MONOBLOCK®
The Integrated X-Ray Source

2 0 2 0

Release Version: 6/6/2020

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Spellman High Voltage... Your Global Resource for High Voltage Power Conversion

MEETING CUSTOMER NEEDS
For over 70 years, Spellman has been helping technology companies grow by providing standard and custom high voltage power converters, X-Ray generators and Monoblock® X-Ray sources of exceptional value and performance and by aligning our procedures, processes and infrastructure to support our customers’ goals – a process we call homologation. At Spellman, homologation is in everything we do. From initial product concept through final delivery, we dedicate a team of experts to work with each customer.

YOUR VISION IS OUR MISSION
Spellman advances medical care, industrial processes, quality control, scientific research, security and telecommunications by providing innovative high voltage power conversion solutions that enable equipment manufacturers to improve their systems’ performance, reliability, cost and bottom line.

- **Innovation & Quality:**
  With over 70 years of high voltage innovation, world-class ISO certified production facilities and global support network, Spellman can meet the needs of discriminating global OEM's system manufacturers.

- **Compliance and Safety:**
  Safety and Regulatory Agency approvals such as: UL, CSA, and IEC can be provided. In addition, Spellman is authorized to conduct UL sanctioned testing.

- **Risk Management:**
  Consistent processes across multiple facilities ensures a secure supply chain. Products can be manufactured at multiple Spellman sites. With standardized manufacturing, training and equipment, you can be assured of quality products and service for years to come.

- **Support and Service:**
  Our globally situated technical support centers are strategically located to provide rapid local response to customer needs. Support Centers are linked through a common ERP system and real-time data reporting so information is always available about your product and delivery status.

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PlasticsSorting
MineralAnalysis
CrystalInspection
X-RayFluorescence
PlatingMeasurement
X-RayDiffraction
ThicknessGauging
CargoScreening
FoodInspection
NDTAnalysis
UnderseaTelecom
SecurityApplications
Radiography
Fluoroscopy
ExtraoralDentalX-Ray
BoneDensitometry
Mammography
MassSpectrometry
CapillaryElectrophoresis
ElectrostaticPrinting
IonBeamImplantation
SemiconductorProcessing
ElectronBeamWelding
CapacitorCharging
HighPowerRFTransmitters

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Spellman has set the standard in development of integrated X-Ray sources with its Monoblock® series.

Our custom OEM designs are used in baggage screening, explosive detection, medical imaging, food inspection, non-destructive testing and many other applications.

A Monoblock® is typically a single assembly containing both high voltage generation components and an X-Ray tube. The physical compactness and inherent elimination of cabling reduces cost and the risk of breakdown making these products extremely reliable. Monoblocks® can be designed in a wide variety of geometries, with beam shape, focal spot size and other critical parameters customized for the application. Digital control via RS-232, Ethernet or USB is available.

<table>
<thead>
<tr>
<th>CURRENT/POWER</th>
<th>MODEL</th>
<th>PAGE</th>
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<td>μXRB130P65</td>
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<td>XRB160PN192</td>
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<tr>
<td>80kV @ 320W</td>
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<tr>
<td>200kV @ 400W</td>
<td>XRB200PN400</td>
<td>46-48</td>
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<tr>
<td>160kV @ 480W</td>
<td>XRB160PN480/1</td>
<td>49-51</td>
</tr>
<tr>
<td>160kV @ 480W</td>
<td>XRB160PN480/2</td>
<td>52-54</td>
</tr>
<tr>
<td>160kV @ 480W</td>
<td>XRB160PN480/CT</td>
<td>55-57</td>
</tr>
<tr>
<td>150kV @ 600W</td>
<td>XRB150PN600</td>
<td>58-60</td>
</tr>
<tr>
<td>160kV @ 688W</td>
<td>XRB160PN688/CT</td>
<td>61-63</td>
</tr>
<tr>
<td>90kV @ 900W</td>
<td>PDM90PN900</td>
<td>64-66</td>
</tr>
<tr>
<td>40-125kV @ 3.5kW</td>
<td>MMB125PN3.5</td>
<td>67-69</td>
</tr>
</tbody>
</table>

- Internal X-Ray tube eliminates maintenance issues with external HV cables/connectors
- Power Factor Correction minimizes input power requirements
- Universal Input circuitry accepts a wide variety of worldwide input voltages
- Sealed, leak-free tank can be mounted in any physical orientation
- Unique radiation shielding minimizes weight while ensuring very low X-Ray leakage
- Standard digital interface simplifies communication and system integration
Spellman’s XRB011 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 80kV at 20W and 80kV at 50W. Features like 24Vdc input voltage, small package size, standard analog interface and RS-232/Ethernet digital interface simplify integrating the XRB011 into your X-Ray system. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability and performance.

**TYPICAL APPLICATIONS**

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Micro focus tube
- Focal Spot: 33μm Nominal, 50μm max. (IEC 336)
- Beam Filter: Ultem 0.060˝ (1.5mm) Oil 0.175˝ (4.4mm)
- Beam Geometry: Symmetrical 40° cone

**Input Voltage:**
- 20W: 24Vdc ±1V @ 2.5A
- 50W: 24Vdc ±1V @ 4A

**X-Ray Tube Voltage:**
Nominal X-Ray tube voltage is adjustable between 35kV to 80kV

**X-Ray Tube Current:**
- 20W: 0-250μA over specified tube voltage range
- 50W: 0-700μA over specified tube voltage range

**X-Ray Tube Power:**
- 20/50W maximum continuous

**Voltage Regulation:**
- Line: ±0.5% for a ±1V change of nominal input line voltage
- Load: ±0.1% for a load change of 25μA to maximum rated current

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within ±1% of the programmed value

**Voltage Risetime:**
Ramp time shall be ≤250ms from 10% to 90% of maximum rated output voltage

**Voltage Temperature Coefficient:**
≤100ppm°C

**Over Temperature Fault:**
Indicates that the internal oil temperature has exceeded 65°C. The high voltage output will be disabled. Toggling the X-Ray ON Command OFF and ON will reset the fault.

**Over Voltage Fault:**
An overvoltage (OV) fault is detected when the output voltage exceeds 82kV. The high voltage output will be disabled. Toggling the X-Ray ON Command OFF and ON will reset the fault.

**Voltage Ripple:**
1% peak to peak

**Current Regulation:**
- Line: ±0.5% for a ±1V change of nominal input line voltage
- Load: ±0.5% for a voltage change of 35kV to 80kV

**Current Accuracy:**
Current measured through the X-Ray tube is within ±2.5% of the programmed value

**Over Current Fault:**
An overcurrent (OC) fault is detected when the emission current exceeds 275μA (20W model) and 710μA (50W model). Toggling the X-Ray ON Command OFF and ON will reset the fault.

**Arc Intervention:**
One arc fault. The high voltage output will be disabled. Toggling the X-Ray ON command OFF and ON will reset the fault.

**Filament Configuration:**
Internal high frequency AC filament drive with closed loop filament emission control

**Analog Interface:**
Ground referenced 10kV/V, 25μA/V (20W model) and 70μA/V (50W model) for programming and monitoring analog interface signals. Open collector, active low digital signal interface. Internal jumper is needed to be configured for analog interface.

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ANALOG INTERFACE—
J1 25 PIN MALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24V</td>
<td>+24Vdc±1Vdc @ 4A</td>
</tr>
<tr>
<td>2</td>
<td>+24V</td>
<td>+24Vdc±1Vdc @ 4A</td>
</tr>
<tr>
<td>3</td>
<td>+24V</td>
<td>+24Vdc±1Vdc @ 4A</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>+24V RETURN</td>
<td>+24V RETURN</td>
</tr>
<tr>
<td>6</td>
<td>+24V RETURN</td>
<td>+24V RETURN</td>
</tr>
<tr>
<td>7</td>
<td>+24V RETURN</td>
<td>+24V RETURN</td>
</tr>
<tr>
<td>8</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>9</td>
<td>Interlock Input</td>
<td>Input, Active low, Interlock is low safe to enable high voltage. Connect to +24V Return</td>
</tr>
<tr>
<td>10</td>
<td>kV Monitor</td>
<td>Output, 0 to 8V = 0 to rated output voltage. Zout=100Ω</td>
</tr>
<tr>
<td>11</td>
<td>mA Monitor</td>
<td>Output, 0 to 10V = 0 to rated output current. Zout=100Ω</td>
</tr>
<tr>
<td>12</td>
<td>X-Ray Ready status</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>13</td>
<td>X-Ray ON status</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>14</td>
<td>Filament Standby status</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>15</td>
<td>Over Voltage Fault</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>16</td>
<td>Over Current Fault</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>17</td>
<td>ARC Fault</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>18</td>
<td>Filament Current Limit Fault</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>19</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>20</td>
<td>Interlock Output</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
<tr>
<td>21</td>
<td>mA Program</td>
<td>Input, 0 to 10V = 0 to rated output current. Zin=10kΩ</td>
</tr>
<tr>
<td>22</td>
<td>kV Program</td>
<td>Input, 0 to 8V = 0 to rated output voltage. Zin=10kΩ</td>
</tr>
<tr>
<td>23</td>
<td>X-Ray ON Command</td>
<td>Input, Active low Low (short) = X-Ray ON High (open) = X-Ray OFF Internal pull up resistor to +15V</td>
</tr>
<tr>
<td>24</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>25</td>
<td>Over Temperature</td>
<td>Output, Active Low, Open Collector, 24Vdc @ 10mA max</td>
</tr>
</tbody>
</table>

Digital Interface:
- RS-232: standard
- Ethernet: optional

Control Software:
A demo GUI is available for engineering evaluations

Interlock/Signals:
A hardware interlock functions in both analog and digital programming modes.

Operating Temperature:
0°C to +40°C

Storage Temperature:
-20°C to +70°C

Humidity:
10% to 95% relative humidity, non-condensing

Cooling:
- 50W option: Customer provided, external cooling fan, 50cfm, minimum

Analog Interface and Input Line Connector:
- 25 pin D connector, male

Digital Interface Connector:
- RS-232: 9 pin D connector, female
- Ethernet: RJ45 connector

Grounding Point:
- 6-32 ground stud provided on chassis

Dimensions:
- 20W: 5.81"W x 5.0"H x 10.81"D (147.57mm X 127mm X 274.57mm)
- 50W: 6.00"W x 5.0"H x 10.81"D (152.4mm x 127mm x 274.57mm)

Weight:
- 20W: 18lbs (8.165kg)
- 50W: 20lbs (9.072kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Less than 1mR/hr at 1 meter

Regulatory Approvals:
Compliant to EMC 60601-1-2. UL/CUL recognized file E242584. CE to EN 61010-1 for Non-Medical Applications.
20W Model

ORDERING INFORMATION

XRB011-80PN20  80kV, 250μA, 20W, Analog Interface, RS-232
XRB011-80PN20E  80kV, 250μA, 20W, Analog Interface, RS-232, Ethernet
XRB011-80PN20A  80kV, 250μA, 20W, Analog Interface
XRB011-80PN20/CE  80kV, 250μA, 20W, Analog Interface, RS-232, CE
XRB011-80PN20E/CE  80kV, 250μA, 20W, Analog Interface, RS-232, Ethernet, CE
XRB011-80PN20A/CE  80kV, 250μA, 20W, Analog Interface, CE

XRB011
20W Model

DIMENSIONS: in.[mm]
50W Model

ORDERING INFORMATION

- XRB011-80PN50  80kV, 700μA, 50W, Analog Interface, RS-232
- XRB011-80PN50E  80kV, 700μA, 50W, Analog Interface, RS-232, Ethernet
- XRB011-80PN50A  80kV, 700μA, 50W, Analog Interface
- XRB011-80PN50/CE  80kV, 700μA, 50W, Analog Interface, RS-232, CE
- XRB011-80PN50E/CE  80kV, 700μA, 50W, Analog Interface, RS-232, Ethernet, CE
- XRB011-80PN50A/CE  80kV, 700μA, 50W, Analog Interface, CE

XRB011
50W Model

DIMENSIONS: in.[mm]
Spellman’s μXRB130P65 microfocus Monoblock® X-Ray sources are designed for high resolution imaging applications powering its internal microfocus X-Ray tube up to 130kV @ 65W. Features like 24Vdc input voltage, small package size and standard RS-232 digital interface simplify integrating the μXRB130P65 into your X-Ray system. The small, round focal spot size, optimized over the range of operating voltage, and high magnification, combined with stable high intensity output provides distortion free, superior quality 2D and 3D images.

**TYPICAL APPLICATIONS**

Industrial X-Ray:
- Circuit board and electronic component inspection
- High resolution Non Destructive Testing of metal and plastic parts
- Micro CT for Industrial applications
- Battery inspection

Medical X-Ray:
- Micro CT for life sciences applications

**OPTIONS**

<p>| | |</p>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>WB</td>
<td>Wide Beam</td>
</tr>
<tr>
<td>ET</td>
<td>Extended Tube (wide beam only)</td>
</tr>
<tr>
<td>LW</td>
<td>Light Weight</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

**Narrow Beam Benefits (Standard):**

The small round spot is optimized over the range of kV and power to provide distortion free images. Operated at 4 watts yields a 6 micron spot for high resolution imaging. The 14mm spot to window spacing offers high geometric magnification.

**Narrow Beam X-Ray Characteristics (Standard):**
- Spot Ellipticity: ±20% @ 16 watts, 130kV (either axis referred to average)
- Beam Geometry: ≥ 53°, round beam, uniform beam profile in any direction
- Spot to Window Spacing: 14mm ±0.5mm
- Window Diameter (uncollimated): =19mm
- Window Material and Thickness: Beryllium, 0.25mm
- Target Material: Tungsten

**Wide Beam Benefits (WB Option):**

The 115 degree round beam is well suited for automated inspection where a large field of view is required for maximum throughput or off angled views. The 10mm spot to window spacing provides superior high geometric magnification.

**Wide Beam X-Ray Characteristics (WB Option):**
- Spot Ellipticity: ±20% @ 16 watts, 130kV (either axis referred to average)
- Cone of Illumination: 115°, round beam, uniform beam profile in any direction
- Spot to Window Spacing: 10mm ±0.5mm
- Window Diameter (uncollimated): =38mm
- Window Material and Thickness: Beryllium, 0.51mm
- Target Material: Tungsten
- X-Ray Leakage: Behind X-Ray tube is ≤0.5mR/hr at 2.55cm

**Input Voltage:**
- +24-27Vdc

**Input Current:**
- <6 amps

The μXRB130P65 is ideal for applications such as printed circuit board inspection, battery inspection and industrial/medical micro CT.

Photos provided by ThermoFisher Scientific.

See more at www.spellmanhv.com
**Anode Supply:**
Output Voltage:
- 20kV to 130kV (referenced to Cathode Gun Supply)
Output Current:
- up to 0.5mA, from 20kV to 130kV

**Environmental:**
Operating Temperature:
- 0°C to +32°C
Storage Temperature:
- -20°C to +70°C
Humidity:
- 0 to 95%, non-condensing
Altitude:
- Up to 5,000 feet (1524 meters)

**Cooling:**
Internal fan is incorporated. Adequate air circulation around unit must be provided.

**Digital Interface:**
RS-232

**Mechanical:**
See drawings

**Weight:**
- Standard: 30lbs. (13.60kg)
- Standard/Extended Tube: 34lbs. (15.40kg)
- Light Weight: 23lbs. (10.43kg)
- Light Weight/Extended Tube: 27lbs. (12.24kg)

**Regulatory Approvals:**
- Compliant to EEC EMC Directive.
- Compliant to EEC Low Voltage Directive.

**Spellman High Voltage Electronics Corporation**

**Grapical User Interface**
Spellman provides an example of a Graphical User Interface (GUI) for the convenience of the user but most customers implement their own software.

<Main System Screen>

**Diagnostics Screen**

**J1 INPUT/OUTPUT—16 PIN AMP #206036-1 CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chamber Interlock Out</td>
<td>To close Chamber Interlock connect pin 1 to pin 2, R&lt;2Ω</td>
</tr>
<tr>
<td>2</td>
<td>Chamber Interlock In</td>
<td>To close Chamber Interlock connect pin 2 to pin 1, R&lt;2Ω</td>
</tr>
<tr>
<td>3</td>
<td>X-Ray ON Lamp Out</td>
<td>120Vac @ 3A/250Vac @ 1.5A rated contacts. Close at X-Ray ON</td>
</tr>
<tr>
<td>4</td>
<td>X-Ray ON Lamp In</td>
<td>120Vac @ 3A/250Vac @ 1.5A rated contacts. Close at X-Ray ON</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>Prime Power Interlock Out</td>
<td>To close Power Interlock connect pin 6, 7 to pin 8, 10, R&lt;2Ω</td>
</tr>
<tr>
<td>7</td>
<td>Prime Power Interlock In</td>
<td>To close Power Interlock connect pin 8, 10 to pin 6, 7, R&lt;2Ω</td>
</tr>
<tr>
<td>8</td>
<td>Prime Power Interlock In</td>
<td>To close Power Interlock connect pin 8, 10 to pin 6, 7, R&lt;2Ω</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>10</td>
<td>Prime Power Interlock In</td>
<td>To close Power Interlock connect pin 8, 10 to pin 6, 7, R&lt;2Ω</td>
</tr>
<tr>
<td>11</td>
<td>+24Vdc Input (+)</td>
<td>+24Vdc Input (+)</td>
</tr>
<tr>
<td>12</td>
<td>+24Vdc Input (+)</td>
<td>+24Vdc Input (+)</td>
</tr>
<tr>
<td>13</td>
<td>+24Vdc Return (-)</td>
<td>+24Vdc Return (-)</td>
</tr>
<tr>
<td>14</td>
<td>+24Vdc Return (-)</td>
<td>+24Vdc Return (-)</td>
</tr>
<tr>
<td>15</td>
<td>X-Ray On Indicator Out</td>
<td>24Vdc @ 3A rated contacts. Close at X-Ray On</td>
</tr>
<tr>
<td>16</td>
<td>X-Ray On Indicator In</td>
<td>24Vdc @ 3A rated contacts. Close at X-Ray On</td>
</tr>
</tbody>
</table>

**J2 RS-232 DIGITAL INTERFACE—9 PIN AMP #788903-1 CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
<td>Data Carrier Detect</td>
</tr>
<tr>
<td>2</td>
<td>RD</td>
<td>Received Data</td>
</tr>
<tr>
<td>3</td>
<td>TD</td>
<td>Transmitted Data</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>Data Terminal Ready</td>
</tr>
<tr>
<td>5</td>
<td>SGNO</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>Data Set Ready</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>Request to send</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>Clear to send</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
<td>Ring Indicator</td>
</tr>
</tbody>
</table>

**SPOT TABLE**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>NARROW BEAM</th>
<th>WIDE BEAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage Range</td>
<td>45-130kV</td>
<td>50-130kV</td>
</tr>
<tr>
<td>Maximum Power</td>
<td>65W, 130kV</td>
<td>65W, 130kV</td>
</tr>
<tr>
<td>Maximum Beam Current</td>
<td>0.500mA</td>
<td>0.500mA</td>
</tr>
<tr>
<td>Spot Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Watt</td>
<td>≤ 7μ, 45-130kV ≤ 8μ, 50-130kV</td>
<td></td>
</tr>
<tr>
<td>8 Watt</td>
<td>≤ 10μ, 45-130kV ≤ 14μ, 50-130kV</td>
<td></td>
</tr>
<tr>
<td>16 Watt</td>
<td>≤ 22μ, 45-130kV ≤ 24μ, 50-130kV</td>
<td></td>
</tr>
<tr>
<td>32 Watt</td>
<td>≤ 48μ, 70-130kV ≤ 48μ, 70-130kV</td>
<td></td>
</tr>
<tr>
<td>40 Watt</td>
<td>≤ 60μ, 80-130kV ≤ 60μ, 80-130kV</td>
<td></td>
</tr>
<tr>
<td>65 Watt</td>
<td>≤ 100μ, 130kV ≤ 100μ, 130kV</td>
<td></td>
</tr>
</tbody>
</table>

**How to Order:**
- Standard (Narrow Beam) PART NO.: μXRB130P65
- Wide Beam Option PART NO.: μXRB130P65WB
- Wide Beam Option and Extension Tube PART NO.: μXRB130P65WBE

[www.spellmanhv.com](http://www.spellmanhv.com)
uXRB130P65
130KV @ 65W MICROFOCUS MONOBLOCK®

DIMENSIONS: in.[mm]

WIDE BEAM (WB Option)
SIDE VIEW

BOTTOM VIEW

REAR VIEW

FRONT VIEW

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Spellman’s XRB80N100 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 80kV at 100W. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating this unit into your X-Ray system. The XRB80N100 is available either with fan shaped (standard) or (optional) cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
X-Ray Scanning: Bone Densitometry, Thickness Measurement, Food Inspection, Fill Level Confirmation, Parcel Inspection

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Focal Spot: 0.5mm (IEC 336)
- Beam Filter:
  - Ultem: 3.30mm ±0.15mm
  - Oil: 8mm ±0.1mm
  - Glass: 1.8mm ±0.25mm
  - BE: 0.8mm
- Beam Geometry:
  - Fan: Standard. The beam angular coverage will be 75° with the beam plane perpendicular to the X-Ray tube axis and 13° wide.
  - Cone: Optional. 25° cone beam

**Input Voltage:**
Power factor corrected input 0.98, 100-240Vac ±10% 50/60Hz, 2A, maximum

**X-Ray Tube Voltage:**
Nominal X-Ray tube voltage is adjustable up to 80kV

**X-Ray Tube Current:**
150uA to 1.25mA over specified tube voltage range

**X-Ray Tube Power:**
100W maximum continuous

**Voltage Regulation:**
- Line: ±0.05% of maximum output voltage over a ±10% change of nominal input line voltage
- Load: ±0.1% of maximum rated voltage for 150uA to 1.25mA load change

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within ±2% of the programmed value

**Voltage Risetime:**
- Standard: Ramp time shall be 500ms from 10% to 90% of maximum rated output voltage
- Optional: 5 seconds. Specify at time of order

**Voltage Overshoot:**
5% of maximum voltage, to return within 2.5% of maximum voltage in less than 100ms

**Voltage Ripple:**
1% peak to peak of maximum voltage for frequencies ≤1kHz

**Emission Current Parameters**

**Current Regulation:**
- Line: ±0.05% of rated output current over a ±10% change of nominal input line voltage
- Load: ±0.1% of rated output current for a change from 50% to 100% of rated output voltage

**Current Accuracy:**
Current measured through the X-Ray tube is within ±2% of the programmed value

**Current Risetime:**
- Standard: Ramp time shall be 500ms from 10% to 90% of maximum rated current
- Optional: 5 seconds. Specify at time of order

**Arc Intervention:**
3 arcs in 10 seconds with a 200ms quench = Shutdown

**Filament Configuration:**
Internal high frequency AC filament drive with closed loop filament emission control
**Analog Interface:**
Ground referenced 0 to 9Vdc for all programming and monitoring signals. Relay contacts and open collector signals for other signals. See analog interface connector pin out table.

**Digital Interface:**
Jumpers are needed to be configured and the digital interface cable installed to enable the RS-232 interface.

**Control Software:**
A demo GUI is available for engineering evaluations

**Interlock/Signals:**
A hardware interlock functions in both analog and digital programming modes. The hardware X-Ray Enable signal only functions in analog programming mode.

**Operating Temperature:**
0°C to +40°C

**Storage Temperature:**
-40°C to +70°C

**Humidity:**
10% to 95% relative humidity, non-condensing

**Cooling:**
Customer provided 150cfm external cooling fan as required to maintain oil temperature below 55°C. (External cooling is not required if fan option is selected)

**Input Line Connector:**
3 pin, Phoenix Contact 1829167, SHV part number 105725-219. Mating connector Phoenix Contact #1805990, SHV part number 105808-475 provided with unit.

**Analog Interface Connector:**
15 pin D connector, male

**Digital Interface Connector:**
9 pin D connector, female

**Grounding Point:**
8-32 ground stud provided on chassis

**Dimensions:**
See line drawings

**Weight:**
32lbs (14.5kg)

**Orientation:**
Can be mounted in any orientation.

**X-Ray Leakage:**
Not to be greater than 0.5mR/hr at 5cm outside the external surface

**Regulatory Approvals:**
XRB80N100
80KV @ 100W MONOBLOCK®

OPTIONS

RT  5 second Risetime for both voltage and current
CB  Cone Beam
FN  Integrated Cooling Fan
M   Elapsed Time Meter
(measures X-Ray ON elapsed time)

How to Order:
Standard: PART NO.: XRB80N100
Risetime, Cone Beam, Fan and Elapsed Time Meter Options
PART NO.: XRB80N100/RT/CB/FN/M

DIMENSIONS: in.[mm]

Standard Unit

FRONT VIEW
NOTE: Shown with Elapsed Time Meter option

SIDE VIEW

BACK VIEW

BOTTOM VIEW

1.92 ±0.06 [48.6±1.5]

25°
CON BEAM
OPTION

13°
FAN BEAM
OPTION

8.400 [213]

.281 [7.1] DIA.
4 MOUNTING
HOLES

8.95 [227]

3.07 ±0.06
[78.0 ±1.5]
DIMENSIONS: in.[mm]

Cooling Fan Option

TOP VIEW

SIDE VIEW

BACK VIEW
Spellman’s XRB80PN100HR (high reliability) Monoblock® X-Ray source is designed for OEM applications powering its internal Bipolar X-Ray tube up to 80kV at 100W. Features like universal input, small package size and a standard RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. The XRB80PN100HR is available either with fan shaped (standard) or (optional) cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance. The XRB80PN100HR is designed for long field life.

**TYPICAL APPLICATIONS**
X-Ray Scanning, Thickness Measurement, Food Inspection, Fill Level Confirmation, Parcel Inspection

**SPECIFICATIONS**

**X-Ray Characteristics:**
- **Focal Spot:** 0.8mm (IEC 336) standard
  0.5mm (IEC 336) optional
- **Beam Filter:**
  - Ultem: 3.00mm ±0.15mm
  - Oil: 7.5mm ±0.25mm
  - Glass: 1.7mm ±0.2mm
  - Be: 0.8mm
- **Beam Geometry:**
  - **Fan:** The standard beam angular coverage will be 80° with the beam plane perpendicular to the X-Ray tube axis and 20° wide (with a 2° tolerance)
  - An optional 80° x 10° (with a 2° tolerance) is also available
  - **Cone:** Optional. 20° cone beam (with a 2° tolerance)

**Input Voltage:**
Power factor corrected input 0.98, 100-240Vac ±10%
50/60Hz, 2A maximum

**X-Ray Tube Voltage:**
Nominal X-Ray tube voltage is adjustable 40kV (±20kV) to 80kV (±40kV)

**X-Ray Tube Current:**
150µA to 2.00mA over specified tube voltage range (100W max.)

**X-Ray Tube Power:**
100W maximum continuous

**Voltage Regulation:**
- **Line:** ±0.05% of maximum output voltage over a ±10% change of nominal input line voltage
- **Load:** ±0.1% of maximum rated voltage for 150µA to 2.00mA load change

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within ±2% of the programmed value

**Voltage Risetime:**
Standard: Ramp time shall be <500ms from 10% to 90% of maximum rated output voltage

**Voltage Ripple:**
0.5% peak to peak of maximum voltage for frequencies ≤1kHz

**Emission Current Parameters**

**Current Regulation:**
- **Line:** ±0.05% of rated output current over a ±10% change of nominal input line voltage
- **Load:** ±0.1% of rated output current for a change from 50% to 100% of rated output voltage

**Current Accuracy:**
Current measured through the X-Ray tube is within ±2% of the programmed value

**Current Risetime:**
Standard: Ramp time shall be <500ms from 10% to 90% of maximum rated current

**Arc Intervention:**
4 arcs in 10 seconds with a 100ms quench/100ms re-ramp = Shutdown

**Filament Configuration:**
Internal AC filament drive with closed loop filament emission control

www.spellmanhv.com/manuals/XRB80PN100HR
Analog Monitoring Interface:
Ground referenced 0 to 9Vdc for all monitoring signals. Relay contacts and open collector signals for other signals. See analog interface connector pin out table.

Digital Programming and Monitoring Interface:
The RS-232 interface allows for programming of kV, mA output and X-Ray enable. Provides monitoring for kV, mA output and oil temperature. Tolerance 3%.
*(with an additional 5μA offset at ≤10% mA programming)*

Control Software:
A demo GUI is available for engineering evaluations

Operating Temperature:
0°C to +40°C

Storage Temperature:
-40°C to +70°C

Humidity:
10% to 95% relative humidity, non-condensing

Cooling:
X-Ray Tank: Customer provided 250 cfm external cooling fan as required to maintain oil temperature below 55°C.
Controller: Forced air via internal fan.

Input Line Connector:
3-pin Phoenix Contact 1829167. Mating connector provided with unit

Analog Interface Connector:
15 pin male D connector provided with unit

Digital Interface Connector:
9 pin female D connector provided with unit

Grounding Point:
M4 ground stud provided on chassis

Dimensions:
X-Ray Tank: 11.3” x 9.625” x 4.93”H (287.02mm x 244.4mm x 125.2mm)
Controller: 8.5” x 6.70” x 2.21”H (215.9mm x 170.2mm x 56.1mm)

Weight:
X-Ray Tank: 36lbs (16.32kg)
Controller: 3.7lbs (1.68kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 0.5mR/hr at 5cm outside the external surface.

Regulatory Approvals:
Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. UL/CUL recognized file E235530

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**LED INDICATORS**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL NAME</th>
<th>CONDITION</th>
<th>Illuminated When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 1</td>
<td>OV</td>
<td>High kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 2</td>
<td>UV</td>
<td>Low kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 3</td>
<td>UC</td>
<td>Low mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 4</td>
<td>OC</td>
<td>High mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 5</td>
<td>ARC FLT</td>
<td>Arc fault occurs</td>
<td></td>
</tr>
<tr>
<td>LED 6</td>
<td>OT</td>
<td>Over temperature occurs</td>
<td></td>
</tr>
<tr>
<td>LED 7</td>
<td>X-RAY ON</td>
<td>X-Rays are enabled</td>
<td></td>
</tr>
<tr>
<td>LED 8</td>
<td>PWR</td>
<td>Power is ON</td>
<td></td>
</tr>
</tbody>
</table>
OPTIONS
- CB: Cone Beam
- .5mm: .5mm focal spot X-Ray tube
- NF: 80° x 10° Narrow Fan beam
- RA: Right Angle cable

How to Order:

| Standard: | PART NO.: XRB80PN100HR |
| Cone Beam Option | PART NO.: XRB80PN100HR/CB |
| .5mm Focal Spot Option | PART NO.: XRB80PN100HR/.5mm |
| 80° x 10° Narrow Fan Beam Option | PART NO.: XRB80PN100HR/NF |
| Cable Option: | PART NO.: XRB80PN100HR/RA |

DIMENSIONS: in.[mm]

CONTROL UNIT

TOP VIEW

SIDE VIEW

BOTTOM VIEW

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Corporate Headquarters
Hauppauge, New York USA
+1-631-630-3000  FAX: +1-631-435-1620
e-mail: sales@spellmanhv.com

www.spellmanhv.com
Spellman’s XRB100N100 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 100kV at 100W. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
X-Ray Scanning: Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Stationary anode, tungsten target
- Focal Spot: 0.5mm (IEC 336)
- Beam Filter: Lexan: 3.2mm, Oil: 10mm ±0.1mm, Glass: 1.8mm max
- Beam Geometry: Symmetrical fan 74° x 10° ±1°

**Input Voltage:**
- Power factor corrected input 0.98, 100-240Vac ±10% 50/60Hz, 2A, maximum

**X-Ray Tube Voltage:**
- Nominal X-Ray tube voltage is adjustable between 40kV to 100kV

**X-Ray Tube Current:**
- 100μA to 1mA over specified tube voltage range

**X-Ray Tube Power:**
- 100W maximum continuous

**Voltage Regulation:**
- Line: ±0.1% of maximum output voltage over a ±10% change of nominal input line voltage
- Load: ±0.1% of maximum rated voltage for 100μA to 1mA load change

**Voltage Accuracy:**
- Voltage measured across the X-Ray tube is within ±2% of the programmed value

**Voltage Risetime:**
- Ramp time shall be 1 second from 10% to 90% of maximum rated output voltage

**Voltage Overshoot:**
- 5% of maximum voltage, to return within 2.5% of maximum voltage in less than 50ms

**Voltage Ripple:**
- 0.5% peak to peak of maximum voltage for frequencies ≤1kHz

**Emission Current Parameters**

**Current Regulation:**
- Line: ±0.5% of rated output current over a ±10% change of nominal input line voltage
- Load: ±0.5% of rated output current for a change from 50% to 100% of rated output voltage

**Current Accuracy:**
- Current measured through the X-Ray tube is within ±1% of the programmed value

**Current Risetime:**
- Ramp time shall be 1 second from 10% to 90% of maximum rated current

**Arc Intervention:**
- 3 arcs in 10 seconds with a 200ms quench = Shutdown

**Filament Configuration:**
- Internal high frequency AC filament drive with closed loop filament emission control

See Spellman’s XRB100N100 Monoblock® for more details.

www.spellmanhv.com/manuals/XRB100
Analog Interface:
Ground referenced 0 to 9Vdc for all programming and monitoring signals. Relay contacts and open collector signals for other signals. See analog interface connector pin out table.

Digital Interface:
Jumpers are needed to be configured and the digital interface cable installed to enable the RS-232 interface.

Control Software:
A demo GUI is available for engineering evaluations.

Interlock/Signals:
A hardware interlock functions in both analog and digital programming modes. The hardware X-Ray Enable signal only functions in analog programming mode.

Operating Temperature:
0°C to +40°C

Storage Temperature:
-40°C to +70°C

Humidity:
10% to 95% relative humidity, non-condensing

Cooling:
Forced air and natural convection augmented by customer provided external cooling fan to maintain oil temperature below 55°C.

Input Line Connector:
3 pin, Phoenix Contact 1829167, SHV part number 105725-219. Mating connector Phoenix Contact #1805990, SHV part number 105808-475 provided with unit.

Analog Interface Connector:
15 pin D connector, male

Digital Interface Connector:
9 pin D connector, female

Grounding Point:
M4 ground stud provided on chassis

Dimensions:
See page 3 of 3

Weight:
55lbs (25kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 0.5mR/hr at 5cm outside the external surface.

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### AC LINE POWER CONNECTOR— J1 THREE POSITION PHOENIX CONTACT

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Earth Ground</td>
</tr>
<tr>
<td>2</td>
<td>Line</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

Mating connector provided with unit

### RS-232 DIGITAL INTERFACE— J3 9 PIN FEMALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>TD</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>3</td>
<td>RD</td>
<td>Receive Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>NC</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

### XRB ANALOG INTERFACE— J2 15 PIN MALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Supply Fault Output</td>
<td>Open collector, 35V @ 10mA max. high = no fault</td>
</tr>
<tr>
<td>2</td>
<td>mA Program Input</td>
<td>0 to 9.00Vdc = 0 to 100% rated output, Zin =10MΩ</td>
</tr>
<tr>
<td>3</td>
<td>kV Program Input</td>
<td>0 to 9.00Vdc = 0 to 100% rated output, Zin =10MΩ</td>
</tr>
<tr>
<td>4</td>
<td>X-Ray On Lamp Relay Output</td>
<td>Common, dry contacts, 30Vdc @ 1A, max</td>
</tr>
<tr>
<td>5</td>
<td>X-Ray On Lamp Relay Output</td>
<td>Normally open, X-Ray ON = closed</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor Output</td>
<td>0 to 9Vdc = 0 to 100% rated output, Zout =10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>X-Ray On Lamp Relay Output</td>
<td>Normally closed, X-Ray ON = open</td>
</tr>
<tr>
<td>8</td>
<td>kV Monitor Output</td>
<td>0 to 9.00Vdc = 0 to 100% rated output, Zout =10kΩ</td>
</tr>
<tr>
<td>9</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>10</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>11</td>
<td>HV Interlock Return Input</td>
<td>Connect to Pin 12 to close HV interlock</td>
</tr>
<tr>
<td>12</td>
<td>HV Interlock Output</td>
<td>+15Vdc @ open, 5mA when connected to pin 11</td>
</tr>
<tr>
<td>13</td>
<td>X-Ray Enable Output</td>
<td>+15Vdc @ open, 5mA when connected to pin 15</td>
</tr>
<tr>
<td>14</td>
<td>X-Ray Status Output</td>
<td>Open collector, 35V @ 10mA max high = X-Ray OFF</td>
</tr>
<tr>
<td>15</td>
<td>X-Ray Enable Return Input</td>
<td>Connect to pin 13 to enable X-Ray generation</td>
</tr>
</tbody>
</table>

### LED INDICATORS

<table>
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<tr>
<th>INDICATOR</th>
<th>SIGNAL NAME</th>
<th>CONDITION</th>
<th>Illuminated When...</th>
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<tbody>
<tr>
<td>LED 1</td>
<td>OV</td>
<td>High kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 2</td>
<td>UV</td>
<td>Low kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 3</td>
<td>UC</td>
<td>Low mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 4</td>
<td>OC</td>
<td>High mA occurs</td>
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</tr>
<tr>
<td>LED 8</td>
<td>PWR</td>
<td>Power is ON</td>
<td></td>
</tr>
</tbody>
</table>
Spellman’s XRBHR (high reliability) Series of Monoblock® X-Ray sources are designed for OEM applications powering their internal Bipolar X-Ray tube at 80kV and 100kV at power levels of 100W, 210W, 350W and 500W. Features such as universal input, compact package size and a standard RS-232 digital interface simplify integration of any XRBHR model into your X-Ray system. Each XRBHR model is available with fan shaped (standard) or cone shaped (optional) beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance. The XRBHR Series is designed for long field life and available with a warranty of up to 3 years.

TYPICAL APPLICATIONS

OPTIONS
- CB Cone Beam
- .5mm .5mm focal spot X-Ray tube
- RA Controller to tank right angle connector
- TE Controller to tank top exit cable

SPECIFICATIONS
X-Ray Characteristics:
- Focal Spot: 0.8mm (IEC 336) standard
  0.5mm (IEC 336) optional
- Beam Filter:
  Ultem: 1.50mm ±0.15mm
  Oil: 9.0mm ±0.25mm
  Glass: 1.7mm ±0.2mm
  Be: 0.8mm
- Beam Geometry:
  Fan: Standard. The beam angular coverage will be 90° with the beam plane perpendicular to the X-Ray tube axis and 12° wide (with a 2° tolerance)
  Cone: Optional. 40° cone beam (with a 2° tolerance)

Input Voltage: 100-240Vac, ±10%, 50/60 Hertz, 98 power factor
Input Current:
- 100W @ 2A
- 210W @ 4A
- 350W @ 6A
- 500W @ 8A

- Compact & Lightweight
- Universal Input, Power Factor Corrected
- Can be Mounted in Any Physical Orientation
- Analog Monitoring Interface, Standard RS-232 Digital Interface and Ethernet
- Data Logging and Firmware Controlled X-Ray Tube Seasoning

X-Ray Tube Voltage:
See table
X-Ray Tube Current:
See table
X-Ray Tube Power:
See table
Voltage Regulation:
- Line: ±0.05% of maximum output voltage over a ±10% change of nominal input line voltage
- Load: ±0.1% of maximum rated voltage for 150uA to full rated load change

Voltage Accuracy:
Voltage measured across the X-Ray tube is within ±2% of the programmed value

Voltage Risetime:
Standard ramp time shall be <500ms from 10% to 90% of maximum rated output voltage

Voltage Ripple:
0.5% peak to peak of maximum voltage for frequencies ≤1kHz

Emission Current Parameters
Current Regulation:
- Line: ±0.05% of rated output current over a ±10% change of nominal input line voltage
- Load: ±0.1% of rated output current for a change from 50% to 100% of rated output voltage

Current Accuracy:
Current measured through the X-Ray tube is within ±2% of the programmed value

Current Risetime:
Standard ramp time shall be <500ms from 10% to 90% of maximum rated current

Arc Intervention:
4 arcs in 10 seconds with a 100ms quench/100ms re-ramp = Shutdown

Filament Configuration:
Internal floating AC filament drive with closed loop filament emission control circuitry

Analog Interface:
Ground referenced 0 to 9Vdc for all monitoring signals. Relay contacts and open collector signals for other signals. See analog interface connector pin out table.

Digital Interface:
The RS-232 interface allows for programming of kV, mA output and X-Ray enable. Provides monitoring for kV, mA output and oil temperature.
Operating Temperature:  
0°C to +40°C

Storage Temperature:  
-40°C to +70°C

Humidity:  
10% to 95% relative humidity, non-condensing

Cooling:  
X-Ray Tank:
100W: Convection/customer supplied forced air so tank is <55˚C
210W: Externally powered forced air cooling, 24Vdc @ 2A
350W: Externally powered forced air cooling with oil pump and heat exchanger, 24Vdc @ 5A
500W: Externally powered forced air cooling with oil pump and heat exchanger, 24Vdc @ 5A
Controller: Forced air via internal fan.

Grounding Point:  
M5 ground female thread on tank  
M5 ground stud on control chassis provided

Dimensions:  
X-Ray Tank: see drawings  
100W/210W Controller: see drawings  
350W/500W Controller: see drawings

Weight:  
X-Ray Tank:  
100W @ 75 lbs. (34kg)  
210W @ 75lbs. (34kg)  
350W @ 81.5lbs. (37kg)  
500W @ 81.5lbs. (37kgs)  
Controller:  
100W/210W: 4 pounds (1.18kg)  
350W/500W: 7 pounds (3.18kg)

Orientation:  
Can be mounted in any orientation.

X-Ray Leakage:  
Not to be greater than 0.5mR/hr at 5cm outside the external surface.

Regulatory Approvals:  
Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. UL/CUL recognized file E235530

MODEL SELECTION TABLE

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Voltage</th>
<th>Max. Current</th>
<th>Max. Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>XRB80PN210HR</td>
<td>80kV</td>
<td>5.25mA</td>
<td>210 watts</td>
</tr>
<tr>
<td>XRB80PN350HR</td>
<td>80kV</td>
<td>8mA</td>
<td>350 watts</td>
</tr>
<tr>
<td>XRB80PN500HR</td>
<td>80kV</td>
<td>8mA</td>
<td>500 watts</td>
</tr>
<tr>
<td>XRB100PN100HR</td>
<td>100kV</td>
<td>2mA</td>
<td>100 watts</td>
</tr>
<tr>
<td>XRB100PN210HR</td>
<td>100kV</td>
<td>4.2mA</td>
<td>210 watts</td>
</tr>
<tr>
<td>XRB100PN350HR</td>
<td>100kV</td>
<td>7mA</td>
<td>350 watts</td>
</tr>
<tr>
<td>XRB100PN500HR</td>
<td>100kV</td>
<td>8mA</td>
<td>500 watts</td>
</tr>
</tbody>
</table>

LED INDICATORS for 100W and 200W Units

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL</th>
<th>CONDITION</th>
<th>ILLUMINATED WHEN...</th>
<th>LED COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OV Error 6</td>
<td>High kV occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>UV Error 5</td>
<td>Low kV occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>UC Error 4</td>
<td>Low mA occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Power On</td>
<td>AC input power is present</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OC Error 3</td>
<td>High mA occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>ARC Error 2</td>
<td>Arc fault occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OT Error 1</td>
<td>Over temperature occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>X-Ray On</td>
<td>X-Rays are being generated</td>
<td>Green</td>
<td></td>
</tr>
</tbody>
</table>

LED INDICATORS for 350W and 500W Units

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL</th>
<th>CONDITION</th>
<th>ILLUMINATED WHEN...</th>
<th>LED COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OV Error 6</td>
<td>High kV occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>2</td>
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<td>Red</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>UC Error 4</td>
<td>Low mA occurs</td>
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<td></td>
</tr>
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</tr>
<tr>
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<td>7</td>
<td>X-Ray On</td>
<td>X-Rays are being generated</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Power On</td>
<td>AC input power is present</td>
<td>Green</td>
<td></td>
</tr>
</tbody>
</table>

SMART XRB

The XRBHR has two new digital features: data logging and firmware controlled seasoning.

Data Logging:  
Think of this as an “airplane black box”. The data logging captures data on fault events and non-fault events. Fault events will turn off the high voltage:

FAULT EVENTS

Temperature  
High Current  
High Voltage  
Power Fault  
Anode kV  
Total kV  
Filament  
Cathode kV  
Total mA  
Temperature

We also log non-fault events, these are changes in set points or state of the unit.

NON FAULT EVENTS

HV On  
kV Set point  
Low Current  
Pre Heat Set point  
HV Off  
mA Set point  
Filament Limit Set point  
Line Dip

Fault event data is actual graphical data. Non fault event data is just stored as event type, data and timestamp. We also have a preventative maintenance fault, which throws a non-shutdown fault if the X-Ray tube has been factory installed over 4 years ago or if over 15,000 hours of HV ON is logged.

Firmware Controlled Seasoning:  
Every unit comes with an initial seasoning table, or customers can set their own. The XRBHR knows when the unit has been on, when it has been off, hours on the X-Ray tube, etc. As a preventative maintenance feature upon turn on, we review the data and suggest that a particular seasoning protocol be run based upon the actual usage history of the unit. Proper seasoning compliance of the X-Ray tube will help get the longest lifetime.
### Power and Interface Connections for 100W and 210W Units

#### AC INPUT—6 PIN MOLEX 09-50-8061

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC Input (high)</td>
<td>100-240Vac (high)</td>
</tr>
<tr>
<td>2</td>
<td>Pin Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>3</td>
<td>AC Input (neutral)</td>
<td>100-240Vac (neutral)</td>
</tr>
<tr>
<td>4</td>
<td>Pin Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>N/C</td>
</tr>
</tbody>
</table>

#### ANALOG INTERFACE—7 PIN MOLEX 09-50-8071

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Interlock Enable</td>
<td>Apply +24Vdc to enable interlock. Open/removal of +24Vdc will cause X-Ray generation to stop.</td>
</tr>
<tr>
<td>3</td>
<td>Pin removed</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor</td>
<td>0-10Vdc = 0-100% rated output voltage. Zout = 10kΩ</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0-10Vdc = 0-100% rated output current. Zout = 10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>X-Ray On</td>
<td>Open collector, High (Open) = No Fault, 35Vdc @10mA maximum</td>
</tr>
</tbody>
</table>

#### RS-232 DIGITAL INTERFACE—9 PIN MALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Transmitted Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>3</td>
<td>Received Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>N/C</td>
</tr>
</tbody>
</table>

#### ETHERNET DIGITAL INTERFACE—RJ45 8 PIN FEMALE CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX +</td>
<td>Transmit Data +</td>
</tr>
<tr>
<td>2</td>
<td>TX -</td>
<td>Transmit Data -</td>
</tr>
<tr>
<td>3</td>
<td>RX +</td>
<td>Receive Data +</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>6</td>
<td>RX -</td>
<td>Receive Data -</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

#### HV LAMP ON RELAY—3 PIN MOLEX 09-50-8031

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normally Closed dry contact</td>
<td>50V max. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>2</td>
<td>Common</td>
<td>50V max. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>3</td>
<td>Normally Open dry contact</td>
<td>50V max. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
</tbody>
</table>

### Power and Interface Connections for 350W and 500W Units

#### AC INPUT—3 PIN PHOENIX CONTACT 1858772

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC Input (high)</td>
<td>100-240Vac (high)</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>AC Input (neutral)</td>
<td>100-240Vac (neutral)</td>
</tr>
</tbody>
</table>

#### DC INPUT FOR HEAT DISSIPATION UNIT—4 PIN AMP (210/350/500W) 206060-1

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24Vdc</td>
<td>24Vdc @ 5 amps</td>
</tr>
<tr>
<td>2</td>
<td>24Vdc Return</td>
<td>24Vdc Return</td>
</tr>
<tr>
<td>3</td>
<td>24Vdc</td>
<td>24Vdc @ 5 amps</td>
</tr>
<tr>
<td>4</td>
<td>24Vdc Return</td>
<td>24Vdc Return</td>
</tr>
</tbody>
</table>

#### ANALOG INTERFACE—10 PIN PHOENIX CONTACT 1792605

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Interlock Enable</td>
<td>Apply +24Vdc to enable interlock. Open/removal of +24Vdc will cause X-Ray generation to stop.</td>
</tr>
<tr>
<td>3</td>
<td>Pin removed</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor</td>
<td>0-10Vdc = 0-100% rated output voltage. Zout = 10kΩ</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0-10Vdc = 0-100% rated output current. Zout = 10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>Fault Signal</td>
<td>Open collector, High (Open) = No Fault, 35Vdc @10mA maximum</td>
</tr>
<tr>
<td>8</td>
<td>HV ON Lamp Relay N/O</td>
<td>N/O dry contacts, 50 volts maximum. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>9</td>
<td>HV ON Lamp Relay C</td>
<td>Common dry contacts. 50 volts maximum. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>10</td>
<td>HV ON Lamp Relay N/C</td>
<td>N/C dry contacts. 50 volts maximum. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
</tbody>
</table>

#### ETHERNET DIGITAL INTERFACE—RJ45 8 PIN FEMALE CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Transmitted Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>3</td>
<td>Received Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>N/C</td>
</tr>
</tbody>
</table>

#### HV LAMP ON RELAY—3 PIN MOLEX 09-50-8031

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX +</td>
<td>Transmit Data +</td>
</tr>
<tr>
<td>2</td>
<td>TX -</td>
<td>Transmit Data -</td>
</tr>
<tr>
<td>3</td>
<td>RX +</td>
<td>Receive Data +</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>6</td>
<td>RX -</td>
<td>Receive Data -</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>
80-100KV/100-500W MONOBLOCK®

DIMENSIONS: in.[mm]

100/210W CONTROL UNIT

FRONT VIEW

BOTTOM VIEW

REAR VIEW

SIDE VIEW

RA Right Angle Connector Option

Top Exit Cable Option

Straight Connector (standard)

Side Exit Cable (standard)

M5 GROUND STUD

M5 x 10mm 4PL

AIR FLOW

60.0 ±2.0 [510 ± 51]

6.12 [155.4]

13.46 [341.9]

3.25 [82.5]

3.93 [100]

.413 [10.5]

.470 [11.9]

12.52 [318.0]
Spellman’s XRBD Series of Monoblock® X-Ray sources are designed for OEM applications powering their internal bipolar X-Ray tube at 160kV at power levels of 100W, 210W, 350W and 500W. Features such as universal input, compact package size and a standard RS-232 digital interface simplify integration of any XRBD model into your X-Ray system. Each XRBD model is available with fan shaped (standard) or cone shaped (optional) beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**

**OPTIONS**
- CB: Cone Beam
- .5mm: .5mm focal spot X-Ray tube
- RA: Controller to tank right angle connector
- TE: Controller to tank top exit cable

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Focal Spot: 0.8mm (IEC 336) standard
- 0.5mm (IEC 336) optional
- Beam Filter:
  - Ultem: 1.50mm ±0.15mm
  - Oil: 9.0mm ±0.25mm
  - Glass: 1.7mm ±0.2mm
  - Be: 0.8mm
- Beam Geometry:
  - Fan: Standard. The beam angular coverage will be 90° with the beam plane perpendicular to the X-Ray tube axis and 12° wide (with a 2° tolerance)
  - Cone: Optional. 40° cone beam (with a 2° tolerance)

**Input Voltage:**
100-240Vac, ±10%, 50/60 Hertz, .98 power factor

**Input Current:**
- 100W @ 1.4A
- 210W @ 2.8A
- 350W @ 4.6A
- 500W @ 6.6A

**Voltage Regulation:**
- Line: ±0.05% of maximum output voltage over a ±10% change of nominal input line voltage
- Load: ±0.1% of maximum rated voltage for 150uA to full rated load change

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within ±2% of the programmed value

**Voltage Risetime:**
Standard ramp time shall be <500ms from 10% to 90% of maximum rated output voltage

**Voltage Ripple:**
0.5% peak to peak of maximum voltage for frequencies ≤1kHz

**Emission Current Parameters**

**Current Regulation:**
- Line: ±0.05% of rated output current over a ±10% change of nominal input line voltage
- Load: ±0.1% of rated output current for a change from 50% to 100% of rated output voltage

**Current Accuracy:**
Current measured through the X-Ray tube is within ±2% of the programmed value

**Current Risetime:**
Standard ramp time shall be <500ms from 10% to 90% of maximum rated current

**Arc Intervention:**
4 arcs in 10 seconds with a 100ms quench/100ms re-ramp = Shutdown

**Filament Configuration:**
Internal floating AC filament drive with closed loop filament emission control circuitry

**Analog Interface:**
Ground referenced 0 to 9Vdc for all monitoring signals. Relay contacts and open collector signals for other signals. See analog interface connector pin out table.
Digital Interface:
The RS-232 interface allows for programming of kV, mA output and X-Ray enable. Provides monitoring for kV, mA output and oil temperature.

Operating Temperature:
0°C to +40°C

Storage Temperature:
-40°C to +70°C

Humidity:
10% to 95% relative humidity, non-condensing

Cooling:
X-Ray Tank:
100W: Convection/customer supplied
210W: Externally powered forced air cooling, 24Vdc @ 2A
350/500W: Externally powered forced air cooling with oil pump and heat exchanger, 24Vdc @ 5A

Controller: Forced air via internal fan.

Grounding Point:
M5 ground female thread on tank
M5 ground stud on control chassis provided

Dimensions:
see drawings

Weight:
X-Ray Tank:
100/210W @ 78lbs. (35.4kg)
350/500W @ 84.5lbs. (38.3kg)

Controller:
100W/210W: 4 pounds (1.18kg)
350W/500W: 7 pounds (3.18kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 0.5mR/hr at 5cm outside the external surface.

Regulatory Approvals:
Designed to meet UL/EN61010-1
Designed to meet EN61326-1
(may require an external line filter)

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**LED INDICATORS for 100W and 200W Units**

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<th>CONDITION</th>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>UC Error 4</td>
<td>Low mA occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Power On</td>
<td>AC input power is present</td>
<td>Green</td>
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</tr>
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<td>5</td>
<td>OC Error 3</td>
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<tr>
<td>6</td>
<td>ARC Error 2</td>
<td>Arc fault occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OT Error 1</td>
<td>Over temperature occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>X-Ray On</td>
<td>X-Rays are being generated</td>
<td>Green</td>
<td></td>
</tr>
</tbody>
</table>

---

**LED INDICATORS for 350W and 500W Units**

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL</th>
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<tr>
<td>4</td>
<td>OC Error 3</td>
<td>High mA occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ARC Error 2</td>
<td>Arc fault occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>OT Error 1</td>
<td>Over temperature occurs</td>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>X-Ray On</td>
<td>X-Rays are being generated</td>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Power On</td>
<td>AC input power is present</td>
<td>Green</td>
<td></td>
</tr>
</tbody>
</table>

---

**SMART XRB**

The XRBD has two new digital features: data logging and firmware controlled seasoning.

**Data Logging:**
Think of this as an “airplane black box”. The data logging captures data on fault events and non-fault events. Fault events will turn off the high voltage:

**FAULT EVENTS**

- Temperature
- High Current
- High Voltage
- Power Fault
- Watchdog
- Interlock

The XRBD stores data 620ms before the event, the event itself and for 620ms after the event. Data is recorded every 20ms (62 samples total) showing:

- Anode kV
- Cathode kV
- Total kV
- Total mA
- Filament
- Temperature

We also log non-fault events, these are changes in set points or state of the unit.

**NON FAULT EVENTS**

- HV On
- HV Off
- kV Set point
- mA Set point
- Low Current
- Filament Limit Set point
- Pre Heat Set point
- Line Dip

Fault event data is actual graphical data. Non fault event data is just stored as event type, data and timestamp. We also have a preventative maintenance fault, which throws a non-shutdown fault if the X-Ray tube has been factory installed over 4 years ago or if over 15,000 hours of HV ON is logged.

**Firmware Controlled Seasoning:**
Every unit comes with an initial seasoning table, or customers can set their own. The XRBD knows when the unit has been on, when it has been off, hours on the X-Ray tube, etc. As a preventative maintenance feature upon turn on, we review the data and suggest that a particular seasoning protocol be run based upon the actual usage history of the unit. Proper seasoning compliance of the X-Ray tube will help get the longest lifetime.
### Power and Interface Connections for 100W and 210W Units

#### AC INPUT—6 PIN MOLEX 09-50-8061

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC Input (high)</td>
<td>100-240Vac (high)</td>
</tr>
<tr>
<td>2</td>
<td>Pin Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>3</td>
<td>AC Input (neutral)</td>
<td>100-240Vac (neutral)</td>
</tr>
<tr>
<td>4</td>
<td>Pin Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>N/C</td>
</tr>
</tbody>
</table>

#### ANALOG INTERFACE—7 PIN MOLEX 09-50-8071

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Interlock Enable</td>
<td>Apply +24Vdc to enable interlock. Open/Removal of +24Vdc will cause X-Ray generation to stop.</td>
</tr>
<tr>
<td>3</td>
<td>Pin removed</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor</td>
<td>0-10Vdc = 0-100% rated output voltage. Zout = 10kΩ</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0-10Vdc = 0-100% rated output current. Zout = 10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>X-Ray On</td>
<td>Open collector, High (Open) = No Fault, 35Vdc @10mA maximum</td>
</tr>
</tbody>
</table>

#### RS-232 DIGITAL INTERFACE—9 PIN MALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Transmitted Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>3</td>
<td>Received Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>N/C</td>
</tr>
</tbody>
</table>

#### ETHERNET DIGITAL INTERFACE—RJ45 8 PIN FEMALE CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX +</td>
<td>Transmit Data +</td>
</tr>
<tr>
<td>2</td>
<td>TX -</td>
<td>Transmit Data -</td>
</tr>
<tr>
<td>3</td>
<td>RX +</td>
<td>Receive Data +</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>6</td>
<td>RX -</td>
<td>Receive Data -</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

#### HV LAMP ON RELAY—3 PIN MOLEX 09-50-8031

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normally Closed dry contact</td>
<td>50V max. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>2</td>
<td>Common</td>
<td>50V max. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>3</td>
<td>Normally Open dry contact</td>
<td>50V max. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
</tbody>
</table>

### Power and Interface Connections for 350W and 500W Units

#### AC INPUT—3 PIN PHOENIX CONTACT 1858772

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC Input (high)</td>
<td>100-240Vac (high)</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>AC Input (neutral)</td>
<td>100-240Vac (neutral)</td>
</tr>
</tbody>
</table>

#### DC INPUT FOR HEAT DISSIPATION UNIT—4 PIN AMP (210/350/500W) 206060-1

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24Vdc</td>
<td>24Vdc @ 5 amps</td>
</tr>
<tr>
<td>2</td>
<td>24Vdc Return</td>
<td>24Vdc Return</td>
</tr>
<tr>
<td>3</td>
<td>24Vdc</td>
<td>24Vdc @ 5 amps</td>
</tr>
<tr>
<td>4</td>
<td>24Vdc Return</td>
<td>24Vdc Return</td>
</tr>
</tbody>
</table>

#### ANALOG INTERFACE—10 PIN PHOENIX CONTACT 1792605

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Interlock Enable</td>
<td>Apply +24Vdc to enable interlock. Open/Removal of +24Vdc will cause X-Ray generation to stop.</td>
</tr>
<tr>
<td>3</td>
<td>Pin removed</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor</td>
<td>0-10Vdc = 0-100% rated output voltage. Zout = 10kΩ</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0-10Vdc = 0-100% rated output current. Zout = 10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>Fault Signal</td>
<td>Open collector, High (Open) = No Fault, 35Vdc @10mA maximum</td>
</tr>
<tr>
<td>8</td>
<td>HV ON Lamp Relay N/O</td>
<td>N/C dry contacts. 50 volts maximum. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>9</td>
<td>HV ON Lamp Relay C</td>
<td>Common dry contacts. 50 volts maximum. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
<tr>
<td>10</td>
<td>HV ON Lamp Relay N/C</td>
<td>N/C dry contacts. 50 volts maximum. Rated for 1 amp or less, 50mA nominal load</td>
</tr>
</tbody>
</table>

#### RS-232 DIGITAL INTERFACE—9 PIN MALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Transmitted Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>3</td>
<td>Received Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>N/C</td>
</tr>
</tbody>
</table>

#### ETHERNET DIGITAL INTERFACE—RJ45 8 PIN FEMALE CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX +</td>
<td>Transmit Data +</td>
</tr>
<tr>
<td>2</td>
<td>TX -</td>
<td>Transmit Data -</td>
</tr>
<tr>
<td>3</td>
<td>RX +</td>
<td>Receive Data +</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>6</td>
<td>RX -</td>
<td>Receive Data -</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

#### Power and Interface Connections for 160KV/100-500W MONOBLOCK®

- XRBD
- Spellman High Voltage Electronics Corporation
- www.spellmanhv.com
DIMENSIONS: in.[mm]

350/500W TANK

TOP VIEW

SIDE VIEW

BACK VIEW

FRONT VIEW

13.37 [339.59]

18.99 [482.34]

13.75 [349.25]

7.25 [184.15]

10.50 [266.7]

AIR FLOW

6.08 [154.4]

F.S.

M8X1.25 THD (4PL)

1.00 [254]

6.08 [154.4]

3.00 [12.1]

13.25 [336.55]

14.50 [368.30]

10.00 [254]

10.50 [266.7]

6.00 [152.4]

13.75 [349.25]

13.37 [339.59]

7.25 [184.15]

17°
Spellman's XRB160PN192 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 160kV at 192W. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. Standard models are available with fan shaped beam geometry. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**

X-Ray Scanning: Plating Measurement, Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm
- Beam Filter: 0.016" thick 6061 Al
- Beam Geometry: Asymmetrical fan 80° x 10° ±2°

**Input Voltage:**
- 100-240Vac ±10%, 50/60Hz, 5A maximum

**X-Ray Tube Voltage:**
- Nominal X-Ray tube voltage is adjustable between 80kV to 160kV

**X-Ray Tube Current:**
- 0.1mA to 1.2mA, 192W maximum over specified tube voltage range

**X-Ray Tube Power:**
- 192W maximum continuous

**Voltage Regulation:**
- Line: ±0.1% for a ±10% input line change of nominal input line voltage
- Load: ±0.1% for a 0.1mA to 1.2mA load change

**Voltage Accuracy:**
- Voltage measured across the X-Ray tube is within ±2% of the programmed value

**Voltage Risetime:**
- Ramp time shall be <200ms from 10% to 90% of rated output

**Voltage Overshoot:**
- Within 5% of rated voltage in <10ms

**Voltage Ripple:**
- 1% pp of rated voltage @ ≤1kHz

**Current Regulation:**
- Line: ±0.1% for a ±10% input line change of nominal input line voltage
- Load: 0.5% @ 80-160kV, 0.1mA to 1.2mA

**Current Accuracy:**
- Current measured through the X-Ray tube is within ±2% of the programmed value

**Current Risetime:**
- <200ms from 10% to 90% of rated output

**Arc Intervention:**
- 4 arcs in 10 seconds with a 200ms quench = Shutdown

**Filament Configuration:**
- Internal high frequency AC filament drive with closed loop filament emission control

**Analog Interface:**
- 0 to 10Vdc ground referenced signals

**Digital Interface:**
- RS-232 interface.

**Control Software:**
- A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.

**Interlock Signals:**
- A hardware interlock function is provided

**Operating Temperature:**
- 0°C to +40°C

**Storage Temperature:**
- -40°C to +70°C

**Humidity:**
- 10% to 95% relative humidity, non-condensing

**Cooling:**
- Natural convection augmented by customer provided 250cfm cooling fans for 200W operation
**Input Line Connector:**
6 pin Molex 26-60-4060

**Analog Interface Connector:**
7 pin Molex 26-60-5070

**Digital Interface Connector:**
9 pin D connector, female

**Grounding Point:**
8-32 ground stud provided on chassis

**Dimensions:**
18” x 13.5” x 7.63” (458mm x 343mm x 193.80mm)

**Weight:**
90lbs (40.5kg)

**Orientation:**
Can be mounted in any orientation.

**X-Ray Leakage:**
Not to be greater than 0.5mR/hr at 5cm outside the external surface

**Regulatory Approvals:**

### AC INPUT POWER

**J1 6 PIN CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>4</td>
<td>Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Spare</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>Spare</td>
<td>N/C</td>
</tr>
</tbody>
</table>

### RS-232 DIGITAL INTERFACE—

**JB16 9 PIN FEMALE D CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>TD</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>3</td>
<td>RD</td>
<td>Receive Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

### ANALOG INTERFACE—

**J7 7 PIN MOLEX CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ex Gate</td>
<td>Low = X-Ray OFF, +12Vdc = X-Ray ON</td>
</tr>
<tr>
<td>2</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>4</td>
<td>KV Monitor</td>
<td>0-9 Vdc = 0 to 100% rated output</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0 to 9Vdc = 0 to 100% rated output</td>
</tr>
<tr>
<td>7</td>
<td>Fault</td>
<td>Open collector, 35V @ 10mA max, High = No Fault</td>
</tr>
</tbody>
</table>

### LED INDICATORS

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL NAME</th>
<th>CONDITION</th>
<th>ILLUMINATED WHEN...</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 1</td>
<td>OV</td>
<td>High kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 2</td>
<td>UV</td>
<td>Low kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 3</td>
<td>UC</td>
<td>Low mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 4</td>
<td>OC</td>
<td>High mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 5</td>
<td>ARC FLT</td>
<td>Arc fault occurs</td>
<td></td>
</tr>
<tr>
<td>LED 6</td>
<td>OT</td>
<td>Over temperature occurs</td>
<td></td>
</tr>
<tr>
<td>LED 7</td>
<td>X-RAY ON</td>
<td>X-Rays are enabled</td>
<td></td>
</tr>
<tr>
<td>LED 8</td>
<td>PWR</td>
<td>Power is ON</td>
<td></td>
</tr>
</tbody>
</table>
WARNING!
DO NOT CONNECT AC INPUT POWER TO UNIT WITH COVER REMOVED. DISREGARDING THIS MAY CAUSE FATAL ELECTRICAL SHOCK.

WARNING!
REFER SERVICE TO QUALIFIED PERSONNEL. INTERNAL PARTS MAY PRESENT A RISK OF ELECTRICAL SHOCK DURING SERVICING.

Corporate Headquarters
Hauppauge, New York USA
+1-631-630-3000 FAX: +1-631-435-1620
e-mail: sales@spellmanhv.com
www.spellmanhv.com

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Spellman’s XRB80PN320 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 80kV at 320W. Features like small package size and RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. Standard models are available with fan shaped beam geometry. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
X-Ray Scanning: Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

- **X-Ray Characteristics:**
  - Tube Type: Glass tube, Tungsten target, Be filter
  - Focal Spot: 0.8mm x 0.8mm (IEC 336)
  - Beam Filter: 5052 Al, 0.040” (±0.01”)
  - Beam Geometry: Asymmetrical fan 80° x 10° ±2°

- **Input Voltage:**
  - 200-240Vac ±10%, 50/60Hz, 6.5A max

- **X-Ray Tube Voltage:**
  - Nominal X-Ray tube voltage is adjustable between 40kV to 80kV

- **X-Ray Tube Current:**
  - 0.5mA to 4mA over specified tube voltage range

- **X-Ray Tube Power:**
  - 320W maximum continuous

- **Voltage Regulation:**
  - Line: ±0.05% for a ±10% input line change
  - Load: ±0.05% for a 0.5mA to 4mA load change

- **Voltage Accuracy:**
  - Voltage measured across the X-Ray tube is within ±2% of the programmed value

- **Voltage Risetime:**
  - Ramp time shall be <500ms from 10% to 90% of rated output

- **Voltage Overshoot:**
  - Within 5% of rated voltage in <10ms

- **Voltage Ripple:**
  - ≤1% p-p of rated voltage @ 1kHz

- **Current Regulation:**
  - Line: ±0.5% @ 50-100% V nominal over specified Line range
  - Load: ±0.5% @ 50-100% V nominal over specified Load range

- **Current Accuracy:**
  - Current measured through the X-Ray tube is within ±2% of the programmed value

- **Current Risetime:**
  - <500ms from 10% to 90% of rated output

- **Arc Intervention:**
  - 4 arcs in 10 seconds = shutdown

- **Filament Configuration:**
  - Internal high frequency AC filament drive with closed loop filament emission control

- **Analog Interface:**
  - 0 to 10Vdc ground referenced monitoring signals

- **Digital Interface:**
  - RS-232

- **Control Software:**
  - A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.

- **Interlock Signals:**
  - A hardware interlock functions in digital programming modes.

- **Operating Temperature:**
  - 0°C to +40°C

- **Storage Temperature:**
  - -40°C to +70°C

- **Humidity:**
  - 10% to 90% relative humidity, non-condensing

- **Cooling:**
  - Heat exchanger w/fan and oil pump
Input Line Connector:
Terminal block, Schurter, Inc. part no. 6100-33

Digital Interface Connector:
9 pin D, female

Analog Monitoring Connector:
10 pin Phoenix Contact 1755503

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
See line drawing

Weight:
120lbs (54.4kg) maximum

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 0.5mR/hr at 5cm outside the external surface

Regulatory Approvals:
Designed to be compliant to EEC EMC Directive and EEC Low Voltage Directive with an external filter.

### AC INPUT POWER TERMINAL BLOCK

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>2</td>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>3</td>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>4</td>
<td>Neutral</td>
<td>Neutral</td>
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<tr>
<td>5</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>6</td>
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<td>Neutral</td>
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</table>

### RS-232 DIGITAL INTERFACE

<table>
<thead>
<tr>
<th>JB16 9 PIN FEMALE D CONNECTOR</th>
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</table>

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>TX</td>
<td>RS-232 Transmit</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>RS-232 Receive</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
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### ANALOG MONITORING—

<table>
<thead>
<tr>
<th>JB11 10 PIN PHOENIX CONTACT</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Enable</td>
<td>+24Vdc = Enable X-Ray, 0Vdc/Open = Disable X-Rays</td>
</tr>
<tr>
<td>2</td>
<td>RTN</td>
<td>Signal Return</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor</td>
<td>0 to 10Vdc = 0 to 100kV, Zout = 10kΩ</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Return</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0 to 10Vdc = 0 to 5mA, Zout = 10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>Fault</td>
<td>Open Collector, High (Open) = No Fault, 35Vdc @ 10mA max.</td>
</tr>
<tr>
<td>8</td>
<td>HV On Lamp, Relay N/O</td>
<td>Relay Normally Open, 50Vdc @ 1A maximum</td>
</tr>
<tr>
<td>9</td>
<td>HV On Lamp, Relay Common</td>
<td>Relay Common, 50Vdc @ 1A maximum</td>
</tr>
<tr>
<td>10</td>
<td>HV On Lamp, Relay N/C</td>
<td>Relay Normally Closed, 50Vdc @ 1A maximum</td>
</tr>
</tbody>
</table>
DIMENSIONS: in.[mm]

TOP VIEW

SIDE VIEW

BACK VIEW
Spellman’s XRB200PN400 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 200kV at 400W. Features like universal input, small package size, standard analog monitoring and RS-232 digital interface simplify integrating this unit into your X-Ray system. Standard models are available with fan shaped beam geometry. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**

X-Ray Scanning: Food Inspection, Fill Level Confirmation, Security Applications

**SPECIFICATIONS**

**X-Ray Characteristics:**
- **Tube Type:** Glass tube, Tungsten target, Be filter
- **Focal Spot:** 0.8mm x 0.5mm (IEC336)
- **Beam Filter:** Glass 1.8mm, Oil 10mm, Al 1mm
- **Beam Geometry:** Symmetrical fan 85° x 10° ±1°

**Input Voltage:**
100Vac-240Vac ±10%, 50/60Hz, 6A maximum

**X-Ray Tube Voltage:**
- Nominal X-Ray tube voltage is adjustable between 100kV to 200kV

**X-Ray Tube Current:**
- 0.5mA to 2mA over specified tube voltage range

**X-Ray Tube Power:**
- 400W maximum continuous (350W average without external forced air)

**Voltage Regulation:**
- **Line:** ±0.1% for a ±10% input line change
- **Load:** ±0.1% for a 0.5mA to 2mA load change

**Voltage Accuracy:**
- Voltage measured across the X-Ray tube is within ±1% of the programmed value

**Voltage Risetime:**
- <1 second from 10% to 90% of rated output

**Voltage Overshoot:**
- 5% in less than 100ms

**Voltage Ripple:**
- ≤0.2% pp of rated maximum voltage

**Current Regulation:**
- **Line:** ±0.1% @ 100-200kV, 0.25mA to 2mA
- **Load:** ±0.5% @ 100-200kV, 0.25mA to 2mA

**Current Accuracy:**
- Current measured through the X-Ray tube is within ±1% of the programmed value

**Current Risetime:**
- <1 second from 10% to 90% of rated output

**Arc Intervention:**
- 4 arcs in 10 seconds = shutdown

**Filament Configuration:**
- Internal high frequency AC filament drive with closed loop filament emission control

**Digital Interface:**
- RS-232 interface.

**Control Software:**
- A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.

**Interlock Signals:**
- A hardware interlock function is provided

**Operating Temperature:**
- 0°C to +40°C

**Storage Temperature:**
- -40°C to +70°C

**Humidity:**
- 5% to 95% relative humidity, non-condensing

**Cooling:**
- Heat exchanger w/fan and oil pump, powered from 24Vdc, 2A power supply (customer provided). External forced air cooling if needed to keep oil temperature below 55°C
**Input Line Connector:**
3 pin Phoenix Contact 1829167

**Analog Interface Connector:**
10 pin Phoenix Contact 1755503

**Digital Interface Connector:**
9 pin D connector, female

**Grounding Point:**
M5 ground stud provided on chassis

**Dimensions:**
See drawing

**Weight:**
148.0lbs (67.0kg)

**Orientation:**
Can be mounted in any orientation.

**X-Ray Leakage:**
Not to be greater than 5uSv/hr at 5cm outside the external surface

---

### AC INPUT POWER
**3 PIN PHOENIX CONTACT**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

---

### DC POWER FOR HEAT DISSIPATION UNIT
**4 PIN AMP 206061-1 CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24</td>
<td>+24Vdc</td>
</tr>
<tr>
<td>2</td>
<td>RTN</td>
<td>Return</td>
</tr>
<tr>
<td>3</td>
<td>+24</td>
<td>+24Vdc</td>
</tr>
<tr>
<td>4</td>
<td>RTN</td>
<td>Return</td>
</tr>
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### ANALOG INTERFACE—
**10 PIN PHOENIX CONTACT**

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<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray</td>
<td>+24Vdc = enable X-Ray</td>
</tr>
<tr>
<td>2</td>
<td>X-Ray Return</td>
<td>X-Ray Return</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor Output</td>
<td>0 to 9Vdc = 0 to 100% Rated Voltage</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor Output</td>
<td>0 to 9Vdc = 0 to 100% Rated Current</td>
</tr>
<tr>
<td>7</td>
<td>Fault</td>
<td>Open Collector, Open = No Fault</td>
</tr>
<tr>
<td>8</td>
<td>Relay N/O</td>
<td>HV On, 50V @ 1A maximum</td>
</tr>
<tr>
<td>9</td>
<td>Relay Common</td>
<td>HV On, 50V @ 1A maximum</td>
</tr>
<tr>
<td>10</td>
<td>Relay N/C</td>
<td>HV On, 50V @ 1A maximum</td>
</tr>
</tbody>
</table>

---

### RS-232 DIGITAL INTERFACE—
**9 PIN FEMALE D CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data</td>
<td>Conforms to E/A RS-232-C</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data</td>
<td>Conforms to E/A RS-232-C</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>
Spellman’s XRB160PN480/1 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 160kV at 480W. Features like power factor correction, small package size, standard analog monitoring and RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. Standard models are available with fan shaped beam geometry. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**

X-Ray Scanning: Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm (IEC336)
- Beam Filter: Curved 1mm Al
- Beam Geometry: Asymmetrical fan 80° x 10° ±2°

**Input Voltage:**
- 220Vac, ±10%, 50/60Hz, 6.5A max

**X-Ray Tube Voltage:**
- Nominal X-Ray tube voltage is adjustable between 80kV to 160kV

**X-Ray Tube Current:**
- 0.25mA to 3mA over specified tube voltage range

**X-Ray Tube Power:**
- 480W maximum continuous

**Voltage Regulation:**
- Line: ±0.1% for a ±10% input line change of nominal input line voltage
- Load: ±0.1% for a 0.25mA to 3mA load change

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within ±2% plus 1.785kV of the programmed value

- **Voltage Risetime:**
  Ramp time shall be ≤2 seconds from 10% to 90% of rated output
- **Voltage Overshoot:**
  ±1% switching between 90kV to 160kV @ 0.25mA
- **Voltage Ripple:**
  ≤0.1% of rated voltage from 10Hz to 1kHz
- **Current Regulation:**
  Line: ±0.5% @ 80-160kV, 0.25mA to 3mA
  Load: ±0.5%, 0.25mA to 3mA
- **Current Accuracy:**
  Current measured through the X-Ray tube is within 2% of the programmed value
- **Current Risetime:**
  ≤2 seconds from 10% to 90% of rated output
- **Arc Intervention:**
  4 arcs in 10 seconds = shutdown
- **Filament Configuration:**
  Internal high frequency AC filament drive with closed loop filament emission control
- **Analog Interface:**
  0 to 10Vdc ground referenced signals
- **Digital Interface:**
  RS-232 interface
- **Control Software:**
  A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.
- **Interlock Signals:**
  A hardware interlock function is provided
- **Operating Temperature:**
  0°C to +40°C
- **Storage Temperature:**
  -20°C to +70°C
- **Humidity:**
  5% to 95% relative humidity, non-condensing

Spellman High Voltage is an ISO 9001 and ISO 14001 registered company

Corporate Headquarters
Hauppauge, New York USA
+1-631-630-3000    FAX: +1-631-435-1620
e-mail: sales@spellmanhv.com

www.spellmanhv.com

128086-001    REV. J

Copyright © 2010 Spellman High Voltage Electronics Corp.
Cooling:
Heat exchanger w/fan and oil pump, powered from AC

Input Line Connector:
6 position terminal block

Analog Interface Connector:
7 pin Molex 26-60-5070

Digital Interface Connector:
9 pin D connector, female

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
20" x 22.5" x 10.75" (508mm x 572mm x 273mm)

Weight:
125lbs (56.7kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 0.5mR/hr at 5cm outside the external surface

### AC INPUT POWER
**J1 6 POSITION TERMINAL BLOCK**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>2</td>
<td>Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>4</td>
<td>Removed</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Spare</td>
<td>N/C</td>
</tr>
<tr>
<td>6</td>
<td>Spare</td>
<td>N/C</td>
</tr>
</tbody>
</table>

### ANALOG INTERFACE CONNECTOR—7 PIN MOLEX, 0.156 CENTER

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray</td>
<td>+12Vdc @16mA = enable X-Ray</td>
</tr>
<tr>
<td>2</td>
<td>X-Ray Return</td>
<td>X-Ray Return</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor Output</td>
<td>0 to 1.6Vdc = 0 to 160kV</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor Output</td>
<td>0 to 3Vdc = 0 to 3mA</td>
</tr>
<tr>
<td>7</td>
<td>Fault</td>
<td>Open Collector, Open = No Fault</td>
</tr>
</tbody>
</table>

### RS-232 DIGITAL INTERFACE—9 PIN FEMALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
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<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>TX</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>Receive Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>X-Ray Enable</td>
<td>+12Vdc @16mA = Enable</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>
Spellman's XRB160PN480/2 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 160kV at 480W. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. Standard models are available with fan shaped beam geometry. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
X-Ray Scanning: Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm (IEC336)
- Beam Filter: 1mm curved window
- Beam Geometry: Asymmetrical fan 80° x 10° ±2°

**Input Voltage:**
100-240Vac ±10%, 50/60Hz, 6.5A max; 12Vdc @ 5A

**X-Ray Tube Voltage:**
Nominal X-Ray tube voltage is adjustable between 80kV to 160kV

**X-Ray Tube Current:**
0.25mA to 3mA over specified tube voltage range

**X-Ray Tube Power:**
480W maximum

**Voltage Regulation:**
- Line: ±0.1% for a ±10% input line change of nominal input line voltage
- Load: ±0.1% for a 0.3mA to 3mA load change

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within ±1% of the programmed value

**Voltage Risetime:**
Ramp time shall be <1 second from 10% to 90% of rated output

**Voltage Overshoot:**
Within 5% of rated voltage in <10ms

**Voltage Ripple:**
0.1% pp of rated voltage @ ≤1kHz

**Current Regulation:**
- Line: ±0.1% for a ±10% input line change of nominal input line voltage
- Load: ±0.5% @ 80-160kV, 0.3mA to 3mA

**Current Accuracy:**
Current measured through the X-Ray tube is within ±1% of the programmed value

**Current Risetime:**
<1 second from 10% to 90% of rated output

**Arc Intervention:**
4 arcs in 10 seconds with a 200ms quench = Shutdown

**Filament Configuration:**
Internal high frequency AC filament drive with closed loop filament emission control

**Analog Interface:**
0 to 10Vdc ground referenced signals

**Digital Interface:**
RS-232 interface.

**Control Software:**
A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.

**Interlock Signals:**
A hardware interlock functions in both analog and digital programming modes.

**Operating Temperature:**
0°C to +40°C

**Storage Temperature:**
-40°C to +70°C

**Humidity:**
95% relative humidity, non-condensing

**Cooling:**
Heat exchanger w/fan and oil pump, powered from DC input
**Input Line Connector:**
3 pin, Phoenix Contact 1829167

**Analog Interface Connector:**
10 pin, Phoenix Contact 1755503

**Digital Interface Connector:**
9 pin D connector, female

**Heat Exchanger Power Connector:**
4 pin AMP part no. 206061-1

**Grounding Point:**
8-32 ground stud provided on chassis

**Dimensions:**
See outline drawing

**Weight:**
125lbs (56.7kg)

**Orientation:**
Can be mounted in any orientation.

**X-Ray Leakage:**
Not to be greater than 0.5mR/hr at 5cm outside the external surface

---

### AC INPUT POWER

**3 PIN PHOENIX CONTACT**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

### DC POWER FOR HEAT DISSIPATION UNIT

**4 PIN AMP 206061-1 CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+12</td>
<td>+12Vdc</td>
</tr>
<tr>
<td>2</td>
<td>RTN</td>
<td>Return</td>
</tr>
<tr>
<td>3</td>
<td>+12</td>
<td>+12Vdc</td>
</tr>
<tr>
<td>4</td>
<td>RTN</td>
<td>Return</td>
</tr>
</tbody>
</table>

### ANALOG INTERFACE—JB15 10 PIN PHOENIX CONTACT

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Signal</td>
<td>+24Vdc =Enable X-Ray, 0Vdc/open = Disable X-Ray, Zin=2.2kΩ</td>
</tr>
<tr>
<td>2</td>
<td>X-Ray Signal Return</td>
<td>Return</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>400V Monitor</td>
<td>0-10Vdc = 0 to 178kV, Zout = 10kΩ</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0-10Vdc = 0 to 3.4mA, Zout = 10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>Fault Signal</td>
<td>Open collector, High (Open) = No Fault, 35Vdc @10mA maximum</td>
</tr>
<tr>
<td>8</td>
<td>HV ON Lamp Relay n/c</td>
<td>Relay Normally Open, 50Vdc @ 1A maximum</td>
</tr>
<tr>
<td>9</td>
<td>HV ON Lamp Relay common</td>
<td>Relay Common, 50Vdc @ 1A maximum</td>
</tr>
<tr>
<td>10</td>
<td>HV ON Lamp Relay n/c</td>
<td>Relay Normally Closed, 50Vdc @ 1A maximum</td>
</tr>
</tbody>
</table>

### LED INDICATORS

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL NAME</th>
<th>CONDITION</th>
<th>Illuminated When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 1</td>
<td>OT</td>
<td>Over temperature occurs</td>
<td></td>
</tr>
<tr>
<td>LED 2</td>
<td>ARC FLT</td>
<td>Arc fault occurs</td>
<td></td>
</tr>
<tr>
<td>LED 3</td>
<td>UV</td>
<td>Low KV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 4</td>
<td>OVL</td>
<td>High KV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 5</td>
<td>LUC</td>
<td>Low mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 6</td>
<td>OK</td>
<td>High mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 7</td>
<td>X-RAY ON</td>
<td>X-Rays are enabled</td>
<td></td>
</tr>
<tr>
<td>LED 8</td>
<td>PWR</td>
<td>Power is ON</td>
<td></td>
</tr>
</tbody>
</table>

### RS-232 DIGITAL INTERFACE—9 PIN FEMALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data</td>
<td>Conforms to EIA RS-232-C</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>
Spellman’s XRB160PN480/CT Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 160kV at 480W. Features like small package size and RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. Standard models are available with fan shaped beam geometry. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
X-Ray Scanning: Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm (IEC336)
- Beam Filter: 1.7mm of glass, 1mm of Al, and 10mm of oil
- Beam Geometry: Symmetrical fan 105° ±3° x 4° ±1°

**Input Voltage:**
- Monoblock®: 100-240Vac ±10%, 50/60Hz, 6.5A max
- Heat Dissipation Unit: 24Vdc, 3A

**X-Ray Tube Voltage:**
Nominal X-Ray tube voltage is adjustable between 20kV to 160kV

**X-Ray Tube Current:**
0.3mA to 6mA over specified tube voltage range

**X-Ray Tube Power:**
320W continuous, 480W peak

**Voltage Regulation:**
- Line: ±0.1% for a ±10% input line change of nominal input line voltage
- Load: ±0.1% for a 0.3mA to 6mA load change

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within ±1% of the programmed value

**Voltage Risetime:**
Ramp time shall be <1 second from 1% to 90% of rated output

**Voltage Overshoot:**
Within 5% of rated voltage

**Voltage Ripple:**
0.1% pp of rated voltage @ ≤1kHz

**Current Regulation:**
- Line: ±0.5%
- Load: ±0.5%

**Current Accuracy:**
Current measured through the X-Ray tube is within ±1% of the programmed value

**Current Risetime:**
<1 second from 1% to 90% of rated output

**Arc Intervention:**
4 arcs in 10 seconds = Shutdown

**Filament Configuration:**
Internal high frequency AC filament drive with closed loop filament emission control

**Digital Interface:**
RS-232

**Control Software:**
A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.

**Interlock Signals:**
A hardware interlock functions in digital programming modes.

**Operating Temperature:**
0°C to +40°C

**Storage Temperature:**
-40°C to +70°C

**Humidity:**
5% to 90% relative humidity, non-condensing

**Cooling:**
Heat exchanger w/fan and oil pump, powered from customer provided 24Vdc @ 3A
Input Line Connector:
  3 pin Phoenix Contact part no. 1829167
Digital Interface Connector:
  9 pin D, female
Analog Signal Connector:
  10 pin Phoenix Contact part no. 1755503
Cooler Power Connector:
  4 pin AMP part no. 206061-1
Grounding Point:
  8-32 ground stud provided on chassis
Dimensions:
  24.00” x 16.00” x 6.50”
  (609.60mm x 406.40mm x 165.10mm)
Weight:
  125lbs (49.5kg) ±10lbs (±4.5kg)
Orientation:
  Can be mounted in any orientation.
X-Ray Leakage:
  Not to be greater than 0.5mR/hr at 5cm
  outside the external surface
Special Features:
  Stationary or rotating CT application up to 90rpm
  at a max. radius of 24.75” (629mm)
Spellman’s XRB150PN600 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 150kV at 600W. Features like power factor correction, small package size and a standard analog and RS-232 digital interface simplify integrating this unit into your X-Ray system. Standard models are available with cone shaped beam geometry. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
X-Ray Scanning: Bone Densitometry, Food Inspection, Security

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.5mm x 0.5mm (IEC 336)
- Beam Filter: 0.06” Ultem
- Beam Geometry: Cone, 18° ±1°

**Input Voltage:**
200-240Vac ±10%, 50/60Hz, 6.5A maximum

**X-Ray Tube Voltage:**
- Nominal X-Ray tube voltage is adjustable between 70kV to 150kV

**X-Ray Tube Current:**
- 1.0mA to 4.0mA over specified tube voltage range

**X-Ray Tube Power:**
- 160W continuous, 600W peak
- Duty Cycle: 30 seconds on, 300 seconds off
  @ 600W peak

**Voltage Regulation:**
- Line: ±0.1% for a ±10% input line change of 180 to 264Vac
- Load: ±0.1% for a 1.0mA to 4.0mA load change.
  600W maximum

**Voltage Accuracy:**
- Voltage measured across the X-Ray tube is within ±2% of the programmed value

**Voltage Risetime:**
- ±1% in less than 300ms

**Voltage Overshoot:**
- ±10% during 300ms risetime

**Voltage Ripple:**
- 1% rms of rated voltage @ 10Hz to 1MHz

**Current Regulation:**
- Line: ±0.1% from 180-264Vac
- Load: ±0.5% @ 70kV-150kV, 1.0mA to 4.0mA

**Current Accuracy:**
- Current measured through the X-Ray tube is within ±2% of the programmed value

**Current Risetime:**
- ±1% in less than 300ms

**Arc Intervention:**
- 4 arcs in 10 seconds with a 200ms quench = Shutdown

**Filament Configuration:**
- Internal high frequency AC filament drive with closed loop filament emission control

**Analog Interface:**
- 0 to 5Vdc ground referenced signals

**Digital Interface:**
- RS-232 interface.

**Control Software:**
- A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.

**Interlock/Signals:**
- A hardware interlock function is provided

**Operating Temperature:**
- 0°C to +40°C

**Storage Temperature:**
- -40°C to +70°C

**Humidity:**
- 10% to 95% relative humidity, non-condensing

**Cooling:**
- External fan required. 250cfm minimum to maintain an oil temperature of 55°C
Input Line Connector:
3 pin Phoenix Contact P/N 1829167

Analog Interface Connector:
10 pin Phoenix Contact P/N 1755503

Digital Interface Connector:
9 pin D connector, female

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
13.46” x 13.38” x 6.24”
(341.89mm x 339.85mm x 158.50mm)

Weight:
66lbs (30kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Less than 100mR/hr at 1m distance, measured at 140kV, 3mA

### AC INPUT POWER

**JB1 3 PIN PHOENIX CONTACT**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>Line</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Chassis Ground</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

### RS-232 DIGITAL INTERFACE—

**JB16 9 PIN FEMALE D CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spare</td>
<td>N/C</td>
</tr>
<tr>
<td>2</td>
<td>Transmit</td>
<td>RS-232</td>
</tr>
<tr>
<td>3</td>
<td>Receive</td>
<td>RS-232</td>
</tr>
<tr>
<td>4</td>
<td>Spare</td>
<td>N/C</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>Spare</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>Spare</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>Spare</td>
<td>N/C</td>
</tr>
<tr>
<td>9</td>
<td>Spare</td>
<td>N/C</td>
</tr>
</tbody>
</table>

### ANALOG INTERFACE—

**JB15 10 PIN PHOENIX CONTACT**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Signal</td>
<td>+12Vdc =Enable X-Ray, 0Vdc =  No X-Ray, Zin= 1kΩ</td>
</tr>
<tr>
<td>2</td>
<td>X-Ray Signal Return</td>
<td>Signal Return</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor</td>
<td>0 to 5Vdc = 0 to 175kV,  Zout= 10kΩ</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>mA Monitor</td>
<td>0 to 5Vdc = 0 to 4.5mA,  Zout= 10kΩ</td>
</tr>
<tr>
<td>7</td>
<td>Fault Signal</td>
<td>Open collector, High (Open) = No Fault, 35Vdc @10mA maximum</td>
</tr>
<tr>
<td>8</td>
<td>HV ON Lamp Relay n/o</td>
<td>Relay Normally Open, 50Vdc @ 1A maximum</td>
</tr>
<tr>
<td>9</td>
<td>HV ON Lamp Relay common</td>
<td>Relay Common, 50Vdc @ 1A maximum</td>
</tr>
<tr>
<td>10</td>
<td>HV ON Lamp Relay n/c</td>
<td>Relay Normally Closed, 50Vdc @ 1A maximum</td>
</tr>
</tbody>
</table>

### LED INDICATORS

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL NAME</th>
<th>CONDITION</th>
<th>Illuminated When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 1</td>
<td>OT</td>
<td>Over temperature occurs</td>
<td></td>
</tr>
<tr>
<td>LED 2</td>
<td>ARC FLT</td>
<td>Arc fault occurs</td>
<td></td>
</tr>
<tr>
<td>LED 3</td>
<td>UV</td>
<td>Low kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 4</td>
<td>OV</td>
<td>High kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 5</td>
<td>UC</td>
<td>Low mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 6</td>
<td>OC</td>
<td>High mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 7</td>
<td>X-RAY ON</td>
<td>X-Rays are enabled</td>
<td></td>
</tr>
<tr>
<td>LED 8</td>
<td>PWR</td>
<td>Power is ON</td>
<td></td>
</tr>
</tbody>
</table>
DIMENSIONS: in.[mm]

FRONT VIEW TANK

SIDE VIEW TANK

TOP VIEW TANK

AIR INTAKE

AIR EXHAUST

SIDE VIEW TANK

SIDE VIEW CONTROL ASSEMBLY

TOP VIEW TANK

SIDE VIEW CONTROL ASSEMBLY

CORPORATE HEADQUARTERS

Hauppauge, New York USA

+1-631-630-3000 FAX: +1-631-435-1620
e-mail: sales@spellmanhv.com

www.spellmanhv.com

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Spellman’s XRB160PN688/CT Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 160kV at 688W. Features like small package size and RS-232 digital interface simplify integrating this unit into your X-Ray system. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
X-Ray Scanning: Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 2.5mm x 2.5mm (IEC 60336)
- Beam Filter: 1.5mm glass, 9-26mm oil, 0.4mm Al
- Beam Geometry: Asymmetrical fan 93° x 15° ±2°

**Input Voltage:**
230Vac, ±15%, 50/60Hz, 5A max

**X-Ray Tube Voltage:**
- Nominal X-Ray tube voltage is adjustable between 50kV to 160kV
- 0.25mA to 4.3mA over specified tube voltage range

**X-Ray Tube Power:**
688W maximum continuous

**Voltage Regulation:**
- Line: ±0.1% ±10%
- Load: ±0.1% 0.25 to 4.3mA

**Voltage Accuracy:**
Voltage measured across the X-Ray tube is within 1% of the programmed value

**Voltage Risetime:**
Ramp time shall be 500ms nominal, 1 second maximum from 10% to 90% of rated output

**Voltage Overshoot:**
Within 5% of rated voltage

**Voltage Ripple:**
1% p-p of rated voltage

**Current Regulation:**
- Line: ±0.5% ±10%
- Load: ±0.5% 0.25 to 4.3mA

**Current Accuracy:**
Current measured through the X-Ray tube is within 5% of the programmed value

**Current Risetime:**
500ms nominal, 1 second maximum

**Arc Intervention:**
4 arcs in 10 seconds = shutdown

**Filament Configuration:**
Internal high frequency AC filament drive with closed loop filament emission control

**Digital Interface:**
RS-232 interface.

**Control Software:**
A demo GUI for engineering evaluations will be provided for the RS-232 digital interface upon request.

**Interlock Signals:**
A hardware interlock function is provided

**Operating Temperature:**
5°C to +40°C

**Storage Temperature:**
-25°C to +65°C

**Humidity:**
10% to 90% relative humidity, non-condensing

**Cooling:**
Heat exchanger w/fan and oil pump, powered from AC
Input Line Connector:
5 pin Molex 26-60-4050

Heat Exchanger Power Connector:
4 pin AMP part no. 206061-1

Digital Interface Connector:
9 pin D connector, female

Grounding Point:
M5 ground stud provided on chassis

Dimensions:
See drawing

Weight:
140lbs ±10lbs (64kg ±4.5kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Less than 300uR/hr at a distance of 10cm from all surfaces

Special Features:
Stationary or rotating CT application up to 100rpm at a maximum radius 20.25˝ (514mm)

**AC INPUT POWER**

**J1 5 PIN MOLEX 26-60-4050 CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>230Vac Input</td>
</tr>
<tr>
<td>2</td>
<td>Line</td>
<td>230Vac Input</td>
</tr>
<tr>
<td>3</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>4</td>
<td>Neutral</td>
<td>230Vac Neutral</td>
</tr>
<tr>
<td>5</td>
<td>Neutral</td>
<td>230Vac Neutral</td>
</tr>
</tbody>
</table>

**AC POWER FOR HEAT DISSIPATION UNIT**

**4 PIN AMP 206061-1 CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>230Vac Input</td>
</tr>
<tr>
<td>2</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>230Vac Neutral</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Chassis Ground</td>
</tr>
</tbody>
</table>

**RS-232 DIGITAL INTERFACE—**

**J5 9 PIN FEMALE D CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>TX</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>Receive Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>
Spellman’s new Panoramic Dental Monoblock® consists of an integrated X-Ray tube, dual-output high voltage power supply, and filament supply with control circuitry. The PDM90PN900 is designed for extra oral dental X-Ray applications including CT and Panoramic X-Ray. Features like small package size, standard analog and RS-232 digital interface simplify integrating this Monoblock® into your X-Ray system. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability and performance.

**TYPICAL APPLICATIONS**
Dental X-Ray: Panoramic and CT Imaging

**SPECIFICATIONS**

**X-Ray Tube Characteristics:**
- Target Angle: 5 degrees
- Focal Spot: 0.5mm nominal
- Beam Filtration: 3.0mm of Al equivalent
- Beam Geometry: see page 3

**X-Ray Tube Voltage:**
Nominal X-Ray tube voltage is adjustable between 50kV to 90kV

**Voltage Regulation:**
- Line: ±0.5% for a ±1V change of nominal input line voltage
- Load: ±0.1% for a load change of 25μA to maximum rated current

**X-Ray Tube Current:**
1mA to 10mA over specified tube voltage range

**Current Regulation:**
- Line: ±0.5% for a ±1V change of nominal input line voltage
- Load: ±0.5% for a voltage change of 35kV to 80kV

**X-Ray Tube Power:**
900W peak power

**Duty Cycle:**
- CT (Pulsed): ≤45 seconds scan time cycle at up to 40 pulses per second available
- Panoramic (Continuous): Maximum scan time = 30s, with 60s off-time. Five consecutive scans

**Input Voltage:**
100-240Vac ±10% 50/60 Hz, 10 amps RMS maximum

**Interface:**
The RS-232 serial communications interface will be used to program and monitor output voltage and current, control various functions and report status and faults.

**Digital Interface Connector:**
- RS-232: 9 pin D connector, male

**Operating Temperature:**
0°C to +40°C

**Storage Temperature:**
-20°C to +70°C

**Humidity:**
5% to 95% relative humidity, non-condensing

**Cooling:**
- Tank: Convection
- Controller: Forced air via provided fan

**Dimensions:**
- X-Ray Tank: 9.7”W x 7.7”H x 4.7”D
  (247mm x 195mm x 119mm)
- Inverter/Controller: 7.1”W x 9.8”H x 3.6”D
  (180mm x 250mm x 92mm)

**Weight:**
- X-Ray Tank: 17lbs (7.7kg)
- Inverter/Controller: 6.5lbs (3kg)

**X-Ray Leakage:**
Less than 100mR/hour (or <1mGy/hr) @ 1meter from the Monoblock® surface.

**Regulatory Approvals:**
Compliant to EMC 60601-1-2 (external EMC filter and shielding required). UL/CUL recognized file E242584.
ANALOG INTERFACE—
J2 10 PIN PHOENIX CONTACT

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X-Ray Ready/Sync</td>
<td>+5 V Logic</td>
</tr>
<tr>
<td>2</td>
<td>X-Ray Enable</td>
<td>+5 V Logic</td>
</tr>
<tr>
<td>3</td>
<td>+ X-ray Signal (Exgate)</td>
<td>+5VDC = Enable X-Ray, Low (or Open) = Disable X-Ray</td>
</tr>
<tr>
<td>4</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>5</td>
<td>VMTR Signal (KV monitor)</td>
<td>Voltage: 0 to +5.00 V max, Scale Factor: 0 – 5.00 Vdc = 0 to 100 kV</td>
</tr>
<tr>
<td>6</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>7</td>
<td>IMTR Signal (mA monitor)</td>
<td>Voltage: 0 to +5.00 V max, Scale Factor: 0 – 5.00 Vdc = 0 – 12.1mA</td>
</tr>
<tr>
<td>8</td>
<td>Fault Signal</td>
<td>Output signal: Open Collector, High (Open) = No Fault</td>
</tr>
<tr>
<td>9</td>
<td>HV ON Lamp, Relay N/O</td>
<td>Relay Normally Open, Dry contacts rated 1A or less will handle a nominal 50mA DC load</td>
</tr>
<tr>
<td>10</td>
<td>HV ON Lamp, Common</td>
<td>Common</td>
</tr>
</tbody>
</table>

RS-232 DIGITAL INTERFACE—
J5 9 PIN MALE D CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>TX</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>3</td>
<td>RX In</td>
<td>Receive Data</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>SGND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

LED INDICATORS

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>SIGNAL NAME</th>
<th>CONDITION</th>
<th>ILLUMINATED WHEN...</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 1</td>
<td>OV</td>
<td>High kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 2</td>
<td>UV</td>
<td>Low kV occurs</td>
<td></td>
</tr>
<tr>
<td>LED 3</td>
<td>UC</td>
<td>Low mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 4</td>
<td>OC</td>
<td>High mA occurs</td>
<td></td>
</tr>
<tr>
<td>LED 5</td>
<td>ARC FLT</td>
<td>Arc fault occurs</td>
<td></td>
</tr>
<tr>
<td>LED 6</td>
<td>OT</td>
<td>Over temperature occurs</td>
<td></td>
</tr>
<tr>
<td>LED 7</td>
<td>PW (Pulse mode)</td>
<td>Pulse mode selected</td>
<td></td>
</tr>
<tr>
<td>LED 8</td>
<td>CW (CW mode)</td>
<td>CW mode selected</td>
<td></td>
</tr>
<tr>
<td>LED 9</td>
<td>CW (CW mode)</td>
<td>X-Ray is ON</td>
<td></td>
</tr>
</tbody>
</table>
Spellman’s MMB125PN3.5 Medical Monoblock® with <1ms rise time is ideal for extremities, specialized applications and vascular imaging. Benefit from Spellman’s 70 plus years of high voltage innovation with this MMB125PN3.5 Monoblock® X-Ray source specifically designed for the C-Arm OEM. Our advanced technology and design expertise in conjunction with our depth of manufacturing capabilities position Spellman as the wise choice for your Monoblock® requirements.

Spellman’s Ultra-Fast MMB Series utilizes our unique technologies that increases the quality of the X-Ray beam and significantly reduces patient dose. Pulsed Fluoroscopy enhances imaging of dense and complex anatomy to further support dose management. With a rise time of <1ms, Spellman’s MMB Series is among the fastest in the industry.

### TYPICAL APPLICATIONS
- **C-Arm OEM**

### SPECIFICATIONS

#### X-Ray Characteristics:
- **Focal Spot**: 0.5mm for small focus, 1.6mm for large focus
- **Target Angle**: 16°
- **Target Material**: Tungsten
- **Beam Filter**: 0.8mm Al
- **Beam Geometry**: Refer to line drawing
- **X-Ray Leakage**: Less than <1mGy/hour @ 1meter from tank surface.
- **Maximum Filament Current**: 4.3A
- **Filament Inverter Switching Frequency**: 20kHz
- **Anode Heat Content**: 35.5kJ
- **Maximum Anode Heat Dissipation**: 600W
- **Distance Between Focal Spot to X-Ray Output Window**: 45mm
- **Focal Spot Position**: Refer to outline drawing, additionally it is marked on tank cover.

#### Input Power:
- **Input Voltage**: 190-264Vac, single phase, 50/60 Hz
- **Continuous Current**: ≤9A @ 600W, 220V
- **Peak Current**: ≤34A @ 3500W, 220V

#### X-Ray Tube Voltage:
- **Operational Range**: 40 to 125kV
- **KV Rise Time**: <1ms (from 10% to 90%)
- **Reproducibility**: ≤0.05 per IEC60601-2-54
- **KV Ripple**: ≤1%
- **KV Accuracy Fluoroscopy**: ±5%
- **KV Overshoot**: ≤5%

#### X-Ray Tube Current:
- **Fluoro**: 0.2mA to 6 mA (small focal spot)
- **Pulsed Fluoro**: 0.5mA to 10 mA (small focal spot)
- **Radiography**: 10mA to 40mA (large focal spot)
- **mA Accuracy**: ±10%

#### Maximum Operating Conditions:
- **Continuous Low Level Fluoro**: 6 mA for 5 minutes
- **Continuous High Level Fluoro**: 10 mA for 2 minutes
- **Pulsed Fluoro**: 0.5fps, 1fps, 2fps, 4fps, 8fps, 15fps, 25fps, 30fps for 2 minutes
- **Pulse on time**: the lower value of 40ms or 50% duty cycle
- **Radiographic**: Single shot large focal spot, 0.1 seconds @ 3500 watts
- **Maximum Anode Heat Dissipation**: 600W
- **Average Power**: 600W for 5 minutes
- **Tank Heat Content**: No less than 675kHU
- **Max. Cooling Rate**: 150W

#### X-Ray Tube Current Protection:
- Over Current (High mA): Trip point is set at 15% over maximum rated current, or at 15% over programmed output current value for longer than 50ms.
- Under Current (High mA): Trip point is set at 15% under programmed output current value for longer than 50ms.
- Over Current (Low mA): Trip point is set at 20% over maximum rated current, or at 20% over programmed output current value for longer than 50ms.
- Under Current (Low mA): Trip point is set at 20% under programmed output current value for longer than 50ms.
X-Ray Tube Voltage Protection:
Over Voltage (High kV): Trip point is when the kV output exceeds 137.5kV for more than 10ms or it set is at 10% over programmed output voltage value for longer than 30ms.
Under Voltage (Low kV): Trip point is set at 10% under the programmed output voltage value for longer than 30ms.

X-Ray Tube Arc Protection:
Arc Intervention: Unit will detect an Arc but HV will not be shut down, but if multiple arcs occur (4 arcs in 10 seconds) the unit will shut down.

Over Temperature Protection:
Over Temperature: Over temperature of tank cover trip point shall be within 60°C ±5°C. Over temperature of tank oil trip point shall be set 65°C.

Operating Temperature: 0 to +40 ºC.
Storage Temperature: -20 to +70 ºC
Altitude: 0 to 8000 feet (0 to 2438 meters)
Humidity: 5 to 95%, non-condensing.

Dimensions:
X-Ray Tank: 12.2” x 6.2” x 5.7” (310mm x 158mm x 145mm)
Controller: 14.9” x 10.6” x 3.2” (380mm x 270mm x 83mm)

Weight:
X-Ray Tank: 27.5 pounds (13kg)
Controller: 9.9 pounds (4.5kg)

Regulatory Approvals:
Designed to be compliant to:
IEC 60601-1:2005+A
Medical electrical equipment Part 1: General requirements for basic safety and essential performance.
IEC 60601-1-2
2007 Medical electrical equipment Part 1-2: General requirements for basic safety and essential performance- Collateral standard: Electromagnetic compatibility—Requirements and tests.
IEC 60601-1-3
IEC 60601-2-54
2009 Medical electrical equipment Part 2: Particular requirements for the basic safety and essential performance of X-Ray equipment for radiography and radioscopy.

EMC
Designed to meet IEC requirements for medical components. (Note: External EMI filter may be required)
RoHS
Controller and Tank Assembly are RoHS compliant.

AC LINE POWER CONNECTOR—TE: 1-350943-0

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
<td>Earth Ground</td>
</tr>
<tr>
<td>2</td>
<td>AC Input 1</td>
<td>190 - 264Vac, single phase, 50/60Hz, 3A max.</td>
</tr>
<tr>
<td>3</td>
<td>AC Input 2</td>
<td>190 - 264Vac, single phase, 50/60Hz, 3A max.</td>
</tr>
</tbody>
</table>

Note: Ground stud is provided on chassis

DIGITAL INTERFACE—9 PIN FEMALE D CONNECTOR TE: 574784-5

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>RS-232 TX Out</td>
<td>RS-232 Transmit</td>
</tr>
<tr>
<td>3</td>
<td>RS-232 RX In</td>
<td>RS-232 Receive</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>RS-232 Ground</td>
<td>Ground from RS-232 transceiver IC</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>NC</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

ANALOG INTERFACE—15 PIN FEMALE D CONNECTOR TE: 5747845-5

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>2</td>
<td>+5Vdc Out</td>
<td>+5Vdc, 100mA max.</td>
</tr>
<tr>
<td>3</td>
<td>Prep</td>
<td>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. Contact connection to pin 14. Closed = PREP, the filament is placed in preheat mode</td>
</tr>
<tr>
<td>4</td>
<td>Ready</td>
<td>The generator is ready for X-Ray exposure. Open Collector. Low/Active = Ready</td>
</tr>
<tr>
<td>5</td>
<td>Exposure</td>
<td>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 14. Closed = Exposure</td>
</tr>
<tr>
<td>6</td>
<td>X-Ray ON 75% Status</td>
<td>Transistor output to indicate X-Ray ON status synchronized with 75% of kV set point</td>
</tr>
<tr>
<td>7</td>
<td>X-Ray ON Status</td>
<td>Transistor output to indicate X-Ray ON status synchronized with kV start up</td>
</tr>
<tr>
<td>8</td>
<td>X-Ray Shutdown</td>
<td>User signal to generator to rapidly turn HV OFF and ON during serial exposure sequence. Low/Active=HV OFF</td>
</tr>
<tr>
<td>9</td>
<td>HVG Fault Status</td>
<td>Generator signal indicating generator fault. Open collector transistor output. Low/Active = Fault</td>
</tr>
<tr>
<td>10</td>
<td>kV Monitor</td>
<td>Signal from generator. 0-10V = 0-140kV</td>
</tr>
<tr>
<td>11</td>
<td>mA Monitor</td>
<td>Signal from generator. Large focus: 0-10V = 0-50mA Small focus: 0.5V=0-10mA</td>
</tr>
<tr>
<td>12</td>
<td>Filament Current Monitor</td>
<td>Signal from generator. 0-10V = 0-6A</td>
</tr>
<tr>
<td>13</td>
<td>Monitor GND</td>
<td>Ground for reference of monitor signals</td>
</tr>
<tr>
<td>14</td>
<td>+24Vdc Out</td>
<td>For connection to PREP and EXPOSURE control relay coils</td>
</tr>
<tr>
<td>15</td>
<td>Shield Ground</td>
<td>For connection of interface cable shield to generator chassis ground</td>
</tr>
</tbody>
</table>
MMB125PN3.5
40-125KV @ 3.5KW MONOBLOCK®

DIMENSIONS: in.[mm]

**GENERATOR TANK**
- 1.77 [45]
- 6.22 [158]
- 0.689 [17.5]

**SIDE VIEW**

**TOP VIEW**
- 4xM6X1.25
- 4xM6X0.7-6H
- 3.66 [93]
- 5.71 [145]

**CONTROL UNIT**

**FRONT VIEW**

**TOP VIEW**
- 1.18 [30.0]
- 6.69 [170.0]
- 6.30 [160.0]
- 14.97 [380.0]

**WARNING**
- REFER SERVICE TO QUALIFIED PERSONNEL
- INTERNAL PARTS MAY PRESENT A RISK OF ELECTRICAL SHOCK DURING SERVICING

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Spellman High Voltage is an ISO 9001 and ISO 14001 registered company.
www.spellmanhv.com
() 2019 Spellman High Voltage Electronics Corp.
Spellman USA and Corporate HQ
475 Wireless Blvd.
Hauppauge, NY 11788
United States
tel: +1 631-630-3000
fax: +1 631-435-1620
email: sales@spellmanhv.com

Spellman Valhalla NY USA
One Commerce Park
Valhalla, NY 10595
United States
tel: +1 914-686-3600
fax: +1 914-686-5424

Spellman UK
Broomers Hill Park #14, Broomers Hill
Pulborough, West Sussex,
United Kingdom RH20 2RY
tel: +44 (0) 1798 877000
fax: +44 (0) 1798 872479

Spellman Japan
Kano Bldg. 5F, 1-26-7 Nishigotanda,
Shinagawa-ku, Tokyo 141-0031 Japan
tel: +81 (0) 3-5436-9810
fax: +81 (0) 3-5436-9811

Spellman China
Spellman High Voltage Electronics (SIP) Co Ltd.
Block D, No.16 SuTong Road,
Suzhou Industrial Park 215021 China
tel: +86 512-67630010
fax: +86 512-67630030

Spellman High Voltage Korea Co.,Ltd.
#B-720, BRC Smart Valley,
Song Do Mirae-ro 30,
Yeonsu-Gu, Incheon, Korea 406-081
tel: +82 32-719-2300
fax: +82 32-720-4300

Spellman de Mexico – Plant 2
Avenida Pedregal # 2 Esquina
Avenida Chapultepec
Parque Industrial FINSA Oriente
Matamoros, Tamps., Mexico 87340
tel. +52 868 150-1200

Spellman de Mexico – Plant 3
Avenida Chapultepec # 101 Esquina
Avenida Horizonte
Parque Industrial FINSA Oriente
Matamoros, Tamps., Mexico 87340
tel. +52 868 150-1200

Spellman High Voltage GmbH
Josef-Baumann-Straße 23
44805 Bochum
Germany
tel: +49 (0) 234 87906-0
fax: +49 (0) 234 87906-11

www.spellmanhv.com