



- **Custom Designed Specifically for Mammography Applications**
- **Compact Space Saving Modular Format**
- **Fast Settling Helps Minimize Unnecessary Patient Radiation Exposure**
- **Dual Speed Starter, Boost/Brake Capability**
- **RS-232 and Optional Ethernet Interfaces**
- **Low Cost, Value Added Design**

Spellman's VMX redefines the standard for high performance, low cost Mammography X-Ray generators. The VMX was born from an integrated, high performance, value added design perspective so there's no need to compromise critical specifications to meet ever demanding system price targets.

The 40kV/5kW X-Ray generator integrates a dual filament power supply and a dual speed starter. A DC current source filament power supply provides fast rise times with stable and accurate X-Ray tube emission currents. The solid encapsulated high voltage output section eliminates oil concerns while reducing the effects of environmental humidity and contamination.

Flexibility in interfacing is provided via RS-232 and optional Ethernet connectivity. The VMX supports advanced mammography application features including Smart AEC Exposure, Automatic Filament Calibration, Tube Anode Heat Calculator and user configurable Tube Library. Compact, full featured, high performance, low cost. Spellman's VMX, the next generation Mammography X-Ray generator.

### SPECIFICATIONS

#### Input Voltage:

200-240Vac ( $\pm 10\%$ ), single phase, 50Hz/60Hz

#### Input Current:

Minimum 35A service recommended for 5kW operation  
External EMC Filter (Schaffner FN2070-36-08-36A)  
required to meet CE/EMC specifications – Not provided with the generator

Mains Contactor – Not provided within the generator.  
Customer is responsible for mains safety disconnection.

#### Output Voltage

##### Output Voltage Range:

20kV to 40kV

##### Polarity:

Positive, grounded cathode X-Ray tube

##### Accuracy:

Within 1% of programmed values

##### Reproductibility:

<0.5%

##### Settling Time:

<10ms

#### Ripple:

$\leq 1\%$

#### Stability:

$\leq 0.01\%$  per 8 hours

#### Temperature Coefficient:

$\leq 100\text{ppm}/^\circ\text{C}$

#### Output Current/Power

##### Output Current Range:

10mA to 200mA

##### Output Power:

5kW @ 0.1 second loading time  
30W maximum average power

#### Maximum mAs:

600mAs

#### Exposure Timer:

5ms-10 seconds

#### Accuracy:

Within 2% of programmed values measured after mA rises to stable DC level

#### Reproductibility:

<0.5%

#### Settling Time:

<10ms

#### Filament Configuration:

DC filament drive: self corrected filament preheat settings with closed loop emission control and smart learning algorithm

#### Filament Output:

0-6 amps at a compliance of 5.5 volts, maximum

#### Dual Speed Starter:

High speed (180Hz) and low speed (60Hz) can be configured via the serial interface.  
Boost and Brake capability provided.

#### High Voltage Connector:

60kV, Claymount CA-3 type or equivalent

#### Optional Communication Interface:

Ethernet (RJ45)

#### Grounding Point:

M5 ground stud provided on chassis

#### Environmental:

Temperature Range:  
Operating:  $10^\circ\text{C}$  to  $40^\circ\text{C}$   
Storage:  $-40^\circ\text{C}$  to  $85^\circ\text{C}$   
Humidity:  
20% to 85% RH, non-condensing.

**Cooling:**

Convection cooled, no internal fans.  
Forced air cooling not required

**Dimensions:**

9.38" H X 6.6" W X 12" D  
(237.5mm x 167.6mm x 304.8mm)

**Weight:**

<22 pounds (10kg)

**Regulatory Approvals:**

Compliant to EMC:IEC 60601-1-2. UL/CUL recognized file E242584. RoHS compliant.

**Application Features:**

- 2 point/3 point exposure modes
- AEC/Smart AEC exposure modes
- Automatic filament current calibration
- Tube anode heat calculator
- User configurable tube library

**VMX STANDARD SYSTEM INTERFACE— JB1 25 PIN MALE D CONNECTOR**

PIN	SIGNAL	PARAMETERS
1	GND	Signal Ground
2	+5Vdc Out	+5Vdc, 100mA max.
3	RS-232 Tx Out	RS-232 Transmit
4	RS-232 Rx In	RS-232 Receive
5	PREP	User signal (Contact Closure) to alert the generator that exposure sequence will begin. Once this signal is active, exposure parameters are locked in and cannot be changed. The generator enables the starter to boost the rotor. Contact connection to pin 24. Closed = PREP, the filament is placed in preheat mode
6	READY	Generator signal to user to indicate the rotor runs to speed and the generator is ready for X-Ray exposure Open Collector. Low/Active = Ready
7	ROTOR SHUTDOWN	User signal to brake the rotor drive
8	EXPOSURE	User signal (Contact Closure) to generator to generate X-Rays. Filament is boosted, and high voltage is generated after the boost time. Contact connection to pin 24. Closed = Exposure
9	X-Ray ON 75% Status	Transistor output to indicate X-Ray ON status synchronized with 75% of kVP setting point.
10	X-Ray ON Status	Transistor output to indicate X-Ray ON status synchronized with kV start up.
11	N/C	N/C
12	X-Ray SHUTDOWN/AEC	User signal to generator to rapidly turn HV OFF and ON during serial exposure sequence
13	RS-232 ISO Ground	Isolated ground from RS-232 transceiver IC
14	HVG FAULT Status	Generator signal indicating generator fault. Open collector transistor output. Low/Active = Fault
15	Status Bit 1	3 bit status lines for up to 6 status messages. See separate matrix describing functionality. Open Collector. Low/Active = Message
16	Status Bit 2	
17	Status Bit 3	
18	N/C	N/C
19	N/C	N/C
20	kV Monitor	Signal from generator. 0-10V = 0-40kV. Zout = 1kΩ
21	Emission Monitor	Signal from generator. 0-10V = 0-200mA. Zout = 1kΩ
22	Filament Current Monitor	Signal from generator. 0-10V = 0-6A. Zout = 1kΩ
23	Program/Monitor Return	Ground for reference of program and monitor signals
24	+24Vdc Out	For connection to PREP and EXPOSURE control relay coils
25	SHIELD/GND	For connection of interface cable shield to generator chassis ground

**TB2 ROTOR INTERFACE**

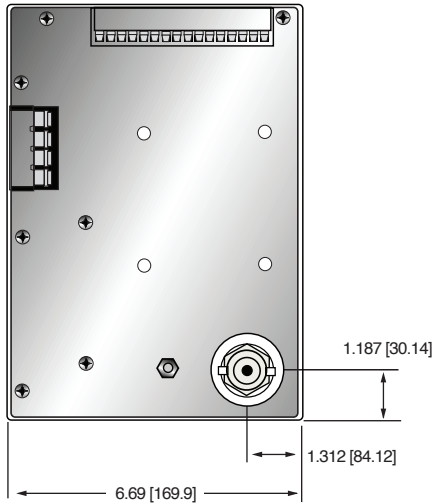
PIN	SIGNAL	PARAMETERS
TB2-1	PHASE	To tube auxiliary winding
TB2-2	RUN	To tube principle winding
TB2-3	COM	To tube common winding
TB2-4	GROUND	To tube housing ground

**TB3 TUBE AND INTERLOCK INTERFACE**

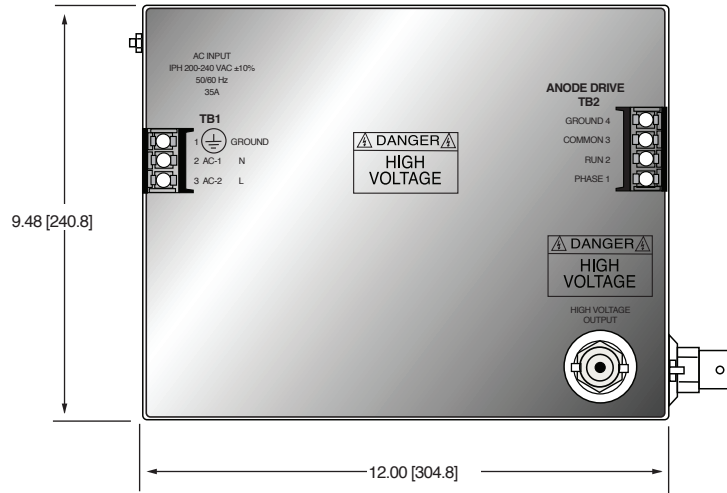
PIN	SIGNAL	PARAMETERS
TB3-1	SMALL FIL	Connection to tube small filament
TB3-2	COMMON	Connection to tube filament common
TB3-3	LARGE FIL	Connection to large filament
TB3-4	GROUND	Generator chassis for cable shield connection
TB3-5	Interlock 2+	Used if tube has separate thermostat switch.
TB3-6	Interlock 2-	Open = OVER TEMP. (short terminals if not used)
TB3-7	Interlock 3+	Used if tube has cooling circulator flow switch.
TB3-8	Interlock 3-	Open = NO FLOW. (short terminals if not used)
TB3-9	Safety Interlock+	User signal (Contact Closure) for safety interlocks such as door interlocks. Open turns HV OFF, or inhibits HV from being generated. Closed = OK 24Vdc @ <1A typical
TB3-10	Safety Interlock-	
TB3-11	Contactors Coil+	Option for contactor coil control
TB3-12	Contactors Coil-	
TB3-13	Spare	N/C
TB3-14	Spare	N/C
TB3-15	Tube Current+	Tube current flows out from this pin
TB3-16	Tube Current-	Tube current flows into this pin

DIMENSIONS: in.[mm]

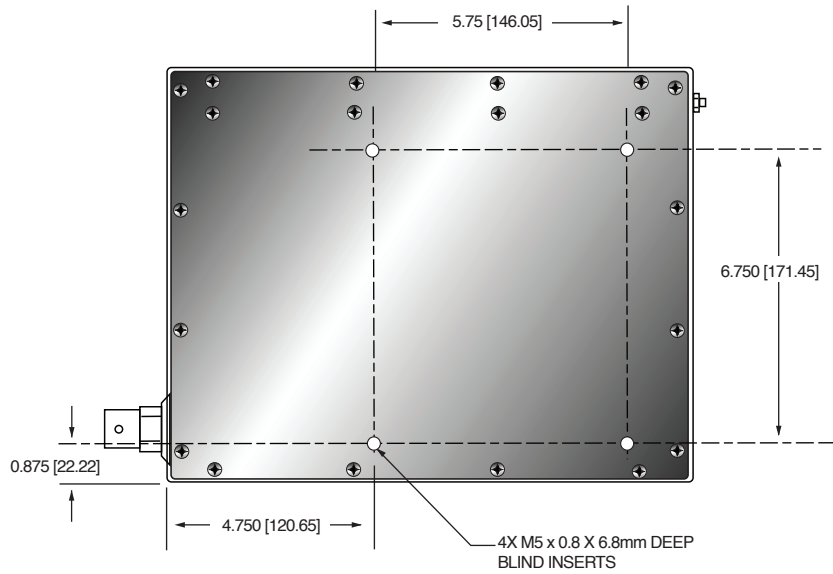
FRONT VIEW



TOP VIEW



BOTTOM VIEW



SIDE VIEW

