



## RAD EPS 45-80 High-Voltage Generator

### PRODUCT SPECIFICATION

Copyright application © 2007, 2008 by **emd technologies** Inc. All rights reserved. **emd technologies** and the EMD Technologies logo are trademarks of **emd technologies** Inc., registered in the U.S.A. and other countries.

Contents of this publication may not be reproduced in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system without the written permission of **emd technologies** Inc., 400 rue du Parc., Saint-Eustache (Québec), Canada, J7R 0A1.

**TABLE OF CONTENTS**

|   |    |
|---|----|
| 1.0 INTRODUCTION TO EPSILON HIGH-VOLTAGE GENERATORS ..... | 3  |
| 1.1 Epsilon Platform & Configurations .....               | 3  |
| 1.2 Technological Landmark .....                          | 4  |
| 1.3 Epsilon Main Features.....                            | 4  |
| 1.4 Optional Features.....                                | 5  |
| 2.0 TECHNICAL SPECIFICATIONS.....                         | 7  |
| 2.1 X-ray Power .....                                     | 7  |
| 2.2 RAD Specifications.....                               | 8  |
| 2.3 AEC Interfaces .....                                  | 10 |
| 3.0 MISCELLANEOUS.....                                    | 11 |
| 3.1 X-ray Tube Interface .....                            | 11 |
| 3.2 Audible Alarms.....                                   | 11 |
| 3.3 Electrical Requirements .....                         | 12 |
| 3.4 Environmental Conditions .....                        | 13 |
| 3.5 Physical Dimensions.....                              | 13 |
| 3.6 Regulation and Quality Approvals.....                 | 16 |

*Specifications are subject to change without notice – May 01, 2008 – Copyright emd technologies 2008*

## 1.0 INTRODUCTION TO EPSILON HIGH-VOLTAGE GENERATORS

### 1.1 Epsilon Platform & Configurations

The **Epsilon™ High-Voltage generator** is an *Advanced High Frequency X-ray Generator* designed with a unique power inverter technology and modular conception.

As more power or custom features are needed, they are simply added using plug-in modules quickly inserted to the generator's main core. The latter consists of an electronic controller driving an encapsulated (oil-free) high-voltage unit. The generator comes in different configurations, best suited to conventional RAD and to the latest digital procedures. Features and options are summed up in Table 1 below and described later in the text.

**Table 1-** Main Configurations of EPS 45-80 High-Voltage Generator

| Conf.<br>(1/2)   | Power  | Epsilon Console                  |               | Anode Starter                              | HPR | 2-T | Dc  | Pd |
|--|--------|----------------------------------|---------------|--|-----|-----|-----|----|
|  |        | O <sup>(1)</sup>                 | Hs            |  |     |     |     |    |
| EPS 30   | 30 kW  | O <sup>(1)</sup>                 | Hs            | Low/Dual                                   | No  | O   | O   | O  |
| EPS 45   | 45 kW  | O                                | Hs            | Low/Dual                                   | No  | O   | O   | O  |
| EPS 50   | 50 kW  | O                                | Hs            | Low/Dual                                   | No  | O   | O   | O  |
| EPS 55   | 55 kW  | O                                | Hs            | Low/Dual                                   | No  | O   | O   | O  |
| EPS 65   | 65 kW  | O                                | Hs            | Low/Dual                                   | No  | O   | O   | O  |
| EPS 70   | 70 kW  | O                                | Hs            | Low/Dual                                   | No  | O   | O   | O  |
| EPS 80   | 80 kW  | O                                | Hs            | Low/Dual                                   | O   | O   | O   | O  |
| <b>Hs :</b> Optional Handswitch  |        | <b>2-T:</b> 2-Tube option        |               | <b>Pd:</b> Pedestal Stand                  |     |     |     |    |
| <b>HPR:</b> High Performance Radiography                                   |        | <b>Dc :</b> Decorative Cabinet   |               |  |     |     |     |    |
| Conf.<br>(2/2)   | A.P.S. | Relay                            | AEC Interface |  |     |     | DAP |    |
|  |        |                                  | Ion           | S.S. Ion <sup>(2)</sup>                    | PhD | PMT |     |    |
| All config.  | O      | O                                | 2             | O  | O   | O   | O   |    |
| <b>A.P.S.:</b> Auxiliary Power Supplies<br>(24 VDC or 24 VDC/24VAC)        |        | <b>Ion :</b> Ion chamber         |               | <b>S.S. Ion :</b> Solid State Ion Chambers |     |     |     |    |
| <b>Relay:</b> Relay board (8 progr. relays)                                |        | <b>PhD:</b> Photodiode           |               | <b>DAP:</b> Dose Area Product              |     |     |     |    |
|  |        | <b>PMT:</b> Photomultiplier tube |               |  |     |     |     |    |
| <b>Notes:</b> (1) O = Option (2) Solid state ion chamber interface option. |        |                                  |               |  |     |     |     |    |

## 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.

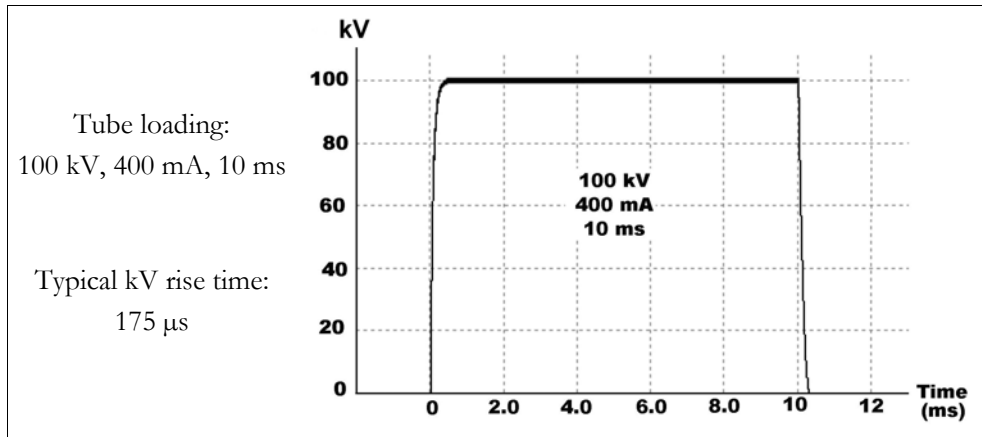


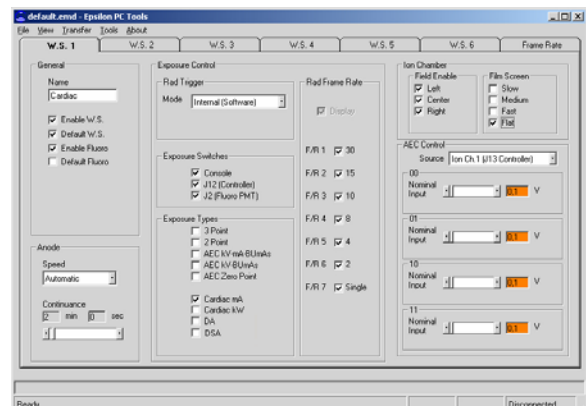
Figure 1 – Typical kV Waveform.

## 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.

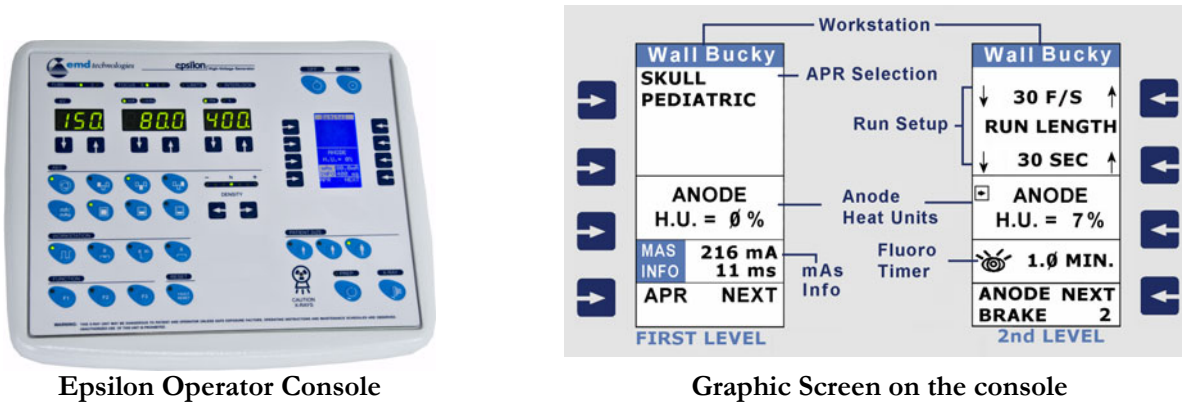
## 1.4 Optional Features

### 1. Epsilon Operator Console P/N 9777.01 (.21)

The Epsilon RAD Operator Console is an elegant X-ray control panel affording simple control of the EPS 45-80 High-Voltage generator. It manages 4 configurable workstations with 3 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.



**Figure 2**

### 2. High Performance Radiography P/N 10010.000

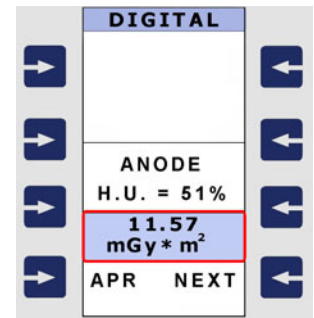
High Performance Radiography option is available on EPS 80R configuration. It extends the irradiation time from 10 seconds to 63 seconds, and the mAs factor from 1000 up to 12,500 mAs on some X-ray tubes.

### 3. 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.

**4. 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.



**5. 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.

**6. Auxiliary Power Supplies P/N 10023.001**

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

**7. Falling Load P/N 10013.000**

This option allows the generator to initiate an AEC-mAs exposure at a higher tube current value, after which the mA drops as the exposure proceeds.

**8. 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.

**9. Decorative Cabinet P/N 10017.001**

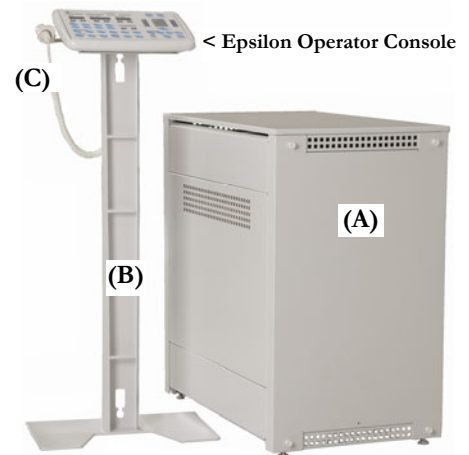
This option (A) affords mechanical enclosure of the generator by providing a high quality cabinet that covers the **Epsilon** High-Voltage generator and hides out the mains cable entry. Multiple passageway configurations are possible for High-Voltage cables.

**10. Custom Pedestal Stand P/N 10003.000**

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

**11. 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           |
| <b>EPS 30</b>     | 150 kV<br>30 kW | 120 kV<br>30 kW | 93 kV<br>30 kW  | 75 kV<br>30 kW  | --              | --              | --              | --             |
| <b>EPS 45</b>     | 150 kV<br>30 kW | 150 kV<br>37 kW | 140 kV<br>45 kW | 112 kV<br>45 kW | 90 kV<br>45 kW  | --              | --              | --             |
| <b>EPS 50</b>     | 150 kV<br>30 kW | 150 kV<br>37 kW | 150 kV<br>48 kW | 125 kV<br>50 kW | 100 kV<br>50 kW | 79 kV<br>50 kW  | --              | --             |
| <b>EPS 55</b>     | 150 kV<br>30 kW | 150 kV<br>37 kW | 150 kV<br>48 kW | 137 kV<br>55 kW | 110 kV<br>55 kW | 87 kV<br>55 kW  | --              | --             |
| <b>EPS 65</b>     | 150 kV<br>30 kW | 150 kV<br>37 kW | 150 kV<br>48 kW | 150 kV<br>60 kW | 130 kV<br>65 kW | 103 kV<br>65 kW | 81 kV<br>65 kW  | --             |
| <b>EPS 70</b>     | 150 kV<br>30 kW | 150 kV<br>37 kW | 150 kV<br>48 kW | 150 kV<br>60 kW | 140 kV<br>70 kW | 111 kV<br>70 kW | 87 kV<br>70 kW  | --             |
| <b>EPS 80</b>     | 150 kV<br>30 kW | 150 kV<br>37 kW | 150 kV<br>48 kW | 150 kV<br>60 kW | 150 kV<br>75 kW | 127 kV<br>80 kW | 100 kV<br>80 kW | 80 kV<br>80 kW |

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

## 2.2 RAD Specifications

**WORKSTATIONS** : 4 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 3 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 <sup>(1)</sup> ; | 630 <sup>(2)</sup> ; | 800 <sup>(3)</sup> ; | 1000 <sup>(4)</sup> . |

- (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 <sup>(1)</sup> to 10 seconds, with 25% increment steps (41 stations).

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

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

**MAS** : From 0.4 to 1000 mAs <sup>(1)</sup>, 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 <sup>(2)</sup> ; | 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 2.3).


**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 <b>time</b> factors.   |
| Two-point   | Loads the tube at specific kV and <b>mAs</b> factors.  |
| AEC mode  | Loads the tube ...   |
| AEC-mA  | <ul style="list-style-type: none"> <li>At specific kV &amp; mA factors and adjustable backup time (for a given kV);</li> </ul>   |
| AEC-mAs   | <ul style="list-style-type: none"> <li>At specific kV &amp; backup mAs factors;</li> </ul>   |
|   | ... 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 (4 <sup>2</sup> ). 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 AEC Interfaces

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 (*)<br>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 optional 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 optional 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

### 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 5-** Audible Alarms

| Exposure Alarm                     | Tone                                    |
|------------------------------------|---|
| “X-ray beam-on” alarm              | Continuous tone                         |
| “80 % of maximum run length” alarm | Pulsed tone (2 <i>beeps</i> per second) |
| “Anode H.U. over 80%” alarm        | Pulsed tone (2 <i>beeps</i> 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<sup>(\*)</sup>). Standard line regulation from no load to full load will provide full power output, at maximum kV.

**Table 6-** Power Ratings and Electric Line Requirements

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

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 standby mode for **EPS RAD** configurations (no continuous X-ray for EPS RAD generators).

(\*) 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

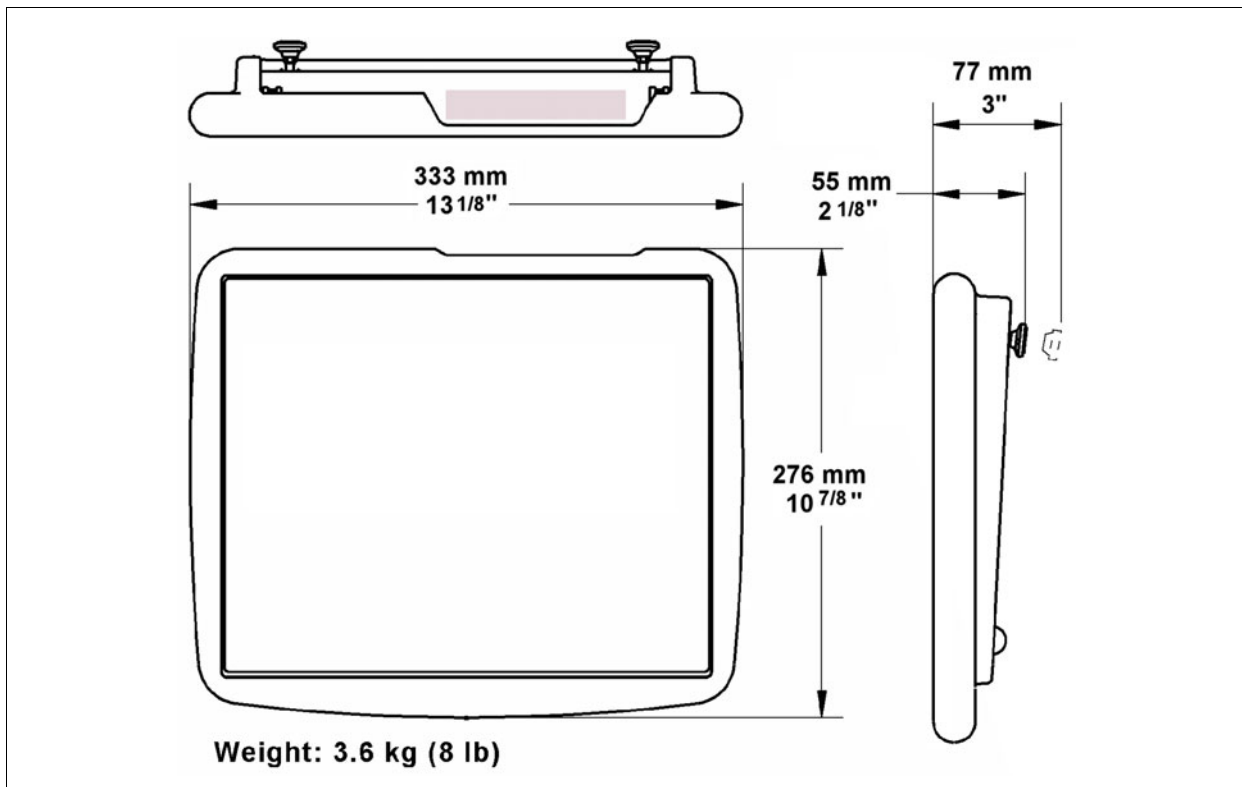
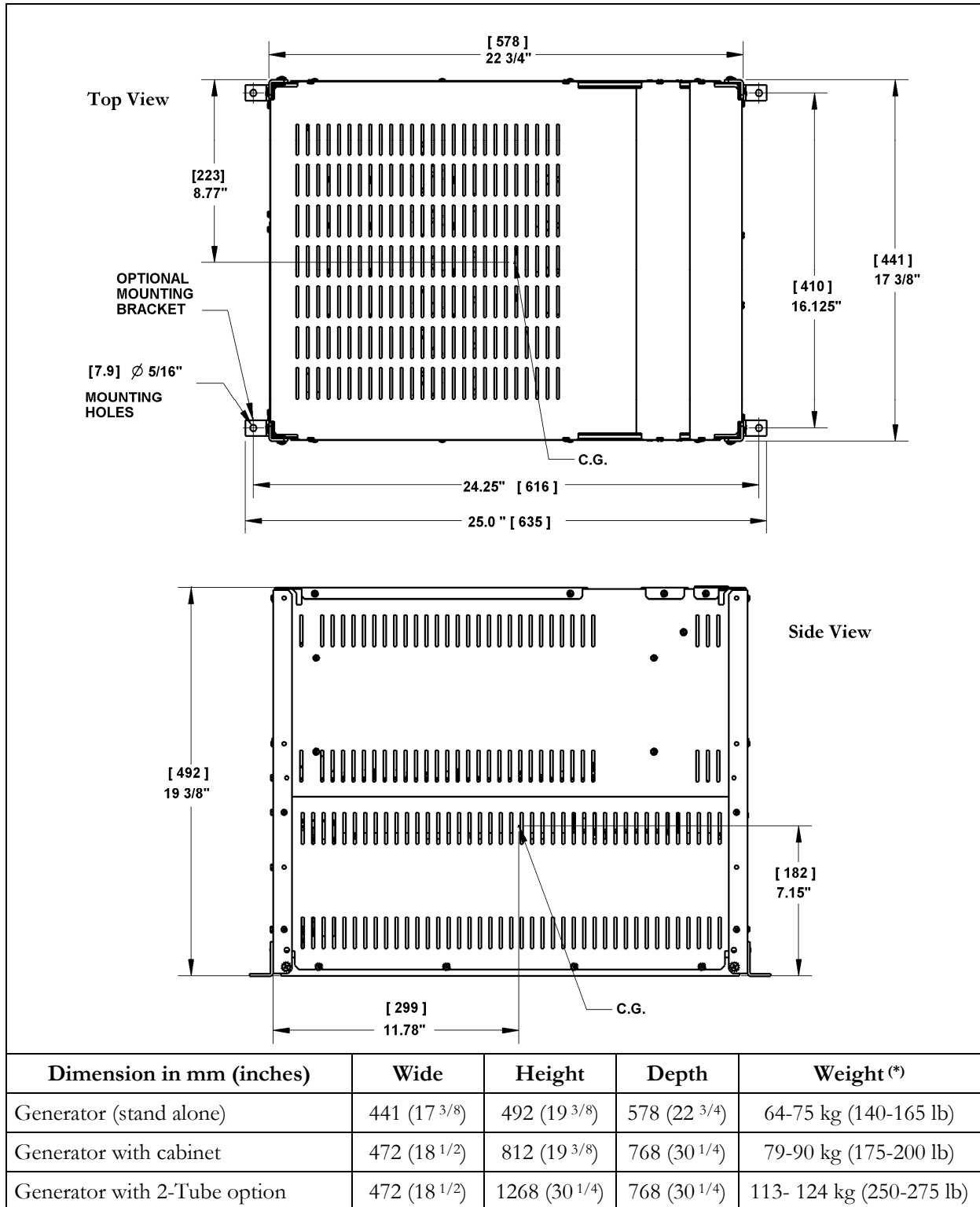


Figure 4 – Optional Operator Console Dimensions.



(\*) Approximately, as a function of power configuration

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

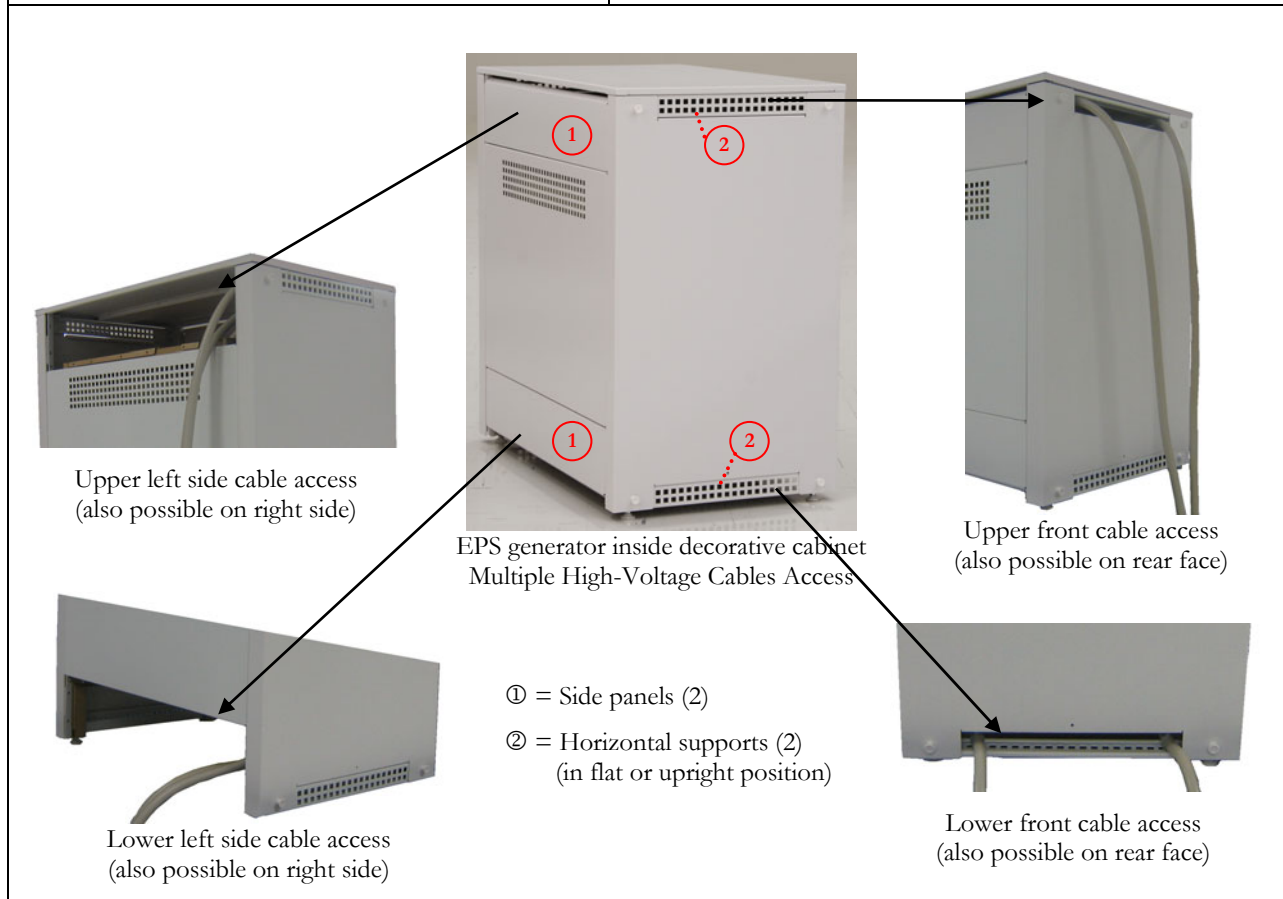
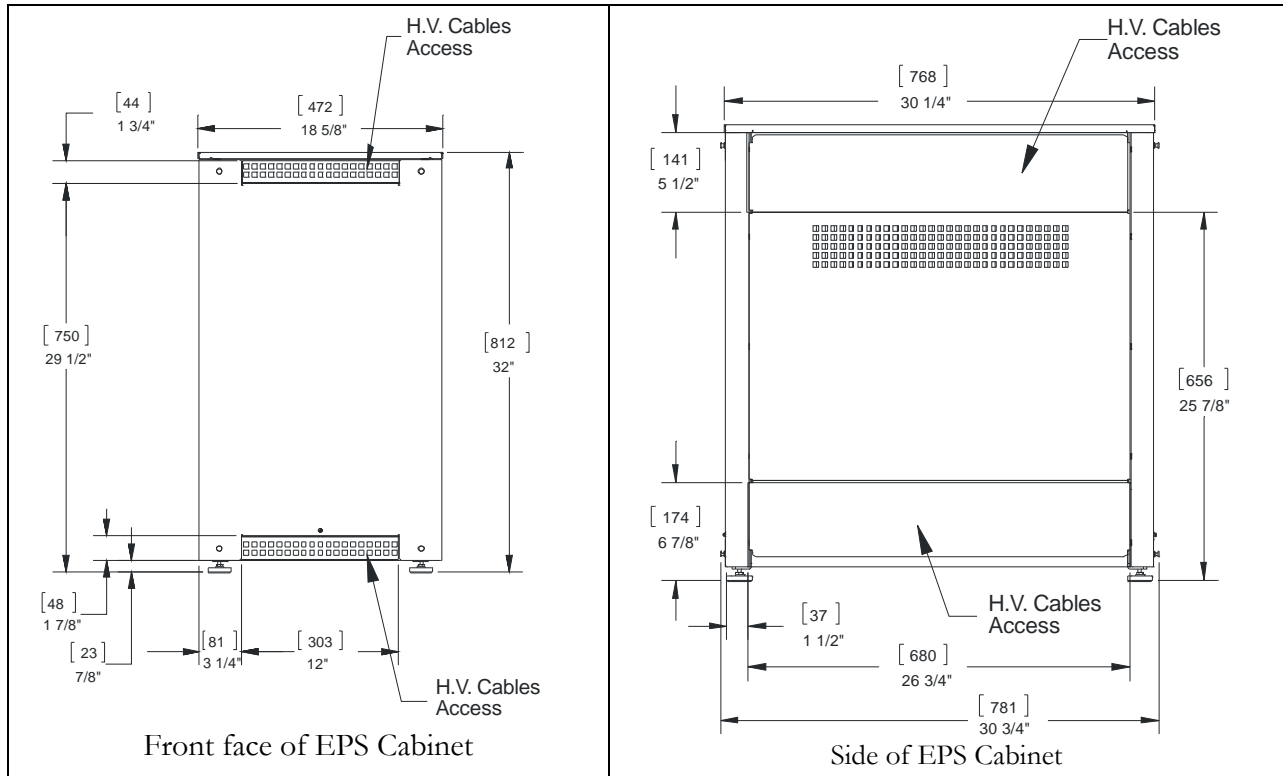


Figure 6 – Decorative Cabinet dimensions and different possible cable access.

### 3.6 Regulation and Quality Approvals

Table 7- 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<br>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 <b>emd technologies</b> could void its conformity to applicable standards.</p> |   |   |