Spellman has set the standard in development of integrated X-Ray sources with its Monoblock® series of X-Ray sources. Our custom OEM designs are used in baggage screening, explosive detection, medical imaging, food inspection and non-destructive testing and many other applications.

A Monoblock® is typically a single assembly housing 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.

“The physical compactness and inherent elimination of cabling reduces cost and the risk of breakdown making these products extremely reliable.”
**BENEFITS OF SPELLMAN MONOBLOCK® TECHNOLOGY**

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

**TYPICAL MONOBLOCK APPLICATIONS**

**EXPLOSIVE DETECTION SYSTEMS**

**CARRY ON BAGGAGE SCREENING**

**CHECKED BAGGAGE SCREENING**

**MEDICAL CT SCANNING**

**DENTAL CT SCANNING**

**BONE DENSITOMETRY**

**FOOD INSPECTION**

**FILL LEVEL CONFIRMATION**

**PRODUCT INSPECTION**

**THICKNESS GAUGING**

**NDT**

---

**TABLE OF CONTENTS**

**MONOBLOCK**
- Manufacturing Capabilities Page 4
- XRB011 75kV @ 15 Watts Page 5
- XRB80 80kV @ 100 Watts Page 7
- XRB100 100kV @ 100 Watts Page 10
- XRB101 150kV @ 160 Watts Page 13
- XRB201 160kV @ 200 Watts Page 16
- XRB202 160kV @ 200 Watts Page 19
- XRB301 160kV @ 320 Watts Page 22
- XRB302 80kV @ 320 Watts Page 25
- XRB401 200kV @ 400 Watts Page 28
- XRB501 160kV @ 500 Watts Page 31
- XRB502 160kV @ 500 Watts Page 34
- XRB701 160kV @ 700 Watts Page 37

**MONOBLOCK Worksheet** Page 40

---

**DRIVING TOMORROW’S TECHNOLOGY**
Oil is processed using filtering, heat and vacuum to obtain superior electrical insulation. A proprietary oil distribution process flushes the unit, fills it with processed oil and evacuates any trapped air from the tank. All Monoblock® units are sealed using an internal bladder to accommodate oil expansion so insulating oil is not subjected to environmental contamination.
Spellman’s XRB011 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 75kV at 15 watts. Features like 24Vdc input voltage, small package size and a standard analog 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 performance.

**TYPICAL APPLICATIONS**
Mini-C arm medical radiography, X-Ray Imaging, and NDT

**SPECIFICATIONS**

**Input Voltage:**
24Vdc @ 2A and ±15Vdc @ 300mA

**X-Ray Tube Voltage:**
Nominal X-Ray tube voltage is adjustable between 35kV-75kV

**X-Ray Tube Current:**
10 -200uA over specified tube voltage range

**X-Ray Tube Power:**
15 watts, maximum continuous

**Voltage Regulation:**
- Line: ±0.5% for a ±5% line change of nominal input line voltage
- Load: ±0.1% for a load change of 10uA to 200uA

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

**Voltage Risetime:**
250ms from cold start (power up), 10ms after warm up

**Voltage Ripple:**
1% rms

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

- **INTEGRATED HV SUPPLY, FILAMENT SUPPLY, X-RAY TUBE, BEAM PORT AND CONTROL ELECTRONICS**
- **COMPACT & LIGHTWEIGHT**
- **CAN BE MOUNTED IN ANY PHYSICAL ORIENTATION**
- **ANALOG CONTROL INTERFACE**

**Current Regulation:**
- Line: ±0.5% for a ±5% line change of nominal input line voltage
- Load: ±0.5% for a voltage change of 35kV to 75kV

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

**X-Ray Characteristics:**
- Tube Type: Oxford XTG 90507, typical
- Focal Spot: 33 micron focal spot, nominal
- Beam Geometry: Cone beam, 40°

**Control Interface:**
Ground referenced, 10kV/volt and 20uA/volt programming and monitoring analog interface signals. Open collector, active low digital signal interface.

**Operating Temperature:**
10°C to +40°C

**Storage Temperature:**
0°C to +50°C

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

**Cooling:**
Customer provided, 50cfm, minimum

**Input Line Connector:**
9 pin D, ITT p/n DE9P, male

**Analog Interface Connector:**
15 pin D, ITT p/n ZEDA 15PBA, male

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

**Dimensions:**
5.81"W X 5.0"H X 10.81"D (147.57mm X 127mm X 274.57mm)

**Weight:**
18 lbs (4.5kg)

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

**X-Ray Leakage:**
Less than 50mR/Hr at 1 meter with 50% duty cycle

For locations worldwide
www.spellmanhv.com
Spellman High Voltage is an ISO 9001:2008 and ISO 14001:2004 registered company

Spellman High Voltage Electronics Corporation
Hauppauge, New York USA
+1-631-630-3000 | FAX: +1-631-435-1620
e-mail: sales@spellmanhv.com
**DC INPUT POWER**

**J2 9 PIN MALE MINI-D CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+15Vdc</td>
<td>+15Vdc @ 300mA</td>
</tr>
<tr>
<td>2</td>
<td>±15Vdc RTN</td>
<td>±15Vdc Return</td>
</tr>
<tr>
<td>3</td>
<td>-15Vdc</td>
<td>-15Vdc @ 300mA</td>
</tr>
<tr>
<td>4</td>
<td>+24Vdc</td>
<td>+24Vdc @ 2A</td>
</tr>
<tr>
<td>5</td>
<td>+24Vdc</td>
<td>+24Vdc @ 2A</td>
</tr>
<tr>
<td>6</td>
<td>Filament Standby</td>
<td>Contact closure to 24Vdc return for filament standby</td>
</tr>
<tr>
<td>7</td>
<td>+24Vdc RTN</td>
<td>+24Vdc return</td>
</tr>
<tr>
<td>8</td>
<td>+24Vdc RTN</td>
<td>+24Vdc return</td>
</tr>
<tr>
<td>9</td>
<td>Spare</td>
<td>Spare</td>
</tr>
</tbody>
</table>

**XRB011 ANALOG INTERFACE—**

**J1 15 PIN MALE MINI-D CONNECTOR**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>kV Program Input</td>
<td>10kV/volt, Zin = 10kΩ</td>
</tr>
<tr>
<td>2</td>
<td>uA Program Input</td>
<td>20µA/volt, Zin = 10kΩ</td>
</tr>
<tr>
<td>3</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>4</td>
<td>kV Monitor Output</td>
<td>10kV/volt, ±1%, Zout = 100Ω</td>
</tr>
<tr>
<td>5</td>
<td>uA Monitor Output</td>
<td>20µA/volt, ±1%, Zout = 100Ω</td>
</tr>
<tr>
<td>6</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>7</td>
<td>X-Ray Ready Status Output</td>
<td>Open collector, 60Vdc @ 300mA maximum, active low</td>
</tr>
<tr>
<td>8</td>
<td>X-Ray On Status Output</td>
<td>Open collector, 60Vdc @ 300mA maximum, active low</td>
</tr>
<tr>
<td>9</td>
<td>X-Ray On Input</td>
<td>Low (short)=X-Ray On, Open=X-Ray Off (Internal pull up resistor to 15Vdc)</td>
</tr>
<tr>
<td>10</td>
<td>Filament Standby Status Output</td>
<td>Open collector, 60Vdc @ 300mA maximum, active low</td>
</tr>
<tr>
<td>11</td>
<td>Filament Current Limit Fault Output</td>
<td>Open collector, 15Vdc @ 10mA maximum, active low</td>
</tr>
<tr>
<td>12</td>
<td>Over Voltage Fault Output</td>
<td>Open collector, 60Vdc @ 300mA maximum, active low</td>
</tr>
<tr>
<td>13</td>
<td>Over Current Fault Output</td>
<td>Open collector, 60Vdc @ 300mA maximum, active low</td>
</tr>
<tr>
<td>14</td>
<td>Tube Arc Fault Output</td>
<td>Open collector, 60Vdc @ 300mA maximum, active low</td>
</tr>
<tr>
<td>15</td>
<td>Signal Ground</td>
<td>Signal Ground</td>
</tr>
</tbody>
</table>

**DIMENSIONS:** in.[mm]

**TOP VIEW**

- 4.81 [122.57]
- 5.81 [147.57]
- 5.31 [134.87]
- 2.85 [72.31]
- 25 [63.5]
- 1.50 [38.1]
- 2.00 [50.8]
- 10.81 [274.57]
- 7.81 [198.37]

**SIDE VIEW**

- 5.00 [127.00]
- 1.25 [31.75]
- 9.25 [234.56]
Spellman’s XRB80 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 80kV at 100 watts. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating the XRB80 into your X-Ray system. Standard models are available either with fan shaped or cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Thickness Measurement, Food Inspection, Fill Level Confirmation, Parcel Inspection and Bone Densitometry

**SPECIFICATIONS**

**Input Voltage:**
Power factor corrected input >0.98, 90-264Vac, 47-63 Hertz, 2 Amps, maximum

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

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

**X-Ray Tube Power:**
100 watts, 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 ≤1 kHz

**Voltage Temperature Coefficient:**
≤150ppm/°C

**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

**Current Temperature Coefficient:**
≤100ppm/°C

**Arc Intervention:**
- **Standard:** 3 arcs in 10 seconds with a 200mS quench = Shutdown
- **Optional:** 1 arc = Shutdown. Specify at time of order

**Filament Configuration:**
High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**X-Ray Characteristics:**

**Focal Spot:**
- **Standard:** 0.5mm (IEC 336)
- **Beam Filter:** Ultem: 3.30mm ±0.15mm
  - Oil: 8mm ±0.1mm
  - Glass: 1mm ±0.25mm
- **Fan Beam:** Standard. The beam angular coverage will be 75 degrees with the beam plane perpendicular to the X-Ray tube axis and 13 degrees wide.
- **Cone Beam:** Optional. 25 degree cone beam

[www.spellmanhv.com/manuals/XRB80](http://www.spellmanhv.com/manuals/XRB80)
**XRB80 MONOBLOCK®
80KV @ 100 WATTS**

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 RS232 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:
Natural convection augmented by customer provided 150CFM external cooling fan as required 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:
8-32 ground stud provided on chassis

Dimensions:
9.6 L X 7.6 W X 7.0 H
(243.8mm x 193.0mm x 177.8mm)

Weight:
≤32 pounds (14.5 kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 0.5mR/hr at 5cm outside the external surface per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Regulatory Approvals:

---

**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>NC</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, 35 volts @ 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 @ 1 amp. 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, 35 volts @ 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>
<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**

<table>
<thead>
<tr>
<th>RT</th>
<th>5 second Risetime for both voltage and current</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC</td>
<td>1 arc = Shutdown</td>
</tr>
<tr>
<td>CB</td>
<td>Cone Beam</td>
</tr>
</tbody>
</table>

**How to Order:**

- **Standard:** PART NO.: XRB80N100
- **Risetime and Cone Beam Options:**
  - PART NO.: XRB80N100/RT/CB

**Dimensions:** in. [mm]

**Front View**

**Side View**

**Back View**

**Bottom View**

 Spellman High Voltage is an ISO 9001:2008 and ISO 14001:2004 registered company
Spellman's XRB100 Monoblock® X-Ray source is designed for OEM applications powering its internal X-Ray tube up to 100kV at 100 watts. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating the XRB100 into your X-Ray system. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

- **Input Voltage:**  Power factor corrected input >0.98, 90-264Vac, 46-63 Hertz, 2 Amps, 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:** 100 watts, 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:**
  - Standard: 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 50μS

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

**Voltage Temperature Coefficient:**
≤150ppm/°C

**Emission Current Parameters**

- **Current Accuracy:** Current measured through the X-Ray tube is within ±1% of the programmed value
- **Current Risetime:**
  - Standard: Ramp time shall be 1 second from 10% to 90% of maximum rated current
- **Current Temperature Coefficient:**
  - ≤100ppm/°C

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

**Filament Configuration:**
High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**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:** Fan Beam. The beam angular coverage will be 74 degrees with the beam plane perpendicular to the X-Ray tube axis and 10 degrees wide ±1%.

[www.spellmanhv.com/manuals/XRB100](http://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 needed to be configured and the digital interface cable installed to enable the RS232 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:
8-32 ground stud provided on chassis

Dimensions:
See page 3 of 3

Weight:
<55 pounds (25 kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 0.5mR/hr at 5cm outside the external surface per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Regulatory Approvals:

---

**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>SIGNAL</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, 35 volts @ 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 @ 1 amp, 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, 35 volts @ 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>
<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>

---

Spellman High Voltage is an ISO 9001:2008 and ISO 14001:2004 registered company
Spellman’s XRB101 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 150kV at 160 watts. Features like power factor correction, small package size and a standard analog and RS-232 digital interface simplify integrating the XRB101 into your X-Ray system. Standard models are available either with fan shaped or cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Bone Densitometry, Food Inspection, Security

**SPECIFICATIONS**

**Input Voltage:**
- 180-264Vac, 50/60Hz, 6.5 amps maximum

**X-Ray Tube Voltage:**
- Nominal X-Ray tube voltage is adjustable between 40kV 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, 600 watts maximum

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

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

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

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

**Voltage Temperature Coefficient:**
- ≤150ppm/°C

**Current Regulation:**
- Line: ±0.1% from 180-264Vac
- Load: <0.5% @ 40-150kV, 1.0mA to 4.0mA

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

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

**Current Temperature Coefficient:**
- ≤150ppm/°C

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

**Filament Configuration:**
- High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm, 0.5mm x 0.5mm (IEC 336)
- Beam Filter: 0.06” Ultem, 0.016-0.08” Aluminum
- Beam Geometry: Fan up to 40°x10°, cone up to 18°

**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
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, male

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
18” X 13.5” X 6.25” (458mm X 343mm X 159mm)

Weight:
<66 lbs (30kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Less than 100mR/hr at 1m distance, measured at
140kV, 3mA, with a 100 sq. cm probe or equivalent, per FDA 21 CFR 1020.30

Regulatory Approvals:

---

**AC INPUT POWER**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>180-264Vac</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—**

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spare</td>
<td>NC</td>
</tr>
<tr>
<td>2</td>
<td>Transmit</td>
<td>RS232</td>
</tr>
<tr>
<td>3</td>
<td>Receive</td>
<td>RS232</td>
</tr>
<tr>
<td>4</td>
<td>Spare</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>Spare</td>
<td>NC</td>
</tr>
<tr>
<td>7</td>
<td>Spare</td>
<td>NC</td>
</tr>
<tr>
<td>8</td>
<td>Spare</td>
<td>NC</td>
</tr>
<tr>
<td>9</td>
<td>Spare</td>
<td>NC</td>
</tr>
</tbody>
</table>

**ANALOG INTERFACE—**

<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/open = Disable X-Ray, 2mA= 1kΩ</td>
</tr>
<tr>
<td>2</td>
<td>X-Ray Signal Return</td>
<td>Signal Return</td>
</tr>
<tr>
<td>3</td>
<td>NIC</td>
<td>NIC</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/c</td>
<td>Relay Normally Open, 50Vdc @ 1 amp maximum</td>
</tr>
<tr>
<td>9</td>
<td>HV ON Lamp Relay common</td>
<td>Relay Common, 50Vdc @ 1 amp maximum</td>
</tr>
<tr>
<td>10</td>
<td>HV ON Lamp Relay n/c</td>
<td>Relay Normally Closed, 50Vdc @ 1 amp 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>
Spellman’s XRB201 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 160kV at 200 watts. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating the XRB201 into your X-Ray system. Standard models are available either with fan shaped or cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**Input Voltage:**
90-264Vac, 50/60Hz, 5 amps maximum

**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:**
200 watts, 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 ±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:**
0.2% pp of rated voltage @ ±1kHz

**Voltage Temperature Coefficient:**
≤150ppm/°C

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

**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

**Current Temperature Coefficient:**
≤150 ppm/°C

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

**Filament Configuration:**
High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm, 0.5mm x 0.5mm (IEC 336)
- Beam Filter: 0.016 - 0.08" Aluminum, 0.125" Ultem
- Beam Geometry: Fan up to 80°x30°, cone up to 40°

**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:**
Convection/external forced air so tank is <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, male

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
See drawing

Weight:
90 lbs (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 per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Regulatory Approvals:

Special Features/Requirements:
High stability X-ray output. Dose rate variations <2%

---

**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>90-264Vac</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 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>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—**
**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, Z=2.2kΩ</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>W Monitor</td>
<td>0-10Vdc = 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>0-10Vdc = 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/o</td>
<td>Relay Normally Open, 50Vdc @ 1 amp maximum</td>
</tr>
<tr>
<td>9</td>
<td>HV ON Lamp Relay common</td>
<td>Relay Common, 50Vdc @ 1 amp maximum</td>
</tr>
<tr>
<td>10</td>
<td>HV ON Lamp Relay n/c</td>
<td>Relay Normally Closed, 50Vdc @ 1 amp 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>

---
Spellman’s XRB202 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 160kV at 200 watts. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating the XRB202 into your X-Ray system. Standard models are available either with fan shaped or cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Plating Measurement, Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**Input Voltage:**
- 90-264Vac, 50/60Hz, 5 amps maximum

**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:**
- 200 watts, 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

**Voltage Temperature Coefficient:**
- 150ppm/°C

**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

**Current Temperature Coefficient:**
- 150ppm/°C

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

**Filament Configuration:**
- High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm, 0.5mm x 0.5mm
- Beam Filter: 0.016” thick 6061 Aluminum, ±0.0045”
- Beam Geometry: fan up to 80°x30°, cone up to 40°

**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

[Spellman High Voltage is an ISO 9001:2008 and ISO 14001:2004 registered company]
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 6.25” (458mm X 343mm X 159mm)

Weight:
90 lbs (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 per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Regulatory Approvals:
Spellman’s XRB301 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 160kV at 320 watts. Features like small package size and RS-422 (RS-232 optional) digital interface simplify integrating the XRB301 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**
- Food Inspection, Fill Level Confirmation
- Security Applications

**SPECIFICATIONS**

**Input Voltage:**
230Vac, ±15% 50/60Hz, 2.2 amps max or 350Vdc ±10%

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

**X-Ray Tube Current:**
0.5mA to 3mA over specified tube voltage range

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

**Voltage Regulation:**
- Line: ±0.1% for a ±10% input line change of nominal input line voltage
- Load: ±0.1% for a 0.5mA to 3mA load change

**Voltage Accuracy:**
- Voltage measured across the X-Ray tube is within ±0.5% of the programmed value

**Voltage Risetime:**
- Ramp time shall be <500ms from 1% to 99% of rated output

**Voltage Overshoot:**
- within 5% of rated voltage

**Voltage Ripple:**
- 0.5% pp of rated voltage @ ≤1kHz

**Voltage Temperature Coefficient:**
150ppm/°C

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

**Current Accuracy:**
- Current measured through the X-Ray tube is within ±0.5% of the programmed value

**Current Risetime:**
- <500ms from 1% to 99% of rated output

**Current Temperature Coefficient:**
150ppm/°C

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

**Filament Configuration:**
- High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 1.1mm x 0.5mm
- Beam Filter: 1.5mm of glass, 1mm of Al, and 10mm of oil
- Beam Geometry: fan 105°x4°, 80°x10° cone up to 40°

**Digital Interface:**
- RS-422 interface, RS-232 optional

**Control Software:**
- A demo GUI for engineering evaluations will be provided for the RS-422 (RS-232 optional) digital interface upon request.

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

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

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

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

**Cooling:**
- Heat exchanger w/fan and oil pump, powered from AC

**Input Line Connector:**
- 10 pin Molex 39-29-9103

---

For locations worldwide
[www.spellmanhv.com](http://www.spellmanhv.com)
Spellman High Voltage is an ISO 9001:2008 and ISO 14001:2004 registered company
Digital Interface Connector:
9 pin D, female

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
18” X 13.5” X 6.25” (458mm X 343mm X 159mm)

Weight:
110 lbs. (49.5kg) ±10 lbs. (±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 per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Regulatory Approvals:

Special Features:
Stationery or CT application up to 100 rpm

### AC INPUT POWER
#### J1 10 PIN MOLEX CONNECTOR

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Neutral</td>
<td>350Vdc RTN/230Vac Neutral</td>
</tr>
<tr>
<td>2</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Chassis Ground</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Chassis Ground</td>
</tr>
<tr>
<td>5</td>
<td>Line</td>
<td>+350Vdc/230Vac Line</td>
</tr>
<tr>
<td>6</td>
<td>Neutral</td>
<td>350Vdc RTN/230Vac Neutral</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>
<tr>
<td>10</td>
<td>Line</td>
<td>+350Vdc/230Vac Line</td>
</tr>
</tbody>
</table>

### RS-422 DIGITAL INTERFACE
#### J2 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>TX+</td>
<td>RS422 Transmit +</td>
</tr>
<tr>
<td>2</td>
<td>TX-</td>
<td>RS422 Transmit -</td>
</tr>
<tr>
<td>3</td>
<td>RX+</td>
<td>RS422 Receive +</td>
</tr>
<tr>
<td>4</td>
<td>RX-</td>
<td>RS422 Receive -</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Chassis Ground</td>
</tr>
<tr>
<td>6</td>
<td>X-Ray On Ind</td>
<td>L = X-Ray OFF, H= X-Ray ON</td>
</tr>
<tr>
<td>7</td>
<td>Intick Out</td>
<td>Connect to Pin 9</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>9</td>
<td>Intick In</td>
<td>Connect to Pin 7</td>
</tr>
</tbody>
</table>
Spellman’s XRB302 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 80kV at 320 watts. Features like small package size and RS-232 digital interface simplify integrating the XRB302 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**
Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**Input Voltage:**
- 200-264Vac, 50/60Hz; 6.5 amps 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:**
- 320 watts 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

**Voltage Temperature Coefficient:**
- 150ppm/°C

**Current Regulation:**
- Line: <0.5% @ 40-80kV, 200-264Vac
- Load: <0.5% @ 40-80kV, 0.5mA to 4mA

**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

**Current Temperature Coefficient:**
- 150ppm/°C

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

**Filament Configuration:**
- High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm, 0.5mm x 0.5mm (IEC 336)
- Beam Filter: 5052 Aluminum, 0.040" (±0.01"); two pieces of 6061, 0.16" (±0.005")
- Beam Geometry: Fan 105°x4°, 80°x10° cone up to 40°

**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, powered from DC
Input Line Connector:
3 pin, Phoenix Contact 1829167

Digital Interface Connector:
9 pin D, male

Analog Monitoring Connector:
10 pin Phoenix Contact 1755503

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
See outline drawing

Weight:
120 lbs. (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 per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Regulatory Approvals:

Special Features:
Stationary or CT application up to 100 rpm
Spellman’s XRB401 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 200kV at 400 watts. Features like universal input, small package size, standard analog monitoring and RS-232 digital interface simplify integrating the XRB401 into your X-Ray system. Standard models are available with fan shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**

Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**Input Voltage:** 90Vac-264Vac, 50/60Hz, 6 amps maximum

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

**X-Ray Tube Current:**
- 0.2mA to 2mA over specified tube voltage range

**X-Ray Tube Power:**
- 400 watts maximum continuous

**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

**Voltage Temperature Coefficient:**
- 150 ppm/°C

**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

**Current Temperature Coefficient:**
- ±150 ppm/°C

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

**Filament Configuration:**
- High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**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, Aluminum 1mm
- **Beam Geometry:** 105°x4°

**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 temp. 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, male

Grounding Point:
M5 ground stud provided on chassis

Dimensions:
See drawing

Weight:
120 lbs (44.78kg)

Orientation:
Can be mounted in any orientation.

X-Ray Leakage:
Not to be greater than 5uSv/hr at 5cm outside the external surface per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Regulatory Approvals:

Special Features:
Stationary or CT application up to 120 rpm

---

**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>90-264Vac</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>
</tbody>
</table>

**ANALOG INTERFACE—**
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</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/C</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/O</td>
<td>HV On, 50V @ 1A 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>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 XRB501 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 160kV at 500 watts. Features like power factor correction, small package size, standard analog monitoring and RS-232 digital interface simplify integrating the XRB501 into your X-Ray system. Standard models are available either with fan shaped or cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

**Input Voltage:**
- 120Vac, ±10%, 50/60Hz, 6.5 amps max (230Vac optional)

**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:**
- 500 watts, 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% plus1.785kV 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

**Voltage Temperature Coefficient:**
- ±150ppm/°C

**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

**Current Temperature Coefficient:**
- 200ppm/°C

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

**Filament Configuration:**
- High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**X-Ray Characteristics:**
- Tube Type: Glass tube, Tungsten target, Be filter
- Focal Spot: 0.8mm x 0.8mm, 0.5mm x 0.5mm (320W max.)
- Beam Filter: 0.016-0.08” thick 6061 Aluminum
- 0.125” Ultem
- Beam Geometry: Fan up to 80° x 30°, cone up to 40°

**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

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, male

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
20” X 22.5” X 10.75” (508mm X 572mm X 273mm)

Weight:
125 lbs (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 with Eberline E-120 survey meter with Eberline HP-270 energy compensated probe

Regulatory Approvals:

AC INPUT POWER
J1 6 POSITION 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>120Vac</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 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</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 XRB502 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 160kV at 500 watts. Features like universal input, small package size and a standard analog and RS-232 digital interface simplify integrating the XRB502 into your X-Ray system. Standard models are available either with fan shaped or cone shaped beam geometries. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

Input Voltage:
90-264Vac, 50/60Hz, 6.5 amps 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 6mA over specified tube voltage range

X-Ray Tube Power:
500 watts, 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 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 10% to 90% of rated output

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

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

Voltage Temperature Coefficient:
±150ppm/°C

- **INTEGRATED HV SUPPLY, FILAMENT SUPPLY, X-RAY TUBE, BEAM PORT AND CONTROL ELECTRONICS**
- **COMPACT & LIGHTWEIGHT**
- **UNIVERSAL INPUT, POWER FACTOR CORRECTED**
- **CAN BE MOUNTED IN ANY PHYSICAL ORIENTATION**
- **ANALOG CONTROL INTERFACE AND STANDARD RS-232 DIGITAL INTERFACE**

Current Regulation:
Line: <±0.1% for a ±10% input line change of nominal input line voltage
Load: <0.5% @ 75-160kV, 0.3mA to 6mA

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

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

Current Temperature Coefficient:
±150ppm/°C

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

Filament Configuration:
High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

X-Ray Characteristics:
Tube Type: Glass tube, Tungsten target, Be filter
Focal Spot: 0.8mm x 0.8mm, 0.5mm x 0.5mm
Beam Filter: 0.016” thick 6061 Aluminum, ±0.0045”
125” Ultem
Beam Geometry: Fan up to 80°x30°, cone up to 40°

Analog Interface:
0 to 10Vdc ground referenced signals

Digital Interface:
RS232 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:
10% to 95% relative humidity, non-condensing

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

Analog Interface Connector:
10 pin, Phoenix Contact 1755503

Digital Interface Connector:
9 pin D connector, male

Grounding Point:
8-32 ground stud provided on chassis

Dimensions:
See outline drawing

Weight:
125 lbs (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 per FDA 21 CFR 1020.40 and OSHA 29 CFR 1020.96

Special Features/Requirements:
55dB SPL @ 1m with fans stopped on heat exchanger High stability X-ray output: Dose rate variations <1%

Regulatory Approvals:
Spellman’s XRB701 Series of Monoblock® X-Ray sources are designed for OEM applications powering its internal X-Ray tube up to 160kV at 700 watts. Features like small package size and RS-232 digital interface simplify integrating the XRB701 into your X-Ray system. Proprietary emission control circuitry provides excellent regulation of X-Ray tube current, along with outstanding stability performance.

**TYPICAL APPLICATIONS**
Food Inspection, Fill Level Confirmation and Security Applications

**SPECIFICATIONS**

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

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

**X-Ray Tube Current:**
0.25mA to 6mA over specified tube voltage range

**X-Ray Tube Power:**
700 watts, maximum continuous

**Voltage Regulation:**
Line: ±0.1% ±10% line
Load: ±0.1% 0.25 to 6mA

**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

**Voltage Temperature Coefficient:**
150 ppm/°C

**Current Regulation:**
Line: ±0.5% ±10% line
Load: ±0.5% 0.25 to 6mA

**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:**
High frequency AC filament drive; referenced to cathode potential of the X-Ray tube. Closed loop filamentary emission control circuit regulates filament current to provide desired X-Ray tube emission current.

**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 Aluminum
- **Beam Geometry:** Fan 93° x 15°

**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
Cooling Power Connector:  
4 pin Tyco 206061-1

Digital Interface Connector:  
9 pin D connector, male

Grounding Point:  
M5 ground stud provided on chassis

Dimensions:  
See drawing

Weight:  
140 lbs ±10 lbs (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 while operating at 160kV @ 4.3mA

Regulatory Approvals:  

Special Features:  
Stationary or CT application up to 100 rpm

---

### AC INPUT POWER  
J1 5 PIN CONNECTOR (MOLEX 26-60-4050)

<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>

### COOLING POWER  
J2 4 PIN CONNECTOR (TYCO 206061-1)

<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 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</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>
Thank you for your interest in Spellman’s Monoblock® series X-Ray sources. This catalog encompasses the broadest range of Monoblock® configurations available in the high voltage industry; however, we recognize that your unique application may require a custom approach not represented by the existing platforms within these pages. To assist you in organizing your customized specification for a Monoblock® series X-Ray source, we provide this specification form which you can complete and use as the basis for discussion with a Spellman sales engineer. Our experts are here to help.

Please call 631-630-3000, or email sales@spellmanhv.com, or communicate directly with your local sales engineer.

<table>
<thead>
<tr>
<th>SPECIFICATION REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-Ray Tube Manufacturer:</td>
</tr>
<tr>
<td>X-Ray Tube Model Number:</td>
</tr>
<tr>
<td>Window Type:</td>
</tr>
<tr>
<td>Operational Configuration:</td>
</tr>
<tr>
<td>○ Bipolar</td>
</tr>
<tr>
<td>○ Single Ended</td>
</tr>
<tr>
<td>Beam Parameters:</td>
</tr>
<tr>
<td>○ Cone</td>
</tr>
<tr>
<td>○ Fan</td>
</tr>
<tr>
<td>○ Pencil</td>
</tr>
<tr>
<td>Beam Direction:</td>
</tr>
<tr>
<td>○ Up</td>
</tr>
<tr>
<td>○ Down</td>
</tr>
<tr>
<td>○ Side</td>
</tr>
<tr>
<td>Target Angle:</td>
</tr>
<tr>
<td>Focal Spot:</td>
</tr>
<tr>
<td>Required Filtering:</td>
</tr>
<tr>
<td>Input Voltage:</td>
</tr>
<tr>
<td>○ AC</td>
</tr>
<tr>
<td>○ DC</td>
</tr>
<tr>
<td>Output Voltage:</td>
</tr>
<tr>
<td>Output Current:</td>
</tr>
<tr>
<td>Output Power:</td>
</tr>
<tr>
<td>Emission Current Range:</td>
</tr>
<tr>
<td>Maximum Peak Power:</td>
</tr>
<tr>
<td>Continuous Power:</td>
</tr>
<tr>
<td>Duty Cycle:</td>
</tr>
<tr>
<td>Rise Time:</td>
</tr>
<tr>
<td>Interface:</td>
</tr>
<tr>
<td>Maximum Physical Size:</td>
</tr>
<tr>
<td>○ In.</td>
</tr>
<tr>
<td>○ mm</td>
</tr>
<tr>
<td>Maximum Weight:</td>
</tr>
<tr>
<td>○ lb.</td>
</tr>
<tr>
<td>○ kg</td>
</tr>
</tbody>
</table>

**Additional Needs/Requirements:**

______________________________
______________________________
______________________________
______________________________
______________________________
______________________________
______________________________
______________________________
______________________________
______________________________