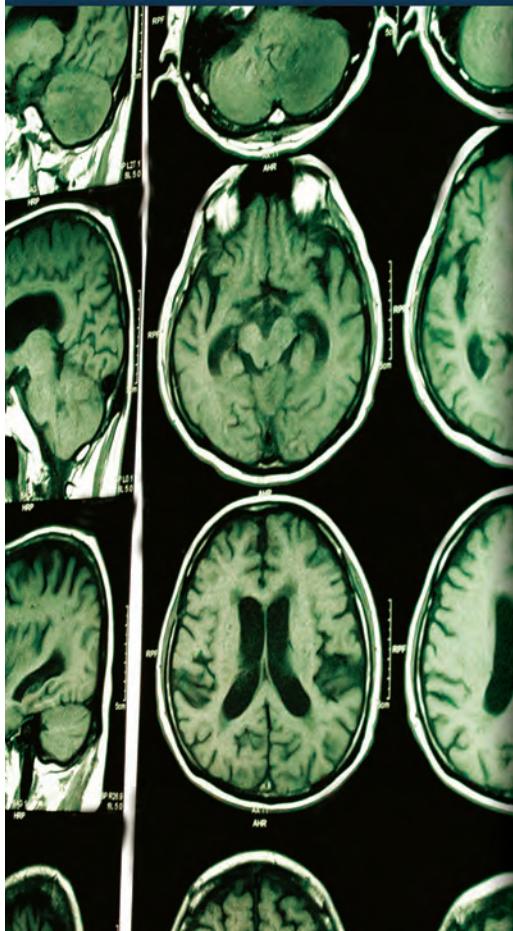


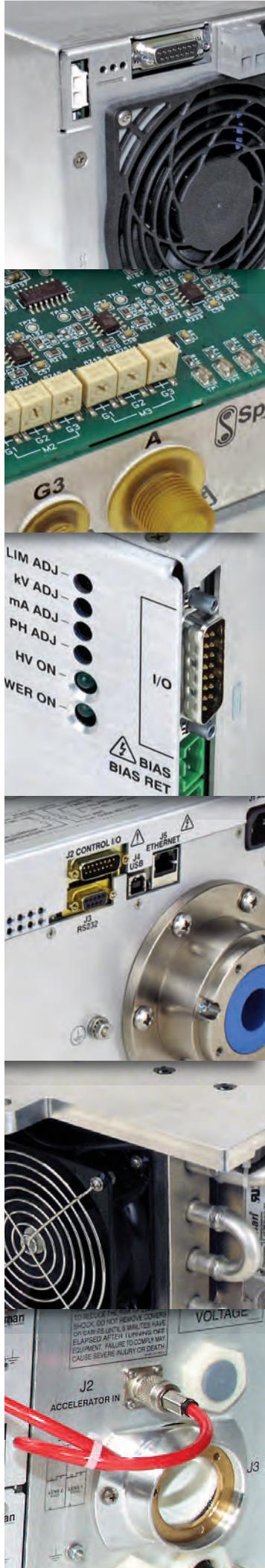
HIGH VOLTAGE
Power Supplies & X-Ray Generators

2017

Release Version: 1.10.17



spellmanhv.com



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

MEETING CUSTOMER NEEDS

For 70 years, Spellman has been helping technology companies grow by providing standard and custom high voltage power converters and X-Ray generators 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 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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HIGH VOLTAGE POWER SUPPLIES and X-RAY GENERATORS

Modular Supplies

offer a single output up to 1200W in diverse form factors, and are designed to be integrated into systems, with either analog or digital control.



Rack Mounted Supplies

from 1U to 6U, provide single or multiple outputs and either full featured front panel controls, or a blank front with digital interfaces for integration in OEM systems.



X-Ray Generators

consist of integrated high voltage and filament power supplies and emission loop control circuitry. They may be modular or rack mounted.



MODULES			X-RAY SOURCE		
POWER	MODEL	PAGE	MODEL	PAGE	
3W	MS	4-5	Portable NDT (LORAD)		
4W	PMT	6-7	LPX160	116-118	
4W-30W	UM	8-13	LPX200	119-121	
	UM8-40	14-19	LPX300	122-124	
10W	MPS	20-22	LPX1620		
12W	230	23-24	Tube Stand	125-126	
20W	MPS20W	25-26	LPX		
30W	EPM	27-28	Laser Pointer	127	
	V6	29-31			
60W	SMS	32-33			
60W/125W	UMW	34-37			
120W	PCM	38-39			
200W/350W	PTV	40-41			
300W-1200W	SLM	42-44			
RACK MOUNT			APPLICATION SPECIFIC		
POWER	MODEL	PAGE	MODEL	PAGE	
10W-1200W	SL	45-49	Mass Spectrometry		
30W	205B	50-51	ML430	128-129	
225W	210	52-53	ML1350	130-131	
1200W	SL150KV	54-55	MCP	132-133	
2000W	SL2KW	56-58	MX2.5	134-135	
	SLS	59-61	MX8 PLUS	136-137	
4kW	STA	62-64	MX10	138-139	
6kW	STR	65-67	MX10 PLUS	140-141	
12kW-100kW	ST	68-71	MX20	142-143	
			MXR	144-145	
			TOF3000	146-147	
X-RAY GENERATORS			E Beam/I Beam		
POWER	MODEL	PAGE	EGM	148-150	
3W-260W	XLG	72-73	FIBX	151-152	
50W/65W/75W	MNX	74-76	EBM	153-154	
	uX	77-81	VS100	155-156	
	MFX	82-84			
80W-640W	XRF	85-86			
100W	uXHP	87-90			
300W-1200W	DXM	91-94			
	DXB	95-97			
	DXM100	98-100			
600W-1200W	XLF	101-102			
1.8kW-6.0kW	XRV	103-106			
	XRVC				
	Controller	185			
3kW-4kW	DF/FF	107-108			
5kW	VMX	109-111			
	PMX	112-114			
24kW-120kW	CT	115			
ACCESSORIES			Power Feed Equipment		
MODEL	PAGE	PFE	157-158		
		HVPFE	159-160		
Image Intensifiers					
DGM935	161-162				
DGM945	163-164				
Electrophoresis/Electrospinning					
CZE1000R	165-166				
CZE2000	167-168				
Capacitor Charging					
CCM1KW	169-171				
CCM	172-173				
e-Beam Evaporation					
EVA	174-180				
Electrostatic Chuck					
ECHUCK	181				
Injector Control					
ICA	182-183				
Power Distribution					
PDU	184				
ACCESSORIES					
MODEL	PAGE	XRVC	185		
		XRV I/O Box	186-189		
		HVD	190		
		SIC	191-192		



Spellman's MS Modules have been designed for printed circuit board mounting with high reliability, small size and light weight. Each module provides 3W of output power to 3kV with well regulated low ripple, high stability and high voltage in a versatile, compact cost-effective design. The modules incorporate remote control and arc & short-circuit protection. Radiated pickup is eliminated by sealing each module in an aluminum enclosure.

TYPICAL APPLICATIONS

- Photomultiplier Tubes
- Precision Lenses
- Image Intensifiers
- Nuclear Instruments
- Spectroscopy

OPTIONS

- I Isolated Input to Output
 - Isolation Voltage: 40V for units up to 1kV
 - 100V for units >1kV

SPECIFICATIONS

Input Voltage:

+12Vdc ±1V. Other input voltages also available.

Input Current:

< 0.56A at full output.

Output Voltage:

Continuously adjustable over each entire range
Models available in either positive or negative polarity.
See table for voltage ranges.

- **Low Cost**
- **Output Voltages up to 3kV**
- **3 Watts Power Rating**
- **Positive or Negative Polarity**
- **Arc and Continuous Short Circuit Protected**
- **Low Stored Energy**
- **High Reliability**
- **Internal 5V Reference**
- **OEM Customization Available**

Line Regulation:

< 0.005% for input change of 1V

Load Regulation:

< 0.05% for 100µA to full load change. (at max. voltage)

Output Voltage Control:

Remote voltage programming such that 0-5Vdc gives 0 to full rated output

Output Power:

3W continuous.

Voltage Regulation:

Line: 0.005% for input change of 1V
Load: 0.05% for 100µA to full load change at maximum voltage.

Ripple:

< 0.01% p-p of full output voltage.

5Vdc Reference:

+5.0V (±0.2V)
A maximum of 1mA can be drawn from this output.

Temperature:

Operating: 0°C to +50°C.
Storage: -35°C to +85°C.

Temperature Coefficient:

50ppm/°C typical.

Stability:

< 0.05%/8 hrs at constant operating conditions after one hour warm-up.

Humidity:

0 to 90% non-condensing.

Dimensions:

Up to 1000Vdc:
.87" H x 2.1"W x 3.1"D (23mm x 53mm x 78mm).

1000V to 3000Vdc:
1.1" H x 2.36"W x 4.2"D (28mm x 60mm x 106mm).

Weight:

Up to 1000V: 0.2lb (80g).

Over 1000V: 0.4lb (160g).

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

MS SELECTION TABLE

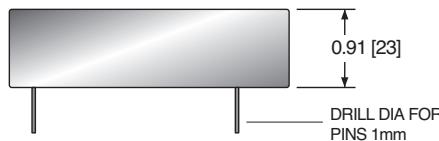
OUTPUT VOLTAGE (V)	OUTPUT CURRENT (mA)	RIPPLE V (p-p)	MODEL
300	10	0.03	MS0.3*/C
500	6	0.05	MS0.5*/C
750	4	0.075	MS0.75*/C
1000	3	0.10	MS1*/C
1500	2	0.15	MS1.5*/C
2000	1.5	0.20	MS2*/C
2500	1.2	0.25	MS2.5*/C
3000	1	0.30	MS3*/C

*Specify "P" for positive polarity or "N" for negative polarity.

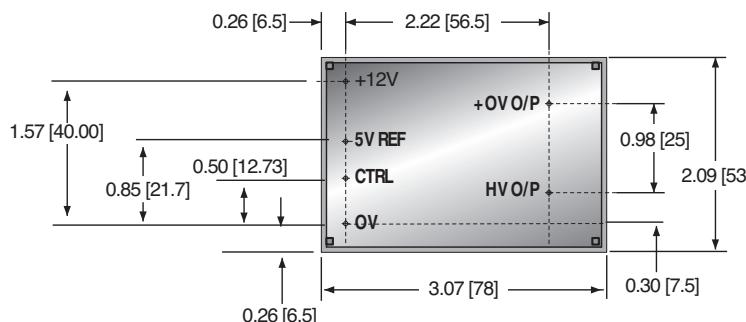
DIMENSIONS: in.[mm]

UNIT UP TO 1000V

SIDE VIEW



BOTTOM VIEW

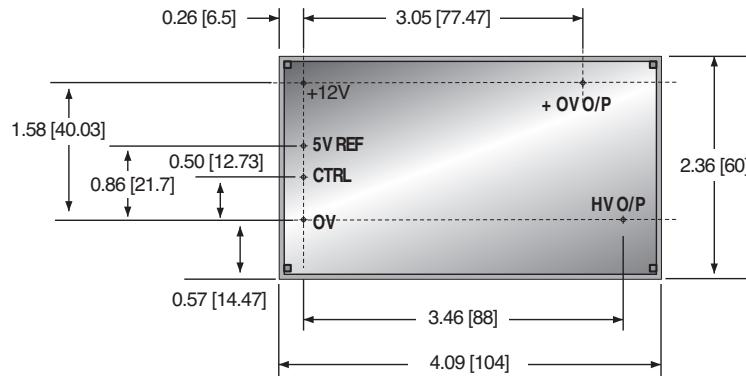


UNIT > 1000V UP TO 3000V

SIDE VIEW



BOTTOM VIEW



View on pins.
Recommended hole size
for terminals 1mm.

CE



Spellman's Bertan brand of PMT modular high voltage power supplies offer well regulated, fixed polarity outputs up to 7.5kV, which operate off a low voltage DC input voltage. These fully enclosed modules are specifically designed with proprietary linear power conversion techniques to provide exceptionally low ripple and noise. The PMT is ideal for precision applications including: photomultiplier tubes, solid state detectors and ultrasonic transducers.

The output voltage can be controlled by either a local internal potentiometer or by a customer provided ground referenced signal for remote operation. Additionally a ground referenced output voltage monitor signal is provided. The PMT can be powered from either a single positive voltage source or a split \pm voltage source, providing application flexibility.

TYPICAL APPLICATIONS

- Photomultiplier tubes
- Ultrasonic transducers
- Solid state detectors

SPECIFICATIONS

Input Voltage:

Option 1: +24Vdc to +30Vdc @ 400mA
Option 3: \pm 12Vdc to \pm 18Vdc @ 400mA
specify "-1" (option 1) or "-3" (option 3) when ordering

Efficiency:

\approx 50%, typical

Output Polarity:

Positive or negative, specify at time of order

Output Voltage:

See "model selection" table

Output Current:

See "model selection" table

Output Power:

1.875W, 2W, 2.5W, 3W, 4W

Voltage Regulation:

Line: \pm 0.001% of rated output voltage for a $+1\%$ input line change

Load: \pm 0.001% of rated output voltage for a full load change

- **500V to 7.5kV @ 1.9 to 4 Watts**
- **Low Cost Modular Design**
- **Excellent Stability & Regulation**
- **Low Noise & Ripple**
- **Arc & Short Circuit Protected**
- **CE Listed, UL Recognized and RoHS Compliant**

Ripple:

See "model selection" table

Stability:

\leq 0.005% per hour, 0.02% per 8 hours, after a 1/2 hour warm up

Accuracy:

Remote Programming \pm (2% of setting, $+0.5\%$ of maximum)
Voltage Monitor \pm 2%

Temperature Coefficient:

\leq 50ppm/ $^{\circ}$ C

Arc/Short Circuit:

All units are fully arc and short circuit protected and will limit continuous short circuit output current to less than 150% of maximum rated output current.

Operating Temperature

0 $^{\circ}$ C to +50 $^{\circ}$ C

Storage Temperature:

-40 $^{\circ}$ C to +85 $^{\circ}$ C

Humidity:

20% to 85% RH, non-condensing

Interface Connector:

12 position card edge connector, mate provided with unit

Output Connector:

A captive 24" (610mm) of RG-59B/U shielded cable, unterminated is provided

Cooling:

Convection cooled.

Dimensions:

3.875 $^{\prime}$ W X 1.25 $^{\prime}$ H X 6.3125 $^{\prime}$ D (98mm x32mm x 160mm)

Weight:

\leq 2.0 pounds (0.9kg)

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. UL/CUL recognized, File E137710. RoHS compliant.

DIMENSIONS: in.[mm]

MODEL SELECTION TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
PMT-05C-P,N	0 to 500V	0 to 8mA	5mV
PMT-10C-P,N	0 to 1kV	0 to 4mA	4mV
PMT-20C-P,N	0 to 2kV	0 to 2mA	2mV
PMT-30C-P,N	0 to 3kV	0 to 1mA	6mV
PMT-50C-P,N	0 to 5kV	0 to 0.5mA	10mV
PMT-75C-P,N	0 to 7.5kV	0 to 0.25mA	100mV

Specify "P" for positive polarity or "N" for negative polarity

INTERFACE CONNECTOR

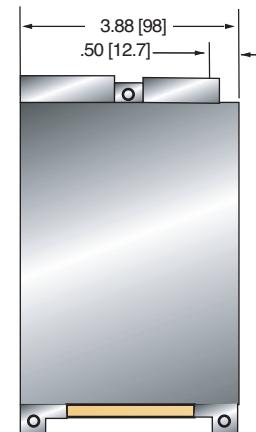
Signal	Parameters	Option 1 Pin Number	Option 3 Pin Number
+ Power Input	+24Vdc to +30Vdc or +12Vdc to +18Vdc	3&4	3 & 4 & 5
- Power Input	-12Vdc to -18Vdc	n/a	2 & 6
Ground	Ground	1 & 12	1 & 12
Voltage Monitor	See Voltage Monitor Table	11	11
+9Vdc Reference	+9.0Vdc, 10mA maximum	10	10
Voltage Program Input	0 to 9Vdc = 0 to 100% rated output, 100kΩ Zin	8	8
Local Voltage Program	Internal program potentiometer wiper, 0 to 9Vdc	9	9

VOLTAGE MONITOR TABLE

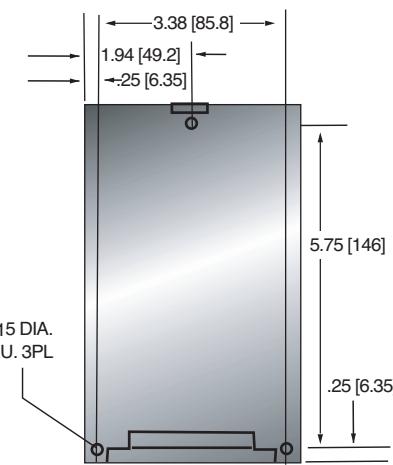
Model	Signal Voltage	Signal Impedance
PMT-05C-P,N	0 to 5 volts	50k ohms
PMT-10C-P,N	0 to 1 volts	10k ohms
PMT-20C-P,N	0 to 2 volts	25k ohms
PMT-30C-P,N	0 to 3 volts	30k ohms
PMT-50C-P,N	0 to 5 volts	100k ohms
PMT-75C-P,N	0 to 7.5 volts	200k ohms

Note: The Voltage Monitor polarity matches the high voltage output polarity

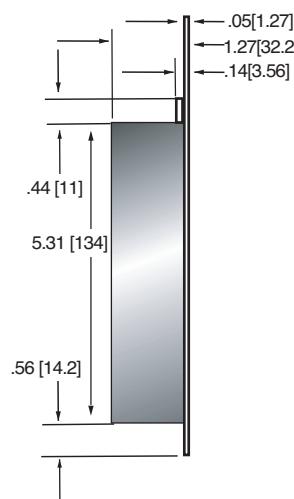
TOP VIEW



BOTTOM VIEW



FRONT VIEW





- **8 Voltage Ranges from 62.5V to 6kV, Fixed Negative or Positive Polarity**
- **Available Output Power Increments of 4, 20 and 30 Watts**
- **Voltage/Current Regulation with Automatic Crossover Control**
- **Voltage and Current Monitor Signals**
- **Fully Arc and Short Circuit Protected**
- **Precision +5V Reference Output**
- **Comprehensive Standard Interface**
- **CE Listed, UL Recognized and RoHS Compliant**

www.spellmanhv.com/manuals/UM

Form, Fit and Function Design:

Spellman's UM Series of printed circuit board mountable, high voltage modules offer a form, fit and function replacement for presently available commercially made units, while providing additional features and benefits at competitive pricing. Utilizing proprietary power conversion technology and Spellman's six decades of high voltage experience, these SMT based high voltage modules provide improved performance/reliability and easier system integration at a lower cost when compared to the competition.

Advanced Power Conversion Topology:

UM converters use a proprietary zero voltage switching power conversion topology providing exceptional efficiency and inherent low noise and ripple. Radiated emissions are reduced compared to conventional switching topologies, minimizing or even eliminating the need to shield the unit from adjacent circuitry.

The high voltage output is generated using a ferrite core high voltage step up transformer which feeds the output circuitry. Units at 1kV or higher utilize an arrangement of half wave Cockcroft-Walton voltage multiplier stages to obtain the specified high voltage output, while lower voltage units use a robust rectification and filter circuit.

Due to the fixed, high frequency conversion rate the output capacitance is small resulting in minimal stored energy. Through the use of generously rated surge limiting resistors and a fast acting current loop, all units are fully arc and short circuit protected.

Control and Regulation:

The actual output voltage generated is sampled via a high impedance divider to create a voltage feedback signal. A current feedback signal is created via a current sense resistor in the low end return of the high voltage output circuitry. These two accurate ground referenced feedback signals are used to precisely regulate and control the units in addition to external monitoring purposes.

Due to the UM's unique converter topology it can provide full current into low impedance loads or even a short circuit. Standard units limit at 103% of maximum rated output current.

Standard Interface:

The Spellman UM Series interface provides current programming capability and positive polarity, buffered, low output impedance voltage and current monitor signals (zero to +4.64Vdc equals zero to full scale rated). A voltage programming input is provided where 0 to +4.64Vdc equals 0 to 100% of rated voltage.

Current programmability allows the user to set where the unit will current limit, anywhere from 0 to 100% of maximum rated current. This feature is beneficial where less than full output current is desired, like in the case of protecting a sensitive load.

The buffered low impedance voltage and current monitor signals can drive external circuitry directly, while minimizing loading and pickup effects. These features save the user the expense and implementation of external interface buffering circuitry while improving overall signal integrity.

This standard interface is made available via a row of 13 pins with 0.1" pin spacing. A legacy interface (7 pins on a 0.2" spacing) that is compatible with presently available commercially made units can be provided by ordering the "L" option.

Mechanical and Environmental Considerations:

The UM Series are solid encapsulated, printed circuit board mountable, plastic cased converters measuring only 2.97" X 1.5" X 0.83" (75.4mm X 38.1mm X 21.1mm). All units are encapsulated using a silicon based potting material which is considerably lighter in weight than epoxy. Two isolated, non grounded 2-56 machine screws thread into the module to securely mount it to the printed circuit board, relieving any stress on the interface pins. Mounting plates, brackets and flanged mounting options are also available.

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. UL/CUL recognized, File E227588. RoHS compliant.

SPECIFICATIONS**Input Voltage:**

12Vdc for 4W, 24Vdc for 20W and 30W

Nominal Voltage Range:

11Vdc to 30Vdc for 4W, 23Vdc to 30Vdc for 20W and 30W

Input Current: (typical)

Disabled:	30mA
No load:	90mA
Full load:	
4 watt units:	0.5A
20 watt units:	1.0A
30 watt units:	1.5A

Efficiency:

80-85%, typical

Voltage Regulation:

Line:	<0.01%
Load:	<0.01%

Current Regulation:

Line:	<0.01%
Load:	<0.01%

Stability:

0.01% per 8 hours, 0.02% per day after 30 min. warmup

Accuracy:

2% on all programming and monitoring, except I Sense 10%

Temperature Coefficient: (typical)

Standard: 100ppm/°C

Optional: 25ppm/°C (T Option)

Environmental:

Temperature Range:

Operating: 0°C to 65°C case temperature

Storage: -55°C to 85°C, non operational

Humidity:

10% to 90%, non-condensing.

Cooling:

Convection cooled, typical. 30 watt units operating at full power might require additional cooling to maintain case temperature below 65°C. Methods may include: forced air cooling, use of heat sink or metal case, etc. It is the user's responsibility to maintain the case temperature below 65°C. Damage to the power supply due to inadequate cooling is considered misuse and repairs will not be covered under warranty.

Dimensions:2.96" L X 1.49" W X 0.81" H
(75.2mm X 37.9mm X 20.6mm)**Weight:**

4 oz. (113g), typical

UM 4W SELECTION TABLE

Model Number	Output V	Output Current	Low Freq. Ripple %Vp-p @ 1Hz-1kHz	High Freq. Ripple %Vp-p @ 1kHz-1MHz	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM0.062*4	0 to 62.5V	64mA	0.030	0.028	8.8µF	1Ω	1.5V	0.5MΩ
UM0.125*4	0 to 125V	32mA	0.045	0.014	8.8µF	4.4Ω	2.75V	0.88MΩ
UM0.25*4	0 to 250V	16mA	0.034	0.017	2.2µF	20Ω	4.9V	1.50MΩ
UM0.5*4	0 to 500V	8mA	0.036	0.040	0.8µF	94Ω	10.1V	2.65MΩ
UM1*4	0 to 1KV	4mA	0.025	0.015	0.2µF	470Ω	10.75V	20MΩ
UM2*4	0 to 2kV	2mA	0.022	0.015	0.097µF	1.0KΩ	10.4V	30MΩ
UM4*4	0 to 4kV	1mA	0.019	0.017	0.012µF	9.4KΩ	11.1V	100MΩ
UM6*4	0 to 6kV	0.67mA	0.016	0.015	0.007µF	20KΩ	9.9V	150MΩ

UM 20W SELECTION TABLE

Model Number	Output V	Output Current	Low Freq. Ripple %Vp-p @ 1Hz-1kHz	High Freq. Ripple %Vp-p @ 1kHz-1MHz	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM0.062*20	0 to 62.5V	320mA	0.060	0.088	8.8µF	1Ω	330mV	0.5MΩ
UM0.125*20	0 to 125V	160mA	0.067	0.044	8.8µF	4.4Ω	675mV	0.88MΩ
UM0.25*20	0 to 250V	80mA	0.035	0.019	2.2µF	20Ω	1.135V	1.50MΩ
UM0.5*20	0 to 500V	40mA	0.041	0.040	0.8µF	94Ω	2.25V	2.65MΩ
UM1*20	0 to 1KV	20mA	0.039	0.095	0.2µF	470Ω	4.35V	20MΩ
UM2*20	0 to 2kV	10mA	0.026	0.016	0.097µF	1.0KΩ	6.6V	30MΩ
UM4*20	0 to 4kV	5mA	0.023	0.028	0.012µF	9.4KΩ	6.65V	100MΩ
UM6*20	0 to 6kV	3.3mA	0.017	0.018	0.007µF	20KΩ	6.74V	150MΩ

UM 30W SELECTION TABLE

Model Number	Output V	Output Current	Low Freq. Ripple %Vp-p @ 1Hz-1kHz	High Freq. Ripple %Vp-p @ 1kHz-1MHz	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM0.062*30	0 to 62.5V	480mA	0.075	0.112	8.8µF	1Ω	500mV	0.5MΩ
UM0.125*30	0 to 125V	240mA	0.075	0.056	8.8µF	4.4Ω	930mV	0.88MΩ
UM0.25*30	0 to 250V	120mA	0.055	0.031	2.2µF	20Ω	1.65V	1.50MΩ
UM0.5*30	0 to 500V	60mA	0.085	0.041	0.8µF	94Ω	3.4V	2.65MΩ
UM1*30	0 to 1KV	30mA	0.032	0.171	0.2µF	220Ω	6.5V	20MΩ
UM2*30	0 to 2kV	15mA	0.031	0.112	0.097µF	470Ω	9.85V	30MΩ
UM4*30	0 to 4kV	7.5mA	0.028	0.071	0.012µF	4.4KΩ	9.85V	100MΩ
UM6*30	0 to 6kV	5mA	0.020	0.051	0.007µF	9.4KΩ	10.0V	150MΩ

Note: Total ripple is the sum of the low frequency and high frequency ripple. Grayed text indicates Legacy interface signals.



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I28068-001 REV. M

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STANDARD INTERFACE

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+12Vdc or +24Vdc power return/HV return
1A	Signature Resistor	Unique Identifying resistor connected to ground
2	+ Power Input	+12Vdc or +24Vdc power input
2A	N/C	
3	I Sense	See I Sense text and tables
3A	I Mon	0 to 4.64Vdc = 0 to 100% rated output. Zout < 10kΩ
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
4A	V Mon	0 to 4.64Vdc = 0 to 100% rated output. Zout < 10kΩ
5	Signal Ground	Signal Ground
5A	I Pgm	0 to 4.64Vdc = 0 to 100% rated output. Zin > 47kΩ Leave open for preset current limit @103% of rated output current
6	Remote Adjust	Positive Polarity Unit: 0 to +4.64VDC = 0 to 100% rated voltage, Zin >1MΩ Negative Polarity Unit: +5VDC to 0.36V = 0 to 100% rated voltage, Zin >100kΩ Leave open if pin 6A (VPgm) is used for programming
6A	VPgm	0 to 4.64Vdc = 0 to 100% rated voltage. Zin > 100kΩ Leave open if pin 6 (remote adjust) is used for programming
7	+5V Reference Output	+5Vdc ±0.5%, 50ppm/°C. Zout =475Ω
8	HV Ground Return	HV Ground Return
9	E Out Monitor	10:1 ratio for models below 1kV, 100:1 ratio for models 1kV and above. Polarity of Voltage Monitor signal equals polarity of unit. Accuracy is ±2%, 100ppm/°C. Calibrated with DVM with 10MΩ input impedance
10	HV Output	HV Output
11	HV Output	HV Output

Grayed out signals are provided for backward legacy compatibility and their use is not required

Power Ground Return, Signal Ground and HV Ground Return are connected internally. For best performance they should not be connected externally.

LEGACY INTERFACE (L OPTION)

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+12Vdc or +24Vdc power return/HV return
2	+ Power Input	+12Vdc or +24Vdc power input
3	I Sense	See I Sense text and tables for details
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
5	Signal Ground	Signal Ground
6	Remote Adjust	Positive Polarity Unit: 0 to +4.64VDC = 0 to 100% rated voltage, Zin >1MΩ Negative Polarity Unit: +5VDC to 0.36V = 0 to 100% rated voltage, Zin >100kΩ
7	+5V Reference Output	+5Vdc ±0.5%, 50ppm/°C. Zout =475Ω
8	HV Ground Return	HV Ground Return
9	E Out Monitor	10:1 ratio for models below 1kV, 100:1 ratio for models 1kV and above. Polarity of Voltage Monitor signal equals polarity of unit. Accuracy is ±2%, 100ppm/°C. Calibrated with DVM with 10MΩ input impedance
10	HV Output	HV Output
11	HV Output	HV Output

Power Ground Return, Signal Ground and HV Ground Return are connected internally. For best performance they should not be connected externally.

Standard Interface Connections

Seventeen (17) gold plated 0.025" (0.64mm) square pins suitable for direct PCB mounting. See mechanical drawing for location and spacing details.

Programming and Monitor Signals

Voltage and current programming is done via positive polarity, high input impedance, 0 to 4.64Vdc signals. Voltage and current monitors are positive polarity, buffered low output impedance 0 to 4.64Vdc signals.

I Mon

The I Mon signal is a true output current monitoring signal. All internal offsets due to feedback divider currents have been compensated for.

Signature Resistor

A unique identifying signature resistor for each type of unit is connected from Pin 1A to ground. Details if desired are available upon request.

Legacy Interface Connections

Eleven (11) gold plated 0.025" (0.64mm) square pins suitable for direct PCB mounting. See mechanical drawing for location and spacing details.

I Sense Signal

The I Sense signal polarity is opposite of the output polarity of the module. This signal is protected via a transorb and provided via a series connected 47k isolation resistor. Internal HV dividers create a small, linear offset voltage on the I sense signal that can be compensated for.

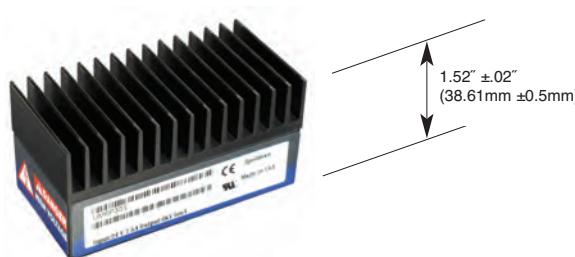
Adhesive Backed Heat Sink

UM modules are provided with an uninstalled top mounted adhesive backed heat sink. Label removal is not required if the customer elects to install and use the provided heat sink.

The UM's internal power dissipation causes a case temperature rise. If the case exceeds 65°C, the unit needs external cooling (fan or heat sink). Even if the case is below 65°C, it is prudent to keep it much lower. Like a semiconductor device; the hotter it is, the shorter the life. For every 10°C reduction of temperature the lifetime will be increased by a factor of ≈2.35. The thermal resistance from internal circuitry to ambient is 8°C/watt without a heat sink (still air). This reduces to 6°C/watt with the heat sink.

Example:

Assuming ≈80% efficiency for a 20 watt UM module, the 5 watts of internal power dissipation would create a 40°C rise. Using the heat sink there would be only a 30°C rise. Ultimately it is up to the user to determine what cooling method is applicable for their application, but the general recommendation is to keep the module as cool as possible.



UM OPTIONS

C Option

Fast Rise Time Applications-

If applications demand a power supply that is optimized for fast rise time/low overshoot requirements, then the C Option should be considered. A Hysteretic control circuit is employed providing improved performance in these unique applications with higher ripple observed (1% Vpp typical). If used for capacitor charging, a Spellman Capacitor Charging Questionnaire should be filled out to assure all aspects of the intended usage is understood assuring the appropriate unit is provided. Speak to a Spellman sales person for more details.

T Option

Low Temperature Coefficient-

The T Option offers the UM with an improved temperature coefficient. The standard voltage feedback divider is replaced with one having a superior temperature coefficient, resulting in a unit with 25ppm/C° (typical) temperature coefficient.

Maximum short circuit
discharge rate:

$$\frac{CV^2}{2} (f) < 1 \text{ watt}$$

C = Output capacitance of unit
C ext = External capacitance
V = Maximum rated voltage
f = Frequency of discharge
I = Nominal output current
 t_R = Rise time

Typical Rise Time:

$$t_R = \frac{C + C_{ext}}{I} (V)$$

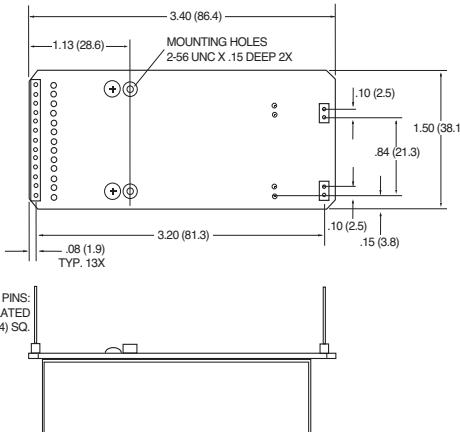
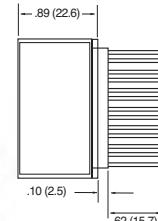
Minimum rise time is 3ms

PHYSICAL INTERFACING

A Option

Adapter Board-

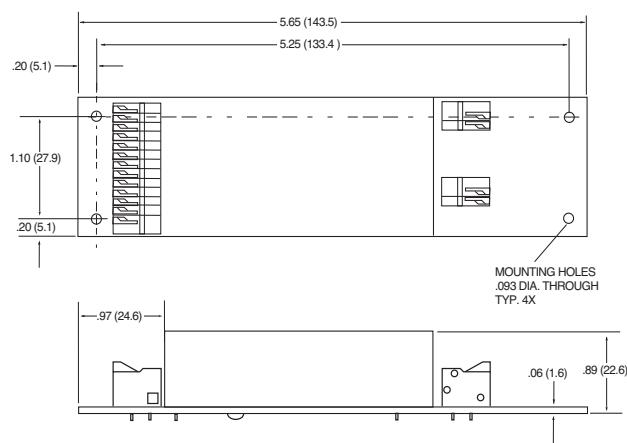
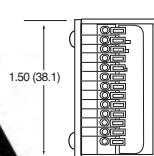
Spellman's UM module can be fitted with an adapter board that will allow a drop in replacement for other commercially available modules of a physically larger size, while providing identical functionality with superior performance.



B Option

Terminal Block-

The B Option provides terminal block connections for both the customer interface and high voltage output/return. This feature can be helpful in situations where frequent wiring changes are anticipated, as in a testing or prototype environment.



SHIELDING

M Option

Mu Metal Shield-

UM modules can be fitted with an adhesive backed Mu Metal foil shield to help protect sensitive adjacent circuitry.



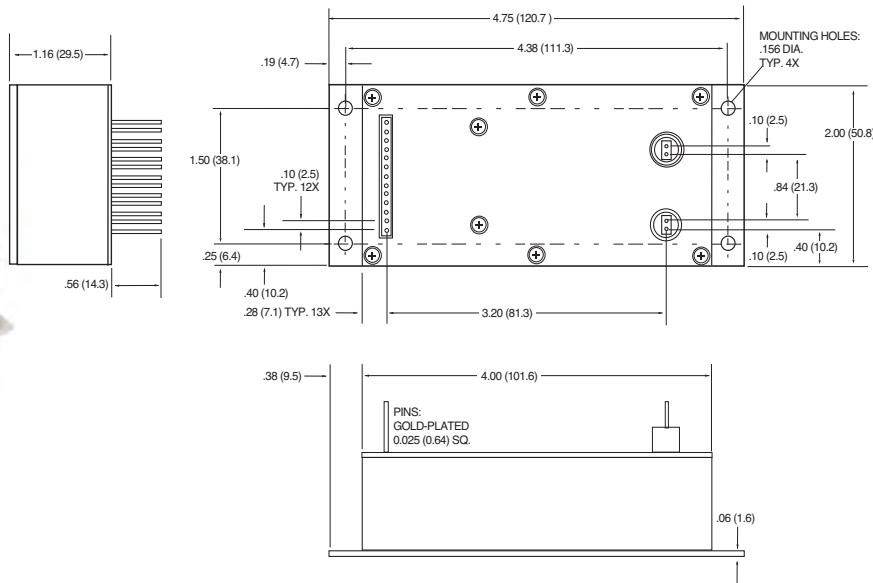
Same as standard unit.
See page 6 of 6 for dimensional drawings

SHIELDING continued

S Option

RF Tight Shielded Can-

The S Option mounts the UM module inside of a flanged RF tight aluminum can.

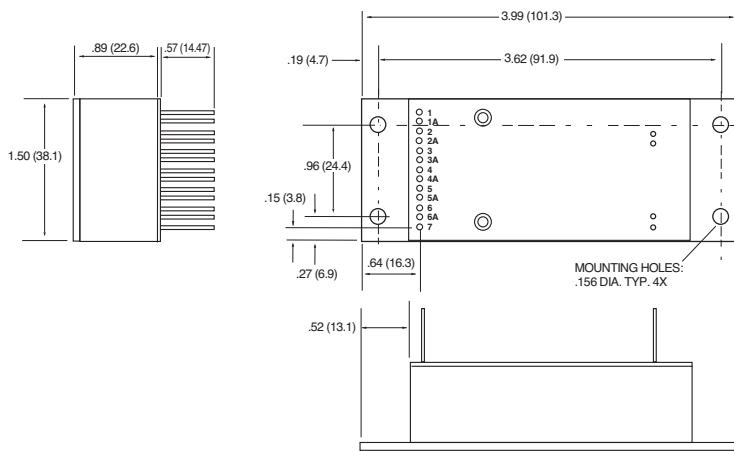


CHASSIS MOUNTING

E Option

Eared Mounting Plate-

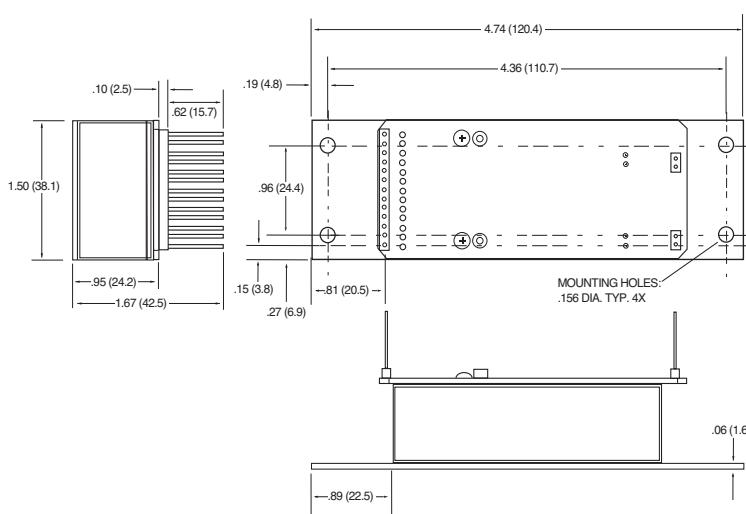
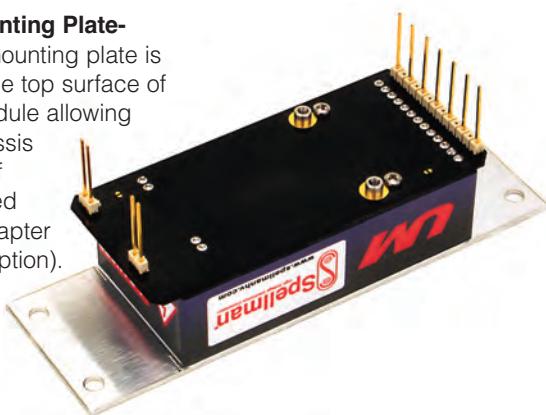
An eared mounting plate is affixed to the top surface of the UM module allowing simple chassis mounting of unit.



E2 Option

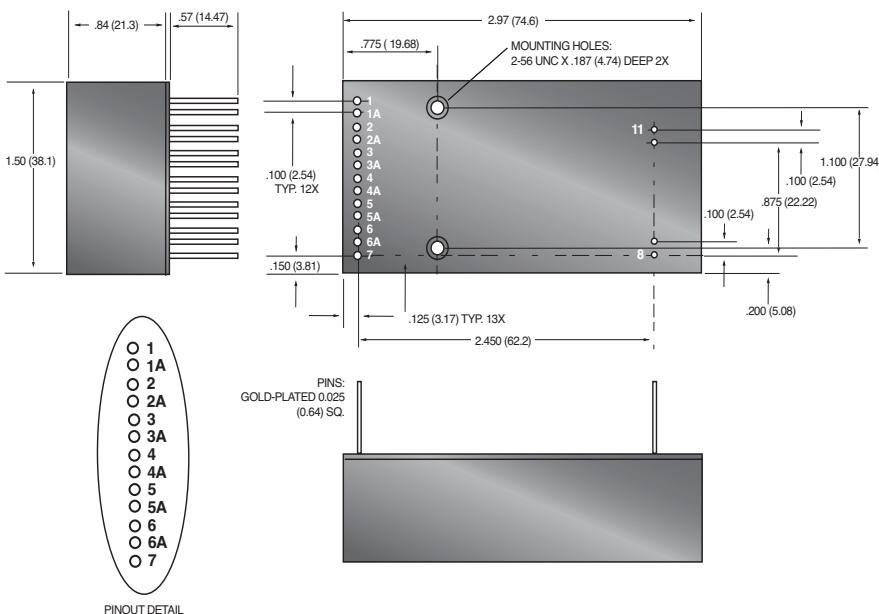
Eared Mounting Plate-

An eared mounting plate is affixed to the top surface of the UM module allowing simple chassis mounting of units ordered with the Adapter Board (A Option).

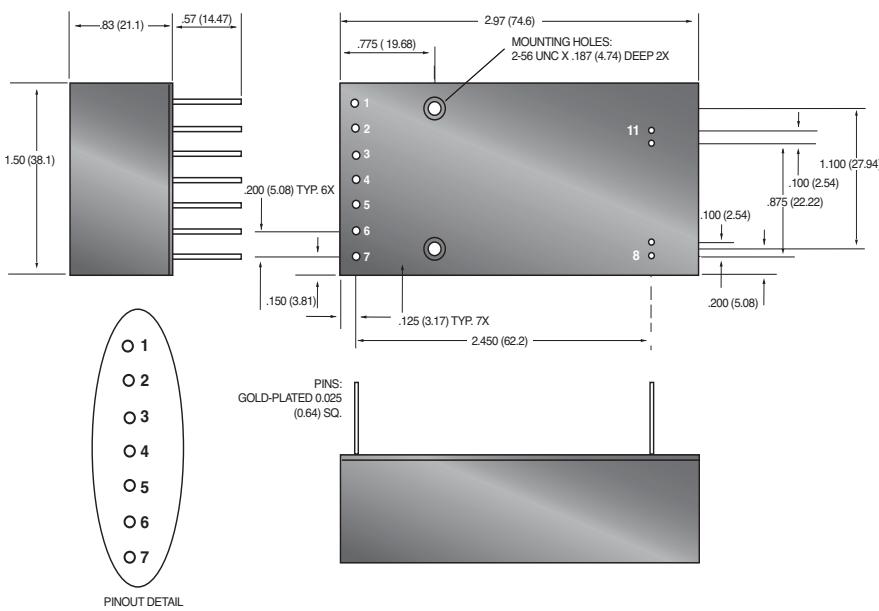


DIMENSIONS: in.[mm]

17 PIN - Standard Interface



11 PIN - Legacy Interface



Note: There may be some restrictions on multiple option combinations. Please contact our sales department for more details.

ORDERING INFORMATION

Voltage	0 to 62.5Vdc	0.062
	0 to 125Vdc	0.125
	0 to 250Vdc	0.25
	0 to 500Vdc	0.5
	0 to 1000Vdc	1
	0 to 2000Vdc	2
	0 to 4000Vdc	4
	0 to 6000Vdc	6
Polarity	Positive	P
	Negative	N
Power	Watts Output	4
	Watts Output	20
	Watts Output	30

STANDARD UNIT ORDERING EXAMPLE

UM1N20

Model | Voltage | Polarity | Power

OPTION ORDERING INFORMATION

OPTION	OPTION CODE
Legacy Interface	L
Fast Rise Time	C
Low Temperature Coefficient	T
Adapter Board	A
Terminal Block	B
Mu Metal Shield	M
RF Tight Shielded Can	S
Eared Mounting Plate	E
Eared Mounting Plate/Adapter Board	E2

OPTION ORDERING EXAMPLE

UM4P30/L/E

Model | Voltage | Polarity | Power | Option | Option



- **9 Voltage Ranges from 8kV to 40kV, Fixed Negative or Positive Polarity**
- **Available Output Power Increments of 4, 15 and 30 Watts**
- **Voltage/Current Regulation with Automatic Crossover Control**
- **Voltage and Current Monitor Signals**
- **Fully Arc and Short Circuit Protected**
- **Precision +5V Reference Output**
- **Comprehensive Standard Interface**
- **CE listed and RoHS compliant**

www.spellmanhv.com/manuals/UM8-40

Form, Fit and Function Design:

Spellman's UM Series of printed circuit board mountable, high voltage modules offer a form, fit and function replacement for presently available commercially made units, while providing additional features and benefits at competitive pricing. Utilizing proprietary power conversion technology and Spellman's six decades of high voltage experience, these SMT based high voltage modules provide improved performance/reliability and easier system integration at a lower cost when compared to the competition.

Advanced Power Conversion Topology:

UM converters use a proprietary zero voltage switching power conversion topology providing exceptional efficiency and inherent low noise and ripple. Radiated emissions are reduced compared to conventional switching topologies, minimizing or even eliminating the need to shield the unit from adjacent circuitry.

The high voltage output is generated using a ferrite core high voltage step up transformer which feeds a half wave Cockcroft-Walton voltage multiplier to obtain the specified high voltage output.

Due to the fixed, high frequency conversion rate the output capacitance is small resulting in minimal stored energy.

Through the use of generously rated surge limiting resistors and a fast acting current loop, all units are fully arc and short circuit protected.

Control and Regulation:

The actual output voltage generated is sampled via a high impedance divider to create a voltage feedback signal. A current feedback signal is created via a current sense resistor in the low end return of the high voltage output circuitry. These two accurate ground referenced feedback signals are used to precisely regulate and control the units in addition to external monitoring purposes.

Due to the UM's unique converter topology it can provide full current into low impedance loads or even a short circuit. Standard units limit at 103% of maximum rated output current.

Standard Interface:

The Spellman UM Series interface provides current programming capability and positive polarity, buffered, low output impedance voltage and current monitor signals (zero to +4.64Vdc equals zero to full scale rated). A voltage programming input is provided where 0 to +4.64Vdc equals 0 to 100% of rated voltage.

Current programmability allows the user to set where the unit will current limit, anywhere from 0 to 100% of maximum rated current. This feature is beneficial where less than full output current is desired, like in the case of protecting a sensitive load.

The buffered low impedance voltage and current monitor signals can drive external circuitry directly, while minimizing loading and pickup effects. These features save the user the expense and implementation of external interface buffering circuitry while improving overall signal integrity.

This standard interface is made available via a row of 13 pins with 0.1" pin spacing. A legacy interface (7 pins on a 0.2" spacing) that is compatible with presently available commercially made units can be provided by ordering the "L" option.

Mechanical and Environmental Considerations:

The UM Series are solid encapsulated, printed circuit board mountable, plastic cased converters. All units are encapsulated using a silicon based potting material which is considerably lighter in weight than epoxy. Isolated, non grounded 2-56 machine screws thread into the module to securely mount it to the printed circuit board, relieving any stress on the interface pins. Mounting plates, brackets and flanged mounting options are also available. High voltage output is provided via a 36" (914.4mm) minimum length of appropriately rated high voltage wire.

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. RoHS compliant. UL/CUL recognized, File E227588.

SPECIFICATIONS

Input Voltage:

12Vdc for 4W, 24Vdc for 15W and 30W

Nominal Voltage Range:

11Vdc to 30Vdc for 4W, 23Vdc to 30Vdc for 15W and 30W
4W units can operate at 24Vdc input with no deratings or damage to unit

Input Current: (typical)

Disabled: 10mA @ 24Vdc
Full output, no load: 160mA @ 24Vdc, 300mA @ 12Vdc
Full output, full load:
 4 watt units: 330mA @ 24Vdc, 640mA @ 12Vdc
 15 watt units: 850mA @ 24Vdc
 30 watt units: 1590mA @ 24Vdc

Voltage Regulation:

Line: <0.01% Load: <0.01%

Current Regulation:

Line: <0.01% Load: <0.01%

Stability:

0.01% per 8 hours, 0.02% per day after 30 min. warmup

Accuracy:

2% on all programming and monitoring, except I Sense 10%

Temperature Coefficient: (typical)

Standard: 100ppm/ $^{\circ}$ C
Optional: 25ppm/ $^{\circ}$ C (T Option)

Environmental:

Temperature Range:

Operating: -40 $^{\circ}$ C to 65 $^{\circ}$ C case temperature

Storage: -55 $^{\circ}$ C to 105 $^{\circ}$ C, non operational

Humidity:

10% to 90%, non-condensing.

Cooling:

Convection cooled, typical. 30 watt units operating at full power might require additional cooling to maintain case temperature below 65 $^{\circ}$ C. Methods may include: forced air cooling, use of heat sink or metal case, etc. It is the user's responsibility to maintain the case temperature below 65 $^{\circ}$ C. Damage to the power supply due to inadequate cooling is considered misuse and repairs will not be covered under warranty.

Dimensions:

8kV-12kV: 3.700" \times 1.500" \times 0.990" H (93.98mm X 38.10mm X 25.03mm)

15kV-20kV: 4.700" \times 1.500" \times 0.990" H (119.38mm X 38.10mm X 25.03mm)

25kV-40kV: 6.960" \times 1.600" \times 1.14" H (176.78mm X 40.84mm X 28.87mm)

Weight:

8kV-12kV: 5.7 ounces (162 grams), typical

15kV-20kV: 7.2 ounces (204 grams), typical

25kV-40kV: 13.1 ounces (371 grams), typical

Output Cable:

UM8, UM10, UM12, UM15: TV20 (min. length, 36" (914.4mm)

UM20, UM25: TV30 (min. length, 36" (914.4mm))

UM30, UM35, UM40: TV40 (min. length, 36" (914.4mm))

UM 4W, 8kV TO 40kV SELECTION TABLE

Model Number	Output V	Output Current	Ripple(max) %Vp-p	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM8*4	0 to 8kV	0.5mA	0.05	6830pF	50k Ω	.5V	200M Ω
UM10*4	0 to 10kV	0.4mA	0.05	4380pF	50k Ω	2.4V	300M Ω
UM12*4	0 to 12kV	0.333mA	0.05	4380pF	50k Ω	3.33V	300M Ω
UM15*4	0 to 15kV	0.266mA	0.05	3220pF	100k Ω	1.69V	400M Ω
UM20*4	0 to 20kV	0.2mA	0.05	2310pF	100k Ω	1.316V	550M Ω
UM25*4	0 to 25kV	0.16mA	0.05	1540pF	100k Ω	1.1V	800M Ω
UM30*4	0 to 30kV	0.133mA	0.05	1370pF	120k Ω	0.95V	900M Ω
UM35*4	0 to 35kV	0.115mA	0.05	1370pF	140k Ω	0.72V	900M Ω
UM40*4	0 to 40kV	0.1mA	0.05	1370pF	140k Ω	1.3V	900M Ω

UM 15W, 8kV TO 40kV SELECTION TABLE

Model Number	Output V	Output Current	Ripple(max) %Vp-p	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM8*15	0 to 8kV	1.875mA	0.05	6830pF	50k Ω	3.75V	200M Ω
UM10*15	0 to 10kV	1.5mA	0.05	4380pF	50k Ω	8.152V	300M Ω
UM12*15	0 to 12kV	1.25mA	0.05	4380pF	50k Ω	5V	300M Ω
UM15*15	0 to 15kV	1mA	0.05	3220pF	100k Ω	5.53V	400M Ω
UM20*15	0 to 20kV	0.75mA	0.05	2310pF	100k Ω	4.21V	550M Ω
UM25*15	0 to 25kV	0.6mA	0.05	1540pF	100k Ω	3.42V	800M Ω
UM30*15	0 to 30kV	0.5mA	0.05	1370pF	120k Ω	2.89V	900M Ω
UM35*15	0 to 35kV	0.429mA	0.05	1370pF	140k Ω	2.39V	900M Ω
UM40*15	0 to 40kV	0.375mA	0.05	1370pF	140k Ω	4.21V	900M Ω

UM 30W, 8kV TO 40kV SELECTION TABLE

Model Number	Output V	Output Current	Ripple(max) %Vp-p	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal	High Voltage Divider Resistance
UM8*30	0 to 8kV	3.75mA	0.05	6830pF	50k Ω	5.36V	200M Ω
UM10*30	0 to 10kV	3mA	0.05	4380pF	50k Ω	7.87V	300M Ω
UM12*30	0 to 12kV	2.5mA	0.05	4380pF	50k Ω	5V	300M Ω
UM15*30	0 to 15kV	2mA	0.06	3220pF	100k Ω	5.29V	400M Ω
UM20*30	0 to 20kV	1.5mA	0.06	2310pF	100k Ω	8.15V	550M Ω
UM25*30	0 to 25kV	1.2mA	0.06	1540pF	100k Ω	6.56V	800M Ω
UM30*30	0 to 30kV	1mA	0.06	1370pF	120k Ω	5.52V	900M Ω
UM35*30	0 to 35kV	0.857mA	0.05	1370pF	140k Ω	4.66V	900M Ω
UM40*30	0 to 40kV	0.75mA	0.05	1370pF	140k Ω	8.15V	900M Ω

Grayed text indicates Legacy interface signals.

STANDARD INTERFACE

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+12Vdc or +24Vdc power return/HV return
1A	Signature Resistor	Unique Identifying resistor connected to ground
2	+ Power Input	+12Vdc or +24Vdc power input
2A	OT Output	+5Vdc @ 1mA = Over Temp fault
3	I Sense	See I Sense text and tables for details
3A	I Mon	0 to 4.64Vdc = 0 to 100% rated output. Zout < 10kΩ
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
4A	V Mon	0 to 4.64Vdc = 0 to 100% rated output. Zout < 10kΩ
5	Signal Ground	Signal Ground
5A	I Pgm	0 to 4.64Vdc = 0 to 100% rated output. Zin > 47kΩ Leave open for preset current limit @103% of rated output current
6	Remote Adjust	Positive Polarity Unit: 0 to +4.64VDC = 0 to 100% rated voltage, Zin >1MΩ Negative Polarity Unit: +5VDC to 0.36V = 0 to 100% rated voltage, Zin >100kΩ Leave open if pin 6 (VPgm) is used for programming
6A	V Pgm	0 to 4.64Vdc = 0 to 100% rated voltage. Zin > 100kΩ Leave open if pin 6 (remote adjust) is used for programming
7	+5V Reference Output	+5Vdc ±1%, 25ppm/°C. Zout =475Ω
8	HV Ground Return	HV Ground Return
9	E Out Monitor	1000:1 ratio. Polarity of Voltage Monitor signal equals polarity of unit. Accuracy is ±2%, 100ppm/°C. Calibrated with DVM with 10MΩ input impedance

Grayed out signals are provided for backward legacy compatibility and their use is not required.

Power Ground Return, Signal Ground and HV Ground Return are connected internally. For best performance they should not be connected externally.

LEGACY INTERFACE (L OPTION)

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+12Vdc or +24Vdc power return
2	+ Power Input	+12Vdc or +24Vdc power input
3	I Sense	See I Sense text and tables for details
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
5	Signal Ground	Signal Ground
6	Remote Adjust	Positive Polarity Unit: 0 to +4.64VDC = 0 to 100% rated voltage, Zin >1MΩ Negative Polarity Unit: +5VDC to 0.36V = 0 to 100% rated voltage, Zin >100kΩ
7	+5V Reference Output	+5Vdc ±1%, 25ppm/°C. Zout =475Ω
8	HV Ground Return	HV Ground Return
9	E Out Monitor	1000:1 ratio. Polarity of Voltage Monitor signal equals polarity of unit. Accuracy is ±2%, 100ppm/°C. Calibrated with DVM with 10MΩ input impedance

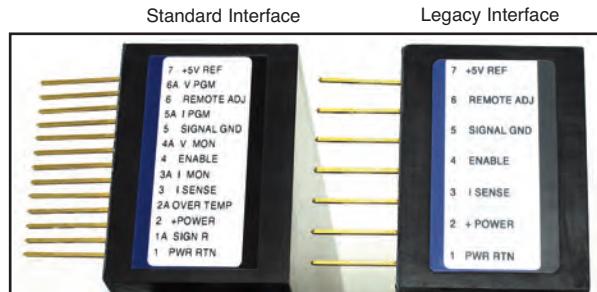
Power Ground Return, Signal Ground and HV Ground Return are connected internally. For best performance they should not be connected externally.

Standard Interface Connections

Fifteen (15) gold plated 0.025" (0.64mm) square pins suitable for direct PCB mounting.

Legacy Interface Connections

Nine (9) gold plated 0.025" (0.64mm) square pins suitable for direct PCB mounting.



See mechanical drawing for location and spacing details

Programming and Monitor Signals

Voltage and current programming is done via positive polarity, high input impedance, 0 to 4.64Vdc signals. Voltage and current monitors are positive polarity, buffered low output impedance 0 to 4.64Vdc signals.

I Mon

The I Mon signal is a true output current monitoring signal. All internal offsets due to feedback divider currents have been compensated for.

Signature Resistor

A unique identifying signature resistor for each type of unit is connected from Pin 1A to ground. Details if desired are available upon request.

I Sense Signal

The polarity of the I Sense signal is opposite of the polarity of the output voltage of the unit that generated it. So a positive output polarity unit creates a negative polarity current monitor signal; while a negative output polarity unit creates a positive polarity current monitoring signal. This signal is clamped to ground internally via a bidirectional transient protection device and the signal is made available via a series connected 47kΩ isolation resistor. Internal HV dividers create a small, linear offset voltage on this current monitor signal that can be compensated for.

OT Output

The unit is protected by an internal thermostat that will shut the unit off if the case temperature exceeds 65°C. The OT Output signal will change states indicating an over temperature fault has occurred. In order to clear the OT signal and re-enable the unit, the temperature has to drop below 55 degrees C and input power needs to be recycled. For details on unit cooling requirements and the OT Output signal please see the operator's manual.

UM8-40 OPTIONS

C Option

Fast Rise Time Applications-

If applications demand a power supply that is optimized for fast rise time requirements, then the C Option should be considered. If used for capacitor charging, a Spellman Capacitor Charging Questionnaire should be filled out to assure all aspects of the intended usage is understood assuring the appropriate unit is provided. Speak to a Spellman sales person for more details.

T Option

Low Temperature Coefficient-

The T Option offers the UM with an improved temperature coefficient. The standard voltage feedback divider is replaced with one having a superior temperature coefficient, resulting in a unit with 25ppm/C° (typical) temperature coefficient.

maximum short circuit charge rate:
 $\frac{CV^2}{2} (f) < 1 \text{ watt}$

- = Output capacitance of unit
- x_t = External capacitance
- = Maximum rated voltage
- = Frequency of discharge
- = Nominal output current
- = Rise time

Typical Rise Time

$$t_R = \frac{C + C_{ext}}{I} \quad (V)$$

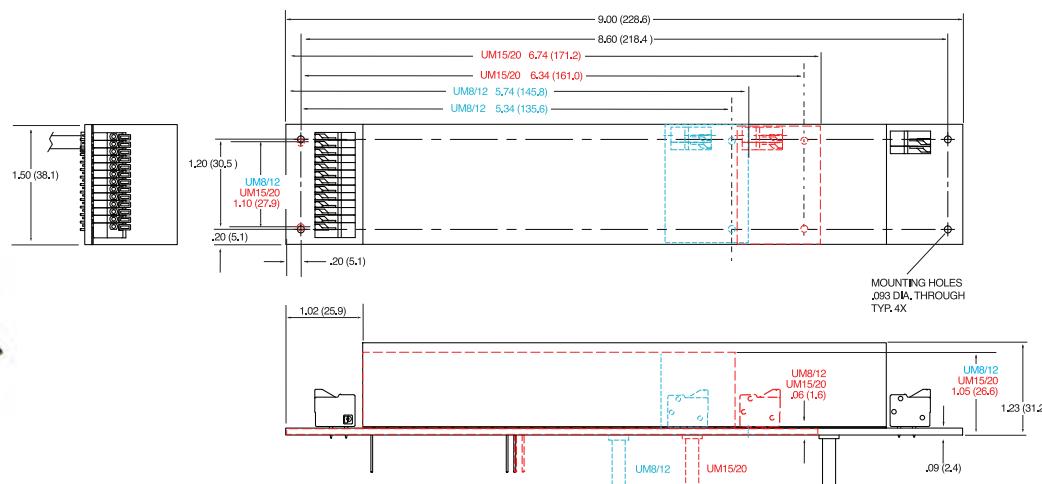
Minimum rise time is 10ms

PHYSICAL INTERFACING

B Option

Terminal Block-

The B Option provides terminal block connections for both the customer interface and high voltage output/return. This feature can be helpful in situations where frequent wiring changes are anticipated, as in a testing or prototype environment.

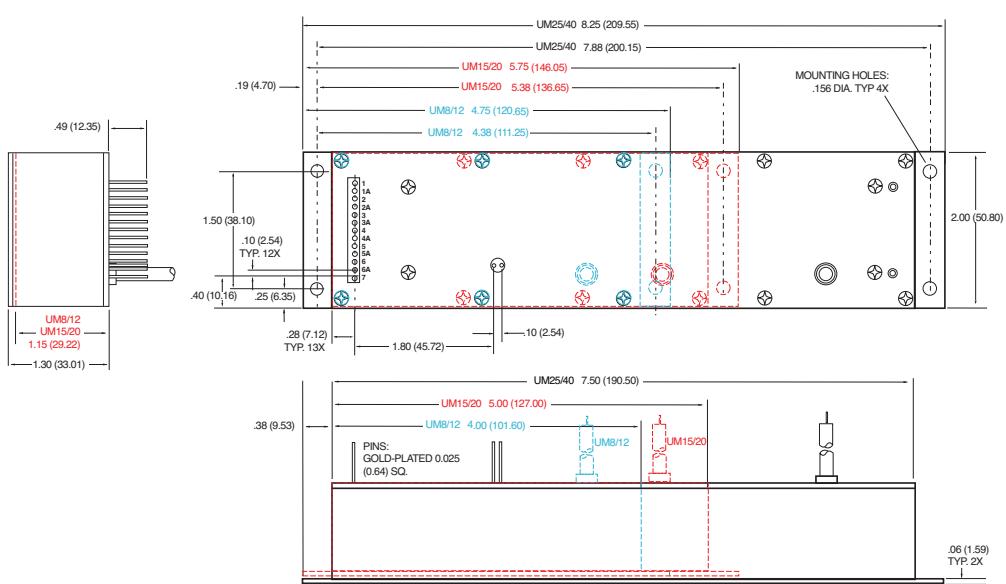


SHIELDING OPTIONS

S Option

BE Tight Shielded Cap-

RF Tight Shielded Can-
The S Option mounts the UM module inside
of a flanged RF tight aluminum can.



SHIELDING OPTIONS (CONT)

M Option

Mu Metal Shield-

UM modules can be fitted with an adhesive backed Mu Metal foil shield to help protect sensitive adjacent circuitry.



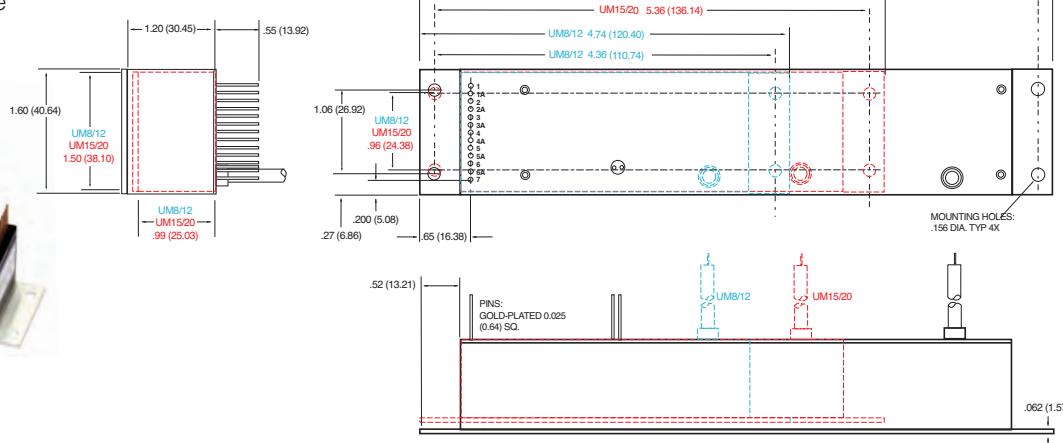
Same as standard unit.
See page 6 of 6 for dimensional drawings

CHASSIS MOUNTING OPTION

E Option

Eared Mounting Plate-

An eared mounting plate is affixed to the top surface of the UM module allowing simple chassis mounting of unit.



ORDERING INFORMATION

Voltage	0 to 8kV	8
	0 to 10kV	10
	0 to 12kV	12
	0 to 15kV	15
	0 to 20kV	20
	0 to 25kV	25
	0 to 30kV	30
	0 to 35kV	35
	0 to 40kV	40
Polarity	Positive	P
	Negative	N
Power	Watts Output	4
	Watts Output	15
	Watts Output	30

STANDARD UNIT ORDERING EXAMPLE

UM30N30

Model | Voltage | Polarity | Power

OPTION ORDERING INFORMATION

OPTION	OPTION CODE
Legacy Interface	L
Fast Rise Time	C
Low Temperature Coefficient	T
Mu Metal Shield	M
RF Tight Shielded Can	S
Eared Mounting Plate	E
Terminal Block	B

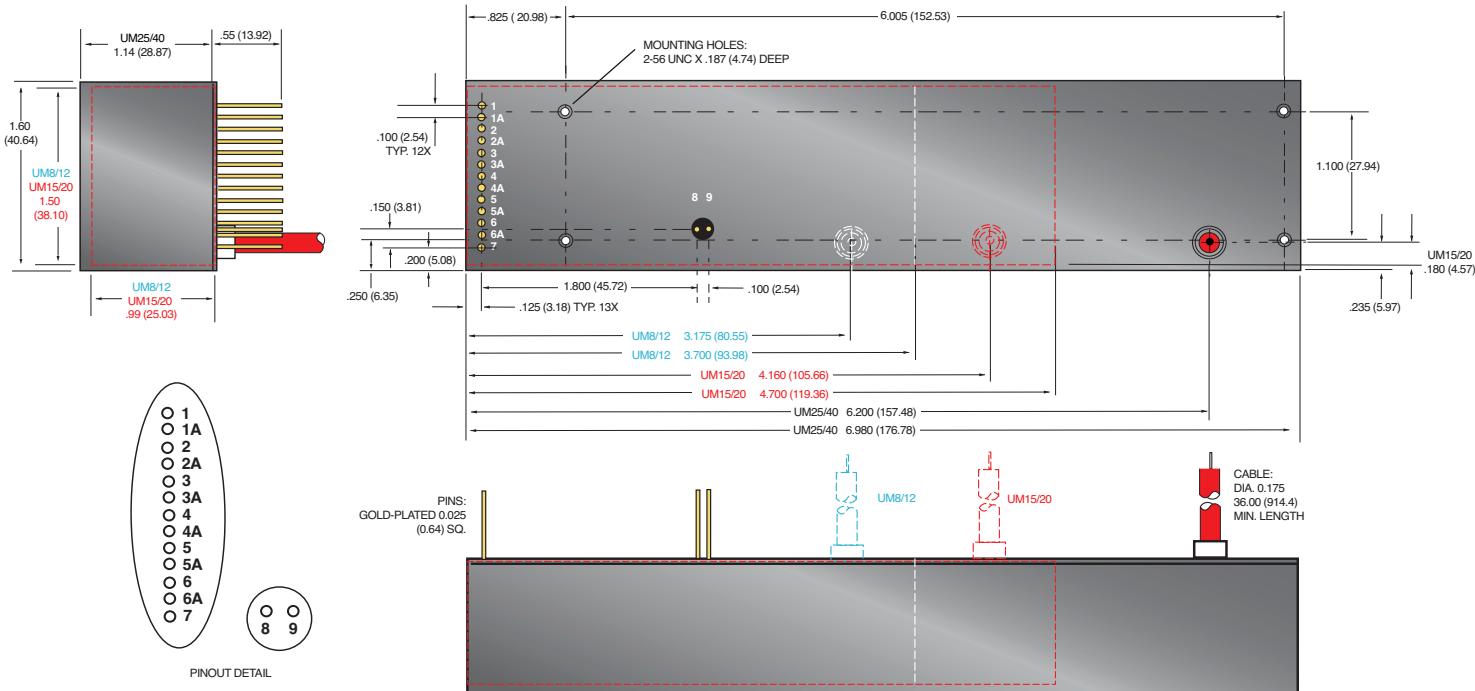
OPTION ORDERING EXAMPLE

UM25P15/L/E

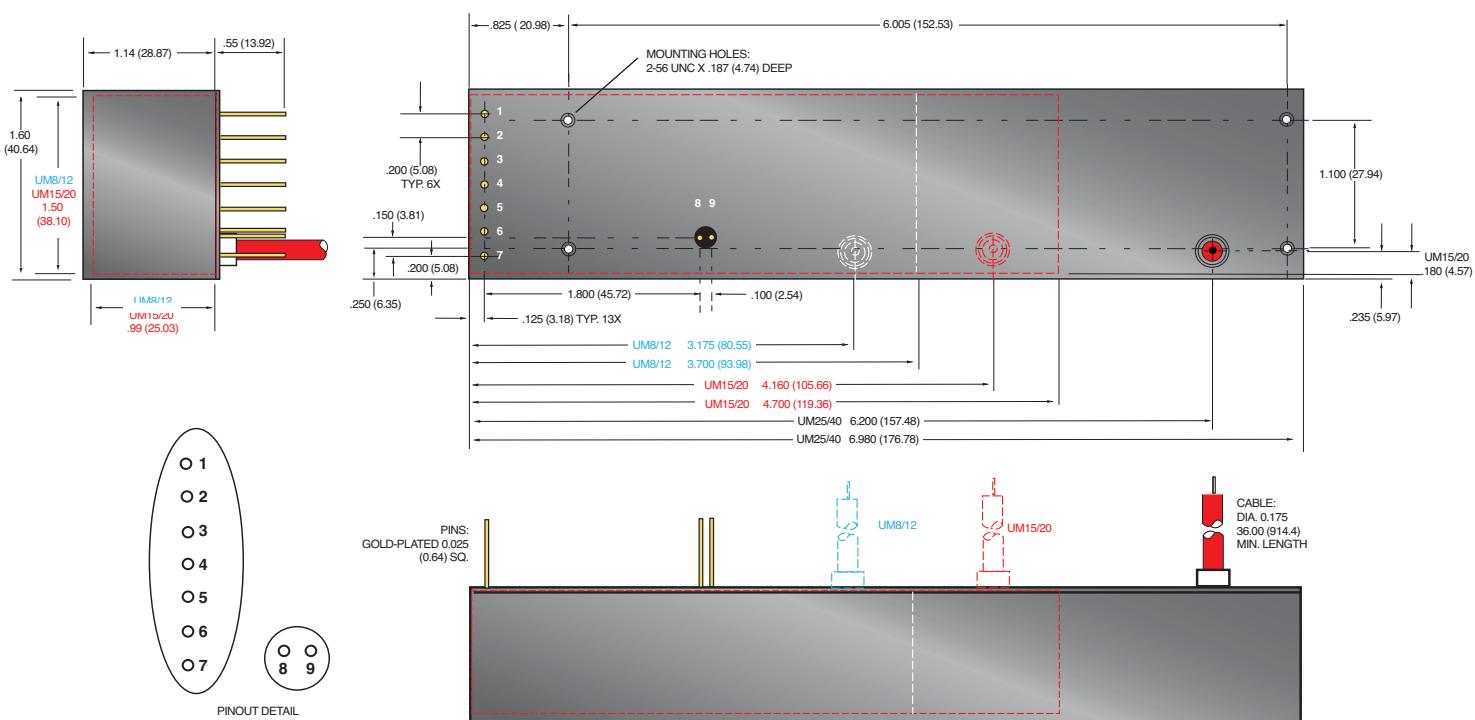
Model | Voltage | Polarity | Power | Option | Option

DIMENSIONS: in.[mm]

15 PIN - Standard Interface



9 PIN - Legacy Interface





Spellman's new MPS series are a family of high voltage 10 Watt modules that provide output voltages ranging from 1kV to 30kV.

The MPS series are high performance products designed with Spellman's hybrid topology of linear and switch mode power conversion techniques delivering lower noise with higher efficiency. The MPS series produces excellent ripple and stability performance specifications from a compact footprint. Additionally the MPS series features, as standard, a differential amplifier input for the voltage programming signal to improve immunity from external system noise and addressing any offset issues. Alternatively the output voltage may be pre-set by an internal potentiometer.

A fully featured remote user interface is provided via 15-pin D-type connector as standard and an optional RS-232 or RS-485 serial interface is also available.

Spellman's proprietary HV technology coupled with SMT circuitry results in an ultra compact and lightweight module that is available as either a positive or negative supply that is ideal for OEM applications.

TYPICAL APPLICATIONS

Photomultiplier Tubes	Electrostatic Printing
Electron and Ion Beams	Scintillators
Electromultiplier Detectors	Mass Spectrometry
Microchannel Plate Detectors	Electrostatic Lenses
Nuclear Instruments	

OPTIONS

VCC	Variable Current Control
HS	High Stability
DCC 2	RS-232
DCC 4	RS-485

Note: It is not possible to supply the unit with both full HS and DCC options

- **Differential Input for Voltage Program**
- **Optional RS-232/RS-485 Control**
- **10 Watts Output Power**
- **Voltage and Current Monitors and Controls**
- **High Stability**
- **Ultra Low Ripple and Noise**
- **CE Marked and UL61010A-1 Certified**

www.spellmanhv.com/manuals/MPS

Operators Manual

www.spellmanhv.com/MPS/faq

FAQ's

www.spellmanhv.com/MPS/dcc

Digital Interface

SPECIFICATIONS

Input Voltage:

+24 Vdc, $\pm 2\text{Vdc}$

Input Current:

≤ 1 amp maximum

Output Voltage:

9 models available from 1kV to 30kV

Output Polarity:

Positive or negative, specify at time of order

Power:

10 watts, maximum

Voltage Regulation:

Line: $\leq 0.001\%$ of rated output voltage over specified input voltage

Load: $\leq 0.001\%$ of rated output voltage for full load change

Current Regulation (VCC Option):

Line: $\leq 0.01\%$ for 1V input voltage change under any load conditions

Load: $\leq 0.01\%$ for full load to short circuit

Ripple:

See "model selection" table

Stability:

$\leq 0.007\%$ per hour, 0.02% per 8 hours after 1.0 hour warm up period.
 $\leq 0.05\%$ per 1000 hours after 1.0 hour warm up period (HS option)

Temperature Coefficient:

$\leq 25\text{ppm}$ per degree C

$\leq 10\text{ppm}$ per degree C (HS option)

Environmental:

Temperature Range:

Operating: 0°C to 50°C

Storage: -35°C to 85°C

Humidity:

20% to 85% RH, non-condensing

Cooling:

Convection cooled

Dimensions:

1-10kV: 1.18" H X 2.75" W X 5.12" D
(30mm x 70mm x 130mm)
15-20kV: 1.18" H X 2.75" W X 6.49" D
(30mm x 70mm x 165mm)
30kV: 1.37" H X 2.95" W X 8.47" D
(65mm x 75mm x 215mm)

Weight:

1-3kV: 9.88 oz. (280g)
5-10kV: 14.82 oz. (420g)
15-20kV: 22.92 oz. (650g)
30kV: 35.51 oz. (950g)

Interface Connector:

15 pin male D connector

Output Connector:

A captive 39.4" (1 meter) long shielded HV cable is provided

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. UL/CUL recognized, File E227588.

**MPS ANALOG INTERFACE—
15 PIN D CONNECTOR (NON-DCC UNITS)**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power/Signal Ground	Ground
2	+24Vdc Input	+24Vdc @ 1 amp maximum
3	Voltage Monitor Output	0 to 10Vdc=0 to 100% Rated Output, Zout =10kΩ
4	Local Programming Potentiometer Wiper Output	Potentiometer connected to +10Vdc and Ground, 0 to 10Vdc adjustable wiper output provided
5	Voltage Program Input	0 to 10Vdc=0 to 100% Rated Output, Zin=10MΩ
6	Voltage Program Differential Amplifier Output	0 to 10Vdc=0 to 100% Rated Output, Zout =10kΩ
7	Voltage Program Differential Amplifier Input—Positive	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of rated output, diode clamped to ground, Zin =38kΩ
8	Current Monitor Output	0 to 10Vdc = 0 to 100% Rated Output, Zout =10kΩ
9	Voltage Program Differential Amplifier Input—Negative	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of Rated Output, diode clamped to ground, Zin =38kΩ
10	No Connection	No Connection
11	Current Program Input	Standard: Internally connected to provide 110% fixed current limit VCC Option: 0 to 10Vdc=0 to 100% Rated Output, Zin=1MΩ
12	Enable Input	Low = Enable, TTL, CMOS, Open Collector Compliant
13	Internal Connection	No Connection
14	Vref (/HS unit only)	+10V ultra high stability reference output. On standard units the reference voltage is available on pin 4
15	Analog Signal Ground (15kV to 20kV units)	Analog Signal Ground (No connection for (1kV to 10kV units)

**MPS ANALOG INTERFACE—
15 PIN D CONNECTOR (DCC UNITS)**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power/Signal Ground	Ground
2	+24Vdc Input	+24Vdc @ 1 amp maximum
3	No Connection	No Connection
4	Local Programming Potentiometer Wiper Output	Potentiometer connected to +10Vdc and Ground, 0 to 10Vdc adjustable wiper output provided
5	No Connection	No Connection
6	No Connection	No Connection
7	No Connection	No Connection
8	No Connection	No Connection
9	No Connection	No Connection
10	No Connection	No Connection
11	No Connection	No Connection
12	Enable Input	Low = Enable, TTL, CMOS, open collector compliant
13	No Connection	No Connection
14	TxD	Transmit data (output) with respect to ground (pin 1)
15	RxD	Receive data (input) with respect to ground (pin 1)

Notes: 1.) The DCC option operated via a simple ASCII protocol.

Contact us for more information.

2.) The HS and DCC option cannot be offered together

MPS SELECTION TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
MPS1*10/24	1kV	10mA	<10mV
MPS2*10/24	2kV	5.00 mA	<20mV
MPS2.5*10/24	2.5kV	4.00 mA	<25mV
MPS3*10/24	3kV	3.3mA	<25mV
MPS5*10/24	5kV	2mA	<30mV
MPS10*10/24	10kV	1mA	<50mV
MPS15*10/24	15kV	0.66mA	<100mV
MPS20*10/24	20kV	0.5mA	<150mV
MPS30*10/24	30kV	0.33mA	<250mV

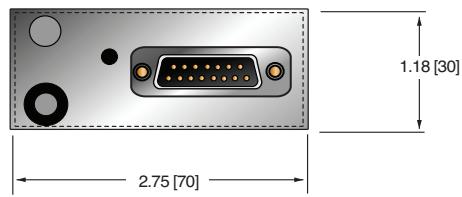
*Specify "P" for positive polarity or "N" for negative polarity.

Custom units available.

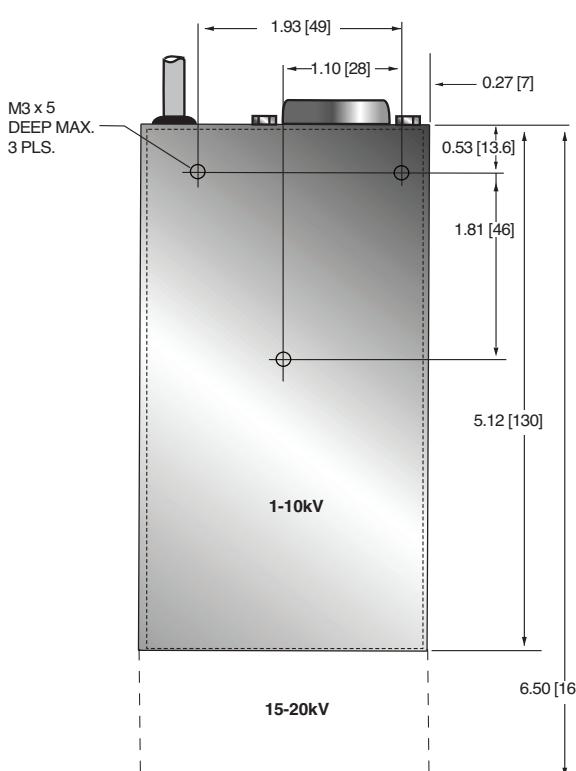
DIMENSIONS: in.[mm]

1-20kV

FRONT VIEW



BOTTOM VIEW

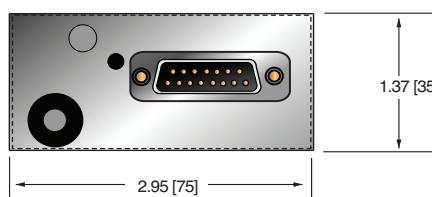


SIDE VIEW

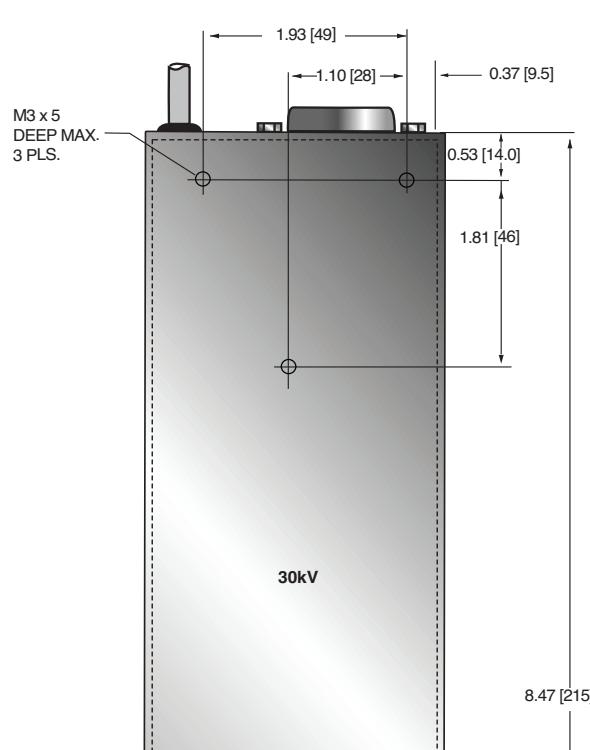


30kV

FRONT VIEW



BOTTOM VIEW



SIDE VIEW





Not Intended For New Designs

- **Modular Bench Top Design Design**
- **Low Ripple and Noise**
- **3.5 Digit Front Panel Digital Metering**
- **Reversible Output Polarity**

www.spellmanhv.com/manuals/230

Spellman's Bertan brand of 230 Series high voltage power supplies provide regulated high voltage outputs from 1 to 30kV. The low noise, linear topology employed results in extremely low output ripple specifications. These 12 to 15W units are inherently reversible by design, providing either positive or negative output polarity. The 230 Series is fully arc and short circuit protected. Excellent regulation specifications are featured along with outstanding stability performance.

TYPICAL APPLICATIONS

HiPot Testing
Electrostatics
General Laboratory Usage

OPTIONS

F Isolated (Floating) Output

SPECIFICATIONS

Input Voltage:

115Vac, ±10%, 50/60Hz @ 0.5A
230Vac, ±10%, 50/60Hz @ 0.25A
Input voltage is switch selectable

Output Voltage:

See "model selection" table

Output Polarity:

All units are reversible polarity by design

Output Current:

See "model selection" table

Voltage Regulation:

Line: ±0.002% of rated output voltage over specified input voltage range

Load: ±0.005% of rated output voltage for a full load change

Current Regulation:

Internally set to limit at less than 125% of rated current.
A rear panel switch allows limiting at 25% of rated full current.

Ripple:

See "model selection" table

Temperature Coefficient:

≤100ppm/°C

Stability:

≤0.01%/hour, 0.02% per 8 hours after a 1/2 hour warm up

Accuracy:

Front panel control: ±(0.2% of setting + 0.2% of maximum)
Front panel Meter: Voltage ±(0.5% of setting + 0.5% of maximum)
Current ±(2% of setting + 0.5% of maximum)
Remote Programming: ±(0.1% of setting + 0.1% of maximum)
Voltage Monitor: ±(0.1% of reading + 0.1% of maximum)
Current Monitor: ±(2% of reading + 1% of maximum)

Front Panel Metering and Controls:

Power ON/OFF switch
3.5 digit metering for voltage and current, switch selectable
Polarity indicator
10 turn locking potentiometer to set output voltage
HV output connector
Ground stud

Operating Temperature

0°C to +50°C

Storage Temperature:

-40°C to +85°C

Humidity:

20% to 85% RH, non-condensing

Input Line Connector:

IEC320 EMI filter/input connector, a detachable line cord is provided

Interface Connector:

9 pin "D" connector, a mating connector is provided

Output Connector:

A detachable 10 foot (3 meter) HV cable is provided for units up to 5kV; 10kV through 20kV: 59" (1.5 meter); 30kV: 10 foot (3 meter)

Cooling:

Convection cooled

Dimensions

7.63" W X 5.03" H X 8.91" D
(194mm X 128mm X 226mm)

Weight:

≤10lbs (4.5kg)

Regulatory Approvals:

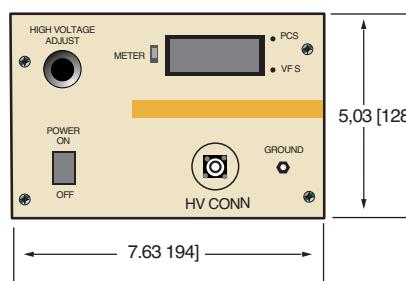
Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

MODEL SELECTION TABLE

230 Series	Voltage	Current	Ripple
230-01R	0 to 1kV	0 to 15mA	10mV
230-03R	0 to 3kV	0 to 5mA	30mV
230-05R	0 to 5kV	0 to 3mA	50mV
230-10R	0 to 10kV	0 to 1.5mA	500mV
230-20R	0 to 20kV	0 to 0.5mA	2V
230-30R	0 to 30kV	0 to 0.4mA	5V

DIMENSIONS: in.[mm]

FRONT VIEW



INTERFACE CONNECTOR

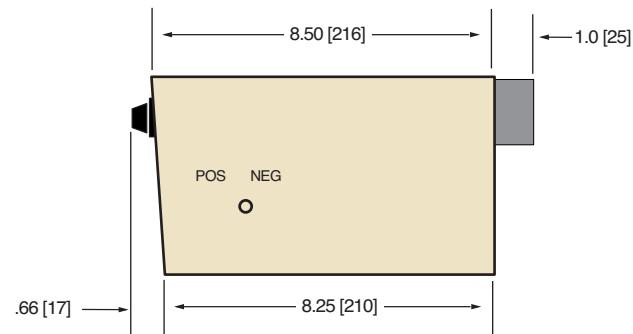
PIN	SIGNAL	PARAMETERS
1	Voltage Monitor	0 to 5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
2	N/C	No Connection
3	Enable	TTL "0" disables HV, TTL "1" or open enables HV
4	+5Vdc Reference	+5.0Vdc @ 10mA, maximum
5	Current Monitor	0 to 5Vdc = 0 to 100% rated current, Zout = 10KΩ
6	Voltage Program Input	0 to 5Vdc = 0 to 100% rated voltage, Zin = 1MΩ
7	Analog Ground	Ground
8	Digital Ground	Ground
9	Polarity Indicator	Open collector, 30V @ 25mA, positive = ON

OPTIONS:

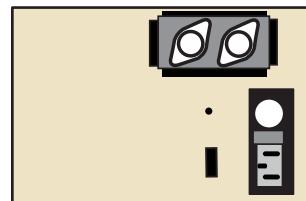
Isolated (Floating) Output-Option F

Units up to and including 5kV can be provided with differential outputs capable of floating up to ±2kV from ground. Voltage programming and monitoring functions are normally referenced to ground. Current monitoring and metering is eliminated. Replace "R" suffix with "F" for this option. Output connectors (positive, negative and ground) for 1kV and 3kV models are 3-way binding posts; 5kV model uses Spellman P/N JAC for positive and negative outputs with 3-way binding post for ground. Mating connectors are Spellman P/N PA (MHV type 1705-14)

SIDE VIEW



BACK VIEW





Spellman's new MPS20W series are a family of high voltage 20 Watt modules that provide output voltages ranging from 1kV to 10kV.

The MPS20W series are high performance products designed with Spellman's hybrid topology of linear and switch mode power conversion techniques delivering lower noise with higher efficiency. The MPS20W series produces excellent ripple and stability performance specifications from a compact footprint. Additionally the MPS20W series features, as standard, a differential amplifier input for the voltage programming signal to improve immunity from external system noise and addressing any offset issues. Alternatively the output voltage may be pre-set by an internal potentiometer. A fully featured remote user interface is provided via 15-pin D-type connector as standard. The output voltage is arc and short circuit protected and the power input has a current limiter fitted.

Spellman's proprietary HV technology coupled with SMT circuitry results in an ultra compact and lightweight module that is available as either a positive or negative supply that is ideal for OEM applications.

TYPICAL APPLICATIONS

Photomultiplier Tubes
Microchannel Plate Detectors
Scintillators
Mass Spectrometry
Electron and Ion Beams
Electrostatic Lenses
Nuclear Instruments
Electrostatic Printing

OPTIONS

VCC Variable Current Control

SPECIFICATIONS

Input Voltage:

+24 Vdc, ± 2 Vdc

Input Current:

≤ 1.5 amps

Output Voltage:

5 models available from 1kV to 10kV

- **Differential Input for Voltage Program**
- **20 Watts Output Power**
- **Voltage and Current Controls**
- **Voltage and Current Monitors**
- **High Stability**
- **Ultra Low Ripple and Noise**
- **High Voltage Enable Control**

www.spellmanhv.com/manuals/MPS20W

Output Polarity:

Positive or negative, specify at time of order

Power:

≤ 20 watts

Voltage Regulation:

Line: $\leq 0.001\%$ of rated output voltage over specified input voltage

Load: $\leq 0.001\%$ of rated output voltage for full load change

Current Regulation (Vcc Option):

Line: $\leq 0.01\%$ for 1V input voltage change under any load conditions

Load: $\leq 0.001\%$ for 0 to full load

Ripple:

See "model selection" table

Stability:

$\leq 0.01\%$ per hour, 0.02% per 8 hours after 1.0 hour warm up period.

Temperature Coefficient:

≤ 25 ppm per degree C

Environmental:

Temperature Range:

Operating: 0°C to 50°C

Storage: -35°C to 85°C

Humidity:

20% to 85% RH, non-condensing

Cooling:

Convection cooled

Dimensions:

1.31" H X 3.74" W X 5.91" D (33.5mm x 95mm x 150mm)

Weight:

1-2kV: 15.17 oz. (430g)

3-10kV: 25.76 oz. (730g)

Interface Connector:

15 pin male D connector

Output Connector:

A captive 39.4" (1 meter) long shielded HV cable is provided

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

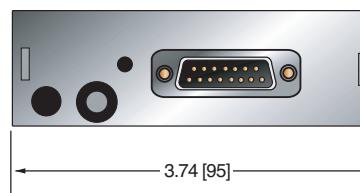
MPS20W SELECTION TABLE

Model	Output Voltage	Output Current	Ripple (Vpp)
MPS1*20/24	0-1kV	20mA	<25mV
MPS2*20/24	0-2kV	10 mA	<50mV
MPS3*20/24	0-3kV	6.67mA	<75mV
MPS5*20/24	0-5kV	4mA	<125mV
MPS10*20/24	0-10kV	2mA	<250mV

*Specify "P" for positive polarity or "N" for negative polarity.
Custom units available.

DIMENSIONS: in.[mm]

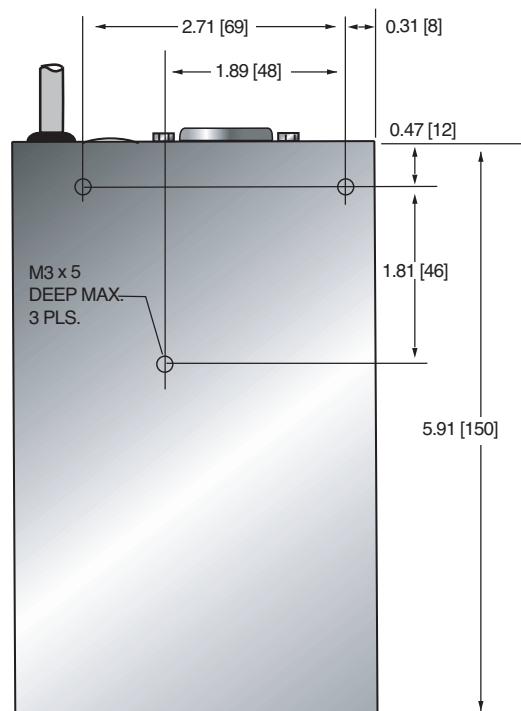
FRONT VIEW



MPS20W ANALOG INTERFACE— 15 PIN D CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power/Signal Ground	Ground
2	+24Vdc Input	+24Vdc @ 1.5 amp maximum
3	Voltage Monitor Output	0 to 10Vdc=0 to 100% Rated Output, Zout =2.2kΩ
4	Local Programming Potentiometer Wiper Output	Potentiometer connected to +10Vdc and Ground, 0 to 10Vdc adjustable wiper output provided
5	Voltage Program Input	0 to 10Vdc=0 to 100% Rated Output, Zin=10MΩ
6	Voltage Program Differential Amplifier Output	0 to 10Vdc=0 to 100% Rated Output, Zout =2.2kΩ
7	Voltage Program Differential Amplifier Input—Positive	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of rated output, diode clamped to ground, Zin =38kΩ
8	Current Monitor Output	0 to 10Vdc = 0 to 100% Rated Output, Zout =2.2kΩ
9	Voltage Program Differential Amplifier Input—Negative	0 to 10Vdc differential between pin 7 and pin 9 = 0 to 100% of Rated Output, diode clamped to ground, Zin =38kΩ
10	No Connection	No Connection
11	Current Program Input	Standard: Internally connected to provide 110% fixed current limit VCC Option: 0 to 10Vdc=0 to 100% Rated Output, Zin=1MΩ
12	Enable Input	Low = Enable, TTL, CMOS, Open Collector Compliant
13	Internal Connection	No Connection
14	No Connection	No Connection
15	Analog Signal Ground	Analog Signal Ground

BOTTOM VIEW



SIDE VIEW



CE



The EPM series of high voltage power supplies provides very well regulated, low ripple high voltage in a highly efficient, compact design.

The dramatically reduced size of this module series is obtained by a state of the art off-line resonant converter. The resonant converter utilizes a unique control scheme, which allows constant frequency operation while maintaining high efficiency. The high switching frequency allows for very low ripple and excellent dynamic response capabilities.

The output voltage and current are controllable over the full range of operation. Voltage and current programming and monitoring signals are all 0-10Vdc where corresponds to 0 to 100% rated output. A High Voltage Inhibit/Enable signal allows for simple on/off control of the power supply.

TYPICAL APPLICATIONS

Electrophoresis	Photomultipliers
Electron Beam	Laboratory Applications
Ion Source	Electrospinning

- **Compact Package**
- **Voltage and Current Programming from Zero to Rated Output**
- **Test Points for Output Current and Voltage**
- **Control of Output Via Enable/Inhibit Signal**
- **OEM Customization Available**

www.spellmanhv.com/manuals/EPM

SPECIFICATIONS

Input:

+24Vdc ±10%

Output:

8 models from 1kV to 30kV. Each model is available in positive or negative polarity output.

Voltage Regulation:

Load: 0.02% of output voltage for a full load change.
Line: 0.01% for ±10% change in input voltage.

Current Regulation:

Load: 0.01% of output current from 0 to rated voltage.
Line: 0.01% of rated current over specified input range.

Ripple:

0.1% p-p of maximum rated output voltage.

Dimensions:

2.06" H x 5.63" W x 5.69" D
(52.32mm x 143mm x 144.53mm)

Weight:

2.2 pounds (1kg)

Input Connector:

9 pin AMP Metri-Mate. Mating connector and pins supplied.

Output Cable:

18" ±1" (457mm) of UL® listed high voltage wire.

Voltage Stability:

0.02% per 8 hours (after 1/2 hour warm-up).

Voltage Temperature Coefficient:

0.01% per °C.

Voltage Test Point:

10Vdc ±2% = maximum rated output.

Current Test Point:

10Vdc ±2% = maximum rated output.

Remote Enable:

3.4Vdc = HV ON.
1.0Vdc or open = HV OFF.

Regulatory Approvals:

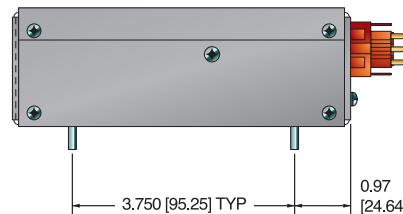
Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

EPM SELECTION TABLE

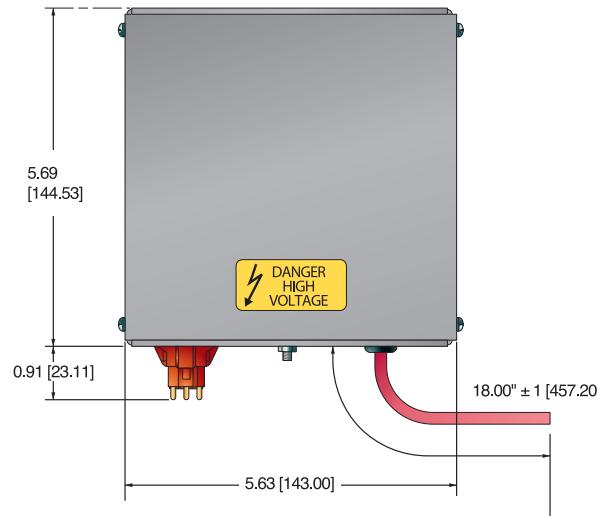
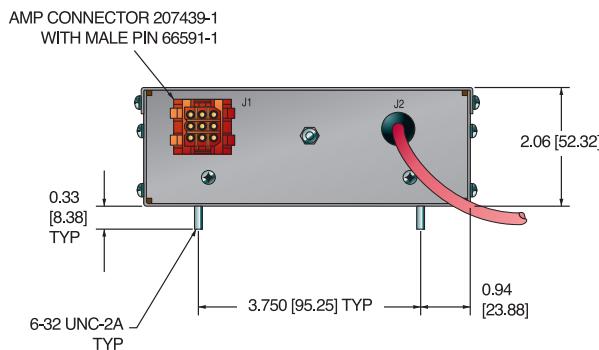
Maximum Rating kV	mA	Model Number
1	30	EPM 1*30
3	10	EPM 3*30
5	6	EPM 5*30
10	3	EPM 10*30
15	2	EPM 15*30
20	1.5	EPM 20*30
25	1.2	EPM 25*30
30	1	EPM 30*30

*Specify "P" for positive polarity or "N" for negative polarity.

DIMENSIONS: in.[mm]

SIDE VIEW

CONNECTOR 9 PIN

PIN	SIGNAL	PARAMETERS
1	Power Ground	Power Ground
2	+24Vdc	+24Vdc @ 1.85 amps, maximum
3	High Voltage Enable/Inhibit	0Vdc = HV OFF, +5Vdc = HV ON (see manual for details)
4	Voltage Test Point	0 to 10Vdc = 0 to 100% rated output, Zout = 10kΩ
5	Current Test Point	0 to 10Vdc = 0 to 100% rated output, Zout = 10kΩ
6	Voltage Programming	0 to 10Vdc = 0 to 100% rated output, Zin = 10MΩ
7	Current Programming	0 to 10Vdc = 0 to 100% rated output, Zin = 10MΩ
8	+10Vdc Reference	+10Vdc @ 1mA maximum
9	Signal Ground	Signal Ground

TOP VIEW

FRONT VIEW




The V6 Series is a family of regulated, fixed output polarity modular high voltage power supplies which provide exceptional performance and value in many applications.

The V6 Series units are fully enclosed and designed for system or bench top operation. A wide range of output voltages, up to 30kV is available.

The output voltage is controlled locally by an internal multi-turn potentiometer. Remote analog voltage or resistance programming capability is included in all models. Analog monitor outputs are also included for remote monitoring of both the high voltage and current outputs.

TYPICAL APPLICATIONS

- Spectrometers
- CRT Testing
- Detectors
- E Beam Systems
- General Laboratory Usage

OPTIONS

RS RS-232 Interface (analog control not included)

SPECIFICATIONS

Input Voltage:

AC Model: 100-240Vac, $\pm 10\%$; 50/60 Hertz; 1 amp
DC Model: 24Vdc $\pm 10\%$, 2 Amps

Voltage Regulation:

Line: $\pm 0.001\%$ of maximum 90-240Vac input line change
 $\pm 0.001\%$ of maximum $\pm 10\%$ Vdc input line change

Load: $\pm 0.002\%$ of maximum for 0 to maximum rated output current change

Current Regulation:

Line: $\pm 0.05\%$ of maximum current for 90-240Vac input line change
0.05% of maximum current for $\pm 10\%$ Vdc input change

Load: 0.1% of maximum current for 0 to maximum rated output voltage change

Ripple:

See "model selection" table

- **Compact Models up to 30kV**
- **High Stability**
- **Low Ripple and Noise**
- **Analog Control (Remote/Local)**
- **RS-232 Control (Digital Only)**
- **Voltage and Current Monitoring**
- **Arc and Short Circuit Protected**
- **OEM Customization Available**

www.spellmanhv.com/manuals/V6

Temperature Coefficient:

$\leq 50\text{ppm}/^\circ\text{C}$

Stability:

$\leq 0.01\%/\text{hour}, 0.02\% \text{ per 8 hours after a 1/2 hour warm up}$

Operating Temperature:

$0^\circ\text{C} \text{ to } +50^\circ\text{C}$

Storage Temperature:

$-40^\circ\text{C} \text{ to } +85^\circ\text{C}$

Humidity:

20% to 85%RH, non-condensing

Local Control:

Internal multi-turn potentiometer for 0 to maximum output voltage ($\pm 0.2\%$)

Remote Programming:

0 to +5Vdc analog input signal proportional to 0 to maximum rated output. Accuracy is $\pm(0.1\% \text{ of setting} + 0.1\% \text{ of maximum})$. The programming input impedance is 20 megohms.

Voltage Monitor:

0 to +5V proportional to 0 to maximum output voltage. Accuracy is $\pm(0.1\% \text{ of reading} + 0.1\% \text{ of maximum})$. The monitor impedance is 10 kilohms.

Current Monitor:

0 to +5V proportional to 0 to maximum output voltage. Accuracy is $\pm(2.0\% \text{ of reading} + 1.0\% \text{ of maximum})$. The monitor impedance is 10 kilohms.

Enable:

Remote interlock enables (low) disables internally (high) the high voltage output. Signal is normally high and supply will default to a disabled condition.

Current Limit:

All units provide short circuit current limiting to less than 110% of the maximum rated output current. Supply is self restoring upon removal of cause limit condition.

Arc/Short Circuit:

Short circuit and arc protected; self restoring.

Cooling:

Convection cooled

Output Connector:

Models up to and including 5kV use a Spellman P/N JAC high voltage connector. The required mating connector is a Spellman P/N 105808-384, which is provided. The 10kV through 30kV units use a Spellman P/N JGP high voltage connector (Alden 8101). All 10 through 30kV units are provided with mating connectors assembled to 2.0 meters of high voltage cable.

Dimensions:

AC Model: 3.05" W X 5.1" H X 7.06" D
(77mm X 132mm X 179mm)

DC Model: 2.32" W X 5.1" H X 7.06" D
(59mm X 132mm X 179mm)

Weight:

AC Model: 4.5 pounds (2.0kg)

DC Model: 3.75 pounds (1.7kg)

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. RoHS compliant.

**V6A ANALOG/DIGITAL INTERFACE—
J1 15 PIN FEMALE D CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Local Voltage Program	Multi-turn front panel potentiometer
2	TX Out (optional)	RS232 Receive Data
3	RX In (optional)	RS232 Transmit Data
4	Voltage Program Input	0 to 5V=0 to 100% Rated Output, Zin=20MΩ
5	Signal Ground	RS232 Ground (optional)
6	Signal Ground	Ground
7	+5V Reference Out	+5V @ 1mA Max.
8	HV Enable Input	Active Low to Enable the HV
9	Current Program Input	0 to 5V=0 to 100% Rated Output, Zin=20MΩ
10	Current Monitor	0 to 5V=0 to 100% Rated Output, Zout=10kΩ
11	Voltage Monitor	0 to 5V=0 to 100% Rated Output, Zout=10kΩ
12	HV Enable Output	Active Low HV is Enabled
13	Signal Ground	Ground
14	N/C	No Connection
15	N/C	No Connection

**V6D ANALOG/DIGITAL INTERFACE—
J1 15 PIN FEMALE D CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Local Voltage Program	Multi-turn front panel potentiometer
2	TX Out (optional)	RS232 Receive Data
3	RX In (optional)	RS232 Transmit Data
4	Voltage Program Input	0 to 5V=0 to 100% Rated Output, Zin=20MΩ
5	Signal Ground	RS232 Ground (optional)
6	Signal Ground	Ground
7	+5V Reference Out	+5V @ 1mA Max.
8	HV Enable Input	Active Low to Enable the HV
9	Current Program Input	0 to 5V=0 to 100% Rated Output, Zin=20MΩ
10	Current Monitor	0 to 5V=0 to 100% Rated Output, Zout=10kΩ
11	Voltage Monitor	0 to 5V=0 to 100% Rated Output, Zout=10kΩ
12	HV Enable Output	Active Low HV is Enabled
13	+24V Return	Input Voltage Return
14	+24Vdc Input	Input Voltage 24V±10%, 2A
15	+24Vdc Input	Input Voltage 24V±10%, 2A

V6A MODEL SELECTION TABLE

V6 AC Series	Voltage	Current	Ripple
V6A1*30	0 to 1kV	0 to 30mA	15mV
V6A1.5*30	0 to 1.5kV	0 to 20mA	15mV
V6A3*30	0 to 3kV	0 to 10mA	30mV
V6A5*30	0 to 5kV	0 to 6mA	50mV
V6A10*30	0 to 10kV	0 to 3mA	200mV
V6A15*30	0 to 15kV	0 to 2mA	450mV
V6A20*30	0 to 20kV	0 to 1.5mA	800mV
V6A30*30	0 to 30kV	0 to 1mA	1.8 volts

*Specify "P" for positive polarity or "N" for negative polarity

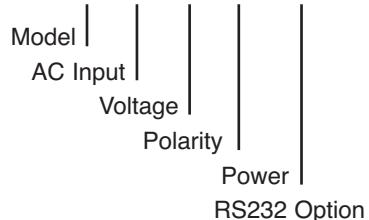
V6D MODEL SELECTION TABLE

V6 DC Series	Voltage	Current	Ripple
V6D1*30	0 to 1kV	0 to 30mA	15mV
V6D1.5*30	0 to 1.5kV	0 to 20mA	15mV
V6D3*30	0 to 3kV	0 to 10mA	30mV
V6D5*30	0 to 5kV	0 to 6mA	50mV
V6D10*30	0 to 10kV	0 to 3mA	200mV
V6D15*30	0 to 15kV	0 to 2mA	450mV
V6D20*30	0 to 20kV	0 to 1.5mA	800mV
V6D30*30	0 to 30kV	0 to 1mA	1.8 volts

*Specify "P" for positive polarity or "N" for negative polarity

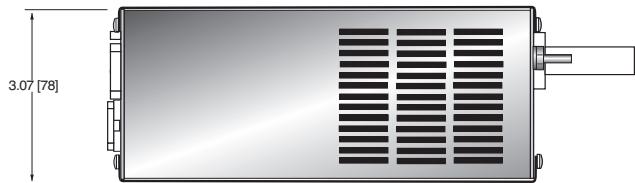
ORDERING EXAMPLE

V6 A 15 P 30 RS



V6-AC

TOP VIEW



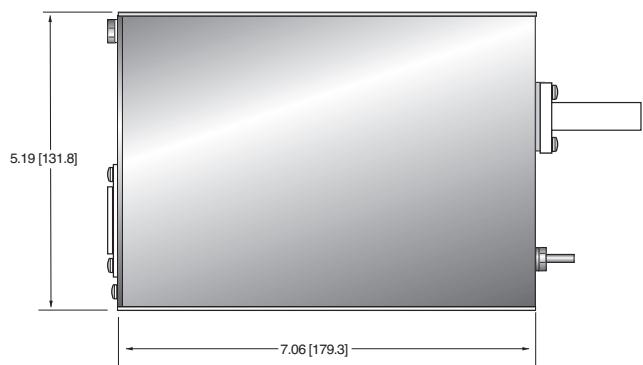
DIMENSIONS: in.[mm]

V6-DC

TOP VIEW



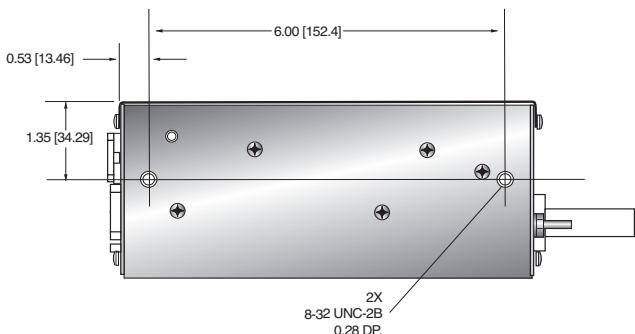
SIDE VIEW



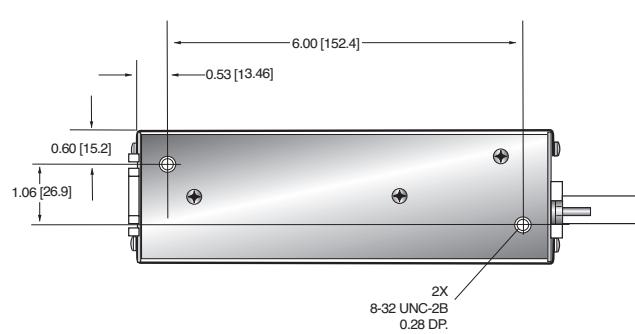
SIDE VIEW



BOTTOM VIEW



BOTTOM VIEW



FRONT VIEW



BACK VIEW

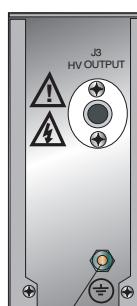


8-32 UNC-2A
GRND STUD

FRONT VIEW



BACK VIEW



8-32 UNC-2A
GRND STUD





Spellman's SMS Series of 60 watt high voltage power supplies are based on a proprietary resonant fly back power conversion topology that provides over 80% efficiency. These fixed polarity modules (specify positive or negative at time of order) feature both voltage and current regulation with automatic crossover, making them ideal for sensitive load applications. The robust design of SMS Series along with comprehensive arc and short circuit protection allow operation in the most demanding environments.

TYPICAL APPLICATIONS

- Electrospinning
- Hipot Testing
- Detector Arrays
- Electrophoresis
- Cable Testing

- **Output Voltages from 1kV to 60kV**
- **Arc and Short Circuit Protected**
- **Low Stored Energy**
- **Test Points for Output Current and Voltage**
- **Enable/Inhibit Control of Output**
- **OEM Customization Available**

www.spellmanhv.com/manuals/SMS

SPECIFICATIONS

- Input:** +24Vdc ±10%
- Output:** 10 models from 1kV to 60kV. Positive or negative polarity outputs.
- Efficiency:** 80 to 85%, typical
- Voltage Regulation:** Load: 0.01% of output voltage no load to full load.
Line: ±0.01% for ±10% change in input voltage.
- Current Regulation:** Load: 0.1% of output current from 0 to rated voltage.
Line: 0.05% of rated current over specified input range.
- Stability:** 0.02% per 8 hours.
- Temperature Coefficient:** 0.01% per °C, voltage or current regulated.
- Ripple:** 0.1% p-p of maximum output voltage.
- Environmental:**
Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
0 to 90%, non-condensing
- Dimensions:** 3'H x 5'W x 9'D (7.6cm x 12.7cm x 23.0cm).
- Weight:** 5.25 pounds (2.38kg)
- Input Connector:** 12 pin AMP Metri-Mate (mating connector and pins provided)
- Output Cable:** 18"±1"(45.7cm) of UL® approved high voltage wire
- Front Panel Ground Connection:** Threaded 8-32 ground stud, nut provided
- Regulatory Approvals:** Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive; Installation Category II. RoHS compliant.

SMS SELECTION TABLE

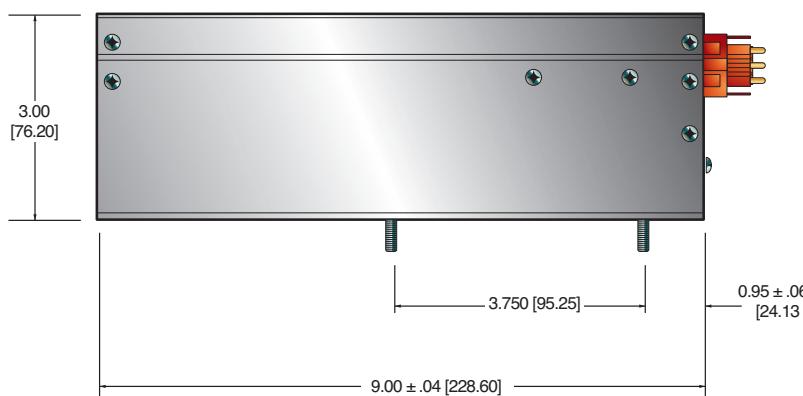
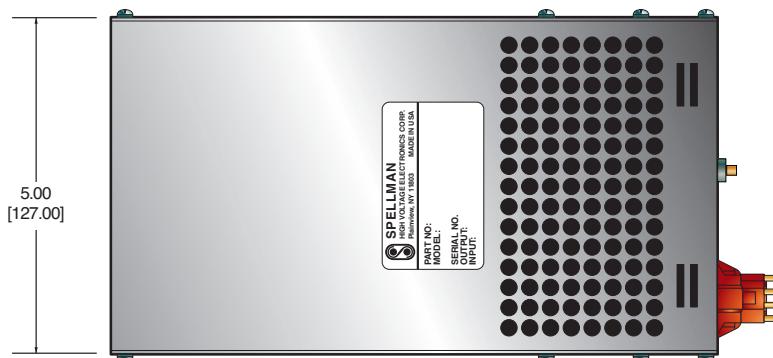
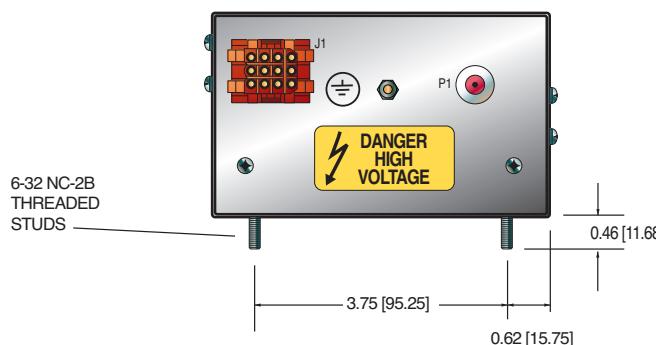
Maximum Rating kV	mA	Model Number
1	60	SMS 1*60
3	20	SMS 3*60
5	12	SMS 5*60
10	6	SMS 10*60
15	4	SMS 15*60
20	3	SMS 20*60
30	2	SMS 30*60
40	1.5	SMS 40*60
50	1.2	SMS 50*60
60	1.0	SMS 60*60

*Specify "P" for positive polarity or "N" for negative polarity.

CONNECTOR 12 PIN

PIN	SIGNAL	PARAMETERS
1	Power Ground	+24Vdc Return
2	+24Vdc Input	+24Vdc @ 3.5 amps, maximum
3	High Voltage Enable/Inhibit	Open = HV OFF, Ground = HV ON
4	Voltage Test Point	0 to 10Vdc = 0 to 100% of rated output
5	Current Test Point	0 to 10Vdc = 0 to 100% of rated output
6	Voltage Programming	0 to 10Vdc = 0 to 100% of rated output
7	Current Programming	0 to 10Vdc = 0 to 100% of rated output
8	+10Vdc Reference	+10Vdc @ 1mA maximum
9	Signal Ground	Signal Ground
10	Spare	No Connection
11	Spare	No Connection
12	Spare	No Connection

DIMENSIONS: in.[mm]

SIDE VIEW

TOP VIEW

BACK VIEW




- **5 Voltage Ranges from 8kV to 20kV, Fixed Negative or Positive Polarity**
- **Available Output Power Increments of 60 and 125 Watts**
- **Voltage/Current Regulation with Automatic Crossover Control**
- **Voltage and Current Monitor Signals**
- **Fully Arc and Short Circuit Protected**
- **UL Recognized**
- **CE Listed and RoHS Compliant**

www.spellmanhv.com/manuals/UMW

Form, Fit and Function Usability:

Spellman's UMW Series of high voltage modules provides users with a form, fit and function replacement for presently available commercially made units, while providing superior features and benefits at competitive pricing. Utilizing proprietary power conversion technology, unique high voltage packaging, and Spellman's unmatched encapsulation techniques, these SMT based high voltage modules provide improved performance and easier system integration at a lower cost when compared to the competition.

Advanced Power Conversion Topology:

UMW converters use a proprietary resonant power conversion topology providing exceptional efficiency and inherent low noise and ripple outputs. Radiated emissions are dramatically reduced compared to conventional switching topologies, effectively minimizing or even eliminating the need to shield the unit from adjacent circuitry.

The high voltage output is generated through the use of a ferrite core high voltage step up transformer which feeds the high voltage output circuitry. Units utilize an appropriate arrangement of low capacitance Cockcroft-Walton voltage multiplier stages to obtain the specified high voltage output.

Due to the fixed, high frequency conversion rate of the converter, the output capacitance is small resulting in minimal stored energy and fast rise times. Through the use of generously rated surge limiting resistors and a fast acting current loop, all units are fully arc and short circuit protected.

Control and Regulation:

The actual output voltage generated is sampled via a high impedance divider to create a voltage feedback signal. A current feedback signal is created via a current sense resistor being placed in the low end return of the high voltage output circuitry. These two accurate ground referenced feedback signals are used to precisely regulate and control the units output. These accurate and calibrated signals are also used for external monitoring purposes.

Due to the UMW's unique converter topology it can provide full current into low impedance loads or even a short circuit. Standard units limit at 103% of maximum rated output current.

Standard User Interface:

The Spellman UMW Series offers a standard customer interface that provides current programming capability and positive polarity, buffered, low output impedance voltage and current monitor signals (0 to +4.64Vdc equals 0 to full scale rated). A voltage programming input is provided where 0 to +4.64Vdc equals 0 to 100% of rated voltage.

Current programmability allows the user to set where the unit will current limit, anywhere from 0 to 100% of maximum rated current. This feature is beneficial where less than full output current is desired, like in the case of protecting a sensitive load.

The buffered low impedance voltage and current monitor signals can drive external circuitry directly, while minimizing loading and pickup effects. These feature save the user the expense and implementation of external interface buffering circuitry while improving overall signal integrity.

Mechanical and Environmental Considerations:

The UMW Series are modular sheet metal enclosed converters measuring 8.00" X 4.50" X 1.075" (203mm X 114mm X 27mm). All units are encapsulated using a propriety silicon based potting material which is considerably lighter in weight than epoxy encapsulation techniques. Physical mounting of the unit is accomplished via the use of bottom mounted studs or threaded blind inserts, dependent upon model ordered.

SPECIFICATIONS**Input Voltage:**

24Vdc

Normal Voltage Range:

23Vdc to 30Vdc

Derated Voltage Range:

11Vdc to 30Vdc

Input Current: (typical)

Disabled:	<40mA
No load:	<600mA
Full load:	
60 watt units:	3 amps
125 watt units:	6.2 amps

Voltage Regulation:Line: <0.01%
Load: <0.01%**Current Regulation:**Line: <0.01%
Load: <0.01%**Stability:**0.01% per 8 hours, 0.02% per day
after 30 min. warmup**Accuracy:**2% on all programming and monitoring,
except I Sense 10%**Temperature Coefficient: (typical)**

100ppm/°C

Overshoot:

<0.1% Vp

Environmental:Temperature Range:
Operating: -0°C to 65°C case temperature
Storage: -55°C to 85°C, non operational
Humidity:
10% to 90%, non-condensing**Dimensions:**8.00" L X 4.50" W X 1.075" H
(203mm X 114mm X 27mm)**Weight:**

1.75 lbs. (0.79kg)

Regulatory Approvals:Compliant to 2004/108/EC, the EMC Directive and
2006/95/EC, the Low Voltage Directive. RoHS compliant,
UL/CUL recognized, File E227588, Volume X1-A21**UMW 60W SELECTION TABLE**

Model Number	Output V	Output Current	Ripple(max) %Vp-p	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal
UMW8*60	0 to 8kV	7.5mA	<1.0 (C load ≥0.05μF)	3553pF	14.1kΩ	1.6V
UMW10*60	0 to 10kV	6mA	<1.0 (C load ≥0.05μF)	3553pF	14.1kΩ	1.47V
UMW12*60	0 to 12kV	5mA	<1.0 (C load ≥0.05μF)	2870pF	30kΩ	1.24V
UMW15*60	0 to 15kV	4mA	<1.0 (C load ≥0.05μF)	2460pF	30kΩ	1.0V
UMW20*60	0 to 20kV	3mA	<1.0 (C load ≥0.01μF)	2460pF	45kΩ	4.61V

UMW 125W SELECTION TABLE

Model Number	Output V	Output Current	Ripple(max) %Vp-p	Output Capacitance	Arc Limiting Resistance	I Sense Scaling Full Scale Signal
UMW8*125	0 to 8kV	15.5mA	<1.0 (C load ≥0.05μF)	7106pF	3kΩ	1.1V
UMW10*125	0 to 10kV	12.5mA	<1.0 (C load ≥0.05μF)	7106pF	3kΩ	1.15V
UMW12*125	0 to 12kV	10.5mA	<1.0 (C load ≥0.05μF)	5740pF	6.6kΩ	1.40V
UMW15*125	0 to 15kV	8.3mA	<1.0 (C load ≥0.05μF)	4920pF	6.6kΩ	1.1V
UMW20*125	0 to 20kV	6.25mA	<1.0 (C load ≥0.01μF)	4920pF	14.1kΩ	9.57V

Grayed text indicates Legacy interface signals.

ORDERING INFORMATION

Voltage	0 to 8kV	8
	0 to 10kV	10
	0 to 12kV	12
	0 to 15kV	15
	0 to 20kV	20
Polarity	Positive	P
	Negative	N
Power	60Watts	60
	125Watts	125
Legacy Interface	Legacy Interface	L

If a high voltage mating connector is required it should be included at time of order. See page 3 for details

ORDERING EXAMPLE

UMW15P125/L

Model | Voltage | Polarity | Power | Option

STANDARD INTERFACE

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+24Vdc power ground return
2	+ Power Input	+24Vdc power input
3	I Sense	See I Sense text and tables for details
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
5	Signal Ground	Signal Ground
6	Remote V Adjust	0 to +4.64Vdc = 0 to 100%, Zin >1MΩ
7	+5V Reference Output	+5Vdc ±2%. Zout = 475Ω
8	Power Ground Return	+24Vdc Power Ground Return
9	+ Power Input	+24Vdc Power Input
10	Signature Resistor	Unique identifying resistor connected to ground
11	Remote I Adjust	0 to +4.64Vdc = 0 to 100%, Zin >1MΩ Leave open for preset current limit @103% of rated output current
12	I Monitor	0 to +5Vdc = 0 to 107.5%, Zout <10kΩ
13	V Monitor	0 to +5Vdc = 0 to 107.5%, Zout <10kΩ
14	E Out Monitor	1.00 Volt, 1GΩ/1.1MΩ divider with 10MΩ meter

LEGACY INTERFACE (L OPTION)

PIN	SIGNAL	PARAMETERS
1	Power Ground Return	+24Vdc power ground return
2	+ Power Input	+24Vdc power input
3	I Sense	See I Sense text and tables for details
4	Enable Input	Low (<0.7V, Isink@1mA)=HV OFF, High (open or >2V)=HV ON
5	Signal Ground	Signal Ground
6	Remote Adjust	Positive Polarity Unit: 0 to +4.64Vdc = 0 to 100% rated voltage Zin>1MΩ Negative Polarity Unit: +5Vdc to 0.36Vdc = 0 to 100% rated voltage Zin>1MΩ
7	+5V Reference Output	+5Vdc ±2%. Zout = 475Ω
8	Power Ground Return	+24Vdc Power Ground Return
9	+ Power Input	+24Vdc Power Input
10	Signature Resistor	Unique identifying resistor connected to ground
11	N/C	
12	N/C	
13	N/C	
14	E Out Monitor	1.00 volt/kV, 1GΩ/1.1MΩ divider with 10MΩ meter

HIGH VOLTAGE MATING CONNECTOR

KV	CONNECTOR
8	LGH1 SHV P.N. 304781-001
10	
12	
15	
20	LGH1L SHV P.N. 304781-101

Interface Connections

Fourteen (14) gold plated 0.025" (0.63mm) square pins that will mate with AMP Mod-U connectors. See mechanical drawing for location and spacing details.

Programming and Monitor Signals

Voltage and current programming is done via positive polarity, high input impedance, 0 to 4.64Vdc signals. Voltage and current monitors are positive polarity, buffered low output impedance 0 to 4.64Vdc signals.

Signature Resistor

A unique identifying signature resistor for each type of unit is connected from Pin 10 to Ground. Details if desired are available upon request.

I Sense Signal

The polarity of the current monitor signal is opposite of the polarity of the output voltage of the unit that generated it. So a positive output polarity unit creates a negative polarity current monitor signal; while a negative output polarity unit creates a positive polarity current monitoring signal. This signal is clamped to ground internally via a bidirectional 18 volt transient protection device and the signal is made available via a series connected 47kΩ isolation resistor. Internal HV dividers create a small, linear offset voltage on this current monitor signal that can be compensated for.

Low Voltage Interface Connector

A mating AMP Mod-U interface connector will be provided.

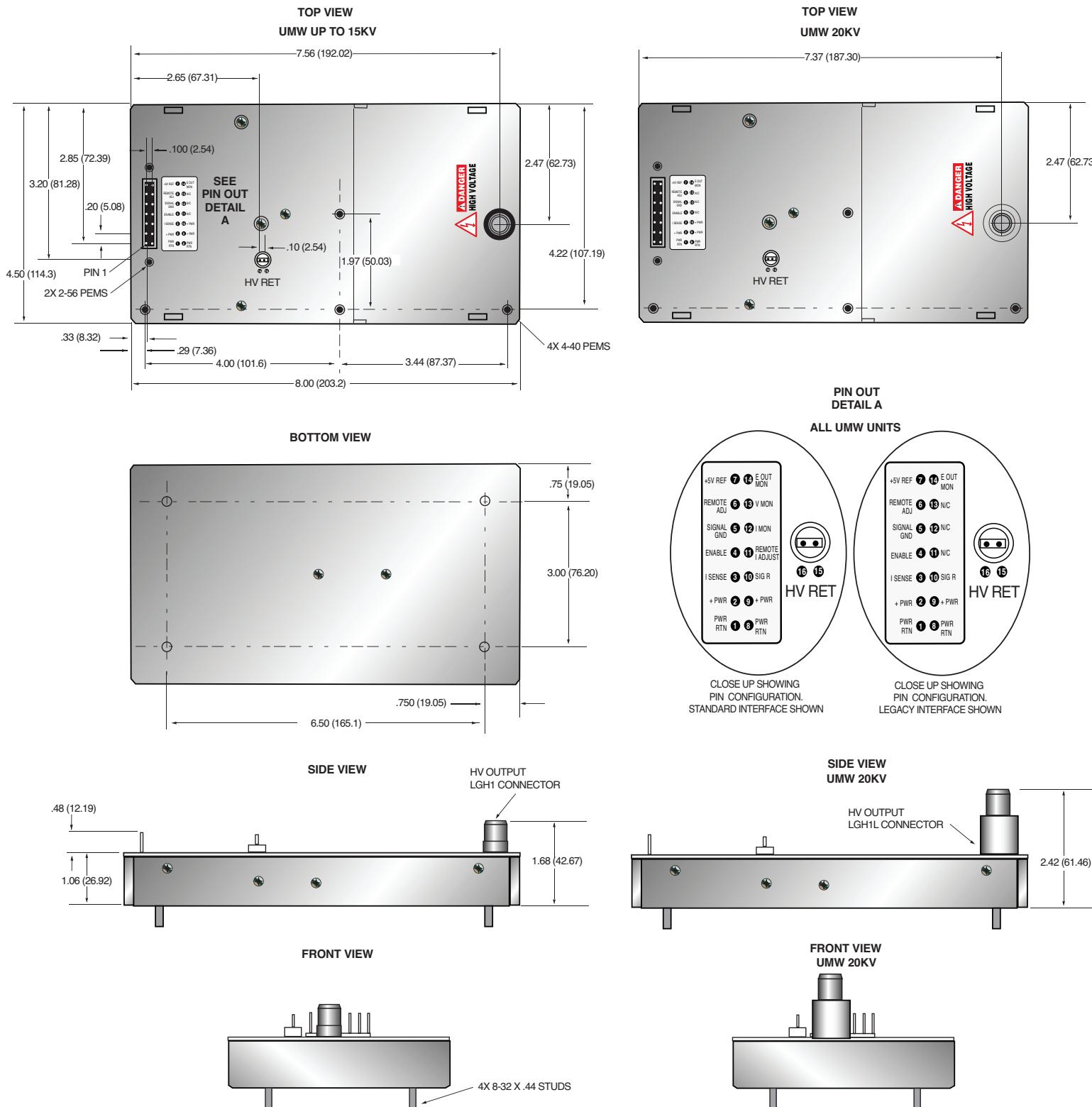
High Voltage Output Mating Connector

An appropriate mating LGH high voltage connector (36" long) will be required. Please see table to left for specific part number.

High Voltage Return

Two gold plated 0.025" (0.63mm) square pins (15 and 16) are provided. These are connected to Power Ground Return.

DIMENSIONS: in.[mm]





Spellman's AC input PCM Series of 120 watt high voltage power supply modules feature a power factor corrected front end, providing 0.99 power factor along with universal input voltage (85Vac to 265Vac) capabilities. These fixed polarity modules (specify positive or negative at time of order) feature both voltage and current regulation with automatic crossover, making them ideal for sensitive load applications. The robust design of PCM Series along with comprehensive arc and short circuit protection allow operation in the most demanding environments.

TYPICAL APPLICATIONS

- Electrospinning
- Hipot Testing
- Detector Arrays
- Electrophoresis
- Cable Testing

SPECIFICATIONS

Input:

85-265Vac, 47-63Hz, power factor corrected.
UL® rated for 85-250Vac input for 1kV to 5kV models.

Power Factor (Typical):

FL: 0.99
NL: 0.98

Efficiency:

80 to 85%, typical

Output:

11 models from 1kV to 70kV. Positive or negative polarity outputs, specify at time of order.

Voltage Regulation:

Load: 0.01% of output voltage, no load to full load.
Line: ±0.01% for ±10% change in input voltage.

Current Regulation:

Load: 0.01% of output current from 0 to rated voltage.
Line: 0.01% of rated current over specified input range.

- **Output Voltages from 1kV to 70kV**
- **Arc and Short Circuit Protected**
- **Low Stored Energy**
- **Test Point for Output Current and Voltage**
- **Enable/Inhibit Control of Output**
- **Safety Interlock Circuit**
- **OEM Customization Available**

www.spellmanhv.com/manuals/PCM

Ripple:

0.1% p-p of maximum output voltage.

Voltage Stability:

0.02% per 8 hours.

Temperature Coefficient:

100ppm per °C, voltage or current regulated.

Environmental:

Operational: 0 to 40°C
Storage: -40°C to +85°C
Humidity: 0 to 90%, non-condensing

Dimensions:

1kV to 50kV:	3.65"H x 5"W x 9"D (9.27cm x 12.7cm x 22.9cm).
60, 70kV:	3.65"H x 5"W x 11"D (9.27cm x 12.7cm x 27.9cm).

Weight:

7 pounds (3.18kg)

AC Input Connectors:

IEC320 with mating cable.

Interface Connector:

15 pin D connector.

HV Output Cable:

Spellman Delrin type connector with 36"
(91.4cm) shielded cable.

Front Panel Ground Connection:

Threaded 8-32 ground stud

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive
and 2006/95/EC, the Low Voltage Directive.
RoHS compliant, UL/CUL recognized, File E148969
(up to 60kV only).

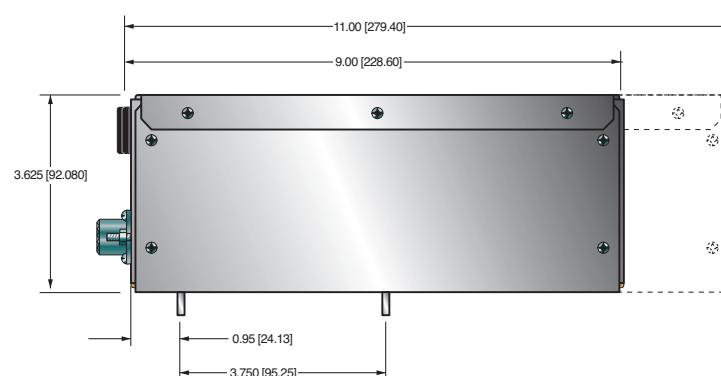
PCM SELECTION TABLE

Maximum Rating kV	mA	Model Number
1	120	PCM 1*120
3	40	PCM 3*120
5	24	PCM 5*120
10	12	PCM 10*120
15	8	PCM 15*120
20	6	PCM 20*120
30	4	PCM 30*120
40	3	PCM 40*120
50	2.4	PCM 50*120
60	2.0	PCM 60*120
70	1.7	PCM 70*120

*Specify "P" for positive polarity or "N" for negative polarity.

DIMENSIONS: in.[mm]

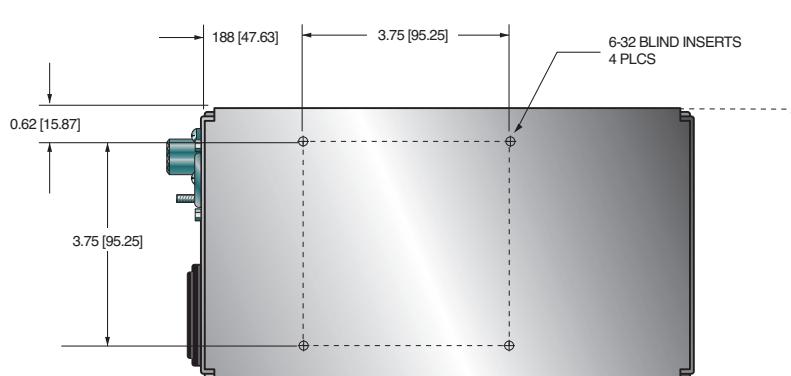
SIDE VIEW



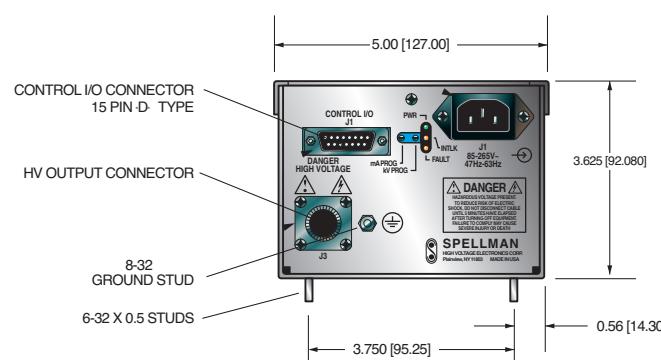
PCM D CONNECTOR 15 PIN

PIN	SIGNAL	PARAMETERS
1	Remote mA Program	0 to 10Vdc = 0 to 100% of rated output
2	Remote kV Program	0 to 10Vdc = 0 to 100% of rated output
3	High Voltage Enable/Inhibit	Open = HV Inhibit, Ground = HV ON
4	mA Monitor	0 to 10Vdc = 0 to 100% of rated output
5	Interlock Return	Connect to pin 6 to close interlock circuit
6	Interlock Out	Connect to pin 5 to close interlock circuit
7	kV Monitor	0 to 10Vdc = 0 to 100% of rated output
8	Local kV Program	Multi-turn front panel pot (screwdriver)
9	Power Supply Fault	0Vdc = No Fault, +15Vdc @ 1mA = Fault
10	+10Vdc Reference	+10Vdc @ 1mA maximum
11	Signal Ground	Signal Ground
12	Spare	No Connection
13	Spare	No Connection
14	Spare	No Connection
15	Local mA Program	Multi-turn front panel pot (screwdriver)

TOP VIEW



BACK VIEW





Spellman's PTV Series of modular high voltage power supplies deliver up to 350W of continuous power. A quasi-resonant inverter design provides over 80% efficiency with very fast dynamic response. PTV power supplies incorporate extensive standard features in two power output ranges (200W and 350W) with a wide range of output voltages operating to the most exacting specifications.

TYPICAL APPLICATIONS

- Projection Television
- X-ray Systems
- E-beam Systems
- Capacitor Charging systems
- CPT/CRT Testing

OPTIONS

FG	Floating Ground (50V max)
BPM/S	Bipolar Master/Slave
NSS	No Slow Start
TP(x)	Alternate Test Point Scaling

SPECIFICATIONS

Input:

115Vac \pm 10%, 50/60Hz.
220Vac \pm 10%, 50/60Hz.
Optional: 100Vac \pm 10%, 50/60Hz.
Specify at time of ordering.

Output:

Models from 1kV to 70kV, 200W or 350W. Each model is available in positive or negative polarity outputs.

- **Output Voltages from 1kV to 70kV**
- **Overvoltage and Short Circuit Protection**
- **EMI/RFI Input Filter**
- **Test Points for Output Current and Voltage**
- **Internal 10V Reference**
- **Output Inhibit Control Via TTL Signal**
- **OEM Customization Available**

www.spellmanhv.com/manuals/PTV

Voltage Regulation:

Load: 0.01% of output voltage no load to full load.
Line: \pm 0.01% for a \pm 10% change in input voltage.

Current Regulation:

Load: 0.01% of output current from 0 to rated voltage.
Line: 0.01% of rated current over specified input range.

Efficiency:

80%, typical.

Ripple:

PTV200: 0.1% p-p of output voltage.
PTV350: 0.2% p-p of output voltage.

Switching Frequency:

45-65kHz, nominal

Temperature:

Operating: 0°C to +40°C.
Storage: -40°C to +85°C.

Voltage Temperature Coefficient:

0.01%/°C

Stability (voltage & current):

0.01%/hr after 1/2 hour warm-up.
0.02% per 8 hours.

Cooling:

200W: Convection cooled.
350W: Fan cooled, rear air intake.

Dimensions:

1-40kV: $3\frac{3}{16}$ "H x $10\frac{3}{4}$ "W x 10"D
(8.1cm x 27.3cm x 25.4cm).
50-70kV: $4\frac{3}{16}$ "H x $10\frac{7}{8}$ "W x $11\frac{13}{16}$ "D
(10.65cm x 27.6cm x 35.1cm).

HV Output:

Flying lead 18" \pm 1"(45.7cm) UL listed.
AMP LGHI connector available for 40kV only.

Power Input Connector:

IEC320.

AC Line Voltage Input Cable:

Length: 8' (2.4m).

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive
and 2006/95/EC, the Low Voltage Directive.
UL/CUL recognized, File E148969 (up to 5kV only).

PTV SELECTION TABLE

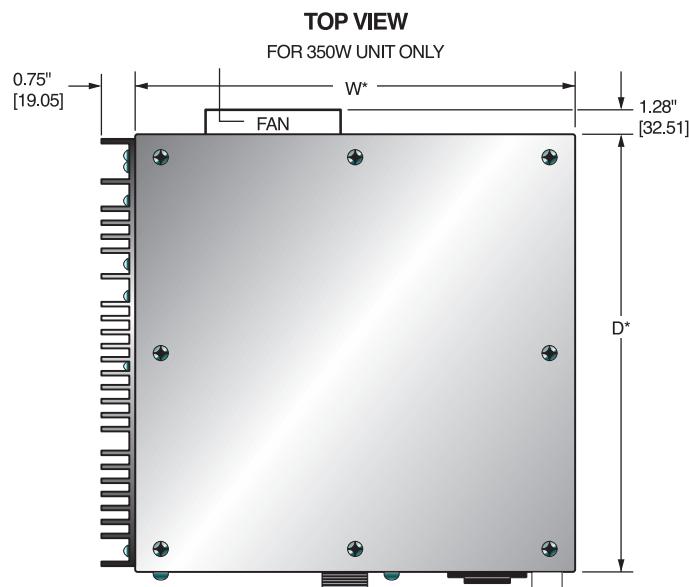
200 Watt Model PTV200			350 Watt Model PTV350		
kV	mA	Model Number	kV	mA	Model Number
1	200	PTV1*200	1	350	PTV1*350
3	70	PTV3*200	3	117	PTV3*350
5	40	PTV5*200	5	70	PTV5*350
10	20	PTV10*200	10	35	PTV10*350
15	14	PTV15*200	15	23	PTV15*350
20	10	PTV20*200	20	18	PTV20*350
25	8	PTV25*200	25	14	PTV25*350
30	7	PTV30*200	30	12	PTV30*350
40	5	PTV40*200	40	9	PTV40*350
50	4	PTV50*200	50	7	PTV50*350
60	3.3	PTV60*200	60	5.8	PTV60*350
70	2.85	PTV70*200	70	5.0	PTV70*350

*Specify "P" for positive polarity or "N" for negative polarity.

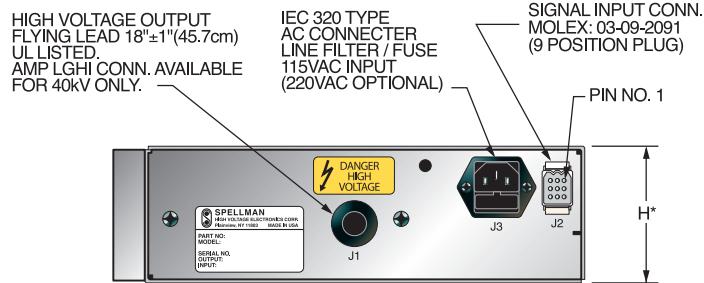
INTERFACE CONNECTOR 9 PIN

PIN	SIGNAL	PARAMETERS
1	+10Vdc Reference	+10Vdc @ 1mA, maximum
2	Current Program	0 to 10Vdc = 0 to 100% rated output, Zin = 10MΩ
3	Voltage Monitor	0 to 10Vdc = 0 to 100% rated output, Zout = 10kΩ
4	Voltage Program	0 to 10Vdc = 0 to 100% rated output, Zin = 10MΩ
5	Common Ground	Power Ground
6	Current Monitor	0 to 10Vdc = 0 to 100% rated output, Zout = 10kΩ
7	Enable/Inhibit	Ground = Inhibit, Open = HV ON
8	OVP Indicator	Collector w/1kΩ pull up to +5Vdc, transistor on =OVP
9	Signal Return	Signal Return

DIMENSIONS: in.[mm]

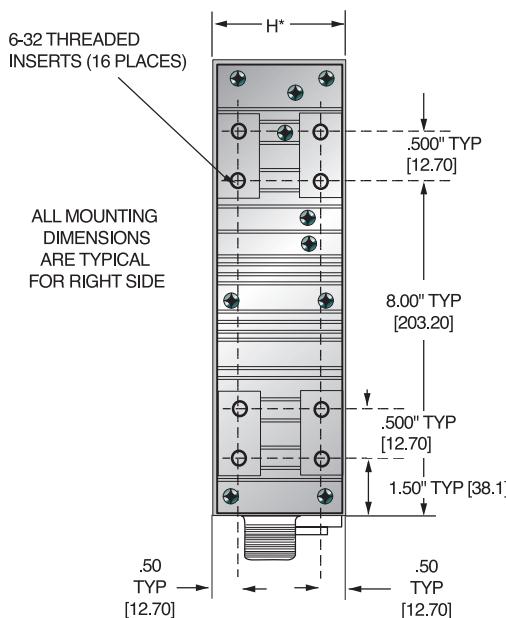


BACK VIEW



*See Specification for H, W, D Dimensions.

SIDE VIEW





Spellman's SLM Series of high voltage modules are designed for OEM applications up to 70kV at 1200 watts. Its universal input, small package size and choice of three standard digital interfaces simplifies integrating the SLM into your system design. Models are available in either positive or negative polarity. The SLM is fully arc and short protected. Excellent regulation specifications are provided along with outstanding stability performance.

TYPICAL APPLICATIONS

- Capacitor Charging
- HiPot Testing
- CRT Testing
- Electrostatics
- E Beam Systems
- CW Lasers

FIRMWARE CONFIGURATIONS

STANDARD BASED FEATURES

AOL	Adjustable Overload Trip
AT	Arc Trip
NAD	No Arc Detect
NSS	No Slow Start
PSS	Programmable Slow Start
RFR	Remote Fault Reset
RMI	Remote Mode Indicators
ROV	Remote Overvoltage Adjust

SPECIFICATIONS

Input Voltage:

Power factor corrected input, ≥ 0.98
90-264Vac, 47-63 Hertz, for 300 watt units
180-264Vac, 47-63 Hertz for 600 and 1200 watt units

Output Voltage:

11 models—1kV to 70kV

Output Polarity:

Negative or positive, specify at time of order

Local Indicators:

Arc, HV On, Temp Error, OVP, I Mode
Power On, OC, Reg Error

Power:

3 power ranges available—300, 600 and 1200 watts.
Other power levels available on special order.

- **Compact & Lightweight**
- **Models from 1kV-70kV, 300W, 600W AND 1200W**
- **Universal Input, Power Factor Corrected**
- **Low Cost Modular Design**
- **Standard Digital Interfaces: USB, Ethernet and RS-232**
- **CE Compliant, UL Recognized**

www.spellmanhv.com/manuals/SLM

Voltage Regulation:

$\leq 0.01\%$ of rated output voltage over specified input voltage range
 $\leq 0.01\%$ of rated output voltage for a full load change

Current Regulation:

$\leq 0.01\%$ of rated output current over specified input voltage range
 $\leq 0.01\%$ of rated output current for a $\pm 100\mu\text{A}$ for a full voltage change

Ripple:

$\leq 0.2\%$ rms of maximum rated voltage, measured with a 10 foot long HV cable

Stability:

$\leq 50\text{ppm}/\text{hr}$ after a 2 hour warm up

Temperature Coefficient:

$\leq 100\text{ppm}$ per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
20% to 85% RH, non-condensing.

Control Interface

Local Interface:

Potentiometers are provided to adjust voltage and current.

Remote Interface: USB, Ethernet and RS-232 are standard, implemented with 12 bits of resolution.
All digital monitors have an accuracy specification of 2%.

Control Software: A VB GUI will be provided for RS-232/USB, the Ethernet interface will have an embedded applet for control.

HV Control Enable/Interlock:

A dry contact, hardware based interlock is provided for remote mode. In local mode this I/O is the enable.

Monitor Signals:

Voltage and current monitor signals are scaled 0-10Vdc equals 0-100% of full scale, accuracy is 1%.

Cooling:

Forced air

Dimensions:

300/600 watts:
4.75" H X 6" W X 12" D (120.65mm x 152.4mm x 304.8mm)
1200 watts:
4.75" H X 12" W X 12" D (120.65mm x 304.8mm x 304.8mm)

Weight:

300/600 watts: 14 pounds (6.35kg)
1200 watts: 26 pounds (11.8kg)

Input Line Connector:

IEC320 cord set with integrated EMI filter

Output Cable:

A detachable 10' (3.3m) long shielded HV cable is provided

Regulatory Approvals:

Compliant to 204/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. UL/CUL recognized, File 227588. RoHS compliant.

SLM SELECTION TABLE- 300W

300 Watt		
kV	mA	Model
1	300	SLM1*300
3	100	SLM3*300
5	60	SLM5*300
10	30	SLM10*300
15	20	SLM15*300
20	15	SLM20*300
30	10	SLM30*300
40	7.5	SLM40*300
50	6	SLM50*300
60	5	SLM60*300
70	4.28	SLM70*300

*Specify "P" for positive polarity or "N" for negative polarity

SLM SELECTION TABLE- 600W

600 Watt		
kV	mA	Model
1	600	SLM1*600
3	200	SLM3*600
5	120	SLM5*600
10	60	SLM10*600
15	40	SLM15*600
20	30	SLM20*600
30	20	SLM30*600
40	15	SLM40*600
50	12	SLM50*600
60	10	SLM60*600
70	8.56	SLM70*600

*Specify "P" for positive polarity or "N" for negative polarity

SLM SELECTION TABLE- 1200W

1200 Watt		
kV	mA	Model
1	1200	SLM1*1200
3	400	SLM3*1200
5	240	SLM5*1200
10	120	SLM10*1200
15	80	SLM15*1200
20	60	SLM20*1200
30	40	SLM30*1200
40	30	SLM40*1200
50	24	SLM50*1200
60	20	SLM60*1200
70	17.14	SLM70*1200

*Specify "P" for positive polarity or "N" for negative polarity

**SLM ANALOG INTERFACE—
J2 15 PIN MALE D CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Fault	Open Collector, 35V @ 10mA Maximum
2	Current Program In	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
3	Voltage Program In	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
4	NC	No Connection
5	Local Voltage Prog.	Multi-turn front panel potentiometer
6	NC	No Connection
7	Local Current Prog.	Multi-turn front panel potentiometer
8	Voltage Monitor	0 to 10V=0 to 100% Rated Output, Zout =4.99k, 1%
9	Signal Ground	Ground
10	Current Monitor	0 to 10V=0 to 100% Rated Output, Zout =4.99k, 1%
11	HV Enable Input	Connect to Pin 12 to HV Enable Supply
12	HV Enable Output	+15V @ Open, ≤15mA @ Closed
13	NC	No Connection
14	HV On Output Signal	Open Collector, 35V @10mA Maximum
15	Spare	No Connection

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

PIN	SIGNAL	SIGNAL PARAMETERS
1	NC	No Connection
2	TX out	Transmit Data
3	RX in	Receive Data
4	NC	No Connection
5	SGND	Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

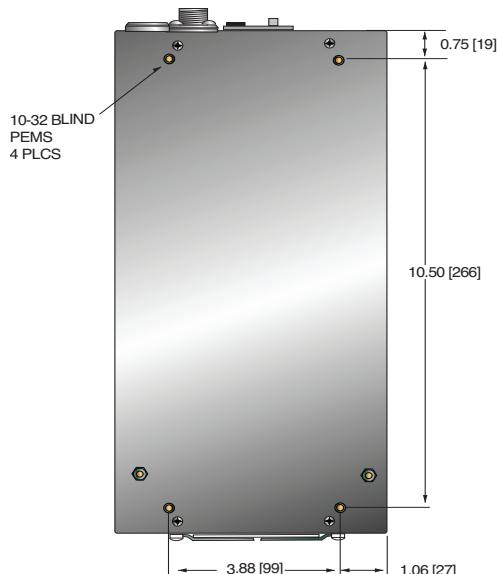
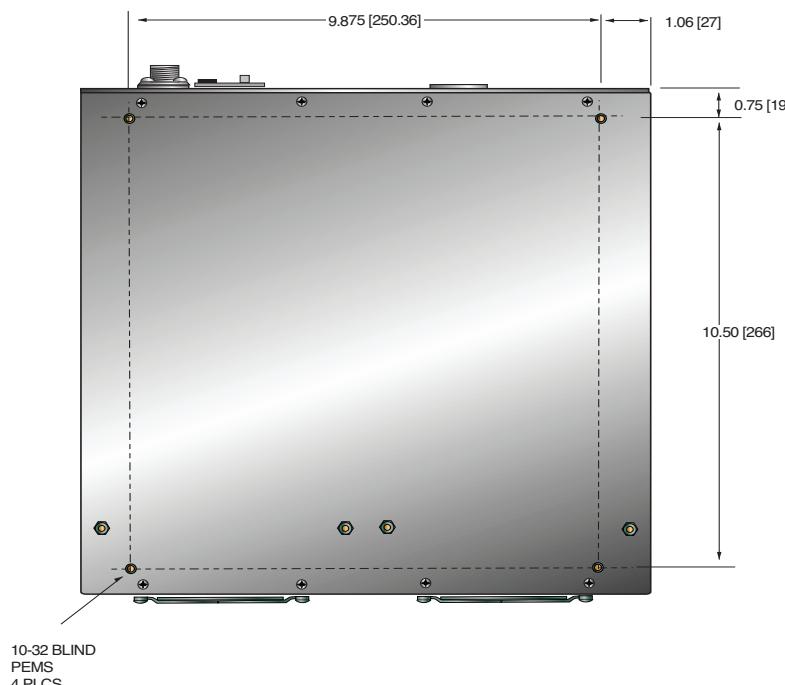
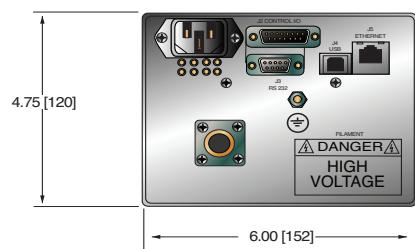
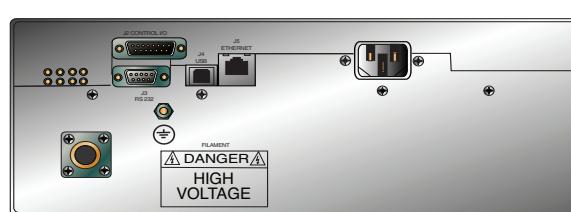
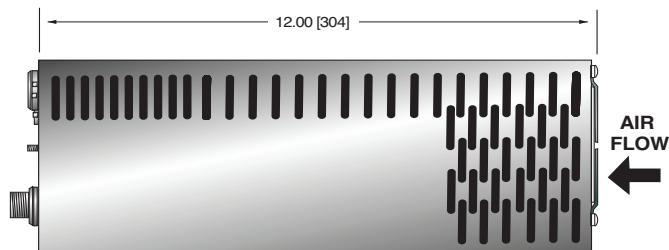
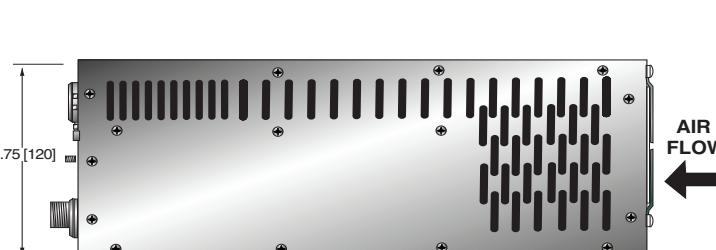
**USB DIGITAL INTERFACE—
J4 4 PIN USB "B" CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	VBUS	+5 Vdc
2	D-	Data -
3	D+	Data +
4	GND	Ground

**ETHERNET DIGITAL INTERFACE—
J5 8 PIN RJ45 CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	NC	No Connection
5	NC	No Connection
6	RX-	Receive Data -
7	NC	No Connection
8	NC	No Connection

DIMENSIONS: in.[mm]

300/600 Watt**BOTTOM VIEW****1200 Watt****BOTTOM VIEW****FRONT VIEW****FRONT VIEW****SIDE VIEW****SIDE VIEW**



Spellman's SL Series of high voltage power supplies are designed to meet uncompromising performance standards in a minimum of space. Their circuitry includes a resonant high frequency inverter with proprietary control which provides fault-free operation in extreme transient and arcing environments with greater than 85% efficiency. These full featured supplies are available in a wide range of outputs with many options.

TYPICAL APPLICATIONS

Analytical X-ray
Electrostatics
E-Beam Systems

Capacitor Charging
Hipot Testing
General Laboratory

OPTIONS

See page 5 for options and descriptions

SPECIFICATIONS

Status Indicators:

Voltage and Current Control Mode, Interlock Open and Closed, High Voltage Inhibit, Overcurrent and Overvoltage, Arc, Regulation Error, Overtemperature, Over Power (Optional).

Input:

115Vac or 220Vac \pm 10%, 50/60Hz. Specify with order.
1200W model available in 200/220Vac only.

Output:

Models available from 1kV to 130kV. Each model is available in positive, negative or reversible polarity output.

Front Panel Controls:

Voltage and current are continuously adjustable by ten-turn potentiometers with lockable counting dials, ON/OFF circuit breaker/lamp, high voltage ON switch/indicator and high voltage OFF switch/indicator.

Voltage Regulation:

Load: 0.005% of maximum voltage +500mV for full load change.
Line: \pm 0.005% of full voltage +500mV over specified input range



NOW AVAILABLE: VFD Front Panel/Ethernet Interface Option

- **Very Compact and Lightweight**
- **Voltage Range from 1kV to 130kV**
- **Reversible Polarity Standard up to 8kV**
- **Extensive Analog and Digital Interface**
- **Arc Quench/Arc Count/Arc Trip**
- **OEM Customization Available**

www.spellmanhv.com/manuals/SL

Current Regulation:

Load: 0.01% of maximum current \pm 100 μ A for full voltage change.
Line: \pm 0.005% of maximum current for a \pm 10% input line change.

Ripple:

0.1% p-p +1Vrms.

Temperature Coefficient:

100ppm/ $^{\circ}$ C voltage or current regulated. Higher stability is available on special order.

Environmental:

Temperature Range:
Operating: 0 $^{\circ}$ C to 50 $^{\circ}$ C.
Storage: -40 $^{\circ}$ C to 85 $^{\circ}$ C.

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

Stability:

100ppm/hour after 1/2 hour warm-up for both voltage and current regulation.

Metering:

Digital voltage and current meters, 3 $\frac{1}{2}$ digit \pm 1 least significant digit.

Output Cable:

10' (3.05m) of shielded high voltage cable removable at the rear panel.

AC Line Input Cable:

10 to 300W: IEC320 Cord Set, 6' (1.83m)
600 to 1200W: 3-conductor, 12AWG, 6' (1.83m) cable permanently attached to unit.

Dimensions:

10W – 300W: 1 $\frac{3}{4}$ "H(1U) x 19"W x 19"D**
(4.45cm x 48.3cm x 48.3cm).
600W – 1200W: 3 $\frac{1}{2}$ "H(2U) x 19"W x 19"D**
(8.9cm x 48.3cm x 48.3cm).
**Depth becomes 24" (60.7cm) for 80 to 130kV ranges.

Weight:

17 to 30lbs (7.7 to 14kg) depending on model.

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.
RoHS compliant.



**10W to 1200W
COMPACT HV POWER SUPPLY**

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

PAGE 2 OF 5

SL SELECTION TABLE- 10W, 30W, 60W

1.75" (1U)

kV	10 Watt mA	Model	30 Watt mA	Model	60 Watt mA	Model
1	10	SL1PN10	30	SL1PN30	60	SL1PN60
2	5	SL2PN10	15	SL2PN30	30	SL2PN60
3	3.3	SL3PN10	10	SL3PN30	20	SL3PN60
6	1.7	SL6PN10	5	SL6PN30	10	SL6PN60
8	1.25	SL8PN10	3.75	SL8PN30	7.5	SL8PN60
10	1.0	SL10*10	3	SL10*30	6	SL10*60
15	0.67	SL15*10	2	SL15*30	4	SL15*60
20	0.50	SL20*10	1.5	SL20*30	3	SL20*60
30	0.33	SL30*10	1.0	SL30*30	2	SL30*60
40	0.25	SL40*10	0.75	SL40*30	1.5	SL40*60
50	0.20	SL50*10	0.60	SL50*30	1.2	SL50*60
60	0.17	SL60*10	0.50	SL60*30	1.0	SL60*60
70	0.14	SL70*10	0.43	SL70*30	0.85	SL70*60
80	0.13	SL80*10	0.38	SL80*30	0.75	SL80*60
100	0.10	SL100*10	0.30	SL100*30	0.60	SL100*60
120	0.10	SL120*10	0.25	SL120*30	0.50	SL120*60
130	0.10	SL130*10	0.25	SL130*30	0.46	SL130*60

*Specify "P" for positive, "N" for negative, or "PN" for reversible polarity.
Higher voltage models available on special order.

SL SELECTION TABLE- 150W, 300W

1.75" (1U)

kV	150 Watt		300 Watt	
	mA	Model	mA	Model
1	150	SL1PN150	300	SL1PN300
2	75	SL2PN150	150	SL2PN300
3	50	SL3PN150	100	SL3PN300
6	25	SL6PN150	50	SL6PN300
8	18.75	SL8PN150	37.5	SL8PN300
10	15	SL10*150	30	SL10*300
15	10	SL15*150	20	SL15*300
20	7.5	SL20*150	15	SL20*300
30	5.0	SL30*150	10	SL30*300
40	3.75	SL40*150	7.5	SL40*300
50	3.00	SL50*150	6.0	SL50*300
60	2.50	SL60*150	5.0	SL60*300
70	2.1	SL70*150	4.28	SL70*300
80	1.90	SL80*150	3.75	SL80*300
100	1.50	SL100*150	3.00	SL100*300
120	1.25	SL120*150	2.50	SL120*300
130	1.15	SL130*150	2.30	SL130*300

SL SELECTION TABLE- 600W, 1200W

3.50" (2U)

kV	600 Watt		1200 Watt	
	mA	Model	mA	Model
1	600	SL1PN600	1200	SL1PN1200
2	300	SL2PN600	600	SL2PN1200
3	200	SL3PN600	400	SL3PN1200
6	100	SL6PN600	200	SL6PN1200
8	75	SL8PN600	150	SL8PN1200
10	60	SL10*600	120	SL10*1200
15	40	SL15*600	80	SL15*1200
20	30	SL20*600	60	SL20*1200
30	20	SL30*600	40	SL30*1200
40	15	SL40*600	30	SL40*1200
50	12	SL50*600	24	SL50*1200
60	10	SL60*600	20	SL60*1200
70	8.6	SL70*600	17	SL70*1200
80	7.5	SL80*600	15	SL80*1200
100	6.0	SL100*600	12	SL100*1200
120	5.0	SL120*600	10	SL120*1200
130	4.6	SL130*600	9.2	SL130*1200

SL TERMINAL BLOCK 26 PIN

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated Output
7	+10Vdc Reference	+10Vdc, 1mA Max
8	Remote Current Program In	0 to 10V=0 to 100% Rated Output
9	Local Current Program Out	Front Panel Program Voltage
10	Remote Voltage Program In	0 to 10V=0 to 100% Rated Output
11	Local Voltage Program Out	Front Panel Program Voltage
12	Power Monitor	0 to 10V=0 to 100% Rated Output (Optional)
13	Remote Power Program In	+15V at Open, <25mA at Closed
14	Local HV Off Out	Connect to HV OFF for FP Operation
15	HV Off	+15V, 10mA Max=HV Off
16	Remote HV On	0=HV On, +15V, 10mA Max=HV Off
17	Remote HV Off Indicator	0=HV On, +15V, 10mA Max=HV On
18	Remote HV On Indicator	0=HV Off, +15V, 10mA Max=HV On
19	Remote Voltage Mode	Open Collector 35V Max, 10mA Max
20	Remote Current Mode	On=Active
21	Remote Power Mode	0=Fault, +15V, 0.1mA Max=No Fault
22	Remote PS Fault	+15V, 100mA Max
23	+15V Output	Signal Ground
24	Power Supply Common	Spare
25	Spare	Chassis Ground

*Specify "P" for positive,
"N" for negative, or "PN"
for reversible polarity.
Higher voltage models
available on special order.

How To Order:

Sample model number: SL80PN1200/NS/DPM4

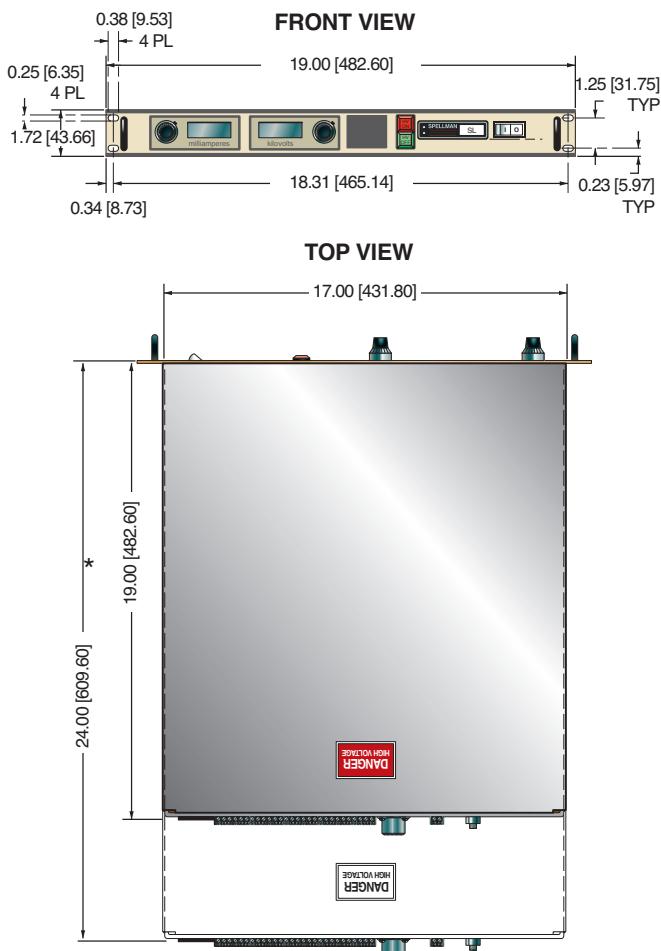
SL series unit, 80kV maximum output voltage,
reversible polarity output, 1200 watts, no slow start,
4.5 digit panel meters

There may be some restrictions on multiple option combinations.
Please contact our Sales department for more details.

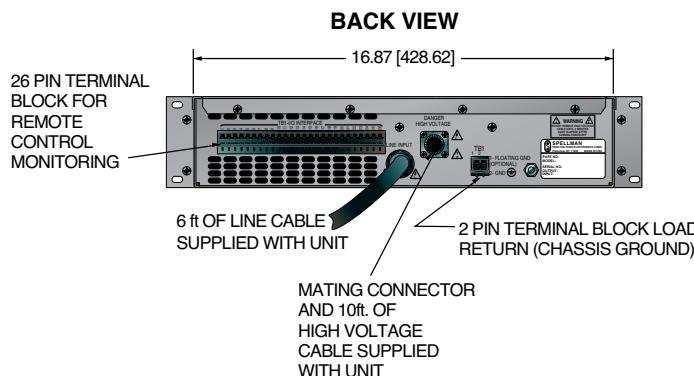
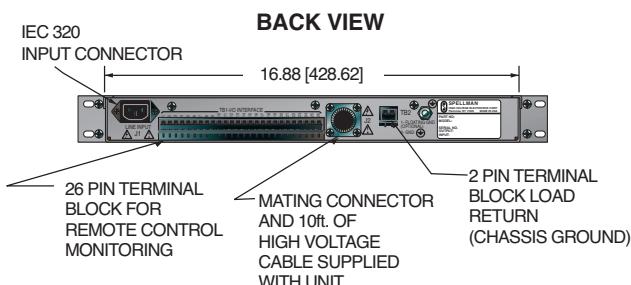
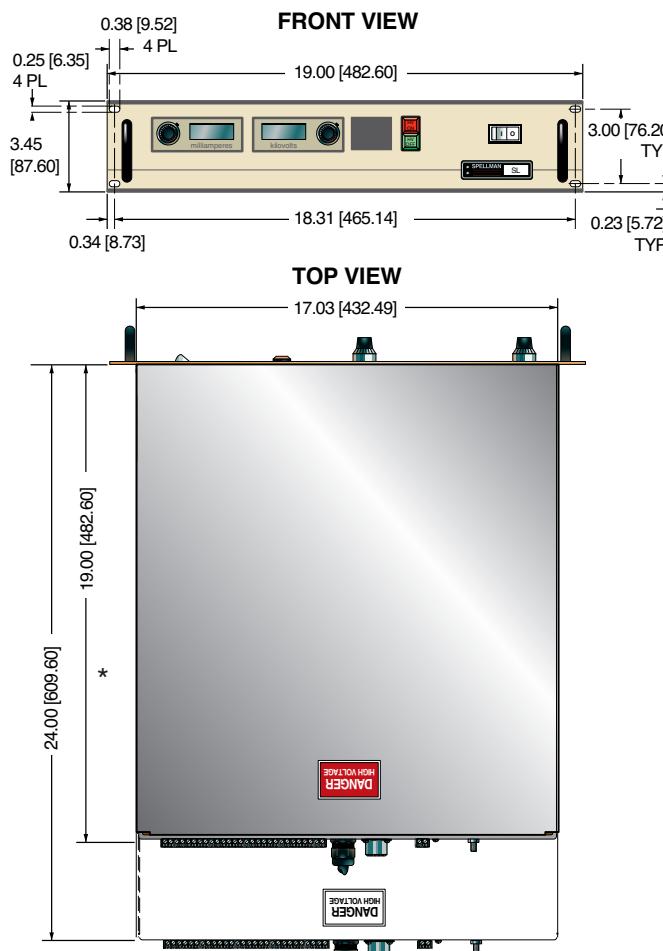
*Specify "P" for positive,
"N" for negative, or "PN"
for reversible polarity.
Higher voltage models
available on special order.

DIMENSIONS: in.[mm]

10W-300W



600W-1200W



* Depth becomes 24" [609.60] for 80kV to 130kV range.



eSL OPTION

The eSL Option provides a vacuum fluorescent front panel display and Ethernet connectivity. Both the 1U (1.75") and 2U (3.5") SL product offerings are available with the eSL Option. Using the front panel local controls the main menu has the following features:

Local/Remote Control

Allows operation from either the local front panel or remotely via the Ethernet Category 5 connector.

Features Menu

Allows control over Adjustable Overload Trip and Slow Start features.

Tutorial Menu

Provides information on how to use the local front panel interface.

Diagnostics Menu

Provides information on the revisions of the hardware, firmware and IP address. Additionally the Diagnostics Menu provides information on the status of the internal low voltage housekeeping power supply voltages.

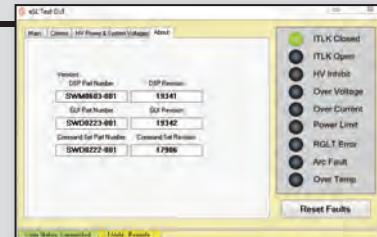
eSL Option power supplies can still be fully controlled via the SL's comprehensive remote analog interface, so these units are fully backwards compatible with standard SL power supplies.

Typical Front Panel Screens**Model Number****Standby****HV ON****Digital Interface**

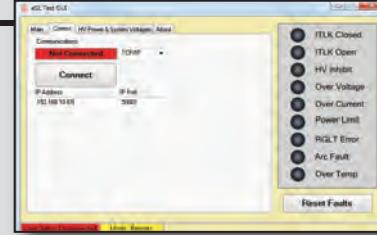
A front panel accessible Category 5 connector provides Ethernet connectivity. Spellman provides a basic demo GUI for convenience of the user, but most customers implement their own software.

About Screen

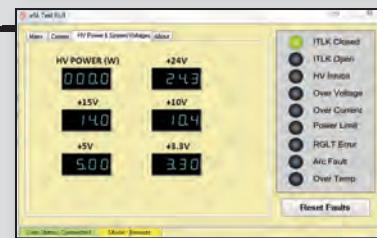
DSP part number, DSP revision, GUI part number, GUI revision, Command set part number, Command set revision

**Coms Screen**

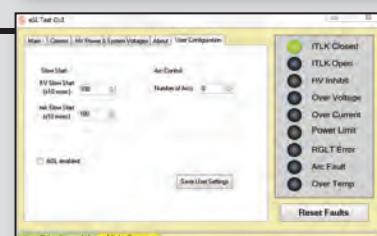
Communications, IP address, IP port

**HV Power and System Voltages Screen**

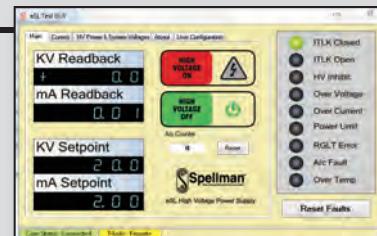
HV power (watts) +24V, +15V, +10V, +5V, +3.3V

**User Configuration Screen**

Slow Start – KV, Slow Start – mA, Adjustable Over Load (AOL), Arc Control, Fault Indicators

**Main Screen**

KV Setpoint, KV Readback, mA Setpoint, mA Readback, HV OFF Button, HV ON Button, Arc Counter, System Diagnostics, Reset Faults Button



SL SERIES OPTIONS**AOL** *Adjustable Overload Trip*

A control board jumper is moved to make the power supply shut down if it ever operates in current mode. This allows the user to set the current programming level as a trip point that will turn the power supply off with an Over Current fault if it ever tries to operate in Current Mode.

APT *Adjustable Power Trip*

A third control loop is installed in the power supply, a power loop. This power loop uses an analog multiplier chip to multiply the voltage and current feedback signals to create a power feedback signal. Programming and feedback scaling is 0-10Vdc = 0-100% of rated power. The circuit is configured to trip the power supply off with an Over Power fault if the power loop ever tries to regulate.

AT *Arc Trip*

A control board jumper is moved such that the first arc sensed will shut the power supply off with an ARC fault.

BPM *Bipolar Master***BPS** *Bipolar Slave*

This option configures two identical but opposite polarity units to function as a single tracking bipolar supply. The voltage feedback of the master (positive unit) is provided to the voltage programming input of the slave (negative unit).

CMS *Current Mode Select*

A front panel switch is provided to allow the power supply to either regulate in current mode or create an over current fault when operated in current mode, which will shut down the supply. This is basically a switch selectable AOL option.

CPC *Constant Power Control*

Identical to the APT Option with the exception the power supply will run and regulate when the power loop becomes active.

DPM4 *Digital Panel Meter, 4.5 digits*

The standard 3.5 digit front panel meters are replaced with 4.5 digit panel meters.

EFR *External Fault Relay*

A set of relay contacts are provided via the rear panel interface that will change state if the power supply shuts down due to a fault condition.

eSL *Ethernet Connectivity/VFD Front Panel*

The eSL Option provides a vacuum fluorescent front panel display, Ethernet connectivity and comprehensive front panel controls.

FCV *Fine Control Voltage*

This option adds a second potentiometer to the front panel of the unit. This allows for a finer local adjustment of the output voltage setting.

FG *Floating Ground*

All the analog returns inside the power supply are isolated from chassis and brought to one point on the rear panel. Any current that flows out of the power supply via the HV cable/connector on the high side must return back to the multiplier via the load return on the low side. With only one path to flow through on the low side, a current meter can be inserted in series and a safe ground referenced measurement can be made of the actual high voltage output current.

FGLL *Floating Ground Low Leakage*

Identical functionality as the FG Option but a shield is placed around the high voltage multiplier to capture any leakage current inside the power supply and return it to the top of the current sense resistor. This negates any internal leakage currents from effecting measurements being made.

IO *Instant On*

A jumper is placed between TB1-15 and TB1-16 on the rear panel, causing the power supply to automatically toggle into HV ON when ever the line voltage is applied.

LL(X) *Lead Length*

Extra long high voltage output cable. 20, 40, 60 and 100 feet are standard lengths.

LR *Low Ripple*

Done on a case by case basis, the standard unit is evaluated and modifications are done to improve the output ripple to 0.05% peak to peak. The operating frequency might be increased, or additional filtering may be added to the HV multiplier.

NAD *No Arc Detect*

This option removes the arc intervention circuitry from the power supply. Care must be exercised when using this option as damage to the HV multiplier could occur.

NSS *No Slow Start*

The standard 6 second long linear ramp of output voltage is removed allowing the high voltage to "step" to its set point when enabled.

PN *Positive/Negative*

Reversible polarity option. Units that are not inherently reversible by design (10kV to 130kV) can have their output polarity reversed by the process of exchanging the high voltage multiplier section.

RFR *Remote Fault Reset*

This option provides the ability to reset any power supply faults that might occur via toggling a signal on the rear panel interface.

ROV *Remote Over Voltage*

The programming signal for the over voltage comparator circuit is made available to the customer remotely, allowing the power supply to be set to trip the OVP circuit anywhere from 0 -110% of rated output voltage.

SL *Slides*

Industry standard rack mounted slides are installed on the power supply.

SS(X) *Slow Start(X)*

The standard slow start is modified to provide a time of (X) seconds. Time frames of 0.1 seconds to 120 seconds can be accommodated.

There may be some restrictions on multiple option combinations. Please contact our Sales department for more details.



Spellman's Bertan brand of 205B Series high voltage power supplies provide regulated high voltage outputs from 1 to 50kV. The low noise, linear topology employed results in extremely low output ripple specifications. These 15 to 30W units are inherently reversible by design, providing either positive or negative output polarity. The 205B is fully arc and short circuit protected. Excellent regulation specifications are featured along with outstanding stability performance.

TYPICAL APPLICATIONS

HiPot Testing
CRT Testing
Electrostatics
E Beam Systems
General Laboratory Usage

OPTIONS

RF Isolated (Floating) Output

SPECIFICATIONS

Input Voltage:

115Vac, $\pm 10\%$, 50/60Hz @ 1A
230Vac, $\pm 10\%$, 50/60Hz @ 0.5A
Input voltage is switch selectable

Output Voltage:

See "model selection" table

Output Polarity:

All units are reversible polarity by design

Output Current:

See "model selection" table

Voltage Regulation:

Line: $\leq 50\text{ppm}/0.001\%$ of rated output voltage over specified input voltage range
Load: $\leq 0.005\%$ of rated output voltage for a full load change

Current Regulation:

Internally set to limit at 105% of rated current at full output voltage. Maximum output current at any other voltage setting must be derated linearly down to 30% of maximum at zero output voltage.

Ripple:

See "model selection" table



Not Intended For New Designs

- **1-50kV @ 15-30W**
- **Standard Rack Mounted Design**
- **Low Ripple and Noise**
- **Digital Metering**
- **Reversible Output Polarity**

www.spellmanhv.com/manuals/205B

Temperature Coefficient:

$\leq 50\text{ppm}/^{\circ}\text{C}$

Stability:

$\leq 0.01\%$ /hour, 0.02% per 8 hours after a 1/2 hour warm up

Accuracy:

Current Monitor: $\pm(0.5\% \text{ of reading} + 0.25\% \text{ of maximum})$
Remote Programming: $\pm(0.1\% \text{ of setting} + 0.1\% \text{ of maximum})$
Voltage Monitor: $\pm(0.1\% \text{ of reading} + 0.1\% \text{ of maximum})$
Front Panel Meter: Voltage $\pm(0.1\% \text{ of setting} + 0.1\% \text{ of maximum})$
Current: $\pm(0.25\% \text{ of setting} + 0.25\% \text{ of maximum})$
Front Panel Control: $\pm(0.25\% \text{ of setting} + 0.05\% \text{ of maximum})$

Operating Temperature:

0°C to $+50^{\circ}\text{C}$

Storage Temperature:

-40°C to $+85^{\circ}\text{C}$

Humidity:

20% to 85%RH, non-condensing

Input Line Connector:

IEC320 EMI filter/ input connector, a detachable line cord is provided

Interface Connector:

9 pin "D" connector, a mating connector is provided

Output Connector:

A detachable 10 foot (3 meter) long HV cable is provided

Cooling:

Convection cooled

Dimensions:

1-20kV: 19.0" W X 3.5" H X 9.625" D

(483mm X 89mm X 244mm)

30-50kV: 19.0" W X 5.25" H X 16.0" D

(483mm X 133mm X 406mm)

Weight:

$\leq 20\text{lbs}$ (9.1kg) up to and including 20kV units,
 $\leq 35\text{lbs}$ (15.9kg) for 30kV and 50kV units

Regulatory Approvals:

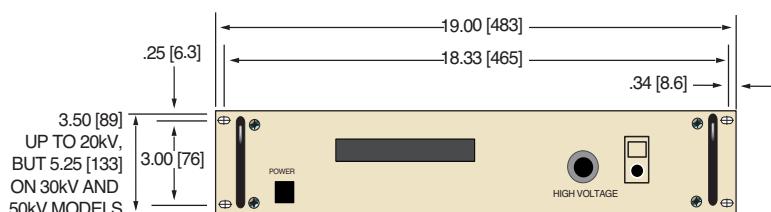
Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

MODEL SELECTION TABLE

205B Series	Voltage	Current	Ripple
205B-01R	0 to 1kV	0 to 30mA	10mV
205B-03R	0 to 3kV	0 to 10mA	30mV
205B-05R	0 to 5kV	0 to 5mA	50mV
205B-10R	0 to 10kV	0 to 2.5mA	100mV
205B-20R	0 to 20kV	0 to 1mA	300mV
205B-30R	0 to 30kV	0 to 0.5mA	400mV
205B-50R	0 to 50kV	0 to 0.3mA	2V

DIMENSIONS: in.[mm]

FRONT VIEW



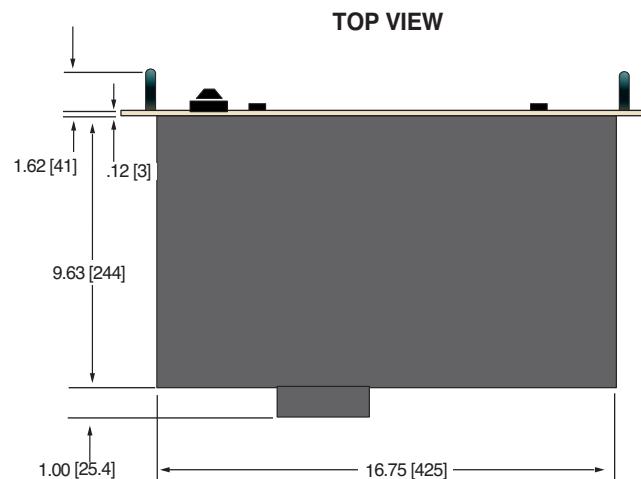
INTERFACE CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Voltage Monitor	0 to 5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
2	N/C	No Connection
3	Enable	TTL "0" disables HV, TTL "1" or open enables HV
4	+5Vdc Reference	+5.0Vdc @ 10mA, maximum
5	Current Monitor	0 to 5Vdc = 0 to 100% rated current, Zout = 10KΩ
6	Voltage Program Input	0 to 5Vdc = 0 to 100% rated voltage, Zin = 1MΩ
7	Analog Ground	Ground
8	Digital Ground	Ground (for use only with 200-C488, sold separately)
9	Polarity Indicator	Open collector, 30V @ 25mA, positive = ON

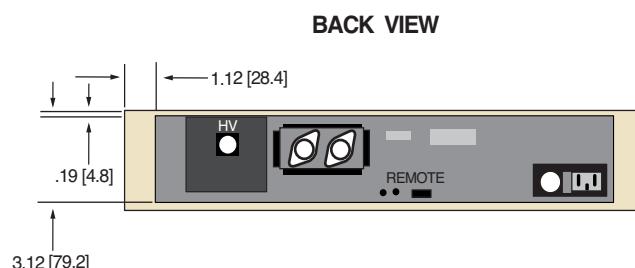
OPTIONS:

Isolated (Floating) Output-Option RF

Units can be provided with the output capable of floating up to $\pm 2\text{kV}$ from ground. All controls, programming and monitoring functions are normally referenced to ground. The high voltage output polarity with respect to the floating input terminal is reversible. Floating input connector is Spellman P/N JDK. Mating connector is provided with each unit (Spellman P/N PDB, MHV type UG-932/U). Replace "R" suffix with "RF" for this option.



TOP VIEW



BACK VIEW

CE



Not Intended For New Designs

- Standard Rack Mounted Design
- Low Ripple and Noise
- Reversible Output Polarity

www.spellmanhv.com/manuals/210

Spellman's Bertan brand of 210 Series of 125 to 225W high voltage power supplies provide regulated high voltage outputs from 1 to 50kV. The low noise, linear topology employed results in extremely low output ripple specifications. Units are inherently reversible by design, providing either positive or negative output polarity. The 210 is fully arc and short circuit protected. Excellent regulation specifications are featured along with outstanding stability performance.

TYPICAL APPLICATIONS

HiPot Testing
CRT Testing
Electrostatics
E Beam Systems
General Laboratory Usage

SPECIFICATIONS

Input Voltage:

115Vac, ±10%, 50/60Hz @ 5A
230Vac, ±10%, 50/60Hz @ 2.5A
Input voltage is switch selectable

Output Voltage:

See "model selection" table

Output Polarity:

1kV to 50kV units are inherently reversible by design

Output Current:

See "model selection" table

Voltage Regulation:

Line: ≤0.001% of rated output voltage over specified input voltage range
Load: ≤0.005% of rated output voltage for a full load change

Current Regulation:

Internally set to limit at 105% of rated current at full output voltage. Maximum output current at any other voltage setting must be derated linearly down to 30% of maximum at zero output voltage

Ripple:

See "model selection" table

Temperature Coefficient:

≤50ppm/°C

Stability:

≤0.01%/hour, 0.02% per 8 hours after a 1/2 hour warm up

Accuracy:

Voltage Monitor: ±(0.25% of reading + 0.25% of maximum)
Current Monitor: ±(0.5% of reading + 0.25% of maximum)
Remote Programming: ±(0.25% of setting + 0.05% of maximum) for 1kV to 30kV ±(0.5% of setting + 0.25% of maximum) for 50kV
Front Panel Control: ±(0.25% of setting + 0.05% of maximum for 1kV to 30kV ±(0.5% of setting + 0.25% of maximum) for 50kV
Front Panel Meter: ±2% of full scale

Operating Temperature

0°C to +50°C

Storage Temperature:

-40°C to +85°C

Humidity:

20% to 85% RH, non-condensing

Input Line Connector:

A captive 3 conductor line cord and NEMA plug is provided

Interface Connector:

7 pin Amphenol 126-198, mating connector and pins provided

Output Connector:

A detachable 10 foot (3 meter) long HV cable is provided

Cooling:

Internal fan, forced-air cooling

Dimensions

1-5kV:	19.0" W X 5.25" H X 11.0" D (483mm X 133mm X 279mm)
10-50kV:	19.0" W X 5.25" H X 16.0" D (483mm X 133mm X 406mm)

Weight:

≤40lbs (18.1kg) up to and including 30kV units
≤50lbs (22.7kg) for 50kV unit

Regulatory Approvals:

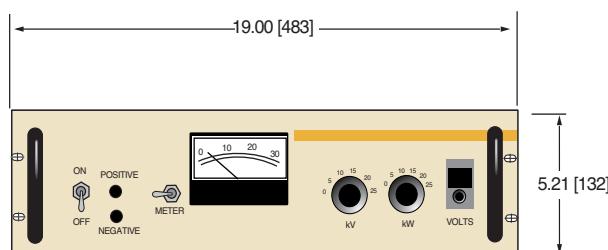
Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

MODEL SELECTION TABLE

210 Series	Voltage	Current	Ripple
210-01R	0 to 1kV	0 to 225mA	50mV
210-1.5R	0 to 1.5kV	0 to 130mA	100mV
210-02R	0 to 2kV	0 to 100mA	100mV
210-03R	0 to 3kV	0 to 75mA	100mV
210-05R	0 to 5kV	0 to 40mA	200mV
210-10R	0 to 10kV	0 to 15mA	500mV
210-20R	0 to 20kV	0 to 7mA	1V
210-30R	0 to 30kV	0 to 4.5mA	1.5V
210-50R	0 to 50kV	0 to 2.5mA	5V

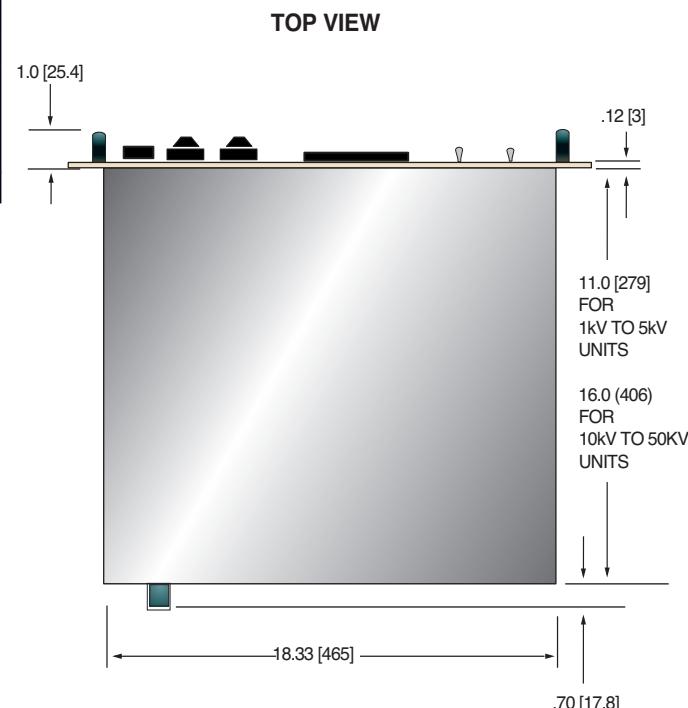
DIMENSIONS: in.[mm]

FRONT VIEW

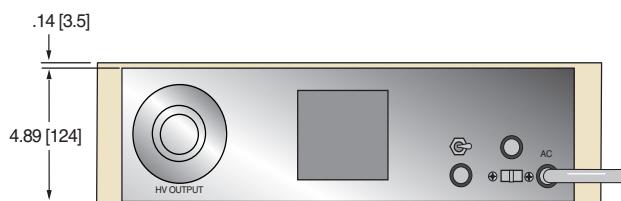


INTERFACE CONNECTOR

PIN	SIGNAL	PARAMETERS
A	-5Vdc Reference	-5.0Vdc @ 5mA, maximum
B	Voltage Program Input	0 to -5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
C	Analog Ground	Ground
D	Current Monitor	0 to 5Vdc = 0 to 100% rated current, Zout = 10KΩ
E	Voltage Monitor	0 to 5Vdc = 0 to 100% rated voltage, Zout = 10KΩ
F	Polarity Indicator	Open collector output, ON = Positive Polarity
G	N/C	No Connection



BACK VIEW



CE



Spellman's SL150kV rack mount high voltage power supply is designed for scientific and industrial OEM applications requiring 150kV at 1200 watts in a compact cable connected standard sized rack. Models are available in positive, negative or reversible polarity. The SL150kV is fully arc and short circuit protected. Excellent regulation specifications are provided along with outstanding stability performance. The vacuum encapsulated high voltage output section assures reliable corona free operation by eliminating any concerns due to environmental factors.

TYPICAL APPLICATIONS

Electrostatics
HiPot Testing
Semiconductor Processing
Capacitor Charging

OPTIONS

200	200Vac Input Voltage
AOL	Adjustable Overload Trip
APT	Adjustable Power Trip
AT	Arc Trip
BFP	Blank Front Panel
CPC	Constant Power Control
DPM4	4.5 Digit Panel Meters
EFR	External Fault Relay
LL(X)	Non-Standard HV Cable Length (10 standard)
NAD	No Arc Detect
NSS	No Slow Start
RFR	Remote Fault Reset
SS(X)	Non-Standard Slow Start (6 seconds standard)

- **Cable Connected 150kV @ 1200W Power Supply**
- **Requires Only 8.75" (5U) Panel Height**
- **Extensive Analog Interface**
- **Arc Quench/Arc Count/Arc Trip**
- **Comprehensive Digital Fault Diagnostics**

www.spellmanhv.com/manuals/SL150KV

SPECIFICATIONS

Front Panel Controls:

Power ON/OFF switch, HV ON Switch, HV OFF Switch with preset feature, 3.5 digit backlight digital meters for display of output voltage and output current, 10 turn locking potentiometers with counting dials for adjustment of both output voltage and output current.

Front Panel Indicators:

HV ON	High Voltage Inhibit
HV OFF	Over Current
Voltage Control Mode	Over Voltage
Current Control Mode	Arc
Interlock Open	Regulation Error
Interlock Closed	Overtemperature

Input:

220Vac ±10%, 50/60 Hertz

Output Voltage:

0 to 150kV

Output Polarity:

Positive, negative or reversible specify at time of order

Output Current:

8mA

Output Power:

1200W

Voltage Regulation:

Load: 0.01% of rated voltage for a full load change
Line: ±0.01% of rated current over specified input voltage range

Current Regulation:

Load: 0.01% of rated current ±100µA for full voltage change.
Line: ±0.01% of rated current over specified input voltage range

Ripple:

0.1% peak to peak of maximum output

Temperature Coefficient:

100ppm/°C.

Stability:

100ppm/hr after a 2 hour warm up, for both voltage and current regulation

Operating Temperature:

0 to 40°C operating

Storage Temperature:

-40 to +85°C storage

Humidity:

20% to 85%, non-condensing

Input Line Connector:

3 conductor 12 AWG 6 ft (1.83m) cable, permanently attached

Output Connector:

A detachable 10 ft (3.05m) shielded HV cable is provided

Cooling:

Forced Air

Dimensions:

8.75"H x 19"W x 22"D rack mount.
(22.23cm x 48.26cm x 55.88cm)

Weight:

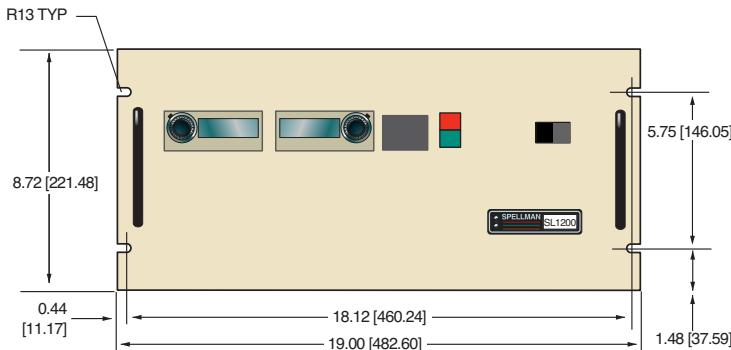
89 pounds (40.4kg)

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive
and 2006/95/EC, the Low Voltage Directive.

DIMENSIONS: in.[mm]

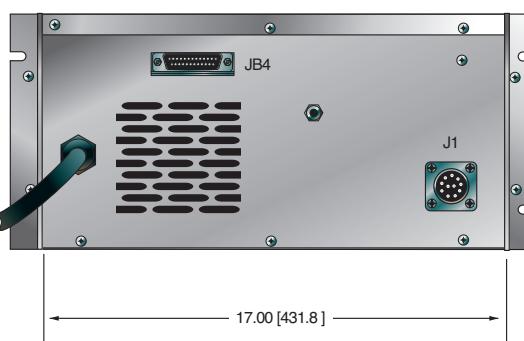
FRONT VIEW



TOP VIEW



BACK VIEW



SL150 ANALOG INTERFACE— JB4 25 PIN MALE D CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground = Inhibit, Open = HV ON
3	External Interlock	+15Vdc @ open, \leq 5mA @ closed
4	External Interlock Return	Connect to pin 3 to enable supply
5	Current Monitor	0 to 10Vdc = 0 to 100% rated voltage, Zout = 10k Ω
6	Voltage Monitor	0 to 10Vdc = 0 to 100% rated voltage, Zout = 10k Ω
7	+10Vdc Reference	+10Vdc @ 1mA, maximum
8	Remote Current Program Input	0 to 10Vdc = 0 to 100% rated voltage, Zout = 10k Ω
9	Local Current Program Output	Multi-turn front panel pot for local control capability
10	Remote Voltage Program Input	0 to 10Vdc = 0 to 100% rated voltage, Zout = 10k Ω
11	Local Voltage Program Output	Multi-turn front panel pot for local control capability
12	EFR (Common)	External Fault Relay (Optional)
13	EFR (Normally Open)	External Fault Relay (Optional)
14	Local HV OFF OUT	+15Vdc @ open, <25mA @ closed, connect to HV OFF for front panel operation
15	HV OFF	Connect to HV OFF OUT for front panel operation
16	Remote HV ON	+15Vdc @ 10mA maximum = HV OFF
17	Remote HV OFF Indicator	0 = HV ON, +15Vdc @ 10mA maximum = HV OFF
18	Remote HV ON Indicator	0 = HV OFF, +15Vdc @ 10mA maximum = HV ON
19	Remote Voltage Mode	Open collector 50Vdc @ 10mA maximum, ON = Active
20	Remote Current Mode	Open collector 50Vdc @ 10mA maximum, ON = Active
21	Remote Power Mode	Open collector 50Vdc @ 10mA maximum, ON = Active
22	Power Supply Fault	Open collector, 50Vdc @ 10mA maximum
23	+15Vdc Output	+15Vdc @ 100mA, maximum
24	Power Supply Ground	Signal Ground
25	Shield Return	Chassis Ground

Specify "P" for positive polarity or "N" for negative polarity, and PN = reversible as illustrated below.

Sample Model Number: SL150P1200/BFP/LL(20)

Where SL = power supply series, 150 = maximum output voltage in kV,
P = positive output polarity, 1200 = maximum output power (watts), BFP = Blank
Front Panel, LL(20) = 20 foot HV cable.



Spellman's SL2KW Series of 2kW high voltage power supplies are designed to meet uncompromising performance standards in a minimum of space. Their circuitry includes a resonant high frequency inverter with proprietary control which provides fault-free operation in extreme transient and arcing environments with greater than 85% efficiency. These full featured supplies are available in a wide range of outputs with many options.

TYPICAL APPLICATIONS

- Semiconductor Manufacturing
- Electrostatics
- E-Beam Systems
- Capacitor Charging
- CPT/CRT Testing
- Hipot Testing
- General Laboratory
- CW Lasers

OPTIONS

See page 3 for options and descriptions

SPECIFICATIONS

Status Indicators:

Voltage and Current Control Mode, Interlock Open and Closed, High Voltage Inhibit, Overcurrent and Overvoltage, Arc, Regulation Error, Overtemperature.

Input:

Standard: 208Vac ±10%, 50/60Hz., three phase
Optional: 220Vac ±10%, 50/60Hz., single phase

Output:

Models available from 0.5kV to 50kV. Each model is available in positive, negative or reversible polarity output.

Front Panel Controls:

Voltage and current are continuously adjustable by ten-turn potentiometers with lockable counting dials, ON/OFF circuit breaker/lamp, high voltage ON switch/indicator and high voltage OFF switch/indicator.

Voltage Regulation:

Load: 0.005% of maximum voltage +500mV for full load change.
Line: ±0.005% of full voltage +500mV over specified input range

- **Very Compact and Lightweight**
- **Low EMI and RFI**
- **Voltage Range from 500V to 50kV**
- **Reversible Polarity Standard up to 8kV**
- **System Status Indicators**
- **Extensive Analog and Digital Interface**
- **Arc Quench/Arc Count/Arc Trip**
- **OEM Customization Available**

www.spellmanhv.com/manuals/SL2KW

Current Regulation:

Load: 0.01% of maximum current ±100µA
for full voltage change.
Line: ±0.005% of maximum current for a ±10%
input line change.

Ripple:

0.1% p-p +1Vrms, three phase line input
0.3% p-p +1Vrms, single phase line input

Temperature Coefficient:

100ppm/°C voltage or current regulated. Higher stability is available on special order.

Environmental:

Temperature Range:
Operating: 0°C to 50°C.
Storage: -40°C to 85°C.
Humidity:
10 to 90% relative humidity, non-condensing

Stability:

100ppm/hour after 1/2 hour warm-up for both voltage and current regulation.

Metering:

Digital voltage and current meters, 3½ digit ±1 least significant digit.

Interface Connector:

25 pin male D connector

Output Cable:

10' (3.3m) of shielded high voltage cable removable at the rear panel.

AC Line Input Cable:

A 6 foot (1.83m) cable is permanently attached to the unit. Single phase units use 3 conductor 12AWG cable, three phase units use 4 conductor 16AWG cable.

Dimensions:

3½"H(2U) x 19"W x 19"D
(8.9cm x 48.3cm x 48.3cm).

Weight:

17 to 26lbs (7.7 to 11.8kg) depending on model.

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.
RoHS Compliant.

SL2KW SELECTION TABLE

MAXIMUM RATING		MODEL NUMBER
kV	mA	
0.5	4000	SL0.5PN2000
1	2000	SL1PN2000
2	1000	SL2PN2000
3	666	SL3PN2000
6	333	SL6PN2000
8	250	SL8PN2000
10	200	SL10*2000
15	133	SL15*2000
20	100	SL20*2000
30	66.6	SL30*2000
40	50	SL40*2000
50	40	SL50*2000

*Specify "P" for positive polarity or "N" for negative polarity or "PN" for reversible polarity

SL2KW 25 PIN D CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated Output
7	+10Vdc Reference	+10Vdc, 1mA Max
8	Remote Current Program In	0 to 10V=0 to 100% Rated Output
9	Local Current Program Out	Front Panel Program Voltage
10	Remote Voltage Program In	0 to 10V=0 to 100% Rated Output
11	Local Voltage Program Out	Front Panel Program Voltage
12	EFR Common	External Fault Relay
13	EFR-NC/EFR-NO	30V @ 2A Maximum
14	Local HV Off Out	+15V at Open, <25mA at Closed
15	HV Off	Connect to HV OFF for FP Operation
16	Remote HV On	+15V, 10mA Max=HV Off
17	Remote HV Off Indicator	0=HV On, +15V, 10mA Max=HV Off
18	Remote HV On Indicator	0=HV Off, +15V, 10mA Max=HV On
19	Remote Voltage Mode	Open Collector 35V Max, 10mA Max,
20	Remote Current Mode	On=Active
21	Remote Power Mode	
22	Remote PS Fault	0=Fault, +15V, 0.1mA Max=No Fault
23	+15V Output	+15V, 100mA Max
24	Power Supply Common	Signal Ground
25	Shield Return	Chassis Ground

How To Order:

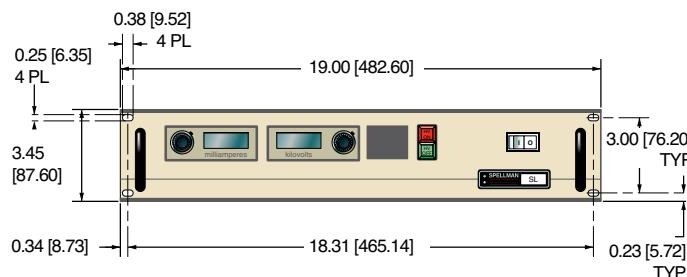
Sample model number: SL20PN2000/NSS/DPM4

SL2KW Series unit, 20kV maximum output voltage, reversible polarity output, 2000 watts, no slow start, 4.5 digit panel meters

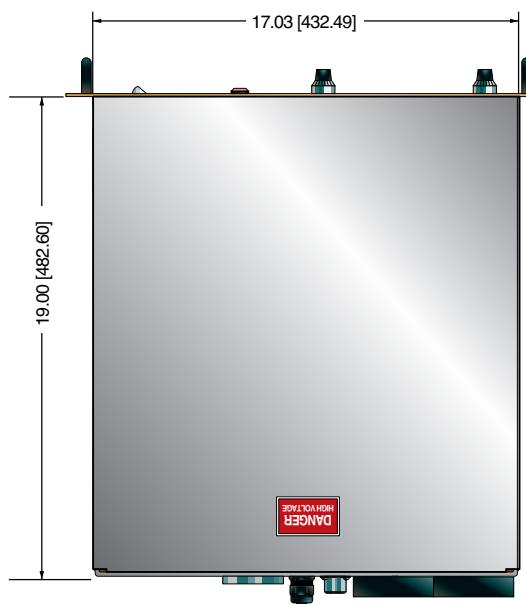
There may be some restrictions on multiple option combinations.
Please contact our Sales department for more details.

DIMENSIONS: in.[mm]

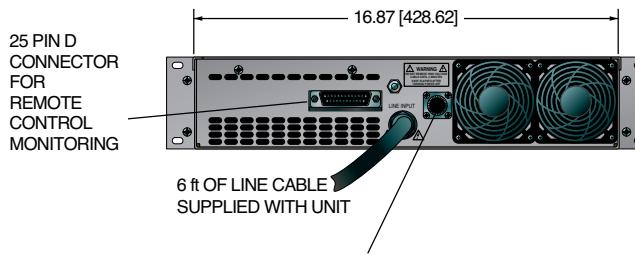
FRONT VIEW



TOP VIEW



BACK VIEW



MATING CONNECTOR
AND 10ft. OF
HIGH VOLTAGE
CABLE SUPPLIED
WITH UNIT



SL2KW SERIES OPTIONS**AOL** *Adjustable Overload Trip*

A control board jumper is moved to make the power supply shut down if it ever operates in current mode. This allows the user to set the current programming level as a trip point that will turn the power supply off with an Over Current fault if it ever tries to operate in Current Mode.

APT *Adjustable Power Trip*

A third control loop is installed in the power supply, a power loop. This power loop uses an analog multiplier chip to multiply the voltage and current feedback signals to create a power feedback signal. Programming and feedback scaling is 0-10Vdc = 0-100% of rated power. The circuit is configured to trip the power supply off with an Over Power fault if the power loop ever tries to regulate.

ARC *Arc Sense*

A signal is provided on a spare pin (TB1-21) that changes state whenever the power supply detects an arc.

AT *Arc Trip*

A control board jumper is moved such that the first arc sensed will shut the power supply off with an ARC fault.

BPM *Bipolar Master***BPS** *Bipolar Slave*

This option configures two identical but opposite polarity units to function as a single tracking bipolar supply. The voltage feedback of the master (positive unit) is provided to the voltage programming input of the slave (negative unit).

CMS *Current Mode Select*

A front panel switch is provided to allow the power supply to either regulate in current mode or create an over current fault when operated in current mode, which will shut down the supply. This is basically a switch selectable AOL option.

CPC *Constant Power Control*

Identical to the APT Option with the exception the power supply will run and regulate when the power loop becomes active.

DPM4 *Digital Panel Meter, 4.5 digits*

The standard 3.5 digit front panel meters are replaced with 4.5 digit panel meters.

EFR *External Fault Relay*

A set of relay contacts are provided via the rear panel interface that will change state if the power supply shuts down due to a fault condition.

FCV *Fine Control Voltage*

This option adds a second potentiometer to the front panel of the unit. This allows for a finer local adjustment of the output voltage setting.

IO *Instant On*

A jumper is placed between TB1-15 and TB1-16 on the rear panel, causing the power supply to automatically toggle into HV ON when ever the line voltage is applied.

LL(X) *Lead Length*

Extra long high voltage output cable. 20, 40, 60 and 100 feet are standard lengths. Non standard lengths can be custom ordered.

NAD *No Arc Detect*

This option removes the arc intervention circuitry from the power supply. Care must be exercised when using this option as damage to the HV multiplier could occur.

NSS *No Slow Start*

The standard 6 second long linear ramp of output voltage is removed allowing the high voltage to "step" to its set point when enabled.

PN *Positive/Negative*

Reversible polarity option. Units that are not inherently reversible by design (10kV to 50kV) can have their output polarity reversed by the process of exchanging the high voltage multiplier section.

RFR *Remote Fault Reset*

This option provides the ability to reset any power supply faults that might occur via toggling a signal on the rear panel interface.

ROV *Remote Over Voltage*

The programming signal for the over voltage comparator circuit is made available to the customer remotely, allowing the power supply to be set to trip the OVP circuit anywhere from 0 -110% of rated output voltage.

SL *Slides*

Industry standard rack mounted slides are installed on the power supply.

SS(X) *Slow Start(X)*

The standard slow start is modified to provide a time of (X) seconds. Time frames of 0.1 seconds to 120 seconds can be accommodated.

There may be some restrictions on multiple option combinations. Please contact our Sales department for more details.



The SLS series of high voltage power supplies provide up to 2000 watts of power with voltage outputs ranging from 160kV to 360kV. These power supplies utilize high frequency resonant inverters with proprietary controls for reliable operation in extreme environments. The high voltage multiplier unit is built with a hybrid design of solid encapsulation and air, thus reducing its overall size. Comprised of 20kV interlocking wafers, the multiplier unit offers flexible building blocks for many different output configurations.

TYPICAL APPLICATIONS

Ion Implantation
Particle Accelerators
Electron Guns

SPECIFICATIONS

Input Voltage:

220Vac \pm 10%, three phase, 50/60Hz. (200Vac \pm 10% optional).

Output Voltage Range:

Models available from 160kV to 360kV and up to 2000W. Each model is available with positive or negative polarity outputs.

Voltage Regulation:

Better than 0.05% for specified line variations and load variations.

Ripple:

0.1% p-p of maximum output voltage.

Remote Voltage Control:

0 to +10V for 0 to maximum voltage. Accuracy and repeatability: 1% of maximum rating.

Remote Current Control:

0 to +10V for 0 to maximum voltage. Accuracy and repeatability: 1% of maximum rating.

Voltage Monitor:

0 to 10V equivalent to rated voltage. Accuracy, 1% reading.

Current Monitor:

0 to 10V equivalent to rated current. Accuracy, 1% reading.

- **160kV - 360kV Outputs**
- **Low Ripple**
- **High Stability**
- **Overshoot, Overvoltage and Arc Protection**
- **Arc Detect**
- **Lightweight, Compact Size**
- **OEM Customization Available**

www.spellmanhv.com/manuals/SLS

Stability:

0.05% per hour after 1/2 hour warm-up.
0.05% per 8 hours.

Slow Start:

Slow start times: 6 seconds standard.

Temperature Coefficient:

0.01% per degrees C.

Protection:

Overshoot, Overvoltage, Arc protection, Overtemperature.

Arc Detect:

If 8 arcs occur in a 10 second, non-synchronous time window, the supply reverts to the Power Down Mode with an ARC fault displayed on the front panel default diagnostic display.

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -20°C to 85°C

Humidity:
10% to 70%, non-condensing.

Dimensions:

Inverter Driver Chassis:
3.50"(2U)H x 19.0"W x 19.0"D (8.9cm x 48.3cm x 48.3cm)
Multiplier Unit:
See page 3.

Distance from Stack to Driver:

2.5 meters \pm 0.1 meter maximum.

Signal Connector:

25 pin, male D connector, J3.

Metering:

Front panel, 3.5 digit, digital voltage and current meters.

Front Panel Controls:

Voltage and current are continuously adjustable by ten-turn potentiometers with lockable counting dials, ON/OFF circuit breaker/lamp, high voltage ON switch/indicator and high voltage OFF switch/indicator.

Front Panel Status Indicators:

Voltage Control Mode
 Current Control Mode
 Interlock Open
 Interlock Closed
 High Voltage Inhibit
 Overtemperature
 Overpower (optional)
 Overcurrent
 Overvoltage
 Arc
 Regulation Error

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.
 RoHS compliant.

Corona Dome Terminations:

The SLS Series of "stack" configured high voltage power supplies come in a various output voltages and different physical configurations. Appropriate corona relief is required for these units to operate at maximum output voltage. Frequently users will provide the corona relief needed so Spellman will provide stack assemblies that by themselves will not be able to operate at maximum output voltage corona free. Please be certain to discuss your requirements with Spellman to be assured you get a stack assembly in the physical configuration you require for your application. The optional K941 Toroid (5" x 20") should be considered if customer corona relief will not be provided.



360kV Stack
 shown with
 optional
 K941 Toroid

SLS SELECTION TABLE

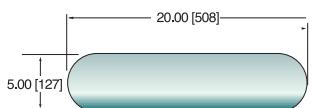
MAXIMUM RATING kV	mA	MODEL NUMBER
160	12.5	SLS160*2000
200	10.0	SLS200*2000
260	7.7	SLS260*2000
300	6.6	SLS300*2000
360	5.5	SLS360*2000

*Specify "P" for positive polarity or "N" for negative polarity
 Other combinations of voltage and current are available.

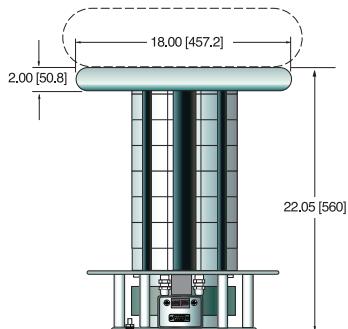
SLS I/O INTERFACE CONNECTOR 25 PIN

PIN	SIGNAL
1	Power Supply Common
2	External Inhibit
3	External Interlock
4	External Interlock Return
5	Current Monitor
6	Voltage Monitor
7	+10V Reference
8	Remote Current Program In
9	Local Current Program Out
10	Remote Voltage Program In
11	Local Voltage Program Out
12	EFR (common)
13	EFR (normally closed)
14	Local HV OFF Out
15	HV OFF
16	Remote HV ON
17	Remote HV OFF Indicator
18	Remote HV ON Indicator
19	Remote Voltage Mode
20	Remote Current Mode
21	Spare
22	Remote PS Fault
23	+15V Output
24	Power Supply Common
25	Shield Return

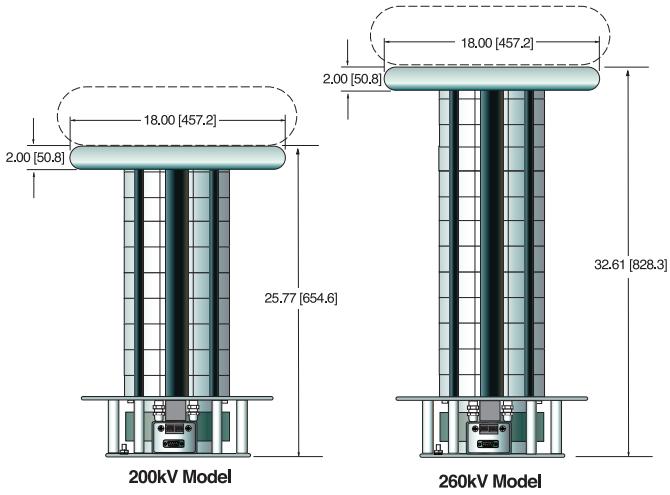
DIMENSIONS: in.[mm]



Optional 5" Toroid
fits all kV models
(Spellman kit number K941)

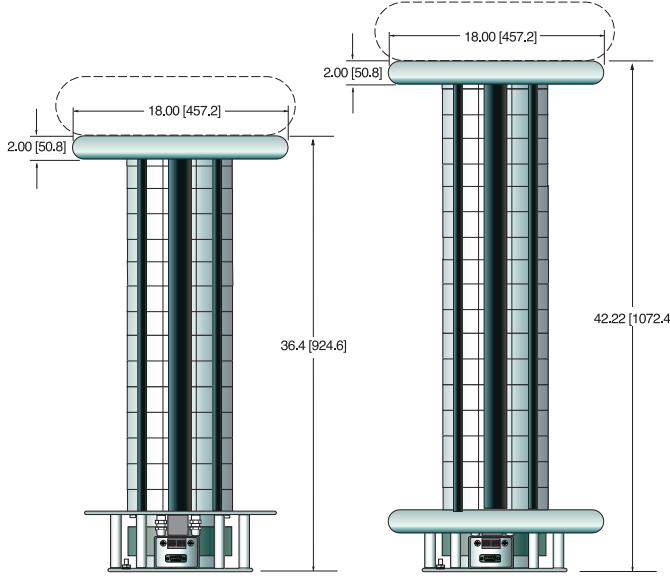


160kV Model



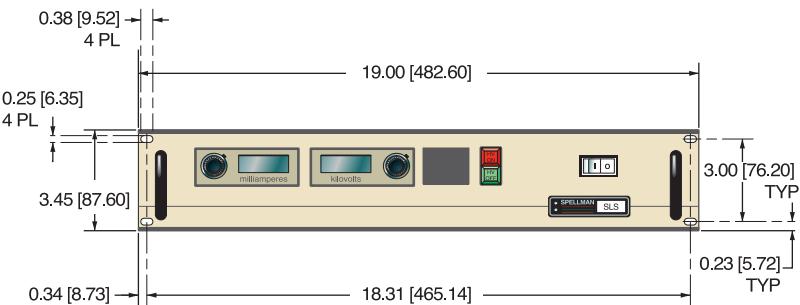
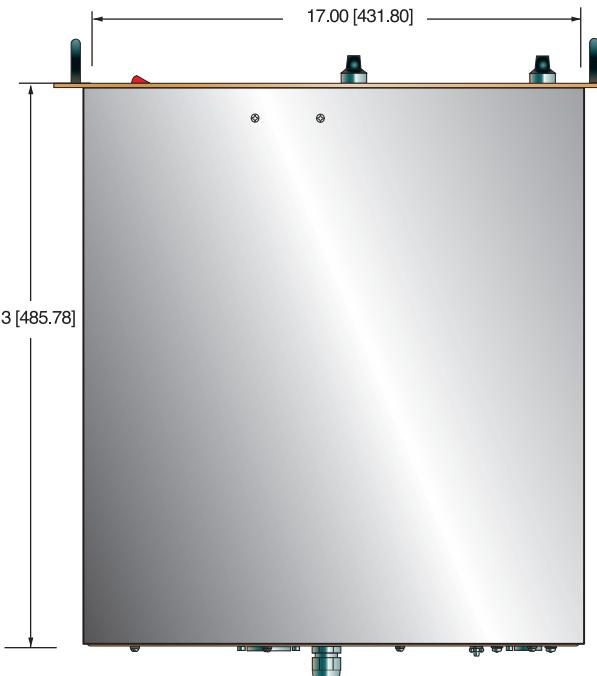
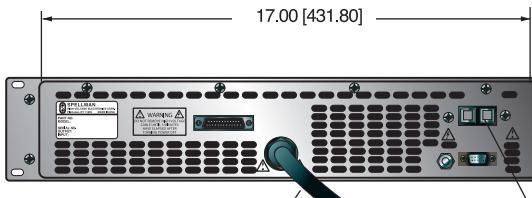
200kV Model

260kV Model



300kV Model

360kV Model

FRONT VIEW

TOP VIEW

BACK VIEW


6 ft OF LINE CABLE
SUPPLIED WITH UNIT.

LOW VOLTAGE
CONNECTION TO HV
TRANSFORMER ASSEMBLY





- **4kW's in Single 3U (5.25") Chassis**
- **Models from 1kV to 70kV**
- **Remote Analog and Remote Ethernet Interface**
- **Arc and Short Circuit Protected**
- **Customer Configurable Features Via Ethernet Interface**
- **OEM Customization Available**

www.spellmanhv.com/manuals/STA

Spellman's STA Series of 4kW high voltage power supplies are available in positive or negative polarities in 15 different models with outputs ranging from 1kV to 70kV. A full featured front panel allows easy local control, while an extensive analog interface provides comprehensive remote capability. The standard Ethernet and RS-232 digital interfaces simplify integrating the STA into your system design.

The STA's robust IGBT inverter is inherently fault tolerant and is ideal for demanding applications like semiconductor processing and vacuum deposition. Many operational features can be configured by the user to suit their particular requirements.

TYPICAL APPLICATIONS

Ion Beam Implantation
Semiconductor Processing
Electron Beam Welding
Capacitor Charging
High Power RF Transmitters
Electrostatic Precipitators
X-Ray Systems

HARDWARE BASED OPTIONS

BFP	Blank Front Panel
HS	High Stability
LL(X)	High Voltage Cable Length
1PH	180-264Vac, Single Phase Input

SOFTWARE CONFIGURABLE FEATURES

Adjustable Overload Trip
Arc Trip Count
Arc Quench Time
Arc Re-Ramp Time
Constant Power Control
Adjustable Power Trip
Slow Start Ramp Times

SPECIFICATIONS

Input Voltage:

Standard: 180-264Vac, 50/60Hz, three phase, 90% efficiency, 0.85 power factor
Optional: 180-264Vac 50/60Hz, single phase (1PH)

Input Current:

Standard: 180-264Vac, three phase 17 amps, maximum
Optional: 180-264Vac, single phase 38 amps, maximum

Output Voltage:

15 models from 1kV to 70kV. Each model is available with positive or negative outputs.

Local Output Controls:

Voltage and current are continuously adjustable over entire range via ten-turn potentiometers with lockable counting dials.

Voltage Regulation:

Load: 0.05% of full voltage +500mV for full load change.
Line: 0.05% of full voltage +500mV over specified input range.

Current Regulation:

Load: 0.05% of full current $\pm 100\mu\text{A}$ for any voltage change.
Line: 0.05% of full current over specified input range.

Ripple:

0.1% p-p +1Vrms

Stability:

0.02%hr. after 1 hour warm-up.

Temperature Coefficient:

100ppm/ $^{\circ}\text{C}$. Higher stability (50ppm/ $^{\circ}\text{C}$) available on special order via the HS option

Environmental:

Temperature Range:
Operating: 0 $^{\circ}\text{C}$ to 40 $^{\circ}\text{C}$
Storage: -40 $^{\circ}\text{C}$ to 85 $^{\circ}\text{C}$
Humidity:
10% to 90% RH, non-condensing.

Cooling:

Forced air; inlet through side panels, outlet at rear panel

Metering:

Digital voltage and current meters, accurate to within 1%

System Status Display:

"Dead Front" type indicators provide status of up to 12 system operations including voltage and current regulation, fault conditions and circuit control.

Analog Interface Connector:
50 pin female D connector

High Voltage Output Cable:
A detachable 10' (3.05m) long shielded HV cable is provided

Dimensions:
1kV to 70kV:
5.25" (3U)H X 19" W X 21" D (133mm x 482mm x 533mm)

Weight:
1kV to 8kV: 46 lbs. (20.87kg)
10kV to 70kV: 58 lbs. (26.31kg)
Individual kV models may vary

Regulatory Approvals:
2004/108/EC, the EMC Directive and 2006/95/EC,
the Low Voltage Directive. RoHS compliant.

Digital Interface

The STA features a standard RS-232 and Ethernet digital interface. Utilizing these standard digital interfaces can dramatically simplify power supply interfacing requirements saving the user both time and money, while enhancing functionality and overall capability. Spellman provides a GUI with the STA that allows the customer to both customize operational features of the STA while also providing basic power supply operational features. Details of the STA's digital interface capability are described in the STA manual, downloadable via the link on the first page of this data sheet.

Arc Intervention

Spellman's STA power supplies have an arc intervention feature that senses arc currents via a fast acting current sense transformer. The purpose of the arc intervention circuitry is to prevent power supply damage from continuous, long term arcing. The factory default configuration will trip off the unit with an Arc Fault if 4 arcs occur in a 10 second time period. Customers can change basic arc intervention parameters (Arc Count, Arc Quench, Reramp Time, and Window Time) within preset limits via the digital interface; customized units can be provided for unique arc prone environments, contact Spellman for details.

STA SELECTION TABLE

kV	MAXIMUM RATING mA	MODEL NUMBER
1	4,000	STA1*4
2	2,000	STA2*4
3	1,333	STA3*4
4	1,000	STA4*4
6	667	STA6*4
8	500	STA8*4
10	400	STA10*4
12	333	STA12*4
15	267	STA15*4
20	200	STA20*4
30	133	STA30*4
40	100	STA40*4
50	80	STA50*4
60	67	STA60*4
70	57	STA70*4

*Substitute "P" or positive polarity and "N" for negative polarity.
Polarity must be specified at time of order.

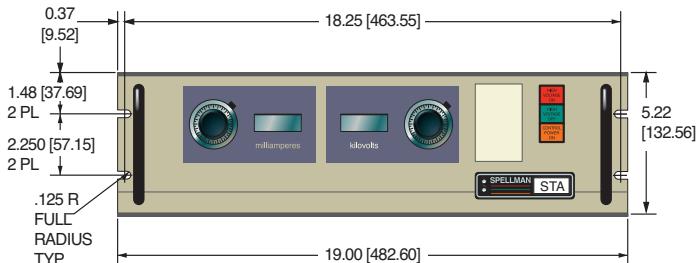
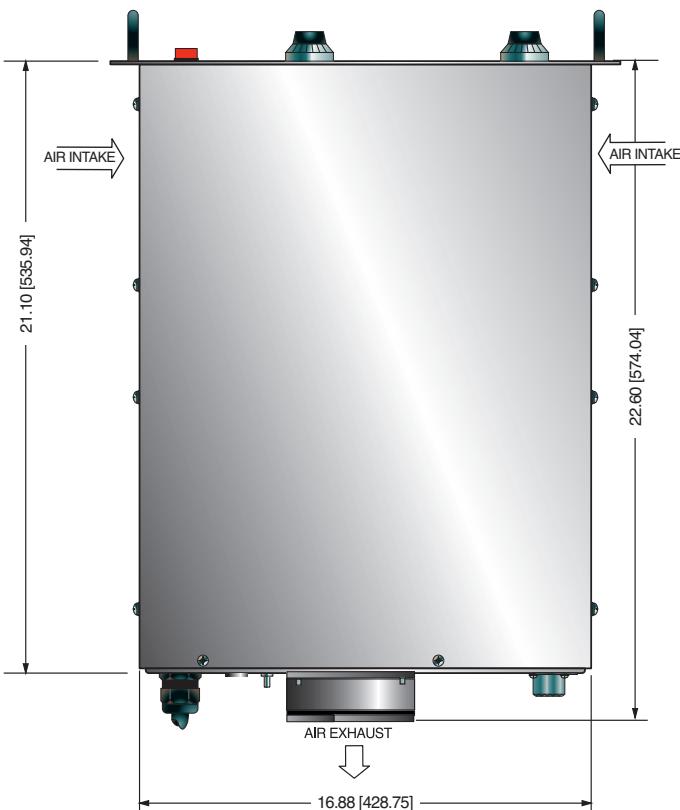
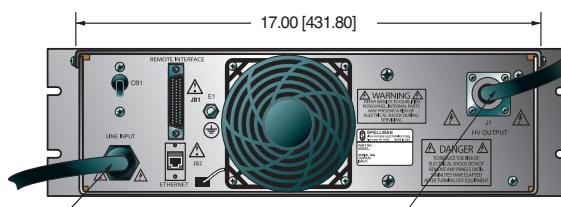


STA rear panel shown with local operation plug installed in 50 pin D connector

**JB1 STA ANALOG INTERFACE—
50 PIN FEMALE D CONNECTOR**

PIN	SIGNAL	PARAMETERS
1	Power Supply Common	Power Supply Ground
2	Reset/HV Inhibit	Normally open, Low = Reset/Inhibit
3	External Interlock	+24Vdc @ open, <25mA @ closed
4	External Interlock Return	Return for External Interlock
5	mA Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
6	kV Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
7	+10Vdc Reference Output	+10Vdc @ 1mA
8	mA Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
9	Local mA Program Output	0-10Vdc = 0-100% rated output, front panel pot
10	KV Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
11	Local KV Program Output	0-10Vdc = 0-100% rated output, front panel pot
12	Remote Power On Output	+24Vdc @ open, 2A peak, 1Adc @ closed
13	Remote Power On Return	Return for Remote Power On
14	Remote HV Off	+24Vdc @ open, 2A peak, 1Adc @ closed, connect to pin 15 for front panel operation
15	Remote HV Off/On Common	HV On/Off Common
16	Remote HV On	+24Vdc @ open, 2A peak, 1Adc @ closed, momentarily connect to pin 15 enable high voltage
17	HV Off Indicator	+24Vdc @ 25mA = HV Off
18	HV On Indicator	+24Vdc @ 25mA = HV On
19	Power Supply Common	Supply Ground
20	+24Vdc Output	+24Vdc @ 100mA, maximum
21	Voltage Mode Status	Open Collector, Low = Active
22	Current Mode Status	Open Collector, Low = Active
23	Power Mode Status	Open Collector, Low = Active
24	Interlock Closed Status	Open Collector, Low = Active
25	Power Test Point	0-10Vdc = 0-100% rated output, Zout= 5KΩ, 1%
26	Spare	
27	Spare	
28	Remote Overvoltage Adjust	0-10Vdc = 0-100% rated output
29	Over Power Fault	Open Collector, Low = Active
30	Over Voltage Fault	Open Collector, Low = Active
31	Over Current Fault	Open Collector, Low = Active
32	System Fault	Open Collector, Low = Active
33	RGLT Error Fault	Open Collector, Low = Active
34	Arc	Open Collector, Low = Active
35	Over Temp Fault	Open Collector, Low = Active
36	AC Fault	Open Collector, Low = Active
37	Spare	
38	Spare	
39	Spare	
40	Spare	
41	Spare	
42	Remote Power Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
43	Local Power Program Output	0-10Vdc = 0-100% rated output, internal pot
44	+5Vdc Output	+5Vdc @ 100mA, maximum
45	+15Vdc Output	+15Vdc @ 100mA, maximum
46	-15Vdc Output	-15Vdc @ 10mA, maximum
47	RS232 Tx	
48	RS232 Rx	
49	RS232 GND	
50	Power Supply Common	Power Supply Ground

DIMENSIONS: in.[mm]

FRONT VIEW

TOP VIEW

BACK VIEW




Need higher power? The ST Series provides 12kW in the same size as the STR Series



- **6kW's in Single 6U (10.5") Chassis**
- **Models from 1kV to 150kV**
- **Remote Analog and Remote Ethernet Interface**
- **Arc and Short Circuit Protected**
- **Customer Configurable Features Via Ethernet Interface**
- **OEM Customization Available**

www.spellmanhv.com/manuals/STR

SPECIFICATIONS

Input Voltage:

- | | |
|-----------|--|
| Standard: | 180-264Vac, 50/60Hz, three phase, 90% efficiency, 0.85 power factor |
| Optional: | 360-528Vac 50/60Hz, three phase (400VAC)
180-264Vac 50/60Hz, single phase (1PH) |

Input Current:

- | | |
|-----------|---|
| Standard: | 180-264Vac, three phase 25 amps, maximum |
| Optional: | 360-528Vac, three phase 12.5 amps, maximum
180-264Vac, single phase 57 amps, maximum |

Output Voltage:

19 models from 1kV to 150kV. Each model is available with positive or negative outputs. 1kV to 10kV units are internally reversible.

Local Output Controls:

Voltage and current are continuously adjustable over entire range via ten-turn potentiometers with lockable counting dials.

Voltage Regulation:

- | | |
|-------|--|
| Load: | 0.05% of full voltage +500mV for full load change. |
| Line: | 0.05% of full voltage +500mV over specified input range. |

Current Regulation:

- | | |
|-------|--|
| Load: | 0.05% of full current $\pm 100\mu A$ for any voltage change. |
| Line: | 0.05% of full current over specified input range. |

Ripple:

0.1% p-p +1Vrms

Stability:

0.02%hr. after 1 hour warm-up.

Temperature Coefficient:

100ppm/ $^{\circ}C$. Higher stability (50ppm/ $^{\circ}C$) available on special order via the HS option

Environmental:

- | | |
|--------------------|-----------------------------------|
| Temperature Range: | |
| Operating: | 0 $^{\circ}C$ to 40 $^{\circ}C$ |
| Storage: | -40 $^{\circ}C$ to 85 $^{\circ}C$ |
| Humidity: | 10% to 90% RH, non-condensing. |

Cooling:

Forced air; inlet through side panels, outlet at rear panel

Metering:

Digital voltage and current meters, accurate to within 1%

System Status Display:

"Dead Front" type indicators provide status of up to 12 system operations including voltage and current regulation, fault conditions and circuit control.

TYPICAL APPLICATIONS

Ion Beam Implantation
Semiconductor Processing
Electron Beam Welding
Capacitor Charging
High Power RF Transmitters
Electrostatic Precipitators
X-Ray Systems

HARDWARE BASED OPTIONS

BFP	Blank Front Panel
HS	High Stability
LL(X)	High Voltage Cable Length
400VAC	360-528Vac, Three Phase Input
1PH	180-264Vac, Single Phase Input

SOFTWARE CONFIGURABLE FEATURES

Adjustable Overload Trip
Arc Trip Count
Arc Quench Time
Arc Re-Ramp Time
Constant Power Control
Adjustable Power Trip
Slow Start Ramp Times

Analog Interface Connector:

50 pin female D connector

High Voltage Output Cable:

A detachable 10' (3.05m) long shielded HV cable is provided

Dimensions:

1kV to 120kV:

10.5" (6U)H X 19" W X 21" D (266mm x 482mm x 533mm)

150kV:

10.5" (6U)H X 19" W X 23" D (266mm x 482mm x 584mm)

Weight:

1kV to 50kV: <100 pounds (45.36kg)

60kV to 120kV: <140 pounds (63.50kg)

150kV: <150 pounds (68kg)

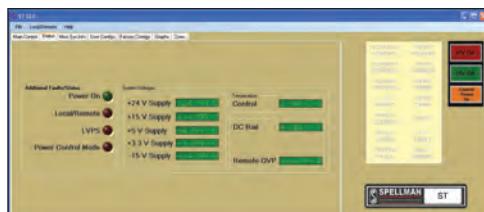
Individual kV models may vary

Regulatory Approvals:

 2004/108/EC, the EMC Directive and 2006/95/EC,
 the Low Voltage Directive. RoHS compliant.

Digital Interface

The STR features a standard RS-232 and Ethernet digital interface. Utilizing these standard digital interfaces can dramatically simplify power supply interfacing requirements saving the user both time and money, while enhancing functionality and overall capability. Spellman provides a GUI with the STR that allows the customer to both customize operational features of the STR while also providing basic power supply operational features. Details of the STR's digital interface capability are described in detail in the STR manual, downloadable via the link on the first page of this data sheet.


Main control screen

Status screen

User configuration screen
Arc Intervention

Spellman's STR power supplies have an arc intervention feature that senses arc currents via a fast acting current sense transformer. The purpose of the arc intervention circuitry is to prevent power supply damage from continuous, long term arcing. The factory default configuration will trip off the unit with an Arc Fault if 4 arcs occur in a 10 second time period. Customers can change basic arc intervention parameters (Arc Count, Arc Quench, Reramp Time, and Window Time) within preset limits via the digital interface; customized units can be provided for unique arc prone environments, contact Spellman for details.


STR rear panel view
STR SELECTION TABLE

MAXIMUM RATING		MODEL NUMBER
kV	mA	
1	6,000	STR1*6
2	3,000	STR2*6
3	2,000	STR3*6
4	1,500	STR4*6
6	1,000	STR6*6
8	750	STR8*6
10	600	STR10*6
12	500	STR12*6
15	400	STR15*6
20	300	STR20*6
30	200	STR30*6
40	150	STR40*6
50	120	STR50*6
60	100	STR60*6
70	86	STR70*6
80	75	STR80*6
100	60	STR100*6
120	50	STR120*6
150	40	STR150*6

*Substitute "P" or positive polarity and "N" for negative polarity.
 Polarity must be specified at time of order.

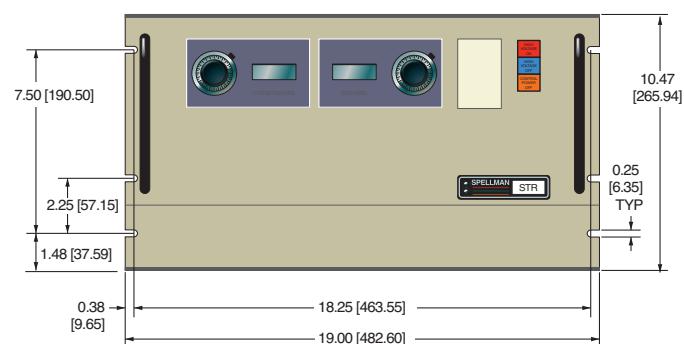
1-10kV units are inherently reversible by design requiring an internal wiring change to swap polarities. Intermediate voltage units are available by special order.

JB1 STR ANALOG INTERFACE— 50 PIN FEMALE D CONNECTOR

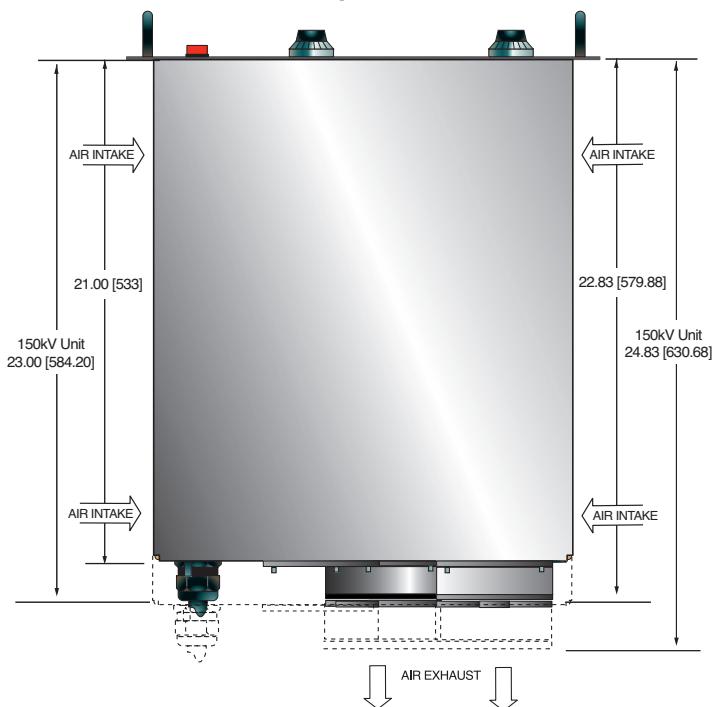
PIN	SIGNAL	PARAMETERS
1	Power Supply Common	Power Supply Ground
2	Reset/HV Inhibit	Normally open, Low = Reset/Inhibit
3	External Interlock	+24Vdc @ open, <25mA @ closed
4	External Interlock Return	Return for External Interlock
5	mA Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
6	kV Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
7	+10Vdc Reference Output	+10Vdc @ 1mA
8	mA Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
9	Local mA Program Output	0-10Vdc = 0-100% rated output, front panel pot
10	kV Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
11	Local kV Program Output	0-10Vdc = 0-100% rated output, front panel pot
12	Remote Power On Output	+24Vdc @ open, 2A peak, 1Adc @ closed
13	Remote Power On Return	Return for Remote Power On
14	Remote HV Off	+24Vdc @ open, 2A peak, 1Adc @ closed, connect to pin15 for front panel operation
15	Remote HV Off/On Common	HV On/Off Common
16	Remote HV On	+24Vdc @ open, 2A peak, 1Adc @ closed, momentarily connect to pin 15 enable high voltage
17	HV Off Indicator	+24Vdc @ 25mA = HV Off
18	HV On Indicator	+24Vdc @ 25mA = HV On
19	Power Supply Common	Supply Ground
20	+24Vdc Output	+24Vdc @ 100mA, maximum
21	Voltage Mode Status	Open Collector, Low = Active
22	Current Mode Status	Open Collector, Low = Active
23	Power Mode Status	Open Collector, Low = Active
24	Interlock Closed Status	Open Collector, Low = Active
25	Power Test Point	0-10Vdc = 0-100% rated output, Zout= 5KΩ, 1%
26	Spare	
27	Spare	
28	Remote Overvoltage Adjust	0-10Vdc = 0-100% rated output
29	Over Power Fault	Open Collector, Low = Active
30	Over Voltage Fault	Open Collector, Low = Active
31	Over Current Fault	Open Collector, Low = Active
32	System Fault	Open Collector, Low = Active
33	RGLT Error Fault	Open Collector, Low = Active
34	Arc	Open Collector, Low = Active
35	Over Temp Fault	Open Collector, Low = Active
36	AC Fault	Open Collector, Low = Active
37	Spare	
38	Spare	
39	Spare	
40	Spare	
41	Spare	
42	Remote Power Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
43	Local Power Program Output	0-10Vdc = 0-100% rated output, internal pot
44	+5Vdc Output	+5Vdc @ 100mA, maximum
45	+15Vdc Output	+15Vdc @ 100mA, maximum
46	-15Vdc Output	-15Vdc @ 10mA, maximum
47	RS232 Tx	
48	RS232 Rx	
49	RS232 GND	
50	Power Supply Common	Power Supply Ground

DIMENSIONS: in.[mm]

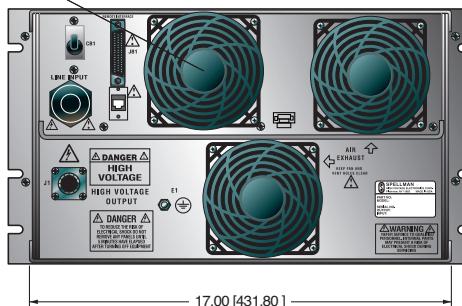
FRONT VIEW



TOP VIEW



BACK VIEW





Spellman's ST Series of 12kW high voltage power supplies are available in positive or negative polarities in 19 different models with outputs ranging from 1kV to 150kV. A full featured front panel allows easy local control, while an extensive analog interface provides comprehensive remote capability. The standard Ethernet and RS-232 digital interfaces simplify integrating the ST into your system design.

The ST's robust IGBT inverter is inherently fault tolerant and is ideal for demanding applications like semiconductor processing and vacuum deposition. Many operational features can be configured by the user to suit their particular requirements. Power >100kW's can be provided by configuring additional chassis in parallel.

TYPICAL APPLICATIONS

- Ion Beam Implantation
- Semiconductor Processing
- Electron Beam Welding
- Capacitor Charging
- High Power RF Transmitters
- Electrostatic Precipitators
- X-Ray Systems

HARDWARE BASED OPTIONS

BFP	Blank Front Panel
HS	High Stability
LL(X)	High Voltage Cable Length
400VAC	360-528Vac Input

SOFTWARE CONFIGURABLE FEATURES

- Adjustable Overload Trip
- Arc Trip Count
- Arc Quench Time
- Arc Re-Ramp Time
- Constant Power Control
- Adjustable Power Trip
- Slow Start Ramp Times

- **12kW's in Single 6U (10.5") Chassis**
- **Models from 1kV to 150kV**
- **Remote Analog and Remote Ethernet Interface**
- **Parallel Units for >100kW's**
- **Arc and Short Circuit Protected**
- **Customer Configurable Features Via Ethernet Interface**
- **OEM Customization Available**

www.spellmanhv.com/manuals/ST

SPECIFICATIONS

Input Voltage:

Standard:	180-264Vac, 50/60Hz, three phase, 90% efficiency, 0.85 power factor
Optional:	360-528Vac 50/60Hz, three phase (400Vac)

Input Current:

Standard:	180-264Vac, three phase; 50 amps, maximum
Optional:	360-528Vac, three phase; 25 amps, maximum

Output Voltage:

19 models from 1kV to 150kV. Each model is available with positive or negative outputs. 1kV to 10kV units are internally reversible.

Local Output Controls:

Voltage and current are continuously adjustable over entire range via ten-turn potentiometers with lockable counting dials.

Voltage Regulation:

Load:	0.05% of full voltage +500mV for full load change.
Line:	0.05% of full voltage +500mV over specified input range.

Current Regulation:

Load:	0.05% of full current $\pm 100\mu\text{A}$ for any voltage change.
Line:	0.05% of full current over specified input range.

Ripple:

0.3% p-p +1Vrms. Lower ripple available via special order

Stability:

0.02%hr. after 1 hour warm-up.

Temperature Coefficient:

100ppm/ $^{\circ}\text{C}$. Higher stability (50ppm/ $^{\circ}\text{C}$) available on special order via the HS option

Environmental:

Temperature Range:	
Operating:	0 $^{\circ}\text{C}$ to 40 $^{\circ}\text{C}$
Storage:	-40 $^{\circ}\text{C}$ to 85 $^{\circ}\text{C}$
Humidity:	10% to 90% RH, non-condensing.

Cooling:

Forced air; inlet through side panels, outlet at rear panel

Metering:

Digital voltage and current meters, accurate to within 1%

System Status Display:

"Dead Front" type indicators provide status of up to 12 system operations including voltage and current regulation, fault conditions and circuit control.

Digital Interface:

Ethernet and RS-232 digital interface implemented with 12 bits of resolution. A VB GUI is provided.

Input Line Connector:

A 6 foot (1.8 meter) long captive line cord is provided.

Analog Interface Connector:

50 pin female D connector

High Voltage Output Cable:

A detachable 10' (3.05m) long shielded HV cable is provided

Dimensions:

1kV to 120kV:

10.5" (6U)H X 19" W X 21" D (266mm x 482mm x 533mm)

150kV:

10.5" (6U)H X 19" W X 23" D (266mm x 482mm x 584mm)

Weight:

1kV to 50kV: <100 pounds (45.36kg)

60kV to 120kV: <140 pounds (63.50kg)

150kV: <150 pounds (68.03kg)

Individual kV models may vary

Regulatory Approvals:

2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. RoHS compliant.

Digital Interface

The ST features a standard RS-232 and Ethernet digital interface. Utilizing these standard digital interfaces can dramatically simplify power supply interfacing requirements saving the user both time and money, while enhancing functionality and overall capability. Spellman provides a GUI with the ST that allows the customer to both customize operational features of the ST while also providing basic power supply operational features. Details of the ST's digital interface capability are described in detail in the ST manual, downloadable via the link on the first page of this data sheet.



Main control screen



Status screen



User configuration screen

Parallel Capability

The ST series is designed to offer additional power capability by adding chassis in parallel to create a Master/Slave configuration providing up to and beyond 100kW's. The Master chassis is the point of connection for customer interfacing; this multi chassis system effectively functions as a single power supply. The Master unit retains the full featured front panel, while Slave units have a Blank Front Panel. To configure an orderable model number simply use Spellman's applicable base ST model number and increment the power denominator in 12kW steps as required:

ST60P24

This would be an ST with a 60kV, positive polarity, providing 24kW's of power (2 chassis)



Rear panel showing connections for parallel operation



Master/slave 24kW ST

Arc Intervention

Spellman's ST power supplies have an arc intervention feature that senses arc currents via a fast acting current sense transformer. The purpose of the arc intervention circuitry is to prevent power supply damage from continuous, long term arcing. The factory default configuration will trip off the unit with an Arc Fault if 4 arcs occur in a 10 second time period. Customers can change basic arc intervention parameters (Arc Count, Arc Quench, Reramp Time, and Window Time) within preset limits via the digital interface; customized units can be provided for unique arc prone environments, contact Spellman for details.

ST SELECTION TABLE

MAXIMUM RATING		MODEL NUMBER
kV	mA	
1	12,000	ST1*12
2	6,000	ST2*12
3	4,000	ST3*12
4	3,000	ST4*12
6	2,000	ST6*12
8	1,500	ST8*12
10	1,200	ST10*12
12	1,000	ST12*12
15	800	ST15*12
20	600	ST20*12
30	400	ST30*12
40	300	ST40*12
50	240	ST50*12
60	200	ST60*12
70	171	ST70*12
80	150	ST80*12
100	120	ST100*12
120	100	ST120*12
150	67	ST150*10

*Substitute "P" or positive polarity and "N" for negative polarity. Polarity must be specified at time of order.
 1-10kV units are inherently reversible by design requiring an internal wiring change to swap polarities.
 Intermediate voltage units are available by special order.
 150kV units are limited to a maximum output of 10kW's

Parallel operation:

Additional power can be provided in increments of 12kW's by connecting chassis in parallel via the use of the ST's master/slave configuration.

Use the applicable base ST model number and increment the power denominated in 12kW steps as required.

ST10P24 10kV @ 24kW's

ST10P36 10kV @ 36kW's

ST10P48 10kV @ 48kW's



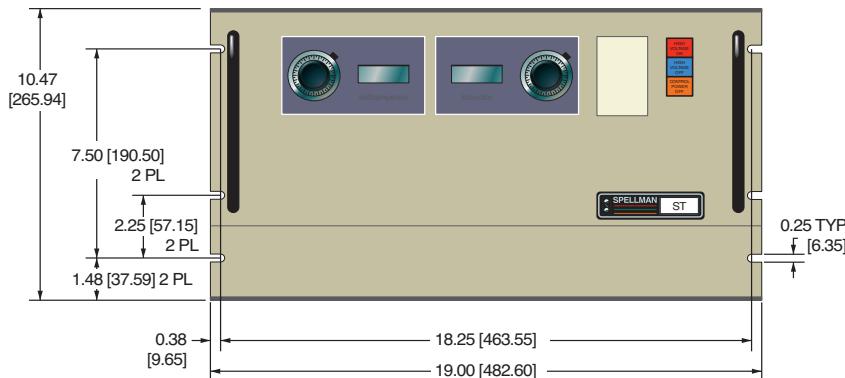
ST rear panel view

JB1 ST ANALOG INTERFACE—
50 PIN FEMALE D CONNECTOR

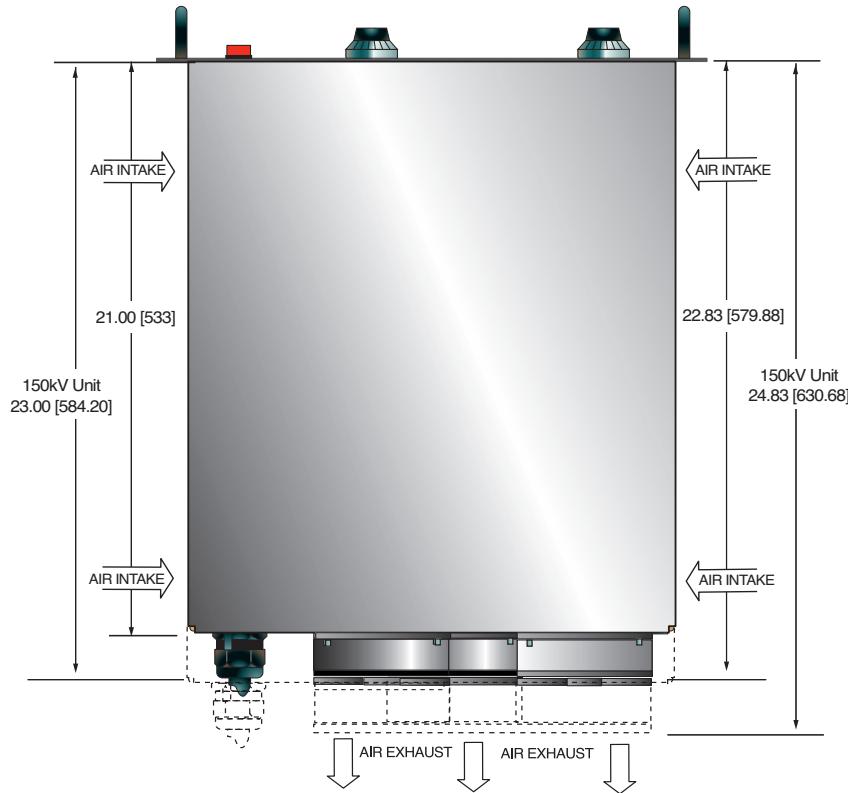
PIN	SIGNAL	PARAMETERS
1	Power Supply Common	Power Supply Ground
2	Reset/HV Inhibit	Normally open, Low = Reset/Inhibit
3	External Interlock	+24Vdc @ open, <25mA @ closed
4	External Interlock Return	Return for External Interlock
5	mA Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
6	kV Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
7	+10Vdc Reference Output	+10Vdc @ 1mA
8	mA Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
9	Local mA Program Output	0-10Vdc = 0-100% rated output, front panel pot
10	kV Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
11	Local kV Program Output	0-10Vdc = 0-100% rated output, front panel pot
12	Remote Power On Output	+24Vdc @ open, 2A peak, 1Adc @ closed
13	Remote Power On Return	Return for Remote Power On
14	Remote HV Off	+24Vdc @ open, 2A peak, 1Adc @ closed, connect to pin 15 for front panel operation
15	Remote HV Off/On Common	HV On/Off Common
16	Remote HV On	+24Vdc @ open, 2A peak, 1Adc @ closed, momentarily connect to pin 15 enable high voltage
17	HV Off Indicator	+24Vdc @ 25mA = HV Off
18	HV On Indicator	+24Vdc @ 25mA = HV On
19	Power Supply Common	Supply Ground
20	+24Vdc Output	+24Vdc @ 100mA, maximum
21	Voltage Mode Status	Open Collector, Low = Active
22	Current Mode Status	Open Collector, Low = Active
23	Power Mode Status	Open Collector, Low = Active
24	Interlock Closed Status	Open Collector, Low = Active
25	Power Test Point	0-10Vdc = 0-100% rated output, Zout= 5KΩ, 1%
26	Spare	
27	Spare	
28	Remote Overvoltage Adjust	0-10Vdc = 0-100% rated output
29	Over Power Fault	Open Collector, Low = Active
30	Over Voltage Fault	Open Collector, Low = Active
31	Over Current Fault	Open Collector, Low = Active
32	System Fault	Open Collector, Low = Active
33	RGLT Error Fault	Open Collector, Low = Active
34	Arc	Open Collector, Low = Active
35	Over Temp Fault	Open Collector, Low = Active
36	AC Fault	Open Collector, Low = Active
37	Spare	
38	Spare	
39	Spare	
40	Spare	
41	Spare	
42	Remote Power Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
43	Local Power Program Output	0-10Vdc = 0-100% rated output, internal pot
44	+5Vdc Output	+5Vdc @ 100mA, maximum
45	+15Vdc Output	+15Vdc @ 100mA, maximum
46	-15Vdc Output	-15Vdc @ 10mA, maximum
47	RS232 Tx	
48	RS232 Rx	
49	RS232 GND	
50	Power Supply Common	Power Supply Ground

DIMENSIONS: in.[mm]

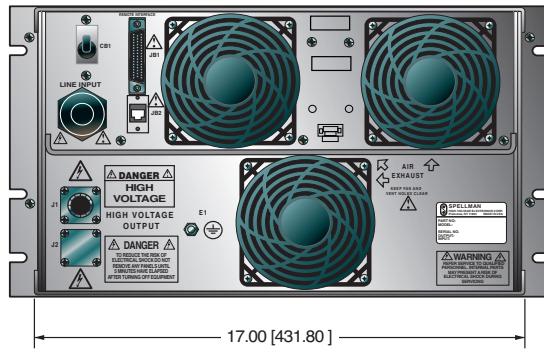
FRONT VIEW



TOP VIEW



BACK VIEW





Spellman's XLG Series of X-ray generators are well regulated high voltage power supplies with output voltages to 130kV and very low ripple achieved through the use of advanced resonant conversion techniques. Extremely stable voltage and emission current outputs result in significant performance improvements over previously available technology. The XLG Series provides all the power, control and support functions required for X-ray applications including a regulated dc filament supply. These units incorporate local and remote programming, monitoring, safety interlock, short-circuit and overload protection.

TYPICAL APPLICATIONS

- Plating Measurement
- Mineral Analysis
- X-ray Fluorescence

OPTIONS

APT	Adjustable Power Trip
AT	Arc Trip
SS(x)	Non-Standard Slow Start
NSS	No Slow Start
IO	Instant ON
LL(x)	Extra Length HV Cable
SL	Slides

SPECIFICATIONS

Input Voltage:

115Vac \pm 10%, 50-60Hz single phase or
220Vac \pm 10%, 50-60Hz single phase.

Voltage and Current Control:

Local: continuously adjustable from zero to maximum rating via a ten-turn potentiometer with a lockable counting dial.
Remote: 0 to +10Vdc proportional from 0 to full output.
Accuracy: \pm 1%. Input Impedance: 10Mohm.

Filament:

Specify at time of order:
FH: 9A, 3V.
FL: 3A, 3V.
Preheat level is 0.45 amps in standby

- **Output Voltages to 130kV**
- **Integrated Ground Referenced Filament Supply**
- **Low Ripple**
- **"Hot Anode"**
- **Positive Polarity**
- **Local & Remote Programming**
- **OEM Customization Available**

www.spellmanhv.com/manuals/XLG

Voltage Regulation:

Load: 0.005% of full output voltage no load to full load.
Line: 0.005% for input voltage range change.

Current Regulation:

Load: 0.05% of full current \pm 100 μ A from 0 to full voltage.
Line: 0.05% of rated current over specified input range.

Ripple:

0.03% rms below 1kHz.
0.75% rms above 1kHz.

Temperature Coefficient:

100ppm/ $^{\circ}$ C.

Stability:

0.01%/8 hrs after 1/2 hour warm-up.
0.02% per 8 hours (typical).

Cooling:

Free air convection.

Metering:

Digital voltage and current meters (3.5 digits),
1% accuracy.

HV Output Cable:

10' (3.3m) of shielded HV cable removable at rear.

I/O Connectors:

25 pin D-type for control interface with
mating connector provided.

Dimensions:

30 to 60kV:
3.5" H x 19" W x 19" D (8.9cm x 48.3cm x 48.3cm).
80 to 130kV:
3.5" H x 19" W x 24" D (8.9cm x 48.3cm x 61.0cm).

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive
and 2006/95/EC, the Low Voltage Directive.

FRONT PANEL STATUS INDICATORS:

Overvoltage	Voltage Control Mode
Overtemperature	Current Control Mode
Regulation Error	Interlock Open
Arc	Interlock Closed
HV ON: Red	HV OFF: Green

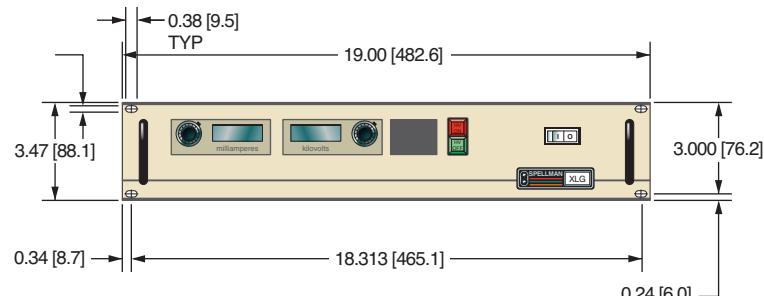
XLG SELECTION TABLE 0.1mA, 0.2mA , 0.5mA

kV	0.1mA	0.2mA	.5mA
30	XLG30P3*	XLG30P6*	XLG30P15*
35	XLG35P3.5*	XLG35P7*	XLG35P17.5*
40	XLG40P4*	XLG40P8*	XLG40P20*
50	XLG50P5*	XLG50P10*	XLG50P25*
60	XLG60P6*	XLG60P12*	XLG60P30*
80	XLG80P8*	XLG80P16*	XLG80P40*
100	XLG100P10*	XLG100P20*	XLG100P50*
120	XLG120P12*	XLG120P24*	XLG120P60*
130	XLG130P13*	XLG130P26*	XLG130P65*

*Specify FH for High power (27W) filament, FL for Low power (9W) filament.

DIMENSIONS: in.[mm]

FRONT VIEW

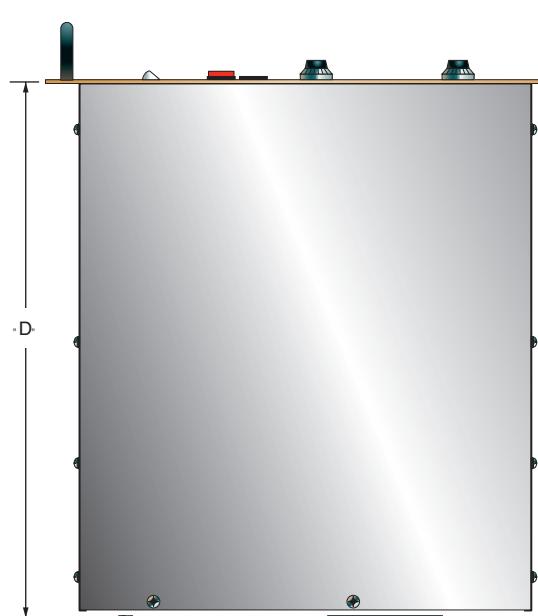


XLG SELECTION TABLE 1.0mA, 2.0mA, 3.0mA

kV	1.0mA	2.0mA	3.0mA
30	XLG30P30*	XLG30P60*	XLG30P90*
35	XLG35P35*	XLG35P70*	XLG35P105*
40	XLG40P40*	XLG40P80*	XLG40P120*
50	XLG50P50*	XLG50P100*	XLG50P150*
60	XLG60P60*	XLG60P120*	XLG60P180*
80	XLG80P80*	XLG80P160*	---
100	XLG100P100*	XLG100P200*	---
120	XLG120P120*	XLG120P240*	---
130	XLG130P130*	XLG130P260*	---

*Specify FH for High power (27W) filament, FL for Low power (9W) filament.

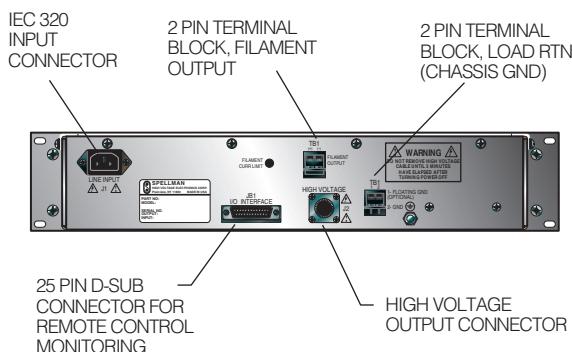
TOP VIEW



XLG CONNECTOR 25 PIN

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated Output
7	+10V Reference	+10V, 1mA Max
8	Remote Current Program In	0 to 10V=0 to 100% Rated Output
9	Local Current Program Out	Front Panel Program Voltage
10	Remote Voltage Program In	0 to 10V=0 to 100% Rated Output
11	Local Voltage Program Out	Front Panel Program Voltage
12	Power Monitor	0 to 10V=0 to 100% Rated Output
13	Remote Power Program In	(Optional)
14	Local HV Off Out	+15V at Open, <25mA at Closed
15	HV Off	Connect to HV OFF for Fp Operation
16	Remote HV On	+15V, 10mA Max=HV Off
17	Remote HV Off Indicator	0=HV On, +15V, 10mA Max=HV Off
18	Remote HV On Indicator	0=HV Off, +15V, 10mA Max=HV On
19	Remote Voltage Mode	Open Collector 50V Max, 10mA Max
20	Remote Current Mode	On=Active
21	Remote Power Mode	0=Fault, +15V, 0.1mA Max=No Fault
22	Remote PS Fault	+15V, 100mA Max
23	+15V Output	+15V, 100mA Max
24	Power Supply Common	Signal Ground
25	Shield Return	Shield Return

BACK VIEW





The MNX Series is the result of Spellman's exceptional high voltage packaging and surface mount fabrication techniques coupled with proprietary encapsulation technology producing this ultra-compact X-Ray generator module. The MNX powers grounded cathode X-Ray tubes from a variety of well-known manufacturers, featuring a 0 to 50kV/65kV high voltage output @ 2mA limited to 50, 65 or 75 Watts. The MNX uses closed loop filament control circuitry providing highly regulated beam current. The ground referenced low noise dc filament supply operates between 0.3 and 3.5 amps. Offering tight regulation, high stability and low ripple, the MNX provides users local and remote analog control to set beam voltage, emission current and filament current limit.

TYPICAL APPLICATIONS

Powering grounded cathode X-ray tubes from Kevex, Oxford, RTW, Superior, Varian, Petrick and Trufocus.

OPTIONS

- XCC** XRM Compatible HV Cable (50kV only)
- 5VPM** 0 to 5 Volt Programming and Monitor Scaling
- 5302** Mammoflex HV cable for MNX
- 2001** Mammoflex HV cable for MNX w/XCC option

SPECIFICATIONS

Input Voltage:

+24Vdc ±10%, for 50W or 75W units
+24Vdc ±1V, for 65kV @ 65W unit

Input Current:

MNX50P50: 4.0 amps, maximum
MNX50P75: 6.0 amps, maximum
MNX65P65: 5.0 amps, maximum
GB Option: 1.0 amp additional, maximum

Efficiency:

80-85%, typical

Output:

0 to 50kV at 0 to 2mA, limited to a maximum of 50 watts or 75 Watts. 0-65kV at 2mA limited to 65 Watts.

Voltage Control:

Local: Internal multi-turn potentiometer to set voltage from 0 to full output voltage.
Remote: 0 to +10Vdc proportional from 0 to full output voltage.
Accuracy: ±1%. Z_{in} : 10Mohm.

Ask about our X-Ray subsystem capabilities

PAGE 1 OF 3

- **50kV at 2mA, 50 or 75 Watt Max**
- **65kV at 2mA, 65 Watt Max**
- **Adjustable Integrated Filament Supply**
- **Arc & Short Circuit Protection**
- **Voltage & Current Programming**
- **Local and Remote Emission Control**
- **Safety Interlock**
- **OEM Customization Available**
- **CE Marked, UL Recognized**

www.spellmanhv.com/manuals/MNX

Emission Control:

Local: Internal potentiometer to set beam current between 0 and full output current.

Remote: 0 to +10Vdc proportional from 0 to full output current.
Accuracy : ±1%. Z_{in} : 10Mohm. Filament limit and filament preheat control capability is also provided.

DC Filament Supply:

Current: 3.5A, adjustable limit
Voltage: 5.0 volt limit

Voltage Regulation:

Load: 0.01% of output voltage no load to full load.
Line: ±0.01% for ±10% change in input voltage.

Current Regulation:

Load: 0.01% of output current from 0 to rated voltage.
Line: ±0.01% for ±10% change in input voltage.

Ripple:

0.1% p-p of maximum rated output voltage, 50kV units (50/75W)
0.1% rms maximum rated output voltage, 65kV units (65W)

Environmental:

Operational: 0°C to +50°C
Storage: -40°C to +85°C
Humidity: 0% to 90%, non-condensing

Temperature Coefficient:

0.01% per °C, voltage and current.

Stability:

0.05% per 8 hours after 1/2 hour warm-up.

Voltage and Current Monitors:

0 to +10Vdc proportional from 0 to rated output. Accuracy ±1%.

Dimensions:

50kV Unit:	5.00"H x 2.87"W x 8"D (127.00mm x 72.90mm x 203.25mm)
65kV Unit:	5.00"H x 2.87"W x 9"D (127.00mm x 72.90mm x 228.65mm)
XCC Option:	5.00"H x 2.87"W x 9"D (50/75W units only) (127.00mm x 72.90mm x 228.65mm)

Weight:

6.5 lbs. (2.9kg)

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. UL/CUL recognized, File E227588.
Note: MNX65P65 is not UL/CUL recognized. RoHS compliant.

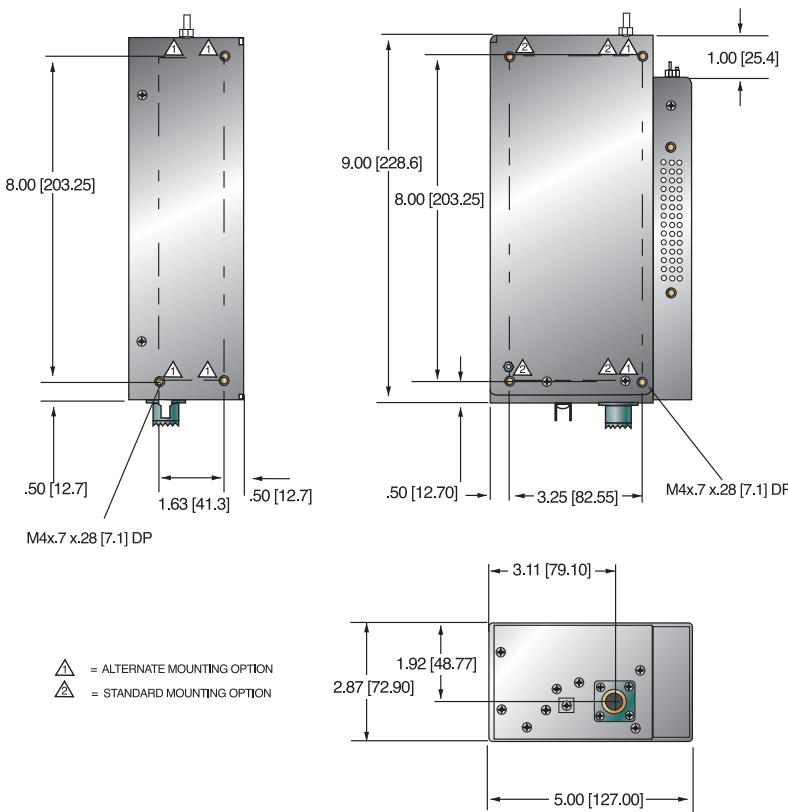
X-Ray Tubes

The MNX powers grounded cathode X-Ray tubes from manufacturers such as Varian Medical Systems, Petrick GmbH and others.



DIMENSIONS: in.[mm]

65kV



J2 POWER INPUT CONNECTOR

PIN	SIGNAL	PARAMETER
1	+24V Input	+24 volts @ 5A, max.
2	24V Return (Gnd.)	Power Ground

J3 FILAMENT CONNECTOR

PIN	SIGNAL	PARAMETER
1	Filament Out	0.3A to 3.5A, 5 volt, max.
2	Filament Return	Filament Ground

J4 ANALOG INTERFACE CONNECTOR MALE 15 PIN MINI "D"

PIN	SIGNAL	PARAMETER
1	Monitor Return	Signal Ground
2	Voltage Monitor	0-10 volts = 0 to full scale, Zout=1KΩ
3	Current Monitor	0-10 volts = 0 to full scale, Zout=1KΩ
4	Interlock Output	Connect 12V HVON bulb to pin 15 to enable
5	+10 Volt Reference	+10 Volts at 1mA, maximum
6	Filament Monitor	1 volt = 1 amp, Zout=1MΩ
7	Voltage Program Input	0-10 volts = 0 to full scale, Zin=10MΩ
8	Local Voltage Program*	0-10 volts, screwdriver adjust
9	Filament Limit Setpoint*	1 volt = 1 amp, screwdriver adjust
10	Current Program Input	0-10 volts = 0 to full scale, Zin=10MΩ
11	Local Current Program*	10 turn pot, screwdriver adjust
12	Not used (+24V Out for Interlock)	(Optional Interlock configuration)
13	Not used (Interlock Coil)	(Optional Interlock configuration)
14	Filament Preheat Setpoint*	1 volt = 1 amp, screwdriver adjust
15	Interlock Return	Interlock Ground

*Denotes 10 turn potentiometer located on front panel

J1 HIGH VOLTAGE OUTPUT CONNECTOR

Spellman drywell type detachable connector.

Standard: A one meter (39.4") long polyethylene mating high voltage cable is provided.

5302: A one meter (39.4") long Mammoflex mating high voltage cable is provided, SHV p/n: 201946-007

2001: A one meter (39.4") long Mammoflex mating high voltage cable is provided, compatible with the XCC Option SHV p/n 201946-002

How To Order:

Sample model number:

50 Watt unit: MNX50P50

65 Watt unit: MNX65P65

75 Watt unit: MNX50P75

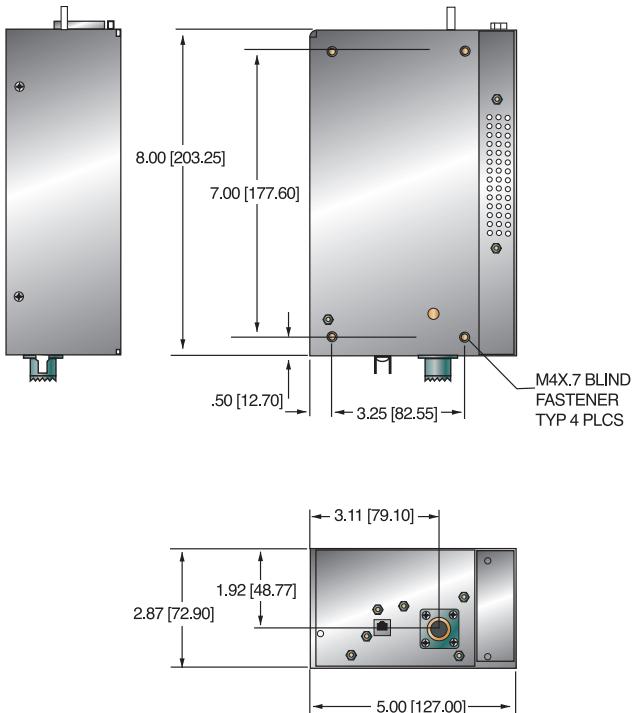
Options are added to the model number as follows:

MNX50P50/XCC

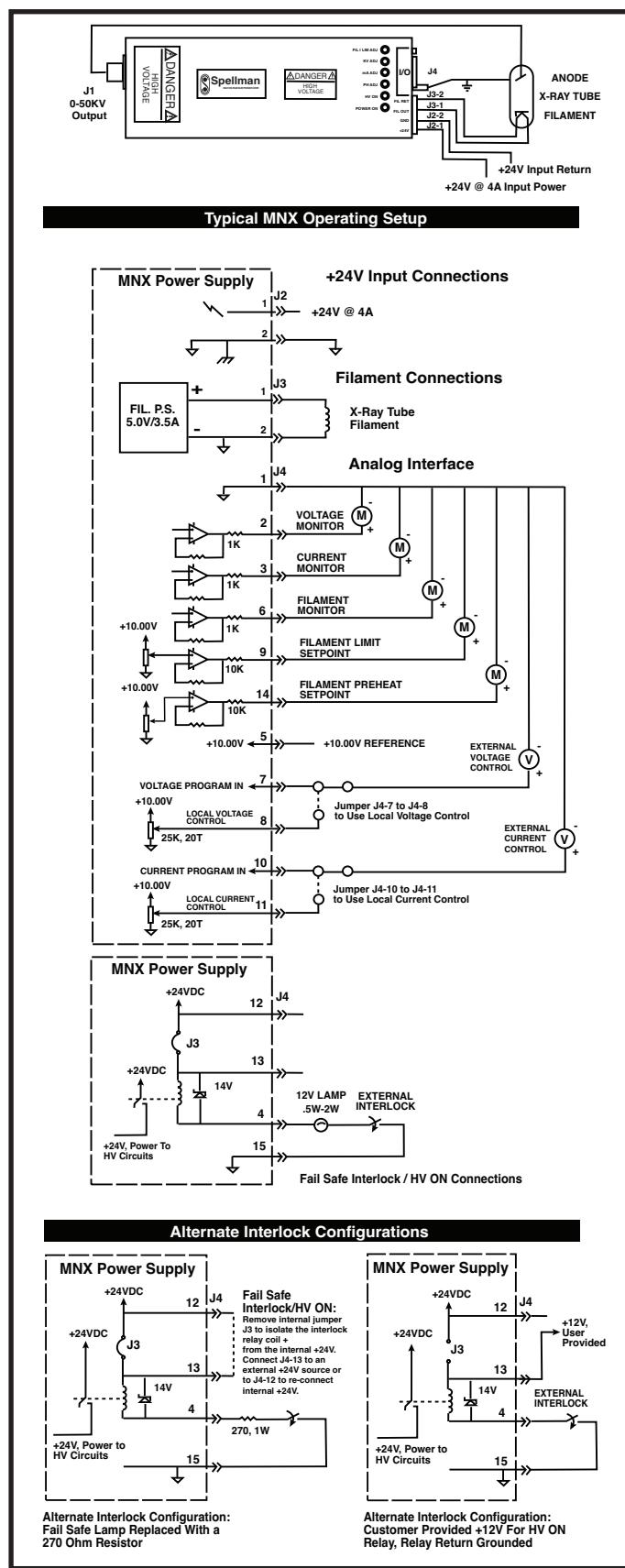
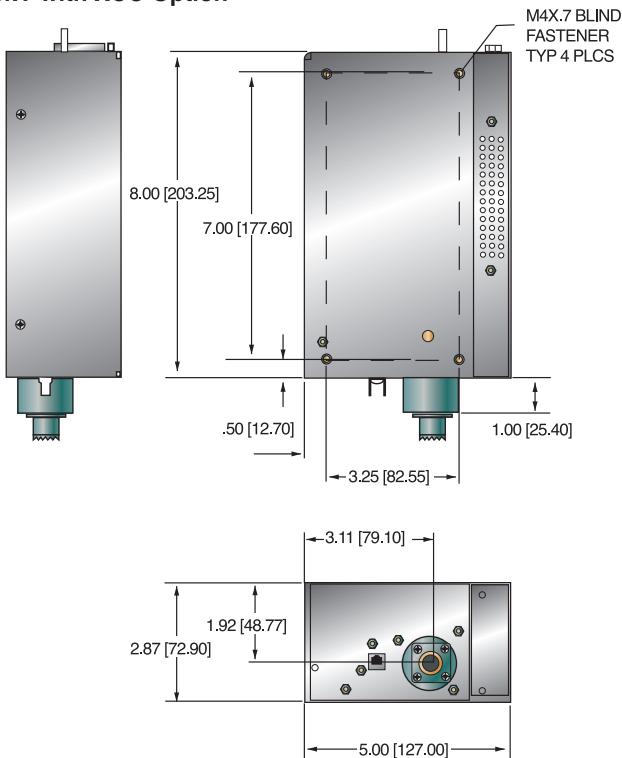
Ask about our X-Ray subsystem capabilities

DIMENSIONS: in.[mm]

50kV



50kV with XCC Option



Ask about our X-Ray subsystem capabilities

PAGE 1 OF 5



The uX Series is the result of Spellman's exceptional high voltage packaging and surface mount fabrication techniques coupled with proprietary encapsulation technology producing this ultra-compact X-Ray generator module. The uX powers grounded cathode X-Ray tubes from a variety of well-known manufacturers, featuring a 0 to 50kV/65kV high voltage output @ 2mA limited to 50, 65 or 75 Watts. The uX uses closed loop filament control circuitry providing highly regulated beam current. The low noise dc filament supply operates between 0.3 and 3.5 amps. Offering tight regulation, high stability and low ripple, the uX provides users local and remote analog control to set beam voltage, emission current and filament current limit. USB, RS-232 and Ethernet interface is standard.

TYPICAL APPLICATIONS

Powering grounded cathode X-Ray tubes from Kevex, Oxford, RTW, Superior, Varian and Trufocus.

OPTIONS

- XCC** XRM Compatible HV Cable (50kV only)
- 5VPM** 0 to 5 Volt Programming and Monitor Scaling
- GB** Grid Bias
- GF** Grounded Filament
- 5302** Mammoflex HV cable for uX
- 2001** Mammoflex HV cable for uX w/XCC option

SPECIFICATIONS

Input:

+24Vdc $\pm 10\%$, 5.0A maximum for either 50 Watts or 75 Watts.
+24Vdc $\pm 1\%$, 5.0A maximum for 65kV/65W units.

Efficiency:

75%, typical

Output:

0 to 50kV at 0 to 2mA, limited to a maximum of 50 watts or 75 Watts. 0-65kV at 2mA limited to 65 Watts.

Voltage Control:

Local: Internal multi-turn potentiometer to set voltage from 0 to full output voltage.
Remote: 0 to +10Vdc proportional from 0 to full output voltage.
Accuracy: $\pm 1\%$. Z_{IN} : 10Mohm.

- **50kV at 2 mA. 50 or 75 Watt Max.**
- **65kV at 2 mA. 65 Watt Max.**
- **Adjustable Isolated Filament Supply**
- **Overvoltage & Short Circuit Protection**
- **Voltage & Current Programming**
- **Local and Remote Emission Control**
- **Safety Interlock**
- **RS-232, Ethernet, & USB Standard**
- **Redundant HV Monitor Signal Available**
- **OEM Customization Available**

Emission Control:

Local: Internal potentiometer to set beam current between 0 and full output current.

Remote: 0 to +10Vdc proportional from 0 to full output current.

Accuracy: $\pm 1\%$. Z_{IN} : 10Mohm. Filament limit and filament preheat control capability is also provided.

DC Filament Supply:

Isolated filament power supply generates emission current feedback signal for accurate low X-Ray tube current performance.

Current: 3.5A, adjustable limit

Voltage: 5.0 volt limit

Environmental:

Operational: 0°C to +50°C

Storage: -40°C to +85°C

Humidity: 0% to 90%, non-condensing

Temperature Coefficient:

0.01% per °C, voltage and current.

Stability:

0.05% per 8 hours after 1/2 hour warm-up.

Voltage and Current Monitors:

0 to +10Vdc proportional from 0 to rated output. Accuracy $\pm 1\%$.

Redundant Voltage Monitor:

A redundant high voltage feedback divider with proportional 0 to +10Vdc = 0 to 100% output voltage signal can be provided on a custom basis.

Dimensions:

50kV Unit: 4.00" H x 2.87" W x 8.00" D
(101.6mm x 72.95mm x 202.20mm).

65kV Unit: 4.00" H x 2.87" W x 9.00" D
(101.6mm x 72.95mm x 228.60mm).

XCC Option: 4.00" H x 2.87" W x 9.00" D
(101.6mm x 72.95mm x 228.60mm).

Weight:

4.5 lbs. (2.1kg) typical

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. UL/CUL recognized, File E227588. RoHS compliant.

X-Ray Tubes

The uX powers grounded cathode X-Ray tubes from manufacturers such as Varian Medical Systems, Petrick GmbH and others.

**Digital Interface**

The uX features a standard USB, RS-232 and Ethernet digital interface. Utilizing these standard digital interfaces can dramatically simplify power supply interfacing requirements saving the user both time and money, while enhancing functionality and overall capability. Spellman provides a GUI with the uX that allows the customer to both customize operational features of the uX while also providing basic power supply operational features. Details of the uX's digital interface capability are described in detail in the uX manual.

Closeup showing digital interface connectors



Main Control Screen



Filament Status Screen

Grid Bias Option (GB):

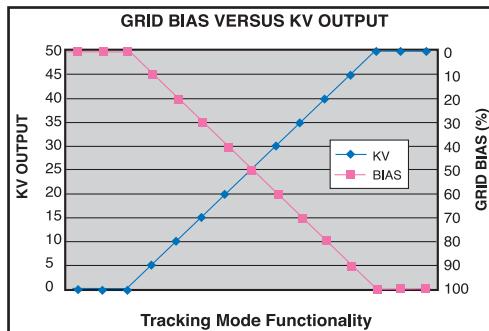
Plug-n-Play compatibility for Oxford's Apogee X-Ray Tube Spellman's Grid Bias Option for the uX Series is specifically designed for popular commercially available grid bias X-Ray tubes. The Grid Bias voltage is developed via the use of separate integrated high frequency switching circuit, providing maximum flexibility and control. The Grid Bias output is a voltage regulated, current compliant topology ideally suited for Wehnelt electrode applications. Arc and short circuit protection of the Grid Bias output prevents any damage due to transient events or installation errors.

Tracking Mode Operation

Functioning in tracking mode the voltage monitor (0-10Vdc = 0 to 50kV) of the main high voltage output is internally connected to the Grid Bias programming input (0-10Vdc = 0 to -300Vdc of Grid Bias). Connected in this manner the Grid Bias output will track in a linearly proportional fashion the setting of the main kV output.

A multturn potentiometer limits the maximum magnitude of Grid Bias output applied to the X-Ray tube, providing unparalleled flexibility.

The output of the Grid Bias option is provided via an auxiliary two position Phoenix Contact terminal block, the mating connector is provided.

**GRID BIAS SPECIFICATIONS**

Output Voltage:	0 to -300Vdc
Output Current:	0.25mA, maximum
Load Regulation:	1% of output voltage, no load to full load
Line Regulation:	1% for a ±10% change in input voltage
Ripple:	1% of maximum rated voltage

uX with Grid Bias Option.
Shown with Oxford Apogee X-Ray Tube
(not included)



Note: Units ordered with the GB Option will be provided with the XCC Option for proper high voltage cable compatibility.

OXFORD
INSTRUMENTS

HIGH VOLTAGE OUTPUT CONNECTOR

Spellman drywell type detachable connector.

Standard: A one meter (39.4") long polyethylene mating high voltage cable is provided.

5302: A one meter (39.4") long Mammoflex mating high voltage cable is provided, SHV p/n 201946-007

2001: A one meter (39.4") long Mammoflex mating high voltage cable is provided, compatible with the XCC Option SHV p/n 201946-002

POWER INPUT/FILAMENT CONNECTOR 4 PIN PHOENIX CONTACT

PIN	SIGNAL	PARAMETER
1	+24V Input	+24 volts @ 5A, max.
2	24V Return (Gnd.)	Power Ground
3	Filament Out	0.3A to 3.5A, 5 volt, max.
4	Filament Return	Filament Return

Note: On the standard uX unit, the filament return wire cannot be grounded as this would short circuit the tube return current monitoring to the uX. If grounding of the filament is required, please select the GF (Grounded Filament) option when ordering.

ANALOG INTERFACE CONNECTOR MALE 15 PIN MINI "D"

PIN	SIGNAL	PARAMETER
1	Monitor Return	Signal Ground
2	Voltage Monitor	0-10 volts = 0 to full scale, Zout=1KΩ
3	Current Monitor	0-10 volts = 0 to full scale, Zout=1KΩ
4	Interlock Output	Connect 12V HVON bulb to pin 15 to enable
5	+10 Volt Reference	+10 Volts at 1mA, maximum
6	Filament Monitor	1 volt = 1 amp, Zout=1KΩ
7	Voltage Program Input	0-10 volts = 0 to full scale, Zin=10MΩ
8	Local Voltage Program*	0-10 volts, screwdriver adjust
9	Filament Limit Setpoint*	1 volt = 1 amp, screwdriver adjust
10	Current Program Input	0-10 volts = 0 to full scale, Zin=10MΩ
11	Local Current Program*	10 turn pot, screwdriver adjust
12	Not used (+24V Out for Interlock)	(Optional Interlock configuration)
13	Not used (Interlock Coil)	(Optional Interlock configuration)
14	Filament Preheat Setpoint*	1 volt = 1 amp, screwdriver adjust
15	Interlock Return	Interlock Ground

*Denotes 10 turn potentiometer accessible through holes in cover

GRID BIAS CONNECTOR 2 PIN PHOENIX CONTACT

PIN	SIGNAL	PARAMETER
1	Ground	Chassis Ground
2	Grid Bias	0 to -300Vdc

USB DIGITAL INTERFACE— 4 PIN USB "B" CONNECTOR

PIN	SIGNAL	PARAMETER
1	VBUS	+5 Vdc
2	D-	Data -
3	D+	Data +
4	GND	Ground

ETHERNET DIGITAL INTERFACE— 8 PIN RJ45 CONNECTOR

PIN	SIGNAL	PARAMETER
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	NC	No Connection
5	NC	No Connection
6	RX-	Receive Data -
7	NC	No Connection
8	NC	No Connection

RS-232 DIGITAL INTERFACE— 9 PIN FEMALE D CONNECTOR

PIN	SIGNAL	PARAMETER
1	NC	No Connection
2	TX out	Transmit Data
3	RX in	Receive Data
4	NC	No Connection
5	SGND	Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

How To Order:

Sample model number:

50 Watt unit: uX50P50

65 Watt unit: uX65P65

75 Watt unit: uX50P75

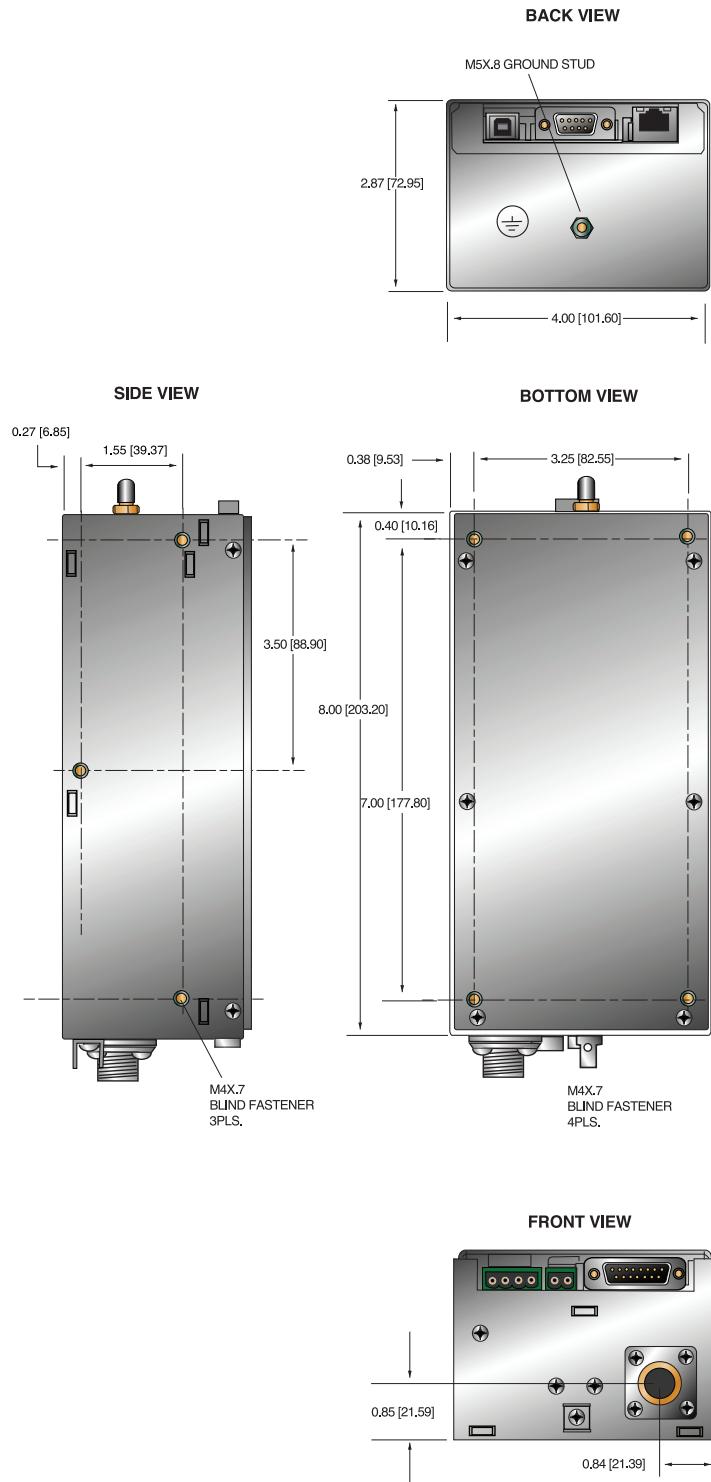
Options are added to the model number as follows:

uX50P50/XCC or uX50P75/GB

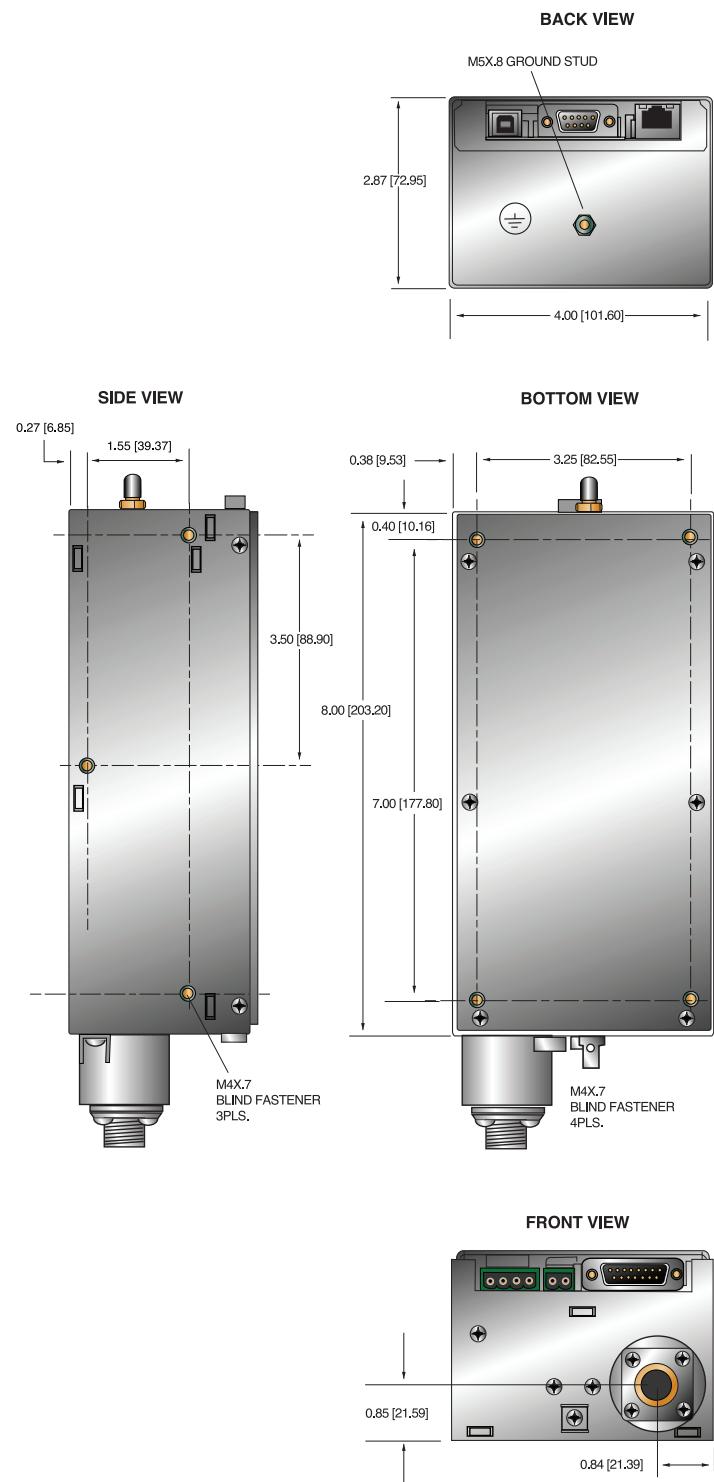
Ask about our X-Ray subsystem capabilities

DIMENSIONS: in.[mm]

50kV

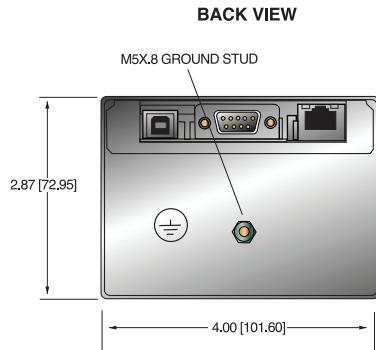


50kV with XCC Option

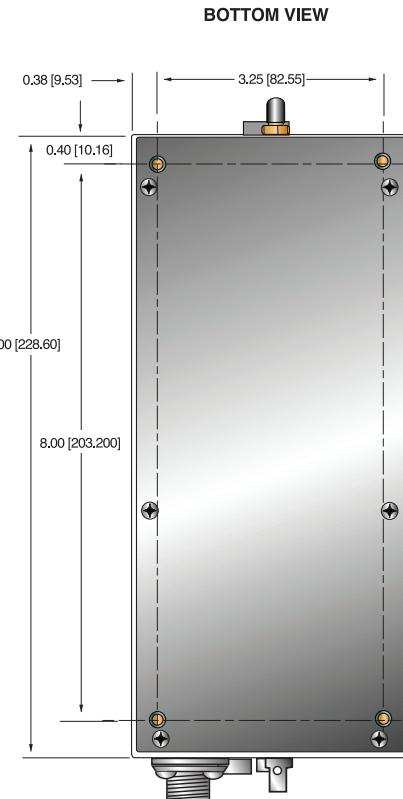


DIMENSIONS: in.[mm]

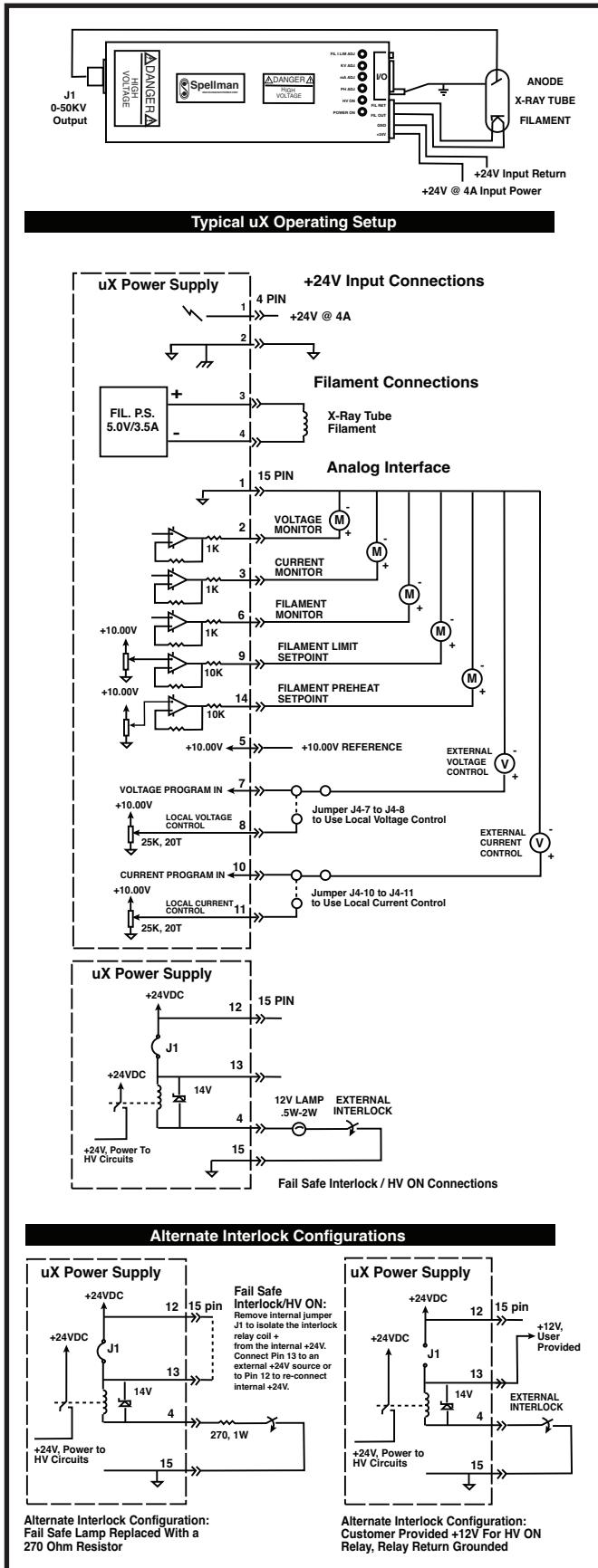
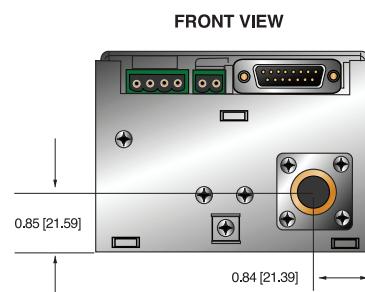
65kV



SIDE VIEW



M4X.7
BLIND FASTENER
3PLS.



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128108-001 REV. D

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The MFX Series is the result of Spellman's exceptional high voltage packaging and surface mount fabrication techniques, coupled with its proprietary encapsulation technology producing this ultra compact-sized OEM X-Ray generator module.

The MFX Series is designed to power floating filament X-Ray tubes from various manufacturers. It features a 0 to 50kV (or 0 to 65kV) high voltage output, and up to 2mA of emission current limited to 50, 65 or 75 Watts, operating from a +24Vdc input. The MFX utilizes a closed loop filamentary beam control circuit to provide a highly regulated beam current. The floating ac filament supply operates between 0.3 and 4 amps. Offering tight regulation, high stability and low ripple, the MFX provides users both local and remote analog control to set beam voltage, emission current and filament current limit. An optional USB, RS-232 and Ethernet interface is available.

OPTIONS

SIC Standard Interface Controller (Ethernet, USB & RS-232)

5VPM 0 to 5 Volt Programming and Monitor Scaling

SPECIFICATIONS

Input:

+24Vdc ±10%, 5.0A maximum for either 50 Watts or 75 Watts.
+24Vdc ±1V, 5.0A maximum for 65kV/65W units.

Efficiency:

80-85%, typical

Output:

0 to 50kV at 0 to 2mA, limited to a maximum of 50 watts or 75 Watts. 0-65kV at 2mA limited to 65 Watts. Negative output polarity.

Voltage Control:

Local: Internal multi-turn potentiometer to set voltage from 0 to full output voltage.

Remote: 0 to +10Vdc proportional from 0 to full output voltage.
Accuracy: ±1%. Z_{in} : 10Mohm.

- **50kV at 2mA, 50 or 75 Watt Max**
- **65kV at 2mA, 65 Watt Max**
- **Floating Integrated Filament Supply**
- **Arc & Short Circuit Protection**
- **Voltage & Current Programming**
- **Local and Remote Emission Control**
- **Safety Interlock**
- **Optional Digital Interface**

www.spellmanhv.com/manuals/MFX

Emission Control:

Local: Internal potentiometer to set beam current between 0 and full output current.

Remote: 0 to +10Vdc proportional from 0 to full output current.
Accuracy : ±1%. Z_{in} : 10Mohm. Filament limit and filament preheat control capability is also provided.

High Frequency AC Filament Supply:

Current: 0-4A, adjustable limit
Voltage: 5.0 volt limit

Voltage Regulation:

Load: 0.01% of output voltage no load to full load.
Line: ±0.01% for ±10% change in input voltage.

Current Regulation:

Load: 0.01% of output current from 0 to rated voltage.
Line: ±0.01% for ±10% change in input voltage.

Ripple:

0.1% p-p of maximum rated output voltage, 50kV units (50/75W)
0.1% rms maximum rated output voltage, 65kV units (65W)

Environmental:

Operational: 0°C to +50°C
Storage: -40°C to +85°C
Humidity: 0% to 90%, non-condensing

Temperature Coefficient:

0.01% per °C, voltage and current.

Stability:

0.05% per 8 hours after 1/2 hour warm-up.

Voltage and Current Monitors:

0 to +10Vdc proportional from 0 to rated output. Accuracy ±1%.

Dimensions:

50kV Unit: 7.00"H x 2.87"W x 8"D
(177.80mm x 72.90mm x 203.25mm)

65kV Unit: 7.00"H x 2.87"W x 9"D
(177.80mm x 72.90mm x 228.65mm)

SIC Option: 7.75"H x 2.87"W x 8"D/9"D
(196.85mm x 72.90mm x 203.25mm/228.65mm)

Weight:

7.0 lbs. (3.2kg)

Regulatory Approvals:

2004/108/EC, the EMC Directive and 2006/95/EC,
the Low Voltage Directive, approval pending. RoHS compliant.

J2 POWER INPUT CONNECTOR

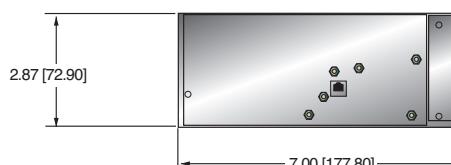
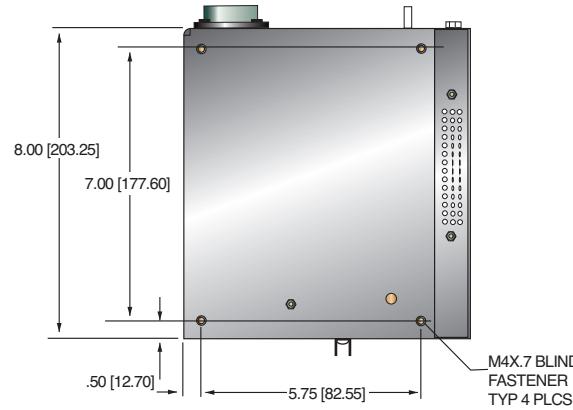
PIN	SIGNAL	PARAMETER
1	+24V Input	+24 volts @ 5A, max.
2	24V Return (Gnd.)	Power Ground

**J4 ANALOG INTERFACE CONNECTOR
MALE 15 PIN MINI "D"**

PIN	SIGNAL	PARAMETER
1	Monitor Return	Signal Ground
2	Voltage Monitor	0-10 volts = 0 to full scale, Zout=1KΩ
3	Current Monitor	0-10 volts = 0 to full scale, Zout=1KΩ
4	Interlock Output	Connect 12V HVON bulb to pin 15 to enable
5	+10 Volt Reference	+10 Volts @ 1mA, maximum
6	Filament Monitor	1 volt = 1 amp, Zout=1KΩ
7	Voltage Program Input	0-10 volts = 0 to full scale, Zin=10MΩ
8	Local Voltage Program*	10 turn pot., screwdriver adjust
9	Filament Limit Setpoint*	1 volt = 1 amp, screwdriver adjust
10	Current Program Input	0-10 volts = 0 to full scale, Zin=10MΩ
11	Local Current Program*	10 turn pot., screwdriver adjust
12	Not used (+24V Out for Interlock)	(Optional Interlock configuration)
13	Not used (Interlock Coil)	(Optional Interlock configuration)
14	Filament Preheat Setpoint*	1 volt = 1 amp, screwdriver adjust
15	Interlock Return	Interlock Ground

*Denotes 10 turn potentiometer located on front panel

DIMENSIONS: in.[mm]

**J1 CATHODE OUTPUT
CLAYMOUNT HV CONNECTOR**

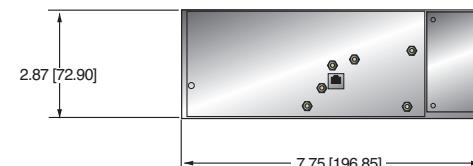
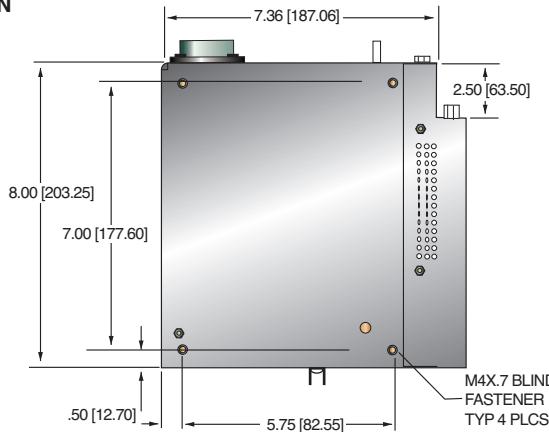
PIN	OUTPUT CONNECTION
C (common)	-High Voltage Output
S (small)	-High Voltage Output
L (large)	Filament Output
G (grid)	Filament Output

Note: No high voltage cable is provided

Recommended Cable:

Claymount part number: 12096

Cable assembly, L3 CA11, CA11, 10F, CS=Bare 10 foot,
Mini Federal Connectors on both ends, ·C· and ·S· are
both connected to the bare wire

50KV WITH SIC OPTION**How To Order:**

Sample model number:

50 Watt unit: MFX50N50

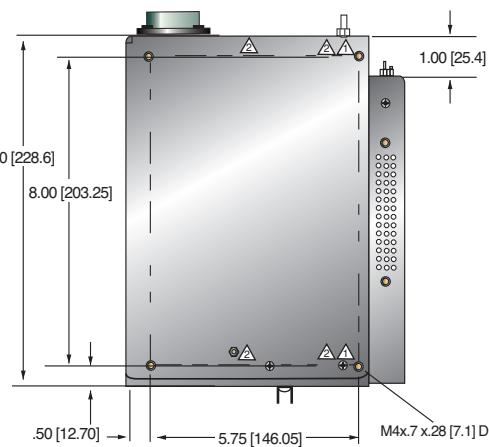
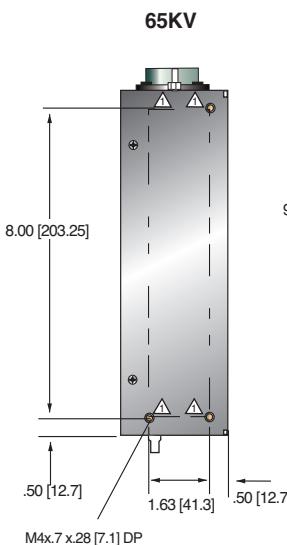
65 Watt unit: MFX65N65

75 Watt unit: MFX50N75

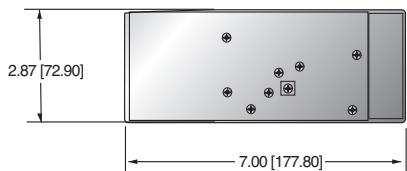
Options are added to the model number as follows:

MFX50N75/SIC

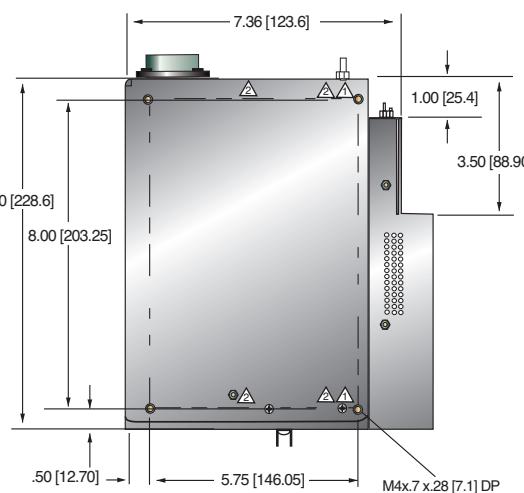
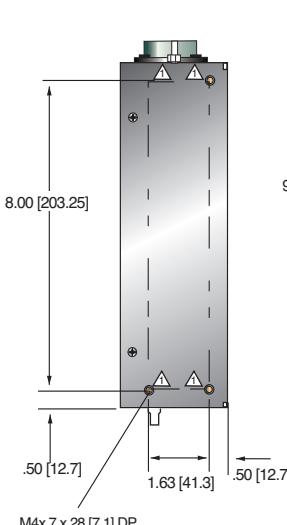
DIMENSIONS: in.[mm]



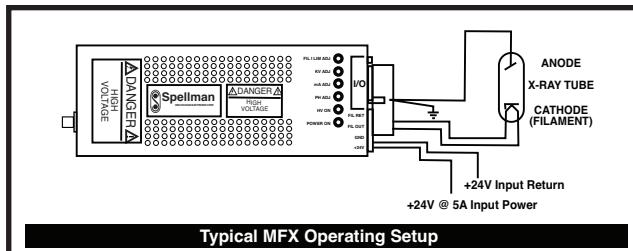
= ALTERNATE MOUNTING OPTION
 = STANDARD MOUNTING OPTION



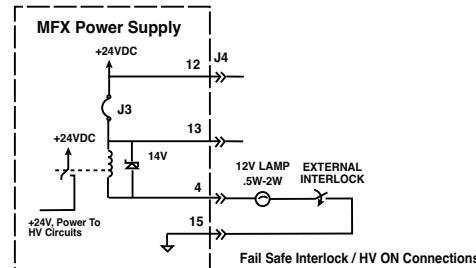
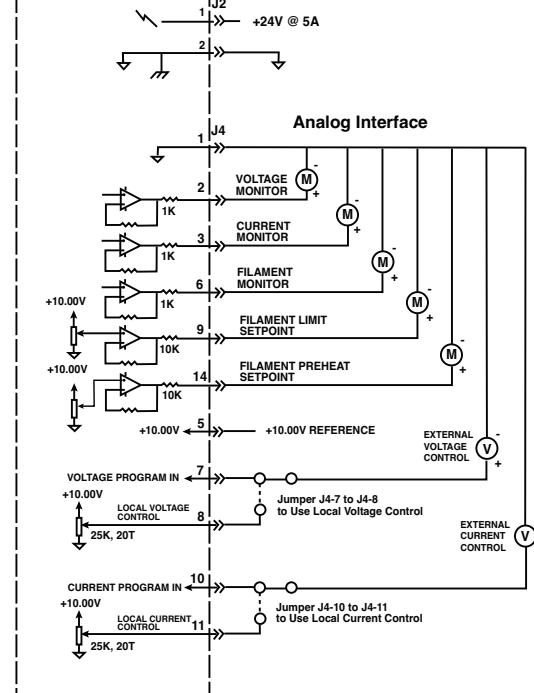
65KV WITH SIC OPTION



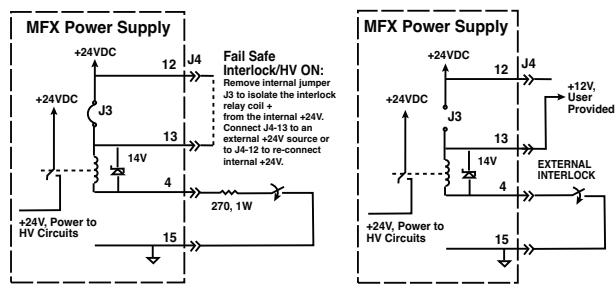
= ALTERNATE MOUNTING OPTION
 = STANDARD MOUNTING OPTION



MFX Power Supply +24V Input Connections



Alternate Interlock Configurations



Alternate Interlock Configuration:
Fail Safe Lamp Replaced With a
270 Ohm Resistor

Alternate Interlock Configuration:
Customer Provided +12V For HV Relay, Relay Return Grounded



Spellman's XRF Series allow for a wide range of input voltages and supply either 80W, 320W or 640W of output power at up to 160kVdc. These lightweight rack-mountable X-Ray generators house a miniaturized high voltage system in a solid encapsulated, oil-free design. The XRF Series is designed with a power factor corrected input circuit which reduces harmonic emissions and noise normally associated with other high frequency switching power supplies. The XRF Series incorporates an internal floating filament and a closed-loop emission control circuit for precise regulation of emission current. Remote monitoring and control of voltage, current and filament current is also provided.

TYPICAL APPLICATIONS

X-ray Inspection, Non-Destructive Testing

OPTIONS

DF Dual Filament
GS Grid Supply
SL Slides

AT Arc Trip
IO Instant ON
SS(X) Non Standard Slow Start

SPECIFICATIONS

Input Voltage:

80W: 90-125 and 180-264Vac at 48-62Hz.
 320W: 180-264Vac at 48-62Hz.
 640W: 180-264Vac at 48-62Hz.

Power Factor:

0.9 or better.

High Voltage Supply:

Output Voltage:
0-160kV, negative polarity.

Output Current:
80W: 0.5mA max.
 320W: 2.0mA at 160kV
 640W: 4.0mA.

Output Voltage Stability:
Within 0.1% of set value after warm-up period at full load.

Output Voltage Ripple:
80W & 320W: <0.1%, or 160V p-p for high freq. and line freq. at full load.
 640W: 0.03% rms <1kHz, 0.75% rms above 1kHz.

Beam Current Stability
80W: Within 0.1% of set value after 1/2 hour warm-up at constant output setting of 30-160kV and line voltage of 90-125 & 180-264Vac.
 320W & 640W:
 Same as 80W except line voltage of 180-264Vac.

- **160kV Output Voltage**
- **Rack-Mountable**
- **Floating Filament**
- **Internal Grid Power Supply (80W Model)**
- **Power Factor Correction**
- **Closed-loop Emission Control**
- **OEM Customization Available**

www.spellmanhv.com/manuals/XRF

Filament Supply:

Constant current DC filament supply with closed-loop current feedback.

Filament Voltage:

7V rms (high frequency) max.
Filament Current: 5A max., adjustable 0-5.0A by external Filament Limit Programming input.

Floating Grid Power Supply:

Grid Supply: The grid supply controls tube beam current in a closed-loop regulation design.

Grid Voltage: 0 to 1200Vdc.

Grid Voltage Ripple: Less than 1.0V rms at any frequency.

Grid Supply Response: Less than 0.5mA in less than 10ms.

Control and Monitoring:

Analog Control Inputs: Three inputs have internal load resistance greater than 330kohms.

Voltage Programming:

80W, 320W & 640W:
 0 to +10Vdc, where 10.0Vdc = 160kV output.

Beam Tube Current Control:

80W: 0 to +10Vdc,
 where 10.0Vdc = 0.5mA tube current.
 320W: 0 to +10Vdc,
 where 10.0Vdc = 2.0mA tube current.
 640W: 0 to +10Vdc,
 where 10.0Vdc = 4.0mA tube current.

Filament Current Control:

0 to +10Vdc, where 5.0Vdc = 5.0A filament current.

Analog Monitor Outputs:

(See tables for details)

Digital Control Inputs:

(See tables for details)

Digital Outputs:

(See tables for details)

Connections:

Output Connector:

160kV European Conical connector
 with 2-ring and center pin end.

Input Power Connector:

5-pin male MS-type, Amphenol P/N 97-3102A-18-20P

Control Connector:

25-pin "D" connector, male, chassis-mounted.

Environmental:

0 to +50°C at 10-95% RH, non-condensing.
 Forced convection cooling.

Dimensions:

7" H x 19" W x 22" D (17.8cm x 48.3cm x 55.9cm).

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.

160kV XRF SELECTION TABLE

OUTPUT VOLTAGE kV	OUTPUT CURRENT mA	OUTPUT POWER W	MODEL NUMBER XRFxxx
160	0.5	80	XRF160N80
160	2.0	320	XRF160N320
160	4.0	640	XRF160N640

J2 AC INPUT CONNECTOR WIRING

5 Pin MS Type	7 Pin UTG Type	CONNECTION
A	1	Auxiliary (Logic) Line
B	2	Auxiliary (Logic) Neutral
C	3	Ground
D	4	Main (Inverter) Line
E	5	Main (Inverter) Neutral

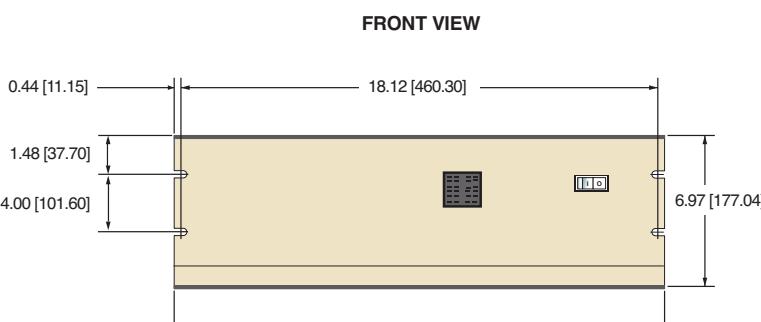
JB1 160kV XRF 80W, 320W, 640W 25 PIN

PIN	SIGNAL	SIGNAL PARAMETERS
1	Filament Limit	0-5V = 0-5A Filament Limit
2	High Voltage on Control	+12VDC IN = HV ON
3	N/C	
4	N/C	
5	High Voltage On Status	Low = HV ON
6	A-Ground	Ground
7	kV Monitor	0-10V = 0-160kV
8	Interlock Control	+12VDC IN = Interlock Closed
9	N/C	
10	mA Demand	0-10V = 0-100% Rated Output
11	N/C	
12	N/C	
13	D-Ground	Ground
14	Fil. Monitor	0-5V = 0-5A
15	N/C	
16	N/C	
17	N/C	
18	N/C	
19	mA Monitor	0-10V = 0-100% Rated Output
20	N/C	
21	+12VDC Out	
22	kV Demand	0-10V = 0-160kV
23	Grid Inhibit/Fil. Select	Low = Grid Inhibit
24	N/C	
25	Chassis Gnd (I/O Shield)	Chassis Gnd.

160kV XRF 80W, 320W, 640W TERMINAL BLOCK 10 PIN

PIN	SIGNAL	SIGNAL PARAMETERS
1	Interlock	Jumper to TB1-2 to close interlock
2	Interlock Return	
3	kV Monitor	0-10V=0-160kV
4	mA Monitor	0-10V = 0-100% Rated Output
5	Filament Monitor	0-5V=0-5A
6	N/C	
7	HV ON Indicator	+15V = HV ON
8	Voltage Mode Indicator	Low = Voltage Mode.
9	Current Mode Indicator	Low = Current Mode.
10	GND	Ground

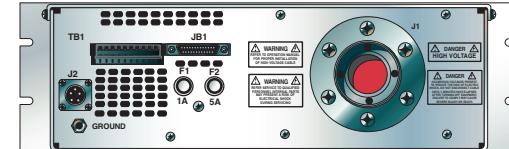
DIMENSIONS: in.[mm]



FRONT VIEW



TOP VIEW



BACK VIEW





The uXHP Series is the result of Spellman's exceptional high voltage packaging and surface mount fabrication techniques coupled with proprietary encapsulation technology producing this ultra-compact X-Ray generator module. The uXHP powers grounded cathode X-Ray tubes from a variety of well-known manufacturers, featuring a 0 to 50kV/65kV/80kV high voltage output @ 5mA limited to 100W. The uXHP uses closed loop filament control circuitry providing highly regulated beam current. The low noise dc filament supply operates between 0.3 and 3.5A. Offering tight regulation, high stability and low ripple, the uXHP provides users local and remote analog control to set beam voltage, emission current and filament current limit. USB, RS-232 and Ethernet interface is standard.

TYPICAL APPLICATIONS

Powering grounded cathode X-Ray tubes from Varian, Kevex, Oxford, RTW, Superior and Trufocus.

SPECIFICATIONS

Input:

+24Vdc $\pm 1\%$; 7.75A maximum

Efficiency:

75%, typical

Output:

See model selection table on page 2

Voltage Control:

Local: Internal multi-turn potentiometer to set voltage from 0 to full output voltage.

Remote: 0 to 10Vdc = 0 to 100% rated output voltage.
Accuracy: $\pm 1\%$. $Z_{in} = 10\text{Mohm}$.

Emission Control:

Local: Internal potentiometer to set beam current from 0 to full output current.

Remote: 0 to 10Vdc = 0 to 100% rated output current.
Accuracy: $\pm 1\%$. $Z_{in} = 10\text{Mohm}$. Filament limit and filament preheat control capability is also provided.

Ask about our X-Ray subsystem capabilities

PAGE 1 OF 4

- **50kV, 65kV and 80kV Output Voltage**
- **100W Output Power**
- **Adjustable Ground Isolated Filament Supply**
- **Overvoltage & Short Circuit Protection**
- **Voltage & Current Programming**
- **Local and Remote Emission Control**
- **Safety Interlock**
- **RS-232, Ethernet, & USB Standard**
- **Redundant HV Monitor Signal**

www.spellmanhv.com/manuals/uXHP

Voltage and Current Monitors:

0 to 10Vdc = 0 to 100% rated output

Accuracy: $\pm 1\%$. $Z_{out} = 1\text{kohm}$

Redundant Voltage Monitor:

A redundant high voltage feedback divider where 0 to 10Vdc = 0 to 100% rated output is monitored via firmware. The analog monitor signal can be provided by special order.

Stability:

0.05% per 8 hours after 1/2 hour warm-up.

Digital Interface:

RS-232, Ethernet and USB is standard

DC Filament Supply:

Ground isolated filament power supply allows actual tube current feedback signal for monitoring accurate low X-Ray tube current performance.

Current: 0-3.5A, adjustable limit

Voltage: 5.0V, maximum compliance

Environmental:

Operational: 0° C to +50° C

Storage: -40° C to +85° C

Humidity: 0% to 90%, non-condensing

Dimensions:

50/65kV Unit: 7.00"H x 3.07"W x 9.00"D
(177.80mm x 78.00mm x 228.60mm)

80kV Unit: 7.00"H x 3.07"W x 10.50"D
(177.80mm x 78.00mm x 266.70mm)

Weight:

50/65kV Unit: 8.5 lbs. (3.85kg)

80kV Unit: 10.0 lbs. (4.53kg)

Cooling:

User provided forced air cooling is required

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. RoHS compliant.

uXHP MODEL SELECTION TABLE

OUTPUT VOLTAGE	OUTPUT CURRENT	OUTPUT POWER	MODEL NUMBER
0-50kV	0-5mA	100W	uXHP50P100
0-65kV	0-5mA	100W	uXHP65P100
0-80kV	0-5mA	100W	uXHP80P100

**CONTROL POWER/FILAMENT CONNECTOR
4 PIN PHOENIX CONTACT**

PIN	SIGNAL	PARAMETER
1	+24V Control Power	+24V @ 1A max
2	+24V Control Power Return	Power Ground
3	Filament Output	0.3A to 3.5A @ 5V, max
4	Filament Return	Filament Return

Note: The filament return wire cannot be grounded as this would short circuit the tube return current monitoring to the uXHP. If grounding of the filament is required, please consult the factory.

**HIGH VOLTAGE POWER INPUT CONNECTOR
2 PIN PHOENIX CONTACT**

PIN	SIGNAL	PARAMETER
1	+24V High Voltage Power Input	+24V @ 7.75A max
2	+24V High Voltage Power Return	Power Ground

**ANALOG INTERFACE CONNECTOR
MALE 15 PIN MINI "D"**

PIN	SIGNAL	PARAMETER
1	Monitor Return	Signal Ground
2	Voltage Monitor	0-10V = 0 to full scale, Zout=1KΩ
3	Current Monitor	0-10V = 0 to full scale, Zout=1KΩ
4	Interlock Output	Connect 12V HV ON bulb to pin 15 to enable
5	+10V Reference	+10V at 1mA, maximum
6	Filament Monitor	1V = 1A, Zout=1KΩ
7	Voltage Program Input	0-10V = 0 to full scale, Zin=10MΩ
8	Local Voltage Program*	0-10V, screwdriver adjust
9	Filament Limit Setpoint*	1V = 1A, screwdriver adjust
10	Current Program Input	0-10V = 0 to full scale, Zin=10MΩ
11	Local Current Program*	10 turn pot, screwdriver adjust
12	Not used (+24V Out for Interlock)	(Optional Interlock configuration)
13	Not used (Interlock Coil)	(Optional Interlock configuration)
14	Filament Preheat Setpoint*	1V = 1A, screwdriver adjust
15	Interlock Return	Interlock Ground

*Denotes 10 turn potentiometer accessible through holes in cover

**USB DIGITAL INTERFACE—
4 PIN USB "B" CONNECTOR**

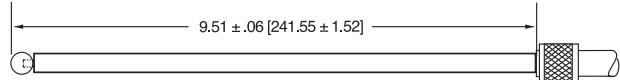
PIN	SIGNAL	PARAMETER
1	VBUS	+5Vdc
2	D-	Data -
3	D+	Data +
4	GND	Ground

HIGH VOLTAGE OUTPUT CONNECTOR

Spellman drywell type detachable connector.

50/65kV: A one meter (39.4") long polyethylene mating high voltage cable with banana plug termination is provided.

80kV: A one meter (39.4") long polyethylene mating high voltage cable with corona ball termination is provided.

**HV Cable Options:**

5302: (50kV unit only)
A one meter (39.4") long Mammoflex mating high voltage cable is provided, SHV p/n 201946-007

2001: (50kV with XCC option and 65kV units only)
A one meter (39.4") long Mammoflex mating high voltage cable is provided, compatible with the XCC Option SHV p/n 201946-002

**ETHERNET DIGITAL INTERFACE—
8 PIN RJ45 CONNECTOR**

PIN	SIGNAL	PARAMETER
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	NC	No Connection
5	NC	No Connection
6	RX-	Receive Data -
7	NC	No Connection
8	NC	No Connection

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

PIN	SIGNAL	PARAMETER
1	NC	No Connection
2	TX out	Transmit Data
3	RX in	Receive Data
4	NC	No Connection
5	SGND	Ground
6	NC	No Connection
7	NC	No Connection
8	Voltage Monitor 2	0-10V = 0 to full scale, Zout = 1KΩ
9	Power Supply OK	+15V = OK, 0V = Fault, Sink/Source 3mA max

How To Order:

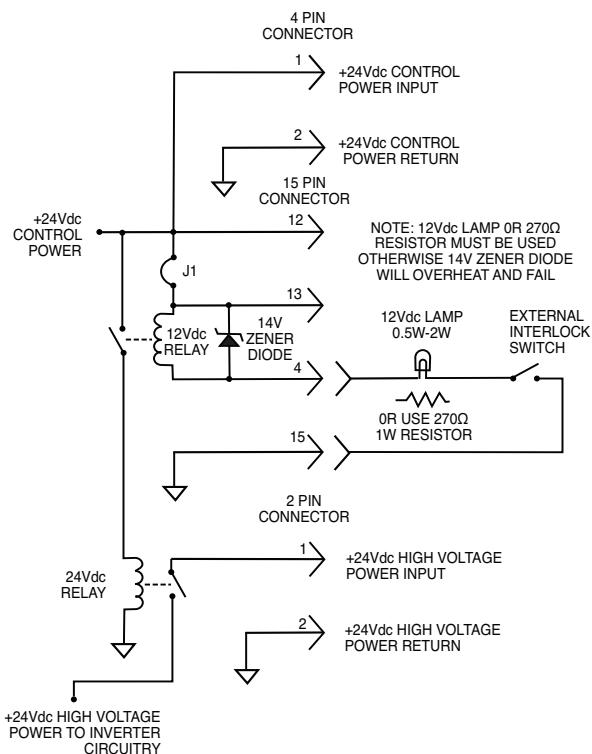
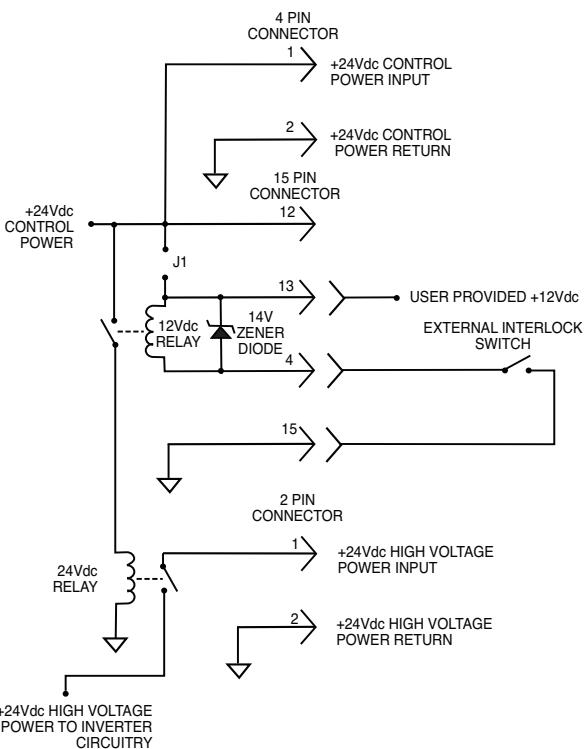
Sample model number:

50kV unit: uXHP50P100

65kV unit: uXHP65P100

80kV unit: uXHP80P100

Ask about our X-Ray subsystem capabilities

RECOMMENDED INTERLOCK CONFIGURATION

ALTERNATE INTERLOCK CONFIGURATION

Digital Interface

The uXHP features a standard USB, RS-232 and Ethernet digital interface. Utilizing these standard digital interfaces can dramatically simplify power supply interfacing requirements

saving the user both time and money, while enhancing functionality and overall capability. Spellman provides a GUI with the uXHP that allows the customer to both customize operational features of the uXHP while also providing basic power supply operational features. Details of the uXHP's digital interface capability are described in detail in the uXHP manual.



Closeup showing digital interface connectors


Varian VF-80J X-Ray Tube

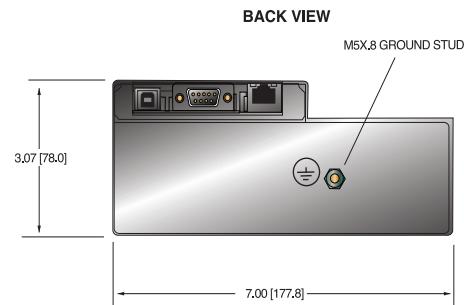
The uXHP was specifically designed in cooperation with Varian to power their new VF-80J X-Ray tube. This joint effort resulted in the creation of both the VF-80J X-Ray tube and the uXHP X-Ray generator. The Varian VF-80J tube is uniquely rated to run at up to 80kV @ 100 watts, 4mA maximum. The uXHP was explicitly designed to operate at up to 80kV

and provide 100 watts down to 25kV, so customers could make full use of the capabilities of the VF-80J X-Ray tube. Varian and Spellman, working together to push the boundaries of X-Ray technology.



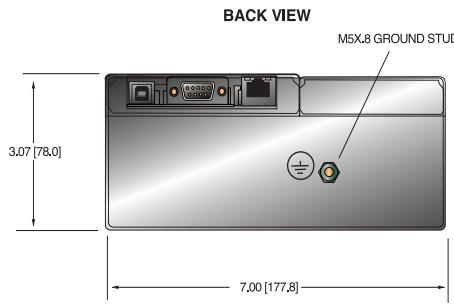
DIMENSIONS: in.[mm]

50kV, 50kV/XCC and 65kV



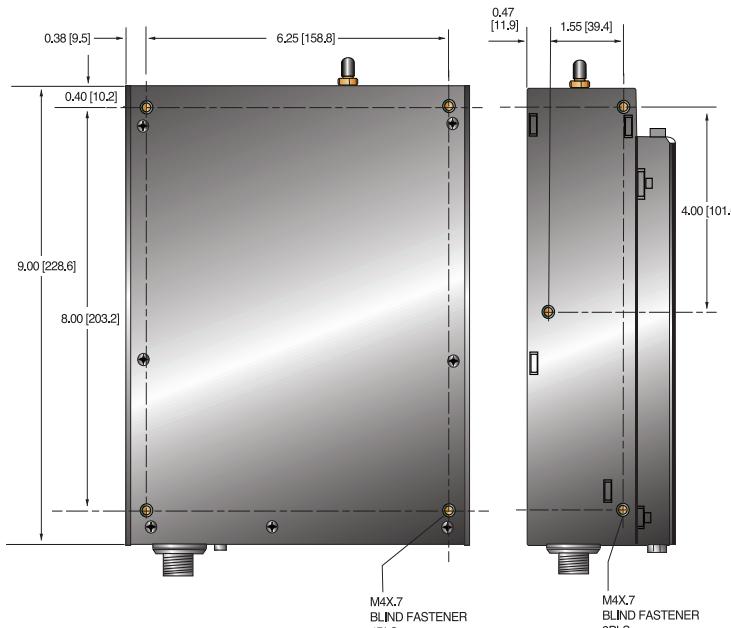
BACK VIEW

80kV



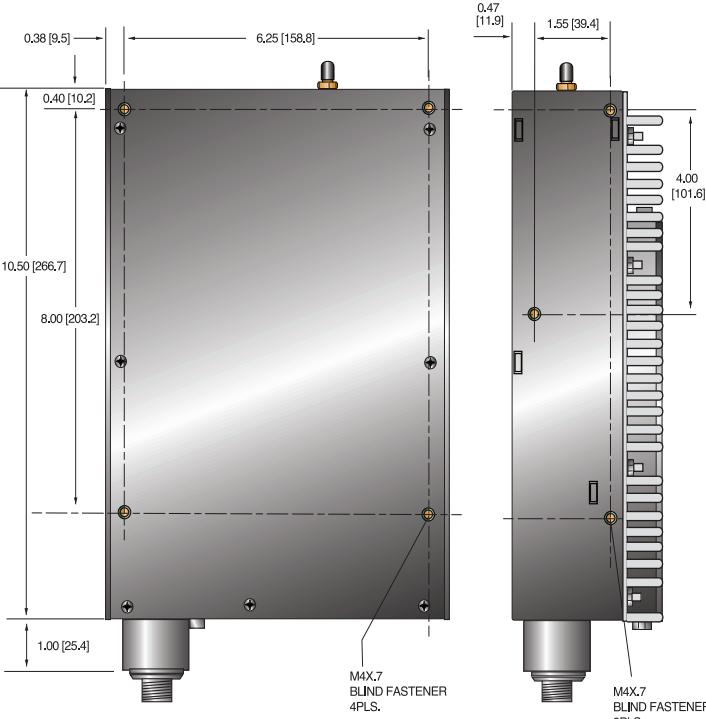
BACK VIEW

BOTTOM VIEW



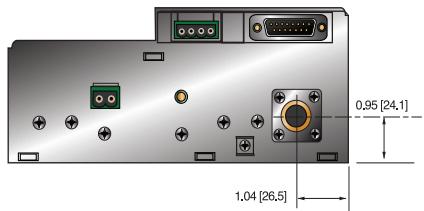
SIDE VIEW

BOTTOM VIEW

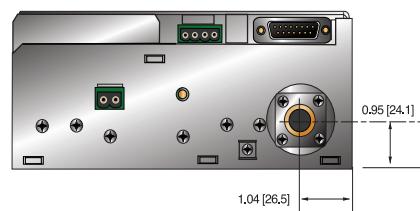


SIDE VIEW

FRONT VIEW



FRONT VIEW





Spellman's new DXM Series of X-Ray generator modules are designed for OEM applications up to 75kV at 1200 watts. Its universal input, small package size and choice of three standard digital interfaces simplifies integrating the DXM into your X-Ray analysis system. Models are available to operate either floating filament (negative HV polarity) or ground referenced filament (positive HV polarity), X-Ray tube designs. DSP based emission control circuitry provides excellent regulation of emission current, along with outstanding stability performance.

TYPICAL APPLICATIONS

- Plastics Sorting
- Crystal Inspection
- Plating Measurement
- Diamond Inspection
- Mineral Analysis
- X-Ray Fluorescence
- X-Ray Diffraction

SPECIFICATIONS

Input Voltage:

Power factor corrected input
90-264Vac, 47-63 Hertz, for 300 watt units
180-264Vac, 47-63 Hertz for 600 and 1200 watt units

Output Voltage:

7 models—20kV, 30kV, 40kV, 50kV, 60kV, 70kV and 75kV

Output Polarity:

Negative-for floating filament X-ray tubes
Positive-for ground referenced filament X-ray tubes

Power:

3 power ranges available—300 watts, 600 watts and 1200 watts
Other power levels available on special order.

Output Voltage Regulation:

$\leq 0.01\%$ of rated output voltage over specified input voltage range
 $\leq 0.01\%$ of rated output voltage for a full load change

Emission Current Regulation:

$\leq 0.01\%$ of rated output current over specified input voltage range
 $\leq 0.01\%$ of rated output current for a change from 30% to 100% of rated output voltage
Filament is disabled when kV is <30% of full scale output

- **Compact & Lightweight**
- **Models from 20kV-75kV, 300W, 600W and 1200W**
- **Universal Input, Power Factor Corrected**
- **Hot Anode or Hot Cathode X-Ray Tube Capable**
- **Standard Digital Interfaces: USB, Ethernet and RS-232**
- **CE Compliant, UL Recognized and RoHS Compliant**

www.spellmanhv.com/manuals/DXM

Ripple:

$\leq 1\%$ rms at >20 kHz, 0.1% rms below 20 kHz

Stability:

$\leq 25\text{ppm}/\text{hr}$ after a 2 hour warm up

Temperature Coefficient:

$\leq 50\text{ppm}$ per degree C

Environmental:

Temperature Range:

Operating: 0°C to 40°C

Storage: -40°C to 85°C

Humidity:

20% to 85% RH, non-condensing.

Filament Configuration:

Closed loop emission control regulates filament setting to provide desired X-Ray tube emission current.

Two types are available: Floating Filament (ac output referenced to negative output voltage) and Ground Referenced Filament (dc output referenced to ground).

Output:

0-5 amps at a compliance of 10 volts, maximum.
The filament loop is disabled when the kV output is less than 30% of full scale output to protect the X-Ray tube.
Standard filament Preheat adjustable 0-2.5 amps.
Other filament levels available on special order.

Control Interface

Local Interface:

Potentiometers are provided to adjust filament limit and preheat levels

Remote Interface:

USB, Ethernet and RS232 are standard.
All digital monitors have an accuracy specification of 2%

Control Software:

A Windows graphical user interface example is provided. Built-in diagnostics can be performed over Ethernet via a Java applet and any standard web browser

High Voltage Enable:

A hardware based, dry contact closure will enable the power supply into the high voltage on mode

Monitor Signals:

Voltage and current monitor signals are scaled 0-10Vdc equals 0-100% of full scale, accuracy is 1%

Cooling:

Forced air

Dimensions:

300/600 Watts: 4.75" H X 6" W X 12" D
(120.65mm x 152.4mm x 304.8mm)

1200 Watts: 4.75" H X 12" W X 12" D
(120.65mm x 304.8mm x 304.8mm)

Weight:

300/600 Watts: 14 pounds (6.35kg)
1200 Watts: 26 pounds (11.8kg)

Input Line Connector:

IEC320 with EMI filter

Output Connector:

Depends upon polarity selected. See table and drawing.
Other connectors and pinouts available on special order.

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and
2006/95/EC, The Low Voltage Directive, UL/CUL
recognized file E227588. RoHS compliant.

DXM SELECTION TABLE— 300W, 600W, 1200W

300 Watt			600 Watt			1200 Watt		
kV	mA	Model	mA	Model	mA	Model	mA	Model
20	15	DXM20*300	30	DXM20*600	60	DXM20*1200		
30	10	DXM30*300	20	DXM30*600	40	DXM30*1200		
40	7.5	DXM40*300	15	DXM40*600	30	DXM40*1200		
50	6	DXM50*300	12	DXM50*600	24	DXM50*1200		
60	5	DXM60*300	10	DXM60*600	20	DXM60*1200		
70	4.28	DXM70*300	8.56	DXM70*600	17.12	DXM70*1200		
75	4	DXM75*300	8	DXM75*600	16	DXM75*1200		

*Specify "P" for positive polarity or "N" for negative polarity

DXM ANALOG INTERFACE— J2 15 PIN MALE D CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Fault	Open Collector, 35V @ 10mA Maximum
2	Current Program In	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
3	Voltage Program In	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
4	Filament Limit Input	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
5	Local Filament Limit	Multi-turn front panel potentiometer
6	Filament Preheat Input	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
7	Local Filament Preheat	Multi-turn front panel potentiometer
8	Voltage Monitor	0 to 10V=0 to 100% Rated Output, Zout =4.99k, 1%
9	Signal Ground	Ground
10	Current Monitor	0 to 10V=0 to 100% Rated Output, Zout =4.99k, 1%
11	X-ray Enable Input	Connect to Pin 12 to HV Enable Supply
12	X-ray Enable Output	+15V @ Open, ≤15mA @ Closed
13	Filament Monitor	1 Volt=1 Amp, Zout=10kΩ
14	X-ray On Output Signal	Open Collector, 35V @10mA Maximum
15	Spare	N/C

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

PIN	SIGNAL	SIGNAL PARAMETERS
1	N/C	No Connection
2	TX out	Transmit Data
3	RX in	Receive Data
4	N/C	No Connection
5	SGND	Ground
6	N/C	No Connection
7	N/C	No Connection
8	N/C	No Connection
9	N/C	No Connection

USB DIGITAL INTERFACE— J4 4 PIN USB "B" CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	VBUS	+5 Vdc
2	D-	Data -
3	D+	Data +
4	GND	Ground

FILAMENT TERMINAL BLOCK— TB1 TWO POSITION TERMINAL BLOCK

POSITION	SIGNAL	SIGNAL PARAMETERS
1	Filament Output	0-5 amps, 10Vdc Maximum
2	Filament Return	Filament Return

For positive polarity/ground referenced filament units

ETHERNET DIGITAL INTERFACE— J5 8 PIN RJ45 CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	N/C	No Connection
5	N/C	No Connection
6	RX-	Receive Data -
7	N/C	No Connection
8	N/C	No Connection

HIGH VOLTAGE OUTPUT CONNECTOR— J6: FLOATING FILAMENT

Negative Polarity: Claymount Mini Federal Standard X-ray connector

HIGH VOLTAGE OUTPUT CONNECTOR— J6: GROUND FILAMENT

Positive Polarity: Spellman High Voltage Delrin Drywell connector.
4 foot (1.21m) long high voltage cable provided

For positive polarity units a ground referenced filament output is provided on a two position terminal TB1. See table

CLAYMOUNT HV CONNECTOR

PIN	OUTPUT CONNECTION
C (common)	High Voltage Output
S (small)	High Voltage Output
L (large)	Filament Output
G (grid)	Filament Output

Note: No high voltage cable is provided

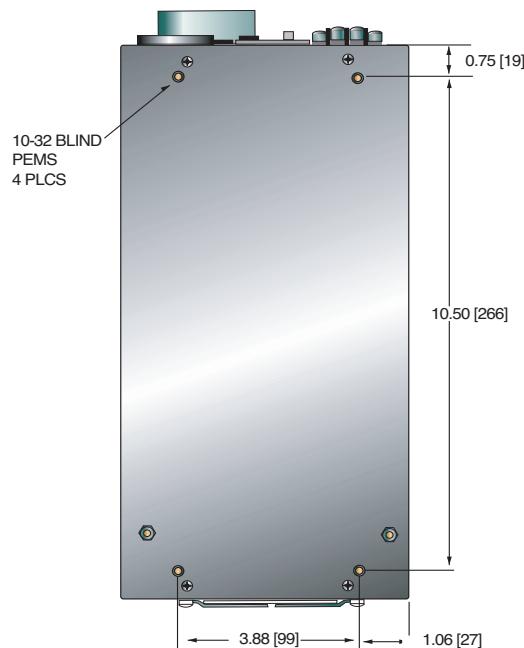
Recommended Cable:

Claymount part number: 12096
Cable assembly, L3 CA11, CA11, 10F, CS=Bare 10 foot,
Mini Federal Connectors on both ends, ·C· and ·S· are
both connected to the bare shield wire

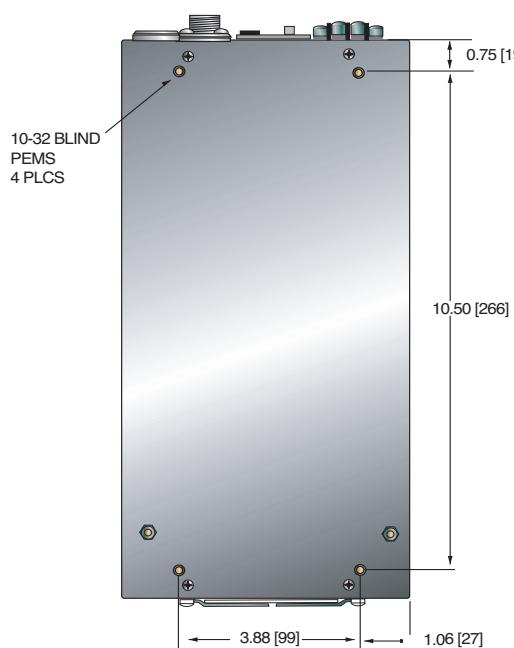
DIMENSIONS: in.[mm]

300/600 Watt

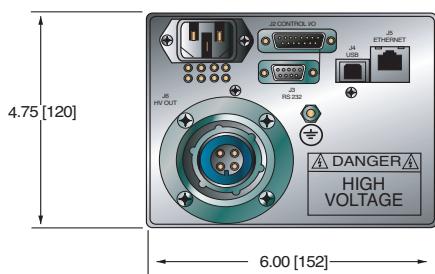
BOTTOM VIEW



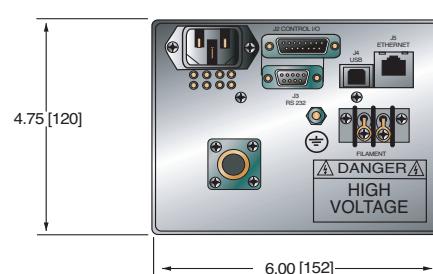
BOTTOM VIEW



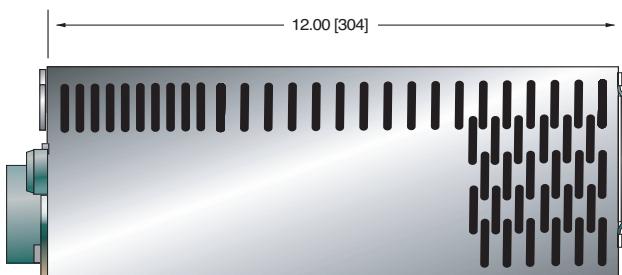
FRONT VIEW



FRONT VIEW

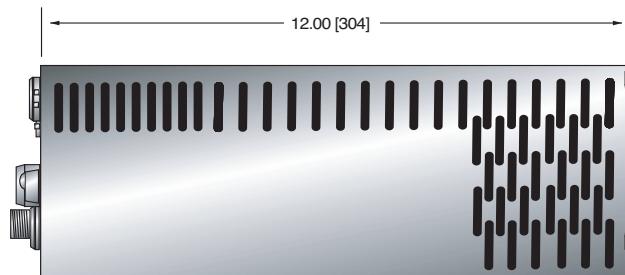


SIDE VIEW



Negative Polarity - Floating Filament

SIDE VIEW

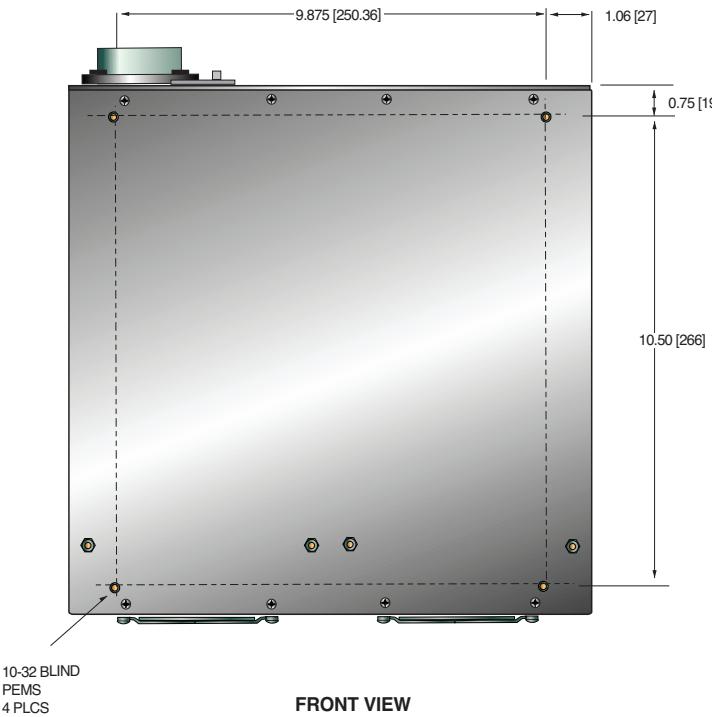


Positive Polarity - Ground Filament

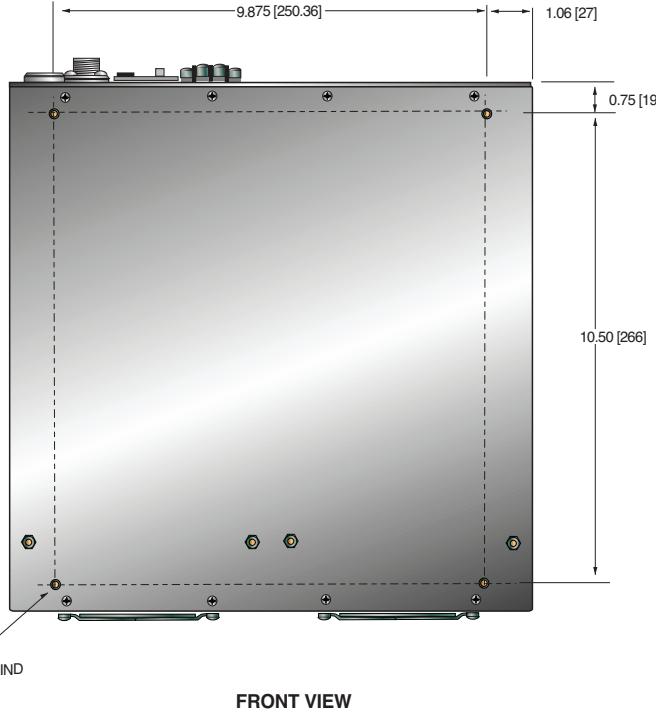
DIMENSIONS: in.[mm]

1200 Watt

BOTTOM VIEW



BOTTOM VIEW



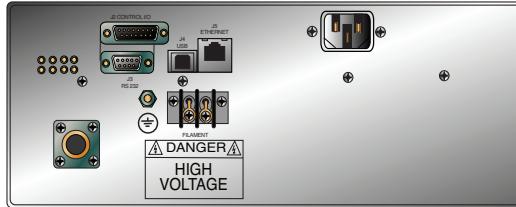
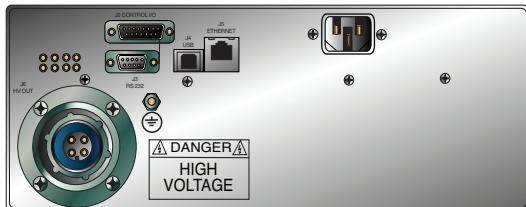
FRONT VIEW

FRONT VIEW

FRONT VIEW

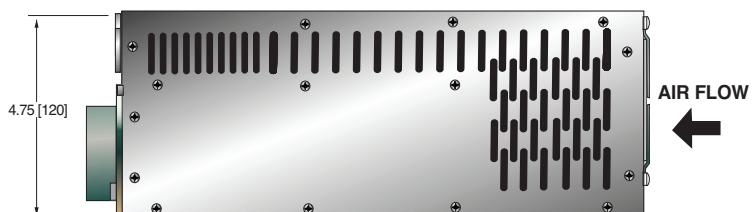
FRONT VIEW

FRONT VIEW

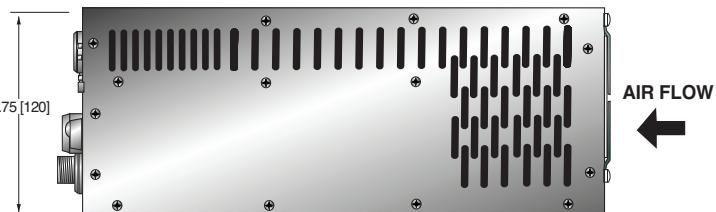


SIDE VIEW

SIDE VIEW



Negative Polarity - Floating Filament



Positive Polarity - Ground Filament





Spellman's new DXB Series of bipolar X-Ray generator modules are designed for OEM applications up to 140kV ($\pm 70\text{kV}$) at 1200 watts. Its universal input, small package size and choice of three standard digital interfaces simplifies integrating the DXB into your X-Ray analysis system. DSP based emission control circuitry provides excellent regulation of emission current, along with outstanding stability performance.

TYPICAL APPLICATIONS

- Plastics Sorting
- Crystal Inspection
- Plating Measurement
- Thickness Gauging
- Food Inspection
- Mineral Analysis
- X-Ray Fluorescence
- X-Ray Diffraction

SPECIFICATIONS

Input Voltage:

Power factor corrected input
90-264Vac, 47-63 Hertz, for 300 and 600 watt units
180-264Vac, 47-63 Hertz for 1200 watt units

Output Voltage:

6 models: 40kV, 60kV, 80kV, 100kV, 120kV and 140kV

Output Polarity:

\pm bipolar output, filament referenced to negative output

Power:

3 power ranges available—300 watts, 600 watts and 1200 watts
Other power levels available on special order.

Output Voltage Regulation:

$\leq 0.01\%$ of rated output voltage over specified input voltage range
 $\leq 0.01\%$ of rated output voltage for a full load change

Emission Current Regulation:

$\leq 0.01\%$ of rated output current over specified input voltage range
 $\leq 0.01\%$ of rated output current for a change from 30% to 100% of rated output voltage
Filament is disabled when kV is $< 30\%$ of full scale output

Ripple:

$\leq 1\%\text{rms}$ at $> 20\text{ kHz}$, $0.1\%\text{rms}$ below 20 kHz

Stability:

$\leq 25\text{ppm/hr}$ after a 2 hour warm up

- **Bipolar Outputs in a Single Unit**
- **Compact & Lightweight**
- **Models from 40kV to 140kV, 300W, 600W and 1200W**
- **Universal Input, Power Factor Corrected**
- **Standard Digital Interfaces: USB, Ethernet and RS-232**
- **CE Compliant, UL Recognized**

www.spellmanhv.com/manuals/DXB

Temperature Coefficient:

$\leq 50\text{ppm}$ per degree C

Environmental:

Temperature Range:

Operating: 0°C to 40°C

Storage: -40°C to 85°C

Humidity:

20% to 85% RH, non-condensing.

Filament Configuration:

Closed loop emission control regulates filament setting to provide desired X-Ray tube emission current.
Floating Filament (ac output referenced to negative output voltage).

Output: 0-5 amps at a compliance of 10 volts, maximum.

The filament loop is disabled when the kV output is less than 30% of full scale output to protect the X-Ray tube.
Standard filament Preheat adjustable 0-2.5 amps.
Other filament levels available on special order.

Control Interface

Local Interface: Potentiometers are provided to adjust filament limit and preheat levels

Remote Interface: USB, Ethernet and RS-232 are standard.
All digital monitors have an accuracy specification of 2%

Control Software: A Windows graphical user interface example is provided. Built-in diagnostics can be performed over Ethernet via a Java applet and any standard web browser

High Voltage Enable: A hardware based, dry contact closure will enable the power supply into the high voltage on mode

Monitor Signals: Voltage and current monitor signals are scaled 0-10Vdc equals 0-100% of full scale, accuracy is 1%

Cooling:

Forced air

Dimensions:

4.75" H X 12" W X 12" D
(120.65mm x 304.8mm x 304.8mm)

Weight:

26 pounds (11.8kg)

Input Line Connector:

IEC320 with EMI filter

Output Connectors:

Claymount Mini Federal Standard X-ray connectors.
Other connectors and pinouts available on special order.

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive. RoHS compliant. UL/CUL recognized file E227588.

DXB SELECTION TABLE— 300W, 600W, 1200W

300 Watt			600 Watt			1200 Watt		
kV	mA	Model	mA	Model	mA	Model	mA	Model
40	7.50	DXB40PN300	15.0	DXB40PN600	30.0	DXB40PN1200		
60	5.00	DXB60PN300	10.0	DXB60PN600	20.0	DXB60PN1200		
80	3.75	DXB80PN300	7.50	DXB80PN600	15.0	DXB80PN1200		
100	3.00	DXB100PN300	6.00	DXB100PN600	12.0	DXB100PN1200		
120	2.50	DXB120PN300	5.00	DXB120PN600	10.0	DXB120PN1200		
140	2.14	DXB140PN300	4.28	DXB140PN600	8.57	DXB140PN1200		

USB DIGITAL INTERFACE—
J4 4 PIN USB “B” CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	VBUS	+5 Vdc
2	D-	Data -
3	D+	Data +
4	GND	Ground

ETHERNET DIGITAL INTERFACE—
J5 8 PIN RJ45 CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	NC	No Connection
5	NC	No Connection
6	RX-	Receive Data -
7	NC	No Connection
8	NC	No Connection

CLAYMOUNT HV CONNECTOR PINOUT
J6 CATHODE OUTPUT

PIN	OUTPUT CONNECTION
C (common)	-High Voltage Output
S (small)	-High Voltage Output
L (large)	Filament Output
G (grid)	Filament Output

CLAYMOUNT HV CONNECTOR PINOUT
J7 ANODE OUTPUT

PIN	OUTPUT CONNECTION
C (common)	+High Voltage Output
S (small)	+High Voltage Output
L (large)	+High Voltage Output
G (grid)	+High Voltage Output

Note: No high voltage cable is provided

Recommended Cable:

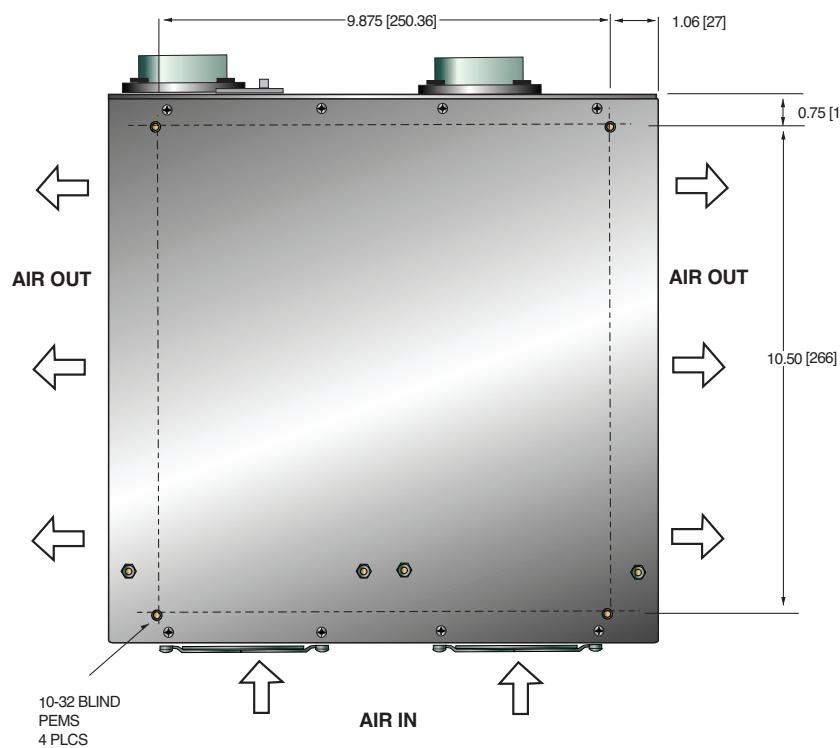
Claymount part number: 12096

Cable assembly, L3 CA11, CA11, 10F, CS=Bare 10 foot,
Mini Federal Connectors on both ends, ·C· and ·S· are
both connected to the bare wireRS-232 DIGITAL INTERFACE—
J3 9 PIN FEMALE D CONNECTOR

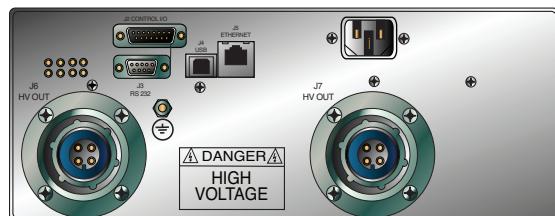
PIN	SIGNAL	SIGNAL PARAMETERS
1	N/C	No Connection
2	TX out	Transmit Data
3	RX in	Receive Data
4	N/C	No Connection
5	SGND	Ground
6	N/C	No Connection
7	N/C	No Connection
8	N/C	No Connection
9	N/C	No Connection

DIMENSIONS: in.[mm]

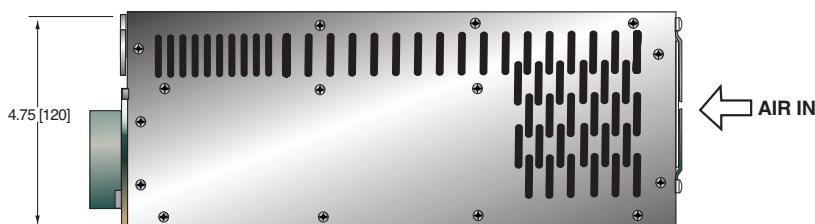
BOTTOM VIEW



FRONT VIEW



SIDE VIEW





Spellman's new DXM100 X-Ray generator module is designed for OEM applications up to 100kV at 1200 watts. Its universal input, small package size and choice of three standard digital interfaces simplifies integrating the DXM100 into your X-Ray analysis system. DSP based emission control circuitry provides excellent regulation of emission current, along with outstanding stability.

TYPICAL APPLICATIONS

NDT Analysis	Crystal Inspection
Plating Measurement	Diamond Inspection
Mineral Analysis	Food/Product Inspection

SPECIFICATIONS

Input Voltage:

Power factor corrected input, ≥ 0.98
180-264Vac, 47-63Hz, 8.25A maximum

Output Voltage:

100kV, maximum

Output Polarity:

Negative-for floating filament X-Ray tubes

Output Current:

12mA maximum

Output Power:

1200 Watts maximum

Output Voltage Regulation:

$\leq 0.01\%$ of rated output voltage over specified input voltage range
 $\leq 0.01\%$ of rated output voltage for a full load change

Emission Current Regulation:

$\leq 0.01\%$ of rated output current over specified input voltage range
 $\leq 0.01\%$ of rated output current for a change from 30% to 100% of rated output voltage
Filament is disabled when kV is $< 30\%$ of full scale output

Ripple:

$\leq 1\%$ rms at > 20 kHz, 0.1% rms below 20 kHz

Stability:

$\leq 25\text{ppm}/\text{hr}$ after a 2 hour warm up

Temperature Coefficient:

$\leq 50\text{ppm}$ per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
 20% to 85% RH, non-condensing.

- **100kV @ 1200W**
- **Compact & Lightweight Modular Unit**
- **Universal Input, Power Factor Corrected**
- **Standard Digital Interfaces: USB, Ethernet and RS-232**
- **Programmable Power Trip Feature**
- **CE Compliant**

www.spellmanhv.com/manuals/DXM100

Filament Configuration:

Closed loop emission control regulates filament setting to provide desired X-Ray tube emission current.

Output: 5.0 amps at a compliance of 10.0 volts, maximum. The filament loop is disabled when the kV output is less than 30% of full scale output to protect the X-Ray tube. Standard filament Preheat adjustable 0-2.5 amps. Other filament levels available on special order.

Control Interface:

Local Interface:

Potentiometers are provided to adjust filament limit and preheat levels

Remote Interface: USB, Ethernet and RS-232 are standard. All digital monitors have an accuracy specification of 2%

Control Software: A Windows graphical user interface example is provided. Built-in diagnostics can be performed over Ethernet via a Java applet and any standard web browser

High Voltage Enable: A hardware based, dry contact closure will enable the power supply into the high voltage on mode

Monitor Signals: Voltage and current monitor signals are scaled 0-10Vdc equals 0-100% of full scale, accuracy is 1%

Over Power Fault: The maximum power the unit can supply can be programmed (0-1200 watts) via the digital interface, this setting will be stored in memory. An over power fault will occur if the output power is $\geq 105\%$ of the set point value. When an over power fault occurs the high voltage output will be disabled and the Over Power Fault indicator will be activated on the GUI/Applet. Additionally both the UV and OV fault LED's on the DXM100 will be illuminated.

Cooling:

Forced air

Dimensions:

6.25" H X 12" W X 15.5" D (158.75mm x 304.79mm x 393.7mm)

Weight:

43 pounds (19.5kg)

Input Line Connector:

IEC320 with EMI filter, 6' (1.83 meter) cord set provided

Output Connector:

CA10 (R10). See table for pin out information

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive. UL/CUL recognized file E227588. RoHS compliant.

DXM100 ANALOG INTERFACE— J2 15 PIN MALE D CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Fault	Open Collector, 35V @ 10mA Maximum
2	Current Program In	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
3	Voltage Program In	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
4	Filament Limit Input	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
5	Local Filament Limit	Multi-turn front panel potentiometer
6	Filament Preheat Input	0 to 10V=0 to 100% Rated Output, Zin=10MΩ
7	Local Filament Preheat	Multi-turn front panel potentiometer
8	Voltage Monitor	0 to 10V=0 to 100% Rated Output, Zout=4.99k, 1%
9	Signal Ground	Ground
10	Current Monitor	0 to 10V=0 to 100% Rated Output, Zout=4.99k, 1%
11	X-ray Enable Input	Connect to Pin 12 to HV Enable Supply
12	X-ray Enable Output	+15V @ Open, ≤15mA @ Closed
13	Filament Monitor	1 Volt=1 Amp, Zout=10kΩ
14	X-ray On Output Signal	Open Collector, 35V @10mA Maximum
15	Spare	NC

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

PIN	SIGNAL	SIGNAL PARAMETERS
1	NC	No Connection
2	TX out	Transmit Data
3	RX in	Receive Data
4	NC	No Connection
5	SGND	Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

USB DIGITAL INTERFACE— J4 4 PIN USB “B” CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	VBUS	+5 Vdc
2	D-	Data -
3	D+	Data +
4	GND	Ground

Typical DXM100 Cable Wiring



ETHERNET DIGITAL INTERFACE— J5 8 PIN RJ45 CONNECTOR

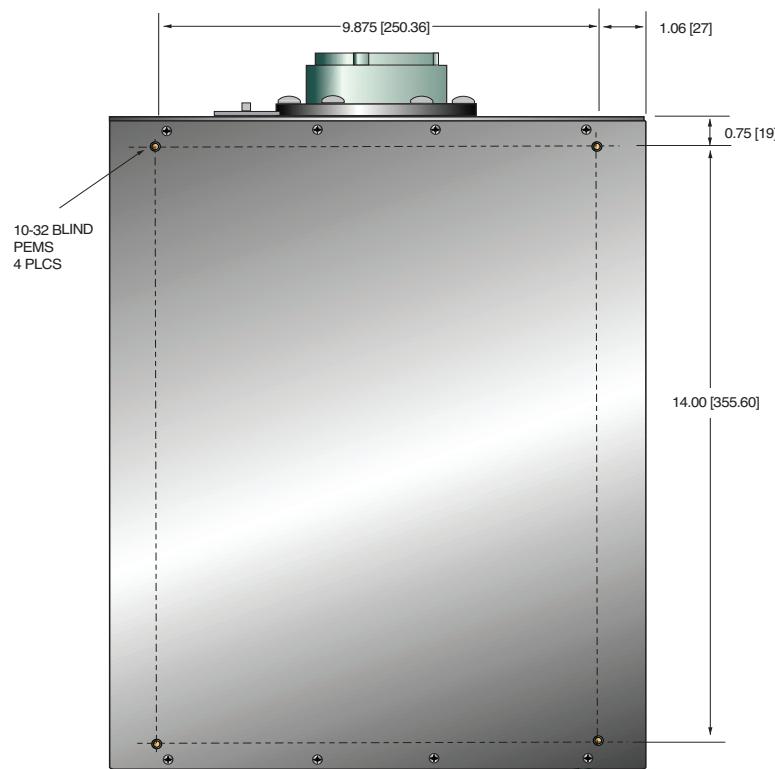
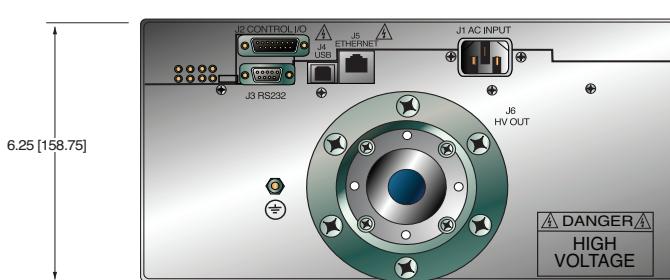
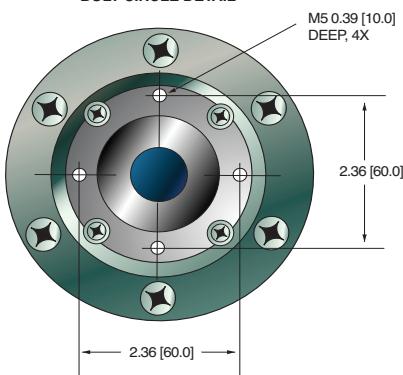
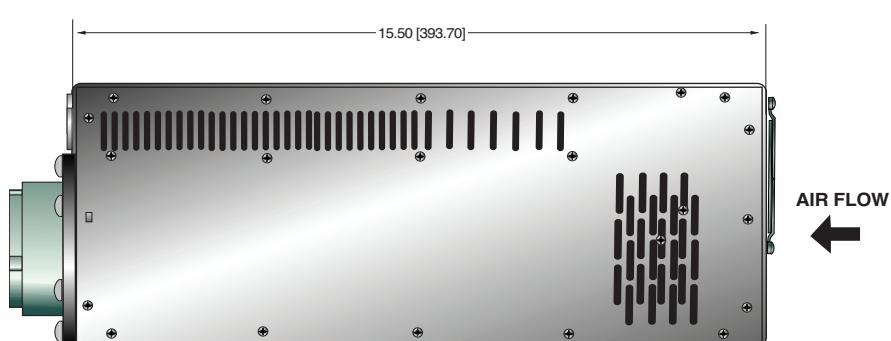
PIN	SIGNAL	SIGNAL PARAMETERS
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	NC	No Connection
5	NC	No Connection
6	RX-	Receive Data -
7	NC	No Connection
8	NC	No Connection

J6 CA10 (R10) HV CONNECTOR

PIN	OUTPUT CONNECTION
C (common)	High Voltage Output
S (small)	High Voltage Output
L (large)	Filament Output

Note: No high voltage cable is provided

DIMENSIONS: in.[mm]

BOTTOM VIEW

FRONT VIEW

HIGH VOLTAGE MATING FLANGE BOLT CIRCLE DETAIL

SIDE VIEW




Spellman's XLF Series of X-Ray generators are well regulated high voltage power supplies with output voltages to 60kV and very low ripple achieved through the use of advanced resonant conversion techniques. Extremely stable voltage and emission current outputs result in significant performance improvements over previously available technology. The XLF Series provides power, control and support functions required for X-Ray applications including a regulated ac filament supply referenced to the cathode. These units also incorporate local and remote programming, monitoring, safety interlock, short-circuit and overload protection.

TYPICAL APPLICATIONS

Plastics Sorting
Crystal Inspection
Diamond Inspection

OPTIONS

APT	Adjustable Power Trip
AT	Arc Trip
SS(x)	Non-Standard Slow Start
NSS	No Slow Start
IO	Instant ON
SL	Slides

SPECIFICATIONS

Input Voltage:

XLF 600W:

115Vac±10%, 50-60Hz single phase or
220Vac±10%, 50-60Hz single phase

XLF 1200W:

220Vac±10%, 50-60Hz single phase only

Voltage and Current Control:

Local: continuously adjustable from zero to maximum rating via a ten-turn potentiometer
Remote: 0 to +10Vdc proportional from 0 to full output
Accuracy: ±1%
Input Impedance: 10Mohm

- **Output Voltages to 60kV**
- **Integrated Floating Filament Supply**
- **Low Ripple**
- **"Hot Cathode"**
- **Negative Polarity**
- **Local & Remote Programming**
- **OEM Customization Available**

www.spellmanhv.com/manuals/XLF

Filament:

12 volts @ 5 amps, preheat level is 0.45 amps in standby

Voltage Regulation:

Load: 0.005% of full output voltage no load to full load
Line: 0.005% for input voltage range change

Current Regulation:

Load: 0.05% of full current ±100µA from 0 to full voltage
Line: 0.05% of rated current over specified input range

Ripple:

0.03% rms below 1kHz
0.75% rms above 1kHz

Temperature Coefficient:

100ppm/°C.

Stability:

0.01%/8 hrs after 1/2 hour warm-up
0.02% per 8 hours (typical)

Cooling:

Fan cooled

Metering:

Digital voltage and current meters (3.5 digits),
1% accuracy

Voltage and Current Monitors:

0 to +10Vdc proportional to rated output

HV Output:

75kV, 3 conductor Federal Standard X-Ray connector

I/O Connectors:

25 pin D-type for control interface with mating connector provided

Dimensions:

3.5"H x 19"W x 20"D (8.9cm x 48.3cm x 50.8cm)

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and
2006/95/EC, The Low Voltage Directive

FRONT PANEL STATUS INDICATORS:

Overvoltage	Voltage Control Mode
Overtemperature	Current Control Mode
Regulation Error	Interlock Open
Arc	Interlock Closed
HV ON: Red	HV OFF: Green

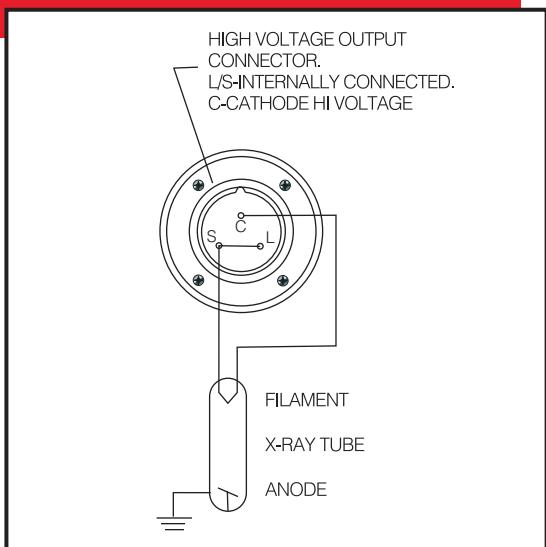
600W, 1200W XLF SELECTION TABLE

600 Watt			1200 Watt		
kV	mA	Model	kV	mA	Model
30	20	XLF30N600	30	40	XLF30N1200
40	15	XLF40N600	40	30	XLF40N1200
50	12	XLF50N600	50	24	XLF50N1200
60	10	XLF60N600	60	20	XLF60N1200

JB1 CONNECTOR 25 PIN

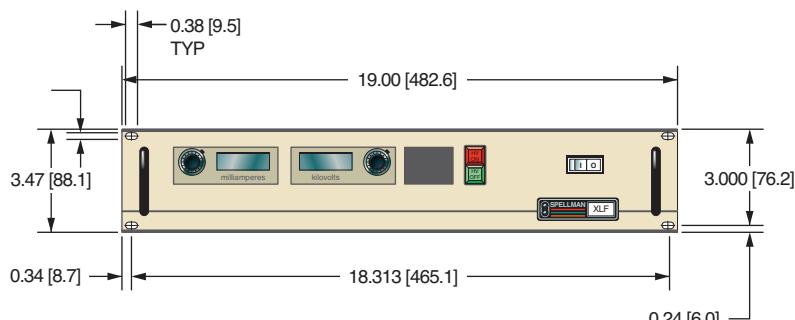
PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	External Inhibit	Ground=Inhibit, Open=HV On
3	External Interlock	+15V at Open, <15mA at Closed
4	External Interlock Return	Return for Interlock
5	Current Monitor	0 to 10V=0 to 100% Rated Output
6	kV Test Point	0 to 10V=0 to 100% Rated Output
7	+10V Reference	+10Vdc @ 1mA Max
8	Remote Current Program In	0 to 10V=0 to 100% Rated Output
9	Local Current Program Out	Front Panel Program Voltage
10	Remote Voltage Program In	0 to 10V=0 to 100% Rated Output
11	Local Voltage Program Out	Front Panel Program Voltage
12	Power Monitor	0 to 10V=0 to 100% Rated Output
13	Remote Power Program In	(Optional)
14	Local HV Off Out	+15V at Open, <25mA at Closed
15	HV Off	Connect to HV OFF for Fp Operation
16	Remote HV On	+15V, 10mA Max=HV Off
17	Remote HV Off Indicator	0=HV On, +15V, 10mA Max=HV Off
18	Remote HV On Indicator	0=HV Off, +15V, 10mA Max=HV On
19	Remote Voltage Mode	
20	Remote Current Mode	Open Collector 50V Max, 10mA Max
21	Remote Power Mode	On=Active
22	Remote PS Fault	0=Fault, +15V, 0.1mA Max=No Fault
23	+15V Output	+15V, 100mA Max
24	Power Supply Common	Signal Ground
25	Shield Return	Shield Return

HIGH VOLTAGE CONNECTOR PINOUT

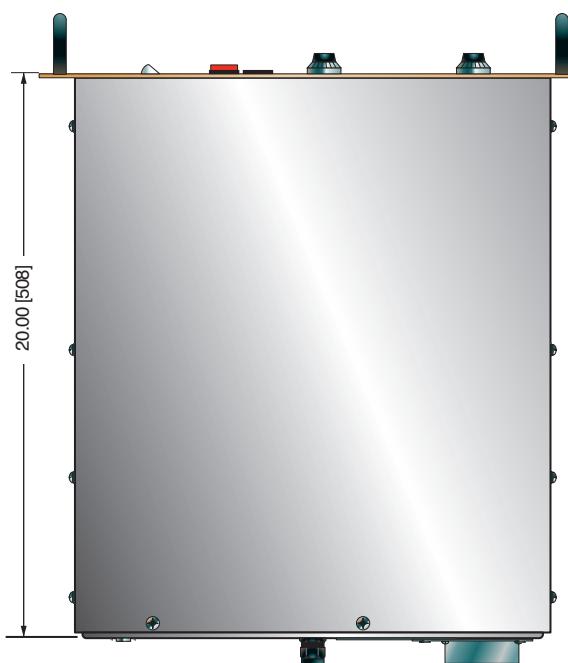


DIMENSIONS: in.[mm]

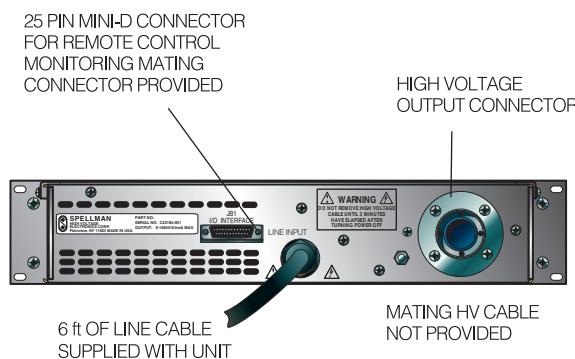
FRONT VIEW



TOP VIEW



BACK VIEW





Spellman's XRV series of X-Ray high voltage power supplies sets the standard for compact 1.8kW to 6.0kW, high performance X-Ray inspection generators. Spanning an output voltage range of 160kV to 450kV in negative, positive or bipolar output configurations, there's a model available for virtually every application requirement.

Active power factor correction circuitry reduces input current requirements while minimizing line related EMI. Spellman's proprietary inverter topology allows for unprecedented efficiencies and power densities. A solid encapsulated high voltage section further reduces size and weight and provides reliable, maintenance free operation.

DSP based SMT control circuitry provides your choice of USB, Ethernet and RS-232 along with analog interfacing, simplifying OEM system integration. The two DC output, current regulated filament power supplies are controlled via sophisticated emission current regulation circuitry to provide accurate and stable X-Ray tube currents. Comprehensive fault diagnostic circuitry, and Arc Sense, Arc Quench and Arc Count functionality is also incorporated into this compact, space saving X-Ray generator.

SPECIFICATIONS

Input Voltage:

1.8kW, 3.0kW, 4.0kW and 4.5kW models:

180-264Vac, single phase, 47-63 Hertz, active power factor corrected input to ≥ 0.98

6.0kW models:

208 or 400Vac, $\pm 10\%$, three phase, 47-63 Hertz, passive power factor corrected

Input Current:

1.8kW, 3.0kW, 4.0kW and 4.5kW models: <30 amps

6.0kW models: <25 amps per phase for 208Vac
<15 amps per phase for 400Vac

Output Voltage:

Accuracy: 0.25%

Stability: $\leq 0.1\%$ per 8 hours, after 1 hour warm up

1.8kW, 3.0kW, 4.0kW and 4.5kW models:

Load: $\pm 0.05\%$ of rated output voltage for a full load change
Line: $\pm 0.05\%$ of rated output voltage over specified input voltage range

6.0kW models:

Load: $\pm 0.1\%$ of rated output voltage for a full load change
Line: $\pm 0.1\%$ of rated output voltage over specified input voltage range

NOW AVAILABLE

1800 Watt units specifically designed for the HP and HPX families of X-Ray tubes used in high speed digital and industrial CT applications.

- **160kV, 225kV, 320kV, 350kV and 450kV Models**
- **Complete X-Ray Generator Package**
- **Power Factor Corrected AC Input Circuitry**
- **Integrated Dual Filament Supplies**
- **Digital Interface—USB, Ethernet and RS-232**
- **Excellent Stability and Regulation**
- **Available with Black Powder Coated Finish**

www.spellmanhv.com/manuals/XRV

Output Polarity:

See "model selection" table

Output Current:

See "model selection" table

Ripple:

See "model selection" table

Temperature Coefficient:

1.8kW, 3.0kW, 4.0kW and 4.5kW models:
 $\pm 50\text{ppm}/^\circ\text{C}$

6.0kW models:
 $\pm 50\text{ppm}/^\circ\text{C}$

Emission Current:

Accuracy: 0.25%

Stability: 100ppm/ $^\circ\text{C}$

1.8kW, 3.0kW, 4.0kW and 4.5kW models:

Load: $\pm 0.05\%$ of rated output current for a change from 30% to 100% of rated output voltage
Line: $\pm 0.05\%$ of rated output current over specified input voltage range

6.0kW models:

Load: $\pm 0.1\%$ of rated output current for a change from 30% to 100% of rated output voltage
Line: $\pm 0.1\%$ of rated output current over specified input voltage range

Filament:

Output:

0-6 amps at a compliance of 10Vdc, maximum
Dual Focal Spot:

Small and large, selectable via interface signal

Configuration:

DC filament drive. Closed loop emission control regulates filament setting to provide desired X-Ray tube emission current

Control Interface:

Remote Interface:

Analog, USB, Ethernet and RS-232 are standard

Control Software:

A VB GUI is provided for RS-232/USB, the Ethernet interface has an embedded applet for control (see page 2)

Operating Temperature

0°C to +50°C

Storage Temperature:

-40°C to +85°C

Humidity:

20% to 85% RH, non-condensing

Mains Input Connector:

1.8kW, 3.0kW, 4.0kW and 4.5kW models:

Type 97-3102A-24-11P

6.0kW models:

Type 97-3102A-24-22P

Interface Connectors:

Digital—Ethernet, RS-232 and USB

Analog—25 pin connector

Output Connector:

See "model selection" table

Cooling:

Forced air

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive

and 2006/95/EC, The Low Voltage Directive.

RoHS and NFC 74-100 compliant.

OPTIONS

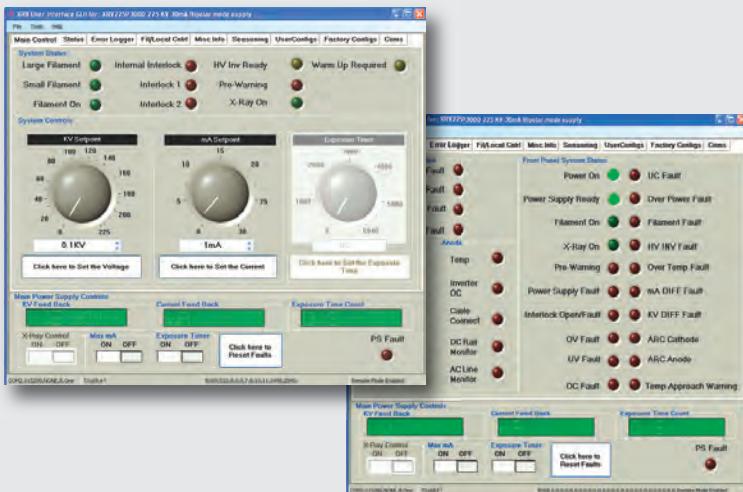
400Vac ±10% (6kW only)

GUI Control Software for XRV

GUI is specifically designed for controlling XRV series power supplies. As an alternative to the analog control, the GUI will allow the user to control all necessary functions of the HVPS from a user-friendly windows based menu. Additionally the GUI can be used as a diagnostic tool when the HVPS is controlled via the analog interface.

Features of the GUI control:

- **Automatic warm-up X-Ray tube**
- **Max watts operation**
- **Timed or Continuous Exposure modes**
- **Configuration menu for user options setting of HVPS**
- **Fault and status monitor**



XRV160/320/350 SPECIFICATIONS

	XRV160*1800	XRV160*3000	XRV160*4000	XRV160*6000	XRV320P&N1800	XRV320P&N4500	XRV350P&N4500
DC Output Voltage	0 to 160kV	0 to 160kV	0 to 160kV	0 to 160kV	0 to ±160kV	0 to ±160kV	0 to ±175kV
Polarity*	Pos or Neg	Pos or Neg	Pos or Neg	Pos or Neg	Bipolar	Bipolar	Bipolar
Output Rated Current	0-30mA	0-30mA	0-50mA	0-50mA	0-30mA	0-30mA	0-30mA
Output Power	1.8kW	3.0kW	4.0kW	6.0kW	1.8kW	4.5kW	4.5kW
Ripple/Noise (p-p)	<0.025%	<0.05%	<0.1%	<0.25%	<0.025%	<0.1%	<0.1%
Dimensions	10.09" H x 17.16" W x 24" D				2 x (10.09" H x 17.16" W x 24" D)		
Weight	150 lbs. (68kg)	150 lbs. (68kg)	150 lbs. (68kg)	155 lbs. (70.3kg)	300 lbs. (136 kg)	300 lbs. (136 kg)	300 lbs. (136 kg)
Output Connector	R24	R24	R24	R24	Two R24	Two R24	Two R24

XRV225/450 SPECIFICATIONS

	XRV225*1800	XRV225*3000	XRV225*4000	XRV225*6000	XRV450P&N1800	XRV450P&N4500
DC Output Voltage	0 to 225kV	0 to 225kV	0 to 225kV	0 to ±225kV	0 to ±225kV	0 to ±225kV
Polarity*	Pos or Neg	Pos or Neg	Pos or Neg	Pos or Neg	Bipolar	Bipolar
Output Rated Current	0-30mA	0-30mA	0-30mA	0-30mA	0-30mA	0-30mA
Output Power	1.8kW	3.0kW	4.0kW	6.0kW	1.8kW	4.5kW
Ripple/Noise (p-p)	<0.025%	<0.05%	<0.1%	<0.25%	<0.025%	<0.1%
Dimensions	15.90" H x 17" W x 30.72" D				2 x (15.90" H x 17" W x 30.72" D)	
Weight	240 lbs. (109kg)	240 lbs. (109kg)	240 lbs. (109kg)	240 lbs. (109kg)	480 lbs. (218 kg)	480 lbs. (218 kg)
Output Connector	R28**	R28**	R28**	R28**	Two R28**	Two R28**

Units are available in positive output polarity without filament, see model selection table for ordering details.

*Specify "P" for positive or "N" for negative polarity.

**Order SHV HV cable flange p/n 407141-024 if using Comet HV cable with R28SL spring loaded plug.

J1 HV CONNECTOR—R24/R28

PIN	SIGNAL	PARAMETERS
C	HV Output	XRV160 and XRV320—R24 Connector XRV225 and XRV450—R28 Connector
S	Small Filament Output	0 to 6 amps @ 10Vdc
L	Large Filament Output	0 to 6 amps @ 10Vdc

J2 ANALOG INTERFACE—25 PIN D CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Power Supply Fault	Low, sum of faults, HVPS detected a fault, open collector, 50V @ 10mA max
2	mA Program	0 to 10V FS Z in = 10M ohms
3	kV Program	0 to 10V FS Z in = 10M ohms
4	Filament Limit L/S Ref.*	0 to 10V FS Z in = 10M ohms
5	Filament Preheat L/S Ref.*	0 to 10V FS Z in = 10M ohms
6	kV Monitor	0 to 10V FS Z out = 4.99k ohms
7	mA Monitor	0 to 10V FS Z out = 4.99k ohms
8	Filament Current Monitor*	0 to 10V FS Z out = 4.99k ohms
9	Signal Ground	Ground
10	X-Ray Enable	+24Vdc = X-Ray ON, connect to pin 14 with dry contact relay
11	Filament ON*	Filament ON status, low, filament is ON open collector 50V, @ 10mA max
12	Interlock 1	Active low, interlock is closed, safe to enable HV
13	Interlock 2	Active low, interlock is closed, safe to enable HV
14	+24Vdc	+24Vdc @ 100mA, maximum
15	Filament Enable*	Active low, turn filament ON
16	Filament Control*	Active low, filament is regulated by ECR (HV must be ON). Not active, the filament is regulated by the preheat reference
17	Filament L/S Select	Filament selection large or small, low = small spot is selected
18	Filament L/S Confirm	Open collector, 50V @ 10mA max Filament selection confirm, low = small spot is selected
19	HVPS RDY	Low = HVPS ready, open collector, 50V @ 10mA max
20	X-Ray ON	X-Ray ON status, low = X-Rays are ON open collector, 50V @ 10mA max
21	Interlock Status	Low, interlocks are closed, can enable HV open collector, 50V @ 10mA max
22	GND	Digital ground
23	X-Ray ON Pre-Warn	Pre-warning, low, before X-Ray ON open collector, 50V @ 10mA max
24	Reset	Active low, minimum 10mS transition
25	Arc fault	Low, arc fault, the HVPS has detected an arc open collector, 50V @ 10mA max

*Not active on positive models

MODEL SELECTION TABLE

MODEL	VOLTAGE	POWER	POLARITY
XRV160*1800	160kV	1.8kW	Pos or Neg
XRV160*3000	160kV	3.0kW	Pos or Neg
XRV160*4000	160kV	4.0kW	Pos or Neg
XRV160*6000	160kV	6.0kW	Pos or Neg
XRV225*1800	225kV	1.8kW	Pos or Neg
XRV225*3000	225kV	3.0kW	Pos or Neg
XRV225*4000	225kV	4.0kW	Pos or Neg
XRV225*6000	225kV	6.0kW	Pos or Neg
XRV320P&N1800	±160kV	1.8kW	Bipolar
XRV320P&N4500	±160kV	4.5kW	Bipolar
XRV350P&N4500	±175kV	4.5kW	Bipolar
XRV450P&N1800	±225kV	1.8kW	Bipolar
XRV450P&N4500	±225kV	4.5kW	Bipolar

*Specify P for positive polarity and N for negative polarity. Positive polarity models do not have integrated filament power supplies. Contact Spellman for custom output voltage/power models.

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

PIN	SIGNAL	PARAMETERS
1	N/C	No Connection
2	TX out	Receive Data
3	RX in	Transmit Data
4	N/C	No Connection
5	SGND	Ground
6	N/C	No Connection
7	N/C	No Connection
8	N/C	No Connection
9	N/C	No Connection

ETHERNET DIGITAL INTERFACE—J4 8 PIN RJ45 CONNECTOR

PIN	SIGNAL	PARAMETERS
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	N/C	No Connection
5	N/C	No Connection
6	RX-	Receive Data -
7	N/C	No Connection
8	N/C	No Connection

USB DIGITAL INTERFACE—J5 4 PIN USB “B” CONNECTOR

PIN	SIGNAL	PARAMETERS
1	VBUS	+5 Vdc
2	D-	Data -
3	D+	Data +
4	GND	Ground

JB1 MAIN AND AUXILIARY INPUT POWER—TYPE 97-3102A-24-11P (Single Phase Units)

PIN	SIGNAL	PARAMETERS
A	Auxiliary AC Line Power	180-264Vac
B	Auxiliary Ground	Ground
C	Auxiliary AC Neutral	Neutral
D	Main AC Line Power	180-264Vac
E	Main Ground	Ground
F	Main AC Neutral	Neutral

JB1 MAIN AC INPUT POWER—TYPE 97-3102A-24-22P (Three Phase Units)

PIN	SIGNAL	PARAMETERS
A	Line 1	208Vac, ±10%, 50/60Hz @ 25 amps
B	Line 2	208Vac, ±10%, 50/60Hz @ 25 amps
C	Line 3	208Vac, ±10%, 50/60Hz @ 25 amps
D	GND	Ground

Note: Use 4 conductor cable or single isolated wires rated no less than 600Vac, 30 amps (10AWG, minimum)

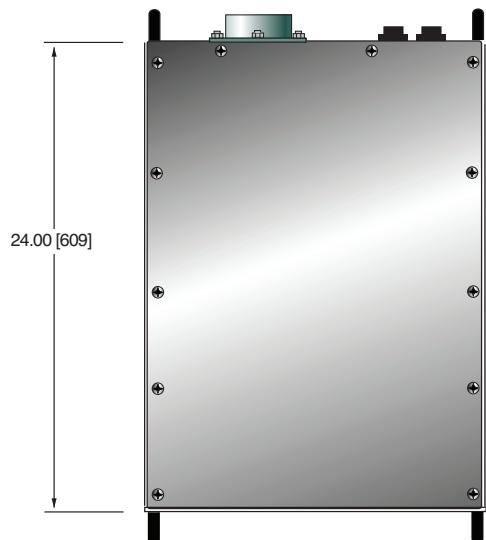
JB2 AUXILIARY AC INPUT POWER—TYPE 97-3102A-20-3P (Three Phase Units)

PIN	SIGNAL	PARAMETERS
A	Line 1	208Vac, ±10%, 50/60Hz (source 3 phase L1, L2)
B	Line 2	208Vac, ±10%, 50/60Hz (source 3 phase L1, L2)
C	GND	Ground

System Ground: System ground wires (10AWG minimum) to the ground terminal E1 GND to the power supply using ground stud M6 X 20MM, with M6 nut.

XRV160

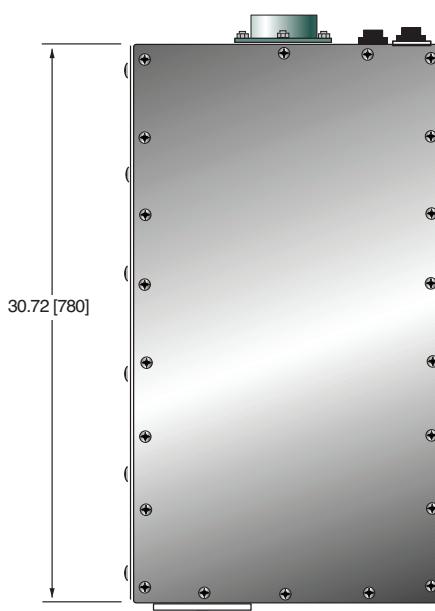
TOP VIEW



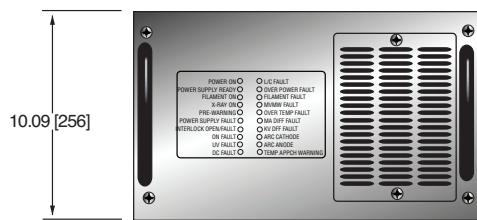
DIMENSIONS: in.[mm]

XRV225

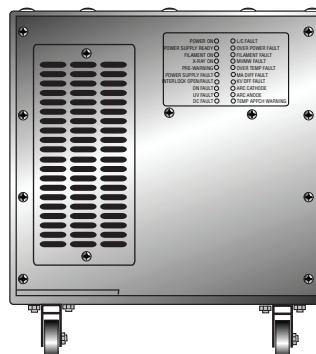
TOP VIEW



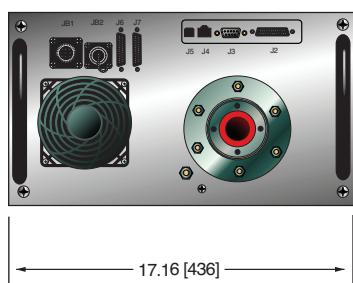
FRONT VIEW



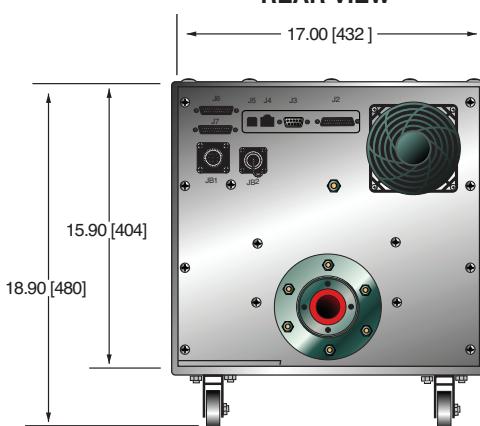
FRONT VIEW



REAR VIEW



REAR VIEW



XRV320 is comprised of two XRV160 units configured in a bipolar arrangement



XRV450 is comprised of two XRV225 units configured in a bipolar arrangement



Spellman's DF/FF Series of X-Ray Generators feature our new inverter design which incorporates IGBTs for power switching and provides new levels of reliability. In addition, re-engineering of the DF/FF's internal filament power supply eliminates audio noise at normal operating levels by operating at a higher frequency. The DF/FF's utilize a sine wave current source, produced by phase shifting series resonant circuits at switching frequencies greater than 20kHz to generate high voltage dc. This technique eliminates undesirable electromagnetic radiation normally associated with switching and power control regulators. The high efficiency of these units allows for air cooling in a 5.25" (3U) high chassis.

TYPICAL APPLICATIONS

X-Ray Diffraction (XRD)
X-Ray Fluorescence (XRF)

ADDITIONAL FEATURES

Water Flow Switch:

A 24Vdc signal is available on the rear panel to turn on the cooling water to the X-Ray tube. This signal can be enabled either when control power is on or when the high voltage is turned on. (Customer must specify)

Fail Safe Interlock:

A 24Vdc signal is available on the rear panel to energize an external X-Ray on lamp. This signal is energized when the high voltage is turned on. High voltage will not enable if this circuit is open. (A 220Vac signal is optional)

Preheat and Ramp:

Automatic preheat and ramp control circuits are provided which ramp the kV and mA slowly to set levels. kV ramps in approximately 10 seconds while mA ramps in approximately 20 seconds.

Output Connector:

75kV, 3 conductor Federal Standard X-Ray connector. -60kV is connected to terminal "C". Terminals "S" and "L" are jumped together. The filament output is connected between terminals "C" and "S". Other configurations are optional. (On the FF3, all output connections S, L, & C are connected together)

Remote Signal Connector:

Remote interface is available via a 50 pin mini D connector. Extensive remote programming and monitoring is provided.

OPTIONS

- RS232** RS-232 Interface
- 220FSI** 220Vac Fail Safe Interlock
- 208-3P** 208Vac Three Phase Input

- **Ideal for Common XRD & XRF X-Ray Tubes**
- **Compact Size, 5 1/4" (3U) High Chassis**
- **Solid Encapsulatation Insures Maintenance-Free Operation**
- **Auto Ramp of the HV Emission Current to Preset Values**
- **OEM Customization Available**

www.spellmanhv.com/manuals/DFFF

SPECIFICATIONS

Input Voltage:

220Vac ±10%, 50 or 60 Hz, single phase
(three phase optional)

Output Voltage:

DF3: 0 to 60kV negative polarity
FF3: 0 to 60kV positive polarity
Other output voltages are available

Output Current:

DF3: 0 to 80mA
FF3: 0 to 100mA
Other output currents are available

Maximum Output Power:

3kW (4kW optional)

Output Voltage Regulation:

Load: 0.005% of rated output for full load change
Line: 0.005% of rated output over specified input range
Temperature Coefficient: 50 ppm/°C (20 ppm/°C optional)
Long Term Stability: 0.01%/8 hours

Emission Current Regulation:

Load: 0.01% of rated output for a 10 to 60kV change
Line: 0.005% of rated output over specified inputs
Temperature Coefficient: 50 ppm/°C
Long Term Stability: 0.01%/8 hours

Ripple:

0.03% rms <1kHz, 0.75% rms above 1kHz

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -20°C to 85°C
Humidity:
10% to 90%, non-condensing

Filament Voltage:

12Vac (dc filament optional)

Filament Current:

5A (up to 12A max available)

Dimensions:

5.25"(3U) H x 19" W x 22" D
(13.3cm x 48.3cm x 55.9cm)

Weight:

90lbs (40kg)

Regulatory Approvals:

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

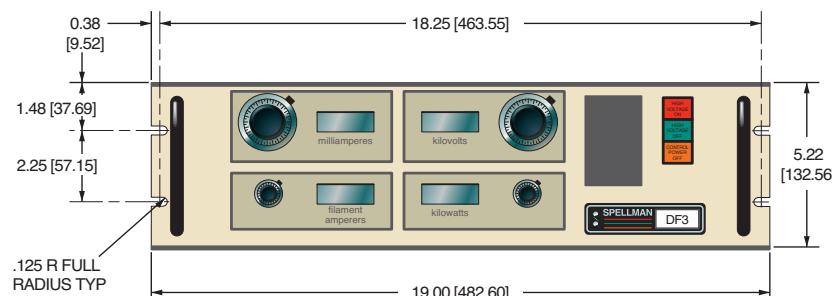
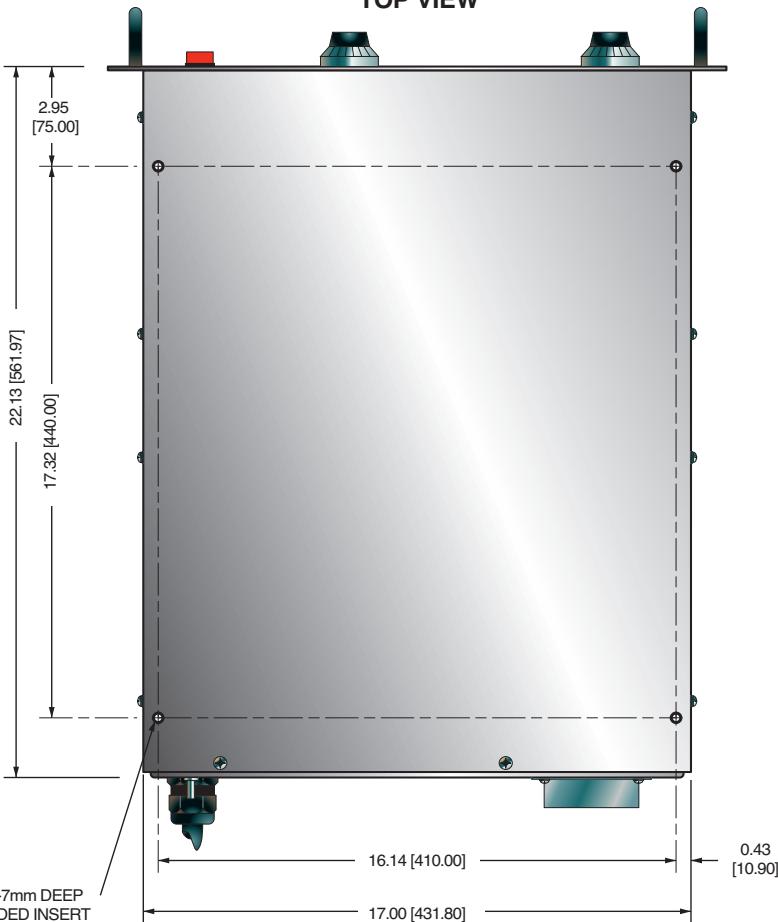
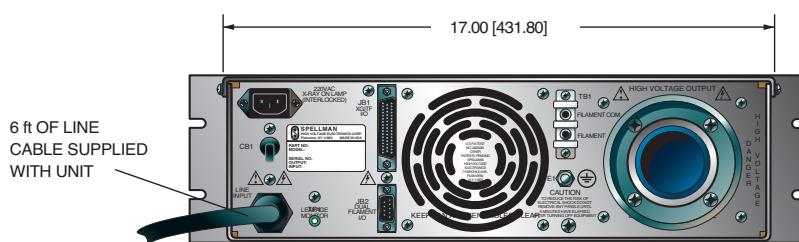
JB1 MINI D CONNECTOR 50 PIN

PIN	SIGNAL
1	+5Vdc (or connect to pin-11)
2	Control Power On
3	Intlk
4	X-Ray On
5	X-Ray Off
6	Spare
7	Spare
8	Reset
9	Rmt/Lcl
10	24V Switched
11	+5Vcch
12	X-Ray On Status
13	Overtoltage
14	kV Min
15	Overpower
16	Filament Current Limit
17	mA Current Limit
18	LCL Status
19	Power Supply Fault
20	Gnd
21	Spare
22	(DF) Remote X-Ray On
23	(DF) Remote X-Ray On Ret
24	Spare
25	Gnd
26	kV Ref
27	kV Com
28	mA Ref
29	mA Com
30	Spare
31	Spare
32	Spare
33	Pwr. Limit (OL Ref)
34	Pwr. Limit Com (OL Com)
35	Filament Current Limit
36	Filament Current Limit Com
37	Spare
38	kV Monitor
39	mA Monitor
40	Spare
41	Spare
42	kV Ref Mon
43	mA Ref Mon
44	Spare
45	Spare
46	Filament Monitor
47	Mon Common
48	Spare
49	Gnd
50	Spare

Cost reduced version for OEM quantities available, contact Sales.



DIMENSIONS: in.[mm]

FRONT VIEW

TOP VIEW

BACK VIEW




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

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

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

SPECIFICATIONS

Input Voltage:

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

Input Current:

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

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

Output Voltage

Output Voltage Range:
20kV to 40kV

Polarity:

Positive, grounded cathode X-Ray tube

Accuracy:

Within 1% of programmed values

Reproducibility:

<0.5%

Settling Time:

<10ms

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

Ripple:

$\leq 1\%$

Stability:

$\leq 0.01\%$ per 8 hours

Temperature Coefficient:

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

Output Current/Power

Output Current Range:

10mA to 200mA

Output Power:

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

Maximum mAs:

600mAs

Exposure Timer:

5ms-10 seconds

Accuracy:

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

Reproducibility:

<0.5%

Settling Time:

<10ms

Filament Configuration:

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

Filament Output:

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

Dual Speed Starter:

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

High Voltage Connector:

60kV, Claymount CA-3 type or equivalent

Optional Communication Interface:

Ethernet (RJ45)

Grounding Point:

M5 ground stud provided on chassis

Environmental:

Temperature Range:
Operating: 10°C to 40°C
Storage: -40°C to 85°C
Humidity:
20% to 85% RH, non-condensing.

Cooling:

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

Dimensions:

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

Weight:

<22 pounds (10kg)

Regulatory Approvals:

VMX40P5 platform is designed to meet applicable requirements of IEC60601-1 and IEC60601-1-2, IEC60601-2-7 and IEC60601-2-45. Spellman will support customers needs when system certification is needed (subject to additional cost and lead time). UL/CUL recognized, File E242584. RoHS compliant.

Application Features:

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

TB2 ROTOR INTERFACE

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

VMX STANDARD SYSTEM INTERFACE—JB1 25 PIN MALE D CONNECTOR

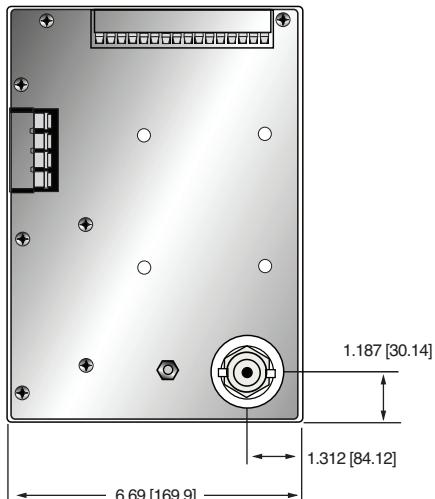
PIN	SIGNAL	PARAMETERS
1	GND	Signal Ground
2	+5Vdc Out	+5Vdc, 100mA max.
3	RS-232 Tx Out	RS-232 Transmit
4	RS-232 Rx In	RS-232 Receive
5	PREP	User signal (Contact Closure) to alert the generator that exposure sequence will begin. Once this signal is active, exposure parameters are locked in and cannot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

TB3 TUBE AND INTERLOCK INTERFACE

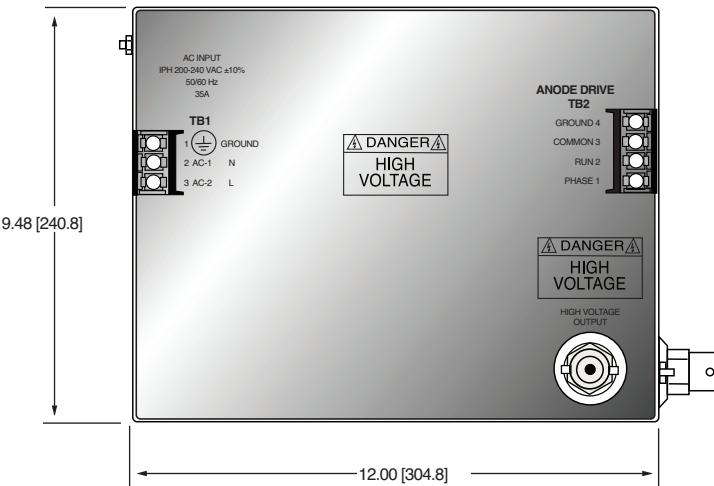
PIN	SIGNAL	PARAMETERS
TB3-1	SMALL FIL	Connection to tube small filament
TB3-2	COMMON	Connection to tube filament common
TB3-3	LARGE FIL	Connection to large filament
TB3-4	GROUND	Generator chassis for cable shield connection
TB3-5	Interlock 2+	Used if tube has separate thermostat switch. Open = OVER TEMP.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

DIMENSIONS: in.[mm]

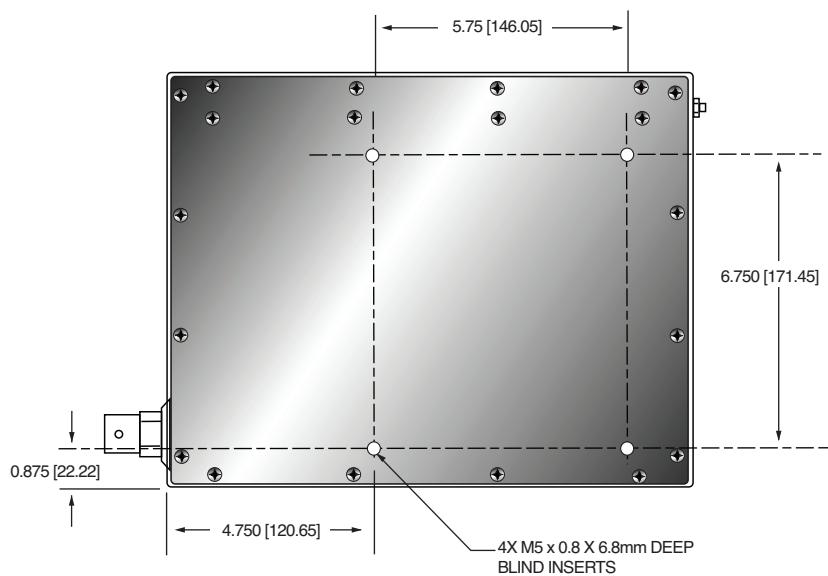
FRONT VIEW



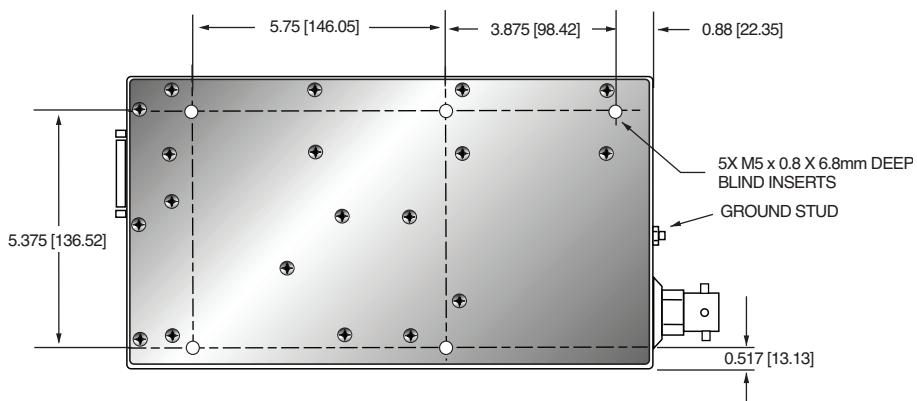
TOP VIEW



BOTTOM VIEW



SIDE VIEW





Spellman's PMX is a high performance X-Ray generator designed specifically for mammography applications including FFDM and DBT. It features 2 and 3 point exposure modes as well as smart AEC with a pre exposure.

The PMX is a 5kW high frequency X-Ray generator integrated with a dual filament power supply, and a dual speed X-Ray tube starter. Due to the PMX's superior power conversion technology and inverter design it can provide stable and accurate X-Ray tube high voltage with fast rise and fall times.

Smooth system integration of the PMX is accomplished through the use of RS-232 and optional Ethernet digital interface, preloaded X-Ray tube parameters, easy access interlocks and I/O connections, and internal generator diagnostics. Optional GUI utility software is also offered to help with initial system integration.

SPECIFICATIONS

Input Voltage:

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

Input Current:

Minimum 35A service recommended for 5kW operation

External EMC Filter (Schaffner FN2070-36-08-36A) required to meet CE/EMC specifications – Not provided

Mains Contactor – Not provided

Customer is responsible for mains safety disconnection.

Output (Tube) Voltage

Output Voltage Range:

20kV to 50kV

Polarity:

Positive, grounded cathode X-Ray tube

Accuracy:

2% (measured per IEC60601-2-45)

Reproducibility:

<0.5%

Rise Time:

<1ms to within 98% of the programmed voltage

Fall Time:

<10ms with a max HV cable length of 8 feet (2.4 meters)

Ripple:

$\leq 2\%$ p-p

- **Custom Designed Specifically for Mammography Applications**
- **Compact Space Saving Modular Format**
- **Fast Rise and Fall Times Help Minimize Unnecessary Patient Radiation Exposure**
- **Dual Speed Starter, Boost/Brake Capability**
- **RS-232 and Optional Ethernet Interfaces**

Output (Tube) Current/Power:

Output Current Range:

10mA to 200mA

Output Power:

5kW @ 0.1 second loading time,
300 Watts maximum average power

Accuracy:

< $\pm 10\%$ on exposure less than 10ms
(measured per IEC60601-2-45)

Rise Time:

<1ms to within 95% of the programmed mA value

Fall Time:

<10ms with a maximum HV cable length
of 8 feet (2.4 meters)

Exposure Time (Loading Time):

Maximum Single Exposure Time:

10 seconds

Shortest Single Exposure Time:

5ms

Loading time accuracy:

$\pm 3\% + 1\text{ms}$ (measured per IEC60601-2-45)

Maximum mAs:

600mAs

Exposure Timer:

5ms-10 seconds

Accuracy:

< $\pm 10\%$ (measured per IEC60601-2-45)

Reproducibility:

<0.5%

Filament Configuration:

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

Filament Output:

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

Dual Speed Starter:

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

High Voltage Connector:

60kV, Claymount CA-3 type or equivalent

Communication Interface:

RS-232 standard, optional Ethernet

Grounding Point:

M5 ground stud provided on chassis

Environmental:

Temperature Range:
Operating: 10°C to 40°C
Storage: -40°C to 85°C

Humidity:
20% to 85% RH, non-condensing.

Cooling:

Internal fan

Dimensions:

9.47" H X 7.19" W X 13.72" D
(240.5mm x 182.6mm x 348.5mm)

Weight:

<23 pounds (10.5kg)

Regulatory Approvals:

The PMX platform is designed to meet applicable requirements of IEC60601-1 and IEC60601-1-2, IEC60601-2-7 and IEC60601-2-45. Spellman will support customers needs when system certification is needed

Application Features:

- 2 point/3 point exposure modes
- AEC/Smart AEC exposure modes
- Dual Speed Starter
- X-Ray tube anode heat calculator
- Preloaded X-Ray tube parameters and expandable X-Ray tube library

TB2 ROTOR INTERFACE

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

**PMX STANDARD SYSTEM INTERFACE –
JB1 25 PIN MALE D CONNECTOR**

PIN	SIGNAL	PARAMETERS
1	GND	Signal Ground
2	+5Vdc Out	+5Vdc, 100mA max.
3	RS-232 Tx Out	RS-232 Transmit
4	RS-232 Rx In	RS-232 Receive
5	PREP	User signal (Contact Closure) to alert the generator that exposure sequence will begin. Once this signal is active, exposure parameters are locked in and cannot be changed. The generator enables the starter to boost the rotor. Contact connection to pin 24. Closed = PREP, the filament is placed in preheat mode
6	READY	Generator signal to user to indicate the rotor runs to speed and the generator is ready for X-Ray exposure Open Collector. Low/Active = Ready
7	ROTOR SHUTDOWN	User signal to brake the rotor drive
8	EXPOSURE	User signal (Contact Closure) to generator to generate X-Rays. Filament is boosted, and high voltage is generated after the boost time. Contact connection to pin 24. Closed = Exposure
9	X-Ray ON 75% Status	Transistor output to indicate X-Ray ON status synchronized with 75% of kVP setting point.
10	X-Ray ON Status	Transistor output to indicate X-Ray ON status synchronized with kV start up.
11	N/C	N/C
12	X-Ray SHUTDOWN/AEC	User signal to generator to rapidly turn HV OFF and ON during serial exposure sequence
13	RS-232 ISO Ground	Isolated ground from RS-232 transceiver IC
14	HVG FAULT Status	Generator signal indicating generator fault. Open collector transistor output. Low/Active = Fault
15	Status Bit 1	3 bit status lines for up to 6 status messages. See separate matrix describing functionality. Open Collector. Low/Active = Message
16	Status Bit 2	
17	Status Bit 3	
18	N/C	N/C
19	N/C	N/C
20	kV Monitor	Signal from generator. 0-10V = 0-50kV. Zout = 1kΩ
21	Emission Monitor	Signal from generator. 0-10V = 0-200mA. Zout = 1kΩ
22	Filament Current Monitor	Signal from generator. 0-10V = 0-6A. Zout = 1kΩ
23	Program/Monitor Return	Ground for reference of program and monitor signals
24	+24Vdc Out	For connection to PREP and EXPOSURE control relay coils
25	SHIELD/GND	For connection of interface cable shield to generator chassis ground

TB3 TUBE AND INTERLOCK INTERFACE

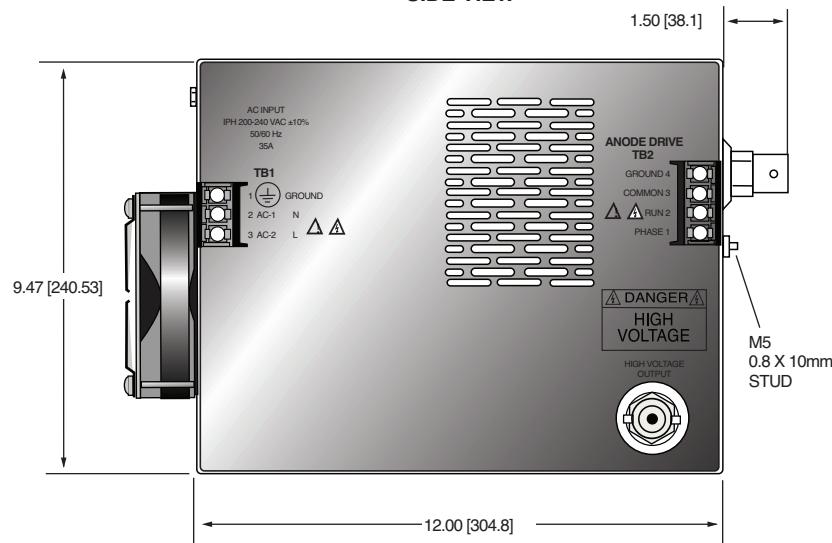
PIN	SIGNAL	PARAMETERS
TB3-1	SMALL FIL	Connection to tube small filament
TB3-2	COMMON	Connection to tube filament common
TB3-3	LARGE FIL	Connection to large filament
TB3-4	GROUND	Generator chassis for cable shield connection
TB3-5	Interlock 2+	Used if tube has separate thermostat switch. Open = OVER TEMP.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

DIMENSIONS: in.[mm]

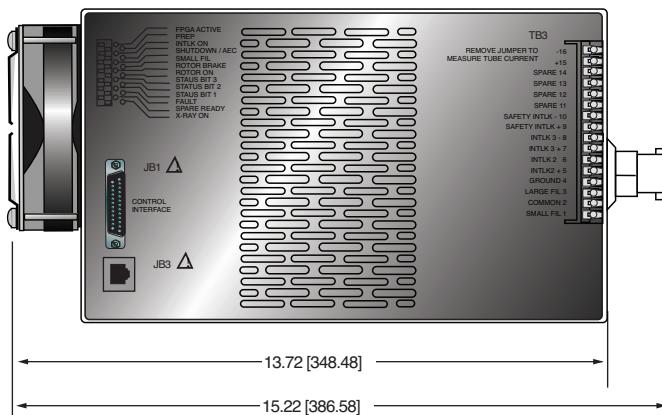
FRONT VIEW



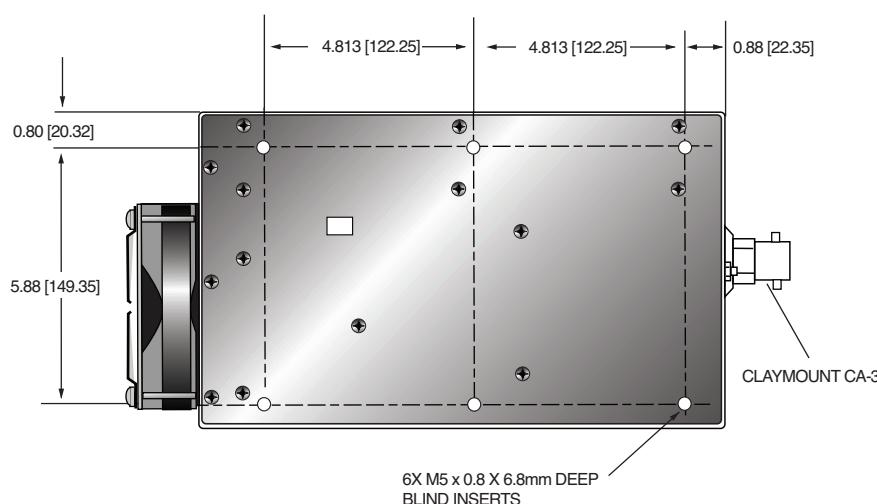
SIDE VIEW



TOP VIEW



BOTTOM VIEW



X-Ray Generators for Rotating CT Scanner Applications



- **Output Voltage: 0 to 150kV (Anode Grounded or Bipolar)**
- **Emission Current: up to 1000mA**
- **Output Power: up to 120kW, Peak**
- **Filament: 15V @ 6A, Referenced to Cathode**
- **Dual Focal Spot**
- **High Powered Filament Power Supply Option**
- **High Speed Floating Grid Modulator Option**
- **High Speed Starter Option**
- **Analog and Digital Control Interface**
- **Designed for High Speed Gantry Rotation**

Spellman has produced CT Scanner X-Ray generators for over 25 years and was the first supplier to provide generators for continuous rotation in a production system.

This expertise has made it possible to develop and produce highly reliable power supplies specifically designed to meet the exacting requirements for helical scanning. These units are designed for high speed gantry rotation and their fast rise time and low ripple outputs make enhanced image quality possible.

Various other power levels and configurations are available for OEM requirements. Contact our sales department for additional details.





Spellman's LPX Series are perfectly suited for today's demanding NDT inspection requirements. LPX units are rugged, yet easy to transport and economical to maintain. They can be line or portable generator powered automatically adapting to standard input voltages to permit all day inspection under extreme conditions virtually anywhere.

The end grounded X-Ray tubes have a focal spot size of 1.5mm sq. and the exposed anode allows for easy and flexible positioning of the tube head assembly. Tube ports use a low-absorption beryllium window that allows the radiographer to utilize the full spectrum of X-Ray energy. The high radiation output of the LPX systems allow for lower kV per exposure, shorter exposure times and increased film contrast for superior radiographic imaging.

The LPX microprocessor-driven control unit provides automatic warm-up and comprehensive self-diagnostic circuitry. Memory to store and recall up to 250 exposure techniques is standard and the last set of exposure parameters is retained before powering down. The LPX is adjustable in 1kV and 0.1mA increments. Exposure duration can be set from 1 second to 99 min 59 seconds in 1 second increments; mAs is variable from 0 to 29995 mAs.

TYPICAL APPLICATIONS

- Aerospace
- Manufacturing
- Defense
- Aviation
- Energy
- Security Systems
- NDT Applications

SPECIFICATIONS

Input Line Requirements:

Automatically adapts to input line voltage
100-130Vac, 50/60Hz, 20 Amperes maximum
200-250Vac, 50/60Hz, 10 Amperes maximum
May also be portable-generator powered

X-Ray Output:

5 to 160kV, 0.1 to 5.0mA
Constant potential, end-grounded anode,
air or liquid cooled versions available

- **5 to 160kV, 0.1 to 5mA**
- **Constant Potential Output**
- **End Grounded Exposed Anode**
- **Portable, Repeatable, Accurate**
- **100% Duty Cycle**
- **Unparalleled Resolution Imaging**
- **Liquid or Air Cooled Models**
- **Penetration of up to 25.4mm Fe**

www.spellmanhv.com/manuals/LPX160

X-Ray Tube Window:

Beryllium 0.8mm (Directional), Nickel 0.6mm (Panoramic)

Radiation Coverage:

40° directional or 360° panoramic tube available

Radiation Output:

14R/min at 50cm filtered with 0.5 inches (12.7mm)
aluminum at 160kV, 5mA

Duty Cycle:

100% - liquid or air cooled

Effective Focal Spot:

Standard: 0.060 in. sq. (1.5mm. sq.)
Panoramic: This tube has a flat target (0 degree) and therefore it is without dimension along the tube axis (other than panoramic tubes with conical targets). The true focal spot on the target can only be estimated by taking two focal spot film exposures in the main beam 90 degrees apart from each other. Due to this no focal spot is inferred.

Ambient Temp:

100% duty cycle @ 120°F (49°C)

Storage Temp:

-30°F to 160°F (-35°C to 71°C)

Anode Cooling:

Liquid coolant solution closed loop between X-Ray tube anode and cooling unit, or fan-forced air cooling

Liquid Cooling Unit Dimensions:

12.7" H x 15.5" W x 15.7" D
(322.6mm x 393.7mm x 398.8mm)

Liquid Cooling Unit Weight:

54lbs. (15.4kg) approx.

LPX160 Tube Head Dimensions:

Liquid Cooled:	7.25" Diam. x 28.5" L (184.2mm x 723.9mm)
Air Cooled:	7.25" Diam. x 30.5" L (184.2mm x 774.7mm)
Panoramic:	7.25" Diam. x 28.0" L (184.2mm x 711.2mm)

LPX160 Tube Head Weight:

Liquid Cooled:	29lbs. (13.15kg)
Air Cooled:	33lbs. (14.97kg)
Panoramic:	29lbs. (13.15kg)

X-Ray Control Unit:

Digital microcomputer based

X-Ray Control Unit Dimensions:

12.7" H x 17.5" W x 10.5" D
(322.58mm x 441.96mm x 266.7mm)

X-Ray Control Unit Weight:

34lbs. (12.68kg) approx.

Safety Devices:

- Tubehead Pressure Relief Valve
- Tubehead Thermal Cut-Out
- Tubehead Pressure Gauge
- Tubehead Low Pressure Cut-Out @ 25psi (1.72 Bar)
- Coolant Flow Sensor (liquid cooled only)
- Control Unit Safety Keypad
- Microcomputer-based Self Diagnostics
- Continuous Exposure Parameter Display

Radiation Leakage:

Less than 0.8 Roentgens per hour at 1 meter from the X-Ray tube target. 2.0 Roentgens per hour for Air Cooled units

Standard Accessories:

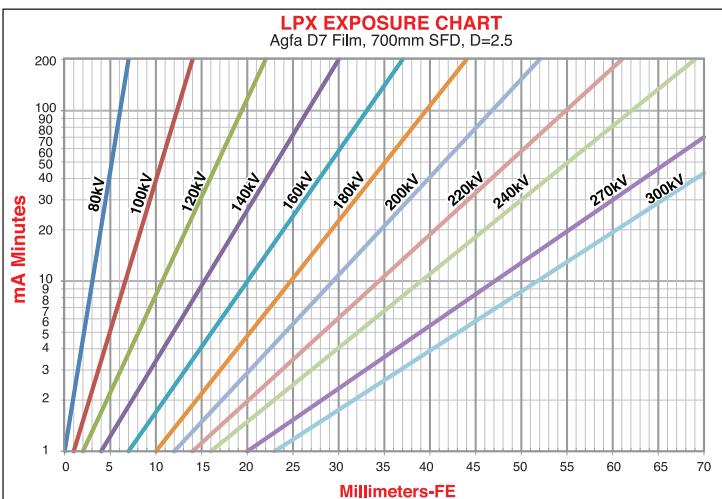
- Operation manual
- Tubehead carrying case
- Tubehead Cable- 100' with strain relief
- Extra key (1) for Control Unit Safety Lock
- Power cable - 25' with strain relief
- Coolant hose - twin, 50' with self-sealing terminations (liquid cooled only)
- Cooler power cable

LPX160 MODEL SELECTION TABLE

MODEL NUMBER	DESCRIPTION
3-000-0778	Air cooled, 40° directional beam, glass insert
3-000-1581	Liquid cooled, 40° directional beam, glass insert
3-000-0777	Liquid cooled, panoramic beam, glass insert

LPX160 OPTIONS

MODEL NUMBER	DESCRIPTION
3-000-0754	LPX160/200 tubehead stand
3-000-0792	Laser pointer for liquid cooled
K935	Laser pointer kit for air cooled



This chart is for reference only (actual settings may vary due to SFD, material, and film type)

OPTIONAL ACCESSORIES**Laser Pointer**

Spellman's exclusive Laser Pointer allows pinpoint image area targeting. The Laser Pointer projects a highly visible reference laser beam from the tubehead to surfaces up to 75 feet away, showing precisely where the central X-Ray beam will be located, providing unmatched accuracy for greater efficiency and reduced set-up times.

**Model 1620 Tubehead Stand**

An optional X-Ray Tubehead Stand allows for quick set up and provides rigid support for optimal image quality with three-axis positioning of the tubehead assembly. The stand incorporates telescoping legs, a hand wheel-driven variable height adjustment and lockable hand wheel controlling the tubehead tilt and horizontal rotation. The tubehead cradle is cushioned for secure mounting and vibration damping. A bubble-type indicator is included for quick and easy leveling of the tubehead. Black anodized aluminum construction. 35lbs. (16kg) approx.

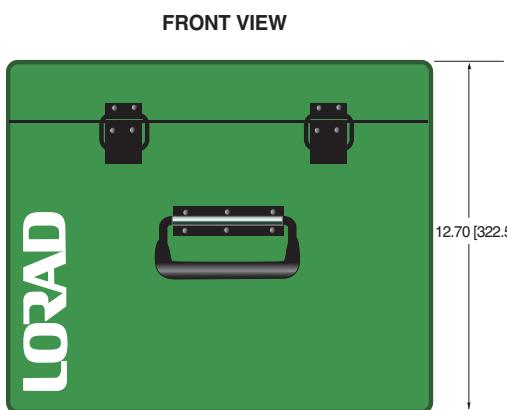
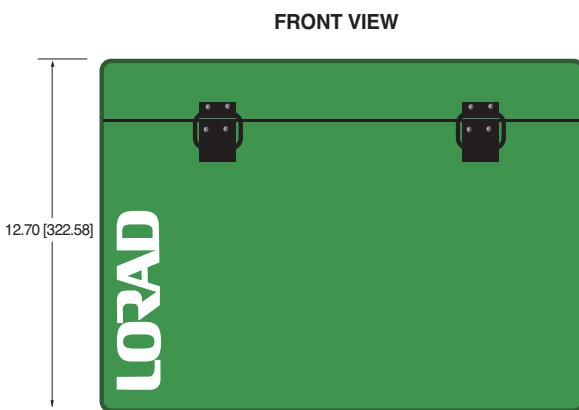
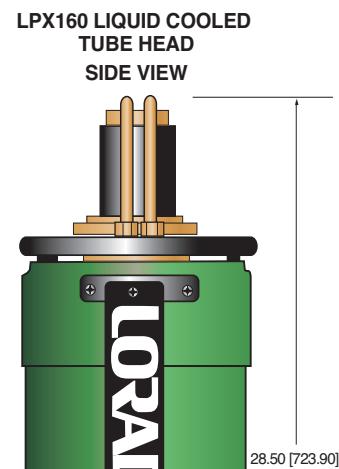
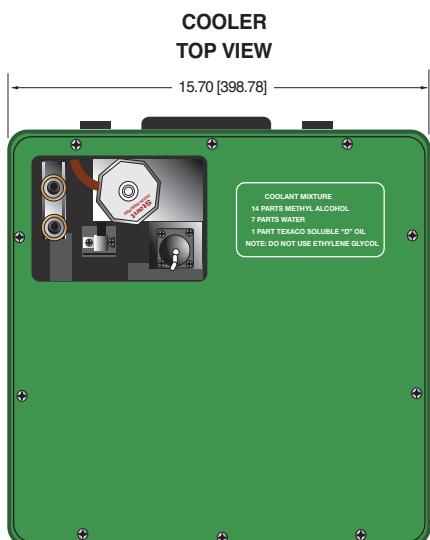
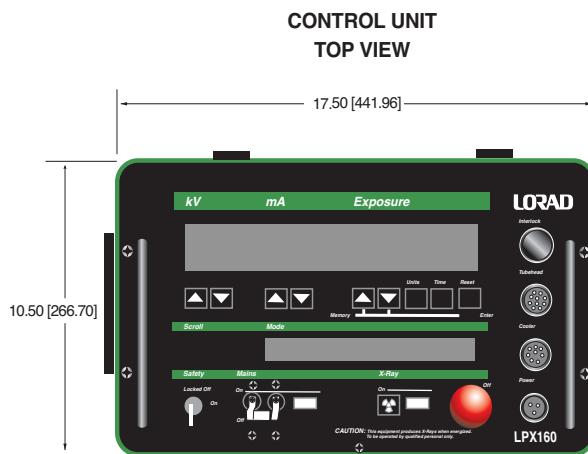
**Optional Air Cooled****Tube Head Assembly**

The air cooled tube head assembly uses a heat sink and high volume fan to dissipate heat from the anode and typically is used in applications that do not have limited access and are not in a volatile fuel vapor atmosphere. The air cooled tube head assembly does not require the cooler unit and the associated mixing and maintenance of liquid coolant. This unit requires less user maintenance and could be considered more environmentally friendly.

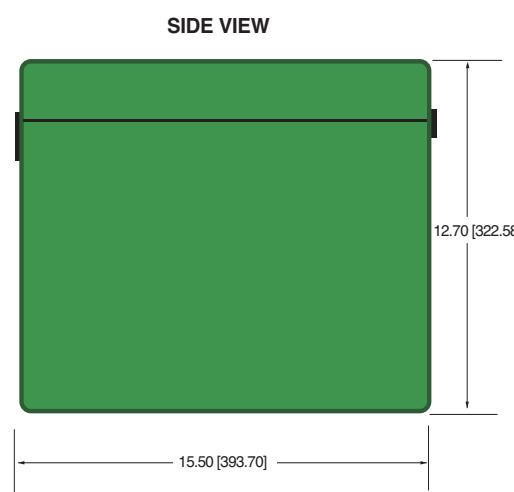
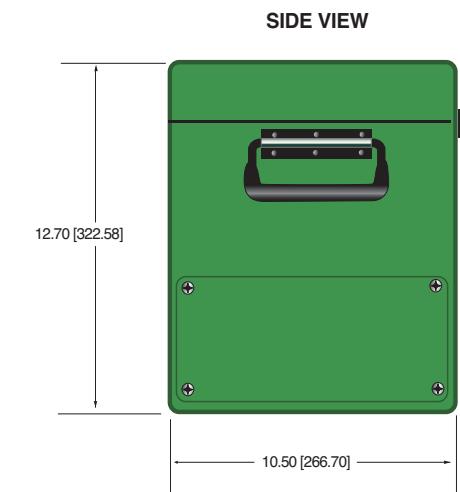
**Optional Panoramic
Tube Head Assembly**

The panoramic tube head assembly comes in a liquid cooled version only and produces radiation in a 360 degree cone making it ideal for aircraft FOD inspection, inspection of tanks or pipes or any application that requires circumferential radiographic inspection.

DIMENSIONS: in.[mm]



7.25 [184.20]





Spellman's LPX Series are perfectly suited for today's demanding NDT inspection requirements. LPX units are rugged, yet easy to transport and economical to maintain. They can be line or portable generator powered automatically adapting to standard input voltages to permit all day inspection under extreme conditions virtually anywhere.

The end grounded X-Ray tubes have a focal spot size of 1.5mm sq. and the exposed anode allows for easy and flexible positioning of the tube head assembly. Tube ports use a low-absorption beryllium window that allows the radiographer to utilize the full spectrum of X-Ray energy. The high radiation output of the LPX systems allow for lower kV per exposure, shorter exposure times and increased film contrast for superior radiographic imaging.

The LPX microprocessor-driven control unit provides automatic warm-up and comprehensive self-diagnostic circuitry. Memory to store and recall up to 250 exposure techniques is standard and the last set of exposure parameters is retained before powering down. The LPX is adjustable in 1kV and 0.1mA increments. Exposure duration can be set from 1 second to 99 min 59 seconds in 1 second increments; mAs is variable from 0 to 29995 mAs.

TYPICAL APPLICATIONS

- Aerospace
- Manufacturing
- Defense
- Aviation
- Energy
- Security Systems
- NDT Applications

SPECIFICATIONS

Input Line Requirements:

Automatically adapts to input line voltage
100-130Vac, 50/60Hz, 20 Amperes maximum
200-250Vac, 50/60Hz, 10 Amperes maximum
May also be portable-generator powered

X-Ray Output:

10 to 200kV, 0.1 to 10.0mA (900 watts max.)
Constant potential, end-grounded anode,
air or liquid cooled versions available

- **10 to 200kV, 0.1 to 10mA (900 watts max.)**
- **Constant Potential Output**
- **End Grounded Exposed Anode**
- **Portable, Repeatable, Accurate**
- **100% Duty Cycle**
- **Unparalleled Resolution Imaging**
- **Liquid or Air Cooled Models**
- **Penetration of up to 51mm Fe**
- **Glass or Metal Ceramic Insert**

www.spellmanhv.com/manuals/LPX200

X-Ray Tube Window:

Beryllium 1.0mm

Radiation Coverage:

40° directional or 360° panoramic tube available

Radiation Output:

21R/min at 50cm filtered with 0.5 inches (12.7mm)
aluminum at 200kV, 4.5mA

Duty Cycle:

100% - liquid or air cooled

Effective Focal Spot:

Standard: 0.060 in. sq. (1.5mm. sq.)
Panoramic: 0.4x4.0mm (IEC336)

Ambient Temp:

100% duty cycle @ 120°F (49°C)

Storage Temp:

-30°F to 160°F (-35°C to 71°C)

Anode Cooling:

Liquid coolant solution closed loop between X-Ray tube anode and cooling unit, or fan-forced air cooling

Liquid Cooling Unit Dimensions:

12.7" H x 15.5" W x 15.7" D
(322.6mm x 393.7mm x 398.8mm)

Liquid Cooling Unit Weight:

54lbs. (15.4kg) approx.

LPX200 Tube Head Dimensions:

Liquid Cooled: 8.38" Diam. x 26.5" L (212.9mm x 673.1mm)
Air Cooled: 8.38" Diam. x 30.0" L (212.9mm x 762mm)
Panoramic: 8.38" Diam. x 26.5" L (212.9mm x 673.1mm)

LPX200 Tube Head Weight:

Liquid Cooled: 37lbs. (16.78kg)
Air Cooled: 41lbs. (18.60kg)
Panoramic: 37lbs. (16.78kg)

X-Ray Control Unit:

Digital microcomputer based

X-Ray Control Unit Dimensions:

12.7" H x 17.5" W x 10.5" D
(322.58mm x 441.96mm x 266.7mm)

X-Ray Control Unit Weight:

34lbs. (12.68kg) approx.

Safety Devices:

- Tubehead Pressure Relief Valve
- Tubehead Thermal Cut-Out
- Tubehead Pressure Gauge
- Tubehead Low Pressure Cut-Out @ 25psi (1.72 Bar)
- Coolant Flow Sensor (liquid cooled only)
- Control Unit Safety Keyswitch
- Microcomputer-based Self Diagnostics
- Continuous Exposure Parameter Display

Radiation Leakage:

Less than 0.8 Roentgens per hour at 1 meter from the X-Ray tube target. 2.0 Roentgens per hour for Air Cooled units

Standard Accessories:

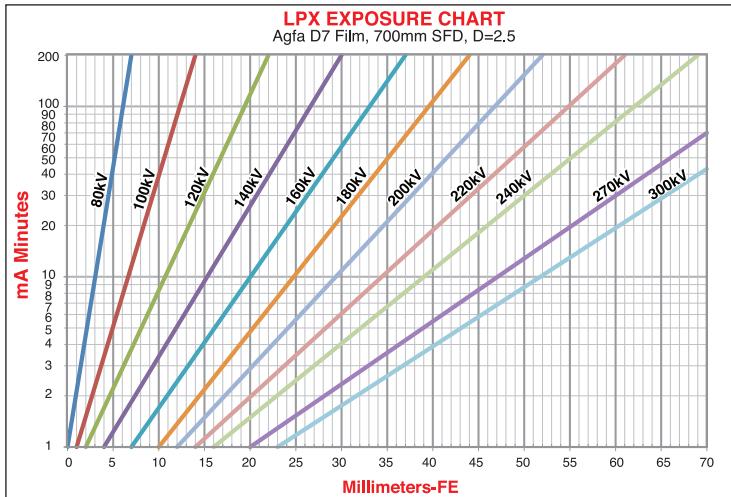
- Operation manual
- Tubehead carrying case
- Tubehead Cable- 100' with strain relief
- Extra key (1) for Control Unit Safety Lock
- Power cable - 25' with strain relief
- Coolant hose - twin, 50' with self-sealing terminations (liquid cooled only)
- Cooler power cable

LPX200 MODEL SELECTION TABLE

MODEL NUMBER	DESCRIPTION
3-000-3065	Air cooled, 40° directional beam, metal ceramic insert
3-000-3064	Liquid cooled, 40° directional beam, metal ceramic insert
3-000-3262	Air cooled, 40°directional beam, glass insert
3-000-3261	Liquid cooled, 40° directional beam, glass insert
3-000-3131	Liquid cooled, panoramic beam, metal ceramic insert

LPX200 OPTIONS

MODEL NUMBER	DESCRIPTION
3-000-0754	LPX160/200 tubehead stand
K936	Laser pointer kit for air cooled
K937	Laser pointer kit for liquid cooled



This chart is for reference only (actual settings may vary due to SFD, material, and film type)

OPTIONAL ACCESSORIES**Laser Pointer**

Spellman's exclusive Laser Pointer allows pinpoint image area targeting. The Laser Pointer projects a highly visible reference laser beam from the tubehead to surfaces up to 75 feet away, showing precisely where the central X-Ray beam will be located, providing unmatched accuracy for greater efficiency and reduced set-up times.

**Model 1620 Tubehead Stand**

An optional X-Ray Tubehead Stand allows for quick set up and provides rigid support for optimal image quality with three-axis positioning of the tubehead assembly. The stand incorporates telescoping legs, a hand wheel-driven variable height adjustment and lockable hand wheel controlling the tubehead tilt and horizontal rotation. The tubehead cradle is cushioned for secure mounting and vibration damping. A bubble-type indicator is included for quick and easy leveling of the tubehead. Black anodized aluminum construction. 35lbs. (16kg) approx.

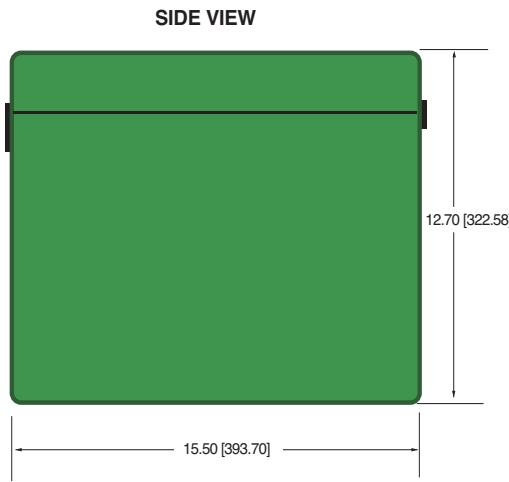
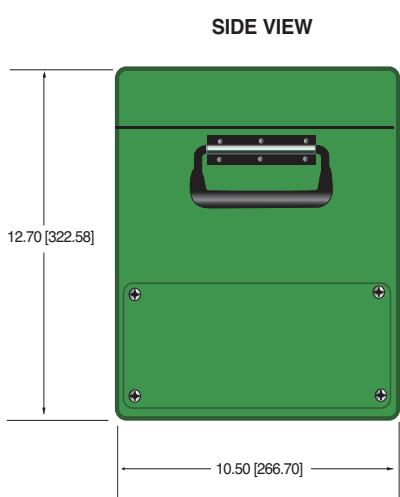
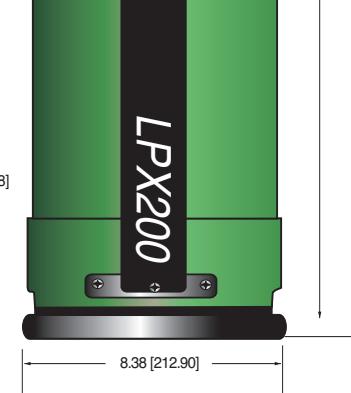
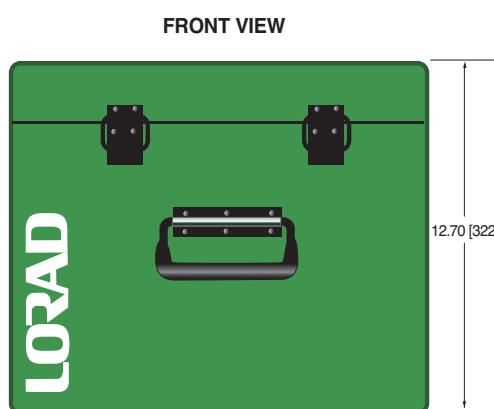
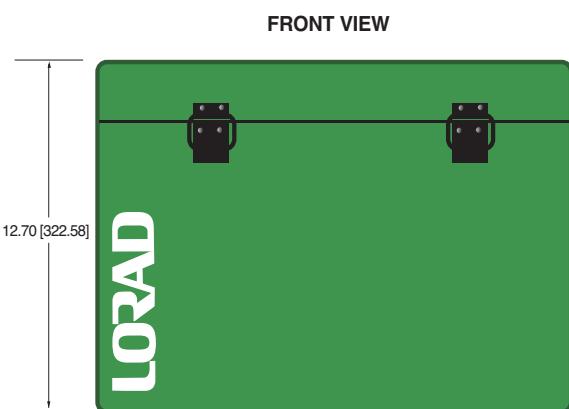
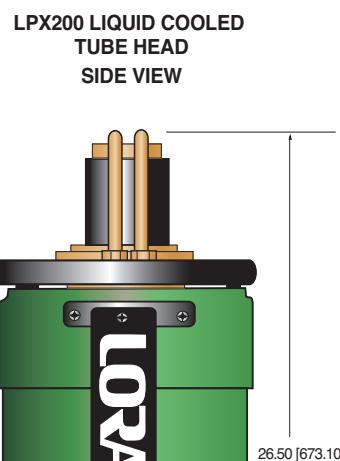
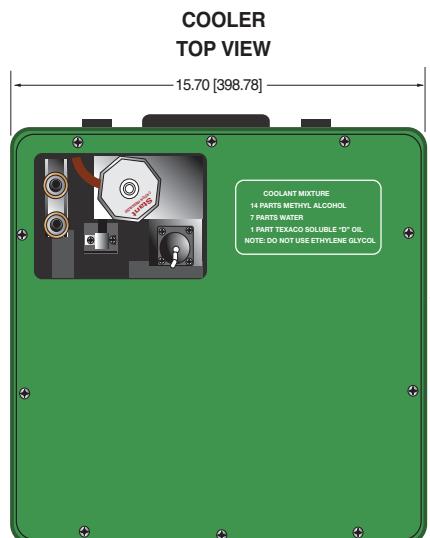
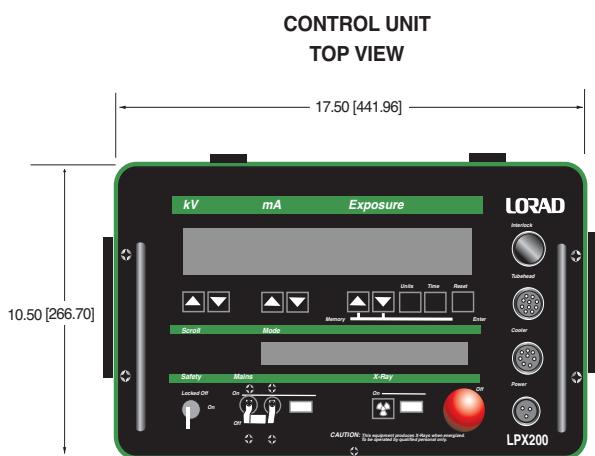
**Optional Air Cooled
Tube Head Assembly**

The air cooled tube head assembly uses a heat sink and high volume fan to dissipate heat from the anode and typically is used in applications that do not have limited access and are not in a volatile fuel vapor atmosphere. The air cooled tube head assembly does not require the cooler unit and the associated mixing and maintenance of liquid coolant. This unit requires less user maintenance and could be considered more environmentally friendly.

**Optional Panoramic
Tube Head Assembly**

The panoramic tube head assembly comes in a liquid cooled version only and produces radiation in a 360 degree cone making it ideal for aircraft FOD inspection, inspection of tanks or pipes or any application that requires circumferential radiographic inspection.

DIMENSIONS: in.[mm]





Spellman's LPX Series are perfectly suited for today's demanding NDT inspection requirements. LPX units are rugged, yet easy to transport and economical to maintain. They can be line or portable generator powered automatically adapting to standard input voltages to permit all day inspection under extreme conditions virtually anywhere.

The end grounded X-Ray tubes have a focal spot size of 1.5mm sq and the exposed anode allows for easy and flexible positioning of the tube head assembly. Tube ports use a low-absorption beryllium window that allows the radiographer to utilize the full spectrum of X-Ray energy. The high radiation output of the LPX systems allow for lower kV per exposure, shorter exposure times and increased film contrast for superior radiographic imaging.

The LPX microprocessor-driven control unit provides automatic warm-up and comprehensive self-diagnostic circuitry. Memory to store and recall up to 250 exposure techniques is standard and the last set of exposure parameters is retained before powering down. The LPX is adjustable in 1kV and 0.1mA increments. Exposure duration can be set from 1 second to 99 min 59 seconds in 1 second increments; mAs is variable from 0 to 29995 mAs.

TYPICAL APPLICATIONS

- Aerospace
- Manufacturing
- Defense
- Aviation
- Energy
- Security Systems
- NDT Applications

SPECIFICATIONS

Input Line Requirements:

Automatically adapts to input line voltage
100-130Vac, 50/60Hz, 20 Amperes maximum
200-250Vac, 50/60Hz, 10 Amperes maximum
May also be portable-generator powered

X-Ray Output:

10 to 300kV, 0.1 to 10.0mA (900 watts max.)
Constant potential, end-grounded anode, liquid cooled

- **10 to 300kV, 0.1 to 10mA (900 watts max.)**
- **Constant Potential Output**
- **End Grounded Exposed Anode**
- **Portable, Repeatable, Accurate**
- **100% Duty Cycle**
- **Unparalleled Resolution Imaging**
- **Penetration of up to 76mm Fe**
- **Liquid or Air Cooled Models**

www.spellmanhv.com/manuals/LPX300

X-Ray Tube Window:

Beryllium 1.0mm

Radiation Coverage:

40° x 60°

Radiation Output:

30R/min at 50cm filtered with 0.5 inches (12.7mm)
aluminum at 300kV, 3.0mA

Duty Cycle:

100% - liquid cooled

Effective Focal Spot:

0.060 in. sq. (1.5mm. sq.)

Ambient Temp:

100% duty cycle @ 120°F (49°C)

Storage Temp:

-30°F to 160°F (-35°C to 71°C)

Anode Cooling:

Liquid coolant solution closed loop between X-Ray tube anode and cooling unit

Liquid Cooling Unit Dimensions:

12.7" H x 15.5" W x 15.7" D
(322.6mm x 393.7mm x 398.8mm)

Liquid Cooling Unit Weight:

54lbs. (15.4kg) approx.

LPX300 Tube Head Dimensions:

Liquid Cooled: 12.00" Diam. x 43.00" L (304.8mm x 1092.2mm)
Air Cooled: 12.00" Diam. x 49.00" L (304.8mm x 1244.6mm)

LPX300 Tube Head Weight:

Liquid Cooled: 98lbs. (44.5kg)
Air Cooled: 105lbs. (47.61kg)

X-Ray Control Unit:

Digital microcomputer based

X-Ray Control Unit Dimensions:

12.7" H x 17.5" W x 10.5" D
(322.58mm x 441.96mm x 266.7mm)

X-Ray Control Unit Weight:

34lbs. (12.68kg) approx.

Safety Devices:

- Tubehead Pressure Relief Valve
- Tubehead Thermal Cut-Out
- Tubehead Pressure Gauge
- Tubehead Low Pressure Cut-Out @ 25psi (1.72 Bar)
- Coolant Flow Sensor
- Control Unit Safety Keyswitch
- Microcomputer-based Self Diagnostics
- Continuous Exposure Parameter Display

Radiation Leakage:

Less than 2.0 Roentgens per hour at 1 meter from the X-Ray tube target.

Standard Accessories:

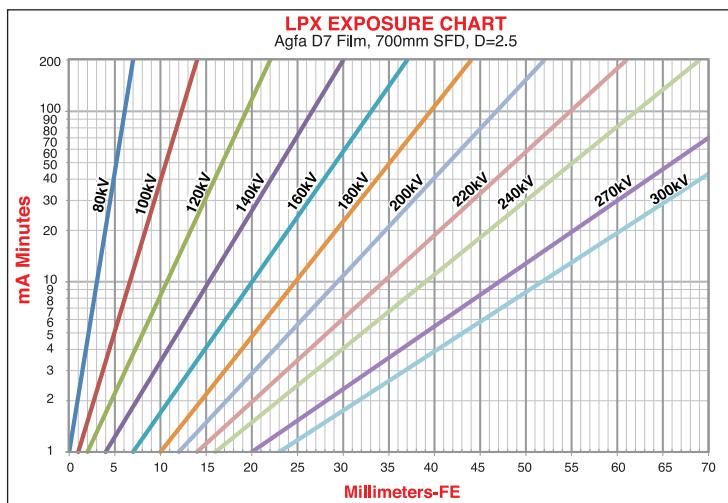
- Operation manual
- Tubehead carrying case
- Tubehead Cable- 100' with strain relief
- Extra key (1) for Control Unit Safety Lock
- Power cable - 25' with strain relief
- Coolant hose - twin, 50' with self-sealing terminations
- Cooler power cable

LPX300 MODEL SELECTION TABLE

MODEL NUMBER	DESCRIPTION
3-000-3172	Liquid cooled, 40° directional beam, metal ceramic insert
3-000-3173	Air cooled, 40° directional beam, metal ceramic insert

LPX300 OPTIONS

MODEL NUMBER	DESCRIPTION
3-000-0756	LPX300 tubehead stand
K936	Laser pointer kit for air cooled
K938	Laser pointer kit for liquid cooled



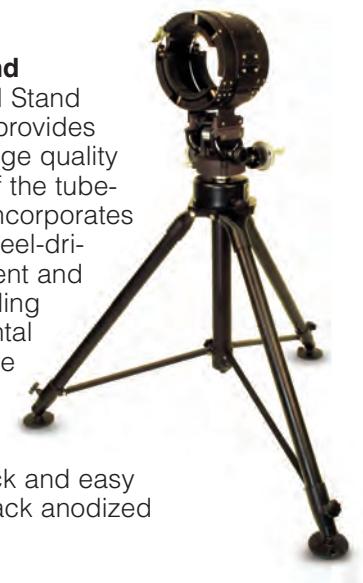
This chart is for reference only (actual settings may vary due to SFD, material, and film type)

OPTIONAL ACCESSORIES**Laser Pointer**

Spellman's exclusive Laser Pointer allows pinpoint image area targeting. The Laser Pointer projects a highly visible reference laser beam from the tubehead to surfaces up to 75 feet away, showing precisely where the central X-Ray beam will be located, providing unmatched accuracy for greater efficiency and reduced set-up times.

**Model 1620 Tubehead Stand**

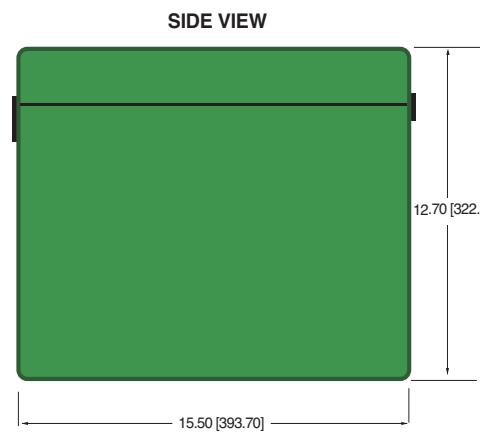
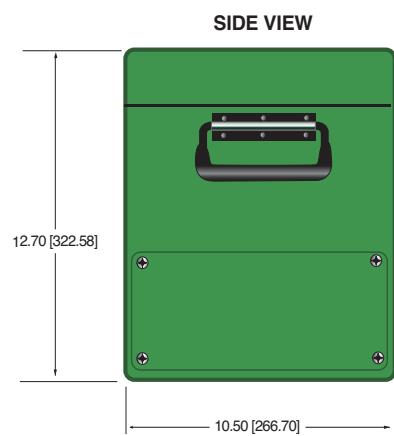
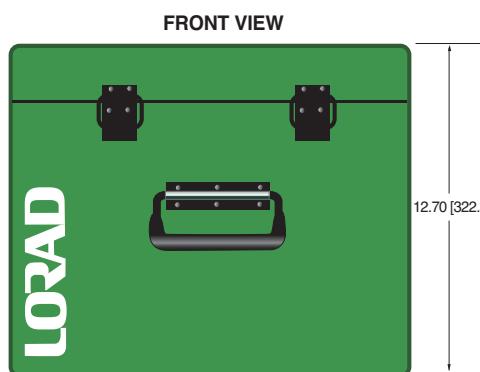
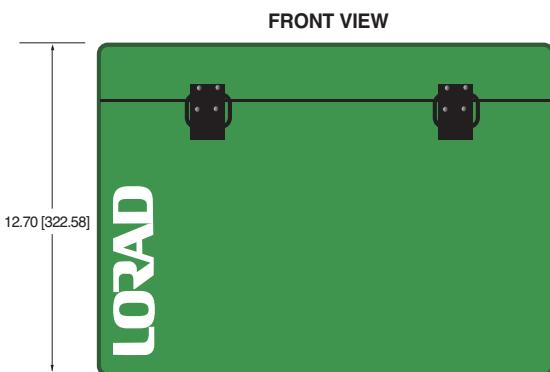
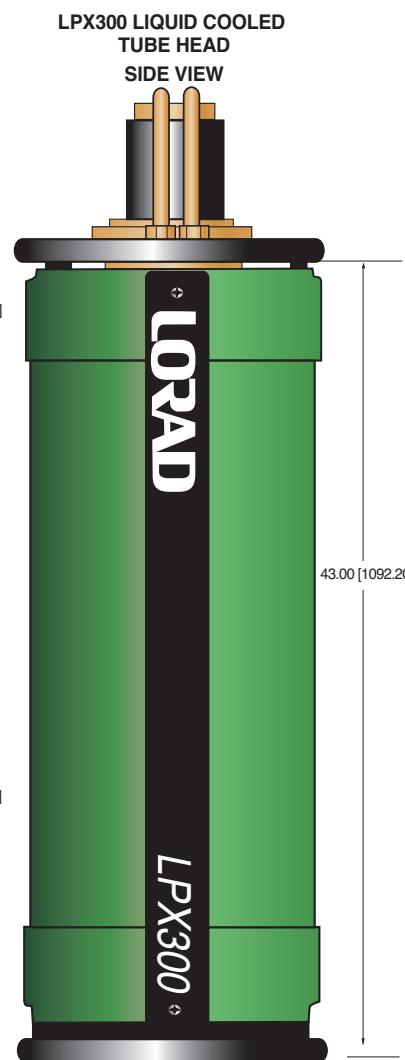
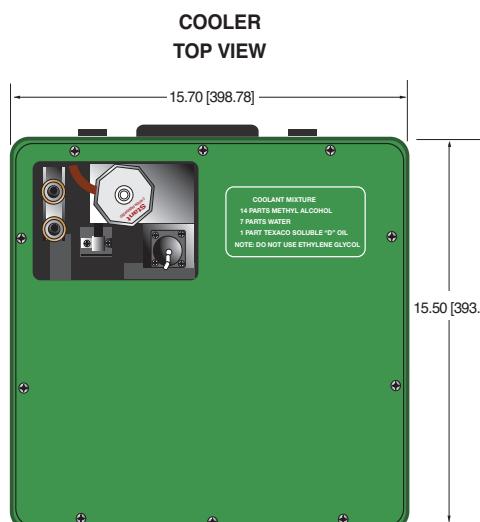
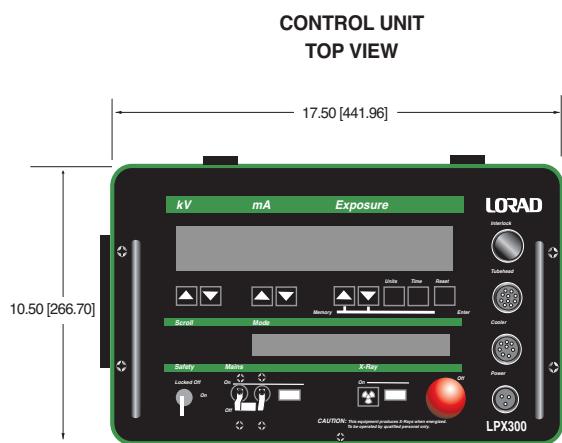
An optional X-Ray Tubehead Stand allows for quick set up and provides rigid support for optimal image quality with three-axis positioning of the tubehead assembly. The stand incorporates telescoping legs, a hand wheel-driven variable height adjustment and lockable hand wheel controlling the tubehead tilt and horizontal rotation. The tubehead cradle is cushioned for secure mounting and vibration damping. A bubble-type indicator is included for quick and easy leveling of the tubehead. Black anodized aluminum construction. 35lbs. (16kg) approx.

**Optional Air Cooled
Tube Head Assembly**

The air cooled tube head assembly uses a heat sink and high volume fan to dissipate heat from the anode and typically is used in applications that do not have limited access and are not in a volatile fuel vapor atmosphere. The air cooled tube head assembly does not require the cooler unit and the associated mixing and maintenance of liquid coolant. This unit requires less user maintenance and could be considered more environmentally friendly.



DIMENSIONS: in.[mm]





Spellman's LPX Series are perfectly suited for today's demanding NDT inspection requirements. LPX units are rugged, easy to transport and the optional LPX1620 Tubehead Stand allows for quick set up and provides rigid support for optimal image quality. The tubehead stand incorporates telescoping legs, a hand wheel-driven variable height adjustment and lockable hand wheel controlling the tubehead tilt and horizontal rotation. The tubehead cradle is cushioned for secure mounting and vibration damping. A bubble-type indicator is included for quick and easy leveling of the tubehead.

SPECIFICATIONS

Horizontal Rotation:

360°

Tilt:

-45° to +90°

Dimensions:

Footprint of legs:

43"(109cm) min., 70.5"(179cm) max.

Floor to center line of tubehead ring:

45.5"(115cm) min., 83.5"(212cm) max.

Weight:

35lbs. (16kg)

SET-UP

1. Extend tripod legs outward
2. Loosen height lock knob and raise gearhead mount approx. 3 inches
3. Place gearhead on tripod shaft. Align set screw hole in shaft with hole in gearhead mount. Using supplied hex key, tighten set screw to engage gear head mount.
4. Mount tubehead in cradle. Open knurled latch and outer ring to remove cradle assembly. Release the two hook latches on the cradle to open it. Fit cradle over tubehead making sure any cooling manifolds are positioned between cushioning pads. Latch the hook latches securely.
5. Mount cradle in the gear head outer ring. Close and latch the knurled knob locking mechanism.
6. Use the height, tilt, and rotation controls to position the X-Ray tubehead as needed. Lock all adjustments before making X-Ray exposures.

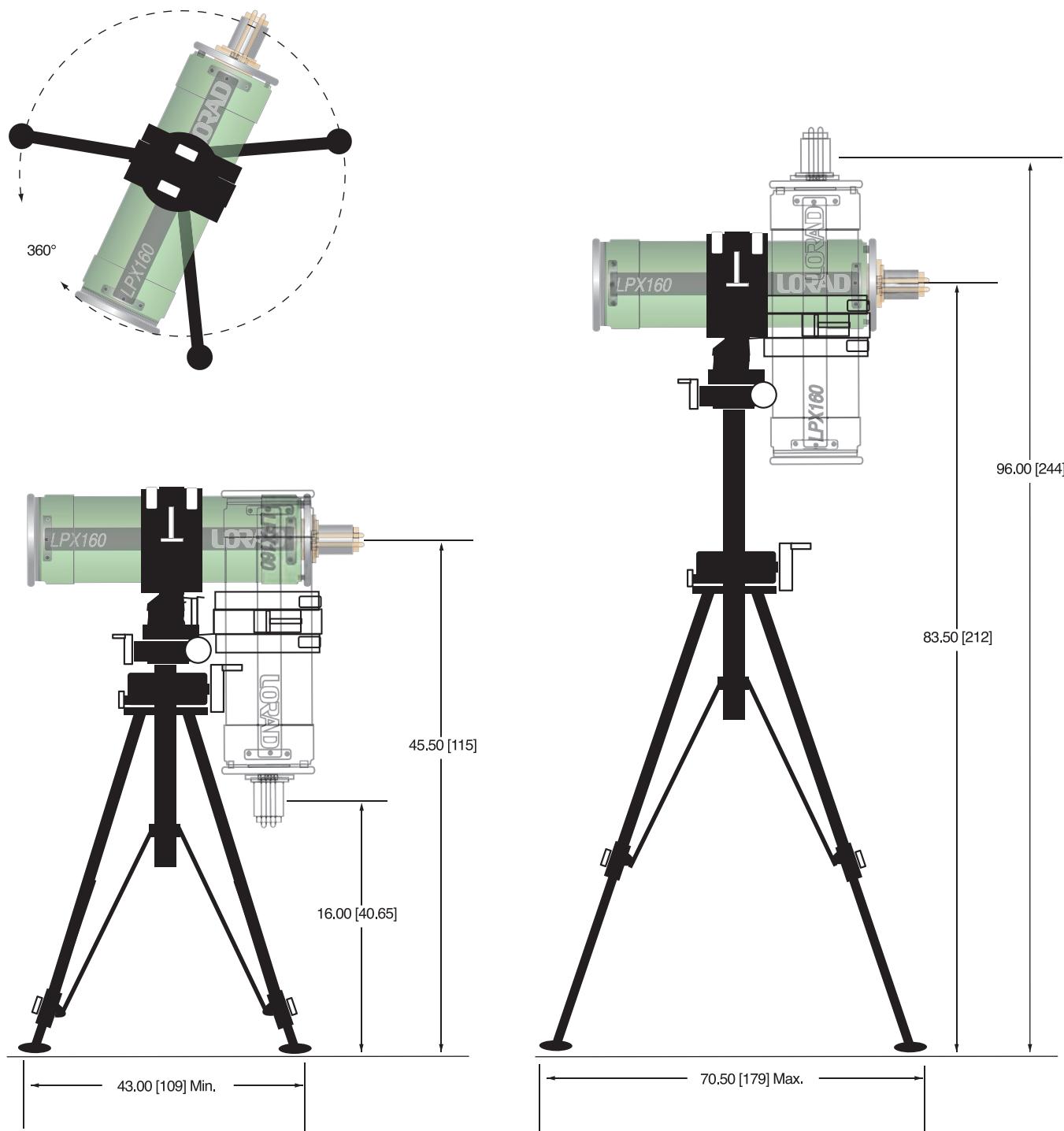


The LPX1620 Tubehead Stand is compatible with all LPX160, LPX200 and LPX300 tubehead assemblies

LPX1620 MODEL SELECTION TABLE

PART NUMBER	DESCRIPTION
3-000-0754	Tubehead stand for LPX160 and LPX200
3-000-0756	Tubehead stand for LPX300

DIMENSIONS: in. [cm]





Other imaging systems may produce inconsistent results and require repeat exposures. Spellman's Laser Pointer, exclusive to Lorad's LPX Systems, locates the centerline of the X-Ray beam for unmatched accuracy and efficiency. The Laser Pointer shows precisely where the central X-Ray beam will contact the test area by projecting a highly visible reference beam from the X-Ray tube head to surfaces up to 75 feet away. The beam is activated by a push button and automatically shuts off after 30 seconds. The Laser Pointer is lightweight and powered by three (3) AAA batteries. The Laser Pointer can be used with Lorad's end-grounded exposed anode tube heads and also with air cooled tube heads with the addition of the air cooled adaptor.

SPECIFICATIONS

Wavelength:

670nm typical

Output power:

4.2mW +/-5%

Laser Class:

Class IIIa Conforming (CDRH 21CFR)
Class 3R (IEC 60825 1)

Operating Current:

@ 5Vdc 45mA typical, 125mA max

Battery Lifetime:

20 hours typical (Alkaline AAA cells)

Operating Temp:

10°C to +40°C

Operating time w/o restart:

30 seconds

Dimensions:

1.75" H x 2.72" W x 2.72" D
(4.44cm x 6.90cm x 6.90cm)

- Exclusive to Lorad LPX Systems
- Quick Set Up
- Accurate up to 75 Feet Away
- Adaptors for Most LPX Tubeheads

Adaptors:

LPX160 A/C Part Number 9-200-0110
LPX160 L/C N/A

LPX160 Panoramic N/A

LPX200 A/C Part Number 9-200-0327

LPX200 L/C Part number 9-200-0370

LPX200 Panoramic N/A

LPX300 L/C 9-200-0465



The LPX Laser Pointer is compatible with most LPX160, LPX200 and LPX300 tubehead assemblies



Spellman's ML430 power supply module has been designed specifically to drive high voltage amplifiers. This compact, low cost, SMT based high performance module is printed circuit board mountable. Its dual output is ideal for amplifier driver requirements together with electrostatic lenses, deflectors and biasing supplies.

This voltage regulated, current limited, fixed, dual output unit provides up to 25mA of load current. The ML430 is fully protected against arc and short circuit conditions. The grounded metal case provides both shielding and heat sinking functions. An Enable feature is provided, allowing simple remote operation of the supply. The ML430 is CE and UL approved.

TYPICAL APPLICATIONS

High Voltage Amplifiers
Electrostatic Lenses

SPECIFICATIONS

Input Voltage:

+24 Vdc, ±1.2Vdc

Input Current:

≤1.2 amp

Output Voltage:

Output 1-Positive:

+430 volts fixed. Accuracy ±7%

Output 2-Negative:

-430 volts fixed. Accuracy ±7%

Accuracy specified over full temperature, input voltage and load ranges

Output Current:

12mA maximum – Output 1-Positive

25mA maximum – Output 2-Negative

- **High Voltage Lens Power Supply**
- **Dual Positive and Negative Outputs**
- **Low Cost, Air Insulated Design**
- **SMT Design—Small Size and Low Weight**
- **UL Approved to UL61010-1**
- **Arc and Short Circuit Protected**
- **Remote Enable Control Provided**

Line Regulation: (typical)

±0.1% – Positive output
±1.0% – Negative output

Load/Cross Regulation: (typical)

±0.1% – Positive output
±3.5% – Negative output

Output Current Limit:

An auto-recovering short circuit fold back limit is employed.
Fully arc protected, capable of 10 arcs in 5 seconds.

Ripple:

≤0.5% p-p of full rated output voltage

Stability:

≤0.25% per hour, constant operating conditions after 1 hour warm up

Temperature Coefficient:

≤200ppm per degree C

Environmental:

Temperature Range:
Operating: 0°C to 50°C
Storage: -35°C to 85°C

Humidity:
10% to 90% RH, non-condensing

Cooling:

Unit must be mounted in free air, in any position with the exception of inverted (pins up). Forced air cooling is recommended

Dimensions:

0.984" H X 2.362" W X 2.362" D (25mm x 60mm x 60mm)

Weight:

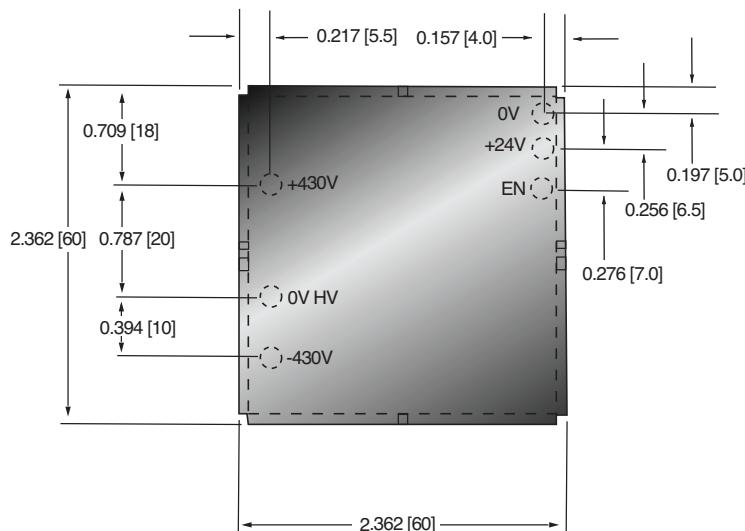
3.31 oz. (94g)

Regulatory Approvals:

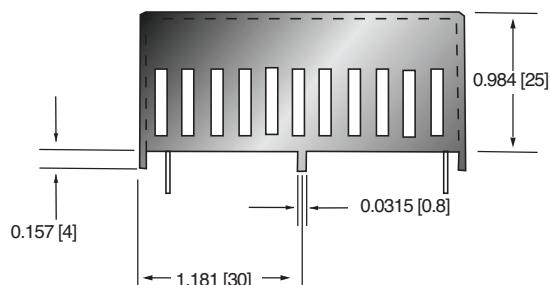
Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive, UL/CUL recognized file E227588.

DIMENSIONS: in.[mm]

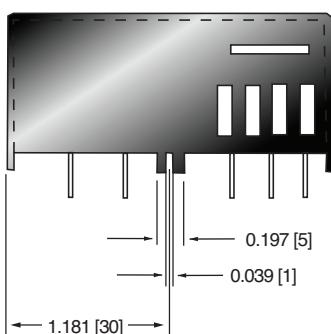
TOP VIEW



FRONT VIEW



SIDE VIEW



How to Order:

PART NO.:ML430P/N16/24





Spellman's ML1350 power supply module has been designed specifically to drive quadrupoles used in mass spectrometry. This compact, low cost, SMT based high performance module is printed circuit board mountable. This quad output supply is ideal for quadrupole drivers and electrostatic lenses.

This voltage regulated, current limited, fixed quad output unit provides up to 15mA of load current from each output. The ML1350 is fully protected against arc and short circuit conditions. The grounded metal case provides both shielding and heat sinking functions. An Enable feature is provided, allowing simple remote operation of the supply. The ML1350 is CE and UL approved.

TYPICAL APPLICATIONS

Quadrupole HVPS
Electrostatic Lenses

SPECIFICATIONS

Input Voltage:

+24 Vdc, ± 1.2 Vdc

Input Current:

≤ 3.0 amps

Output Voltage:

Output 1-Positive:

+245 volts, fixed, accuracy $<\pm 10\%$

Output 2-Negative:

-245 volts, fixed, accuracy $<\pm 10\%$

Output 3-Positive:

+1350 volts, fixed, accuracy $<\pm 7\%$

Output 4-Negative:

-1350 volts, fixed, accuracy $<\pm 7\%$

Output Current:

15mA maximum for each output

Line Regulation: (typical)

± 1 volt all outputs

Load Regulation: (typical)

$\pm 3\%$ all outputs

- **Quad Output High Voltage Power Supply**
- **Low Cost, Air Insulated Design**
- **SMT Design—Small Size and Low Weight**
- **Arc and Short Circuit Protected**
- **Remote Enable Control Provided**
- **UL Approved to UL61010-1**

Output Current Limit:

An auto-recovering short circuit fold back limit is employed.
Fully arc protected, capable of 10 arcs in 5 seconds.

Ripple:

$\leq 0.1\%$ p-p of full rated output voltage

Stability:

$\leq 0.25\%$ per hour, constant operating conditions after 1 hour warm up.

Under Voltage Shutdown:

The power supply will shut down when an input under voltage condition is detected. When the input voltage is restored above 11.8 volts, operating the enable pin will reset this fault.

Temperature Coefficient:

≤ 200 ppm per degree C

Environmental:

Temperature Range:

Operating: 0°C to 50°C

Storage: -35°C to 85°C

Humidity:

10% to 90% RH, non-condensing

Cooling:

Unit must be mounted in free air, in any position with the exception of inverted (pins up). Forced air cooling is recommended.

Dimensions:

0.984" H X 4.331" W X 3.150" D (25mm x 110mm x 80mm)
Width does not include mounting tab

Weight:

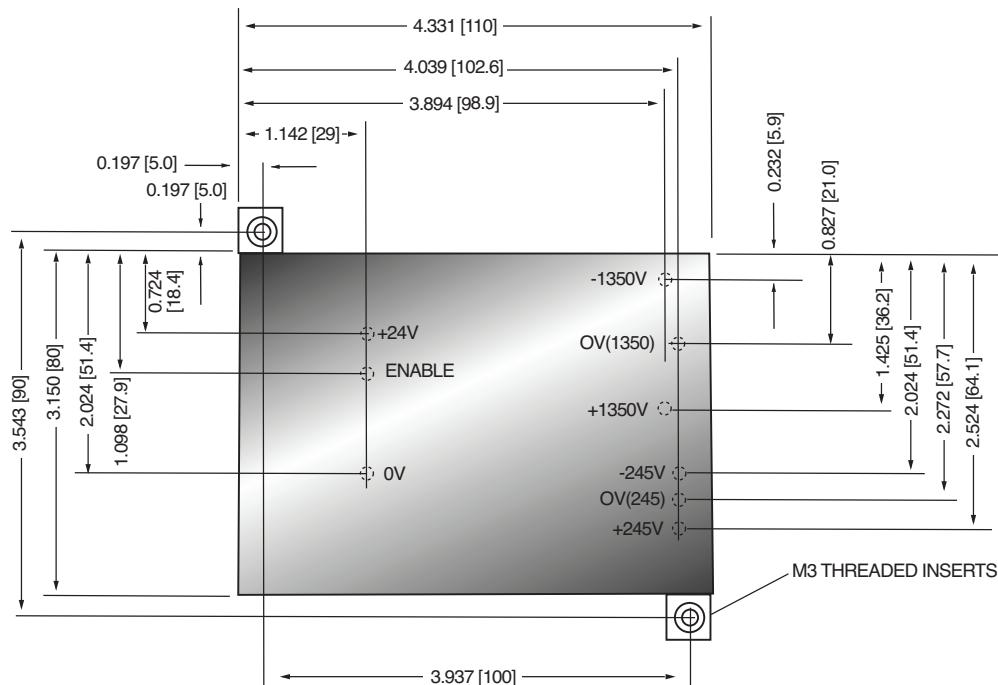
7.27 oz. (206g)

Regulatory Approvals:

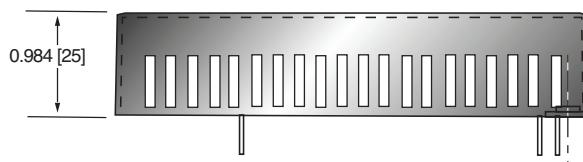
Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive, UL/CUL recognized file E227588.

DIMENSIONS: in.[mm]

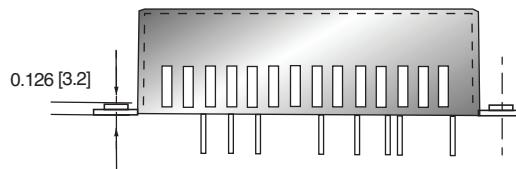
TOP VIEW



FRONT VIEW



SIDE VIEW



How to Order:

PART NO.:ML1350P/N50/24



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Spellman's MCP Module is a well-regulated, high performance DC-DC converter featuring a floating 3kV output, isolated to 16kV. The MCP low output ripple specification makes it ideal for use with detectors in Mass Spectrometry applications like: Electron Multipliers (EM's), Microchannel Plates Detectors (MCP's) and Channel Electron Multipliers.

This +3kV @ 330uA module is packaged in a shielded metal enclosure. The unit has remote voltage programming and a voltage monitor, and features low injected ripple when used with biasing supplies. The MCP module is easily customized to meet OEM requirements with improved ripple performance, improved stability and configurable output lead terminations as required.

TYPICAL APPLICATIONS

Mass Spectrometry Detectors

- Microchannel Plates
- Electron Multipliers
- Channel Electron Multipliers

SPECIFICATIONS

Input Voltage:

+24Vdc, ±0.5 volts

Input Current:

600 mA maximum

Output Voltage:

+100V to +3kV, continuously variable over the entire output range

Output Current:

330uA maximum

Polarity:

Positive

Isolation Voltage:

Up to 16kV total to ground
(resistance to ground 600M on each output)

Line Regulation:

≤0.01% for input voltage change of 1V

- **Floating, Programmable 3kV Output**
- **Output Isolated to 16kV**
- **Well Regulated, Low Ripple**
- **Output Voltage Monitor**
- **Compact Shielded Metal Enclosure**
- **Arc and Short Circuit Protected**

Load Regulation:

≤0.1% for a no load to full load change

Voltage Programming:

0 to 10 volt corresponds to 0 to 100% of rated output voltage

Voltage Monitor:

0 to 5 volts corresponds to 0 to 100% of rated output voltage

Accuracy:

±1% from 10% to 100% of output.
Below 10% accuracy spec is not guaranteed

Ripple:

≤0.1% Volts p-p, 0.1Hz to 1MHz

Stability:

≤1000 ppm/hour at constant operating conditions
after a 1 hour warm up

Temperature Coefficient:

≤300ppm per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
10% to 90%, non-condensing.

Cooling:

Convection cooled

Dimensions:

1.49" H X 4.09" W X 6.73" D (38mm X 104mm X 171mm)

Weight:

2.2 pounds (1kg)

Interface/Power Connector:

9 pin male D connector

HV Output Connector:

HV positive: 29.5" (750mm) flying lead, coaxial HV cable
HV negative: 29.5" (750mm) flying lead, coaxial HV cable

Regulatory Approvals:

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

MCP INTERFACE/POWER CONNECTOR

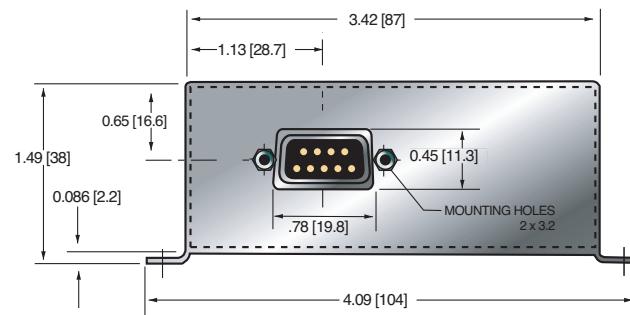
JB1	SIGNAL	SIGNAL PARAMETERS
1	Signal Ground	Signal Ground
2	Voltage Programming Input	0-10Vdc = 0-100% of Rated Output
3	+24V Input	+24V Input
4	+24V Input	+24V Input
5	Voltage Monitor	0-5Vdc=0-100% of Rated Output
6	Power Ground	Power Ground
7	Power Ground	Power Ground
8	Power Ground	Power Ground
9	Power Ground	Power Ground

DIMENSIONS: in.[mm]

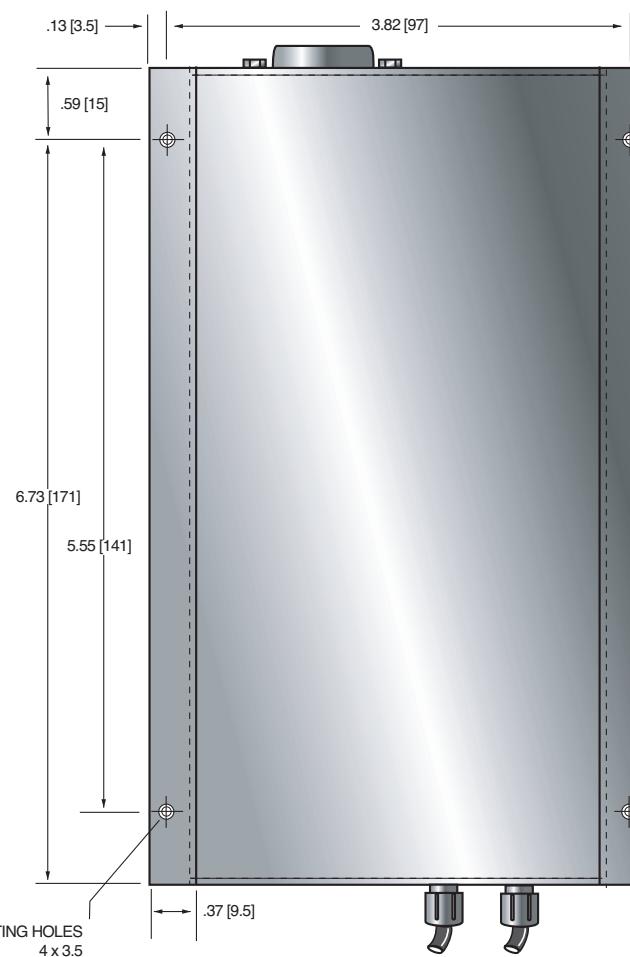
FRONT VIEW



BACK VIEW



TOP VIEW



CE



Spellman's MX2.5 is a well-regulated high performance DC-DC converter featuring a "hot switchable" polarity reversal capability. The MX's low ripple specification makes it ideal for Mass Spectrometry applications; especially security detection systems, Dynodes, sample ionization as well as capillary electrophoresis and electrostatic printing applications.

The MX2.5 is rated at 2.5kV @ 60uA and is packaged in a shielded metal enclosure. This unit features a logic signal input to control output polarity reversal. A HV inhibit feature, along with voltage and current monitors are provided. Easily customized to meet OEM requirements, the MX2.5 can be provided with improved ripple performance and higher voltage and current capabilities.

TYPICAL APPLICATIONS

Mass Spectrometry
Capillary Electrophoresis
Electrostatic Printing

SPECIFICATIONS

Input Voltage:

+24Vdc, ±0.5 volt

Input Current:

<200mA continuous

Output Voltage:

±100Vdc to ±2.5kV

Output Current:

0 to 60uA max.

Polarity:

Remotely reversible via logic signal, 300mS to settle to ±1%, 1 Hz maximum switch rate

Voltage Regulation:

Load: 0.05% of maximum output voltage for a no load to full load change

Line: 0.05% of maximum output voltage for a 1 volt input line change

- **Hot Switchable Polarity Reversible Via a Logic Signal**
- **Well Regulated, Low Ripple**
- **Polarity Reversal Within 300mS**
- **Voltage and Current Monitor Outputs**
- **Remote HV Inhibit**
- **Small PCB Mount Module**
- **Arc and Short Circuit Protected**

Voltage Programming:

0 to 10 volt corresponds to 0 to 100% of rated output voltage

Voltage/Current Monitor:

0 to 10 volt corresponds to 0 to 100% of rated output voltage/current

Programming and Monitor Accuracy:

±1% Voltage Programming/Monitor
±2% Current Monitor

Ripple:

≤0.02% Volts p-p

Stability:

0.02% per hour after 1 hour warmup

Temperature Coefficient:

≤50ppm per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C

Humidity:
10% to 90%, non-condensing

Cooling:

Convection cooled

Dimensions:

1.18" H X 2.36" W X 4.72" D (30mm X 60mm X 120mm)

Weight:

Approximately 8.82 oz. (250g)

Interface/Power Connector:

PCB mount pins

HV Output Connector:

PCB mount pins

Regulatory Approvals:

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

MX2.5 INPUT/OUTPUT CONNECTIONS

PIN	SIGNAL	SIGNAL PARAMETERS
1	+24V	Power Input
2	0v	Signal and Power Ground
3	V _{prog}	0-10V Programming Voltage
4	Polarity Change	Polarity Change Input
5	Shutdown	Output Inhibit, Disables HV Output Down to <60V Within 300ms
6	V _{mon}	0-10V Output Voltage Monitor
7	Output	HT Output
8	I _{mon}	0-10V Output Current Monitor

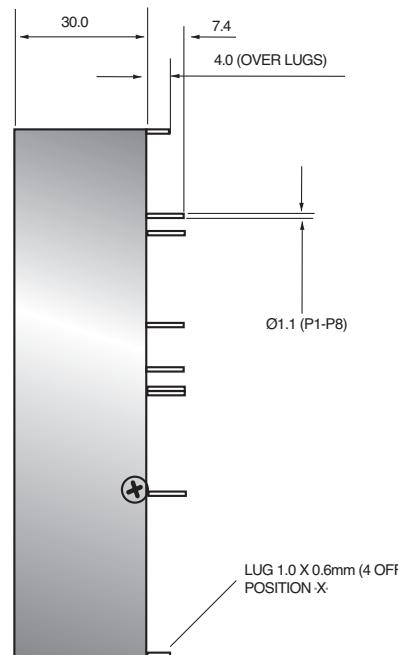
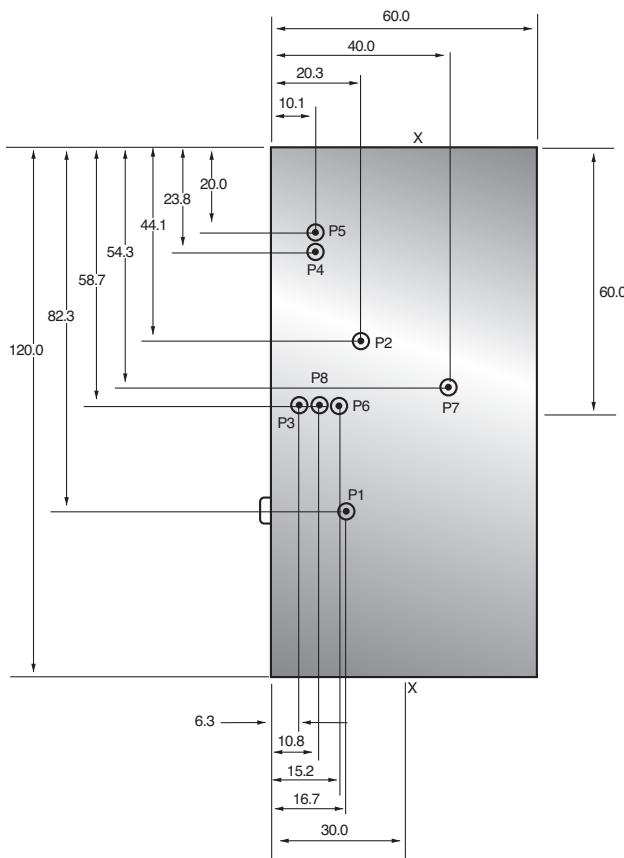
How to Order:

Standard: PART NO.:MX2.5PN24



DIMENSIONS: mm

SIDE VIEW

BOTTOM
VIEW ON PINS



Spellman's RoHS compliant MX8 Plus is a well-regulated high performance fast reversible supply featuring a 25ms "hot switchable" polarity reversing capability.

The MX8 Plus's low ripple specification is typical of the topologies that make Spellman High Voltage your ideal choice for mass spectrometry applications; especially security detection systems, dynodes, sample ionisation as well as capillary electrophoresis and electrostatic printing applications. The MX8 has been designed especially for EI and APCI applications.

The MX8 Plus can be easily tailored to an OEM's requirement, such as improved ripple performance, or different voltage and/or current capabilities.

TYPICAL APPLICATIONS

- Mass Spectrometry
- Capillary Electrophoresis
- Electrostatic Printing

SPECIFICATIONS

Input Voltage:

+24Vdc, ±10%

Input Current:

<0.5A nominal continuous
<1.2A peak during reversing

Output Voltage:

0V to ±8kV (see note 1)

Output Current:

100µA

Output Polarity:

Bipolar

Voltage Regulation:

Line: <±0.1% for ±10% input voltage change
Load: <0.1% for 0 to full load

Current Regulation:

Line: ±0.1% for +1V input voltage change
for any load condition
Load: ±0.1% for full load to short circuit

- **±8kV 25mS Polarity Reversing Speed**
- **Precision Analog Voltage and Current Controls**
- **Precision Analog Voltage and Current Monitors**
- **High Stability**
- **Low Ripple and Noise**
- **High Voltage Inhibit Control**
- **RoHS Compliant**

Ripple:

<0.1% p-p @ 100µA

Temperature Coefficient:

≤100ppm per degree C

Environmental:

Temperature Range:

Operating: 5°C to 45°C

Storage: -35°C to 85°C

Humidity:

10% to 85%, non-condensing

Stability:

0.05% per hour after 1 hour warm up

Polarity Reversal Time:

<25ms from command to 90% into 100pF load capacitance
(see note 2)

Protection:

Arc and short circuit protected

Output Voltage Limit:

Output voltage must not exceed ±8kV ±250V
under any input or output conditions

Dimensions:

1.48" H X 3.23" W X 9.45" D (37.6mm X 82mm X 240mm)

Weight:

Approximately 3.3 pounds (1.5kg)

Input Connector:

14 way Molex housing p/n 39-01-2140 or
similar with female terminals. Cable length 508mm

Output Connector:

Alden F303D24

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and
2006/95/EC, the Low Voltage Directive. RoHS compliant.

Note 1: Linearity not guaranteed below 200V. Maximum offset
±20V when programmed to zero or disabled using remote enable.

Note 2: Unit incorporates circuitry to minimize the effects of low
programmed current on reversing time. Polarity reversal time
applies when current is programmed to 3µA or above.

MX8 PLUS 14 PIN SOCKET

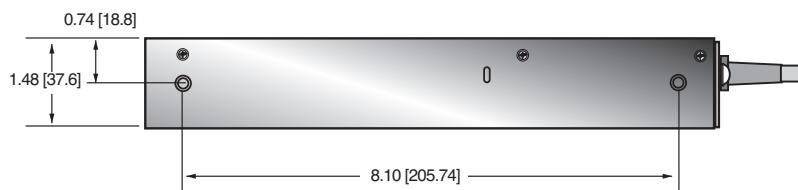
PIN	SIGNAL
1	+24Vdc Input
2	Chassis and 24Vdc Ground
3	Enable/Inhibit Input
4	8kV Voltage Monitor output
5	Voltage Control Input
6	Current Monitor Output
7	Current Control Input
8	Polarity Control Input
9	Analog Ground
10	Current/Voltage Control Indicator
11	N/C
12	N/C
13	N/C
14	N/C

How to Order:

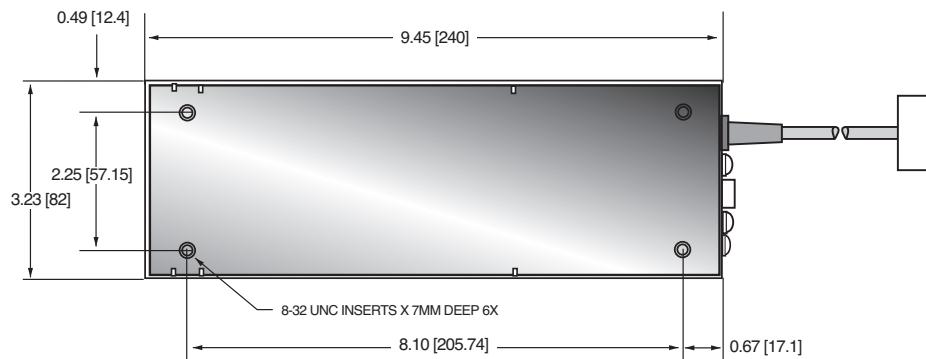
Standard: PART NO.:MXP8PN24

DIMENSIONS: in.[mm]

SIDE VIEW



TOP VIEW



FRONT VIEW





Spellman's MX10 is a well-regulated high performance DC-DC converter featuring a "hot switchable" polarity reversal capability. The MX10's low ripple specification makes it ideal for Mass Spectrometry applications; especially security detection systems, Dynodes, sample ionization as well as capillary electrophoresis and electrostatic printing applications.

The MX10 is rated at 10kV @ 100uA and is packaged in a shielded metal enclosure. This unit features a logic signal input to control output polarity reversal. A HV inhibit feature, along with voltage and current monitors are provided. Easily customized to meet OEM requirements, the MX10 can be provided with current control, improved ripple performance and higher voltage and current capabilities.

TYPICAL APPLICATIONS

- Mass Spectrometry
- Capillary Electrophoresis
- Electrostatic Printing

OPTIONS

VCC: Voltage and Current Control

SPECIFICATIONS

Input Voltage:

+24Vdc, ±1 volt

Input Current:

<400mA continuous
<1.2A during reversing

Output Voltage:

±200Vdc to ±10kV

Output Current:

0 to 100uA max.

Polarity:

Remotely reversible via logic signal, 250mS to settle to ±2%, 1 Hz maximum switch rate

Voltage Regulation:

Load: 0.1% of maximum output voltage for a no load to full load change
Line: 0.1% of maximum output voltage for a 1 volt input line change

- Hot Switchable Polarity Reversible Via a Logic Signal
- Well Regulated, Low Ripple
- Polarity Reversal Within 250mS (Option to Improve to 100mS)
- Voltage and Current Monitor Outputs
- Remote HV Inhibit
- Flying High Voltage Output Cable
- Voltage or Current Control Options

www.spellmanhv.com/manuals/MX10

Current Regulation: (VCC Option)

Load: 0.1% of maximum rated current for a 0 to 100% voltage change
Line: 0.1% of maximum rated current for a 1 volt input line change

Voltage/Current Programming:

0 to 10 volt corresponds to 0 to 100% of rated output voltage

Voltage/Current Monitor:

0 to 10 volt corresponds to 0 to 100% of rated output voltage

Programming and Monitor Accuracy:

±2%

Ripple:

≤0.005% Volts p-p

Stability:

0.1% per hour after 1 hour warmup

Temperature Coefficient:

≤100ppm per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
10% to 90%, non-condensing.

Cooling:

Convection cooled

Dimensions:

1.63" H X 6.61" W X 4.53" D (41.5mm X 168mm X 115mm)

Weight:

Approximately 3 pounds (1.4kg)

Interface/Power Connector:

9 pin male D connector

HV Output Connector:

39.4" (1m) Flying Lead of URM76 LSF cable

Regulatory Approvals:

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

MX10 TERMINAL BLOCK 9 PIN

PIN	SIGNAL	SIGNAL PARAMETERS
1	Voltage Monitor	0-10V=0-100% of Rated Output
2	External Inhibit Input	Open or >10V = "OFF"; <4V = "ON"
3	Current Programming Input	0-10Vdc = 0-100% of Rated Output (on VCC option)
4	Signal Ground	Signal Ground
5	Current Monitor	0-10Vdc = 0-100% of Rated Output
6	Polarity Control Input	Open or >10V = "NEGATIVE"; <4V = "POSITIVE"
7	Voltage Programming Input	0-10Vdc = 0-100% of Rated Output
8	+24V Input	+24V Input
9	Power Ground	Power Ground

How to Order:

Standard: PART NO.:MX10PN24

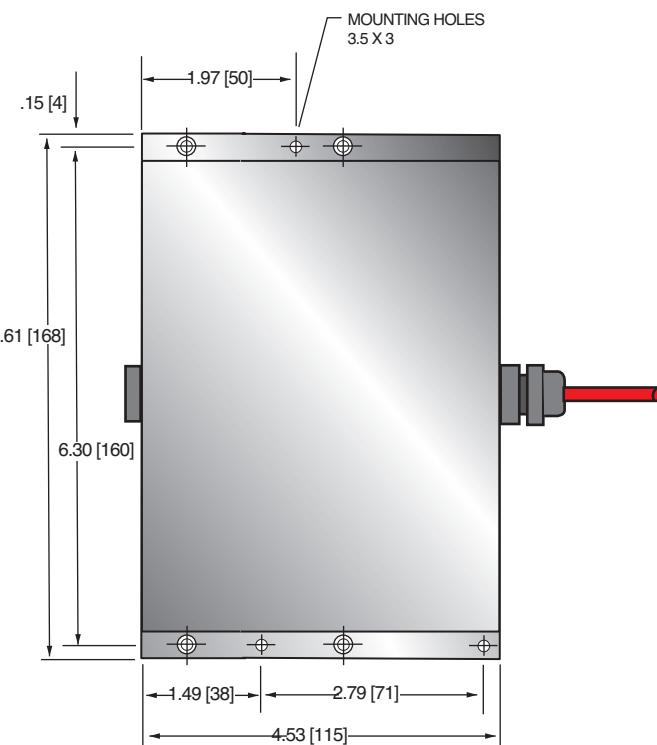
VCC Option: PART NO.:MX10PN24/VCC

DIMENSIONS: in.[mm]

SIDE VIEW



TOP VIEW



CE



Spellman's RoHS compliant MX10 *Plus* is a well-regulated high performance fast reversible dynode supply featuring a 25ms "hot switchable" polarity reversing capability with an integrated -2.3kV electron multiplier supply.

The MX10 *Plus*'s low ripple specification is typical of the topologies that make Spellman High Voltage your ideal choice for mass spectrometry applications; especially security detection systems, dynodes, sample ionisation as well as capillary electrophoresis and electrostatic printing applications. The MX10 *Plus* has been designed especially for dynode detector applications.

The MX10 *Plus* can be easily tailored to an OEM's requirement, such as improved ripple performance, or different voltage and/or current capabilities.

TYPICAL APPLICATIONS

Dynode Supply
Electron Multiplier Supply

SPECIFICATIONS

Input Voltage:

+15Vdc, ±.75Vdc

Input Current:

≤500mA nominal continuous
<2A during reversing

Temperature Coefficient:

≤100ppm per degree C

Environmental:

Temperature Range:

Operating: 5°C to 45°C

Storage: -35°C to 85°C

Humidity:

10% to 85%, non-condensing

Stability:

(constant operating conditions)
≤300ppm per hour after 1 hour warm up

Protection:

Arc and Short circuit protected

Regulatory Approvals:

Compliant to 2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive.
RoHS compliant.

- **±10kV 25ms Polarity Reversing Speed**
- **Integrated Electron Multiplier Supply**
- **Precision Analog Voltage Control**
- **High Stability**
- **Low Ripple and Noise**
- **High Voltage Inhibit Control**
- **RoHS Compliant**

DYNODE SPECIFICATIONS

Output Voltage:

±10kV

Output Current:

10µA

Output Polarity:

Remotely reversible via TTL logic signal

Switching Speed:

25ms to settle 90% into 50pF load

Voltage Regulation:

Line: ≤0.02% for a 1.5V input voltage change

Ripple:

≤10 Volts p-p

ELECTRON MULTIPLIER SPECIFICATIONS

Output Voltage:

Fixed: 0 to -2.3kV

Output Polarity:

Negative

Output Current:

≤230µA

Voltage Regulation:

Line: ≤0.02% for a 1.5V input voltage change
Load: <5V for no load to 22M Ohms load change

Ripple:

≤200mV p-p @ 2.3kV into 22M Ohm load

Output Rise Time:

10ms

Output Fall Time:

10ms

Dimensions:

2.00" H X 5.30" W X 8.00" D (50.8mm X 134.6mm X 203mm)

Weight:

Approximately 3.3 pounds (1.5kg)

Interface/Power Connector:

20 pin flat ribbon connector

Output Connector:

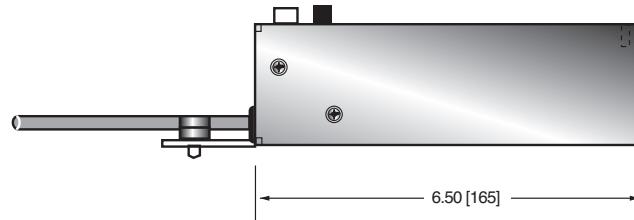
±10kV: modified Alden #A200 connector
-2.3kV: MHV Kings bulkhead KV-79-15 or similar

MX10 PLUS TERMINAL BLOCK 20 PIN

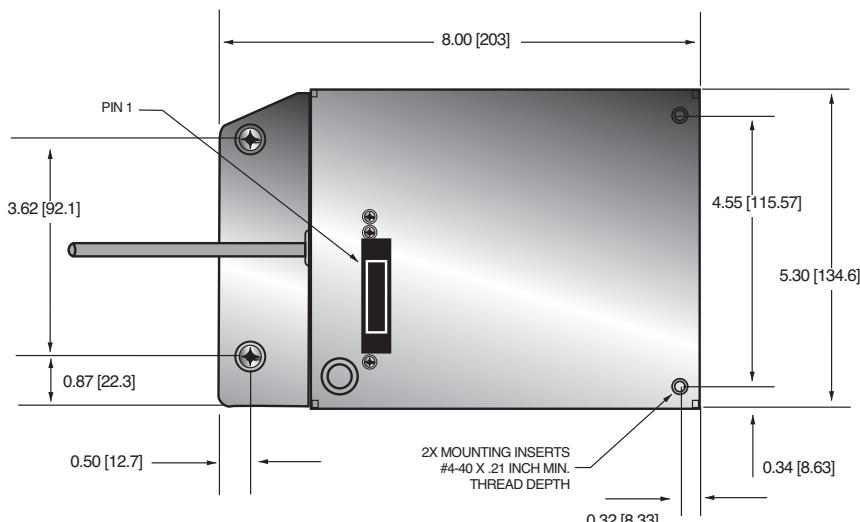
PIN	SIGNAL
1	+15Vdc Input
2	+15Vdc Input
3	N/C
4	N/C
5	Ground
6	Ground
7	Output Voltage Control
8	Signal Reference Ground
9	10kV On
10	10kV On
11	Output Polarity Control
12	EM Protect
13	-2.3kV Output Monitor
14	EM On
15	Ground
16	Ground
17	±10kV Output Monitor
18	N/C
19	+15Vdc Input
20	+15Vdc Input

DIMENSIONS: in.[mm]

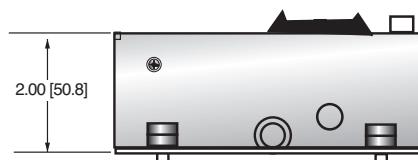
SIDE VIEW



TOP VIEW



FRONT VIEW





Spellman's MX20 is a well-regulated high performance DC-DC converter featuring a "hot switchable" polarity reversal capability. The MX20's low ripple specification makes it ideal for Mass Spectrometry applications; especially security detection systems, Dynodes, sample ionization as well as capillary electrophoresis and electrostatic printing applications.

The MX20 is rated at 20kV @ 100uA and is packaged in a shielded metal enclosure. This unit features a logic signal input to control output polarity reversal. A HV inhibit feature, along with voltage and current monitors are provided. Easily customized to meet OEM requirements, the MX20 can be provided with current control, improved ripple performance and higher voltage and current capabilities.

TYPICAL APPLICATIONS

Mass Spectrometry
Capillary Electrophoresis
Electrostatic Printing

OPTIONS

VCC: Voltage and Current Control

SPECIFICATIONS

Input Voltage:

+24Vdc, ±1.2 volts

Input Current:

<500mA continuous
<1.2A during reversing

Output Voltage:

±500Vdc to ±20kV

Output Current:

0 to 100uA max.

Polarity:

Remotely reversible via logic signal, 500mS to settle to ±2%, 1 Hz maximum switch rate

Voltage Regulation:

Load: 0.02% of maximum output voltage for a no load to full load change
Line: 0.01% of maximum output voltage for a 1 volt input line change

- **Hot Switchable Polarity Reversible Via a Logic Signal**
- **Well Regulated, Low Ripple**
- **Polarity Reversal Within 500ms**
- **Voltage and Current Monitor Outputs**
- **Remote HV Inhibit**
- **Flying High Voltage Output Cable**
- **Voltage or Current Control Options**

www.spellmanhv.com/manuals/MX20

Current Regulation: (VCC Option)

Load: 0.1% of maximum rated current for a 0 to 100% voltage change
Line: 0.01% of maximum rated current for a 1 volt input line change

Voltage/Current Programming:

0 to 10 volts corresponds to 0 to 100% of rated output voltage/current

Voltage/Current Monitor:

0 to 10 volts corresponds to 0 to 100% of rated output voltage/current

Programming and Monitor Accuracy:

±2% Voltage Programming/Monitor
±5% Current Programming/Monitor

Ripple:

≤0.0025% Volts p-p

Stability:

0.1% per hour after 1 hour warmup

Temperature Coefficient:

≤100ppm per degree C

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
10% to 90%, non-condensing

Cooling:

Convection cooled

Dimensions:

2.05" H X 6.61" W X 6.50" D (52mm X 168mm X 165mm)

Weight:

Approximately 5.51 pounds (2.5kg)

Interface/Power Connector:

9 pin male D connector

HV Output Connector:

39.4" (1m) Flying Lead of URM76 LSF cable

Regulatory Approvals:

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

MX20 TERMINAL BLOCK 9 PIN

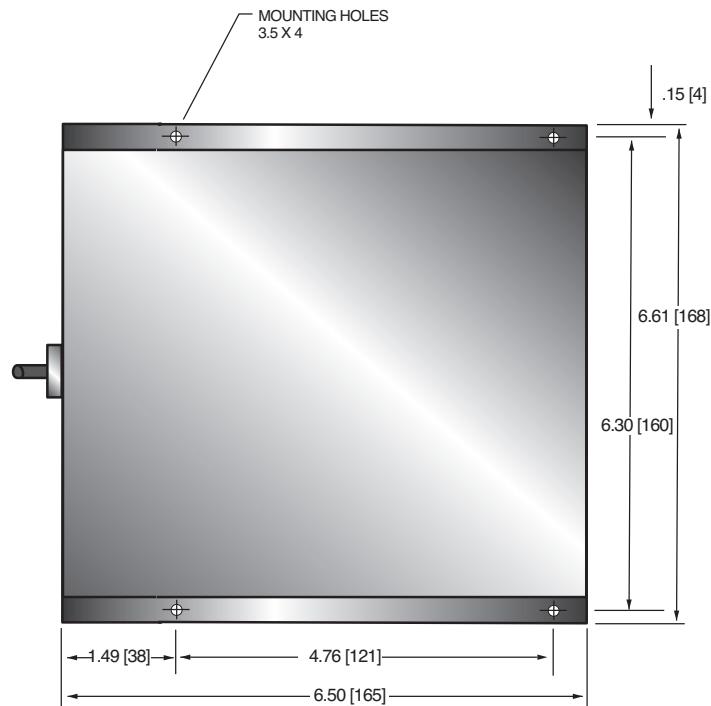
PIN	SIGNAL	SIGNAL PARAMETERS
1	Voltage Monitor	0-10V=0-100% of Rated Output
2	External Inhibit Input	Open or >10V = "OFF", <4V = "ON"
3	Current Programming Input	0-10Vdc = 0-100% of Rated Output (on VCC option)
4	Signal Ground	Signal Ground
5	Current Monitor	0-10Vdc = 0-100% of Rated Output
6	Polarity Control Input	Open or >10V = "NEGATIVE", <4V = "POSITIVE"
7	Voltage Programming Input	0-10Vdc = 0-100% of Rated Output
8	+24V Input	+24V Input
9	Power Ground	Power Ground

DIMENSIONS: in.[mm]

SIDE VIEW



TOP VIEW



CE



Spellman's MXR Series are well-regulated high performance DC-DC converters. The MXR's low ripple specification makes it ideal for Mass Spectrometry and electron microscopes. The MXR20 is rated at 20kV @ 300uA and MXR30 is rated at 30kV @ 300uA. Both are packaged in a shielded metal enclosure. These units feature a logic signal input to control output polarity reversal. A HV inhibit feature, along with voltage and current monitors are provided. Easily customized to meet OEM requirements, the MXR Series can be provided with current control, improved ripple performance and higher voltage and current capabilities.

TYPICAL APPLICATIONS

Mass Spectrometry
Electron Microscopes
Capillary Electrophoresis
Electrostatic Printing

OPTIONS

/DDC 2 RS-232

SPECIFICATIONS

Input Voltage:

24Vdc ($\pm 10\%$)

Input Current:

1.25A

Output Voltage:

$\pm 20V$ to $\pm 20kV$ (MXR20)
 $\pm 30V$ to $\pm 30kV$ (MXR30)

Output Current:

300 μ A

- **Hot Switchable Polarity Reversible within 2s settling to <3ppm**
- **Remote Polarity Reversal and HV Inhibit**
- **Voltage and Current Monitor Outputs**
- **Arc and Short Circuit Protected**
- **Well Regulated, Low Ripple, High Stability**
- **UL Recognized**
- **OEM Customization Available**

Voltage Regulation:

Load: 50ppm of maximum output voltage for a no load to full load change

Line: <20ppm of maximum output voltage for a 5% input line change

Programming and Monitor Accuracy:

$\pm 2\%$ Voltage Programming/Monitor

Ripple:

10ppm

Stability:

0.1% per hour after 1 hour warmup

Temperature Coefficient:

10ppm/ $^{\circ}$ C

Reversing Time:

2s for +20kV to -20kV or +30kV to -30kV settling to <3ppm, faster versions are available

Environmental:

Temperature Range:

Operating: 0 $^{\circ}$ C to 50 $^{\circ}$ C

Storage: -40 $^{\circ}$ C to 85 $^{\circ}$ C

Humidity:

10% to 90%, non-condensing

Cooling:

Convection cooled

Dimensions:

2.05 $^{\prime \prime}$ H X 8.47 $^{\prime \prime}$ W X 9.13 $^{\prime \prime}$ D (52mm X 215mm X 230mm)

Weight:

Approximately 8.80 pounds (4.0kg)

Input Connectors:

Power: 2 way Molex Mini-fit Jr connector

Digital: 10 way 'IDC Ribbon cable' connector

Analog: 12 way Molex KK5.08 series connector

Output Connectors:

Standard output either via co-ax cable (open ended) or GES HB30 receptacle, other output options available.

Regulatory Approvals:

UL Recognized to UL61010-1, CE marked to EN61010-1, RoHS Compliant

MXR POWER VIA 2 WAY MOLEX

PIN	SIGNAL
1	+24Vdc Input
2	Ground return for +24Vdc

MXR DIGITAL INPUT— 10 WAY IDC RIBBON CONNECTOR

PIN	SIGNAL
1	Transmit data (output) with respect to pin 1
2	Serial signal ground return (if required)
3	Receive data (input) with respect to pin 2
4	N/C
5	N/C
6	N/C
7	Interlock opto-isolator input
8	Interlock opto-isolator signal return
9	Polarity change signal opto-isolator input
10	Polarity change signal opto-isolator signal return

MXR ANALOG INPUT— 12 WAY MOLEX KK5.08 CONNEC-

PIN	SIGNAL
1	Current monitor output
2	+24Vdc Input
3	Voltage monitor output
4	N/C
5	N/C
6	N/C
7	Voltage program input
8	Polarity set input
9	Signal ground
10	+24Vdc return
11	N/C
12	Polarity status output

How to Order:

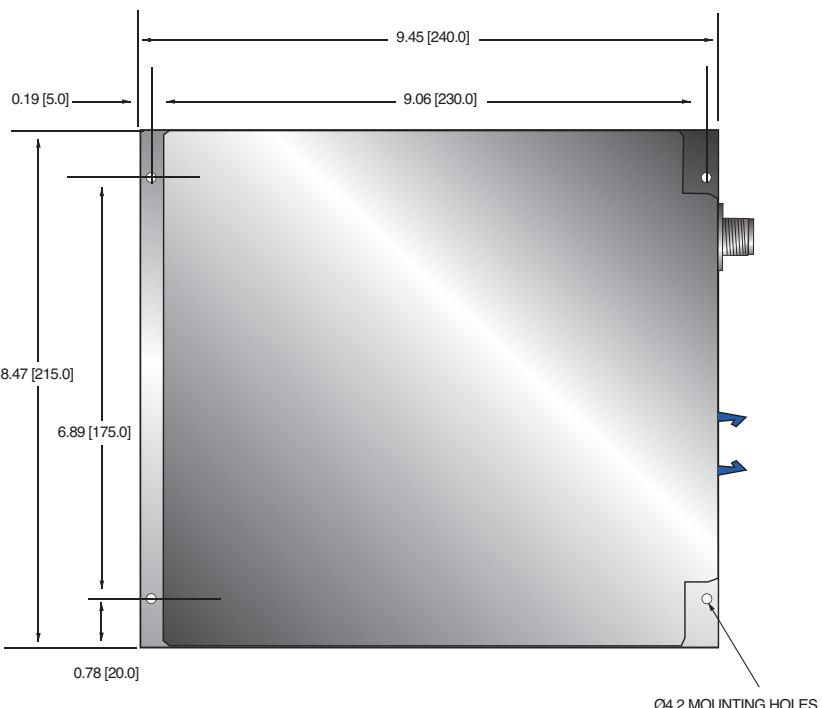
Standard: PART NO.: MXR20PN24
 PART NO.: MXR20PN24

DIMENSIONS: in.[mm]

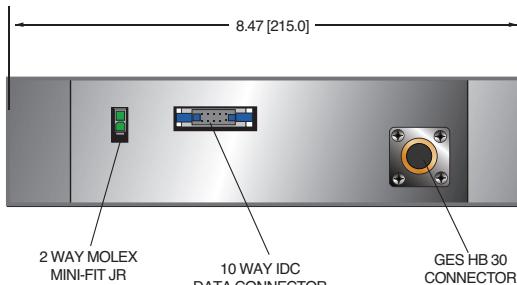
SIDE VIEW



TOP VIEW



FRONT VIEW





- **Remote Output Polarity Reversibility Via TTL Signal Control**
- **Ultra Low Ripple and Noise**
- **Small Footprint OEM Modular Packaging**
- **Encapsulated for Reliable, Long Term Corona Free Operation**
- **CE Listed and RoHS Compliant**

The TOF3000 offers critical specifications like ultra low ripple and noise, excellent temperature coefficient; a stable, repeatable and accurate output, along with remote output polarity reversing capability. These superior specifications result in improved mass spectrometer resolution. Unique high voltage packaging and surface mount fabrication techniques, coupled with Spellman's proprietary encapsulation technology provide this unit in an attractive sized OEM package.

Featuring a 0-30kV @ 400 μ A output with remote polarity reversing capability and dimensions of 3" H x 5" W x 12 5/8" L, the TOF3000 is a small, cost-effective high voltage power supply with technology that sets the standard for the future of Mass Spectrometry applications.

TYPICAL APPLICATIONS

Mass Spectrometry

SPECIFICATIONS

Input Voltage:

+24 Vdc, +5%, -2%

Input Current:

2 amps maximum

Output Voltage:

0 to 30kV

Output Current:

0 to 400 microamperes

Polarity:

Positive or Negative with respect to ground, reversible via TTL signal

Voltage Regulation:

Line: 0.001% for input change of 1 volt
Load: 0.001% for 100 μ A to full load change

Current Regulation:

Line: 0.05% for +5% to -2% input change
Load: 0.1% for 0 to maximum output voltage

Ripple:

\leq 70mV peak to peak

Stability:

0.01% per hour, 0.02% per 8 hours after 1.0 hour warm up period

Temperature Coefficient:

25ppm per degree C

Environmental:

Temperature Range:

Operating: 0°C to 50°C

Storage: -20°C to 65°C

Humidity:

10% to 90% RH, non-condensing

Control Interface

Voltage Program Input:

0 to +10Vdc corresponds to 0 to \pm 30kV, Zin \geq 1 megohm

Program Accuracy:

\pm 0.15% at 15kV, with overall accuracy of \pm 0.25% of maximum output

TTL Polarity Reversal:

High = positive polarity

Low = negative polarity

Voltage Monitor:

0 to 10Vdc corresponds to 0 to 30KV, Zout = 4.7Kohm

Current Monitor:

0 to 10Vdc corresponds to 0 to 400 μ A, Zout = 4.7Kohm

Cooling:

Convection cooled

Dimensions:

3" H X 5" W X 12.625" D (76.2mm x 127mm x 321.7mm)

Weight:

9.5 pounds (4.31kg)

Interface Connector:

15 pin male D connector

Output Connector:

Alden B102, which accepts Alden B200 cable plug

Regulatory Approvals:

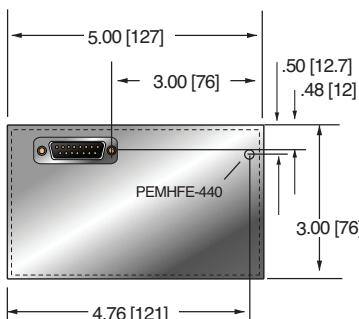
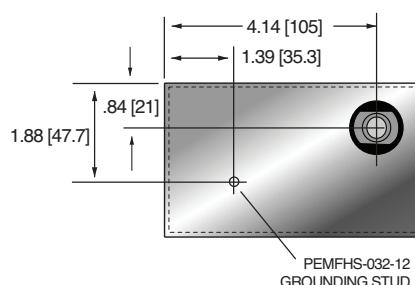
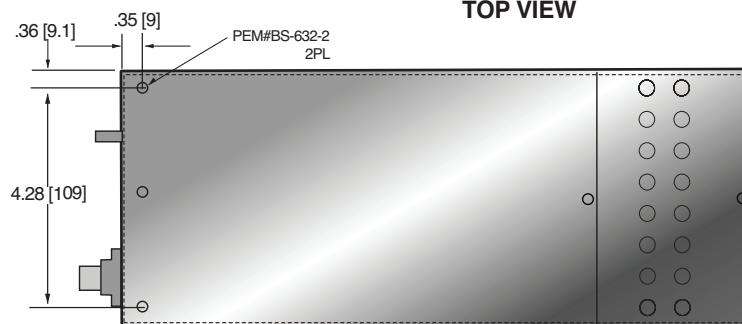
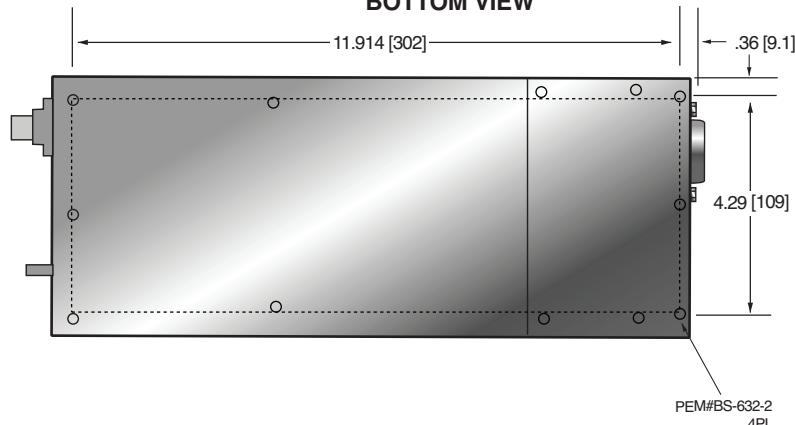
Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive. RoHS compliant.

JB1 INTERFACE CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	Spare	N/C
2	Voltage Program	0 to 10V=0 to 100% Rated Output
3	Spare	N/C
4	Spare	N/C
5	Voltage Monitor	0 to 10V=0 to 100% Rated Output
6	TTL Polarity Control Signal	Hi=Positive Polarity, Low=Negative Polarity
7	Signal Ground	Signal Ground
8	Power Ground	Power Ground
9	Spare	N/C
10	Spare	N/C
11	Spare	N/C
12	TTL HV Enable	Hi=Inhibit, Low=Enable
13	Current Monitor	0 to 10V=0 to 100% Rated Output
14	Spare	N/C
15	+24Vdc	+24Vdc



DIMENSIONS: in.[mm]

FRONT VIEW

BACK VIEW

TOP VIEW

BOTTOM VIEW




Spellman's precision Electron Gun Power Supply is designed to achieve extremely high stability and low ripple. The EGM50 incorporates an integral floating filament supply and active bias. Full control via RS-232 interface reduces end-product development time and eases system integration. Safe, ground level local and remote control of beam energy, filament power and emission current provides optimum operational efficiency.

TYPICAL APPLICATIONS

- Electron-Beam Lithography
- Semiconductor Inspection
- Scanning Electron Microscopes

SPECIFICATIONS

Input Voltage:
90-260Vac

Input Current:
<1.1A @ 100Vac

Input Frequency:
47 to 63Hz

Input Protection:
IEC inlet 3.15A "T" fuse

Temperature Range:
Operating: 20°C to 25°C
Storage: -10°C to 70°C

Operating Humidity:
10 to 70% RH

Connections and Cables:
9-pin "D" type: System Interlocks
25-pin "D" type: RS232
RJ485: Optional Ethernet
Optional HV Cable: 8m (XPVD-75-3Y) Hitachi
3-pin HV: 75kV DC Standard Federal Connector

Local Control:
Front panel push button for filament power and emission current increments
Beam energy on and off

Remote Control:
Via an RS-232C for Beam Energy, Filament Power, and Active Bias

- **Local or Remote Control of Beam Energy, Filament Power and Emission Current**
- **Integrated Floating Filament Supply**
- **Active Bias System**
- **RS-232 Control and Monitoring Interface**
- **High Stability, Less Than 2.5 ppm**
- **OEM Customization Available**

www.spellmanhv.com/manuals/EGM

Monitoring:

Digital monitoring via RS232C.
Analog output monitoring provided via BNC connectors on the rear panel

Front Panel Monitor:

Display 1: Beam energy or bias voltage
Display 2: Emission current
Display 3: Filament power

Dimensions:

2 x 3U 19" Rack Units

Weight:

Control Module 10kg (22lbs.)
HV Module 40kg (86lbs.)

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive

BEAM ENERGY

Output Voltage:

-50kV fixed, adjustable \pm 2% via remote control.
(Other output voltages available upon request)

Output Current:

500μA maximum

Polarity:
Negative

Line Regulation:

<10ppm for a 10% line change at 50kV 500μA

Load Regulation:

<10ppm for 100 to 500μA emission current change

Stability:

<2.0ppm/48hours/0.5°C

Warm Up Time:

5 hours for full stability

Ripple and Noise:

<2.5ppm.

Overcurrent Protection:

Protected against overcurrent to 120% of the rated current.
Unit will shutdown for over current condition greater than 100ms

Arc Protection:

Included

FILAMENT POWER SUPPLY**Output Power:**

10W max. (adjustable in 0.1W steps)
2A maximum current
8.4V maximum voltage

Regulation:

Constant with secondary side control

Line Regulation:

<10ppm for 10% line change

Load Regulation:

<5% change in power from 4W to 7W (1Ω to 7Ω)

Drift:

<50ppm/12 hours/0.5°C after warm-up

Warm Up:

<3 hours for full stability

Ripple and Noise:

<0.1% (operating frequency)
<50ppm (10Hz to 3 kHz)

Monitor:

+1.00V for 10W
100ppm Stability
0.5% accuracy

ACTIVE BIAS**Voltage Range:**

Low: -200 to -1100V ref to filament center tap
High: -200 to -2000V ref to filament center tap
Low or high range selected via rear panel switch

Temperature Coefficient:

<100ppm/°C

Emission Control:

0 to 500μA adjustable in steps of 0.1μA

Emission Monitor:

+5V for 500μA output
100ppm stability
0.1% accuracy

INTERFACE CONNECTOR

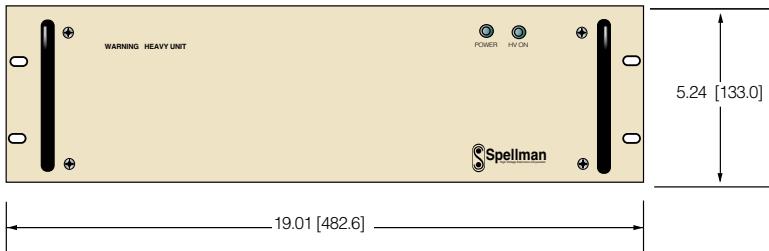
PIN	SIGNAL	SIGNAL PARAMETERS
1	PSU on	Volt free contacts to indicate that there is power on the unit
2	N/C	No Connection
3	N/C	No Connection
4	N/C	No Connection
5	0V	No Connection
6	Interlock/HV Enable	Link to 0V to enable HV output
7	N/C	No Connection
8	N/C	No Connection
9	PSU on	Volt free contacts to indicate that there is power on the unit

RS-232 DIGITAL INTERFACE—

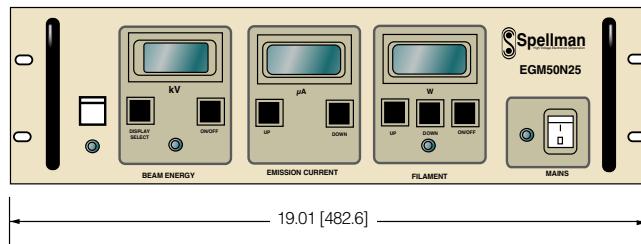
PIN	SIGNAL	SIGNAL PARAMETERS
1	N/C	No Connection
2	TX	PSU Transmit Data
3	RX	PSU Receive Data
4	RTS	Ready to Send
5	CTS	Clear to Send
6	N/C	No Connection
7	0V	
8	N/C	No Connection
9	N/C	+12Vdc up to 100mA, switchable
10	N/C	No Connection
11	N/C	No Connection
12	N/C	No Connection
13	N/C	No Connection
14	N/C	No Connection
15	N/C	No Connection
16	N/C	No Connection
17	N/C	No Connection
18	N/C	No Connection
19	N/C	No Connection
20	N/C	No Connection
21	N/C	No Connection
22	N/C	No Connection
23	N/C	No Connection
24	N/C	No Connection
25	N/C	No Connection

DIMENSIONS: in.[mm]

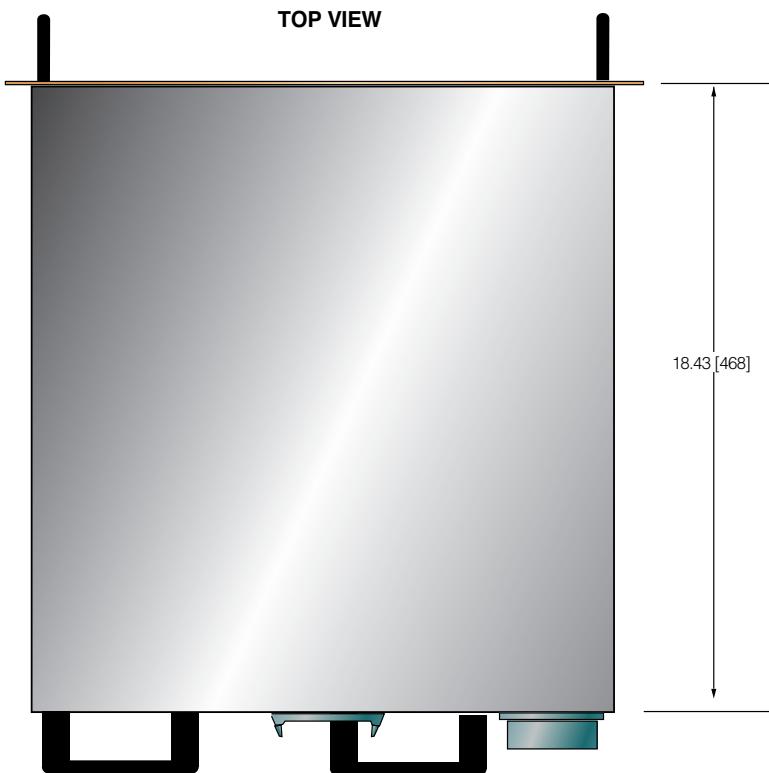
FRONT VIEW



FRONT VIEW



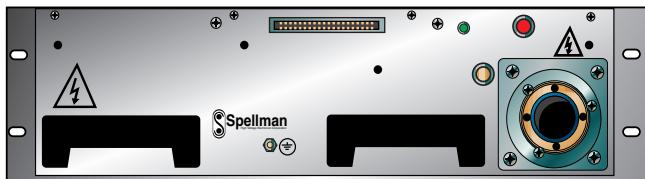
TOP VIEW



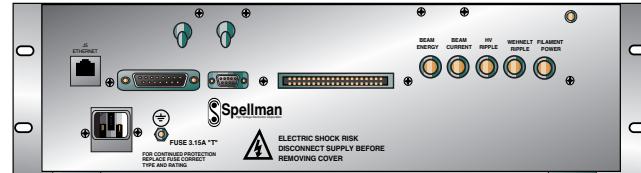
TOP VIEW



BACK VIEW



BACK VIEW



CE



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 RS-232 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.

- **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**

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 µA

Ripple: 200 mV p-p, from 0.1 Hz to 1 MHz

Line Regulation: 100 mV for +/-10% line change

Load Regulation: ±0.01% of maximum voltage for full load change

Stability: 1.5 volts/10 hours after 2 hour warm-up

Temperature Coefficient: 25 ppm/°C

FILAMENT SUPPLY

Output Voltage: Referenced to Accelerator

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: ±0.1% of maximum voltage for full load change

Stability: 5 mA/10 minutes after 2 hour warm-up

Temperature Coefficient: 200 ppm /°C

SUPPRESSOR SUPPLY Referenced to Accelerator

Output Voltage:	-2 kV to +2 kV
Output Current:	30 µA
Ripple:	150 mV p-p from 0.1 Hz to 1 MHz
Line Regulation:	100 mV for +/-10% line change
Load Regulation:	±0.01% of maximum voltage for full load change
Stability:	500mV/10 hours after 2 hour warm-up
Temperature Coefficient:	25 ppm/°C

EXTRACTOR SUPPLY Referenced to Accelerator

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

LENS 1 SUPPLY Referenced to Ground

Output Voltage:	0 to -40 kV
Output Current:	30 µA
Ripple:	150 mV p-p from 0.1 Hz to 1 MHz
Line Regulation:	100 mV for +/-10% line change
Load Regulation:	±0.01% of maximum voltage for full load change
Stability:	500 mV/10 hours after 2 hour warm-up
Temperature Coefficient:	25 ppm/°C

LENS 2 SUPPLY Referenced to Ground

Output Voltage:	0 to +25 kV
Output Current:	30 µA
Ripple:	150 mV p-p from 0.1 Hz to 1 MHz
Line Regulation:	100 mV for +/-10% line change
Load Regulation:	±0.005% of maximum voltage for full load change
Stability:	1.0 volts/10 hours after 2 hour warm-up
Temperature Coefficient:	25 ppm/°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°C to 40°C
Storage temperature:	-30°C to 70°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.



- **Triode Supply for Electron Beam Columns**
- **High Precision, Low Noise, Ultra Stable**
- **Over Current/Voltage Protection**
- **Arc and Short Circuit Protection**
- **OEM Customization Available**
- **UL, CE and RoHS Compliant**

The EBM powers E-Beam Columns in Scanning Electron Microscopes providing acceleration, bias and filament sources in a single compact package. Spellman's proprietary HV packaging and encapsulation technology gives dramatic improvements in size, cost and performance compared to other SEM power supply offerings. The EBM provides a highly regulated, low noise, ultra stable accelerator supply programmable from 0 to -30kV at 170uA. The EBM has floating bias and filament supplies referenced to the accelerator. Programming signals utilize differential analog inputs to minimize external noise and offset voltages effects. A ground referenced accelerator current monitor is provided. The EBM is arc and short circuit immune, along with over voltage and over current protection.

TYPICAL APPLICATIONS

Scanning Electron Microscope

SPECIFICATIONS

Input Voltage:

+24Vdc, ±5%

High Voltage Outputs:

ACCELERATOR:

Voltage:

0V to -30kV full load with respect to ground

Current:

170μA maximum, continuous from -300V to -3kV

Accuracy:

±2% or ±15V (whichever is greater)

Load Regulation:

<±100ppm

Line Regulation:

<±100ppm for 22.8V to 26.4V line change

Ripple:

<15ppm p-p at -30kV, 170μA, maximum bias and filament output

Temperature Coefficient:

<100ppm/°C

Stability:

8ppm/3 minutes at 150μA load current after 1 hour warm up

BIAS:

(Referenced to Accelerator)

Voltage:

0 to +3.5kV (max allowable output limited to 2kV)

Current:

150μA maximum

Accuracy:

±5% of full scale

Line Regulation:

<±0.1% for 10% line change

Ripple:

<150mVp-p at 30kV, 150μA, max. bias and filament output

Temperature Coefficient:

<1000ppm/°C

Stability:

6V/10 minutes

FILAMENT:

(Referenced to Accelerator)

Power:

0 to 15W

Load Resistance:

1 ±5%

Accuracy:

±3% of FS or 0.1V, which ever is greater

Load Regulation:

<2% for 10% change in load resistance

Line Regulation:

<1% for 10% line change

Ripple:

<0.1% p-p max

Temperature Coefficient:

<300ppm/°C

Stability:

100ppm/10 minutes

INTERFACE:

Input:

Analog control for beam energy, filament and bias

Output:

Mini75 receptacle (Claymount CA11 or similar)

Temperature:

Operating: 0°C to +45°C

Storage: -20°C to +75°C

Humidity:

0 to 85% RH, non-condensing

Dimensions:

4.13'H x 9.85'W x 7.48'D (105mm x 250mm x 190mm)
excluding any mounting brackets

Weight:

<22 lbs. (10kg)

Regulatory Approvals:

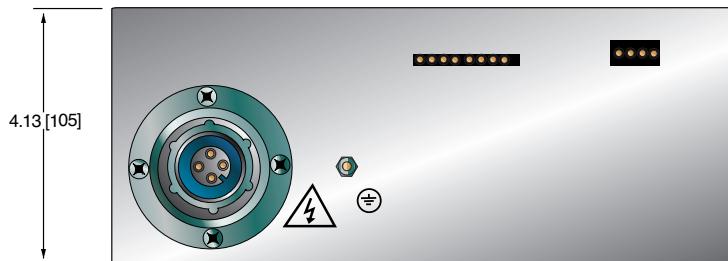
Compliant to 2004/108/EC, the EMC Directive

and 2006/95/EC, the Low Voltage Directive.

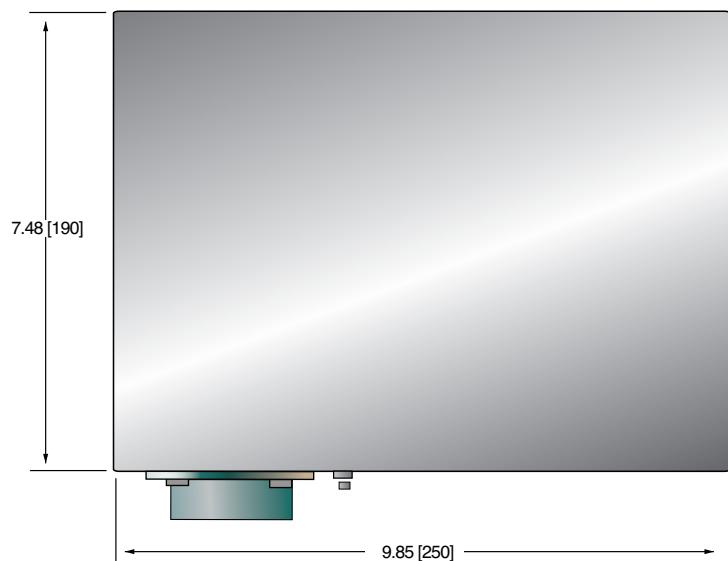
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DIMENSIONS: in.[mm]

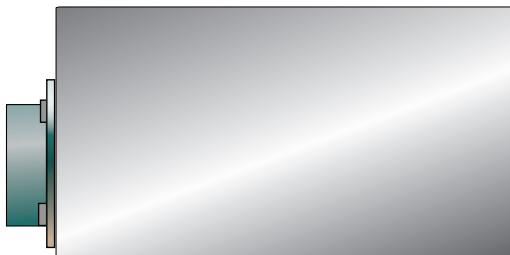
FRONT VIEW



TOP VIEW



SIDE VIEW





The Bertan VS100 high voltage power supply was specifically designed for precision electron beam applications like semiconductor nano-lithography, micro-optics and development mask work. Its ultra low ripple and excellent stability specifications make it ideal for use in these demanding applications. A switch selectable low and high output current range is featured.

The solid encapsulated high voltage section eliminates any user maintenance issues, while isolating the components from environmental variables. The unit is fully overload, arc and short circuit protected. Remote control programming and monitoring capability is provided. A second high voltage monitor, separate from the control electronics is provided. This allows accurate passive measurement of the high voltage output.

TYPICAL APPLICATIONS

Micro-Optics
Semiconductor lithography
Development mask work

SPECIFICATIONS

Input Voltage:

220Vac, ±10%, single phase 50/60 Hertz

Output Voltage:

0 to 100kV, negative polarity. Externally switch selectable to 105kV, ±500 volts

Output Current:

0-10µA, low range
0-100µA, high range
Switch selectable

Line Regulation:

±0.001% of rated voltage over specified input voltage range

Load Regulation:

≤20V for a current change of 25µA to 60µA and 60µA to 25µA

Ripple:

≤75mV peak to peak

Partial High Voltage Discharge:

less than 200mV

- **Electron Beam High Voltage Power Supply**
- **100kV Output Capability**
- **Low/High 10µA/100µA Output Current Selection**
- **Less than 75mV of Ripple**
- **Excellent Regulation and Stability Performance**
- **Oil Free/Solid Encapsulated Design**

Stability:

0.001% per 8 hours after a 6 hour warm up, for a temperature of 20°C ±0.2°C

Temperature Coefficient:

50ppm per degree C over a 10°C to 40°C range

Environmental:

Operating Temperature: 0 to 40 degrees C
Storage Temperature: -40 to 85 degrees C
Humidity: 10 to 90% RH, non condensing

Cooling:

Forced Air-control chassis;
Convection Cooled- high voltage chassis

Front Panel:

Power ON/OFF switch
HV ON/OFF switch
HV ON/OFF indicator
Analog output voltage meter

Dimensions:

Control Chassis: 5.25" H X 19" W X 15.3" D
(13.3cm X 48.3cm X 38.4cm)
HV Chassis: 10.25" H X 19" W X 27" D
(26.7cm X 48.3cm X 55.9 cm)

Weight:

Control Chassis: 20 pounds (9kg)
HV Chassis: 116 pounds (50kg)

Interface Connector:

19 pin Burndy GOB1619SNE
(mating connector provided)

AC Input Connector:

3 pin IEC320 input socket

Output HV Connector:

Claymount 2050-073

Output HV Cable:

Detachable at rear panel, cable not provided.

Regulatory Approvals:

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

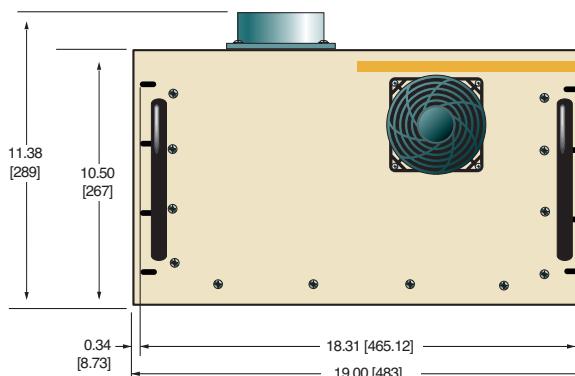
REMOTE INTERFACE CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
A	-5V Reference	-5.0 volts @ 10mA output
B	Voltage Programming	0 to -5v = 0 to 100% rated output, Zin = 100KΩ
C	Spare	N/C
D	Spare	N/C
E	Monitor Common	Ground
F	HV Status	TTL High = HV OFF, TTL Low = HV ON
G	+5V	5 volts @ 250mA output
H	Interlock	Ground or TTL low to enable interlock
J	Program Common	Ground
K	Spare	N/C
L	Spare	N/C
M	Spare	N/C
N	Spare	N/C
P	Voltage Monitor	0 to -5V = 0 to 100% rated output, Zout = 10KΩ
R	Current Monitor	0 to -5V = 0 to 100% rated output, Zout = 10KΩ
S	Spare	N/C
T	Spare	N/C
U	Spare	N/C
V	Spare	N/C

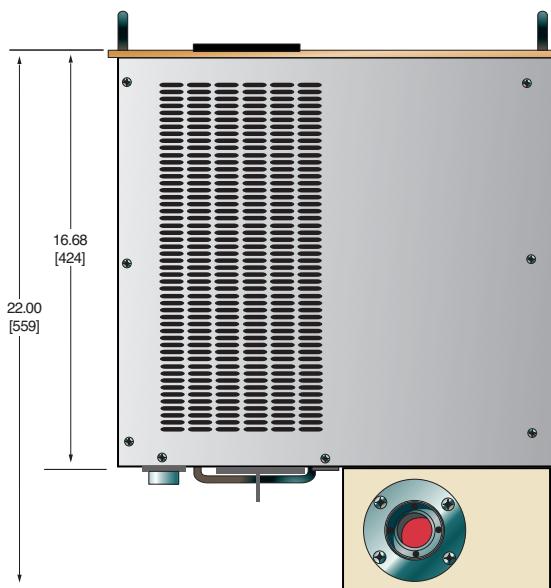
DIMENSIONS: in.[mm]

HV CHASSIS

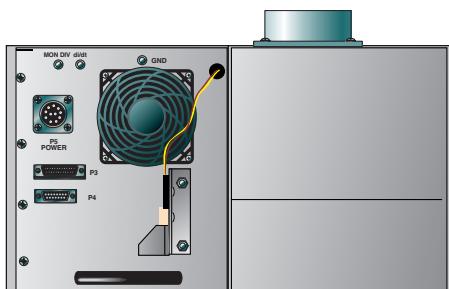
FRONT VIEW



TOP VIEW



BACK VIEW



BACK VIEW





Spellman High Voltage Electronics, the leading independent supplier of Power Feed Equipment to the Telecom industry, has developed a new generation of Low Voltage Power Feed Equipment, (LVPFE). This proposed new LVPFE is targeted at the emerging requirements for shorter submarine cable installations, while addressing underlying markets issues such as lower cost, smaller foot print, and easier operation.

KEY FEATURES

Redundancy is provided for the converters (1+1)

Simplified sliding drawers for PFE open, grounding, test modes

Redundancy is provided for the LCU. In case of failure of LCU, the PFE will continue to operate normally

LCU contains pull-out 17" LCD screen, keyboard, trackball and CPU

Simplified keylock scheme ensures safety of operating personnel

Highly visible Vacuum Fluorescent Display (VFD) on each Converter displays voltage, current and modes of operation

Unique protective "trap door" barrier allows a converter or test load to be replaced safely while the PFE is still powering the cable

SPECIFICATIONS

Output Voltage:

6kV maximum rated continuous operation, 5kV nominal

Output Current:

1.2A maximum rated continuous operation, 1.0A nominal

- **Full Array of Dry Contact Closures Available for Remote Station Alarm Monitoring**
- **Fully-Programmable Electronic Test Load Capable of Dissipating 5kW**
- **Electroding Functions Provided**
- **Single Cabinet. Rear Door Provided for Safety Interlocking**

Output Power:

5kW for 1+1 redundancy

Input Voltage:

-40.5 VDC to -60 VDC

Programming:

Full-featured programming, monitoring, alarms, diagnostics, and ramping functions provided via LCU module.

Monitoring:

Full local and remote monitoring via Ethernet connection.

Current Ripple:

10mA peak to peak of maximum output

Voltage Ripple:

0.2% peak to peak of maximum output

Current Stability:

0.1% (constant load) after a 4 hour warm up

Operating Temperature:

5 to 40°C operating

Storage Temperature:

-40 to +85°C storage

Humidity:

5% to 85%, non-condensing

Cooling:

Forced Air

Dimensions:

86.68"H x 23.64"W x 23.64"D
(2200mm x 600mm x 600mm)

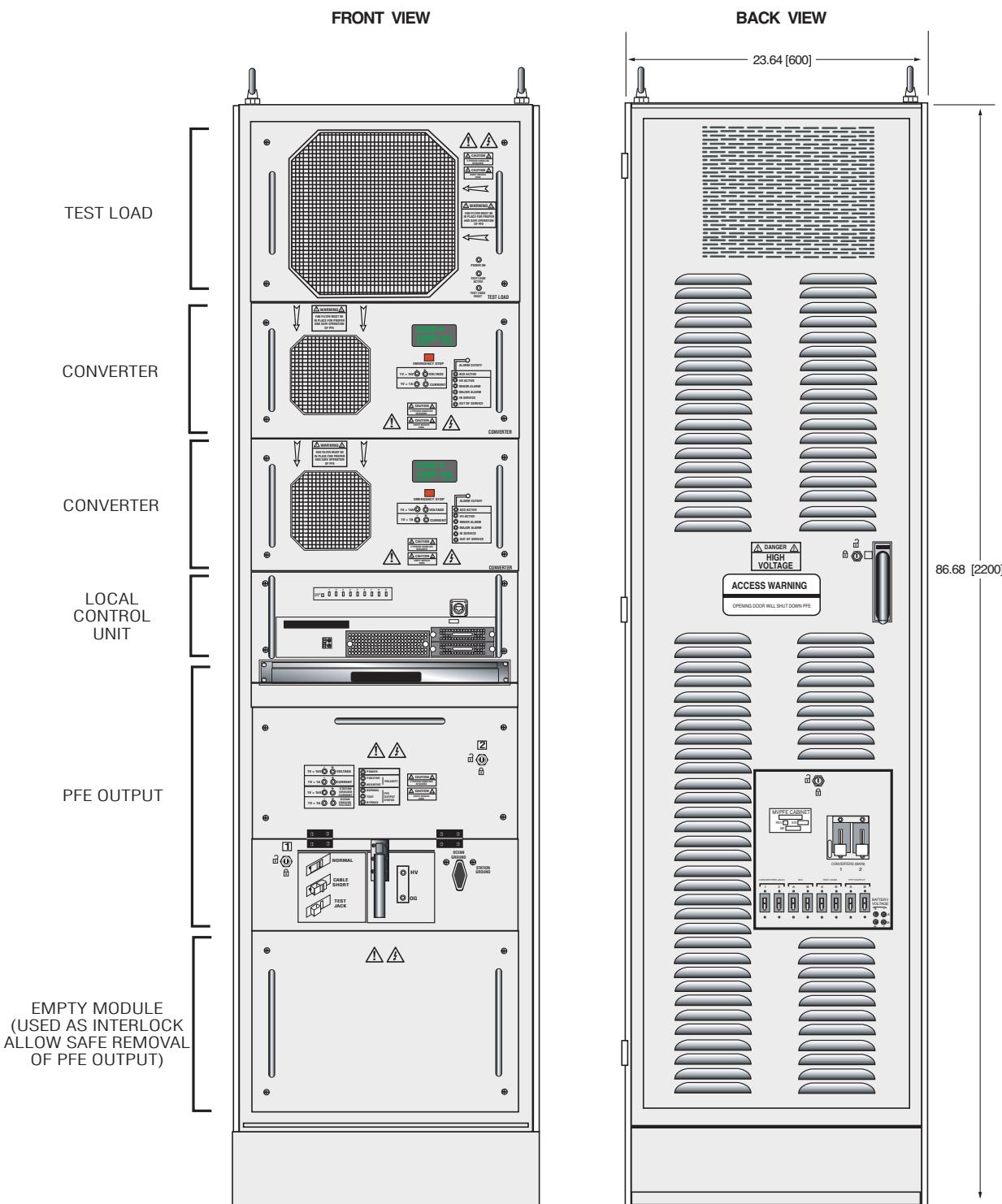
Weight:

900 pounds (335.9kg)

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive. Also complies with: GR-63-CORE, GR-189-CORE, ETSI ETS 300 019, ETS 300 118, ETS 300 127, ETSI EN 300 132-2, ETSI EN 300 386, EN 60950.

DIMENSIONS: in.[mm]



CE



Spellman High Voltage Electronics, the leading independent supplier of Power Feed Equipment to the Telecom industry, has developed a new generation of High Voltage Power Feed Equipment, (HVPFE). This HVPFE is targeted at the emerging requirements for longer submarine cable installations, while addressing underlying issues such as lower cost, smaller foot print, and easier operation.

KEY FEATURES

Redundancy is provided for the converters (n+1)

Simplified sliding drawers for PFE open, grounding, test modes

Redundancy is provided for the LCU. In case of failure of LCU, the PFE will continue to operate normally

LCU contains pull-out 17" LCD screen, keyboard, mouse pad and CPU

Simplified keylock scheme ensures safety of operating personnel

Highly visible Vacuum Fluorescent Display (VFD) on the output module (OMU) and each converter displays voltage, current and modes of operation

Unique protective "trap door" barrier allows a converter to be replaced safely while the PFE is still powering the cable

SPECIFICATIONS

Output Voltage:

18kV maximum rated continuous operation, up to 15kV nominal

Output Current:

1.8A maximum rated continuous operation, 1.5A nominal

- **6, 9, 12, 15kV Versions Available, each @ 1.5A**
- **Full Array of Dry Contact Closures for Remote Station Alarm Monitoring**
- **Fully-Programmable Electronic Test Load Bay Capable of Dissipating 22.5kW**
- **Electroding Functions Provided**
- **3-Bay Design. Rear Doors Provided for Safety Interlocking**
- **Built-in Data Logger Functions Capture Data Every 10ms**

Output Power:

Up to 22.5kW for n+1 redundancy

Input Voltage:

-40.5Vdc to -60Vdc

Programming:

Full-featured programming, monitoring, alarms, diagnostics, and ramping functions provided via LCU module.

Monitoring:

Full local and remote monitoring via Ethernet connection.

Current Ripple:

10mA peak to peak of maximum output

Voltage Ripple:

0.2% peak to peak of maximum output

Current Stability:

0.1% (constant load) after a 4 hour warm up

Operating Temperature:

5 to 40°C operating

Storage Temperature:

-40 to +85°C storage

Humidity:

5% to 85%, non-condensing

Cooling:

Forced Air

Dimensions: (per bay)

86.68" H x 23.64" W x 23.64" D
(2200mm x 600mm x 600mm)

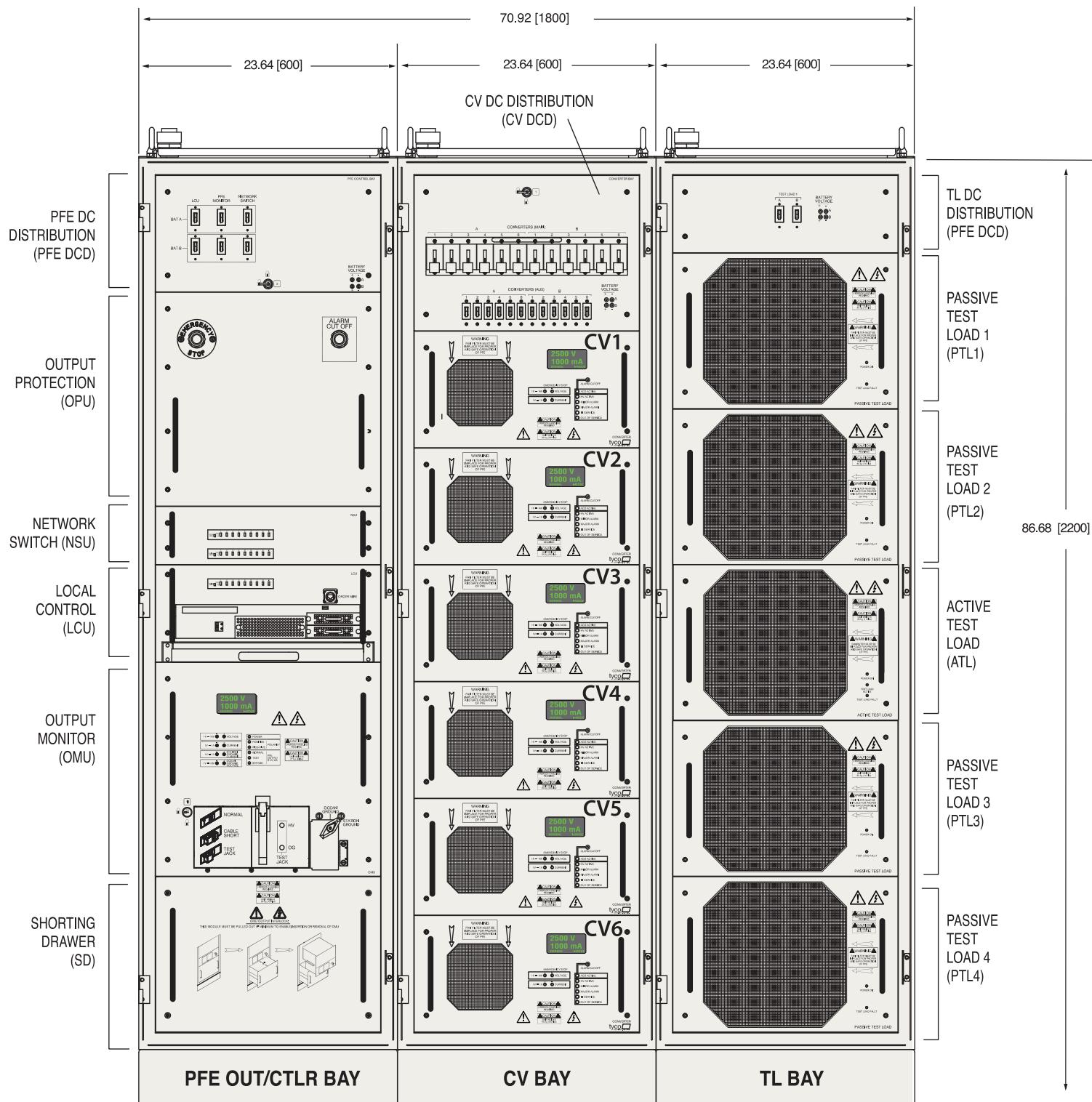
Weight: (per bay)

900 pounds (335.9kg)

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive. Also complies with: GR-63-CORE, GR-189-CORE, ETSI ETS 300 019, ETS 300 118, ETS 300 127, ETSI EN 300 132-2, ETSI EN 300 386, EN 60950.

DIMENSIONS: in.[mm]





Spellman's new DGM935 high voltage power supply for Image Intensifier applications continues to set the standards for high voltage power conversion technology. The DGM series can be adapted to suit specific requirements with a wide selection of multiple output voltages and power capabilities in a compact package, making it perfect for the OEM user.

Monitoring of all output voltages is possible via local test points. The unit can operate in four modes selectable via three inputs. The output voltages are independently adjustable in each mode by the pre-set potentiometer located on the front of the unit.

TYPICAL APPLICATIONS

Radiology
Cardiology
Neuroradiology
Night Surveillance
Non Destructive X-Ray Inspection
Image Intensifiers

SPECIFICATIONS

Input Voltage:

+24Vdc ±1%

Input Current:

500mA maximum

Output Voltages:

Anode:

Output Voltage: 30kV
Output Current: 30µA

Electrode 1:

Output Voltage: 50V to 300V
Output Current: 0 to 1µA

Electrode 2:

Output Voltage: 300V to 2kV
Output Current: 0 to 1µA

Electrode 3:

Output Voltage: 2kV to 18kV
Output Current: 0 to 18µA

- **Multiple Outputs**
- **Simple Interface Via Three Control Inputs**
- **Pre set Adjustment of Output Voltages in Four Mode Operation**

Ripple:

<0.3%

Temperature Coefficient:

<200ppmK⁻¹

Stability:

<0.3% over 8 hrs

Temperature:

Operating: +5°C to +55°C

Input:

8 pin header

Dimensions:

6.30"H x 5.51"W x 1.93"D (160mm x 140mm x 49mm)

Weight:

2.86 lb. (1.5kg)

Regulatory Approvals:

UL Recognised Component to UL60601-1 and CSA C22.2 No 601, CE marked to EN60601-1, EMC tested to meet EN60601-1-2, RoHS Compliant

INPUT/OUTPUT CONNECTORS

Test Point Terminals:

Wire type suitable for clip on probe.

Output Terminals (0V, OVP and GND):

6.3mm Fast-on connector and M4 x 12mm stud

Output Connector Anode:

M14 X 1 thread, 53mm deep x 8.5mm internal diameter.

Output Connector (electrodes 1 & 2):

5/16 x 32 UNF thread, 26.5mm deep x 5mm internal diameter.

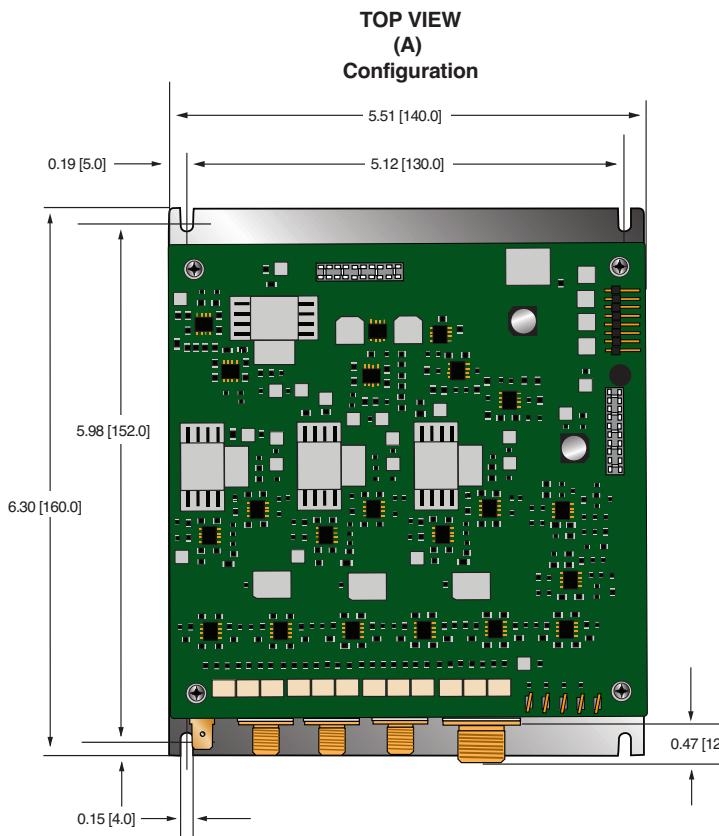
Inputs PC and G:

6.3mm Fast-on connector

Note: 0V, OVP and GND are all connected together internally.

All outputs are protected against high voltage breakdown in the user's equipment and short-circuit protected.

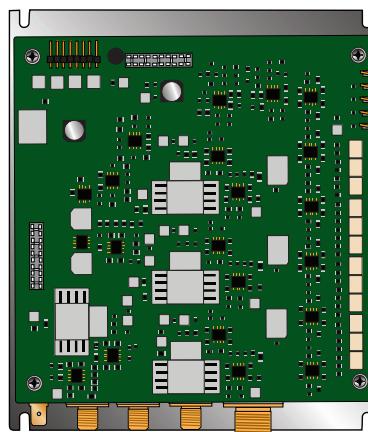
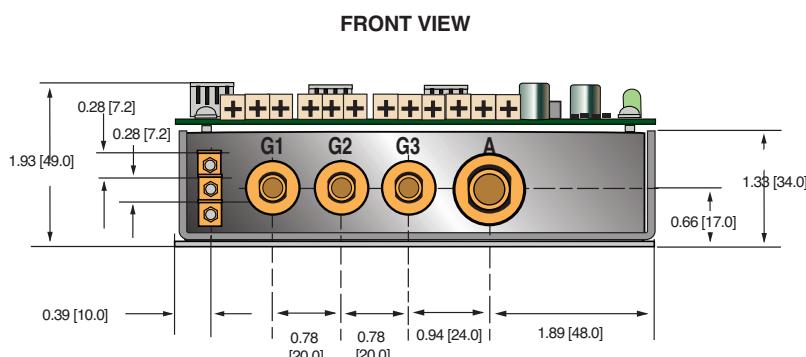
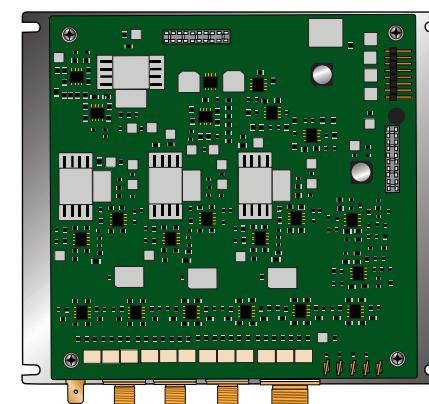
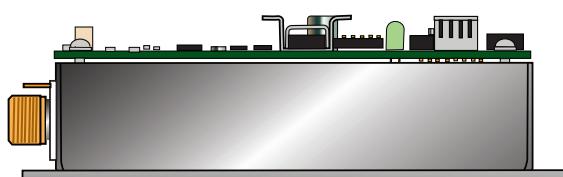
DIMENSIONS: in.[mm]


INPUT 8 PIN HEADER

PIN	SIGNAL	SIGNAL PARAMETERS
1	24V	Power Input
2	0V	Power Ground
3	0V	Power Ground
4	24V	Linked internally to pin1
5	M2	Mode select input 2
6	M1	Mode select input 1
7	N/C	N/C
8	M3	Mode select input 3

ALTERNATE CONFIGURATIONS AVAILABLE

(Specify at time of order)

(B) Configuration

(C) Configuration

SIDE VIEW




Spellman's new DGM945 high voltage power supply for Image Intensifier applications continues to set the standards for high voltage power conversion technology.

The DGM945 also has inputs to allow measurement of the photocathode current and getter current. The photocathode measurement has two ranges : sensitive range: 0 to 50nA and a standard range: 0 to 15µA. The sensitive input is used to provide a monitor output with a sensitivity of 0.1V/nA. The getter input allows measurement of the getter current, indicating if the Image Intensifier tube is still holding a good vacuum and is without gases causing ions.

Monitoring of all output voltages is possible via local test points or over the serial interface. The unit can also store up to eight modes of operation. The output voltages are independently adjustable in each mode either by the rotary encoders built into the unit or via the serial interface.

The DGM series can be adapted to suit specific requirements with a wide selection of multiple output voltages and power capabilities in a compact package, making it perfect for the OEM user.

TYPICAL APPLICATIONS

- Radiology
- Cardiology
- Neuroradiology
- Night Surveillance
- Non Destructive X-Ray Inspection
- Image Intensifiers

SPECIFICATIONS

Input Voltage:

+24Vdc ±10%

- **Multiple Outputs**
- **Three Control Inputs**
- **Three Optical Encoders**
- **RS-232 Serial Port for Control and Monitoring**
- **OEM Customization Available**

Input Current:
500mA maximum

Programmable Output Voltages:

Anode:

Output Voltage: 30kV
Output Current: 5µA continuous (50µA peak)

Electrode 1:

Output Voltage: 10V to 350V
Output Current: 0 to 10µA

Electrode 2:

Output Voltage: 200V to 2kV
Output Current: 0 to 10µA

Electrode 3:

Output Voltage: 2kV to 20kV
Output Current: 0 to 20µA

Electrode 4:

Output Voltage: 2.7kV
Output Current: 0 to 10µA

Ripple:

<0.3%

Temperature Coefficient:
<200ppmK⁻¹

Stability:

<0.3% over 8 hrs

Temperature:

Operating: +5°C to +55°C

Input Connector:

15 pin male sub D

Dimensions:

5.47"H x 5.67"W x 1.97"D (139mm x 144mm x 50mm)

Weight:

2.86 lb. (1.3kg)

Regulatory Approvals:

UL Recognised Component to UL60601-1 and CSA C22.2 No 601, CE marked to EN60601-1, RoHS Compliant

INPUT 15 PIN MALE D CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	0V	Signal Ground
2	RxD	RS-232 receive data input
3	TxD	RS-232 transmit data output
4	0V	Signal Ground
5	0V	Signal Ground
6	UC2	Mode select input 2
7	0V	Signal Ground
8	OVP	Power return
9	DTR	RS-232 Data terminal ready output
10	CTS	RS-232 Clear to send input
11	N/C	N/C
12	Ipc	Ipc = 10nA / volt
13	UC3	Mode select input 3
14	UC1	Mode select input 1
15	24V	Power input

INPUT/OUTPUT CONNECTORS

Test Point Terminals:

Copper pad plus 1.1 mm Ø pth.

Output Terminals (0V, OVP and GND):

6.3mm Fast-on connector and M4 x 12mm stud

Output Connector Anode:

LGH1

Output Connector (other electrodes):

LGH½

Inputs PC and G:

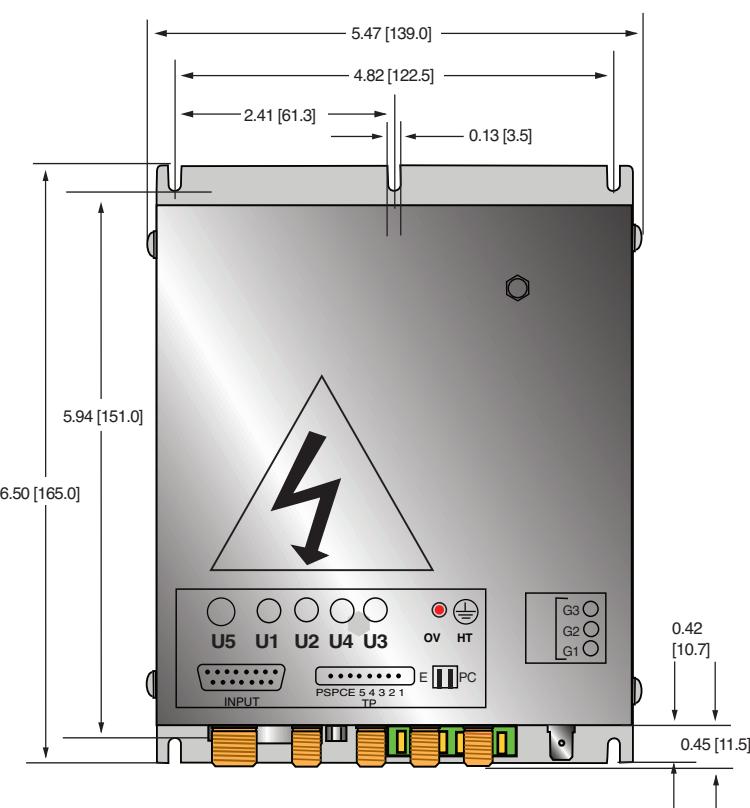
6.3mm Fast-on connector

Note: 0V, OVP and GND are all connected together internally.

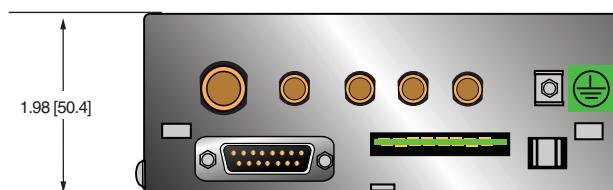
All outputs are protected against high voltage breakdown in the user's equipment and short-circuit protected.

DIMENSIONS: in.[mm]

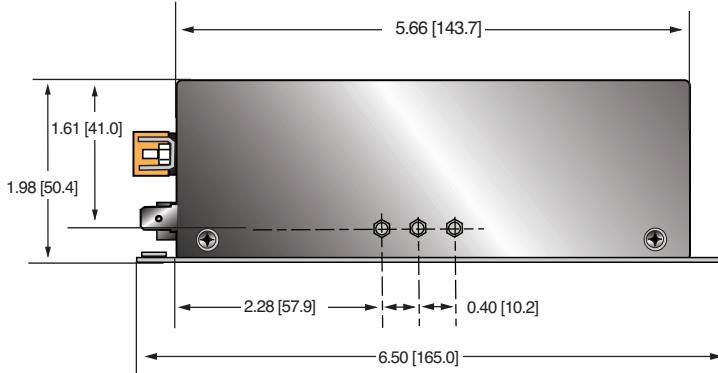
TOP VIEW



FRONT VIEW



SIDE VIEW





Spellman's CZE1000R is a full feature rack mountable high voltage power supply ideal for laboratory usage. It's designed to meet the needs of applications requiring a hot switched reversible output voltage. The output polarity can be quickly and safely reversed via a front panel switch.

Both the output voltage and current are fully adjustable from 0 to 30kV and 0 to 300μA via front panel ten turn locking counting dials. Remote control operation is done by 0 to +10Vdc programming signals; either user generated or using the provided +10 Vdc reference and external potentiometers.

Front panel voltage and current meters provide local monitoring. Voltage and current test points are provided such that 0 to 10Vdc corresponds to 0 to 100% rated output.

A two position, normally closed, external interlock is provided for protection of external high voltage accessible areas. If the interlock is opened the high voltage will shut off and fall to zero in less than one second and not be able to be re-energized until the interlock is closed.

Excellent load and line regulation specifications along with outstanding stability and low ripple of the CZE1000R assure a stable high voltage output for consistent process results.

TYPICAL APPLICATIONS

- Electrospinning
- Mass Spectrometry
- Capillary Electrophoresis
- Electrostatic Research

OPTIONS

- 220** 220Vac Input Voltage
- RPO** Rear Panel HV Output

SPECIFICATIONS

Input Voltage:
115Vac, ±10%, 50/60Hz

Input Current:
Less than 1 amp

Efficiency:
75% typical

Output Voltage:
0 to 30kV

Polarity:
Auto reversible via front panel switch

- **Ideal for Electrospinning**
- **0-30kV Local or Remote Programming**
- **0-300μA Local or Remote Programming**
- **Polarity Reversible Upon Command in <1 Sec at No Load**
- **Low Stored Energy, Current Limited Output**
- **Full Feature Front Panel, Ideal for Laboratory Usage**

www.spellmanhv.com/manuals/CZE1000R

Output Current:

0 to 300μA

Power:

9 watts, maximum

Line Regulation:

0.01% for a 10% input voltage change

Load Regulation:

0.01% for a full load change

Ripple:

0.1% Vp-p

Stability:

0.02% per 8 hours (after 1/2 hr warmup)

NL Time Constant:

100ms

Stored Energy:

0.2 Joules at 30kV

Temperature Coefficient:

100ppm/°C

Operating Temperature:

0°C to 40°C

Storage Temperature:

-40°C to 85°C

Humidity:

10% to 85% RH, non condensing

Cooling:

Convection cooled

Dimensions:

5.25" H x 19" W x 17" D (13.3cm x 48.3cm x 43.2cm).

Weight:

22lbs. (10kg)

Interface Connector:

14 pin terminal block

AC Input Connector:

IEC320 connector with 6' (1.83m) cord

HV Output Connector:

Detachable 36" (0.91m) cable provided

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive

DIMENSIONS: in.[mm]

CZE1000R TERMINAL BLOCK 14 PIN

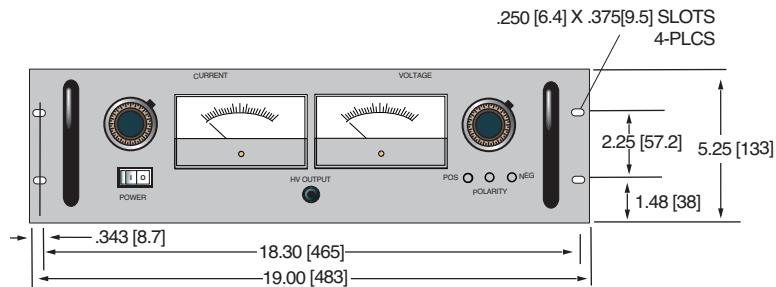
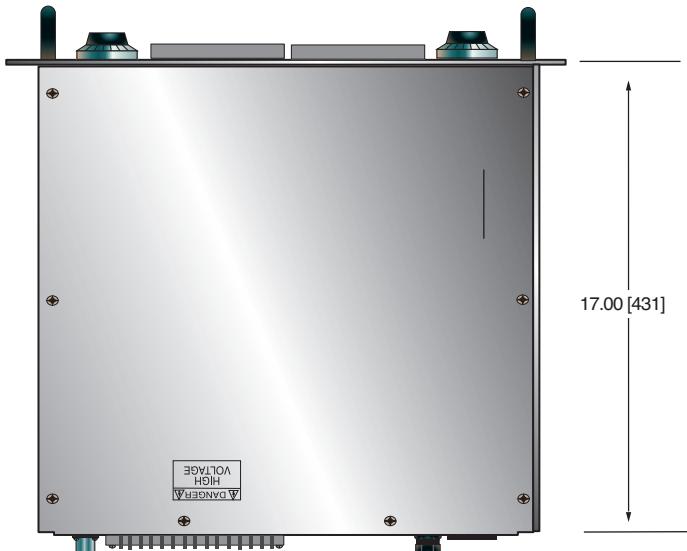
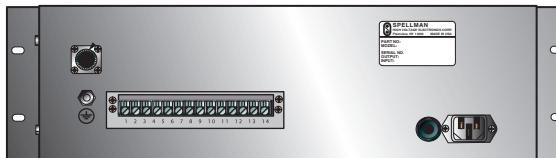
PIN	SIGNAL	PARAMETERS
1	+10Vdc Reference Output	+10Vdc, 4mA maximum
2	Internal Voltage Control	Front Panel Program Voltage (programming potentiometer)
3	Voltage Program Input	0 to 10Vdc = 0 to 100% rated output, $Z_{in} = 10M\Omega$
4	Internal Current Control	Front Panel Current Control (programming potentiometer)
5	Current Program Input	0 to 10Vdc = 0 to 100% rated output, $Z_{in} = 10M\Omega$
6	Signal Common	Ground
7	Voltage Test Point	0 to 10Vdc = 0 to 100% rated output, $Z_{out} = 10k\Omega$, 1%
8	Current Test Point	0 to 10Vdc = 0 to 100% Rated Output, $Z_{out} = 10k\Omega$, 1%
9	External Interlock Out	32Vdc @ 2 amps, max, (connect to pin 10 through safety switch)
10	External Interlock In	Return for interlock (connect to pin 9 through safety switch)
11	+10Vdc Reference Output	+10Vdc, 4mA maximum
12	Enable	Open or ground = HV OFF, >3.4Vdc (up to 15Vdc) = HV ON
13	Spare	No Connection
14	Spare	No Connection

Note:

The unit is shipped with the following pins jumpered for front panel operation: 2-3, 4-5, 9-10, 11-12. It is strongly recommended to remove the 9-10 jumper and use a high voltage safety interlock switch.

High Voltage Cable:

A mating high voltage connector is provided with the unit. Have a spare on hand or replace broken/lost mating high voltage cables by ordering Spellman part number 105719-034

FRONT VIEW

TOP VIEW

BACK VIEW


CE



Spellman's CZE2000 modular high voltage power supply is ideal for OEM usage. It is specifically designed to meet the needs of applications requiring a hot switched reversible output voltage. The output polarity of the unit can be quickly and safely reversed via the Polarity Control Signal provided on the interface connector.

Both the output voltage and current are fully adjustable via ground referenced remote programming signals such that 0 to 10Vdc corresponds to 0 to 100% rated output voltage and current.

Remote motioning functionality is provided by voltage and current test points such that 0 to 10Vdc corresponds to 0 to 100% rated voltage and current. Additionally remote polarity and mode indicators provide a comprehensive overview of power supply operation.

Excellent load and line regulation specifications along with outstanding stability and low ripple assure a stable high voltage output for consistent process results.

TYPICAL APPLICATIONS

- Electrospinning
- Mass Spectrometry
- Capillary Electrophoresis
- Electrostatic Research

SPECIFICATIONS

Input Voltage:

24Vdc, ±10%

Input Current:

Less than 1 amp

Efficiency:

75% typical

Output Voltage:

See selection table

Output Current:

See selection table

Polarity:

Auto reversible via command

Power:

10 watts, maximum

- **Ideal for Electrospinning**
- **0-30kV Remotely Programmable**
- **0-300µA Remotely Programmable**
- **Polarity Reversible Upon Command in <1 Sec at No Load**
- **Low Stored Energy, Current Limited Output**
- **Cost Effective Modular Design**

www.spellmanhv.com/manuals/CZE2000

Line Regulation:

0.01% for a 10% input voltage change

Load Regulation:

0.01% for a full load change

Ripple:

0.1% Vp-p

Stability:

0.02% per 8 hours (after 1/2 hr warmup)

NL Time Constant:

100ms

Stored Energy:

0.2 Joules at 30kV

Temperature Coefficient:

100ppm/°C

Operating Temperature:

0°C to 40°C

Storage Temperature:

-40°C to 85°C

Humidity:

10% to 85% RH, non condensing

Cooling:

Convection cooled

Dimensions:

3.5"H x 5"W x 10"D (8.9cm x 12.7cm x 25.4cm).

Weight:

6.2lbs. (2.8kg)

Interface Connector:

25 pin male D connector

HV Output Connector:

Detachable 36" (0.91m) cable provided

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive, UL/CUL recognized file E148969

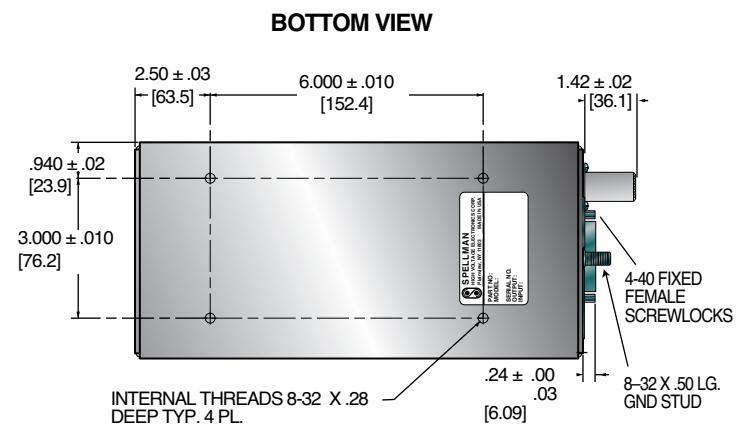
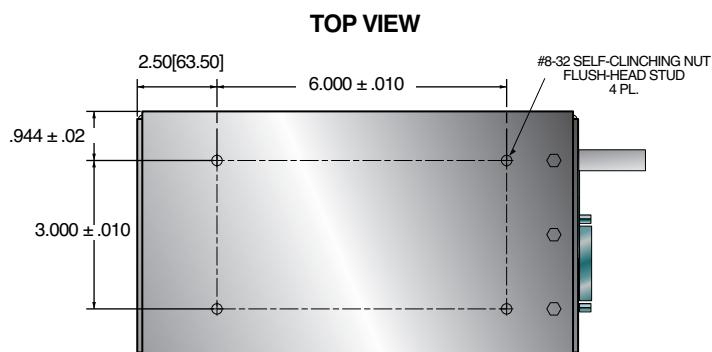
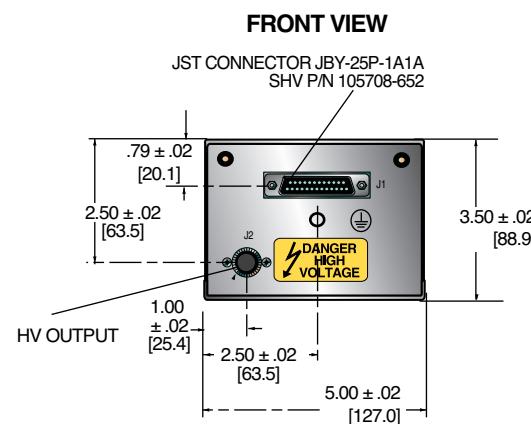
CZE2000 SELECTION TABLE

MAXIMUM RATING		MODEL NUMBER
kV	mA	
5	2.0	CZE 5PN10
10	1.0	CZE 10PN10
15	0.67	CZE 15PN10
20	0.50	CZE 20PN10
30	0.30	CZE 30PN10

CZE2000 25 PIN MALE D CONNECTOR

PIN	SIGNAL	PARAMETERS
1	+24Vdc Return	Power Return
2	+24Vdc Return	Power Return
3	+24Vdc Return	Power Return
4	HV Enable/Inhibit	Open or <1Vdc = HV OFF, >3.4Vdc (up to 15Vdc) = HV ON
5	Voltage Test Point	0 to 10Vdc = 0 to 100% rated output, Zout = 10kΩ, 1%
6	Current Test Point	0 to 10Vdc = 0 to 100% rated output, Zout = 10kΩ, 1%
7	Chassis Ground	Ground
8	Remote Voltage Control	0 to 10Vdc = 0 to 100% Rated Output, Zin = 10MΩ
9	Remote Current Control	0 to 10Vdc = 0 to 100% Rated Output, Zin = 10MΩ
10	+10Vdc Reference Output	+10Vdc, 4mA maximum
11	Signal Return	Signal Return
12	Polarity Control	Open or >3.4Vdc (up to 15Vdc) = Positive Polarity. Grounded or <1Vdc = Negative Polarity
13	Positive Polarity Indicator	+24Vdc sourced through a 100Ω series limiting resistor. +24Vdc = active signal
14	+24Vdc Input	Power Input
15	+24Vdc Input	Power Input
16	Chassis Ground	Ground
17	Negative Polarity Indicator	+24Vdc sourced through a 100Ω series limiting resistor. +24Vdc = active signal
18	I Mode Indicator	Open collector pulled up internally to +15Vdc through 2.7kΩ resistor with a 470Ω limiting resistor in series. Transistor OFF = signal active
19	V Mode Indicator	Open collector pulled up internally to +15Vdc through 2.7kΩ resistor with a 470Ω limiting resistor in series. Transistor OFF = signal active
20	Return Current Test Point	0 to 10Vdc = 0 to 100% rated output current, as measured returned from load. Zout = 10kΩ, 1%
21	Load Return	High Voltage Return Point. Required for GFI circuit functionality
22	Ground Fault Indicator	Open collector pulled up internally to +15Vdc through 4.7kΩ resistor with a 470Ω limiting resistor in series. Transistor OFF = signal active
23	Spare	No Connection
24	Spare	No Connection
25	Spare	No Connection

DIMENSIONS: in.[mm]





Spellman's CCM1KW capacitor charging module is designed to provide up to 1000 Joules per second at an output voltage up to 4000 Volts. The power factor corrected AC input, small package size and both a comprehensive and minimal analog interface simplifies integrating the CCM1KW into your OEM system design. Available in either positive or negative polarity, the CCM1KW is fully arc, open and short circuit protected.

TYPICAL APPLICATIONS

UV light sources for curing and sterilization
Industrial and medical laser applications

SPECIFICATIONS

Input Voltage:

90-264 Vac, 47-63 Hertz, power factor corrected input ≥ 0.98

Input Current:

14 Amps worst case, 1000 Joules per second
7 Amps worst case, 500 Joules per second

Efficiency:

>85%

Output Power:

1000 Joules per second, 500 Joules per second

Output Voltage:

0-1kV, 0-2kV and 0-4kV version available

Output Polarity:

Positive or negative, specify at time of order

Stored Energy:

Less than 0.2 Joules

Pulse to Pulse Repeatability:

$\pm 0.2\%$ up to 1kHz

Temperature Coefficient:

$\leq 100\text{ppm}$ per degree C

- **Compact & Lightweight Package**
- **Universal/Power Factor Corrected Input**
- **Low Cost Modular OEM Platform**
- **Advanced Resonant Soft Switching Inverter Topology**
- **RoHS Compliant**
- **UL/CUL Recognized**

www.spellmanhv.com/manuals/CCM1KW

Fault Diagnostic System:

Over Temperature and Over Voltage
Over Voltage Fault is latched requiring AC power recycle to clear.
Over Temperature Fault is latched but can be cleared via inhibit/fault reset line.

Environmental:

Temperature Range:

Operating: 0°C to 40°C

Storage: -40°C to 85°C

Humidity:

10% to 90% RH, non-condensing

Cooling:

Forced air

Input Line Connector:

2 position Phoenix MSTB connector, straight and right angle mating connector provided

HV Output Connector:

Standard: Kings/Winchester Electronics SHV 1707-1
Optional: Amphenol MHV UG-931/U

Interface-A Connector:

15 pin D, female

Interface-B Connector:

4 pin male Molex 705530038

Ground Stud:

10-32, nut supplied

Dimensions:

3" H X 6" W X 9" D (76.2mm x 152.4mm x 228.6mm)

Mounting:

M4 screw. Max. depth is 0.188" (4.78mm)

Weight:

6.9lb. (3.13kgs)

Regulatory Approvals:

Compliant to 2004/108/EC, The EMC Directive and 2006/95/EC, The Low Voltage Directive, approval pending. RoHS compliant. Compliant to EN60601-1.UL/CUL recognized, File 242584.

AC INPUT-2 POSITION TERMINAL BLOCK

PIN	SIGNAL	SIGNAL PARAMETERS
1	AC Input High/Phase 1	Line Hot/Phase 1
2	AC Input Low/Phase 2	Line Neutral/Phase 2

ANALOG INTERFACE A— 15 PIN FEMALE D CONNECTOR

PIN	SIGNAL	SIGNAL PARAMETERS
1	Inhibit/Fault Reset	Ground = HV Enable, Open/+15Vdc = HV Inhibit
2	N/C	N/C
3	OverTemp Fault	No OT Fault = +15Vdc @ 3mA, OT Fault = Ground
4	Signal Ground	Signal Ground (optional)*
5	Voltage Program	0 to 10Vdc = 0 to 100% rated output voltage
6	Overtoltage Status	No OVP = +15Vdc @ 3mA, OVP Fault = Ground
7	Peak Hold Monitor	Peak output voltage displayed, 0 to 10Vdc = 0 to 100% rated output voltage with a 5 second time constant
8	Voltage Monitor	0 to 10Vdc = 0 to 100% rated output voltage, ±1%
9	+15Vdc	+15Vdc @ 150mA, maximum**
10	N/C	N/C
11	+15Vdc	+15Vdc @ 150mA, maximum (optional)**
12	Signal Ground	Signal Ground (optional)*
13	End of Charge	Charging = +15Vdc @ 1.5mA, End of Charge = Ground
14	Signal Ground	Signal Ground
15	Signal Ground	Signal Ground

Note: Output status signals are NMOS transistor controlled, 100mA maximum sink current. Actual signals are 5kΩ pull ups to the internal +15Vdc logic source.

*Optional interface signals can be provided to be compatible with other pre-existing legacy interfaces. On standard units these signals are N/C.

**+15Vdc ±10% is provided on the standard unit. Optional +12Vdc ±5%/100mA, maximum can be provided.

INTERFACE B-4 PIN MALE D HEADER

PIN	SIGNAL	SIGNAL PARAMETERS
1	Inhibit/Fault Reset	Ground = HV Enable, Open/+15Vdc = HV Inhibit
2	Signal Ground	Signal Ground
3	Voltage Program	0 to 10Vdc = 0 to 100% rated output voltage
4	+15Vdc	+15Vdc @ 150mA, maximum (optional)*

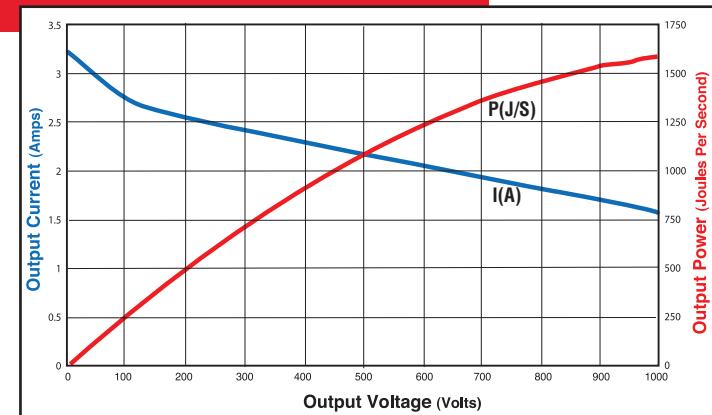
CCM1KW SELECTION TABLE

KV	JOULES/SECOND	MODEL
1	500	CCM1*500
2	500	CCM2*500
4	500	CCM4*500
1	1000	CCM1*1000
2	1000	CCM2*1000
4	1000	CCM4*1000

*Specify P for positive or N for negative

500 J/s units have a single internal fan, 1000 J/s units have both an internal and external fan.

TYPICAL GRAPH FOR CCM1P1000



By utilizing a unique inverter topology, a reduction in peak power is achieved for the same average output power

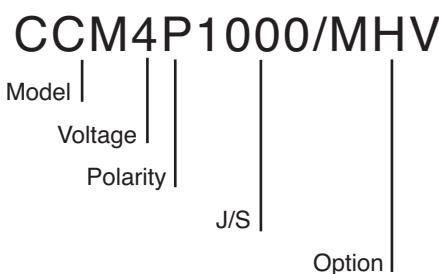


Straight and right angle AC input mating connectors are provided

OPTION ORDERING INFORMATION

OPTION	OPTION CODE
MHV UG-931/U HV Connector	MVH
Legacy Interface Signals	L

OPTION ORDERING EXAMPLE



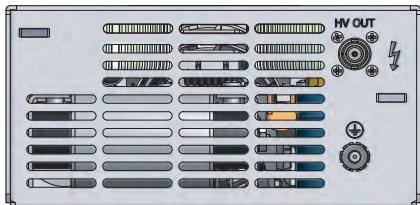
CCM1KW CAPACITOR CHARGING MODULE

SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION

PAGE 3 OF 3

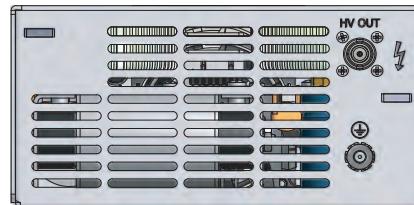
500 Joules per second
(unit with internal fan)
DIMENSIONS: in.[mm]

REAR VIEW

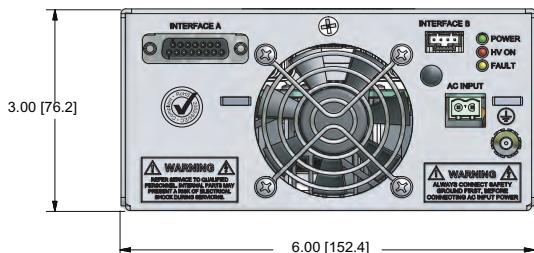


1000 Joules per second
(unit with internal and external fan)
DIMENSIONS: in.[mm]

REAR VIEW



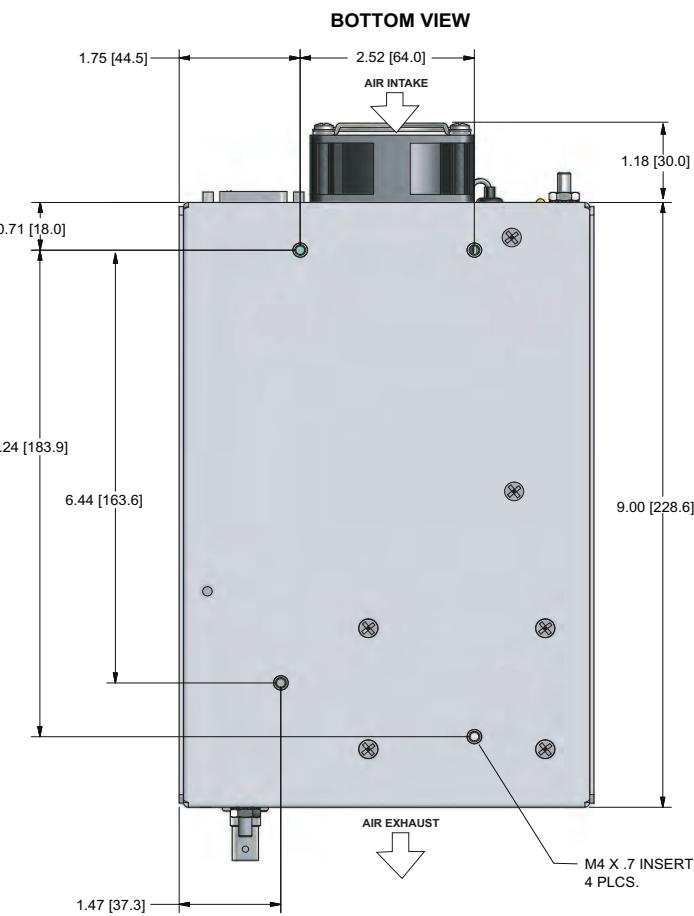
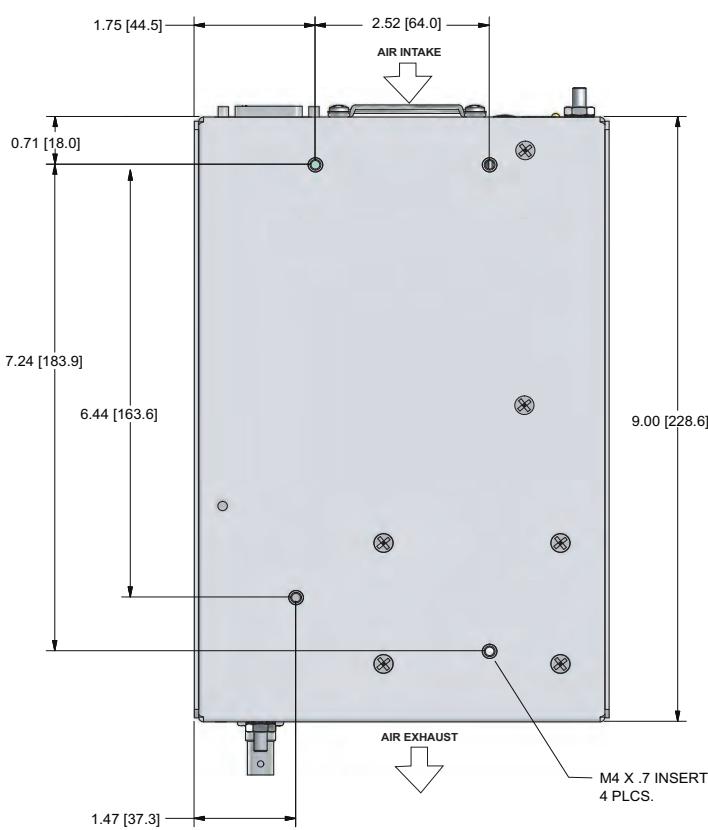
FRONT VIEW



FRONT VIEW



BOTTOM VIEW





- **Compact & Lightweight Package**
- **Power Factor Corrected Input**
- **Low Cost Modular OEM Platform**
- **Rugged IGBT Inverter Design**
- **Auxiliary +24Vdc @ 2.2 Amp Output Provided**

www.spellmanhv.com/manuals/CCM

Spellman's CCM capacitor charging module is designed to provide 3100 joules per second at an output voltage up to 4000 Volts. With a power density of 6.6 watts per cubic inch, the CCM packs more than 30% more power into the same volume when compared to other commercially available units. The power factor corrected AC input, small package size and comprehensive analog interface simplifies integrating the CCM into your OEM system design. Available in either positive or negative polarity, the CCM is fully arc, open and short circuit protected.

TYPICAL APPLICATIONS

UV light sources for curing and sterilization
Industrial and medical laser applications
ICP-MS applications

SPECIFICATIONS

Input Voltage:

180-264 Vac, 47-63 Hertz, power factor corrected input
≥0.98, fused via externally accessible fuses

Efficiency:

>85%

Output Power:

3100 Joules per second, average

Output Voltage:

4000 Volts, maximum

Output Polarity:

Positive or negative, specify at time of order

Pulse to Pulse Repeatability:

±0.6% up to 120 Hertz

Temperature Coefficient:

≤100ppm per degree C

Fault Diagnostic System:

Over Temperature, Over Voltage and Open Load sensing

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C
Humidity:
10% to 90% RH, non-condensing

Cooling:

Forced air

Ground Stud:

M6 X10mm, M6 nut supplied

Input Line Connector:

2 position Phoenix HDFK4 connector

HV Output Connector:

Kings KV-79-15, Bulkhead mounted

+24Vdc Output Connector:

AMP #1-350942-0

Dimensions:

5.81" H X 5.8" W X 14" D (148mm x 147mm x 356mm)

Weight:

14.5lb. (6.6kgs)

Regulatory Approvals:

UL Safety Test Standards:
ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10)
CAN/CSA-C22.2 No. 60601-1 (2008)

EMC Test Standard:

IEC 60601-1-2

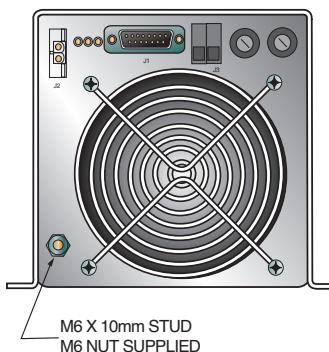
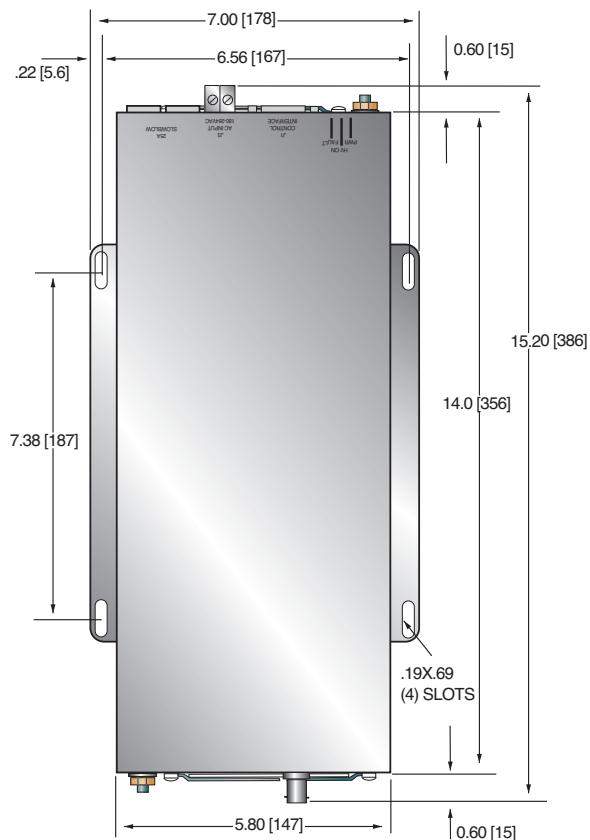
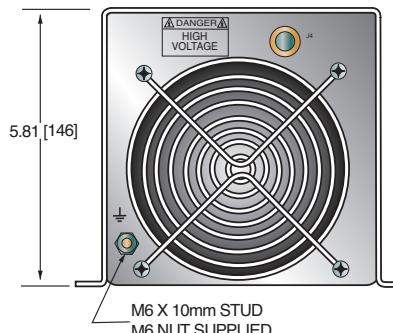
**AUXILIARY +24VDC CONNECTOR
J2 2 POSITION AMP CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	+24Vdc	+24Vdc @ 2.2 amps
2	Ground	Ground

**CCM ANALOG INTERFACE—
J1 15 PIN FEMALE D CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Inhibit	Ground = HV ON, High = HV OFF
2	Temperature Fault	Fault = OV; no fault = +15Vdc through 6.8kΩ
3	General Fault	Fault = OV; no fault = +15Vdc through 6.8kΩ
4	HV ON Indicator	Ground = HV ON, +15Vdc = HV OFF +15Vdc through 6.8kΩ
5	Voltage Program	0 to 10Vdc = 0 to 100% Rated Output
6	Open Circuit Detector	Fault = OV; no fault = +15Vdc through 6.8kΩ
7	Peak Voltage Monitor	0 to 10Vdc = 0 to 100% Rated Output held for 10 seconds at peak level
8	Voltage Monitor	0 to 10Vdc = 0 to 100% Rated Output, Instantaneous output
9	+15Vdc Output	+15Vdc @ 150ma output, maximum
10	N/C	N/C
11	+15Vdc Output	+15Vdc @ 150ma output, maximum
12	+15Vdc Output	+15Vdc @ 150ma output, maximum
13	End of charge Indicator	Ground = End of Charge, High Impedance = Charging
14	Ground	Ground
15	Ground	Ground

DIMENSIONS: in.[mm]

FRONT VIEW

TOP VIEW

BACK VIEW




12kW 10.50" (6U) Chassis



Spellman's new EVA Series is specifically designed for demanding electron beam coating applications. A full featured front panel provides local control, while an extensive analog interface allows remote capability. The included Ethernet and RS-232 digital interfaces simplify integrating the EVA into your system design.

The EVA's robust IGBT inverter design is inherently fault tolerant. The proprietary low capacitance, low stored energy high voltage output section is ideal for dynamic load and fault conditions encountered in coating applications. Fast arc recovery times (<2ms) minimize process interruptions. Many operational parameters can be configured by the user to suit their particular requirements via the provided graphical user interface (GUI).

An optional filament gun supply is available. The EVA can support one, two or three filament gun supply channels providing unprecedented flexibility and cost effectiveness.



3kW/6kW 5.25" (3U) Chassis

HARDWARE BASED OPTIONS

3PH	180-264Vac Three Phase Input
1PH	180-264Vac Single Phase Input (3kW & 6kW only)
400VAC	360-528Vac, Three Phase Input (6kW & 12kW only)
LL(X)	High Voltage Cable Length
HV2	Two High Voltage Output Connectors
HV3	Three High Voltage Output Connectors
FIL1	Filament Gun Supply—One Channel
FIL2	Filament Gun Supply—Two Channels
FIL3	Filament Gun Supply—Three Channels
HPF	50 Amp Filament Supply

SOFTWARE CONFIGURABLE FEATURES

- Adjustable Overload Trip
- Arc Trip Count
- Arc Quench Time
- Arc Reramp Time
- Arc Window Time

- **Specially Designed for E Beam Coating Applications**
- **3kW, 6kW and 12kW Power Levels**
- **Remote Analog and Ethernet/RS-232 Interface**
- **Arc and Short Circuit Protected, Fast Arc Recovery**
- **User Configurable Dynamic Arc Intervention**
- **Optional Filament Gun Supply (up to 3 channels)**
- **OEM Customization Available**

www.spellmanhv.com/manuals/EVA

3/6/12KW HV SPECIFICATIONS

Input Voltage: (must be specified at time of order)

- Option 3PH: 180-264Vac, 50/60Hz, three phase, 90% efficiency, 0.85 power factor
- Option 1PH: 180-264Vac 50/60Hz, single phase, 90% efficiency, 0.65 power factor (3kW & 6kW only)
- Option 400VAC: 360-528Vac 50/60Hz, three phase, 90% efficiency, 0.85 power factor (6kW & 12kW only)

Input Current:

- Option 3PH: 180-264Vac, 50/60Hz, three phase
 - 3kW—13 amps, maximum
 - 6kW—25 amps, maximum
 - 12kW—50 amps, maximum
- Option 1PH: 180-264Vac, 50/60Hz, single phase
 - 3kW—29 amps, maximum
 - 6kW—57 amps, maximum
- Option 400VAC: 360-528Vac, 50/60 Hz, three phase,
 - 6kW—13 amps, maximum
 - 12kW—25 amps, maximum

Output Voltage:

- 5kV @ 600mA, negative polarity. 3kW maximum.
- 10kV @ 600mA, negative polarity. 6kW maximum.
- 10kV @ 1200mA, negative polarity. 12kW maximum.

Local Output Controls:

Voltage is continuously adjustable over entire range via a 10 turn potentiometer.

Voltage Regulation:

- Load: 0.05% of full voltage +500mV for full load change.
- Line: 0.05% of full voltage +500mV over specified input range.

Ripple:

<3% Vrms

Stability:

0.02%hr. after 1 hour warm-up.

Temperature Coefficient:

100ppm/°C.

Environmental:

Temperature Range:
Operating: 0°C to 40°C
Storage: -40°C to 85°C

Humidity:
10% to 90% RH, non-condensing.

Cooling:

Forced air; inlet through side panels, outlet at rear panel

Metering:

Front panel digital voltage and current meters, 3.5 digit, accurate to within 1%.

3/6/12kW HV SPECIFICATIONS**System Status Display:**

"Dead Front" type indicators provide status of up to 12 system parameters including voltage regulation, fault conditions and circuit control.

Input Power Connector:

A 6 foot (1.8 meter) long captive line cord will be provided.

Analog Interface Connector:

50 pin female D connector

High Voltage Output Cable:

10 ft (3.05m) shielded high voltage cable, removable at rear panel.

Dimensions:

3kW/6kW Units:

5.25"(3U)H x 19" W x 21" D (133mm x 482mm x 533mm)

12kW Units:

10.5"(6U)H x 19" W x 21" D (266mm x 482mm x 533mm)

Weight:

3kW/6kW Units: 46 pounds (20.87kg)

12kW Units: 90 pounds (40.82kg)

Regulatory Approvals:

2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. RoHS compliant.

Digital Interface

The EVA features a standard RS-232 and Ethernet digital interface, simplifying power supply communication requirements saving the user time and money, while enhancing functionality and overall capability. Spellman provides a GUI allowing customization of operational features while also providing basic power supply functionality and control via a sample simulated front panel.

Arc Intervention

Spellman's EVA power supplies sense arc events via a fast acting current sense transformer. The arc intervention circuitry prevents power supply damage from continuous, long term arcing. Customers can change arc intervention parameters (Arc Count, Arc Quench, Reramp Time, and Window Time) within preset limits via the provided GUI. Customized units can be configured for unique arc prone environments, contact Spellman for details.

Additional High Voltage Output Connectors

Spellman's EVA is designed to provide 1, 2 or 3 parallel configured high voltage output connectors. The standard unit provides one high voltage output connector. If you intend to use the EVA in a multi channel application but want to utilize your own filament power supply, this factory installed option provides the additional high voltage connections required. Hardware Option HV2 provides two high voltage output connectors, while Hardware Option HV3 provides three high voltage output connectors.

Optional Beam Controller (Filament Power Supply) and Gun Output Box

Multiple beam control units can be provided, allowing 1, 2 or 3 separate electron guns to be independently operated.

Each beam control unit consists of a beam controller and a gun output box. The beam controller is a 1U rack-mounted chassis containing the filament power, control and emission regulation circuitry. The gun output box contains the high frequency filament transformer which is referenced to the high voltage output potential. This box should be mounted close to the electron gun to minimize the length of the high current filament connections. The box also contains electron gun emission current monitoring circuitry and provides a feedback signal used to regulate the electron gun emission current.

Each beam control channel, if operated alone, can utilize 0 to 100% of the rated emission current capacity. When two or three beam control channels are used at the same time, the total system emission current capacity remains the same. Individual channel programming must be done such that the total current does not exceed the system's total emission current available.

BEAM CONTROLLER SPECIFICATIONS**Input Voltage:**

180-264 Vac, 50/60Hz, single phase, 7.5 amps maximum

Output Voltage/Current:

0-12Vrms at \approx 30kHz, 0-35 amps. An optional 50 amp filament (HPF) is available.

Metering:

Front panel digital filament current and emission current meters, 3.5 digit, accurate to within 1%.

System Status Display:

"Dead Front" type indicators provide status of up to 12 system operations including voltage regulation, fault conditions and circuit control.

Input Power Connector:

A 6 foot (1.8 m) long IEC320 Cord Set will be provided.

BEAM CONTROLLER SPECIFICATIONS**Analog Interface Connector:**

Male 25 pin D connector

Filament Output Connections: (gun drive cable)

The secondary leads of the filament power transformer exiting the gun output box are 36" (91.44cm) long. The cover of this box is interlocked for safety purposes.

Environmental:

Temperature Range:

Operating: 0°C to 40°C

Storage: -40°C to 85°C

Humidity:

10% to 90% RH, non-condensing.

Cooling:

Forced air; inlet through side panels, outlet at rear panel.

Dimensions:

Beam Controller:

1.75"H (1U) x 15" W x 19"D (44.5 x 381 X 482.6mm)

Gun Output Box:

4.06"H x 6.13"W x 11"D (103.2 x 155.7 x 279.4mm)

Weight:

Beam Controller:

18 pounds (8.1kg)

Gun Output Box:

6 pounds (2.7kg)

Emission current is programmed locally (front panel adjustment) or remotely (0-10Vdc = 0-100% of rated current) via each beam controller. Filament Limit Set Point, Filament PreHeat Set Point, and Automatic Filament PreHeat functionality are provided.

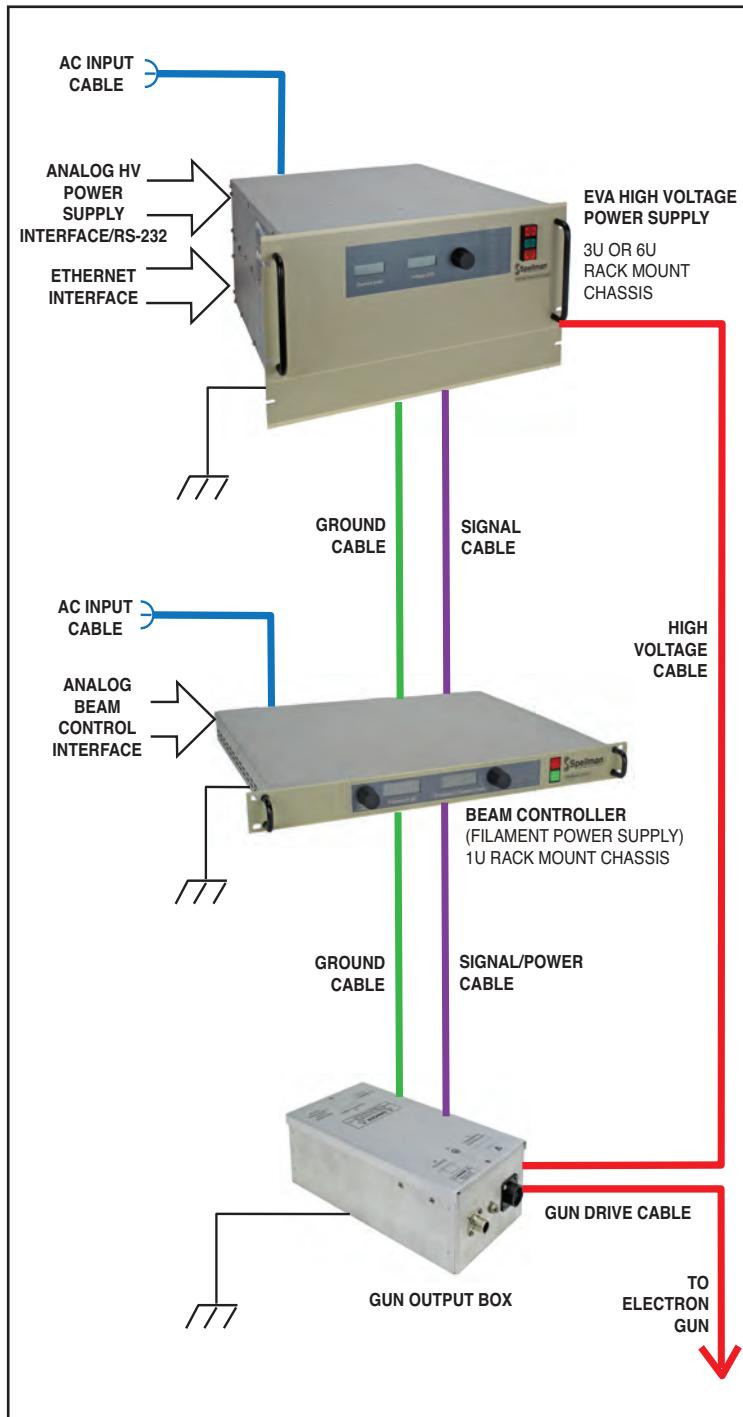
EVA MODEL CONFIGURATION**Ordering:**

EVA5N3/1PH	3 kilowatt unit, single phase
EVA10N6/3PH	6 kilowatt unit, three phase
EVA10N12/400VAC	12 kilowatt unit, 360-528Vac

Note: Input voltage must be specified at time of order. EVA model number must contain input voltage option code to be valid.

Sample Options:

EVA10N6/1PH/HV2	Single Phase Input & 2 HV Connectors
EVA10N12/400VAC/FIL3	360-528Vac Input & 3 Gun Supplies

TYPICAL EVA OPERATING SETUP

The signal cable connecting the high voltage power supply to the beam controller is 39.4" (1m) long. A captive but field replaceable 10 foot (3.05m) long high voltage cable is provided to connect each beam control output box to the high voltage power supply.

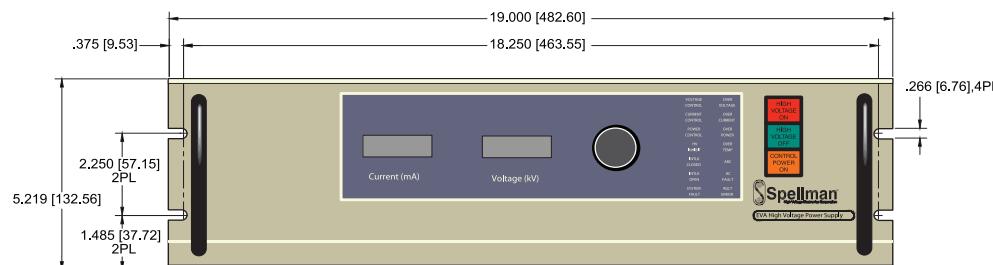
**HV POWER SUPPLY INTERFACE—
50 PIN FEMALE D CONNECTOR**

PIN	SIGNAL	PARAMETERS
1	Power Supply Common	Power Supply Ground
2	Reset/HV Inhibit	Normally open, Low = Reset/Inhibit
3	External Interlock	+24Vdc @ open, <25mA @ closed
4	External Interlock Return	Return for External Interlock
5	mA Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
6	kV Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
7	+10Vdc Reference Output	+10Vdc @ 1mA
8	mA Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
9	Local mA Program Output	0-10Vdc = 0-100% rated output, front panel pot
10	kV Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
11	Local kV Program Output	0-10Vdc = 0-100% rated output, front panel pot
12	Remote Power On Output	+24Vdc @ open, <25mA @ closed
13	Remote Power On Return	Return for Remote Power On
14	Remote HV Off	+24Vdc @ open, <25mA @ closed, connect to pin 15 for front panel operation
15	Remote HV Off/On Common	HV On/Off Common
16	Remote HV On	+24Vdc @ open, <25mA @ closed, momentarily connect to pin 15 enable high voltage
17	HV Off Indicator	+24Vdc @ 25mA = HV Off
18	HV On Indicator	+24Vdc @ 25mA = HV On
19	Power Supply Common	Supply Ground
20	+24Vdc Output	+24Vdc @ 100mA, maximum
21	Voltage Mode Status	Open Collector, Low = Active
22	Current Mode Status	Open Collector, Low = Active
23	Spare	
24	Interlock Closed Status	Open Collector, Low = Active
25	Spare	
26	Spare	
27	Spare	
28	Remote Overvoltage Adjust	0-10Vdc = 0-100% rated output
29	Spare	
30	Over Voltage Fault	Open Collector, Low = Active
31	Over Current Fault	Open Collector, Low = Active
32	System Fault	Open Collector, Low = Active
33	RGLT Error Fault	Open Collector, Low = Active
34	Arc	Open Collector, Low = Active
35	Over Temp Fault	Open Collector, Low = Active
36	AC Fault	Open Collector, Low = Active
37	Spare	
38	Spare	
39	Spare	
40	Spare	
41	Spare	
42	Spare	
43	Spare	
44	+5Vdc Output	+5Vdc @ 100mA, maximum
45	+15Vdc Output	+15Vdc @ 100mA, maximum
46	-15Vdc Output	-15Vdc @ 10mA, maximum
47	RS232 Tx	
48	RS232 Rx	
49	RS232 GND	
50	Power Supply Common	Power Supply Ground

**BEAM CONTROLLER INTERFACE—
25 PIN FEMALE D CONNECTOR**

PIN	SIGNAL	SIGNAL PARAMETERS
1	Power Supply Common	Signal Ground
2	Spare	
3	External Interlock	+15Vdc at Open, <15mA @ Closed
4	External Interlock Return	Return for Interlock
5	Filament Current Test Point	0 to 10Vdc = 0 to 100% rated output
6	Beam Current Test Point	0 to 10Vdc = 0 to 100% rated output
7	+10Vdc Reference	+10Vdc, 1mA Max
8	Filament Limit Program Input	0 to 10Vdc = 0 to 100% rated output
9	Local Filament Limit Program	Front panel potentiometer wiper
10	Beam Current Program Input	0 to 10Vdc = 0 to 100% rated output
11	Local Beam Current Program	Front panel potentiometer wiper
12	Filament Preheat Program In	0 to 10Vdc = 0 to 100% rated output
13	Local Fil. Preheat Program	Internal potentiometer
14	Beam Off	+15Vdc at Open, <25mA @ Closed
15	Beam On/Off Common	Connect together for FP operation
16	Beam On	Momentarily connect to pin 15 = Beam On
17	Remote Beam Off Indicator	0=Beam On, +15V, 10mA Max=Beam Off
18	Remote Beam On Indicator	0=Beam Off, +15V, 10mA Max=Beam On
19	Spare	
20	Spare	
21	Spare	
22	Remote PS Fault	0 = Fault, +15Vdc @ 0.1mA = No Fault
23	Spare	
24	Power Supply Common	Signal Ground
25	Shield Return	Chassis Ground

DIMENSIONS: in.[mm]

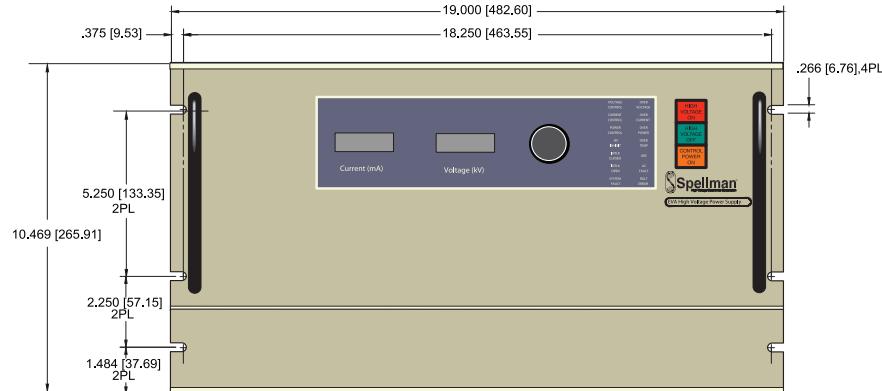
3U 6kW Power Supply
FRONT VIEW

TOP VIEW

BACK VIEW


DIMENSIONS: in.[mm]

6U 12kW Power Supply

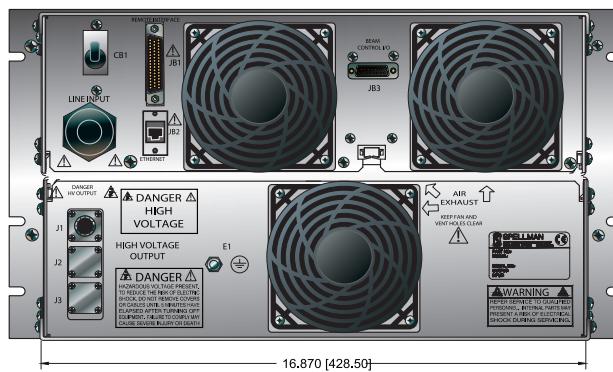
FRONT VIEW



TOP VIEW



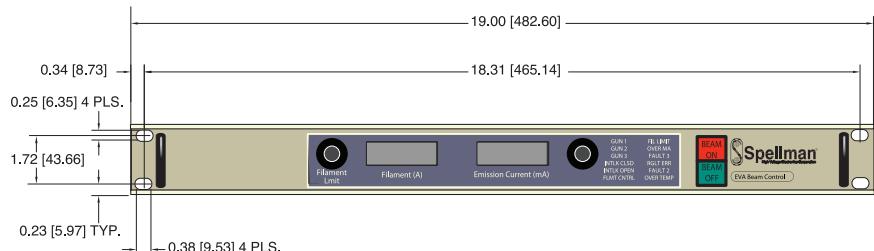
BACK VIEW



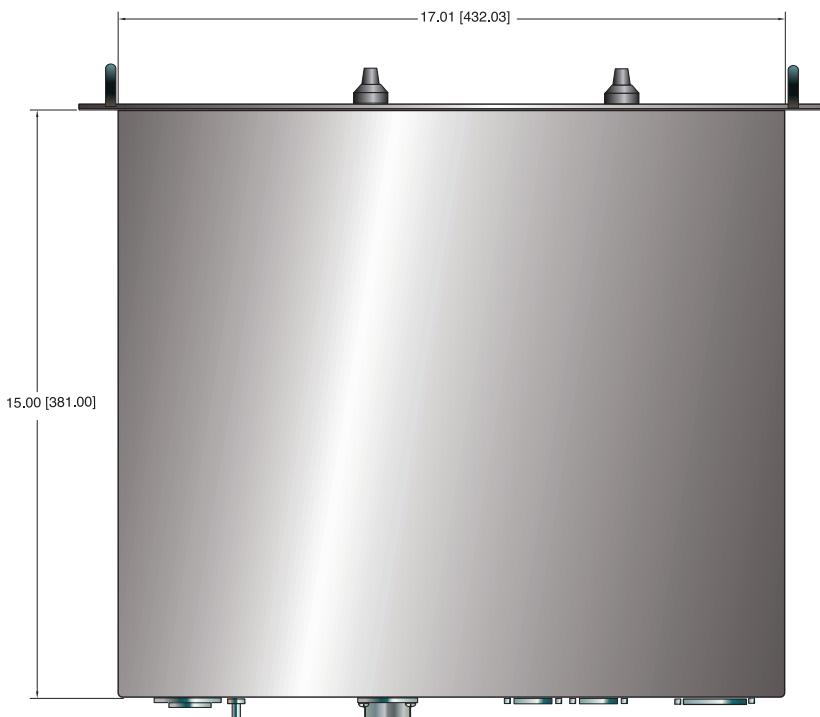
DIMENSIONS: in.[mm]

Beam Controller

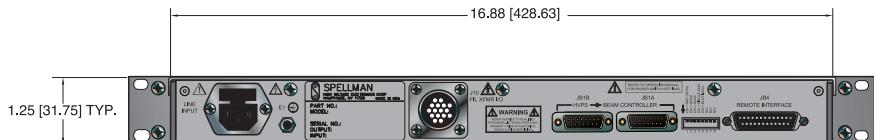
FRONT VIEW



TOP VIEW



BACK VIEW



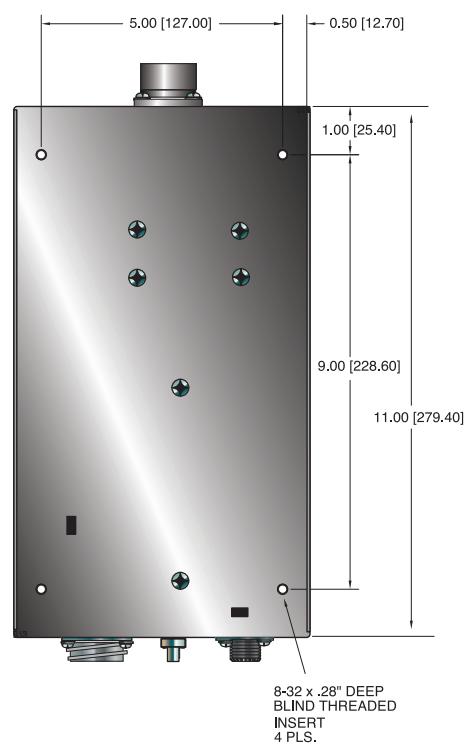
DIMENSIONS: in.[mm]

Gun Output Box

FRONT VIEW



TOP VIEW



BACK VIEW





Spellman's ESC Series of electrostatic chuck power supplies provide clean and accurate voltages required for electrostatic chuck wafer processing applications. These custom designed, well regulated supplies precisely secure the wafer during lengthy process cycles. Versions are available with a ground referenced reversible output in addition to units featuring a true floating bipolar output with associated floating center tap point. Comprehensive fault diagnostic circuitry monitors power supply functionality and communicates status data to the user interface. Spellman's ESC Series power supplies are housed in compact, lightweight packages designed for OEM installations requiring minimal system footprint space.

TYPICAL SPECIFICATIONS

ESC5PN25

Output Configuration:

Single ground referenced HV output, positive or negative polarity

Input:

+24Vdc, ±5% @ 2 amps, maximum

Output:

+2kV to -5kV. 2mA @ +2kV, 5mA @ -5kV

Short Circuit Current Limit:

5.5mA, maximum

Output Isolation:

None, ground referenced output

Slew Rate:

80ms, typical

Maximum Cycle Frequency:

10 times per second

Overshoot:

<10% of set point value

Ripple:

10Vrms

Line Regulation:

±0.7% over specified range

Load Regulation:

±0.7% over specified range

Output Voltage Accuracy:

<2% of set point value between 50-5000Vdc

- **Ground Referenced, Reversible Output**
- **Floating, Reversible Bipolar Output**
- **+24Vdc DC Input**
- **Comprehensive Fault Diagnostics**
- **High Voltage Safety Interlock**
- **OEM Customization Available**

Program/Monitor Accuracy:

1% of full scale, ±50mV

Dimensions:

9.1W x 1.51H x 6.11L (228.6mm x 30.5mm x 155mm)

Weight:

4.5lbs. (2kg)

ESC1.5PN7.5

Output Configuration:

Floating, reversible polarity bipolar output with floating center tap

Input:

+24Vdc, ±10% @ 2 amps, maximum

Output:

Bipolar, 0 to ±750Vdc (0 to 1500Vdc total) @ 5mA

Short Circuit Current Limit:

5.5mA, maximum

Output Isolation:

Center tap is isolated for ±2kV from ground

Slew Rate:

40ms, typical

Maximum Cycle Frequency:

10 times per second

Ripple:

2.5Vrms

Line Regulation:

±0.7% over specified range

Load Regulation:

±0.7% over specified range

Output Voltage Accuracy:

<1% of set point between 50-1500Vdc

Program/Monitor Accuracy:

0.5% of full scale, ±50mV

Dimensions:

3.41W x 31H x 10.51L (86.5mm x 76.5mm x 266.7mm)

Weight:

5lbs. (2.3kg)



Spellman's Injector Control Assembly (ICA) multi-output high voltage power supplies are used to supply the appropriate electrode voltages to a triode electron gun in order to inject electrons into a Linear Accelerator (LINAC). The resulting high-energy electron pulses are used to create high-energy X-Rays for applications such as cargo screening and cancer therapy.

This multi-output, rack mount power supply provides the Cathode, Heater and Grid voltages required by the e-gun. The Cathode current can be pulsed up to 500Hz. The Heater and Grid supplies float at the Cathode voltage potential, typically up to -15kV. Injector current is regulated by programming the Grid Pulse Voltage. Remote control and monitoring is via standard Ethernet protocols. LED indicators on the front panel provide basic output and fault status, including Cathode Current and Arc faults.

The ICA series can be customized for specific system requirements.

TYPICAL APPLICATIONS

Cargo screening, cancer therapy

SPECIFICATIONS

Input Voltage:

100-240Vac, 50-60Hz

Cathode:

Output Voltage:

0 to -15kV

Pulsed Cathode Current:

200 to 1500mA

Mean Cathode Current:

5.5mA (max)

Current Pulse Width:

Up to 6μs (90% to 90%)

Current Pulse Frequency:

Up to 500Hz

Current Risetime:

200ns (typical)

Heater:

Output Voltage:

0 to -6.5Vdc (wrt Cathode)

Current:

3A

Resistance:

0.7ohm

- **Multi-Output E-Gun Supply**
- **Fast Rise Time Pulsed Cathode Current**
- **Remote Programming via Ethernet**
- **Customizable for OEM Applications**

Grid (fixed):

Voltage:

-60 to -135Vdc (wrt Cathode)

Current:

250mA

Pulse Voltage:

0 to 340Vdc (wrt Cathode)

Injector Current is regulated by programming the Grid Pulse Voltage

Connections:

Front Panel:

Ethernet (RJ45 jack)

Interlock (24V nominal, 9 pin D-sub male pin plug)

Pulse Input (BNC)

Rear Panel:

AC Power In (IEC320 C14 male pin receptacle)

HV Out (3 pin terminal block)

Interlock:

24V must be present to enable output high voltage cathode. It is intended to connect to the system to disable the ICA in case any system interlocks have not been satisfied.

Operating Temperature:

10°C to +40°C

Storage Temperature:

-40°C to +70°C

Humidity:

30% to 60% relative humidity, non-condensing

Regulatory Approvals:

The ICA shall be designed in accordance with IEC 60601-1 (Edition 3) Requirements. Certification shall be by agreement.

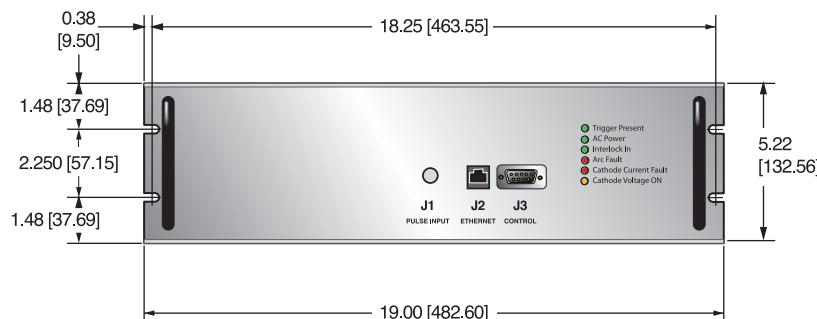
The ICA shall be UL 94V-0 and RoHS compliant.

FRONT PANEL LED INDICATORS

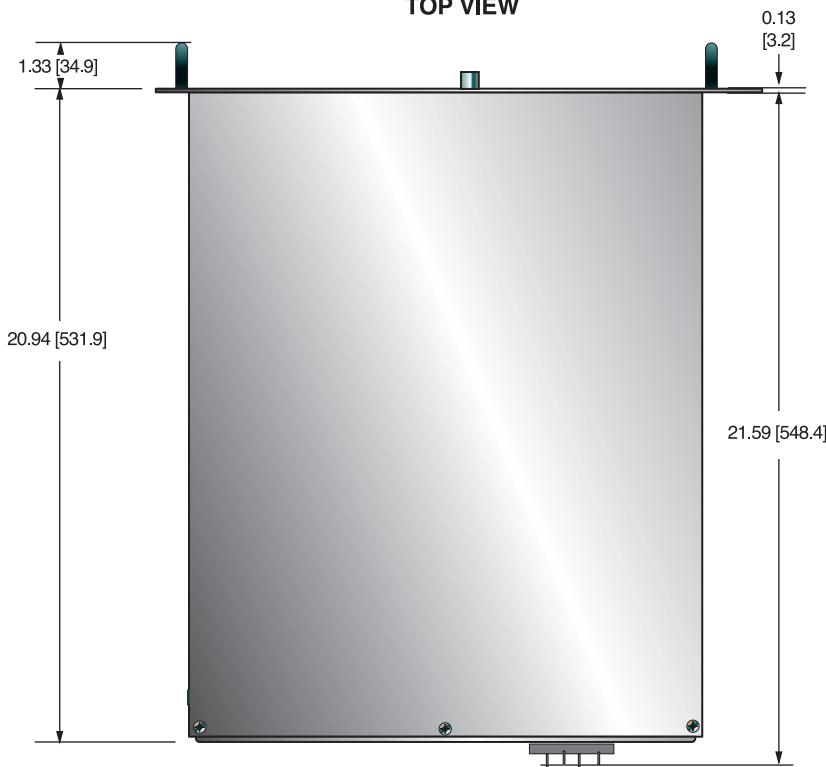
INDICATOR	COLOR	CONDITION Illuminated When...
Trigger Present	Green	Input trigger is present
AC Power	Green	AC supply voltage is present
Interlock In	Green	Interlock in signal is present
Arc Fault	Red	Arc fault signal is active
Cathode Current Fault	Red	Cathode current fault signal is active
Cathode Voltage ON	Amber	Cathode high voltage is present

DIMENSIONS: in.[mm]

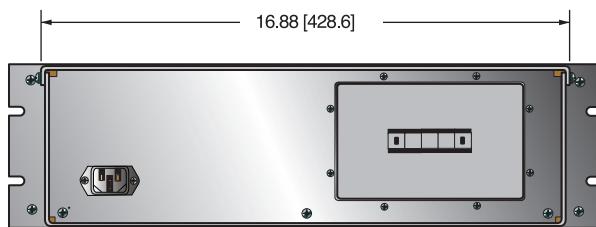
FRONT VIEW



TOP VIEW



BACK VIEW



Get the Customized Clean, Reliable AC and DC Power Your Applications Demand



- **Shielded Isolation Transformer**

Protects Against Incoming Common Mode Noise

- **Single System Ground Point**

Simplifies Wiring of Site Installation

- **Comprehensive Transient Protection**

Prevents Equipment Damage Due to Line Spikes

- **Circuit Breaker Protected Branching Circuits**

Provides Safe Power to All Room Equipment

- **Custom Designed Line Noise Filtering**

Eliminates Load Switching Transient Problems

- **Sophisticated Remote Power Monitoring Capability**

Monitor, Diagnose and Fix Power Quality Issues

Spellman's custom PDU capabilities provide quality AC and DC power for high performance CT scanning, X-Ray imaging and critical industrial process applications. Put Spellman's 70 years of technical leadership in power conversion technology to work for you.

Spellman's power conversion expertise can provide regulated DC supplies up to 100 kilowatts in output power capability. Custom AC and DC power that your system needs for reliable operation in one integrated cost savings assembly.

Proactively eliminate the trouble and expense of downtime due to power quality issues by using a Spellman PDU Series to power your critical applications.

Ask us about a customized PDU for your application

- **AC Power**
- **DC Power**
- **Digital Integration**

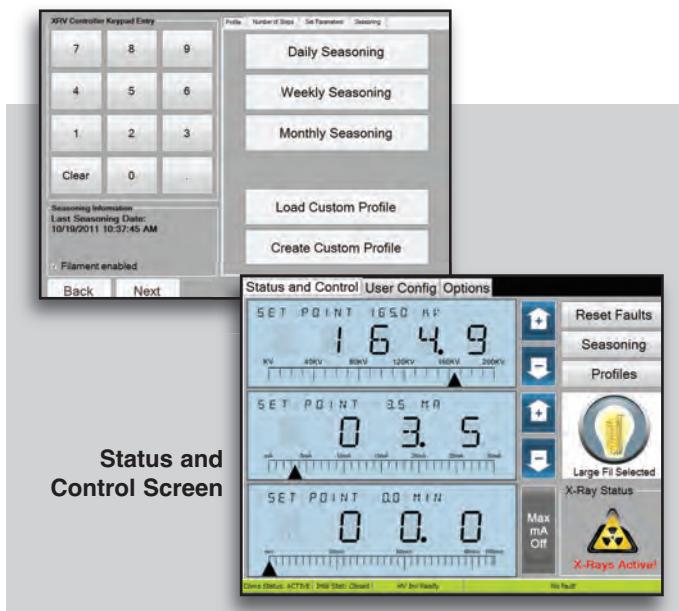


The XRV Controller (XRVC) provides intuitive, touch screen driven programming and control of any of Spellman's popular XRV Series of X-Ray generators. This sophisticated and robust controller was designed using an embedded computing system running a custom Graphical User Interface (GUI). The GUI, embedded computer and ancillary hardware are housed in a rugged 5.25 inch tall (3U) rack mount chassis. Capability of the XRVC include: creation of custom X-Ray tube seasoning profiles, one shot or continuous user fabricated operational profiles, automatic X-Ray tube configuration and much more.

SOFTWARE FEATURES

- Designed for compact, touch centric environment
- Integrated on screen keyboard provides rich input capabilities for operation without an external keyboard
- Adaptive software detects XRV controller and configures accordingly
- Dynamic feedback allows control of unit with real time viewing of the output

Seasoning Screen



- Intel Atom N270 CPU @ 1.6GHz
- 1GB Ram
- 7" Touch Screen LCD @ 800 x 600
- Intel 945 Express Graphics
- 10/100/1000Mbit Ethernet
- RS-232 Serial Ports
- 160GB Internal Hard Drive

ADVANCED CONTROLLER FUNCTIONALITY

Seasoning

- Ability to create, save and load customized seasoning profiles (Default profiles are included)
- Real time seasoning progress, elapsed time and remaining time clocks
- Automatic notice when seasoning is required

Communications

- Ability to communicate with the XRV over RS-232 serial port
- Ability to communicate with the XRV over a direct crossover Ethernet connection or Ethernet switch

One Shot Profiles

- Ability to create, save and load customized one shot profiles
- Verification of profiles within the operating capabilities of the connected XRV unit

X-Ray Tube Selection

- Specific X-Ray tubes automatically configures the system with the recommended manufactureres operational profiles
- Supported tubes for automatic configuration can be uploaded into the XRVC

Easy to Use

- Intuitive, touch-centric, menu driven system allows operator use with little to no learning curve.
- Communication settings are retained by the XRVC, requiring only a single configuration session.
- Comprehensive status/control screen provides information on all critical operational parameters and system status indicators.

SPECIFICATIONS

Input Voltage:

180-264Vac, 50/60Hertz

Dimensions:

5.25"H x 19"W x 13"D (133.35mm x 482.6mm x 330.2mm)

Weight:

12 lbs (5.44kg)

Input Power Connector:

14 pin circular connector type 97-3102A-22-19P

Environmental:

Temperature Range:
Operating: 0°C to +50°C
Storage: -20°C to +80°C

Humidity:
0% to 95% RH

Cooling:

Convection cooled



- **Mains to Cooler/Chiller, XRV Generator and XRV Touch Screen Controller**
- **Integrates all Necessary Safety Mechanisms to X-Ray System Environment to Meet International Standards**
- **X-Ray On, Pre-Warn and Safety Circuit Lamps**
- **Monitors Tube Cooling and Door Interlocks**
- **Rack and Wall Mount Versions Available**
- **Fail Safe Interlock Option Available**

Spellman's optional XRV I/O box is the ideal accessory for integrating Spellman's XRV X-Ray generators to a system environment. The XRV can now easily be packaged with industry standard metal ceramic X-Ray tubes, coolers and chillers while meeting all necessary safety and interlock requirements. The XRV I/O box is capable of accommodating a number of control interface options and can be installed in rack or wall configurations to best suit the integrators system placement requirements.

TYPICAL APPLICATIONS

Power distribution for system components

SPECIFICATIONS

Input Voltage:

180-264Vac, 50/60Hz

Operating Temperature:

0°C to +50°C

Storage Temperature:

-20°C to +80°C

Humidity:

0% to 95% relative humidity, non-condensing

Cooling:

Convection

Dimensions:

19.0"W X 5.21"H X 18.00"D
(482.6mm X 132.33mm X 330.2mm)

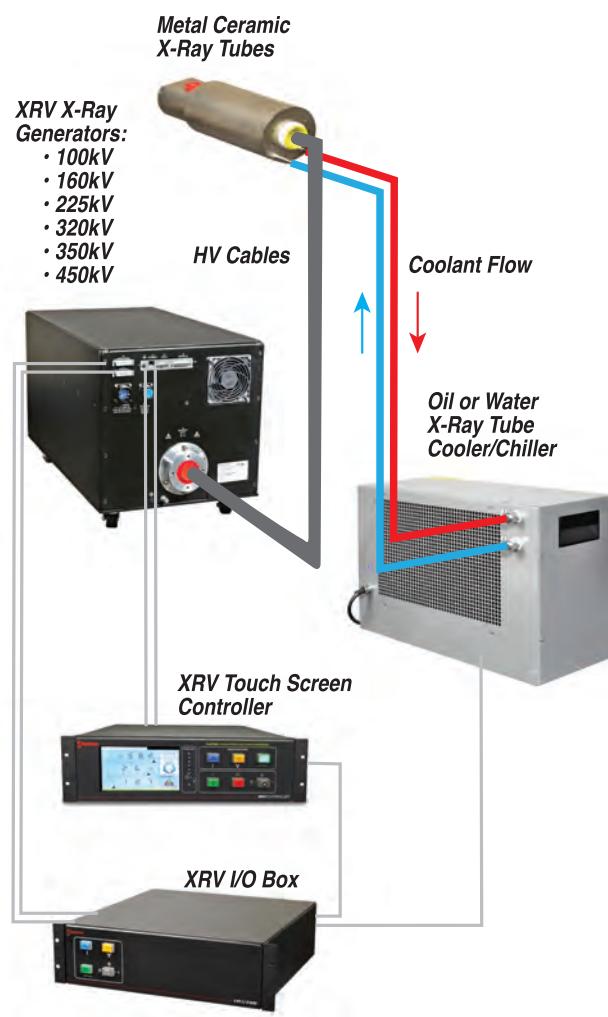
Weight:

30lbs (11.19kg)

Regulatory Approvals:

RoHS compliant.

TYPICAL SYSTEM SET UP



See detailed schematic page 3

XRV I/O BOX SELECTION TABLE

MODEL NUMBER	DESCRIPTION
XRV-9-1	Rack mount without XRV controller
XRV-9-2	Rack mount with XRV controller
XRV-9-3	Wall mount without XRV controller
XRV-9-4	Wall mount with XRV controller
XRV-9-5	Rack mount without XRV controller with optional safety relay for interlocks
XRV-9-6	Rack mount with XRV controller with optional safety relay for interlocks

TB1, TB2, TB3-MAIN AC INPUT POWER—

PIN	SIGNAL	PARAMETERS
TB1-1	Line 1	180 - 264Vac
TB2-1	Line 2	Neutral or 180 - 264Vac (3 phase source)
TB3-1	GND	Ground

TB4- COOLER / CHILLER—MAINS AC OUTPUT

PIN	SIGNAL	PARAMETERS
1	Line 1	180 - 264Vac
2	Line 2	180 - 264Vac or Neutral
3	GND	Ground

TB5-COOLER / CHILLER INTERLOCKS

PIN	SIGNAL	PARAMETERS
1	Flow INTLK	Dry contacts, ≤24Vdc
2	Common	Dry contacts, ≤24Vdc
3	Temp INTLK	Dry contacts, ≤24Vdc

TB6-LOW VOLTAGE / DOOR INTERLOCKS

PIN	SIGNAL	PARAMETERS
1	Door INTLK	Dry contacts, ≤24Vdc
2	Door INTLK	Dry contacts, ≤24Vdc

TB7-XRV I/O MAINS TO CDRH* SAFETY INTERLOCK

PIN	SIGNAL	PARAMETERS
1	Power INTLK Line 1 OUT	180 - 264Vac
2	Line 1 IN	180 - 264Vac
3	Power INTLK Line 2 OUT	Neutral or 180 - 264Vac (3 phase source)
4	Line 2 IN	Neutral or 180 - 264Vac (3 phase source)
5	GND	Ground

*CDRH (Center for Devices and Radiological Health) Safety Interlock Switch meets FDA 21 CFR 1020.40 requirements.

This switch has both low voltage interlock and power interlocks for the XRV mains.

TB8-XRV AUX AC OUTPUT—TO XRV JB1

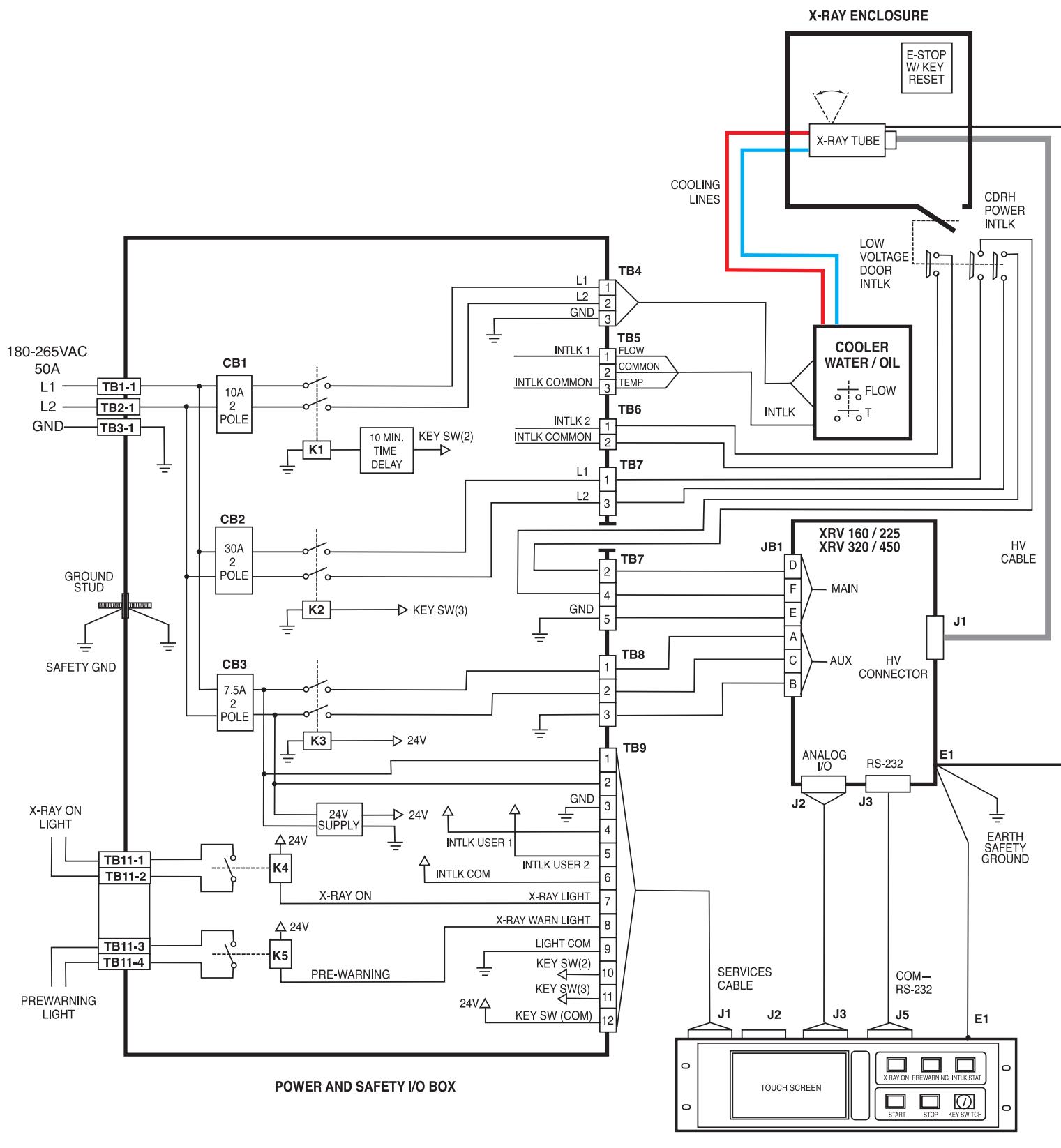
PIN	SIGNAL	PARAMETERS
A	Line 1	180 - 264Vac
B	Line 2	Neutral or 180 - 264Vac (3 phase source)
C	GND	Ground

TB9-XRV I/O TO XRV CONTROLLER INTERFACE

PIN	SIGNAL	PARAMETERS
1	Line 1	180 - 264Vac
2	Line 2	Neutral or 180 - 264Vac
3	GND	Ground
4	INTLK 1	Dry contacts, ≤24Vdc
5	INTLK 2	Dry contacts, ≤24Vdc
6	INTLK Common	Common for INTLK 1, 2
7	X-Ray ON Light	Dry contacts, ≤24Vdc
8	Pre-Warn Light	Dry contacts, ≤24Vdc
9	Light Common	Light common
10	Key Switch 2	Dry contacts, ≤24Vdc
11	Key Switch 3	Dry contacts, ≤24Vdc
12	Key Switch Common	Key common

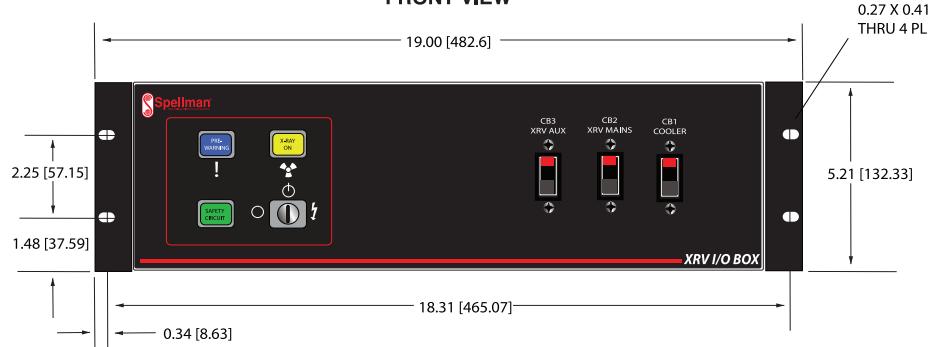
TB11-X-RAY ON / PRE-WARN LIGHTS

PIN	SIGNAL	PARAMETERS
1	X-Ray ON Light	180 - 264Vac, 5 amp
2	X-Ray ON Light	180 - 264Vac, 5 amp
3	Pre-Warn Light	180 - 264Vac, 5 amp
4	Pre-Warn Light	180 - 264Vac, 5 amp

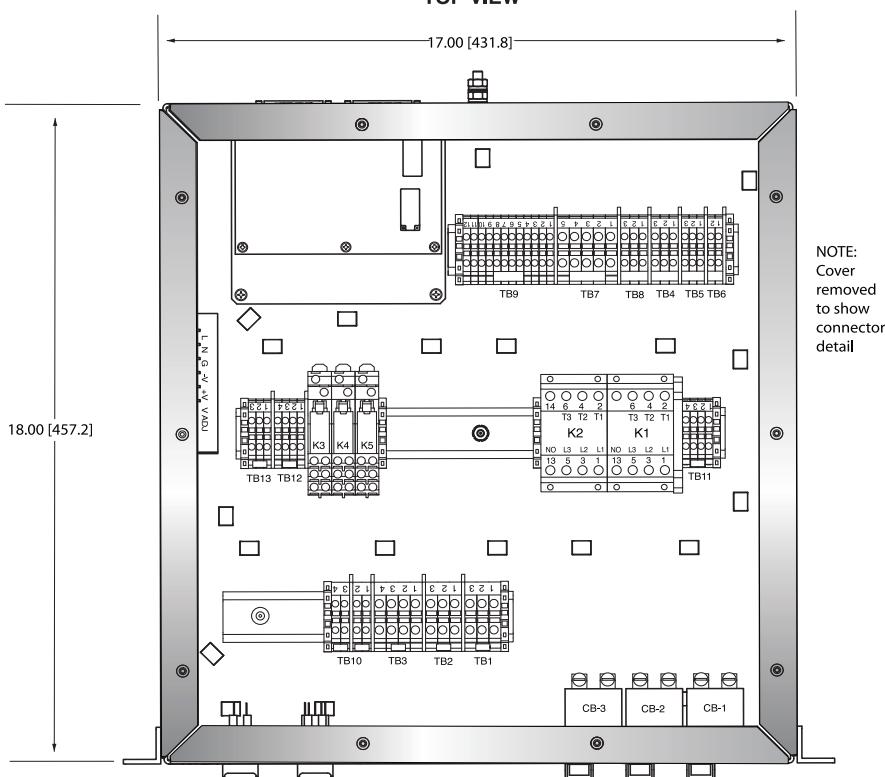


DIMENSIONS: in.[mm]

FRONT VIEW



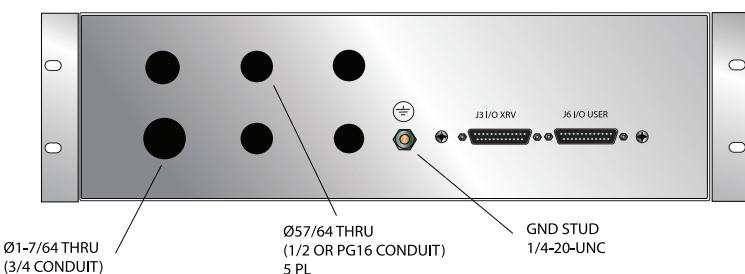
TOP VIEW



SIDE VIEW



BACK VIEW



Resistive Voltage Dividers

**...for the measurement of high voltages
using a standard digital voltmeter***

Spellman's HVD Series of high voltage dividers provide laboratory or production facilities with a convenient method of measuring up to 100kVdc, 200kVdc or 400kVdc with accuracy better than 0.5%. These dividers are designed for use with high impedance digital voltmeters. All HVD dividers are housed in a polycarbonate cylinder containing a matched set of precision metal film resistors which have a temperature coefficient of less than 25 ppm. A ladder-type construction technique is used in conjunction with polished high voltage bushings specifically designed to minimize corona. BNC connectors are used to provide the low voltage proportional output signal.

The HVD Series of high voltage dividers have no inferred bandwidth measurement capability what so ever. They are intended for DC steady state measurement only.

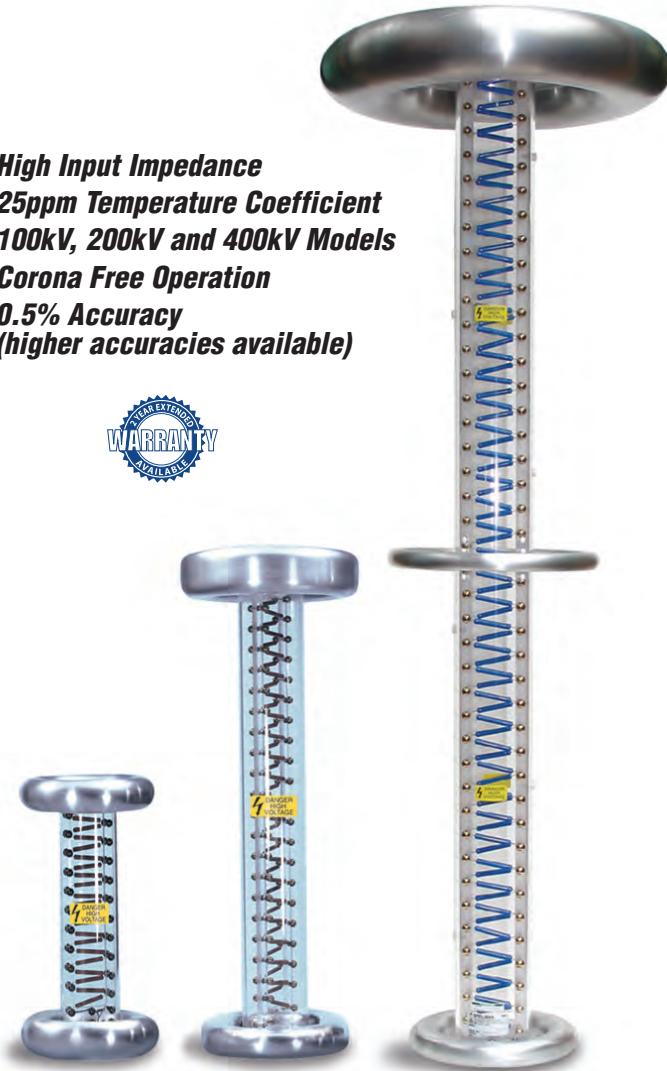
Custom Encapsulated OEM High Voltage Dividers

Spellman designs and manufactures a wide array of custom encapsulated high voltage dividers for OEM applications like ion beam implantation for semiconductor manufacturing. Unique HV divider sizes, shapes, mounting arrangements and terminations can be provided addressing specific custom requirements. Contact Spellman to discuss your needs with our knowledgeable sales staff.

Calibration

Spellman provides an NIST traceable calibration certificate with each HVD. A yearly recalibration cycle is recommended. Contact Spellman for calibration services.

- **High Input Impedance**
- **25ppm Temperature Coefficient**
- **100kV, 200kV and 400kV Models**
- **Corona Free Operation**
- **0.5% Accuracy
(higher accuracies available)**



HVD

	HVD100	HVD200	HVD400
Input Voltage	0-100kVdc	0-200kVdc	0-400kVdc
Input Impedance	1000Mohms	2000Mohms	4000Mohms
Output Impedance	1M; 100kohms	20kohms	40kohms
Output Taps	100V, 10V	2V	4V
Accuracy	0.5%: (0.1% opt) ¹	0.5%: (0.25% opt) ²	0.5%: (0.25% opt) ²
Stability	0.01%/8hrs	0.025%/8hrs	0.025%/8hrs
Temp. Coefficient	25ppm/°C	25ppm/°C	25ppm/°C
Height	17.5" (44.5cm)	33.5" (84.5cm)	61" (154.94cm)
Max. Diameter	10" (25.4cm)	12" (30.5cm)	20" (50.8cm)
Weight	6.75 lbs (3.1kg)	12 lbs (5.5kg)	24.45 lbs (11.8kg)
Output Connector	BNC type	BNC type	BNC type

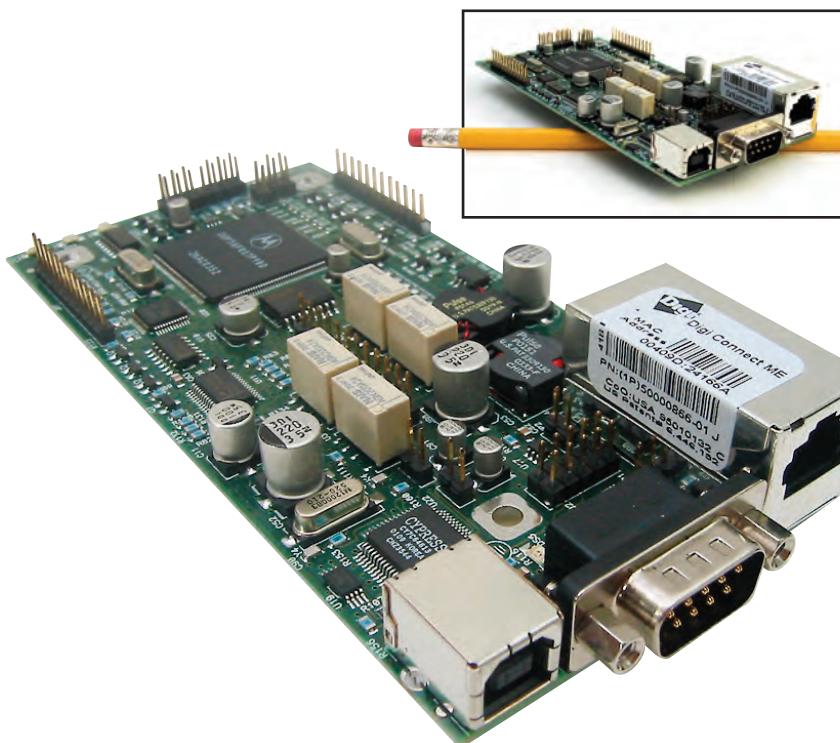
(1) For accuracy of 0.1% specify HVD100-1

(2) For accuracy of 0.25% specify HVD200-1 or HVD400-1

*Impedance of 10Gohm or higher.

W A R N I N G

DANGEROUS LIFE THREATENING VOLTAGES MAY BE PRESENT ON THIS EQUIPMENT. OBSERVE EXTREME CAUTION WHEN OPERATING OR WORKING NEAR HIGH VOLTAGE DEVICES. NEVER TOUCH ANY HIGH VOLTAGE ASSEMBLY THAT IS SUSPECTED TO BE ENERGIZED OR CHARGED. DO NOT HANDLE OR COME WITHIN THE PROXIMITY OF HIGH VOLTAGE CONNECTIONS UNTIL ALL EQUIPMENT IS TURNED OFF AND THE SETUPS CAPACITANCE IS DISCHARGED. FAILURE TO FOLLOW SAFETY PROCEDURES MAY BE FATAL.



The SIC Option Provides 3 Types of Communications Interfaces:

- **RS-232**
- **Ethernet (10/100-Base-T)**
- **USB—Universal Serial Bus**

Data Acquisition and Control capabilities are Provided by:

- **14 Channels of 12 Bit Analog to Digital Converters**
- **2 Additional Analog Channels that Monitor the Housekeeping Power Supply and Ambient Temperature**
- **5 Digital Output Bits**
- **8 Digital Input Bits**
- **3 Relays/Interlocks**

www.spellmanhv.com/manuals/SIC

HARDWARE FEATURES

The digital hardware includes a 40MIPS digital signal processor, a network processor, and a USB processor/controller. Serial port 0 of the DSP is jumper selectable to allow firmware updating through either the RS-232 port or the Ethernet interface.

RS232 INTERFACE

- 115k bits per second
- No Parity
- 8 Data Bits
- 1 Stop Bit
- No Handshaking
- DB-9 Connector (as shown)

ETHERNET INTERFACE

- 10/100-Base-T
- IP Address can be set by the system integrator
- Network Mask can be set by the system integrator
- TCP Port Number can be set by the system integrator
- RJ-45 connector
- Network attachment via Crossover and standard Ethernet cables
- Supported Operating Systems: Windows 98 2ED, Windows 2000 (SP2), Windows NT (SP6), Windows XP Professional, and most other major operating systems

USB—UNIVERSAL SERIAL BUS INTERFACE

- Compliant with USB 1.1 and USB 2.0 specifications
- Type B male connector
- Included driver can be communicated with via standard Windows serial communications methods

RS-232 CABLING

A standard RS-232 cable where lines 2 and 3 are reversed is used to connect the SIC serial port to the serial port on a standard personal computer

ETHERNET CABLING

Category 5 (CAT5) Ethernet patch cables are used to connect the SIC to the host computer. There are two ways to connect the SIC board via Ethernet: the first is to directly cable between the host and the SIC board, and the second is through the use of a hub, switch or network

USB CABLING

A high-quality double-shielded USB 2.0 Type A or B (host to slave) cable should be used in all applications. This type of cable is a standard PC to peripheral cable that utilizes full size connectors.

High EMI Environments

If the SIC USB interface is being used in a high-EMI environment, ferrites should be added to the USB cable.

SOFTWARE COMPATIBILITY**RS232**

The RS-232 interface makes use of a standard 'command/response' communications protocol. All software that addresses the RS-232 interface must adhere to the following parameters:

- 115k bits per second
- No Parity
- 8 Data Bits
- 1 Stop Bit
- No handshaking

ETHERNET

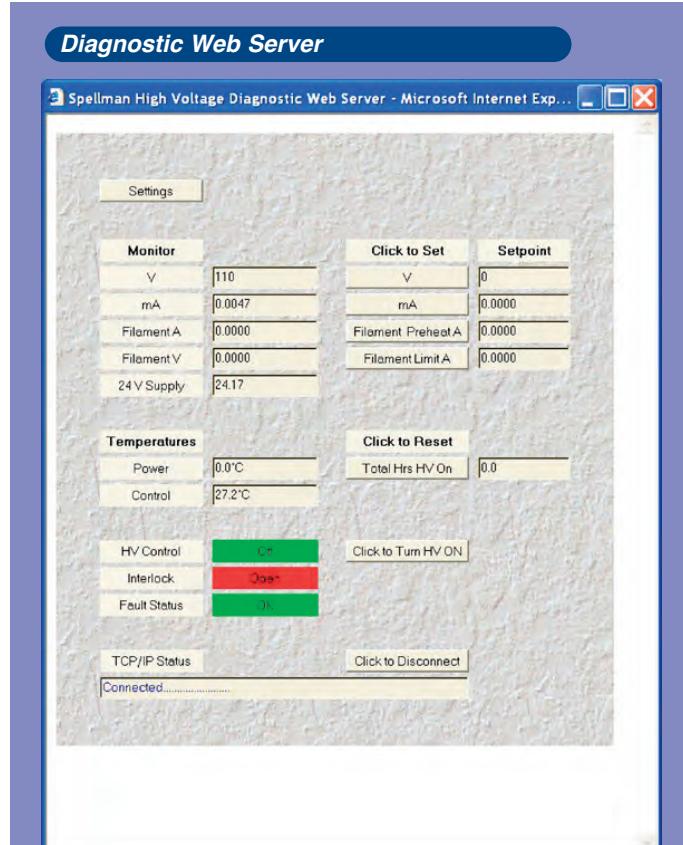
The SIC board contains an embedded diagnostic web server that can be accessed through any standard web browser by browsing to the SIC's IP address. The Ethernet interface communicates using the following protocols:

- TCP/IP
- HTTP
- Telnet
- FTP

These assemblies can auto-switch between 10 Mb/s and 100Mb/s

USB

The USB interface makes use of a standard 'command/response' communications protocol. The USB interface is accessed through a Windows USB driver that emulates a standard communications port (just like in RS-232). Before you can communicate with the SIC USB interface, you must load the supplied USB driver disc. This driver will create a 'virtual' comm port that can be checked by using Windows Device Manager.



The diagnostic web server can control and monitor an SIC equipped power supply from a web browser. It displays operating status of the Power Supply and allows the unit to be configured in real time. The application consists of three web pages; a page displaying contact information, a license agreement, and a monitoring and control applet that is at the heart of this application.

Common High Voltage Power Supply Safety Questions

THE OUTPUT OF ANY HIGH VOLTAGE SUPPLY SHOULD NEVER BE CONSIDERED "SAFE TO TOUCH" UNLESS THE PROPER SERVICING PROCEDURES HAVE BEEN FOLLOWED. REFER TO YOUR OPERATIONS MANUAL FOR INSTRUCTIONS.

Q: Can I safely touch the output of one of your high voltage supplies without being hurt?

A: Safety is paramount. There is no "safe" level of high voltage that one can touch without risk. Using this guideline, every situation involving high voltage is potentially hazardous. Even with a very low current supply there can be a brief pulse of much higher current due to the discharge of the power supplies output capacitance and high voltage cable capacitance. For proper handling procedures, consult your operations manual.

Q: What is safe to touch when working with one of your high voltage power supplies?

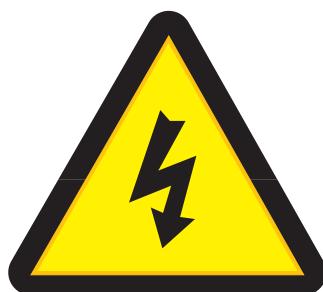
A: There are parts of the supply that are safe to touch; refer to the instructions of your operations manual. Typically the chassis of the power supply is safe to touch along with all operator controls and most interface connectors. Some other connectors could have line voltage or other potentially hazardous voltages present.

Q: How does someone safely use one of your high voltage power supplies?

A: To safely use of our high voltage supplies, one needs to comply in all respects with the procedures set forth in the operations manual. In addition, users should comply with the IEEE 510-1983 standard for high voltage practices. The rigorous enforcement of comprehensive and consistent safety practices is the best method of ensuring user safety.

Recommended Safety Reference Material

A copy of excerpts from the IEEE publication Standard 510-1983 "IEEE Recommended Practices for Safety in High Voltage and High Power Testing" is available on Spellman's website at: www.spellmanhv.com/IEEEsafety





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