



RAD/Fluoro EPS 45-80 High-Voltage Generator

PRODUCT SPECIFICATION

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1.2 Technological Landmark

The Epsilon™ technology achieves variable frequency operation at up to 240 kHz. This produces kV flatness waveform, with outstanding quick rise time. This realization embodies important technological achievements designed with innovative power switching inverter modules and a cascaded series of high frequency power transformers embedded in a solid dielectric high voltage unit.

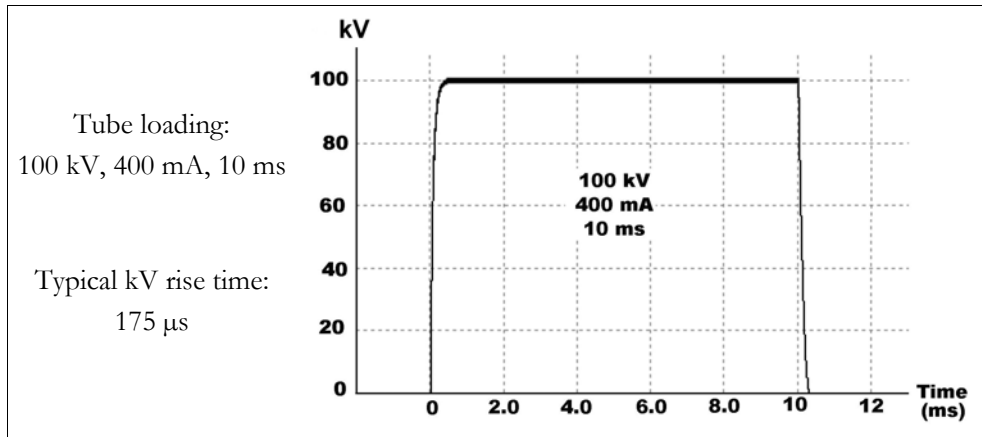


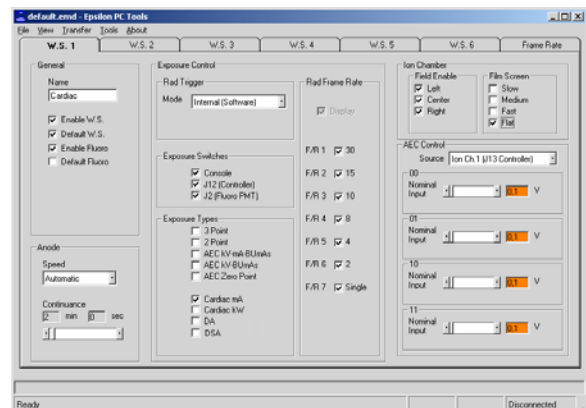
Figure 1 – Typical kV Waveform.

1.3 Epsilon Main Features

1. Extremely sharp kV waveform, with rise and fall times unparalleled in the industry, resulting in superior image quality and reduced soft radiation.
2. Exceptionally high efficiency of 92% resulting in reduced power consumption and increased equipment reliability.
3. Solid dielectric high-voltage encapsulation.
4. Universal power input, allowing the same generator to operate with line inputs of 380 VAC to 480 VAC, 50/60 Hz.
5. 2,000 anatomically programmable regions (APR), with exam names in Roman, Cyrillic and other alphabets.

6. Epsilon PC Tools program:

- a. Configuration files for easy & quick installation of EPS generator.
- b. Generator database backup management.
- c. Second language module.
- d. Software update, tube library, diagnostic mode, history log.



- 7. Self-diagnostic routine with quick access to system status and simplified maintenance.
- 8. Expansion motherboard for simplified customization through optional boards.
- 9. RS-232 (or CAN) software providing full flexibility for customer control.
- 10. Automatic X-ray tube calibration.

1.4 Optional Features

1. Epsilon Operator Console P/N 9777.02 (.22)

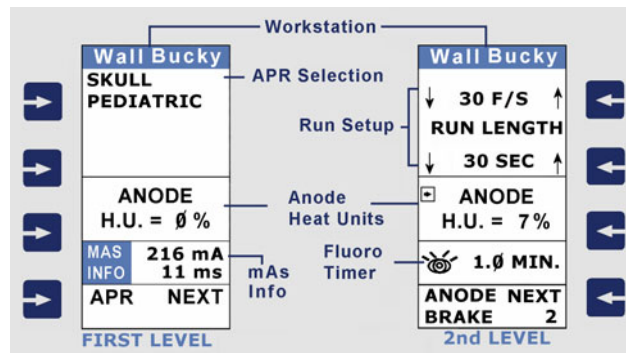
The Epsilon RF Operator Console is an elegant X-ray control panel affording simple control of the EPS 45-80 High-Voltage generator. It manages 6 configurable workstations with 4 patient sizes for more than 2000 APR exams.

Exposure buttons, optical density correction, and many feedbacks from the X-ray room and/or X-ray tube are provided.

Technique factors are quickly available for both pre-exposure and post-exposure visualization. The console also includes a built-in service mode and a diagnostic mode, displayed in a graphic screen.



Epsilon Operator Console



Graphic Screen on the console

Figure 2

2. High Performance Radiography P/N 10010.000

High Performance Radiography option is available on EPS 80R configuration. It extends the irradiation time from 10 seconds to 63 seconds, and the mAs factor from 1000 up to 12,500 mAs on some X-ray tubes.

3. High Power Fluoro P/N 10011.000

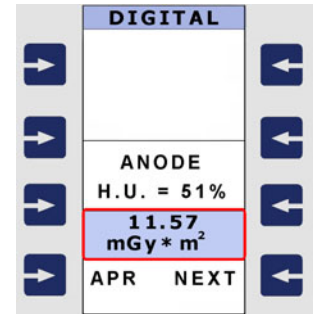
This option performs continuous Fluoro at up to 140 kV & 20 mA.

4. Two-Tube Option P/N 10020.000

The 2-Tube option provides a standalone X-ray tube switch and the necessary hardware & software to drive two different X-ray tubes from a single generator. Optionally, the 2-tube assembly can be enclosed in a decorative cabinet.

5. DAP Interface P/N 10028.000

The DAP Interface option allows interfacing a DAP measurement device on the Epsilon Operator Console to display the radiation level a patient is exposed to in radiological exams. Cumulative dose area product (**DAP**) would also be printed when an optional DAP printer is connected to the generator.



6. High Performance Pulsed Fluoroscopy P/N 10012.000

High Performance Pulsed Fluoro is performed on standard X-ray tubes (no grid), using a *programmable* surface dose rate and a *variable* pulse width. It is done in *Dose Reduction* or *Image Enhancement* mode.

- **Dose reduction** lowers average patient dose at slower pulse rates while keeping the same dose per pulse (the pulse count is reduced).
- **Image enhancement** provides clearer, less noisy images at slower pulse rates while keeping the patient dose about constant.

Continuous Fluoro can be enabled using the service mode, for example to troubleshoot the Fluoro imaging chain.

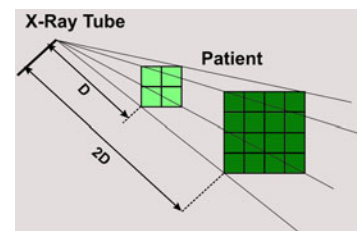
High Performance Pulsed Fluoro versus Standard Pulsed Fluoro

Features	Standard Pulsed Fluoro	High Performance Pulsed Fluoro
Minimum mA	16 mA	5 mA
Minimum mAs	0.08 mAs	0.025 mAs
Maximum Pulse Rate	30 p/s	90 p/s (with High Frame Rate option)
Maximum Fluoro <i>Duty Cycle</i>	33 %	50 %
Maximum kV @ low mAs/pulse (mAs/pulse ≤ 0.25)	Variable, from 125 to 40 kV, as per mAs/pulse	Always 125 kV
Multi-Zoom Function	Not available	4 magnification levels available
SPD Dose Compensation	Not available	Optional

Source to Patient Distance Dose Compensation Option

The generator adjusts the X-ray beam to compensate for the source-to-patient distance (SPD) when the gantry position varies during an exam. This provides constant surface dose along the full SPD span.

$$\text{mAs/pulse} \propto (1/\text{SPD})^2$$



7. Auxiliary Power Supplies P/N 10023.000 (.002)

This option provides a medical grade power supply rated 24 VAC, 150 VA (6.25A) and 24 VDC (2.7A), 65W.

8. Auxiliary Power Supplies P/N 10023.001

This option provides a medical grade power supply rated 24 VDC (2.7A), 65W.

9. Universal Chambers Interface Board P/N 11002.000

Consists of a plug-in board and the necessary software to perform AEC exposures on up to three (3) solid state AEC chambers. This board includes also an additional interface for a standard ion chamber.

10. Decorative Cabinet P/N 10017.001

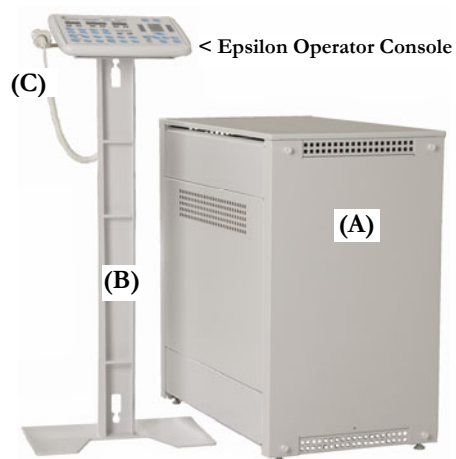
This option **(A)** affords mechanical enclosure of the generator by providing a high quality cabinet that covers the **Epsilon** High-Voltage generator and hides out the mains cable entry. Multiple passageway configurations are possible for High-Voltage cables.

11. Custom Pedestal Stand P/N 10003.000

Supplies an elegant and practical stand **(B)** for the operator console.

12. Handswitch P/N 10018.000 (.001)

An *X-ray Hand-Switch* **(C)** provides the Epsilon operator console with a hand held push-button switch that can be extended 3.8 m (8 feet) from the operator console. Does not permit Fluoro activation. Can be installed on the left or right side of the console.



2.0 TECHNICAL SPECIFICATIONS

2.1 X-ray Power

Table 2- Maximum Power Outputs versus Tube mA (Intermittent Mode)

EPS Configuration	Tube mA							
	200	250	320	400	500	630	800	1000
EPS 30	150 kV 30 kW	120 kV 30 kW	93 kV 30 kW	75 kV 30 kW	--	--	--	--
EPS 45	150 kV 30 kW	150 kV 37 kW	140 kV 45 kW	112 kV 45 kW	90 kV 45 kW	--	--	--
EPS 50	150 kV 30 kW	150 kV 37 kW	150 kV 48 kW	125 kV 50 kW	100 kV 50 kW	79 kV 50 kW	--	--
EPS 55	150 kV 30 kW	150 kV 37 kW	150 kV 48 kW	137 kV 55 kW	110 kV 55 kW	87 kV 55 kW	--	--
EPS 65	150 kV 30 kW	150 kV 37 kW	150 kV 48 kW	150 kV 60 kW	130 kV 65 kW	103 kV 65 kW	81 kV 65 kW	--
EPS 70	150 kV 30 kW	150 kV 37 kW	150 kV 48 kW	150 kV 60 kW	140 kV 70 kW	111 kV 70 kW	87 kV 70 kW	--
EPS 80	150 kV 30 kW	150 kV 37 kW	150 kV 48 kW	150 kV 60 kW	150 kV 75 kW	127 kV 80 kW	100 kV 80 kW	80 kV 80 kW

Nominal power values (kW) are given for a loading time no less than 100 ms.

2.2 RAD Specifications

WORKSTATIONS : 6 workstations.

APR EXAMS : Programmable technique chart consisting of up to 2000 fully customizable exams, stored in the **Epsilon** Operator Console. Every single step on the APR program leads to a new set of parameters, every time more fitted with the intended exam. This reduces the number of key strokes. The APR can be programmed to behave as a traditional APR with 7 regions per workstation, 8-10 exams per region and 4 patient sizes.

kV : From 40 to 150 kV, with 1-kV steps.

mA : From 10 to 1000 mA, with 25% increment steps (up to 21 stations).

10;	12.5;	16;	20;	25;	32;	40;	50;	63;	80;	
100;	125;	160;	200;	250;	320;	400;	500 (1);	630 (2);	800 (3);	1000 (4).

- (1) For 45 kW and above configurations only (3) For 65 kW and above configurations only
 (2) For 50 kW and above configurations only (4) For 80 kW configurations only

IRRADIATION TIME : From 1.0 ms (1) to 10 seconds, with 25% increment steps (41 stations).

1.0 (1);	1.25;	1.6;	2.0;	2.5;	3.2;	4.0;	5.0;	6.3;	8.0;	ms
10;	12.5;	16;	20;	25;	32;	40;	50;	63;	80;	ms
100;	125;	160;	200;	250;	320;	400;	500;	630;	800;	ms
1.0;	1.25;	1.6;	2.0;	2.5;	3.2;	4.0;	5.0;	6.3;	8.0;	10.0 seconds.

- (1) Minimum irradiation time in AEC = 5.0 ms

MAS : From 0.4 to 1000 mAs (1), with 25% increment steps (up to 35 stations).

0.4;	0.5;	0.63;	0.8;	1.0;	1.25;	1.6;	2.0;	2.5;	3.2;
4.0;	5.0;	6.3;	8.0;	10;	12.5;	16;	20;	25;	32;
40;	50;	63;	80;	100;	125;	160;	200;	250;	320;
400;	500;	630 (2);	800;	1000.					

- (1) Maximum mAs in the optional *High Performance Radiography*: 10 000 mAs.
 (2) 600 mAs max. in AEC mode.

AEC MODE : Ion chamber, photomultiplier tube, photodiode or flat panel (refer to Section 2.4).


RAD LOADING : See Table 3.

Table 3- X-ray Tube Loading Factors in Radiography

RAD Technique	Loading Mode
Three-point	Loads the tube at specific kV, mA and irradiation time factors.
Two-point	Loads the tube at specific kV and mAs factors.
AEC mode	Loads the tube ...
AEC-mA	<ul style="list-style-type: none"> At specific kV & mA factors and adjustable backup time (for a given kV);
AEC-mAs	<ul style="list-style-type: none"> At specific kV & backup mAs factors;
AEC-Zero Point	<ul style="list-style-type: none"> At specific backup mAs factor and automatic kV selection based on Fluoro stabilization (ABS or manual);
	... and uses the feedback of an external exposure time pickup device to stop the tube loading.
AEC-Falling Load (option)	In AEC-mAs exposure, the tube is loaded at a higher tube current value, after which the mA drops as the exposure proceeds.
AEC-Lock	Loads the tube as in normal AEC mode for the first frame, and uses the measured mAs factor for the remaining tube loadings.
Serial Tube Loading Mode	
Frame rate	7 pulse rates available at the operator console and service programmable from 0.25 up to 30 f/s ^(1,2) . Operative frame rate selected by the operator, by APR, or by remote selection using a digital input to the generator.
Run length	1, 2, 5, 10, 20, 30, 40, 50 and 60 seconds ⁽²⁾
Tube kW	The operative frame rate and run length combination for a given exposure impacts on the allowed tube kW load. The generator ensures the X-ray tube operating parameters are within safe limits.
<p>(1) Up to 90 f/s with High Frame Rate option.</p> <p>(2) The run length corresponds to the maximum total duration of repeated tube loadings allowed by the generator for a distinct exposure switch actuation.</p>	

FOCAL SPOT / ANODE ROTATION: Manual and automatic focal spot selection can be selected in RAD.

In *automatic focal spot* selection, the filament is determined as a function of the technique kW and the anode speed. Table 4 shows the generator algorithm for the selection of the focal spot and anode rotation speed when *auto speed* and *auto focal spot* are enabled. The anode speed is not user alterable as it is set in the workstation configuration.

Table 4- Focal spot and anode speed selection as a function of technique kW	
kW	Focal spot/Anode speed
	Small/Low
	Small/High
	Large/Low
	Large/High

2.3 Fluoro Specifications

2.3.1 Fluoroscopy Types

1. Continuous & Pulsed Fluoro available on standard Epsilon configurations (refer to Section 2.3.2).
2. High Performance Pulsed Fluoro is optional (refer to Section 2.3.3).
3. High Power Fluoro (Cont.) is optional (refer to Section 2.3.4).

2.3.2 General Specifications for Continuous & Pulsed Fluoro

Table 5- Fluoro Loading Factors

kV range	40 to 125 kV, in one-kV steps, with programmable kV range.										
mA range (Cont. Fluoro)	0.2 to 12.5 mA. Manual continuous Fluoro mA stations:										
	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	
	1.3	1.4	1.6	1.8	2.0	2.2	2.5	2.8	3.2	3.6	
	4.0	4.5	5.0	5.6	6.3	7.1	8.0	9.0	10.0	11.0	12.5
mAs range (Pulsed Fluoro)	From 0.08 up to 5.0 mAs, depending on pulse rate and kV operation. 1. $0.08 \leq \text{mAs} \leq 0.22$ @ 30 p/s & kV ≤ 110 2. $0.25 \leq \text{mAs} \leq 0.90$ @ 30 p/s & kV ≤ 125 3. Up to 1.8 mAs @ 15 p/s & kV ≤ 125 4. Up to 2.8 mAs @ 10 p/s & kV ≤ 125 5. Up to 3.6 mAs @ 7.5 p/s & kV ≤ 125 6. Up to 5.0 mAs @ ≤ 5 p/s & kV ≤ 125										
Pulse rate	0.25 up to 30 p/s (7 pulse rates available at the operator console).										

DUAL FLUORO: Permits to switch from pulsed to continuous Fluoro at the Epsilon operator console, and vice versa.

ANODE ROTATION: Low, high or RAD speed.

FOCAL SPOT : Continuous Fluoro: Small filament (large filament if small filament opens);
Pulsed Fluoro: Small or large filament, as a function of the tube mA.

ALARM : Continuous alarm every 5-minute Fluoro interval. The alarm is shut down by pressing a key on the Epsilon console or by using a digital input to the generator.

TIMER : Cumulative timer display resettable by pressing a key on the Epsilon console.

SHUTDOWN: Fluoro shutdown after 10 minutes of uninterrupted Fluoro.

FLUORO ENTRANCE EXPOSURE RATE:

Two distinct Fluoro entrance exposure rates are supported. The generator controls the Fluoro surface dose rate as a function of the kV, pulse rate and, optionally, of the source-to-patient distance (Table 6). Before using the generator clinically, the maximum Fluoroscopic entrance exposure rate must be adjusted by the service representative using **Epsilon** PC Tools.

Table 6- Fluoroscopic Entrance Exposure Rate Critical Parameters

Parameter	Controlled/Set by	Setting
kV	Generator	Set to maximum Fluoro kV
Pulse rate ⁽¹⁾	Generator	Set to maximum pulse rate
SPD minimum	User	Set to minimum SPD
mA in Continuous Fluoro	User	0.2 to 12.5 mA
mAs / pulse ⁽¹⁾	User	0.08 to 5.0 mAs

(1) In Pulsed Fluoro.

ABS CURVES:

Four (4) service programmable kV/mA tracking curves are provided to improve the contrast during ABS stabilization. The current ABS curve can be changed from the operator console.

2.3.3 High Performance Pulsed Fluoroscopy Option

This option allows doing Pulsed Fluoroscopy on standard X-ray tubes, with no grid, in Dose reduction mode or in Image Enhancement mode.

- **Dose Reduction mode:** This mode reduces the total Fluoro dose to the patient by decreasing the pulse rate operation.
- **Image Enhancement mode:** This mode improves the image contrast at lower Fluoro speeds by increasing the mAs per pulse, using a programmable mAs factor. When Fluoro is performed at a pulse rate slower than maximum, the instantaneous Fluoroscopic entrance exposure rate might be increased by a certain amount (programmable factor). This feature enhances the image quality without being detrimental to the total Fluoroscopic entrance exposure rate, as depicted in Table 8, next page.

Table 7- High Performance Pulsed Fluoro Loading Factors

kV range	40 to 125 kV, in one-kV steps, with programmable kV range.
mAs range	From 0.025 up to 5.0 mAs @ any pulse rate and any kV.
Pulse rate	0.25 up to 30 p/s (7 pulse rates available at the operator console). Up to 90 p/s with High Frame Rate option.

Table 8- High Performance Pulsed Fluoro (Typical Setup)

I -Dose Reduction Mode			
	p/s	Dose to Patient	mAs/min
Reduces the total Fluoro dose to the patient by decreasing the pulse rate operation.	30	Total dose to patient	(mAs/min) x 1
	15	One half total dose to patient	(mAs/min) ÷ 2
	10	One third total dose to patient	(mAs/min) ÷ 3
	7.5	One fourth total dose to patient	(mAs/min) ÷ 4
	5.0	One sixth total dose to patient	(mAs/min) ÷ 6
	3.75	One eighth total dose to patient	(mAs/min) ÷ 8
II -Image Enhancement Mode			
	p/s	Image Enhancement	mAs Factor
Improves the image contrast (greater mAs/pulse) at lower Fluoro speeds using a mAs correction factor.	30	No	mAs <input type="text" value="x 1"/>
	15	Yes	mAs <input type="text" value="x 2"/>
	10	Yes	mAs <input type="text" value="x 3"/>
	7.5	Yes	mAs <input type="text" value="x 4"/>

ENTRANCE EXPOSURE RATE (HIGH PERFORMANCE PULSED FLUORO)

Two distinct Fluoro entrance exposure rates are supported. The generator controls the Fluoro surface dose rate as a function of the kV, pulse rate and, optionally, of the source-to-patient distance. Before using the generator clinically, the maximum Fluoroscopic entrance exposure rate must be adjusted by the service representative using **Epsilon** PC Tools (Table 9).

Table 9- H.P. Pulsed Fluoroscopic Entrance Exposure Rate Critical Parameters

Parameter	Controlled/Set by	Setting
kV	Generator	Set to maximum Fluoro kV
Pulse rate	Generator	Set to maximum pulse rate
SPD minimum	User	Set to minimum SPD
SPD maximum ⁽¹⁾	User	Set to maximum SPD
mAs / pulse	User	0.025 to 5.0 mAs
Image Enhancement factor	User	See Table 8
(1) With SPD Dose Compensation option.		

2.3.4 High Power Fluoroscopy Option

High Power Fluoro allows performing continuous Fluoroscopy on certain X-ray tubes, with tube loading up to 140 kV and 20 mA.

2.4 AEC/ABS Interfaces

2.4.1 AEC Interface

Two ion chambers are supported on the standard Epsilon generator. Other AEC sensors can be interfaced, depending on the generator configuration.

- **Ionization chambers**

Each chamber supports 3 user-selectable fields and 3 film-screen correction tables to compensate for film density relating to film-screen kV curve characteristics. Compensation ranges from – 80 % up to + 130 % of the phototiming level, for 12 kV stations, from 42 through 133 kV. Additional ion chambers are provided as an option:

Optional board	Number/Type of AEC Chamber
Photodiode Ion Chamber Fluoro board P/N 11030.000	2 conventional ion chambers (*)
Universal Chambers Interface Board P/N 11002.000	1 conventional ion chamber (*) 3 solid state chambers (**)

(*) Usable input signal range from 0.1V to 10V or from - 0.1V to -10V.

(**) Usable input signal range from 0.1V to 10V.

- One **photomultiplier tube** (Requires the Fluoro PMT board P/N 9822.00). Gain is adjusted via a high voltage bias supply which can be varied from about – 200 V to about – 950 V.
- One **photodiode** (Requires the Photodiode Ion Chamber Fluoro board P/N 11030.000). Usable input signal range is from about 12.5 mV to 9 V or from about – 12.5 mV to – 9 V.

Optical density adjustment

Six clinically significant optical density corrections are provided with the AEC mode, varying from the standardized optical density N= 1 (Figure 3).

Optical density correction (Ion Chamber)						
0.57	0.69	0.83	1	1.2	1.45	1.75
- 3	- 2	- 1	Normal	+ 1	+ 2	+ 3
75 %	82 %	90 %	100 %	110 %	121 %	133 %
Optical density correction (PMT or Photodiode)						

Figure 3 – Useful range of optical densities in AEC mode.

Photo-timing range	Minimum irradiation time	:	5 ms
	Maximum mAs	:	600 mAs

2.4.2 ABS Interfaces

Different ABS sensors can be interfaced for automatic stabilization of Fluoro image depending on the generator configuration.

Pulsed Fluoroscopy

- **Photomultiplier tube;** Requires the Fluoro PMT board P/N 9822.00. Gain is adjusted via a high voltage bias supply which can be varied from about -200V to about -950V.
- **Photodiode;** Requires the Photodiode Ion Chamber Fluoro board P/N 11030.000. Usable input signal range is from about 12.5 mV to 9 V or from about -12.5 mV to -9 V.
- **Ionization chamber:** See “Ionization chambers” in Section 2.4.1.

Continuous Fluoroscopy

- **Photomultiplier tube;** Requires the Fluoro PMT board P/N 9822.00. Gain is adjusted via a high-voltage bias supply which can be varied from about -200V to about -950V.
- **Photodiode;** Requires the Photodiode Ion Chamber Fluoro board P/N 11030.000. Usable input signal range is from about 5 mV to 1 V or from about -5 mV to -1 V.
- **CCD camera or flat panel detector;** Usable input signal range is from 0.1V to 10V or from -0.1V to -10V.

3.0 MISCELLANEOUS

3.1 X-ray Tube Interface

NUMBER: One standard dual focal spot X-ray tube supported.
Optional 2-tube configuration available.

MODELS: Most popular X-ray tube models are supported through a *built-in* X-ray tube chart. Other X-ray tube models may be added by field service representative.

> Current range : Up to 8.1 amperes (A_{RMS})

> Filament power : Maximum 100 watts

TUBE DERATING: The tube can be derated to extend its usable lifetime, to troubleshoot specific conditions or for other reasons.

ANODE DRIVE : Integrated Low or Dual Speed Rotor Controller.

3.2 Audible Alarms

Table 10- Audible Alarms

Alarms in Fluoro	
Fluoro Alarm	Tone
“Fluoro beam-on” alarm ⁽¹⁾	Pulsed tone: Low Fluoro=> 1 beep/2 seconds High Fluoro => 1 beep/second
“Fluoro 5-minute elapsed” alarm ⁽²⁾	Continuous tone
“Anode H.U. over 80%” alarm	Pulsed tone (2 beeps per second)
“System Fault” alarm	4 consecutive beeps
1. This alarm is heard in the X-ray room only and requires the presence of an external buzzer (not provided with the generator). 2. The alarm is shut off by pressing the Alarm Reset key at the Epsilon Operator Console.	
Alarms in RAD	
Exposure Alarm	Tone
“X-ray beam-on” alarm	Continuous tone
“80 % of maximum run length” alarm	Pulsed tone (2 beeps per second)
“Anode H.U. over 80%” alarm	Pulsed tone (2 beeps per second)
Exposure Fault and B.U.T. alarms	4 consecutive beeps

3.3 Electrical Requirements

The generator requires a three-phase electrical line with a protective earth ground (4 or 5 wires^(*)). Standard line regulation from no load to full load will provide full power output, at maximum kV.

Table 11- Power Ratings and Electric Line Requirements

Epsilon Configuration	Mains Voltage $V_{AC} \pm 10\%$ (3 Phases) ^(1,2)	Apparent Resistance of Supply Mains (Ω) ⁽³⁾	Over-current Releases ⁽⁴⁾ (A)	Nominal Electric Power			
				Short Term		Long Term ⁽⁶⁾ RAD/Fluoro	
				(A) ⁽⁵⁾	(KVA)	(A)	(KVA)
EPS 30	400V	0.44	60	59	40	5.0/7.0	2.0/3.4
	480V	0.64		46	39		2.4/4.1
EPS 45	400V	0.22	80	85	58	5.0/7.0	2.0/3.4
	480V	0.32		72	60		2.4/4.1
EPS 50	400V	0.17	100	102	68	5.0/7.0	2.0/3.4
	480V	0.24		85	70		2.4/4.1
EPS 55	400V	0.17	115	109	73	5.0/7.0	2.0/3.4
	480V	0.22	100	92	76		2.4/4.1
EPS 65	400V	0.17	150	124	85	5.0/7.0	2.0/3.4
	480V	0.16	100	105	88		2.4/4.1
EPS 70	400V	0.17	150	132	90	5.0/7.0	2.0/3.4
	480V	0.16	115	112	93		2.4/4.1
EPS 80	400V	0.11	150	150	102	5.0/7.0	2.0/3.4
	480V	0.16		125	105		2.4/4.1

Notes

- (1) Automatic mains line selection (no transformer tap configuration required). Automatic kW derating when mains line voltage drops below -12%.
- (2) Line Frequency tolerance from 47 to 63 Hz.
- (3) With lower (better) impedance lines, expect approx. 15% more current in Epsilon input current.
- (4) Circuit breaker shall be supplied by customer. Thermal breaker type recommended. The over-current releases values are suggested figures only. The selected value should have current rating versus time curve characteristics higher than the ratings specified. Consult a qualified electrical contractor to comply with local electrical bylaw and site electrical installation.
- (5) Nominal line current values; if electric line goes to minus 10%, the input current will then increase by 10%.
- (6) Values based on Continuous Fluoroscopy at 125 kV @ max. 10 mA for **EPS RF** configurations and on standby mode for **EPS RAD** configurations (no continuous X-ray for RAD High-Voltage generators). For High Performance Fluoro optional configuration (140 kV @ max. 20 mA), the long-term current nominal values are 9.2A/6.4KVA (@ 400 VAC) and 7.7A/6.4KVA (@ 480 VAC).

(*) Maximum wire gauge : 0 AWG (50 mm)

3.4 Environmental Conditions

TEMPERATURE

- Storage : - 25 to + 70°C
- Operating : + 10 to + 40°C

HUMIDITY

- Storage : 30 to 95 %, non-condensing
- Operating : 30 to 75 %, non-condensing

SYSTEM BTU

200 BTU/hr in idle

ATMOSPHERIC PRESSURE

700 hPa to 1060 hPa (hectoPascal)

AUDIBLE NOISE Less than 52 dbA @ 1 m

VIBRATION SHOCK Product packaged to meet air-sea-ground transportation requirements

PRODUCT DISPOSAL



At the end of its usable lifetime, no particular action is necessary for the disposal of the product except those locally in force at the installation site.

3.5 Physical Dimensions

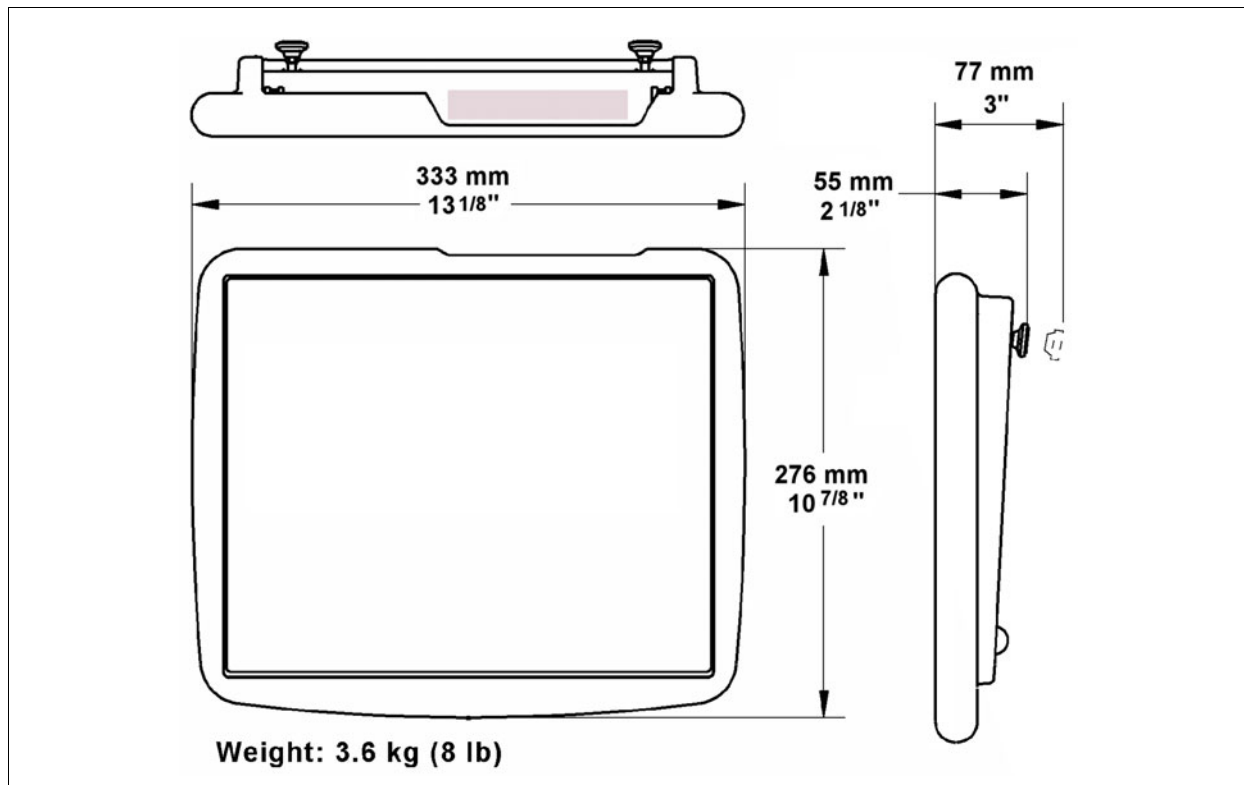
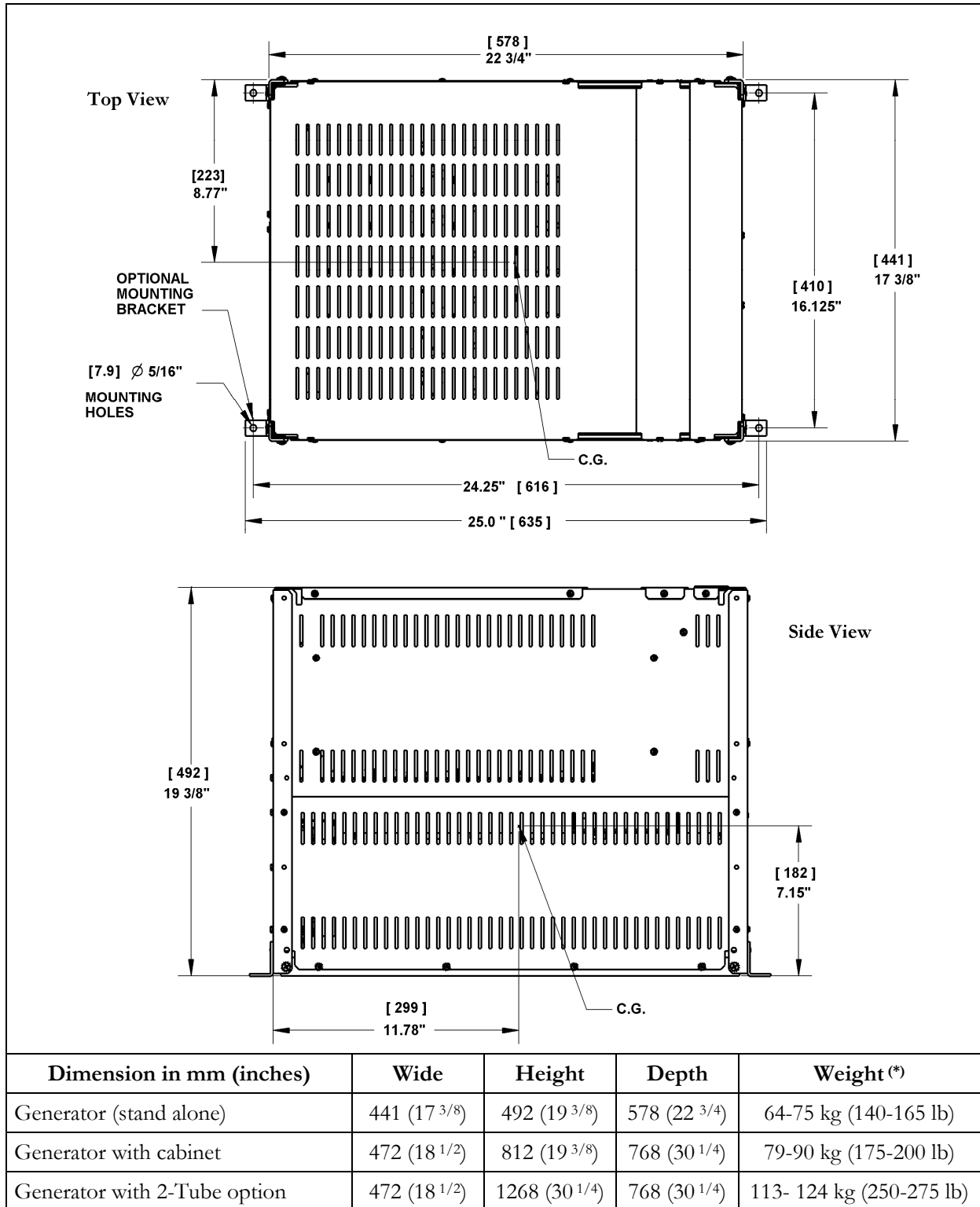


Figure 4 – Operator Console Dimensions.



(*) Approximately, as a function of power configuration

Figure 5 – Epsilon Dimensions; Center of Gravity (C.G.)

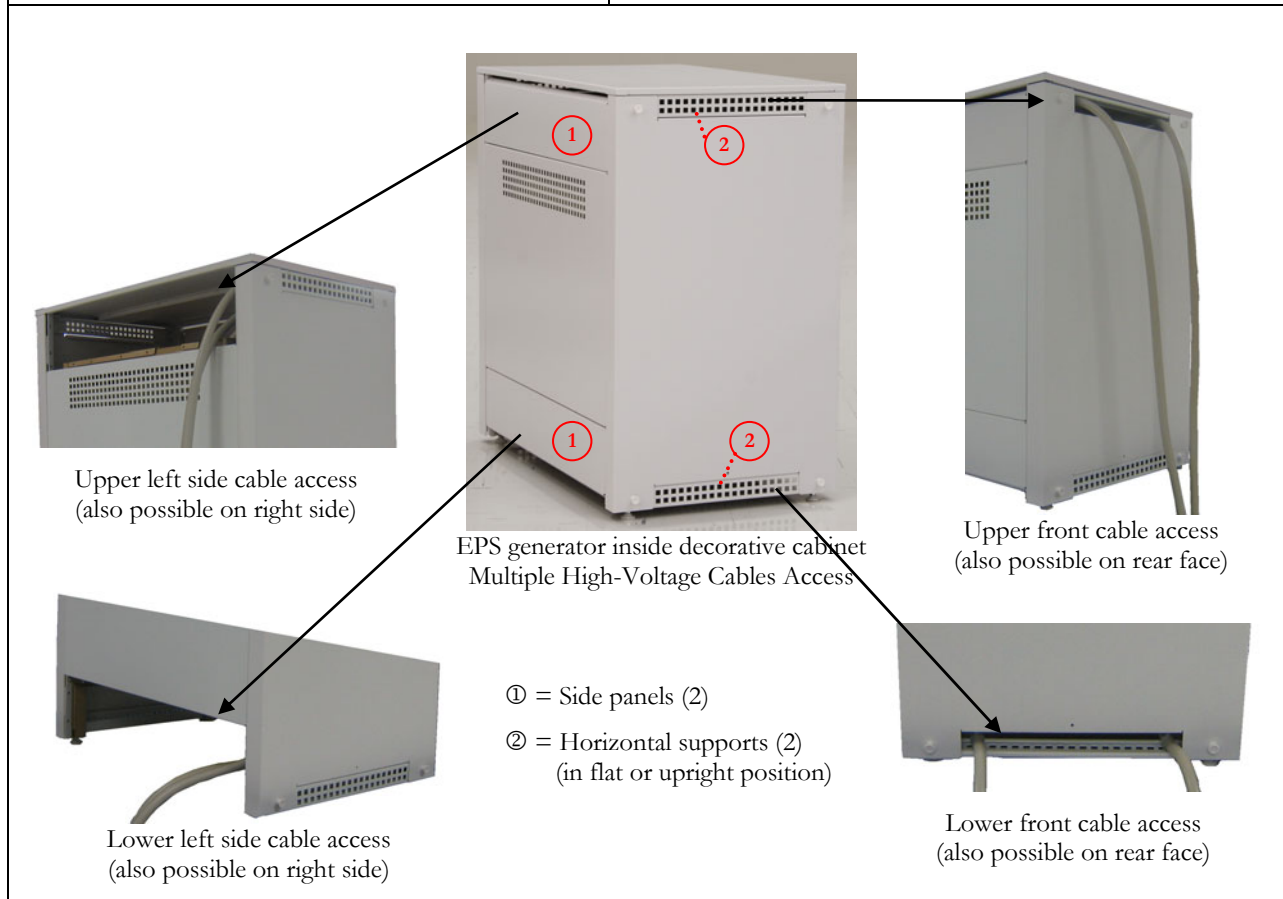
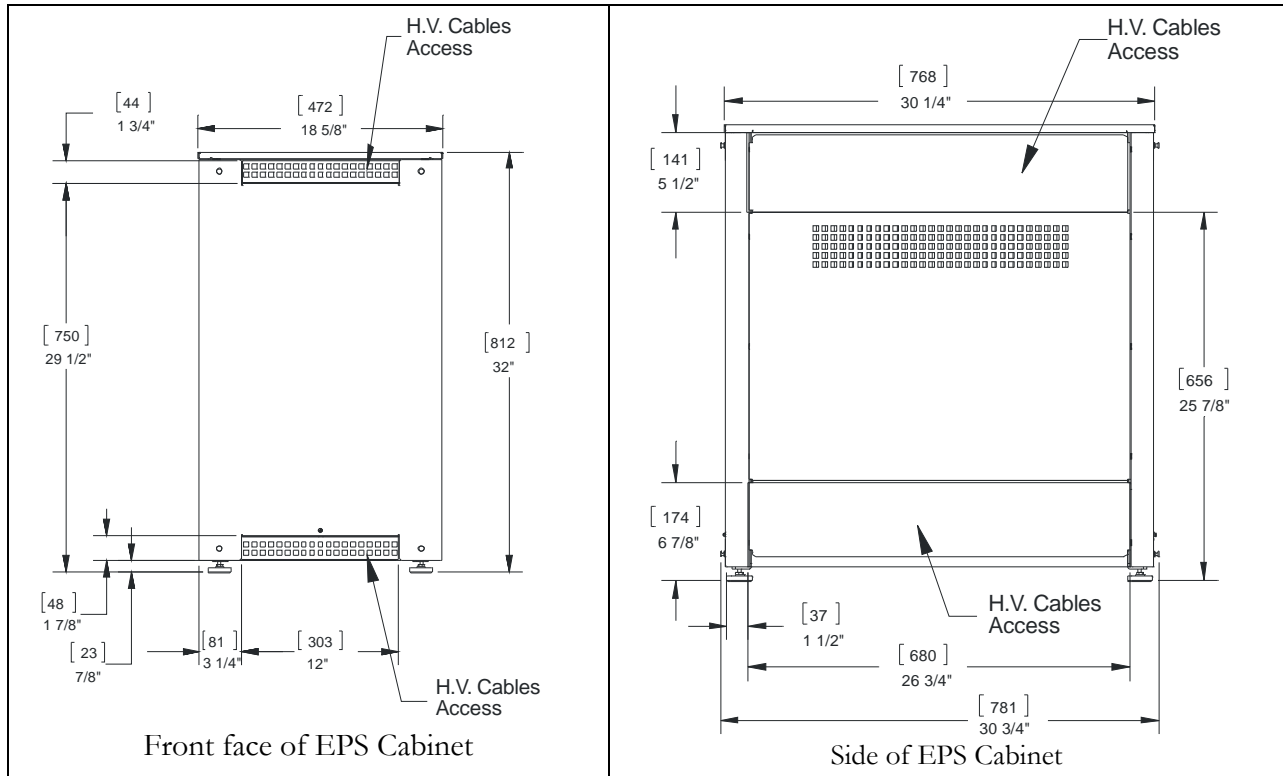


Figure 6 – Decorative Cabinet dimensions and different possible cable access.

3.6 Regulation and Quality Approvals

Table 12- Regulatory Standards

Market	Type	Standard
Canada		CSA C22.2 No. 601-1
USA	Safety	UL 60601-1 & IEC 60601-2-7
	Health	This equipment complies with the Radiation Performance, 21CFR, Sub-chapter J.
Europe	EN 60601-1; EN 60601-1-2; EN 60601-1-3 EN60601-2-7; EN 60601-1-4 Based on the declaration of conformity, this unit complies with European harmonized standards for the application of the CE Mark.	
<p><u>Note</u> The conformity is based on the equipment configured and interconnected as described in the Technical Manual. Changes or modifications to this equipment not expressly approved by emd technologies could void its conformity to applicable standards.</p>		