



- **INTEGRATED SINGLE CHASSIS SOLUTION**
- **HIGH STABILITY, VERY LOW RIPPLE**
- **ENCAPSULATED HV SECTION**
- **CORONA FREE OPERATION**
- **OPTICALLY ISOLATED DIGITAL INTERFACE**
- **CE MARKED & DESIGNED TO MEET SEMI S2**

Spellman's FIBX power supply is an integrated multiple output high voltage power supply specifically designed for focused ion beam. Typical applications include transmission and scanning electron microscopy; semiconductor analysis, milling and repair; disc drive head trimming, ion beam etching and focused ion-beam lithography.

A modular design approach allows individual sub-assemblies to be easily configured in a common rack mounted 6U chassis assembly. Interface, logic and control circuitry utilizes surface mount technology, minimizing cost and size. Spellman's leadership in patented power conversion technology and proprietary high voltage packaging and encapsulation techniques provides reliable and fault free operation in all FIB operating environments.

Individual supplies (Accelerator, Filament, Extractor, Suppressor or Lens) are designed to exacting application specific standards, with ultra low output ripple, excellent regulation, stability, temperature coefficient, drift and accuracy specifications. Isolation and control of the respective floating sources are provided via Spellman's proprietary high voltage isolation techniques.

Customer control of this integrated FIB power supply system is accomplished via a fiber optic isolated RS232 interface. All high voltage safety interlocks are of a fail-safe hardware based design. The FIBX is CE marked and is designed to be compliant with applicable IEC, UL and SEMI standards.

### TYPICAL APPLICATIONS

- Transmission scanning electron microscopy
- Scanning electron microscopy
- Semiconductor analysis, milling and repair
- Ion beam etching
- Focused ion-beam lithography

### SPECIFICATIONS

#### Input Voltage:

105 to 240Vac, 47 to 63 Hz

#### ACCELERATOR SUPPLY Referenced to Ground

- Output Voltage:** 0 to +45 kV
- Output Current:** 30  $\mu$ A
- Ripple:** 200 mV p-p, from 0.1 Hz to 1 MHz
- Line Regulation:** 100 mV for +/-10% line change
- Load Regulation:**  $\pm$ 0.01% of maximum voltage for full load change
- Stability:** 1.5 volts/10 hours after 2 hour warm-up

- Temperature Coefficient:** 25 ppm/ $^{\circ}$ C

#### FILAMENT SUPPLY Referenced to Accelerator

- Output Voltage:** 0 to 5 Vdc
- Output Current:** 0 to 5 A
- Ripple:** 10 mA p-p from 0.1 Hz to 1 MHz
- Line Regulation:** 5 mA for +/-10% line change
- Load Regulation:**  $\pm$ 0.1% of maximum voltage for full load change
- Stability:** 5 mA/10 minutes after 2 hour warm-up

- Temperature Coefficient:** 200 ppm / $^{\circ}$ C

**SUPPRESSOR SUPPLY** Referenced to Accelerator

**Output Voltage:** -2 kV to +2 kV  
**Output Current:** 30  $\mu$ A  
**Ripple:** 150 mV p-p from 0.1 Hz to 1 MHz  
**Line Regulation:** 100 mV for +/-10% line change  
**Load Regulation:**  $\pm$ 0.01% of maximum voltage for full load change  
**Stability:** 500mV/10 hours after 2 hour warm-up  
**Temperature Coefficient:** 25 ppm/ $^{\circ}$ C

**EXTRACTOR SUPPLY** Referenced to Accelerator

**Output Voltage:** 0 to -15 kV  
**Output Current:** 400  $\mu$ A  
**Ripple:** 100 mV p-p, from 0.1 Hz to 1 MHz at 30  $\mu$ A and below  
**Line Regulation:** 100 mV for +/-10% line change  
**Load Regulation:**  $\pm$ 0.01% of maximum voltage for full load change  
**Stability:** 500mV/10 hours after 2 hour warm-up  
**Temperature Coefficient:** 25 ppm/ $^{\circ}$ C

**LENS 1 SUPPLY** Referenced to Ground

**Output Voltage:** 0 to -40 kV  
**Output Current:** 30  $\mu$ A  
**Ripple:** 150 mV p-p from 0.1 Hz to 1 MHz  
**Line Regulation:** 100 mV for +/-10% line change  
**Load Regulation:**  $\pm$ 0.01% of maximum voltage for full load change  
**Stability:** 500 mV/10 hours after 2 hour warm-up  
**Temperature Coefficient:** 25 ppm/ $^{\circ}$ C

**LENS 2 SUPPLY** Referenced to Ground

**Output Voltage:** 0 to +25 kV  
**Output Current:** 30  $\mu$ A  
**Ripple:** 150 mV p-p from 0.1 Hz to 1 MHz  
**Line Regulation:** 100 mV for +/-10% line change  
**Load Regulation:**  $\pm$ 0.005% of maximum voltage for full load change  
**Stability:** 1.0 volts/10 hours after 2 hour warm-up  
**Temperature Coefficient:** 25 ppm/ $^{\circ}$ C

**Remote Interface:**

A fiber optic isolated RS232 interface is provide for remote digital control and monitoring of all power supplies and their functions.

**Environmental:**

Operating temperature: 10 $^{\circ}$ C to 40 $^{\circ}$ C  
 Storage temperature: -30 $^{\circ}$ C to 70 $^{\circ}$ C  
 Humidity: 10% to 90%, non-condensing

**Connectors:**

Accelerator, Filament and Suppressor: 75kV, 3 conductor Federal Standard Xray connector  
 Extractor: LGH 2I  
 Lens 1: LGH 3I  
 Lens 2: LGH 2I

**Input Voltage:**

IEC320 EMI filtered input connector

**Dimensions:**

Industry standard 6U rack mounted chassis  
 10.5" High X 19" Wide X 21" Deep  
 26.7 cm X 48.3 cm X 53.34 cm

**Weight:**

Approximately 73 lbs (33 kg)

**Regulatory Approvals:**

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive and designed to meet SEMI S2.