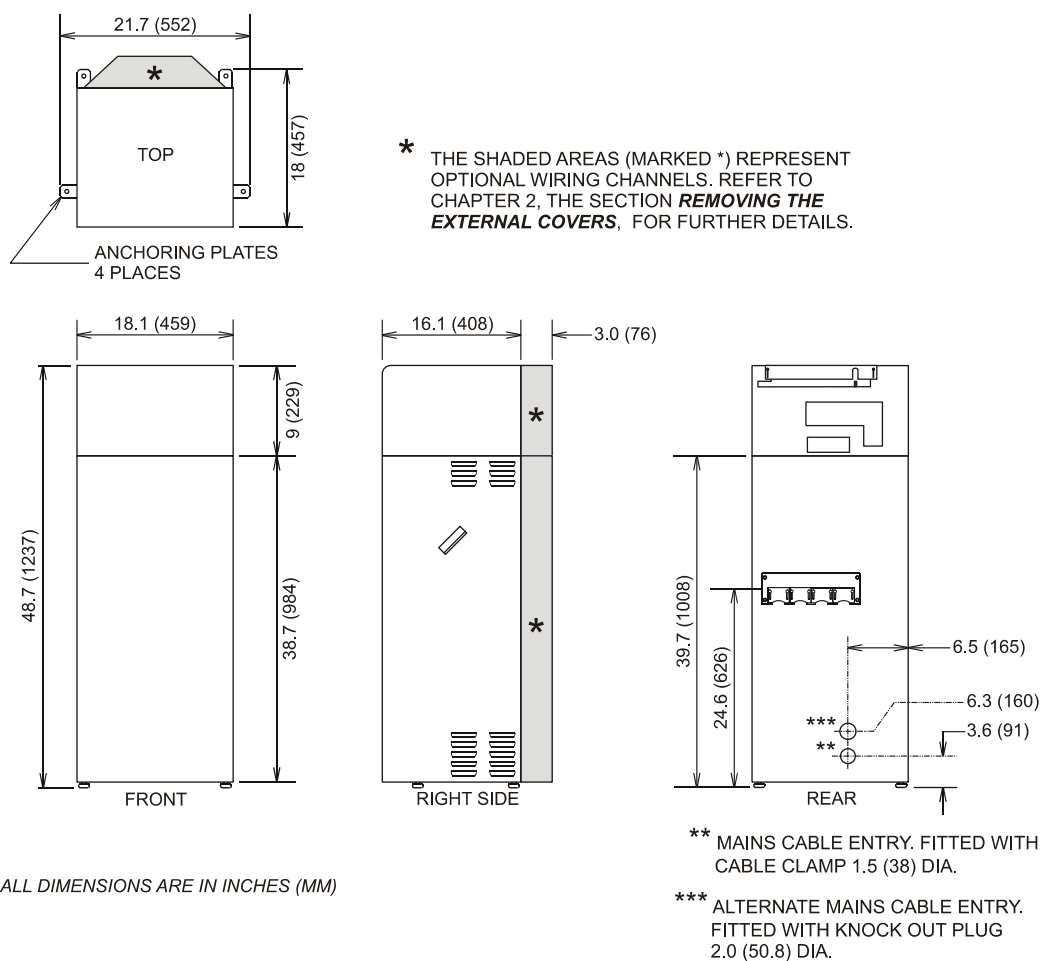
Major items provided are:

- X-ray generator housed in upper and lower cabinets.
- Control console.
- Optional remote fluoro control.
- Interconnecting cable(s).
- Operator's manual.
- Service and installation manual.

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1A.3.0 PHYSICAL SPECIFICATIONS

Figure 1A-1 shows the outline of the Indico 100 X-ray generator main cabinet. Figure 1A-2 shows the outline of the available control consoles, and the remote fluoro control.



AN OPTIONAL LINE-ADJUSTING TRANSFORMER IS AVAILABLE THAT MOUNTS ON THE BOTTOM OF THE GENERATOR CABINET. THIS TRANSFORMER HAS THE SAME WIDTH AND DEPTH AS THE GENERATOR CABINET, AND A HEIGHT OF APPROXIMATELY 8.1 INCHES (206 mm).

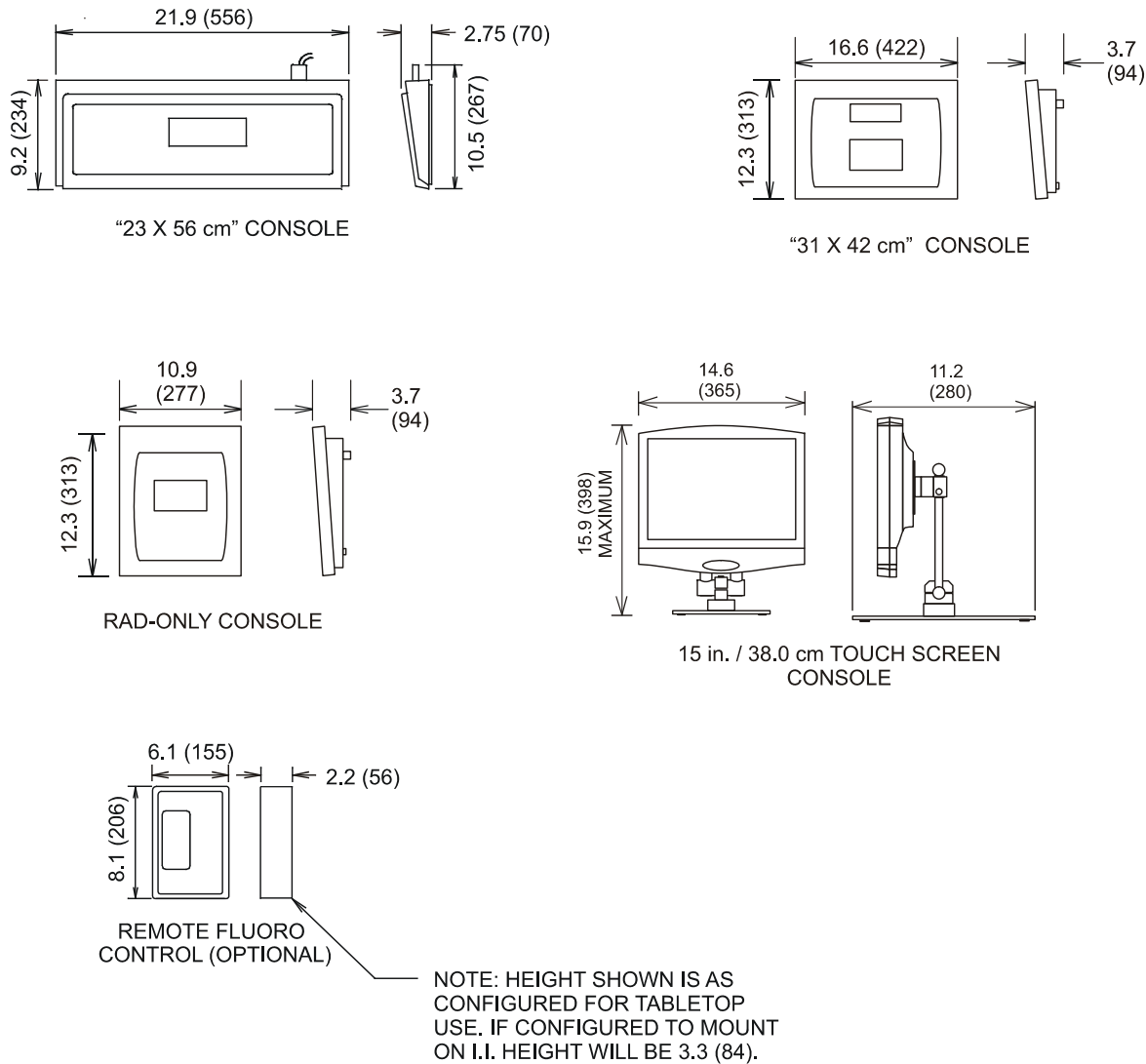
IN_OL.CDR

Figure 1A-1: Generator outline drawing

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1A.3.0 PHYSICAL SPECIFICATIONS (CONT)

Figure 1A-2 shows the outline of the Indico 100 control consoles, and the remote fluoro control.



ALL DIMENSIONS ARE IN INCHES (MM)

IND_CONSOLES.CDR

Figure 1A-2: Console / remote fluoro control outline drawing

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1A.4.0 APPLICATIONS**RAD SYSTEMS:**

- Bucky table, tabletop and off-table radiography.
- Vertical bucky/cassette radiography.
- Conventional tomography.

R&F SYSTEMS:

- Fluoroscopic and spot film applications.
- Tomography with conventional and/or remote R&F tables.
- Optional digital compatible.
- Optional high-level fluoro for therapy simulators (Indico 100).

1A.5.0 FEATURES

- High frequency generator.
- One or two tube operation, Rad or Rad / Fluoro.
- Single or dual filament supplies.
- Low speed or dual speed X-ray tube stator supply.
- Optimal matching of X-ray tubes by PROMs.
- Repetitive self checks of generator functions, provides display of system faults and operating errors.
- Optional AEC, up to four inputs.
- Optional ABS with kV or kV/mA fluoro stabilizer.
- Optional remote fluoro control box for tabletop use or SFD mounting.
- Optional Dose-Area Product (DAP) display.
- X-ray Tube protection. The generator allows setting the following limits:
 - a) Maximum mA, adjustable for each focal spot.
 - b) Maximum kV, adjustable for each X-ray tube.
 - c) Maximum kW, adjustable for each focal spot.
 - d) Maximum filament current limit, adjustable for large and small focal spots.
 - e) Anode heat warning and anode heat alarm levels.
- Calibration features:
 - a) Microprocessor design allows all calibration and programming to be performed via the console.
 - b) mA calibration is automated.
- Messages and diagnostic information: For users and service personnel, the generator console displays various messages indicating status or equipment problems. The user is prompted in case of errors.
- Error log stores last 200 errors and associated generator settings.
- Service and diagnostic information available via a laptop computer (optional).
- KV range: Radiography 40 to 150 kV.
Fluoroscopy 40 to 125 kV.
- mA range: Radiography 10 to 320 mA (30 kW), 10 to 400 mA (32 kW),
10 to 500 mA (40 kW), 10 to 630 mA (50 kW), 10 TO 800 mA (65 kW)
and 10 to 1000 mA (80 and 100 kW).
Fluoroscopy 0.5 to 10 mA, 0.5 to 20 mA with optional high-level fluoroscopy.
Normal and high-level pulsed fluoroscopy 5 to 80 mA.

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1A.5.0 FEATURES (Cont)

- mAs range: Tube dependent, max 1000 mAs.
- Time range: Radiography 1.0 to 6300 ms.
Fluoroscopy 0 to 5 or 0 to 10 minutes.

Refer to the compatibility statement (end of section 1D) for compatibility and features of this specific generator.

1A.6.0 ROTOR CONTROL

The generator will be equipped with a low speed starter, or optional dual speed starter.

DUAL SPEED STARTER

Number of tubes permissible:	Maximum of 32 tube types. Tube type is switch selectable
Current monitoring	Both stator circuits
Dual speed starter output frequency	50 or 60 Hz (low speed) 150 or 180 Hz (high speed). (Independent of line frequency)
Braking	Dynamic braking when in high speed rotation
Rotor boost time	Determined by tube selection plus incremental boost time changes from 100 to 700 msec.
Duty cycle	Not to exceed 2 high speed starts per minute.

LOW SPEED STARTER

Current monitoring	Both stator circuits
Duty cycle	Not to exceed 5 consecutive boosts, followed by a minimum 10 second wait period.

1A.7.0 AUXILIARY POWER OUTPUTS

The generator supplies the following power outputs for X-ray room equipment:

- 24 VDC, 4 Amp.
- 120 VAC, 2.5 Amp.
- 240 VAC, 1.5 Amp.

2.5 AMPS IS AVAILABLE AT 120 VAC OR 1.5 AMPS IS AVAILABLE AT 240 VAC, BUT BOTH ARE NOT AVAILABLE SIMULTANEOUSLY.

The above voltage sources are not compatible with:

- Collimator lamps (24 VAC 150 watts). These lamps are not compatible with the 24 VDC supply.
- Fluorescent lamps. These have high starting currents and generate transients when the tube strikes.
- Some inductive loads may cause difficulties (some motors and solenoids).

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1A.8.0 SYSTEM DOCUMENTATION

The Indico 100 series of X-ray generators includes the following documentation:

- Operator's manual.
- Service and installation manual.
- Supplements and application notes as required.

1A.9.0 REGULATORIES AND DESIGN STANDARDS

1A.9.1 Environmental Specifications

OPERATING

Ambient temperature range	10 to 40 °C (50 to 104 °F).
Relative humidity	20 to 80%, non-condensing.
Altitude	-700 to 3000 meters (1100 to 700 hPa, 825 to 525 mm Hg).

TRANSPORT AND STORAGE

Ambient temperature range	-25 to 70 °C (-13 to 158 °F)..
Relative humidity	5 to 95%, non-condensing.
Atmospheric pressure range	-700 to 3000 meters (1100 to 700 hPa, 825 to 525 mm Hg).

- Long-term storage over 40 °C will reduce the service life of electrolytic capacitors in the generator.
- The membrane control console is limited to a minimum temperature of -20°C, with a maximum duration of 48 hours at that temperature. Transport and storage is limited to a maximum duration of 120 hours between 50 and 70 °C, with an absolute humidity not to exceed the humidity of 85% RH at 50 °C.
- Touchscreen console temperatures below -20°C and above +50°C are limited to 10 days maximum duration, with a humidity not exceeding 50 % RH.

1A.9.2 Applicable Standards

A) SAFETY

The Indico 100 family of generators complies with the following regulatory requirements and design standards:

- FDA Center for Devices & Radiological Health (CDRH) - 21 CFR title 21 subchapter J (USA).
- Radiation Emitting Devices Act - C34 (Canada).
- Medical Device Regulations (Canada).
- EC Directive 93/42/EEC concerning Medical Devices (European Community).
- EN 60601-1/IEC 60601-1, EN 60601-2-7/IEC 60601-2-7, CSA 601.1, UL60601.1
 - Type of protection against electric shock: Class I equipment.
 - Degree of protection against electric shock: Not classified.
 - Degree of protection against harmful ingress of water: Ordinary equipment.
 - Mode of operation: Continuous operation with intermittent loading (standby - exposure).
 - Equipment not suitable for use in presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
- EN 60601-1-4/IEC 60601-1-4, EN ISO 14971.

NOTE: All referenced standards are considered to be at the latest adopted revision.

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1A.9.2 Applicable Standards (con't)



The CE Mark is a declaration by the manufacturer that the product complies with the requirements of the applicable European Union (EU) medical device directive and that the product has been subject to conformity assessment procedures as provided in that directive.



A CSA mark with the indicators "C" and "US" means that product is certified for both the U.S. and Canadian markets, to the applicable U.S. and Canadian standards.


B) EMC (EN 60601-1-2:2001/IEC 60601.1.2:2001)

Guidance and manufacturer's declaration – electromagnetic emissions		
The VZW2930 series of X-ray generators are intended for use in the electromagnetic environment specified below. The customer or the user of the VZW2930 series should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The VZW2930 series of X-ray generators use RF energy only for their internal functions. Therefore, the RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A (The VZW2930 series of X-ray generators in combination with shielded location)	The VZW2930 series of X-ray generators must be used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that exits the shielded location, a minimum RF filter attenuation of 40dB from 30 MHz to 230 MHz and 47dB from 230 MHz to 1 GHz. (The minimum at 30 MHz is 40dB and the minimum at 230 MHz is 47dB).
Harmonic emissions IEC 61000-3-2	Not Applicable	The VZW2930 series is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not Applicable	
NOTE It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specifications.		

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Guidance and manufacturer's declaration – electromagnetic immunity			
The VZW2930 series of X-ray generators are intended for use in the electromagnetic environment specified below. The customer or the user of the VZW2930 series should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruption, and voltage variations on power supply input lines IEC 61000-4-11	$< 5\% U_T$ (> 95 % dip in U_T) for 0.5 cycle $40\% U_T$ (60 % dip in U_T) for 5 cycles $70\% U_T$ (30 % dip in U_T) $< 5\% U_T$ (> 95 % dip in U_T) for 5 s	$< 5\% U_T$ (> 95 % dip in U_T) for 0.5 cycle $40\% U_T$ (60 % dip in U_T) for 5 cycles $70\% U_T$ (30 % dip in U_T) $< 5\% U_T$ (> 95 % dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the VZW2930 series X-ray generator requires continued operation during power mains interruptions, it is recommended that the X-ray generator be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment
NOTE: U_T is the A.C. mains voltage prior to application of the test level.			

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Guidance and manufacturer's declaration – electromagnetic immunity			
The VZW2930 series of X-ray generators are intended for use in the electromagnetic environment specified below. The customer or the user of the VZW2930 series should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 V _{rms} 150 kHz to 80MHz	3 V _{rms} 150 kHz to 80MHz	The VZW2930 series of X-ray generators must be used only in a shielded location with a minimum RF shielding effectiveness and, for each cable that enters the shielded location, a minimum RF filter attenuation of 40dB from 30 MHz to 230 MHz and 47dB from 230 MHz to 1 GHz. (The minimum at 30 MHz is 40dB and the minimum at 230 MHz is 47dB.) Field strengths outside the shielded location from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than 3 V/m. ^a Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80MHz to 2.5 GHz	3 V/m 80MHz to 2.5 GHz	
NOTE 1 These guidelines may not apply all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
NOTE 2 It is essential that the actual shielding effectiveness and filter attenuation of the shielded location be verified to assure that they meet the minimum specification.			
^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the VZW2930 series of X-ray generators is used exceeds the applicable RF compliance level above, the X-ray generator should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the X-ray generator.			

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1A.9.3 Electromagnetic Compatibility (EMC)

In accordance with the intended use, this X-ray generator complies with the European Council Directive concerning Medical Devices. The CE marking affixed to this product signifies this. One of the harmonized standards of this Directive defines the permitted levels of electromagnetic emission from this equipment and its required immunity from the electromagnetic emissions of other devices.

It is not possible, however, to exclude with absolute certainty the possibility that other high frequency electronic equipment, which is fully compliant to the EMC regulations, will not adversely affect the operation of this generator. If the other equipment has a comparatively high level of transmission power and is in close proximity to the generator, these EMC concerns (the risk of interference) may be more pronounced. It is therefore recommended that the operation of equipment of this type such as mobile telephones, cordless microphones and other similar mobile radio equipment be restricted from the vicinity of this X-ray generator.

1A.9.4 RoHS Compliance

Indico 100

产品中有毒有害物质或元素的名称及含量
Table of hazardous substances' name and concentration.

部件名称 Component Name	有毒有害物质或元素 Hazardous substances' name					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
Generator	X	O	O	X	O	O
Console	X	O	O	X	O	O
<p>O: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下 X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求</p> <ul style="list-style-type: none"> 此表所列数据为发布时所能获得的最佳信息 由于缺少经济上或技术上合理可行的替代物质或方案, 此医疗设备运用以上一些有毒有害物质来实现设备的预期临床功能, 或给人员或环境提供更好的保护效果。 <p>O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006. X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.</p> <ul style="list-style-type: none"> Data listed in the table represents best information available at the time of publication Applications of hazardous substances in this medical device are required to achieve its intended clinical uses, and/or to provide better protection to human beings and/or to environment, due to lack of reasonably (economically or technically) available substitutes. 						

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1A.10.0 TECHNIQUE FACTORS DEFINITIONS

- **KV:** KV peak after any initial kV overshoot.
- **TIME:** Time in milliseconds, (ms) that the high voltage (anode to cathode) is greater than or equal to 75% of the desired **kV**.
- **mA:** Average tube current (in mA) during the exposure time.
- **mAs** milliampere-seconds (**mA x TIME**).

1A.11.0 RUNTIME LICENSE AGREEMENT (TOUCHSCREEN CONSOLE)**User / End User License Agreement**

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8. Should you have questions regarding the use of the Software, please contact support@cmp.cpii.com.

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Address any questions regarding X-ray generator operation to:

Mail: Customer Support Department
Communications and Power Industries Canada Inc.
45 River Drive
Georgetown, Ontario, Canada L7G 2J4

Telephone: (905) 877-0161

Fax: (905) 877-8320
Attention: Customer Support Department

E-mail: marketing@cmp.cpii.com
Attention: Customer Support Department

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CHAPTER 1B

SAFETY

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1B.1.0 INTRODUCTION

This section contains important safety warnings and safety information required for installing and servicing the generator.

1B.2.0 SAFETY AND WARNING SYMBOLS

The following advisory symbols are used on the safety warning labels, and/or on circuit boards, and/or on the operator console and the optional remote fluoro control.

	High voltage symbol used to indicate the presence of high voltage.
	Warning symbol used to indicate a potential hazard to operators, to service personnel, or to the equipment. It indicates a requirement to refer to the accompanying documentation for details.
	Radiation exposure symbol used on operator console. Lights to indicate that an exposure is in progress. This is accompanied by an audible tone from the console.
	Fluoro radiation exposure symbol used on operator console and on optional remote fluoro control unit. Lights to indicate that a fluoro exposure is in progress. This is accompanied by an audible tone from the console.
WARNING <i>THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR UNLESS SAFE EXPOSURE FACTORS, OPERATING INSTRUCTIONS AND MAINTENANCE SCHEDULES ARE OBSERVED.</i>	Radiation warning label on console, used in certain jurisdictions. Never allow unqualified personnel to operate the X-ray generator.

1B.3.0 SAFETY NOTICES AND WARNINGS

WARNING: *PROPER USE AND SAFE OPERATING PRACTICES WITH RESPECT TO X-RAY GENERATORS ARE THE RESPONSIBILITY OF USERS OF SUCH GENERATORS. CPI CANADA INC. PROVIDES INFORMATION ON ITS PRODUCTS AND ASSOCIATED HAZARDS, BUT ASSUMES NO RESPONSIBILITY FOR AFTER-SALE OPERATING AND SAFETY PRACTICES.*

THE MANUFACTURER ACCEPTS NO RESPONSIBILITY FOR ANY GENERATOR NOT MAINTAINED OR SERVICED ACCORDING TO THIS SERVICE AND INSTALLATION MANUAL, OR FOR ANY GENERATOR THAT HAS BEEN MODIFIED IN ANY WAY.

THE MANUFACTURER ALSO ASSUMES NO RESPONSIBILITY FOR X-RAY RADIATION OVEREXPOSURE OF PATIENTS OR PERSONNEL RESULTING FROM POOR OPERATING TECHNIQUES OR PROCEDURES.

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1B.3.0 SAFETY NOTICES AND WARNINGS (Cont)

WARNING: THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR UNLESS SAFE EXPOSURE FACTORS, OPERATING INSTRUCTIONS AND MAINTENANCE SCHEDULES ARE OBSERVED.

X-ray radiation exposure may be damaging to health, with some effects being cumulative and extending over periods of many months or even years. **Operators and service personnel should avoid any exposure to the primary beam** and take protective measures to safeguard against scatter radiation. Scatter radiation is caused by any object in the path of the primary beam and may be of equal or less intensity than the primary beam that exposes the film.

No practical design can incorporate complete protection for operators or service personnel who do not take adequate safety precautions. **Only authorized and properly trained service and operating personnel should be allowed to work with this X-ray generator equipment.** The appropriate personnel must be made aware of the inherent dangers associated with the servicing of high voltage equipment and the danger of excessive exposure to X-ray radiation during system operation.



DO NOT CONNECT UNAPPROVED EQUIPMENT TO THE REAR OF THE CONSOLE.

For the 23 X 56 (cm) console, J5 is used for the interconnect cable to the generator main cabinet, J4 is not used, J2 is a serial port for use by an external computer, and J1 is for connection of an optional printer.

For the 31 X 42 (cm) console, J5 is used for the interconnect cable to the generator main cabinet, J2 is a serial port for use by an external computer, and J13 is for connection of an external hand switch and / or foot switch.

For the Rad-only console, J3 is for connection of an external hand switch, J4 is a serial port for use by an external computer, and J8 is for the interconnect cable to the main cabinet.

For the touchscreen console, GEN on the rear of the touchscreen is for the interconnect cable to the generator main cabinet, HS is for connection of an external hand switch, COM 1 & COM 2 are serial ports for use by external devices, LO (3.5 mm stereo jack) is for customer supplied speakers (minimum 8 ohms, do not use externally amplified speakers), ETH is a standard 10/100 ethernet connection, USBA and USBB are USB ports for connection of external devices, CF is for the compact flash memory card which holds the touchscreen software and SW1 is the console upgrade button.

INCORRECT CONNECTIONS OR USE OF UNAPPROVED EQUIPMENT MAY RESULT IN INJURY OR EQUIPMENT DAMAGE.

CAUTION: DO NOT EXCEED THE TUBE MAXIMUM OPERATING LIMITS. INTENDED LIFE AND RELIABILITY WILL NOT BE OBTAINED UNLESS GENERATORS ARE OPERATED WITHIN PUBLISHED SPECIFICATIONS.

WARNING: HAZARDOUS VOLTAGES EXIST INSIDE THE GENERATOR WHENEVER THE MAINS POWER IS SWITCHED ON. THESE AREAS INCLUDE THE MAIN FUSE HOLDER AND PORTIONS OF THE POWER INPUT BOARD, PARTS OF THE GENERATOR INTERFACE BOARD AND ROOM INTERFACE BOARD, THE PRIMARY OF THE ROOM INTERFACE TRANSFORMER, AND THE TERMINALS ON THE LINE ADJUSTING TRANSFORMER, IF FITTED.

THE CONSOLE ON/OFF SWITCH DOES NOT DISCONNECT THE MAINS POWER FROM THE ABOVE AREAS INSIDE THE GENERATOR.

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1B.3.0 SAFETY NOTICES AND WARNINGS (Cont)

NOTE: THE DC BUS CAPACITORS MAY PRESENT A SAFETY HAZARD FOR AT LEAST 5 MINUTES AFTER THE POWER HAS BEEN REMOVED FROM THE UNIT. CHECK THAT THESE CAPACITORS ARE FULLY DISCHARGED BEFORE SERVICING THE GENERATOR.

NOTE: WHEN CONNECTING ADDITIONAL EQUIPMENT TO THE GENERATOR, IT IS THE RESPONSIBILITY OF THE INSTALLER TO VERIFY COMPLIANCE TO ALL REGULATORY STANDARDS FOR SAFETY, EMC, AND HAZARD ANALYSIS / RISK ASSESSMENT OF THE FINAL SYSTEM CONFIGURATION.

The following notes apply to the touchscreen console only.

WARNING: THE TOUCHSCREEN CONSOLE HAS NO USER SERVICEABLE PARTS. DO NOT ATTEMPT TO OPEN THE TOUCHSCREEN CONSOLE.

NOTE: WHEN ATTACHING THE BASE TO THE TOUCHSCREEN CONSOLE ENSURE THE TOUCHSCREEN IS RESTING ON A FLAT, CLEAN SURFACE WITH A PIECE OF NON-ABRASIVE MATERIAL BETWEEN THE TOUCHSCREEN AND THE SURFACE.

NOTE: TO AVOID ACCIDENTAL CONTACT WITH ENERGIZED CIRCUITRY INSIDE THE TOUCHSCREEN CONSOLE, THE MAXIMUM BACK PLATE SCREW LENGTH MUST BE LIMITED TO 25 mm (1 inch).

NOTE: FOR WALL MOUNTED TOUCHSCREEN CONSOLES ENSURE THE BASE IS SECURED PROPERLY TO A WALL STUD.

WARNING: PLEASE ENSURE THERE IS SUFFICIENT AREA AROUND THE VENTING SLOTS OF THE TOUCHSCREEN CONSOLE TO ALLOW PROPER COOLING OF THE INTERNAL COMPONENTS.

NOTE: THE SET SCREW COLLAR MUST BE POSITIONED ON THE UPPER HALF OF THE TILT ARM TO PREVENT PERSONAL INJURY SHOULD THE TOUCHSCREEN SLIP WHILE ADJUSTING THE VIEWING HEIGHT.

USE THE PROVIDED ALLEN KEY TO ENSURE THE SET SCREW COLLAR IS LOCKED INTO POSITION SUCH THAT THERE IS NO LESS THAN 25 mm (1 INCH) OF CLEARANCE BETWEEN BOTTOM EDGE OF THE TOUCHSCREEN CONSOLE AND THE TOUCHSCREEN BASE PLATE WHEN THE TOUCHSCREEN IS ADJUSTED TO ITS MINIMUM HEIGHT. PLEASE BE SURE TO SUPPORT THE TOUCHSCREEN CONSOLE WHEN ADJUSTING ITS VIEWING POSITION.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

1B.4.0 SAFETY WARNINGS LABELS

This section describes the safety labels used inside and outside the generator cabinet. Depending on configuration, your X-ray generator may contain some or all of the labels shown.

NOTE: *THESE LABELS AND WARNINGS ARE INTENDED TO ALERT SERVICE PERSONNEL THAT SERIOUS INJURY WILL RESULT IF THE HAZARD IDENTIFIED IS IGNORED.*

NOTE: *DUE TO THE DIVERSITY OF GENERATOR MODELS, THE EQUIPMENT MAY NOT BE EXACTLY AS SHOWN.*

WARNING: *SWITCH OFF THE MAIN POWER DISCONNECT AND ALLOW SUFFICIENT TIME FOR ALL CAPACITORS TO DISCHARGE BEFORE REMOVING ANY COVERS OR PANELS.*

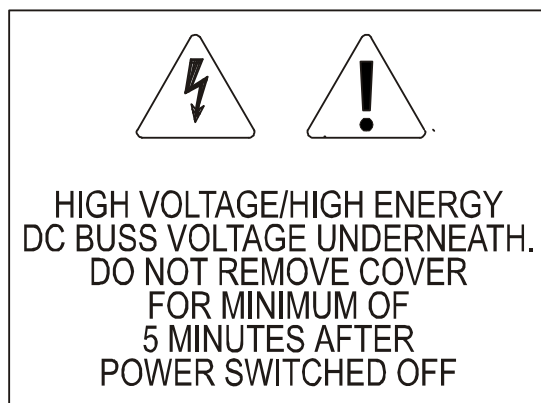
WARNING: *IF ANY BARRIERS OR COVERS MUST BE REMOVED FOR SERVICE, TAKE ALL REQUIRED PRECAUTIONS WITH RESPECT TO THE HAZARD(S) AND IMMEDIATELY REPLACE THE BARRIERS / COVERS WHEN THE NEED FOR REMOVAL IS COMPLETED.*



REPLACE ALL FUSES IN THIS GENERATOR WITH THE SAME TYPE AND RATING.

This information is provided to help you establish safe operating conditions for both you and your 100 kHz series X-ray generator. Do not operate this X-ray generator except in accordance with these precautions, and any additional information provided by the X-ray generator manufacturer and/or competent safety authorities.

1B.4.1 High Voltage / High Energy DC Bus



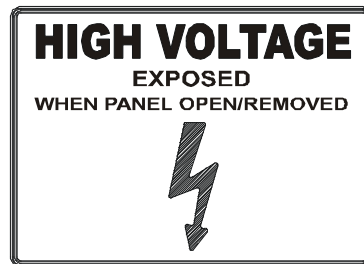
This label is attached to the main access panel on the generator cabinet. The internal capacitors may hold a lethal charge for up to 5 minutes after the console or the main power disconnect is switched off. Do not remove the cover for a minimum of 5 minutes after the power has been switched off.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

1B.4.0 SAFETY WARNINGS LABELS (Cont)

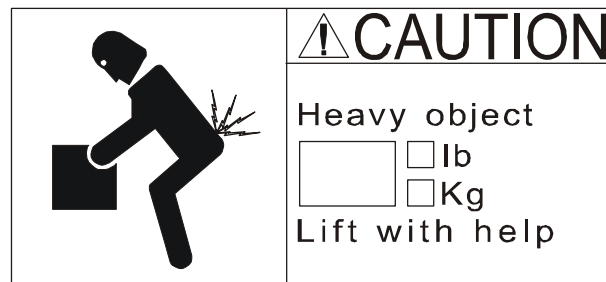
WARNING: WAIT A MINIMUM OF 5 MINUTES AFTER THE INPUT MAINS POWER HAS BEEN REMOVED BEFORE REMOVING ANY COVERS OR ACCESS PANELS. ONCE THE COVER(S) / PANEL(S) ARE REMOVED CHECK THAT THE VOLTAGE ACROSS THE DC BUS CAPACITORS IS LESS THAN 48 VDC BEFORE SERVICING. IF THIS VOLTAGE EXCEEDS 48 VDC, THE CAPACITORS MUST BE MANUALLY DISCHARGED BY QUALIFIED SERVICE PERSONNEL.

1B.4.2 Caution High Voltage Exposed Label



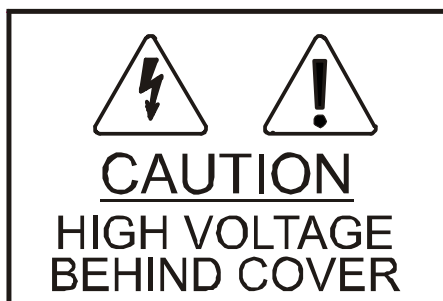
This label is attached to the main access panel on the generator cabinet. High voltage will be exposed if the subject panel is removed and the generator is connected to live AC mains, or if high voltage capacitors are still charged.

1B.4.3 Weight Label



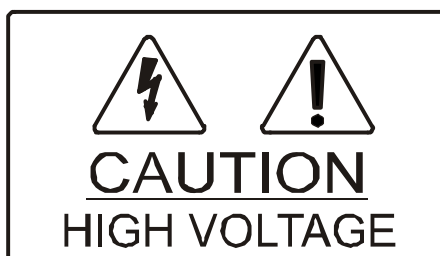
This label is attached to the main access panel on the generator cabinet, and to the HT oil tank. This states the approximate weight of the generator and the HT oil tank, and cautions against attempting to lift those assemblies without proper assistance.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

1B.4.4 Caution High Voltage Behind Cover

This label is attached to a cover over the inverter board(s). The inverter assembly is connected to the main DC bus and will have high voltage applied at all times that the generator is switched on. This assembly will remain energized for up to 5 minutes after the generator is switched off or the main disconnect is switched off.

This label is also attached to a cover over the main input fuses on the power input board. This area will have mains voltage applied as long as the main disconnect is switched on.

1B.4.5 Caution High Voltage

This label is attached to the room interface transformer. This transformer has mains voltage on the primary terminals at all times that the generator is connected to live AC mains.

This label is attached to the resonant assembly. The resonant board will have exposed high voltage at all times that the DC bus is charged.

On Indico 100 SP generators, this label is also attached to the power leads for the cooling fan near the power input board. This fan operates from 120 VAC (as do all cooling fans in the generator).

Use and disclosure is subject to the restrictions on the title page of this CPI document.

1B.4.6 Danger High Voltage Exposed



This label is attached to the primary terminals on the HT oil tank. These terminals may be energized at all times that the generator is switched on, and for 5 minutes after the console or the main disconnect is switched off.

1B.4.7 Console CPU Board / Console Board



For 23 X 56 (cm) consoles:

HIGH VOLTAGE HAZARD: Approximately 400 VAC is present on this board in the area of U32 and J10. This voltage is used to light the backlight for the LCD display assembly in the console.

For 31 X 42 (cm) Indico 100 R&F consoles:

HIGH VOLTAGE HAZARD: Approximately 400 VAC is present on this board in the area of T1, C61, and J10. This is a high voltage source for the fluorescent backlight on the LCD display.

For Indico 100 Rad-only consoles:

HIGH VOLTAGE HAZARD: Approximately 400 VAC is present on this board in the area of T1, C36, and J5. This is a high voltage source for the fluorescent backlight on the LCD display.

Fuse rating (Indico 100 Rad-only console)

F1: GDC-1 (1A 250V slow blow).

For CPI Touchscreen consoles:

HIGH VOLTAGE HAZARD: Approximately 700 VAC is present on the touchscreen board in the areas of T1, C7, C12, J1, J5 and T2, C106, C94, J26, J19. This is a high voltage source for the fluorescent backlight on the LCD display.

1B.4.8 Generator Interface Board



HIGH VOLTAGE HAZARD: Components within the dashed line on the board have high voltage applied at all times that the main disconnect is switched ON. These components are live EVEN WITH THE CONSOLE SWITCHED OFF.

FUSE RATINGS:

F1	GDC-1.6 (1.6A 250V slow blow).
F2	GDC-2.5 (2.5A 250V slow blow).
F3, F4, F5	GDC-5 (5A 250V slow blow).
F6	GDC-2(2A 250V slow blow).

Use and disclosure is subject to the restrictions on the title page of this CPI document.

1B.4.9 Room Interface Board

HIGH VOLTAGE HAZARD: 110 / 220 VAC may be present on this board at all times that the AC mains for the generator is switched on.

1B.4.10 AEC Board

HIGH VOLTAGE HAZARD: AEC board assemblies with an integral high voltage supply for ion chambers or for a PMT may have high voltage present, up to approximately 1000 VDC, at all times that the generator is switched on.

1B.4.11 Power Input Board

HIGH VOLTAGE HAZARD: High voltage is present on this board whenever the generator is connected to live AC mains.

The DC bus capacitors will remain charged for up to 5 minutes after the generator has been switched off.

BURN HAZARD: Power input boards for single phase generators are fitted with several high power resistors that operate at temperatures sufficient to cause skin burn. Ensure that these resistors have cooled sufficiently after the power has been switched off before servicing.

1B.4.12 Low Speed Starter Board

HIGH VOLTAGE HAZARD: High voltage is present on this board whenever the generator is switched on.

BURN HAZARD: This board is fitted with high power resistors that operate at temperatures sufficient to cause skin burn. Ensure that these resistors have cooled sufficiently after the power has been switched off before servicing.

1B.4.13 Dual Speed Starter Board

HIGH VOLTAGE HAZARD: Approximately 600 VDC is present on this board whenever the generator is switched on. This voltage is sourced from the DC bus capacitors in the generator, and therefore the high voltage hazard will remain for up to 5 minutes after the generator has been switched off.

1B.4.14 Inverter Board

HIGH VOLTAGE HAZARD: The inverter boards are connected to the main DC bus and will have high voltage applied at all times that the generator is switched on. This assembly will remain energized for up to 5 minutes after the generator is switched off, or the main disconnect is switched off.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

1B.4.15HT Tank

HIGH VOLTAGE HAZARD: High voltage may be present at the primary terminals on the tank lid board, at the output high voltage connectors, and at the mA/mAs measuring jacks if the shorting link is opened for mA/mAs measurements.

The generator must not be energized if the leads that attach to the primary of the high voltage transformer are disconnected.

TORQUE NOTICE: Do not over-tighten the nuts on the feed through terminals for the primary of the HT transformers. Over tightening may damage the HT tank.

1B.4.16F1 - Primary of Power Supply Auxiliary Transformer

FUSE RATING: Fuse F1 is located on the generator chassis, to the left of the main input fuses on the power input board.

Single phase generators: FNM-3 (3A 250V).

Three phase generators: FNQ-2 (2A 500V).

1B.4.17F4 - Primary of Room Interface Transformer

FUSE RATING: Fuse F4 is located on the generator chassis, to the left of the main input fuses on the power input board.

Single phase generators: FNM-3 (3A 250V).

Three phase generators: FNQ-2 (2A 500V).

CHAPTER 1C

PREPARING FOR INSTALLATION

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Use and disclosure is subject to the restrictions on the title page of this CPI document.

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 \pm 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 \pm 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 \pm 10%, 3~.
	480 VAC \pm 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.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

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).

Use and disclosure is subject to the restrictions on the title page of this CPI document.

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.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

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 H.T. tank ground stud (located at the top of the H.T. tank).

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.

1C.5.2 Generator Weight

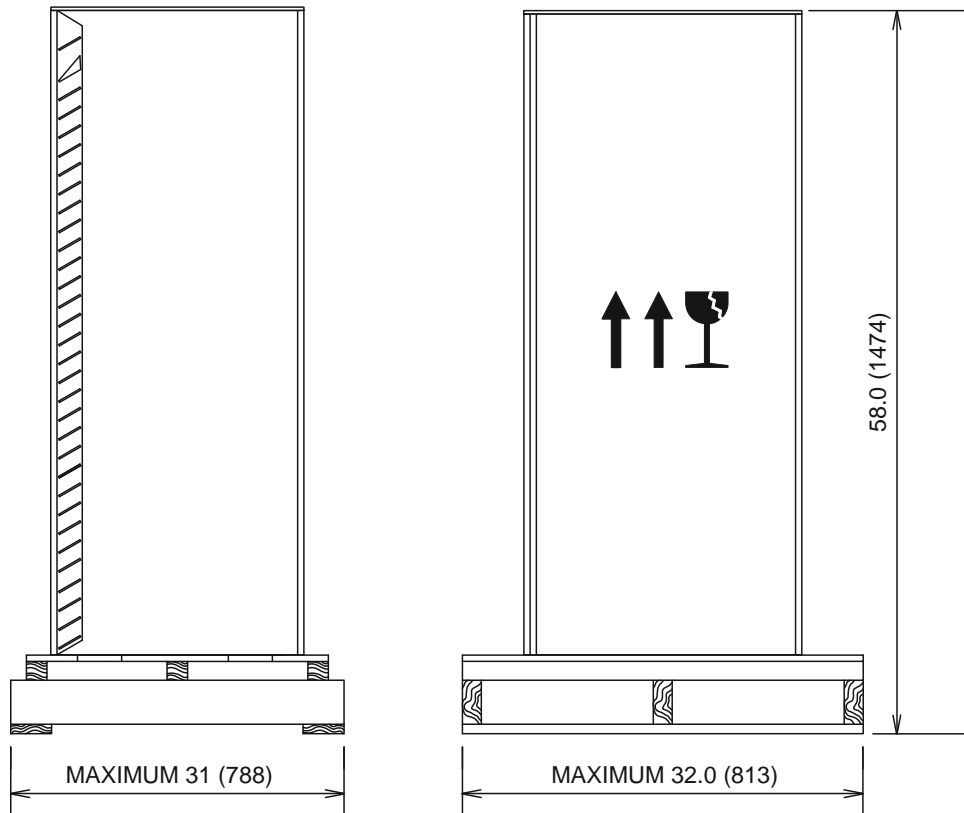
The weight of the generator cabinet and of the available consoles is listed below:

Generator cabinet	217 lbs (98.6 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.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

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

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.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

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.

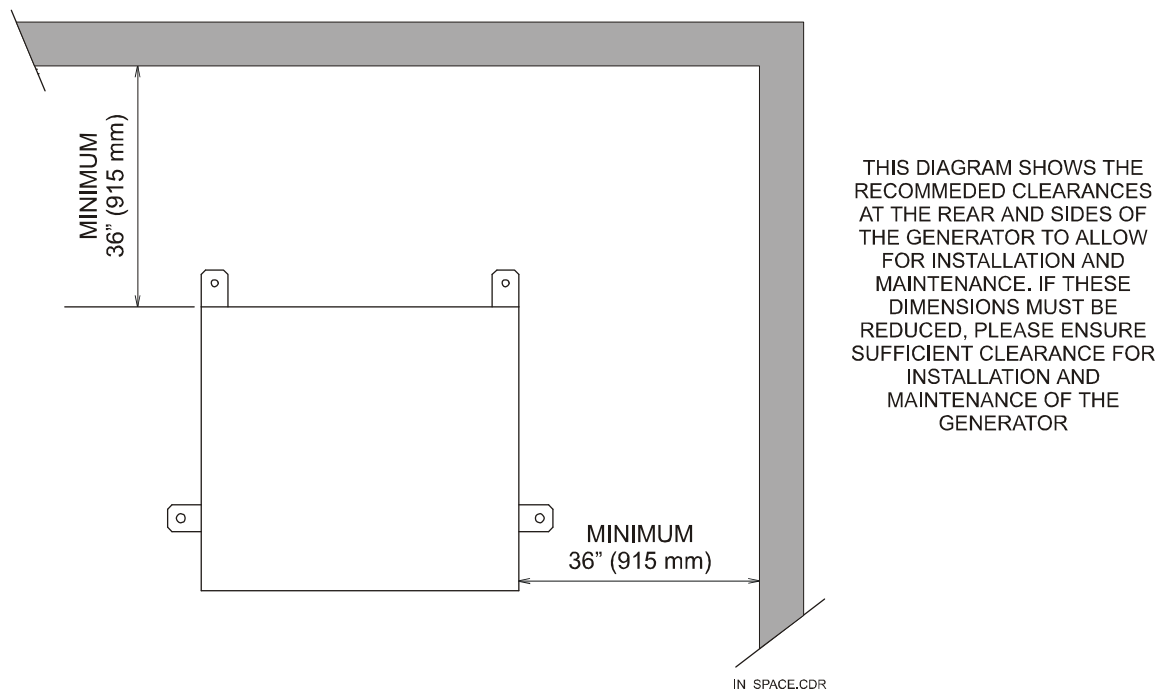


Figure 1C-2: Generator clearances

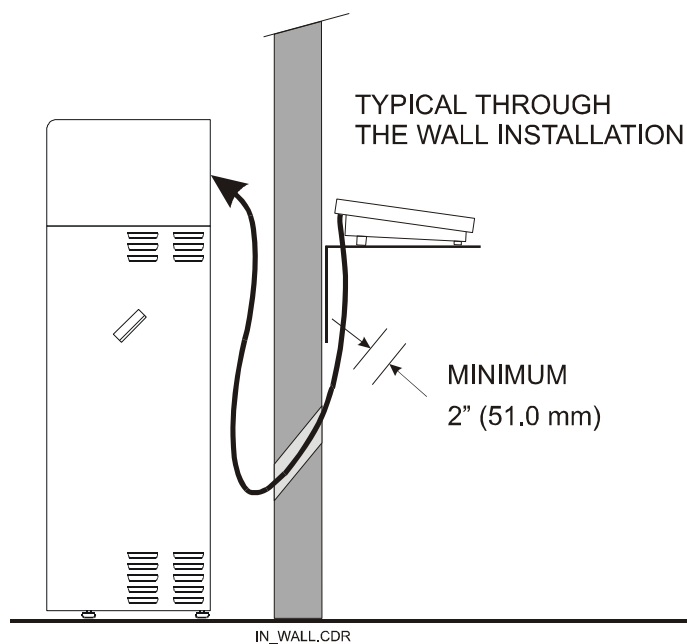


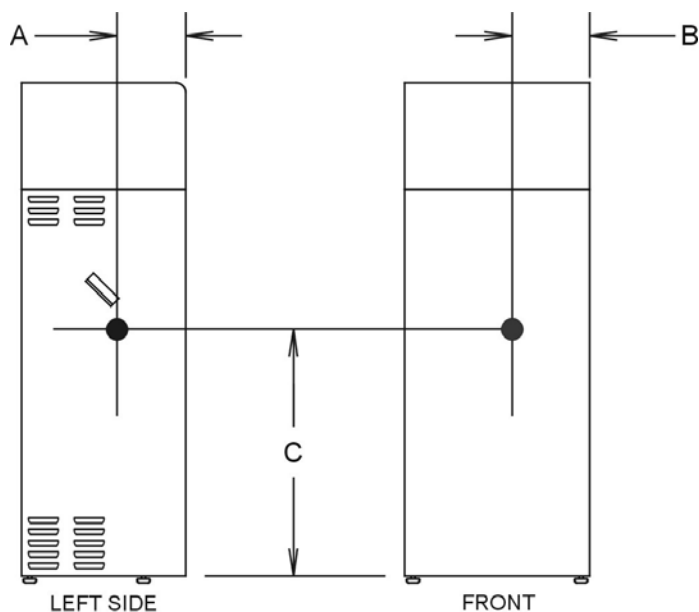
Figure 1C-3: Typical through the wall installation.

Use and disclosure is subject to the restrictions on the title page of this CPI document.

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.



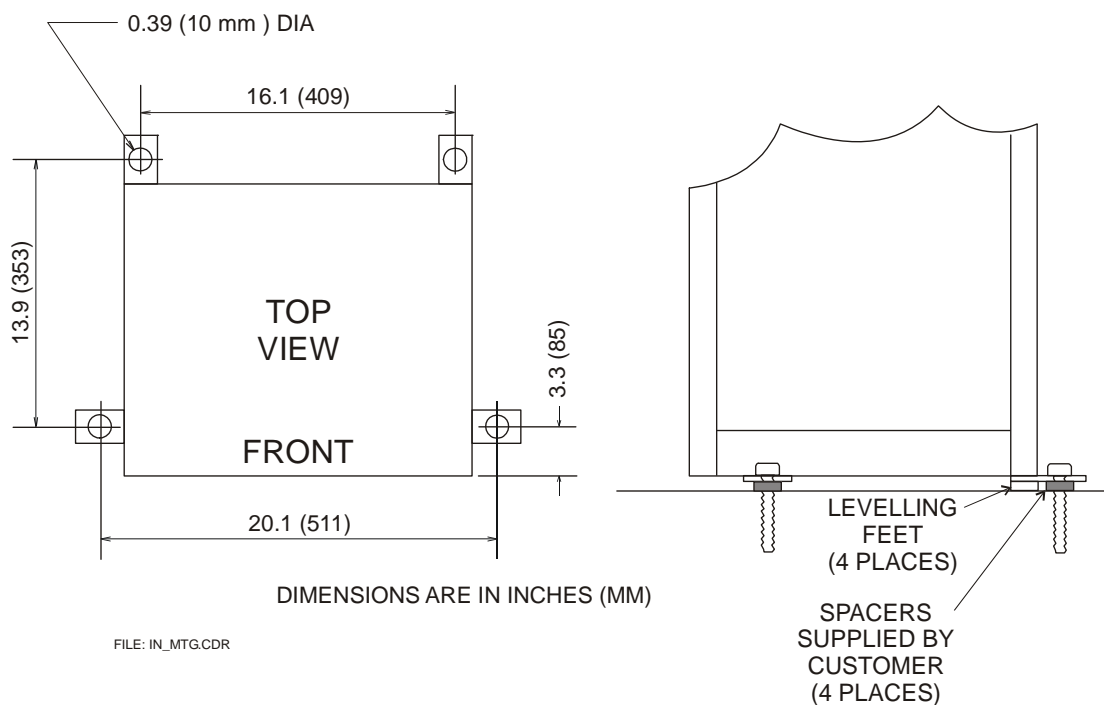
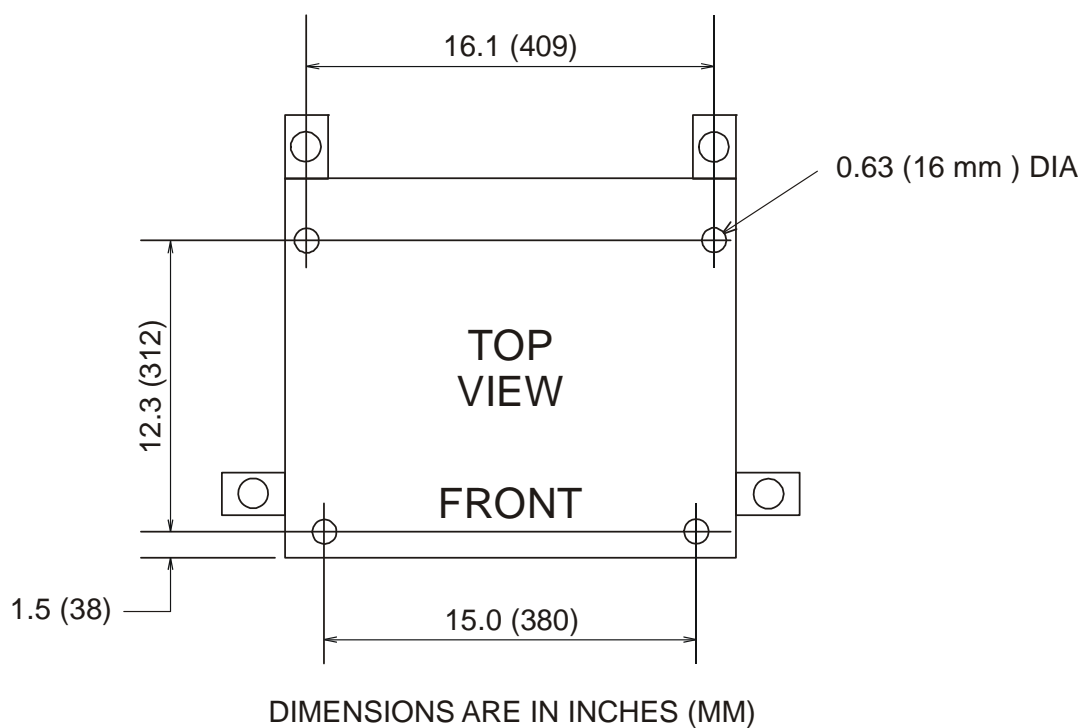
DIMENSION	VALUE
A	8.4 - 8.5 (213 - 216)
B	9.4 - 10.0 (238 - 254)
C	19.8 - 20.8 (502 - 527)

DIMENSIONS ARE IN INCHES (MM)

INDICO 100 SEISMIC.CDR

Figure 1C-4: Indico 100 seismic centers

Use and disclosure is subject to the restrictions on the title page of this CPI document.

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

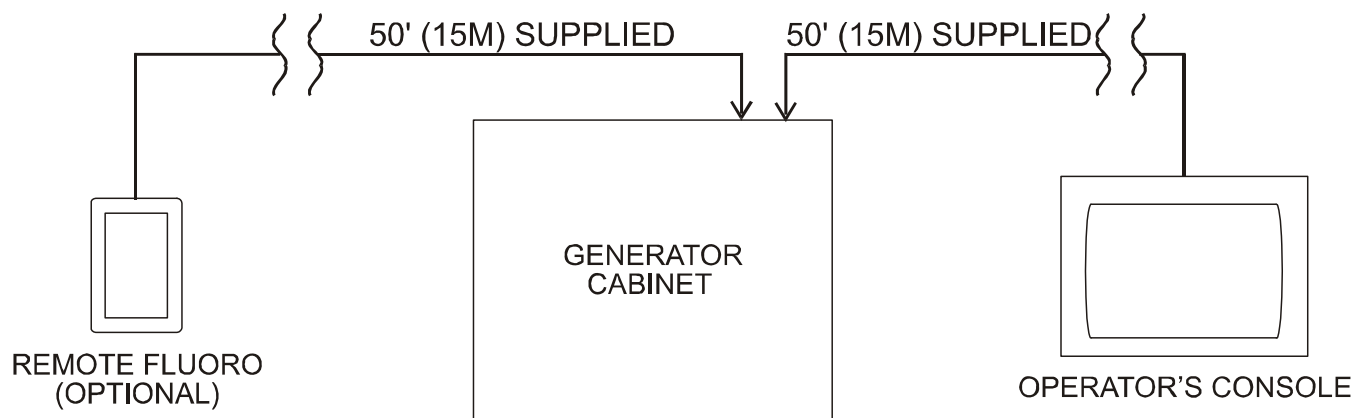
Listed below are the ventilation requirements for the Indico 100 series generator:

- 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 ✓	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?
	Are all halls and doorways large enough to allow the generator to pass through?
	Is there a transport dolly or similar device to move the Generator? It must have a minimum rating of 350 lb. (160 Kg.)
	Do any regulatory bodies need to be notified prior to 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?

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 ✓	DESCRIPTION
	GenWare® for setup and calibration using a membrane consoles if required. Embedded GenWare® may be used when calibrating and programming using a touchscreen console.
	General hand tools for installation: Wrenches, nut drivers, assortment of screwdrivers, pliers, etc.
	If the generator is to be anchored to the floor, suitable hardware and drills, drill bits etc must be available.
	A supply of connectors for wiring: lugs, caps, line splices etc.
	A calibrated DVM which indicates true RMS voltages.
	Dual trace memory oscilloscope with a minimum 20 MHz bandwidth; appropriate leads, probes, etc.
	Device for measuring true kVp and mA (mAs). This may be a Dynalyzer equivalent or a non-invasive system such as the Keithly TRIAD system.
	A calibrated radiation meter with detectors that will allow for R/min and uR type measurements (or uGy and Gy/min).
	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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CHAPTER 1D

COMPATIBILITY LISTING

CONTENTS:

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1D.1.0 INTRODUCTION

This section details external equipment that is compatible with your generator, and lists options that are included in that generator.

1D.2.0 COMPATIBLE DEVICES AND OPTIONS

The Indico 100 family of X-ray generators may be configured to be compatible with various external devices. Certain features must be factory configured, others are user configurable. Please refer to chapter 2 and 3 of this manual and / or consult the factory for further details.

1D.2.1 X-Ray Tubes

Various makes and models of inserts and housings are supported. Refer to the compatibility statement and to chapter 2 of this manual.

CAUTION: PLEASE ENSURE THAT THE X-RAY TUBE INSERT IS AS STATED ON THE COMPATIBILITY STATEMENT.
IF THE HOUSING HAS BEEN RELOADED WITH ANOTHER INSERT TYPE, CALIBRATION MAY BE SERIOUSLY AFFECTED, RESULTING IN TUBE DAMAGE.

1D.2.2 Stators

Various types / impedances of stators are supported. Refer to the compatibility statement and to chapter 2 of this manual.

1D.2.3 AEC Devices

The Indico 100 family of X-ray generators may be configured to be compatible with various AEC devices (ionization, solid state or PMT) via the optional AEC board. Refer to the compatibility statement at the front of this manual for AEC device compatibility of this generator.

1D.2.4 ABS Pickups

Various ABS pickups (light diode, composite video, PMT, etc) may be supported on R&F generators, depending on configuration. Refer to the compatibility statement at the front of this manual, and to chapter 3E.

1D.2.5 Tomographic Tables

Various. Please note that the generator is used as a backup timer ONLY in tomography. AEC is NOT available for tomography.

1D.2.6 Digital Interfaces (R&F Generators)

The generator may be configured to be compatible with various digital imaging systems. Refer to the compatibility statement at the front of this manual.

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1D.2.7 DAP (Dose Area Product)

A DAP (Dose-Area Product) meter is available as an option on Indico 100 X-ray generators. Refer to chapter 3F for details.

1D.2.8 Options

Major options include AEC board, digital interface board, DAP, remote fluoro control unit, dual speed starter, line adjusting transformer, and two tube HT transformer.

NOTE: REFER TO THE COMPATIBILITY STATEMENT AT THE FRONT OF THIS MANUAL FOR COMPATIBILITY OF THIS GENERATOR.

1D.3.0 X-RAY TUBE DATA

INSTALLER, PLEASE INSERT THE TUBE RATING CHARTS FOR THE X-RAY TUBES USED WITH THIS GENERATOR.

TUBE #1	
HOUSING (MAKE / MODEL):	
INSERT (MAKE / MODEL):	
SERIAL #:	
STATOR TYPE:	

TUBE #2	
HOUSING (MAKE / MODEL):	
INSERT (MAKE / MODEL):	
SERIAL #:	
STATOR TYPE:	

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CHAPTER 1E

GENERATOR LAYOUT AND MAJOR COMPONENTS

CONTENTS:

1E.1.0	INTRODUCTION	1E-2
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1E.2.1	Generator Cabinet Assembly	1E-2
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1E.1.0 INTRODUCTION

This section contains generator layout drawings and figures that identify the major generator components and circuit board assemblies.

This section also shows the location and correct orientation of the power EPROM (located on the generator CPU board), the console EPROM (located on the console CPU board) if applicable, and the dual speed starter EPROM (located on the dual speed starter board). Refer to the applicable figures to ensure correct EPROM placement and orientation should EPROM replacement be necessary.

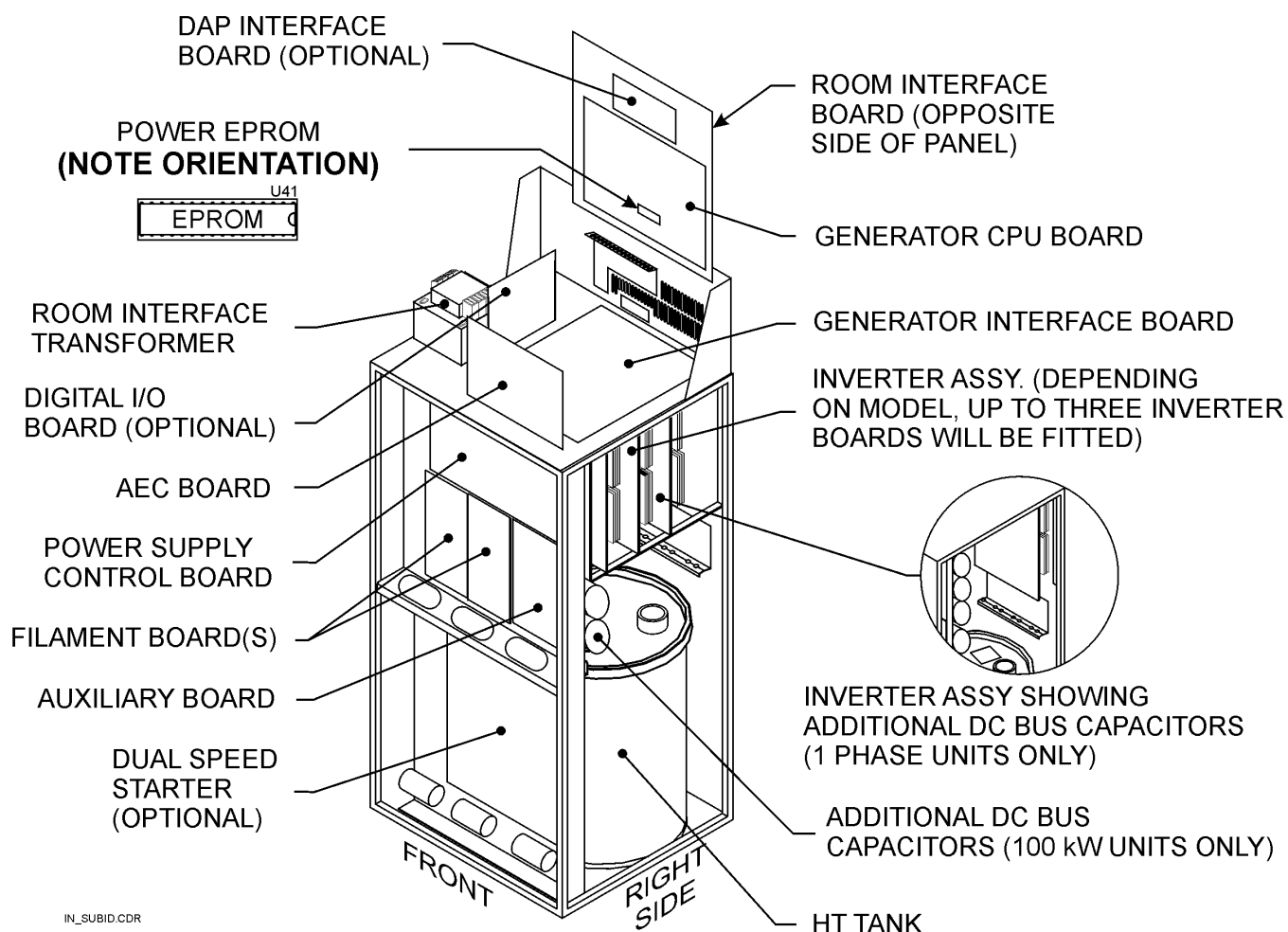
1E.2.0 MAJOR COMPONENT LAYOUT**1E.2.1 Generator Cabinet Assembly**

The following major assemblies are located within the generator cabinet:

- Auxiliary power supply.
- Generator control circuits.
- Room interface for the X-ray system.
- Low speed starter or optional dual speed starter.
- High frequency inverter.
- H.T. transformer.
- Optional AEC board (automatic exposure control).
- Optional DAP interface board.
- Optional digital I/O board.

Figure 1E-1 shows the major components within the front and right side of the generator cabinet. Figure 1E-2 shows the major components accessible from the left side and the rear of the generator cabinet.

These figures are meant to show major component locations only; minor details may differ from actual units.

1E.2.1 Generator Cabinet Assembly (Cont)**Figure 1E-1: Major generator subassemblies & power EPROM location**

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1E.2.1 Generator Cabinet Assembly (Cont)

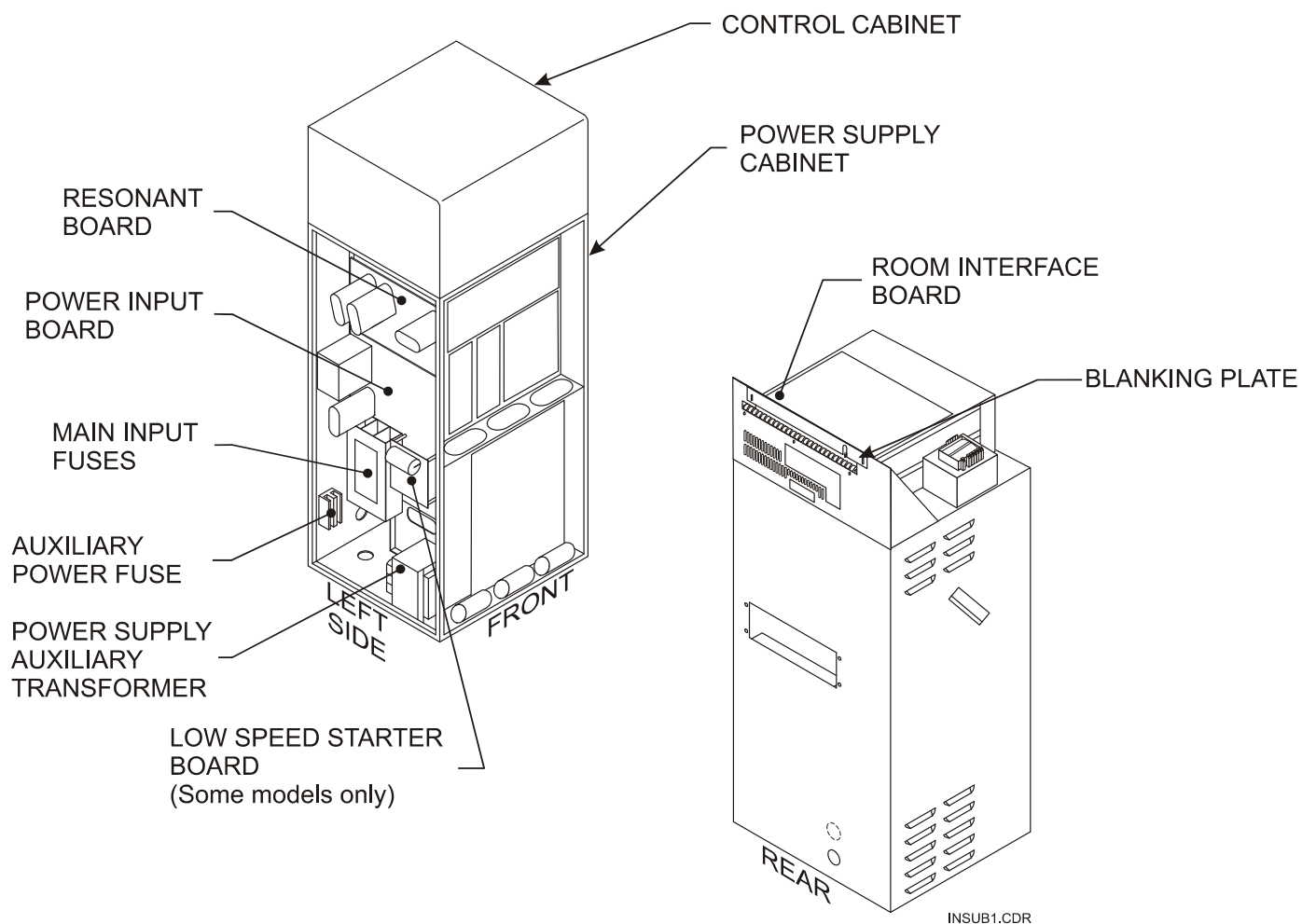


Figure 1E-2: Major generator subassemblies (right side and rear)

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1E.2.2 Console Assembly

Figure 1E-3 is an overview of the 23 X 56 cm console, the 31 X 42 cm console, the Rad-only console, and the touch screen console for Indico 100 generators. Figure 1E-4 is an internal view of these console styles (except touch screen), showing the major components and cabling in the console assembly.

The touch screen console contains no user serviceable parts, and must be returned to the factory for service.

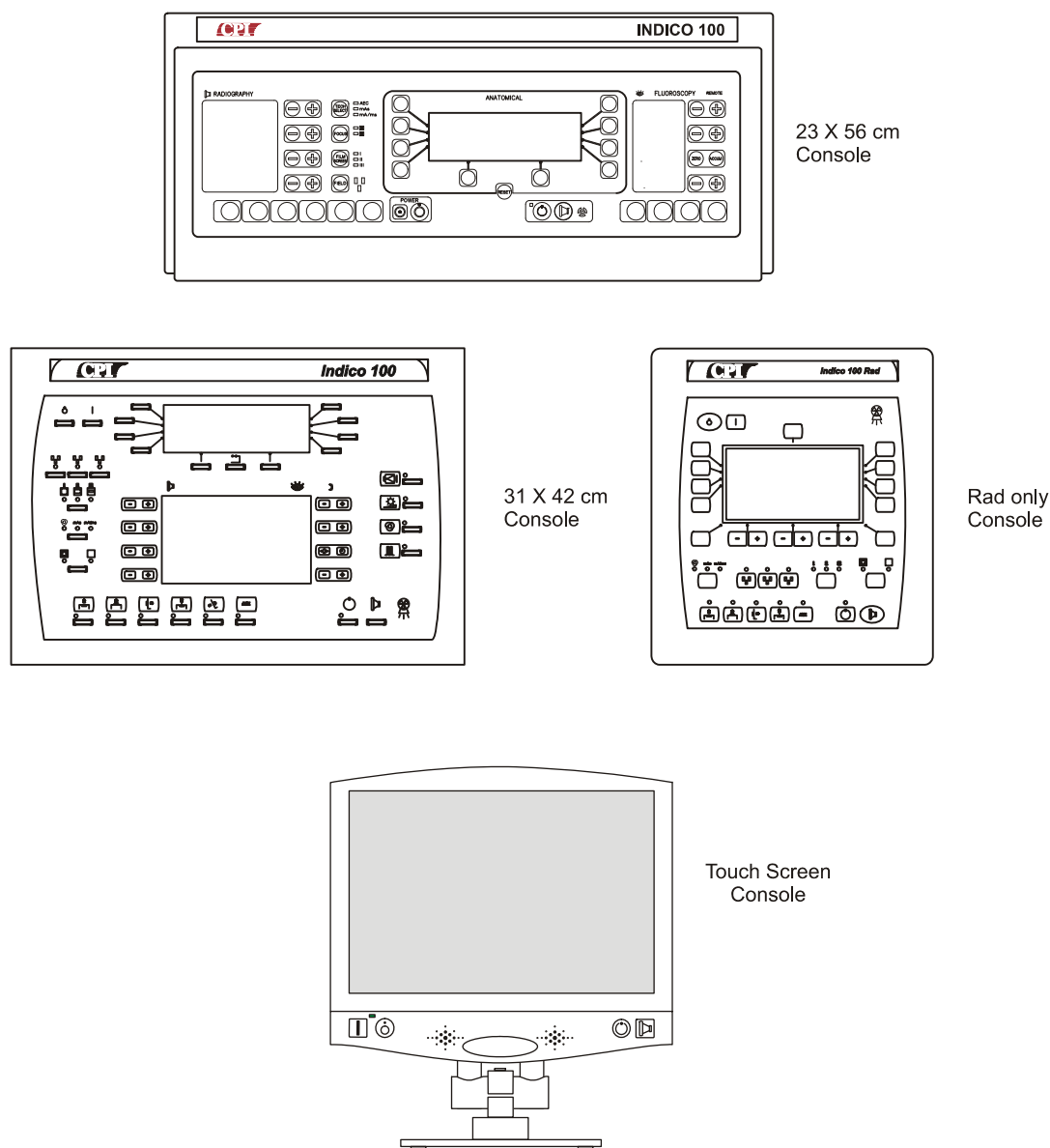
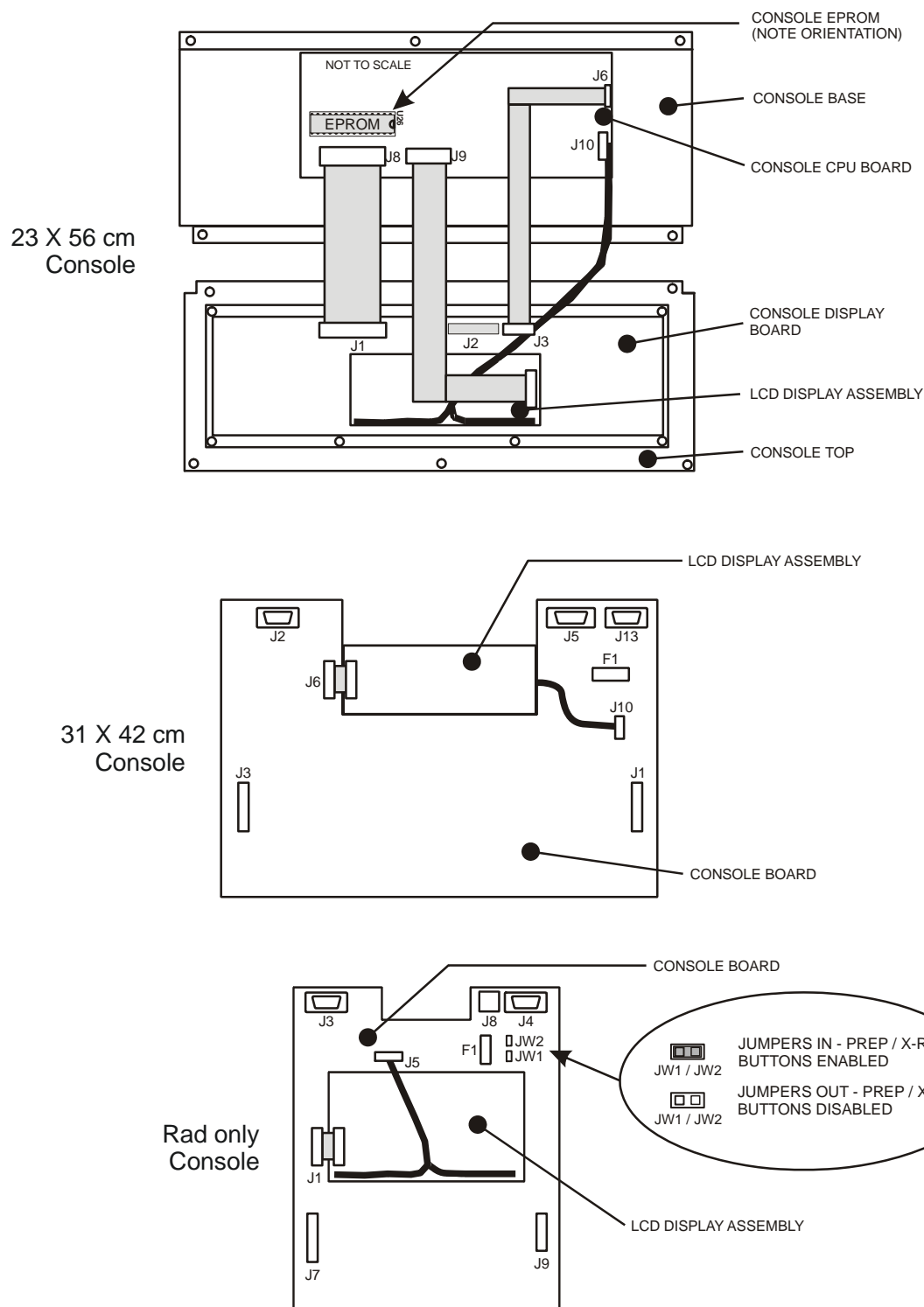


Figure 1E-3: Console top / external view

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1E.2.2 Console Assembly (Cont)



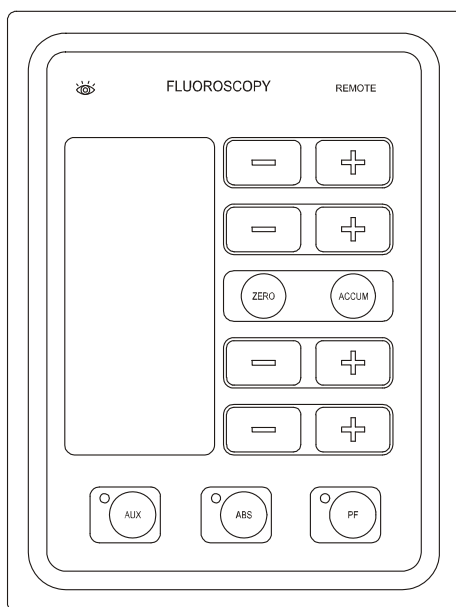
FILE: IN_CONB.CDR

Figure 1E-4: Console internal view including EPROM location (where applicable)

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1E.2.3 Remote Fluoro Control

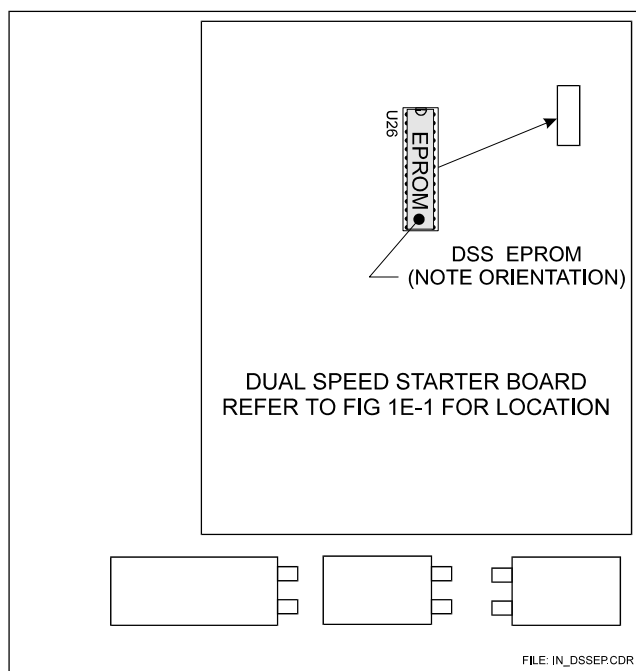
Figure 1E-5 is an overview of the optional remote fluoro control for the Indico 100 generators. This allows operation of fluoro functions from a location other than the main console.



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Figure 1E-5: Remote fluoro control unit overview

1E.2.4 Dual Speed Starter EPROM location



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Figure 1E-6: EPROM location inside the dual speed starter

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